ENGINEERING REPORT

PLANT SCHERER - ASH POND 1 (AP-1)
MONROE COUNTY, GEORGIA

FOR

Georgia Power

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ACRONYMS AND ABBEVIATIONS

AP-1	Ash Pond 1
BMP	Best Management Practices
CCR	Coal Combustion Residuals
CFR	Code of Federal Regulations
CN	Curve Number
CPT	Cone Penetrometer Testing
CRR	Cyclic Resistance Ratio
CSR	Cyclic Stress Ratio
E&S	Erosion and Sediment
E&SC	Erosion and Sediment Control
ECM	Erosion Control Matting
El.	Elevation
EM	Engineering Manual, Engineering Monograph
EPA	Environmental Protection Agency
ER	Engineering Regulations
ETC	Engineered Turf Cover
FGD	Flue Gas Desulfurization
GA	Georgia
EPD	Georgia Environmental Protection Division
GDOT	Georgia Department of Transportation
GM	Geomembrane
GPC	Georgia Power Company
H&H	Hydrology and Hydraulic
HDPE	High Density Polyethylene
HEC-RAS	Hydraulic Engineering Center’s River Analysis System
HELP	Hydraulic Evaluation of Landfill Performance
LLDPE	Linear Low-Density Polyethylene
NAD83	The North American Datum of 1983
NAVD88	The North American Vertical Datum of 1988
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
PFDS	Precipitation Frequency Data Sheet
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RQD	Rock Quality Designation
SCS	Southern Company Services
SPT	Standard Penetration Test
SWPPP	Stormwater Pollution Prevention Plan
TRM	Turf Reinforced Matting
USACE	United States Army Corps of Engineers
USCS	United Soil Classification System

USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USGS	United States Geological Survey

Note : Acronyms and abbreviations not included in the table are defined in the text the first time used.

1 INTRODUCTION

AP-1 at Plant Scherer will be closed by consolidating the CCR within the 550-acre impoundment to a smaller footprint in accordance with 40 CFR 257.102(b)(1)(iii). The proposed closure footprint will consist of two primary regions within the existing AP-1 footprint; a closure-by-removal area located to the north, and the consolidated closure-in-place footprint to the south.

This document provides an engineering narrative that: (i) describes the design criteria that have been adopted to develop the AP-1 closure plan; and (ii) presents a compilation of the engineering documents (drawings, calculation packages, narrative plans) used to present and support the closure design and address operations during construction.

1.1 Description

This Engineering Report describes the design criteria to support the Federal United States Environmental Protect Agency (USEPA) CCR Rules and the Georgia Environmental Protection Division (EPD) Rule 391-3-4-.10 Coal Combustion Residuals. This report covers design aspects associated with the proposed closure as they pertain to the following primary closure activities:

- Removal of CCR contact water from AP-1 via a permitted outfall (dewatering);
- Closure of approximately 200-acres of AP-1 by removal of CCR and placement within the planned consolidated closure footprint;
- Construction of a northern perimeter embankment berm (hereafter referred to as “north berm”) to separate the consolidated AP-1 closure-in-place footprint from the northern 200-acre closure by removal area;
- Lowering (cutting and grading) of an adjacent high topographic region, referred to as the knob area for inclusion in AP-1 closure footprint;
- Grading of approximately 300-acres of closure-in-place footprint and final cover area, 350-acres when including the knob area, to promote positive drainage of post-closure surface water run-off using a combination of local borrow soils, and CCR excavated from within AP-1;
- Installation of a compliant final cover cap system; and
- Breaching and removal (includes lowering) of portions of the existing AP-1 perimeter embankment dikes, which includes one section classified as a Category I High Hazard dam.

Any significant change or modification to the proposed closure plan described herein will be communicated to EPD prior to implementation.

1.2 Background

Plant Scherer is located in Juliette, Georgia which is situated at the northeast edge of Monroe County and approximately 30 miles north of Macon and 60 miles southeast of Atlanta. Plant Scherer is located in a rural area and bordered by mainly agricultural and residential properties. Plant Scherer occupies approximately 12,000 acres and is situated on the north banks of the 3,600-acre Lake Juliette, a manmade lake constructed in conjunction with the plant in the early 1980s. Plant Scherer is a four-unit, coal-fired power generation facility with a capacity of 3,600 megawatts.

The four coal-fired units at Plant Scherer include flue gas desulfurization (FGD) equipment ("scrubbers"), selective catalytic reduction systems (SCRs), and baghouses. Coal Combustion Residuals, or CCRs (bottom and fly ash) and other process water generated by the plant are stored in a 550-acre ash pond situated on-site, northwest of the main plant. The present inventory of CCR in AP-1 is approximately 15.3 million cubic yards.

AP-1 was commissioned in 1980 and has been in operation since the plant became commercially operational in 1982. AP-1 has two discharge structures; one is a "morning-glory" standpipe that serves as the principal spillway that normally passes decanted flows to the settling pond (referred herein as the Recycle Pond), and a second emergency spillway that also discharges to the Recycle Pond during elevated (storm related) pool levels. AP-1 is operated in conjunction and in series with the Recycle Pond in a water recirculating mode in which clarified effluent from the AP-1 discharges by gravity to the Recycle Pond, which then serves as the source of water used by the plant for operations. The recycling pond has a permitted emergency overflow discharge (Outfall 07) to Lake Juliette under the plant's NPDES permit GAD00612796.

The AP-1 perimeter embankment functions as a cross-valley dam. This embankment dike includes a continuous embankment situated on the north and east sides of AP-1 and the AP-1 south dike, situated on the south side of AP-1 and bordering Plant Scherer. The AP-1 dike has a maximum height of approximately 100 feet and the AP-1 southern dike has a maximum height of approximately 30 feet. The minimum crest elevation of the embankment dike is El. 504.1 ft, and the upstream slopes are covered with a grout-filled erosion protection blanket that spans from El. 485 feet to the crest. The crest of the dike is surfaced with grass and a gravel access drive. Downstream slopes are covered with grass, and both upstream and downstream slopes are at a 3H:1V (horizontal to vertical) orientation. The AP-1 dike is regulated by the Georgia Department of Natural Resources Safe Dams Program, and is categorized as "Category 1 High Hazard", with an assigned State ID 102-032-04236.

Figure A below is a location map and aerial view of Plant Scherer pointing out the various site features described above, and its proximity to Lake Juliette to the south.

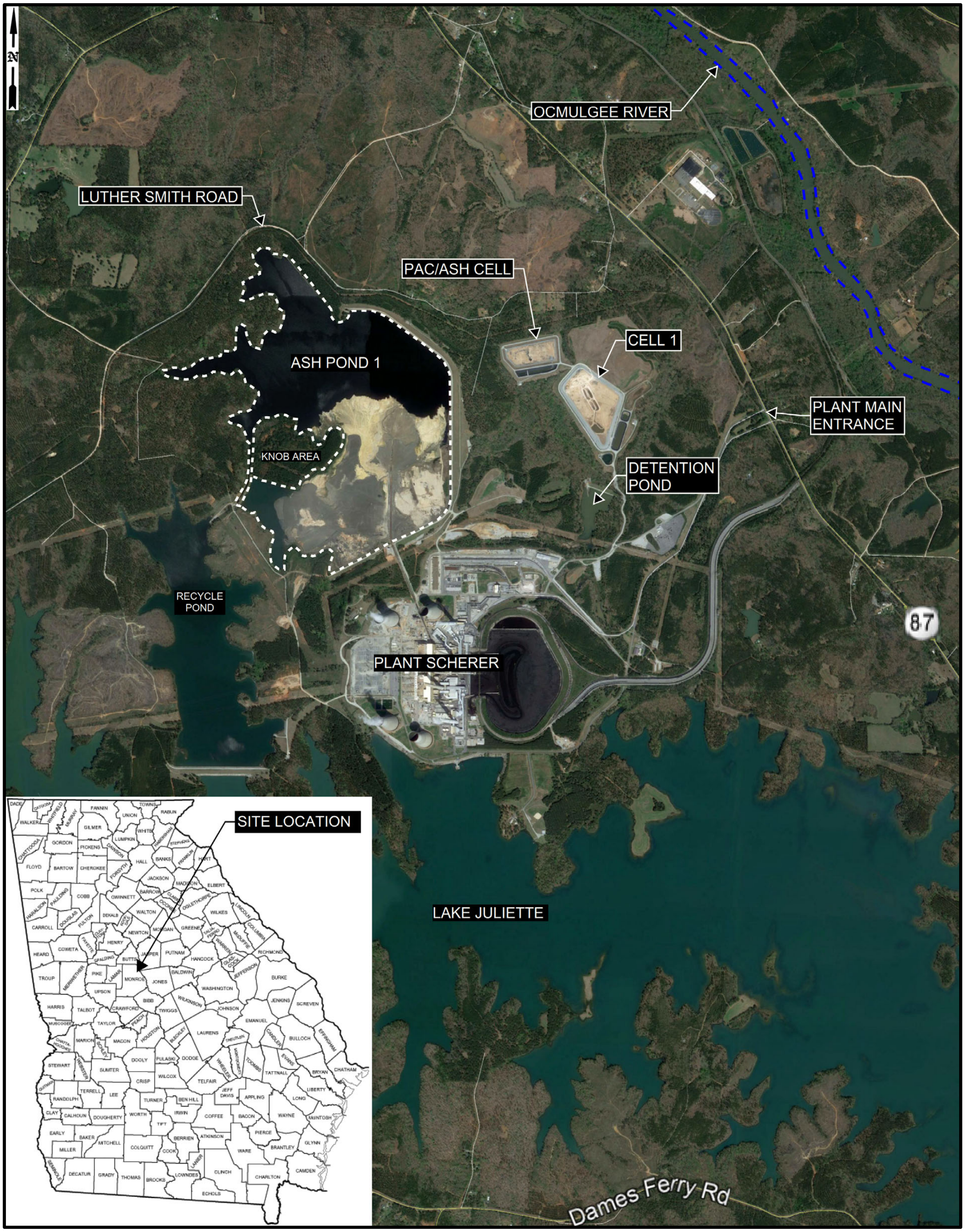

Figure A: Plant Scherer Location Map

The existing AP-1 and surrounding site features are also shown on the attached **Figure 1-1–Existing Ash Pond 1 Site Conditions**.

1.3 Closure Approach

AP-1 closure will consist of two primary regions within AP-1; 1) a closure-by-removal area located to the north and 2) a consolidated closure-in-place footprint located to the south, which will include the knob area. Engineering analyses and groundwater modeling indicate that it is beneficial to include the knob area, to reduce lateral migration of groundwater into the capped, consolidated closure-in-place footprint even though it is outside AP-1 and does not contain CCR.

The two proposed closure areas will be separated by the new north berm that will form the consolidated north limit of the final cover area. The consolidated closure-in-place footprint encompasses approximately 300 acres and 350 acres when the knob area is included. The closure-by-removal area encompasses approximately 200 acres. **Figure B** below illustrates the proposed closure approach for AP-1.

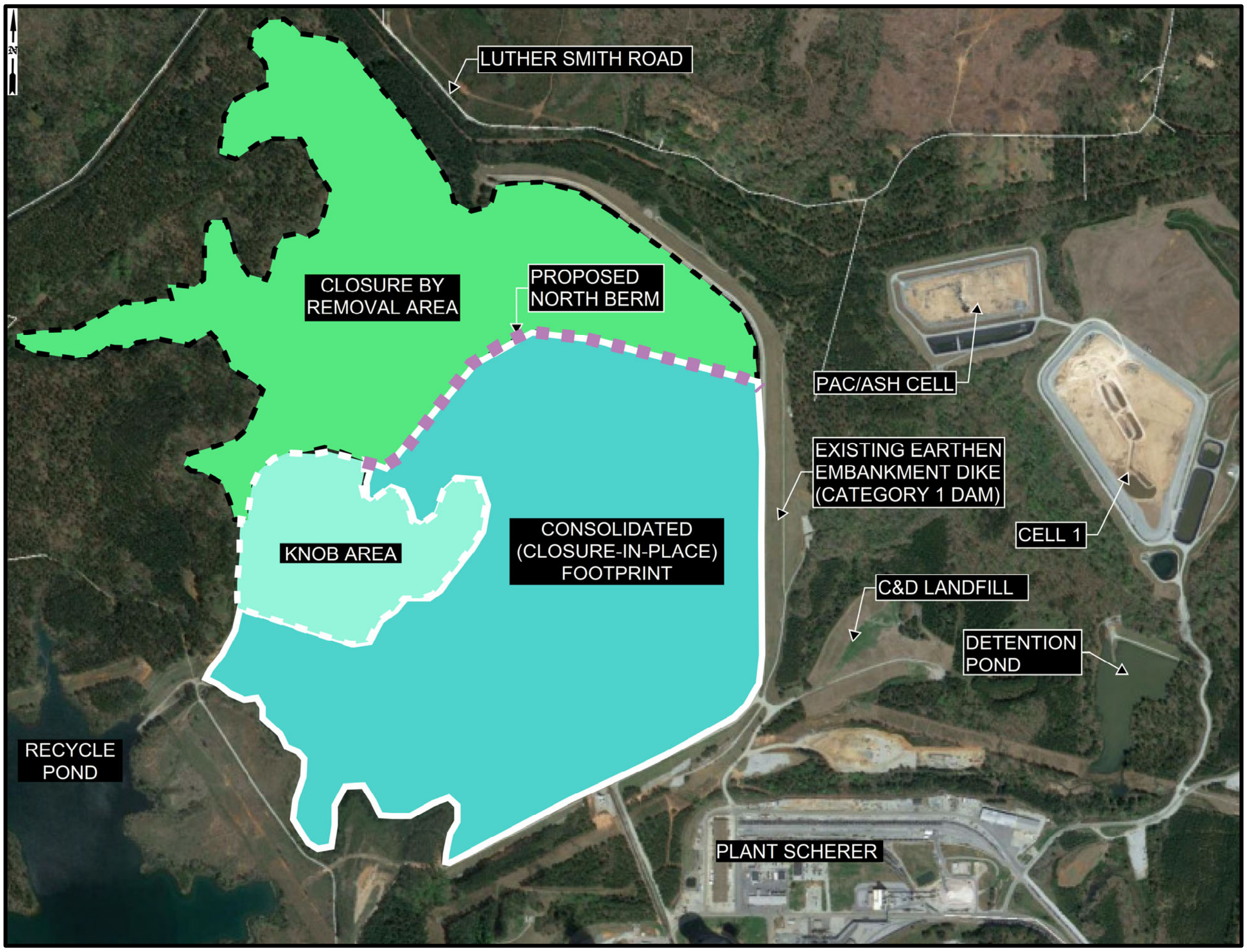

Figure B: Plant Scherer Ash Pond 1 Closure Approach

1.3.1 Closure Geometry and Additional Details

The closure geometry and consolidated footprint design for AP-1 discussed herein was developed using the computer program AutoCAD Civil 3D 2019 which has been utilized to generate engineered pond closure and final cover drawings (hereafter referred to as the Closure Drawings). The Closure Drawings are included in the Plant Scherer EPD permit application package and are referenced herein throughout this report. The main elements of the proposed closure approach geometry and supporting features include:

- AP-1's CCR surface will be graded into a ridge and valley "herringbone" design to minimize the quantity of additional fill required to establish suitable final cover grades. The planar slopes of the final cover area are designed at 3% minimum grades and finish slopes for the north berm are designed at a maximum of 3H:1V. The final cover system stormwater features include drainage swales and perimeter ditches that are designed with 0.5% to 1% slopes.

- CCR will be graded to promote positive drainage to the final cover system stormwater feature drainage swales and perimeter ditches. The stormwater drainage swales and ditches will flow and discharge to outlet structures that will convey post-closure surface water runoff from the final cover partly west to the Recycle Pond and partly east to Berry Creek. In general, approximately 60% of the consolidated closure footprint has been designed to flow west to the Recycle Pond, and the remaining portion of the closure footprint including the eastern and northern portions have been designed to flow east to Berry Creek.

- Conveyance of post-closure stormwater flows west to the Recycle Pond will require the complete removal of the existing "morning glory" principal spillway structure situated at the southwest corner of AP-1 and the replacement of the spillway with a trapezoidal conveyance channel. The replacement channel referred to as the "southwest outlet channel" will consist of a riprap reinforced 20-foot base width and 3H:1V finish sideslopes. A culvert structure is currently planned to be constructed to span the proposed southwest outlet channel and to maintain Plant access to the west portion of AP-1. It is anticipated an open bottom culvert such as an arch culvert type structure will be utilized to span the channel and support Plant traffic and access. The southwest outlet channel will convey post-closure stormwater flows from approximately 235 acres of the total consolidated closure-in-place footprint.

- Conveyance of post-closure stormwater flows east to Berry Creek will be accomplished by the north berm letdown culvert structure that has been designed into the consolidated closure-in-place cap system to convey flows down a section of the north berm into a trapezoidal conveyance channel (referred to herein as "letdown channel") and then into a planned detention basin (Detention Basin A). The letdown channel will be 1 to 2.5% and include a base width of 35-feet and 5H:1V sideslopes that are reinforced with riprap materials. Detention Basin A will include a primary spillway outlet structure that will discharge into a new outlet channel that has been designed to flow into Berry Creek just east of AP-1.

Detention Basin A has also been designed to manage and convey flows from two upstream detention basins (denoted as Detention Basin B and C) within north closure-by-removal area.

- The 50-acre high topographic region located adjacent to AP-1, referred to as the knob area, is located outside of AP-1 limits and does not contain CCR. Based on groundwater modeling, the knob area contributes to groundwater recharge directly upgradient of AP-1 and it has been recommended for capping to reduce lateral flow into AP-1 closure-in-place footprint. Since this region does not contain CCR, it does not require the same type of closure cover system required for the consolidated closure footprint. The knob area will be covered with a low-permeable cover system (either a soil or geosynthetics cover, or a combination of both) that will facilitate a transition from the consolidated closure-in-place footprint final cover system to the knob area cover system.

- Removal of CCR contact water from AP-1 will be necessary to perform the closure-by-removal of the north area and also to complete the earthwork planned activities within the consolidated closure-in-place footprint. Additional information regarding the proposed removal of CCR contact water and dewatering needs are further described in the Closure Plan submitted as a separate permit application document.

- The existing AP-1 ash delta has scattered high and low spots that will require earthwork and regrading activities to achieve the proposed consolidated closure-in-place footprint final cover grades. Maximum fills are expected beyond (north of) the existing ash delta where the north berm will be constructed. Fill depths up to approximately 50 ft are expected along the northern closure slope that will be bordered by the proposed new north berm. The maximum anticipated cut in the ash delta is approximately 18 ft and is planned along the eastern perimeter ditch. Cuts in the ash delta that extend below the normal pool level of AP-1 (El. 494.5 NAVD88) will require CCR dewatering methods to achieve the proposed final cover grades.

- Establishing the north closure-by-removal area will require excavation and removal of CCR within this 200-acre section of AP-1 and relocating the excavated materials south to inside the consolidated closure-in-place footprint. Based on comparing 1980 predevelopment USGS topographic map contours to 2015 bathymetric data, and based on 2016 and 2019 free liquids exploration borings completed in the free water portion of AP-1 by AECOM, thin (<1 foot) deposits of CCR are expected across most of the planned closure-by-removal area. Once CCR is removed and verified including the top six inches of natural soils underlaid by the CCR from the closure-by-removal area, the remaining subgrade will be graded to sheet flow post-closure stormwater flows south and east to Berry Creek.

- The planned new north berm will be an earthen embankment constructed out of local site soils and founded on the native residual foundation soils in-place currently beneath AP-1. The crest of the embankment will be 24 ft wide and a 20 ft wide drivable access road will be constructed along its finished crest. The north berm crest elevation will vary along its alignment, but will generally follow the proposed grading of the consolidated final cover grades and contours, and the final cover system stormwater conveyances, with the lowest elevation at the letdown structure planned for the northeast corner of the consolidated closure-in-place footprint. The high section of the new north berm will be at its planned intersection with the existing east AP-1 dike and at the opposite (west) end where the berm will tie-in with the sideslopes of the knob area.

Figure C below shows the planned AP-1 closure approach/design, with each of the above key features indicated on the figure along with the design final cover system grades.

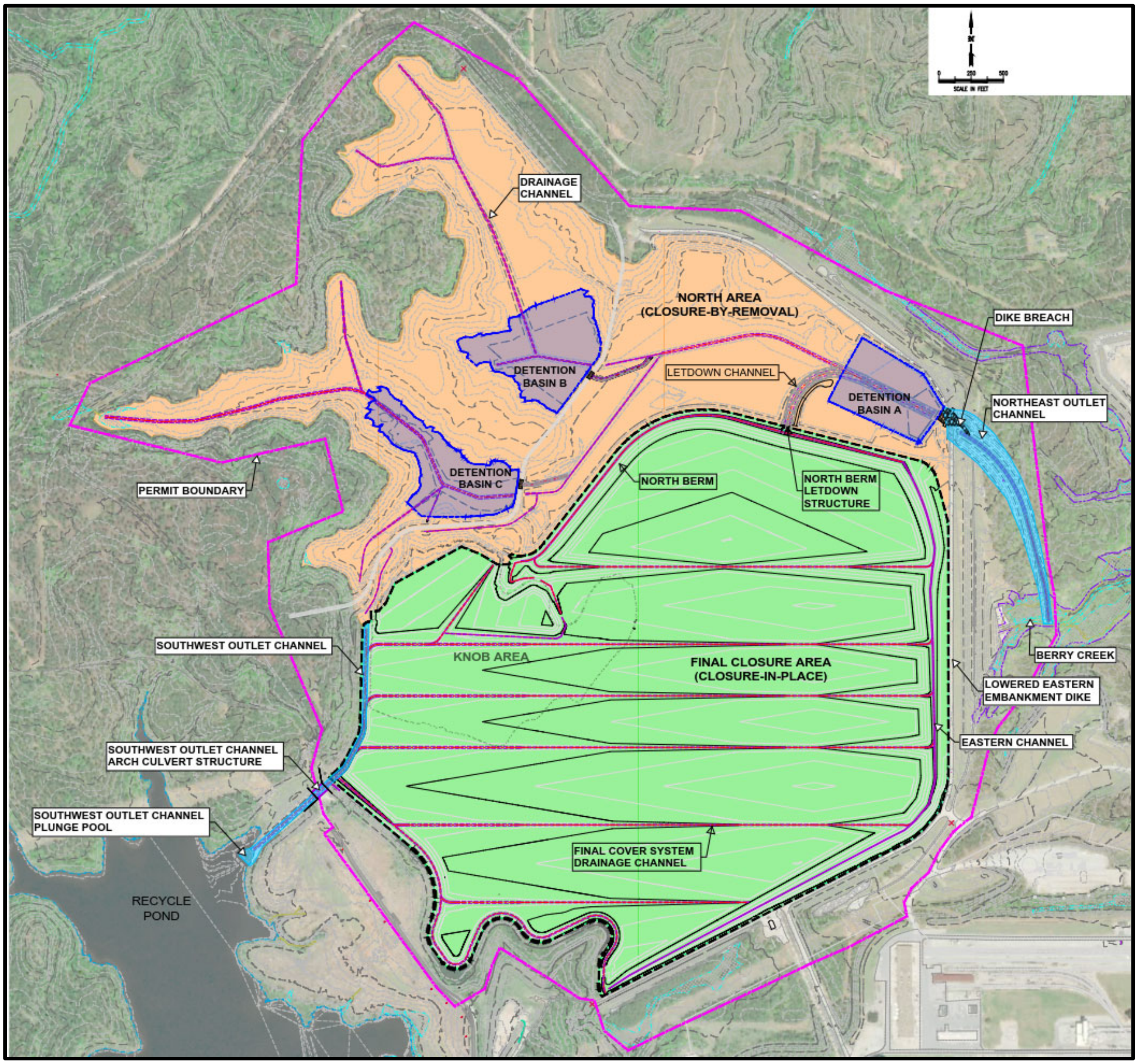

Figure C: Planned Plant Scherer Ash Pond 1 Closure Approach/Design

2 GEOTECHNICAL EVALUATION

AECOM completed geotechnical evaluations to support the planned AP-1 closure design. The geotechnical evaluations include slope stability, settlement, and liquefaction analyses. The sections below summarize the information and data relied upon for the geotechnical evaluations that have been completed, and the analyses methodologies and results.

2.1 Site and Subsurface Information

2.1.1 Geology

According to public geologic references, the Plant Scherer site occurs in the Piedmont Geologic Province of central Georgia, which is underlain by igneous and metamorphic rock and forms the foothills of the Appalachian Mountains. The Piedmont extends west to east across Georgia, from the edge of the Coastal Plain to the south to the Blue Ridge chain of the Appalachian Mountains to the north. The primary and secondary rock types for the Monroe County/Juliette, Georgia Piedmont area are gneiss and amphibolite, respectively, of the Precambrian-Paleozoic period.

AP-1 is located within the Piedmont/Blue Ridge geologic province, which is comprised of late Precambrian (Neoprotezoic) to late Paleozoic (Permian) rocks which have undergone repeated cycles of igneous intrusions and extrusions, metamorphism, folding, faulting, shearing, and silification.

2.1.2 Site Subsurface Explorations

Numerous site and subsurface explorations have been performed within or in the vicinity of AP-1, and along the perimeter of AP-1 since the 1970's. Subsurface explorations dating from 1974 to 2016 account for well over 100 on-site explored locations. The 2016 explorations were completed by AECOM in support of AP-1 closure engineering and design efforts. The attached **Figure 2-1–Geotechnical Site Plan** shows the past locations explored within or in the vicinity of AP-1 at Plant Scherer, including those completed in 2016 by AECOM.

AECOM has reviewed the historic subsurface data from past explorations in and around AP-1 and utilized the most-relevant data as a supplement to the 2019 AECOM exploration data to complete the closure geotechnical evaluations presented in this report. The historic subsurface exploration data relied upon and utilized by AECOM for this permit-level design package include:

- A 1974 to 1976 Law Engineering Testing Company subsurface exploration that included 41 borings completed in the vicinity of the AP-1 south and east perimeters prior to the AP-1 construction (C series borings). The borings included split-spoon sampling and standard penetration testing (SPT) in the soil overburden, with the majority of the borings being terminated at auger refusal or top of rock. Exploration depths varied between 24 to 168 ft below ground surfaces.

- A 1978 and 1979 Alabama Power Company laboratory testing program that included geotechnical testing of random fill materials used in AP-1 construction. Laboratory testing included Atterberg limits, specific gravity, grain size analysis, Proctor (standard and modified), swell, and direct shear testing. There is no indication of where specifically these materials came from, if they were on-site or off-site, or how they were acquired/sampled. AECOM has assumed these are local site soils, but cannot confirm if they are from on-site.

- A 2010 SCS subsurface exploration that included 2 borings (S series borings) through the existing AP-1 perimeter earthen embankment dikes. One of these borings was completed along the east section of AP-1 dike and the second boring was completed along the south dike. The borings included split-spoon sampling and SPT to determine the thickness of embankment materials. Borings were extended to depths of 66 and 126 ft below ground surfaces, and both borings were terminated in residual soils with SPT N-values greater than 50 blows per foot (bpf).

- A 2015-2016 SCS subsurface exploration that included 12 borings (SPT series borings) and 7 cone penetration test soundings (CPTs) (CPT series soundings). These borings and CPTs were completed within the ash delta at the south end of AP-1, along the perimeter dikes, and at other locations surrounding the AP-1. The borings were extended to depths varying from 43 to 170 ft below existing ground surfaces. The borings included split-spoon sampling and SPT, and coring was completed to collect representative rock samples for rock quality designation (RQD). Additionally, 38 piezometers (PZ series borings) were installed around the perimeter of AP-1, with the majority of these piezometers installed near the north and east perimeter dikes. SCS also installed 25 groundwater monitoring wells (SGWA/SGWC series borings) around AP-1 for the CCR monitoring program.

- An AECOM 2016 exploration included 16 borings (B series borings) and 14 CPTs (C series soundings). The borings were completed along the perimeter dikes, within the ash delta, and within the north free water portion of AP-1. The CPTs were completed along the perimeter dikes and the ash delta. The 2016 AECOM borings were extended to depths varying between 30 and 100 ft below the existing ground surface or AP-1 pool level, and terminated within residual foundation soils or partially weathered rock (PWR). The borings included split-spoon sampling and SPT. The CPTs included seismic shear wave velocity measurements and pore pressure dissipation testing. The 2016 AECOM exploration also included installation of 3 paired piezometer sets (6 total piezometers) within the ash delta.

- Additional AECOM explorations in 2018 through 2019 were performed to further evaluate the subsurface conditions and characteristics for closure construction purposes. These explorations included 47 free water explorations (performed in 2019) and 22 ash delta SPT borings and 6 CPT’s. The additional AECOM borings were extended to depths varying between 6 and 102.5 ft below the existing ground surface or AP-1 pool level, and terminated within residual foundation soils or partially weathered rock (PWR). These locations were performed to further delineate the CCR thickness within the closure-by-removal area to further refine the construction quantities for closure activities and to determine CCR thickness and composition along the ash delta.

As stated above, the listed historic subsurface data was used as a supplement to the AECOM subsurface exploration completed specifically to support AP-1 closure efforts.

Figure D below exclusively shows the locations of the AECOM borings, CPTs, and piezometers.

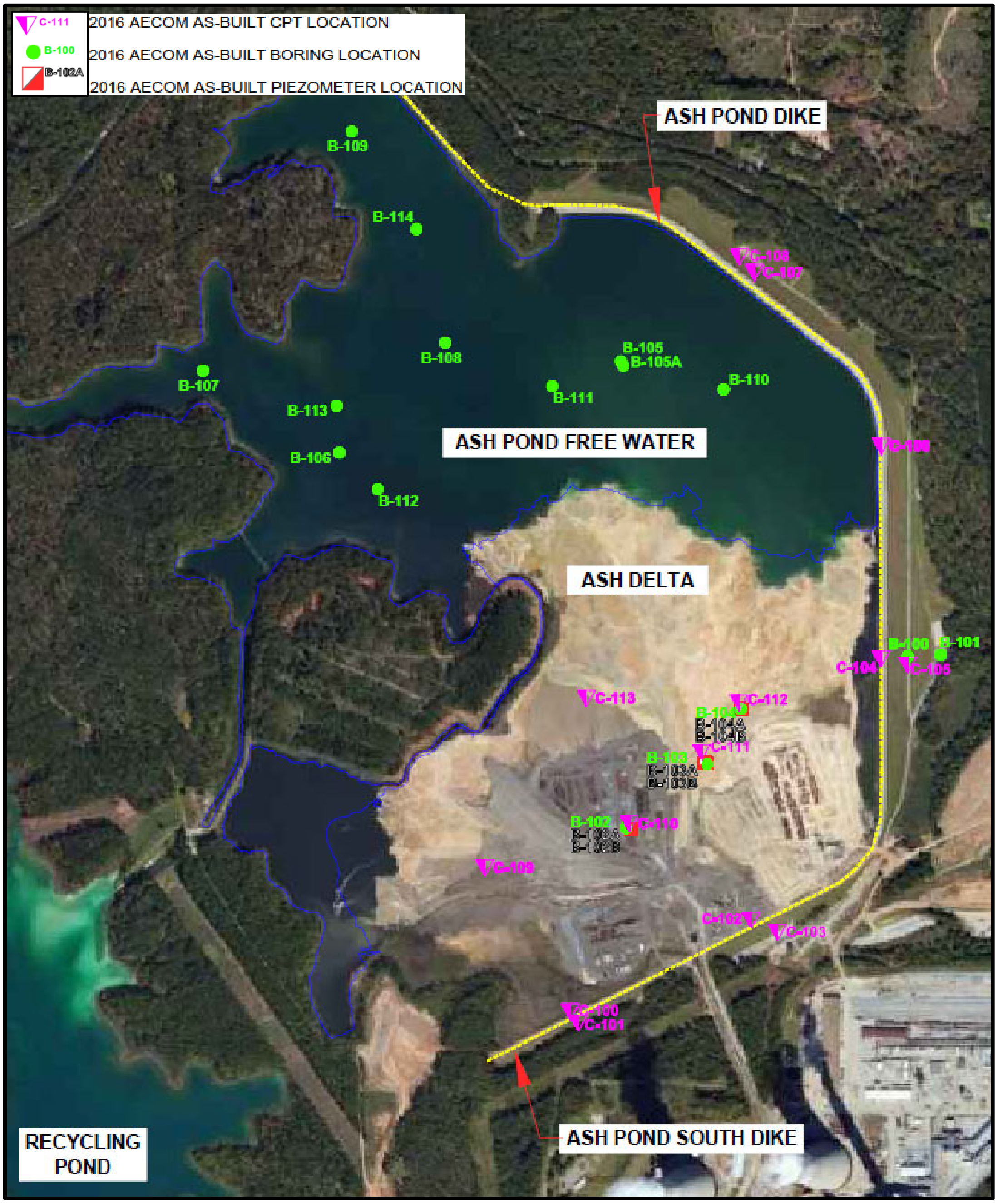

Figure D: AECOM Geotechnical Exploration Locations

Boring and CPT logs, location plans, available laboratory test results, and other relevant data from the past explorations listed above are provided in **Appendix A1,** following logs and data from the AECOM explorations.

2.1.3 Site Subsurface Conditions

Based on results of past site subsurface explorations and the relied upon historic site subsurface data combined with results and data from the AECOM subsurface exploration programs, the following stratigraphic materials have been identified at the site. The stratigraphy descriptions represent subsurface materials encountered in the site subsurface explorations completed within or in the vicinity of AP-1 as stated previously.

- **CCR**: CCR consists of fly ash and bottom ash created by coal combustion at Plant Scherer, and is most-prolific in the south end of AP-1 (ash delta) and only limited across the north end where the larger free water area exists. CCR deposits in the ash delta range from 68.5 to 83.5 ft thick. The upper 5 to 10 ft of the ash delta consists of a mixture of dry fly ash and bottom ash. The lower CCR appears to be wet and consists mainly of fly ash with only limited amounts of bottom ash. The CCR generally consists of very loose non-plastic silt (ML), with some isolated zones of medium dense material or silty sand (SM). SPT N-values recorded in the CCR are typically weight-of-hammer or weight-of-rods, and recorded CPT tip resistances in CCR are typically on the order of 10 to 20 tsf. Much of the ash delta includes a higher-strength crust over the top surface relative to the saturated sluiced CCR present at depth.

- **Dikes**: The AP-1 dikes were constructed with local clayey fill materials originating from on-site excavation/borrowing (potentially within interior sections of AP-1). Dike soils are generally lean clay (CL), silt (ML), and clayey sand (SC), with stiff consistency. Records show that the AP-1 dikes do not include CCR.

- **Alluvium**: Alluvium is present beyond the downstream toe of the AP-1 dikes and along the original drainage features extending through the AP-1 area. The alluvium is variable in nature, but generally consist of very soft to firm lean clay (CL) and fat clay (CH) and very loose to medium dense, silty sand (SM) and clayey sand (SC). Records show that alluvium soils were removed prior to constructing the AP-1 dikes.

- **Residuum**: Residuum extends across the AP-1 site and generally consists of sandy firm to very stiff elastic silt (MH) with trace mica and fine sand with zones of fat clay (CH), lean clay (CL), and silty sand (SM). Within or close to AP-1, the residuum can exhibit soft to very soft consistency. Residuum soils make up the upper layer of the AP-1 and AP-1 dike foundations.

- **Saprolite:** Saprolite extends across the AP-1 site, generally beneath the residuum, and differs from residual soil in that it retains relict structure from the parent bedrock, including banding of various minerals, and relatively high mica content. The saprolite consists of very loose to very dense silty sand (SM) with mica or soft to stiff sandy silt (ML) with mica, and some zones of sandy clay (CL).

- **Partially Weathered Rock:** PWR extends across the site, generally beneath the saprolite. The PWR corresponds to slightly or moderately weathered parent bedrock, which is predominantly a biotite gneiss. PWR is distinguished from saprolite by SPT N-values that are

50 blows per foot or higher (Sowers, 1963). The PWR generally classifies as very dense silty sand (SM) with mica, feldspar, and gravel (fracture rock).

- **Gneiss Bedrock:** Gneiss bedrock extends across the site, generally beneath the PWR. The bedrock is described as light brown to gray, granitic gneiss with gray and white banding, inclined, soft to hard, and fine to coarse grained. RQD from representative site bedrock samples vary from 0 to 100%, indicating a poor to excellent quality of rock.

Appendix A1 should be referenced for detailed information on site subsurface conditions and soil stratigraphy.

2.2 Geotechnical Evaluation

2.2.1 Previous Studies

AECOM has relied upon previous engineering and geological studies, in part, for design and analyses of the planned AP-1 closure approach. These include historical geotechnical evaluations by SCS and a recent groundwater modeling study by AECOM. AECOM has relied on these previous studies and their analyses and engineering conclusions to support design considerations for the planned closure activities. The previous studies utilized and relied upon by AECOM for AP-1 closure engineering and design include:

- A 1976 *Foundation Report and Stability Analysis* by SCS (Safe Dams item SCH-API-025) with calculated soil strength parameters for AP-1 foundation and a hand calculated stability analysis for the east section of the AP-1 dike (SCH-API-027). The report did not indicated specifically where the east embankment dike section was analyzed; therefore, AECOM has utilized this report for informational purposes only.

- A 1986 *Plant Scherer Ash Pond Dam Stability Analysis* by SCS (Safe Dams item SCH-API 026) that evaluated the critical section of the east section of the AP-1 dike. A wet area was noted on the downstream side of the maximum dike section of the embankment; therefore, GPC requested a stability analysis be performed, as well as seepage analyses using flow nets. The conclusions of this analysis recommended the use of pervious material to raise the wet area, if the wet area persisted and caused maintenance issues.

- A 2010 *Slope Stability Analysis of Ash Pond and Retention Pond Dikes* (Calculation ID: TV-SH-ECS9241-001) by SCS completed to determine minimum factors of safety for normal and maximum pool (surcharge) steady state conditions of maximum height locations of the AP-1 and Recycle Pond dikes. The analysis utilized data from borings completed along the dikes to develop material property and strength parameters for the stability analysis. Results of the stability analysis indicated satisfactory factor of safety values.

- November 2018 Geological and Hydrogeological Report, revised as the Hydrogeologic Assessment Report, September 2021 provided information pertaining to site geologic conditions and provided a discussion on conceptual site hydrogeological model. The report describes adjacent high regions that recharge the uppermost aquifer through precipitation that are limited to erosionally-isolated high regions to the west and the small hill south of the landfill area. The report indicates potentiometric contours and horizontal hydraulic gradient is variable and reflects topography at the site. AECOM completed a separate detailed groundwater study specifically to support the closure engineering and design. The AECOM detailed groundwater study and Golder's Geological and Hydrogeological Report have been included in Part B of the permit application.

The groundwater modeling report relied upon for the closure geotechnical analysis was completed in 2020 by AECOM. The report supports the planned AP-1 closure and included development of a conceptual site model, development of an existing, pre-closure conditions numerical groundwater flow model and a conceptual, post-closure groundwater model for the planned consolidated closure approach. AECOM utilized results from the modeling report as a basis to set groundwater levels and establish potentiometric and phreatic surfaces in the geotechnical evaluation and analyses completed as a part of the closure design, and discussed and presented herein.

2.2.2 Liquefaction Screening

One of the first geotechnical evaluations that needed to be considered for the planned AP-1 closure was to analyze the site for susceptibility to liquefaction. Liquefaction is defined as the sudden loss of soil strength due to the increase of pore water pressure during dynamic loading (i.e. earthquakes), which has an impact on stability of the final cover system and AP-1 dikes. The increased pore water pressure is due to volumetric strains caused by cyclic stresses commonly associated with earthquake shaking or other dynamic loadings. Liquefaction occurs primarily in clean sands, non-plastic silty sands, non-plastic silts, and gravels that are below the water table, or otherwise saturated. Liquefaction has reportedly also been observed in saturated sensitive clays and non-plastic silts.

AECOM completed a preliminary screening procedure to evaluate if the site in-situ soils and CCR are susceptible to liquefaction. A commonly used screening procedure is included in the *USEPA document RCRA Subtitle D (258) Seismic Design Guidance for Municipal Solid Waste Landfill Facilities*, among other sources. This method suggests performing a more in-depth analysis if site soils meet three or more of the following criteria:

- **Saturation.** Soils have to be saturated in order to liquefy.
- **Fines Content and Plasticity**. Liquefaction potential in a soil layer increases with decreasing fines content and plasticity of the soil. Soils having less than 15% (by weight) finer than 0.005 mm, a liquid limit less than 35, and an in-situ water content greater than 0.9 times the liquid limit may be susceptible to liquefaction (Seed and Idriss, 1982).

  Seed et al. (1983) state that based on both laboratory testing and field performance, the great majority of cohesive soils will not liquefy during earthquakes. Using these criteria originally stated by Seed and Idriss (1982) and subsequently confirmed by Youd and Gilstrap (1999), in order for a cohesive soil to liquefy, it must meet all three criteria. If a cohesive soil does not meet all three criteria, then it is generally considered not to be susceptible to liquefaction (Day, 2002).

- **Depth below Ground Surface.** Liquefaction is generally not likely to occur more than 50 ft below the ground surface due to overburden confinement of the soils.
- **Soil Penetration Resistance.** Seed et al. (1985) state that soil layers with a normalized SPT N-value less than 22 have been known to liquefy. Marcuson et al. (1990) suggest an SPT N-value of less than 30 as the threshold to use for suspecting liquefaction potential.

The results of the preliminary liquefaction screening completed by AECOM are summarized in **Table 2.1** below:

Table 2.1: Summary of Preliminary Liquefaction Screening Results

Site Subsurface Material	Liquefaction Screening Criteria				
	Saturated*	Fines Content & Plasticity	Depth Below Ground Surface	SPT Resistance	Potentially Liquefiable (meets 3 of more criteria)
CCR Materials**	✓	✓	✓	✓	YES
Embankment Materials	X	X	✓	X	NO
Alluvium	✓	X	✓	✓	YES
Residuum	✓	X	✓	X	NO
Saprolite	✓	X	X	X	NO
Partially Weathered Rock	✓	X	X	X	NO

*This criterion must be met in order for the material to be liquefiable.
**Considers sluiced CCR materials below the post-closure phreatic surface level and not stacked ash materials

Results of the preliminary liquefaction screening analysis indicates that the CCR within AP-1 meets 3 or more of the screening criteria and is therefore potentially liquefiable. The analysis indicates that the on-site alluvium is also potentially liquefiable; however, as stated above, record documents show that alluvial soils were removed prior to constructing the AP-1 dikes. Thus, any alluvium within AP-1 should be within the interior limits of the pond just like the CCR, but it should all be limited to within the lower portions of AP-1 and only along the old predevelopment drainage features and creek beds. Furthermore, much of the alluvium consists of fine grained soils and is likely not susceptible to classical liquefaction.

Based on these screening results, AECOM performed a liquefaction triggering analysis for the CCR using SPT and SCPTu data from the historic subsurface data and data from the AECOM subsurface explorations completed for the closure engineering and design efforts. The SPT-based liquefaction procedure followed the revised methodology by Youd et al. (2001), and updated by Idriss and Boulanger (2008, 2014). The SCPTu-based liquefaction procedure is based on Youd et al. (2001) and Idriss and Boulanger (2008). Both of these procedures consider a stress-based approach to evaluate the potential for liquefaction triggering, and the calculated earthquake-induced cyclic stress ratios (CSR) are compared with the estimated cyclic resistance ratios (CRR) of the soil (CCR and alluvium in this sites case) to establish a factor of safety against liquefaction triggering. This triggering analysis methodology is considered to be the next step analysis for the initial liquefaction screening procedure.

For conservatism, the triggering analysis analyzed existing site in-situ conditions with current subsurface water levels for potential to liquefy. Based on the triggering analysis completed by AECOM, the CCR exhibits factors of safety that are below 1.0 intermittently throughout various layers of the ash delta. Therefore, it has been conservatively assumed that the ash delta deposits below the AP-1 water surface (i.e. saturated zones) have the potential to liquefy during the design earthquake.

Analyses indicate that the AP-1 dikes are not subject to liquefaction under the pseudostatic conditions analyzed. This indicates that even if liquefaction of the CCR occurs, a breach of the Plant Scherer AP-1 embankment dikes will not occur. If liquefaction does occur, CCR beneath the final cover system at post-closure may result in widespread deformation, which could result in onsite maintenance and reconstruction measures of the cover system being required.

The detailed results of AECOM's liquefaction screening and subsequent triggering analysis for the CCR are in **Appendix A3**.

2.2.3 Seismic Site Class and Pseudostatic Coefficient

To evaluate the planned consolidated closure-in-place footprint finish slopes and the AP-1 dikes for seismic loading and post-closure conditions, a seismic hazard class must be selected for the site and the resulting seismic coefficient must be estimated so that horizontal loads from the design earthquake can be considered in the stability analysis. Based on the historic subsurface data and the AECOM exploration data, the presence of loose to medium dense alluvial soils and medium dense to very dense residual and saprolitic soils indicate the most appropriate seismic hazard classification for AP-1 site is Class D.

The seismic coefficient (k_h) is calculated based on the seismic hazard classification identified for the site. It is a variable in that the inertia forces due to earthquake shaking are represented by a constant horizontal force equal to the weight of the potential sliding mass multiplied by the peak average acceleration of the failure mass. This additional force is used in the limit equilibrium stability analysis to account for seismic impacts in the design for the facility, and to minimize impacts to the engineered and critical components. This approach is commonly called a “pseudostatic stability analysis” and is one of the simplest means used in earthquake engineering to evaluate the seismic response of earthen embankments and slopes.

The seismic coefficient k_h is typically the only variable necessary to perform the pseudostatic analysis, and it is used directly in the limit equilibrium analysis as an additional load applied to the modeled embankment. Field observations indicate that the pseudostatic method is appropriate for evaluating the performance of earthen fill embankments and slopes not susceptible to liquefaction, and constructed of fill materials such as clays, clayey soils, dry or moist cohesionless soils, and dense cohesionless soils not subject to strain softening.

AECOM determined the seismic coefficient k_h to be used for AP-1 closure design by utilizing the guidelines established by the International Building Code (IBC) (2012). This method propagates the bedrock acceleration to the ground surface based on the seismic hazard classification. Based on the assigned Class D seismic hazard classification and utilizing USGS-mapped spectral acceleration maps, the Peak Ground Acceleration (PGA) in the bedrock at Plant Scherer is 0.089g. To obtain the site-specific PGA for fill embankment stability analysis, the PGA in the bedrock is multiplied by the site amplification factor 1.6 to obtain the PGA_m at the base of the embankment (PGA_{base}). It is recommended that the acceleration at the base of the embankment be amplified to obtain the PGA at the crest of the modeled fill embankment or slope (PGA_{crest}). Idriss (2015) provides variations of recorded peak crest accelerations (PGA_{crest}) versus those recorded at the base of earth and rock fill dams (PGA_{base}). Based on Idriss (2015), the PGA_{crest} is 0.36g. Makdisi & Seed (1977) provides variation of the maximum acceleration ratio with depth of sliding mass. Based on Makdisi & Seed (1977), the ratio between PGA_{base} of sliding mass and PGA_{crest} is 0.44g (average of all data). In other words, the PGA_{crest} can be reduced by 66% when the sliding mass extends to the bottom of the modeled fill embankment or slope, and the seismic coefficient k_h becomes 0.34xPGA_{crest}.

Therefore, the seismic coefficient k_h is equal to 0.34x0.44g or 0.15g, which was used by AECOM as the seismic coefficient in the pseudo-static stability analysis presented in the following section. The seismic coefficient k_h=0.15g was used for both the global and local stability analyses presented herein.

Details regarding AECOM's selection of the seismic hazard classification and detailed calculations completed by AECOM to determine the seismic coefficient k_h are in **Appendix A4**, which includes methodology and the USGS-mapped spectral acceleration outputs.

2.2.4 Stability Analysis

AECOM completed slope stability analysis for the planned consolidated closure-in-place footprint, which included modeling post-closure conditions of the AP-1 perimeter dikes, the planned new north berm, and the proposed final cover system. The stability analysis was completed using the widely industry accepted computer software program Slope/W (GeoStudio 2016, http://www.geo-slope.com/). This software is capable of utilizing a wide variety of methods to evaluate stability based on 2-dimensional limit equilibrium theory. For the AP-1 stability analysis, Slope/W was set to utilize Spencer's Method to evaluate slope stability and estimate factors of safety for both circular and translational failure surface geometries for deep-seated global slip surfaces and for shallow local slip surfaces.

AECOM completed the stability analysis based on model cross-sections developed for what are believed to be the most-critical embankment slopes of the perimeter AP-1 dikes and the planned new north berm. Considerations for selecting the most-critical cross-sections include maximum height, steepest embankment slopes, presence of relatively weak foundation soils, or other engineering factors, including past experience. Representative critical cross-sections selected for the stability analysis are shown on **Figure E** below.

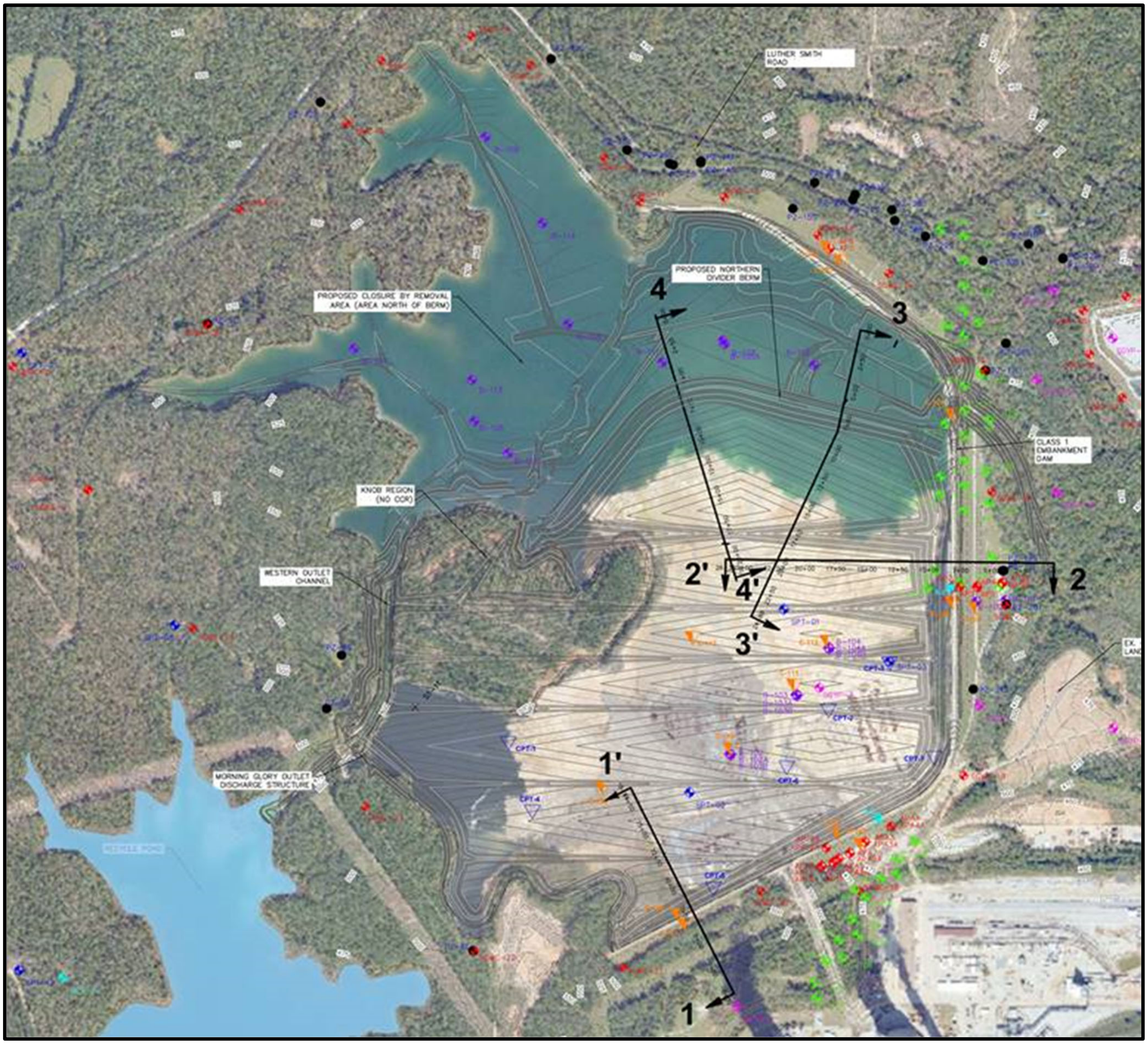

Figure E: Slope Stability Analysis Cross-Section Locations

The slope stability analysis was completed to analyze both static and seismic loading conditions for the planned AP-1 closure approach and geometry, and the analysis evaluated both global and local slip surfaces as stated above. The post-closure seismic loads modeled were developed as described previously, and are based on the design earthquake for the site. The slope stability loading conditions modeled by AECOM are summarized below, and again represent the planned consolidated closure-in-place footprint and estimated post-closure site and subsurface conditions. It should be noted that existing subsurface water level and resulting model phreatic surface were utilized in the slope stability analysis. This is because the expected long-term post-closure subsurface water levels within the consolidated closure-in-place footprint and resulting phreatic surfaces will take years to reach equilibrium. It is more conservative to complete the slope stability model using the current (elevated) water levels and resulting phreatic surfaces for the slope stability analysis, and these are more representative of the conditions occurring during construction and are within the most-critical time period following completion of the AP-1 closure.

- **Static, Steady-State, Global and Local Failure**: This load case models the conditions under static, long-term conditions. Drained (effective stress) shear strength parameters were used for all materials. A minimum Factor of Safety of 1.50 is required for this load case. Global failure extends from well into the embankment crest to the downstream slope toe. Local failure generally occurs in the form of shallow slides or sloughs along the slope surface, but can extend into the crest.

- **Static, Steady-State, Temporary Loading:** This load case models the conditions under static, long-term conditions, but with a temporary load (generally consisting of construction or maintenance equipment loading) placed at the crest of the slope resulting in additional undrained loading. Undrained (total stress) shear strength parameters were used for materials, which would model the embankment experiencing significant changes in load due to the temporary construction equipment weights/loads. A minimum Factor of Safety of 1.30 is required for this loading condition. Failure extends from well into the embankment crest to the downstream slope toe, or can be a shallow localized type slide of the crest edge or upper slope.

- **Pseudostatic (Seismic) Stability Condition:** This load case incorporates the seismic coefficient k_h calculated based on the seismic hazard classification identified for the site, and as described previously, models the additional horizontal loading expected during the design earthquake event (i.e. a “pseudostatic” analysis). The pseudostatic load case used peak undrained (total stress) shear strength parameters in materials that are not considered to be rapidly draining materials, and peak drained (effective stress) shear strength parameters in materials considered to freely drain. A minimum Factor of Safety of 1.00 is required for this load case.

- **Static, Post-Liquefaction Condition:** This load case was analyzed at each critical cross-section where liquefaction triggering analysis indicates potential liquefaction of CCR, and this load case models reduced shear strength conditions that can be expected in the embankment slopes immediately following the design earthquake due to liquefaction. No horizontal seismic coefficient k_h is included in this load cased analysis, but selection of strength parameters take into account the potential for softening/weakening of materials as a result of pore pressures generated in sand-like granular soils, or cyclic softening in clay-like cohesive soils due to the seismic shaking. A minimum Factor of Safety of 1.20 is required for this load case.

The slope stability analysis results are summarized in **Table 2.2** below.

Table 2.2: Slope Stability Analysis Results (Post-Closure)

Load Case	CCR Rule Criteria	Geometry	Cross Sections			
			1-1’	2-2’	3-3’	4-4’
Static, Steady-State (Global Failure)	FS ≥ 1.50	Circular	2.67	2.71	3.16	3.13
Static, Steady-State (Local Failure)	FS ≥ 1.50	Circular	---	---	2.17	2.05
Static, Steady-State, Temporary Loading	FS ≥ 1.30	Circular	2.67	2.26	2.65	1.99
Pseudostatic (Seismic)	FS ≥ 1.00	Circular	1.68	1.62	1.56	1.31
		Block	---	---	1.55	1.61
Static, Post-Liquefaction	FS ≥ 1.20	Circular	2.73	2.72	2.56	2.00
		Block	2.67	2.66	1.95	1.22

The detailed results of AECOM’s stability analysis completed to support the planned AP-1 closure approach are included in **Appendix A3**.

2.2.5 Settlement Analysis

A number of closure design elements are anticipated to induce settlements of earthwork fill placed to reach final closure grades (includes soil and CCR fill) and construct the final cover system within the consolidated closure-in-place footprint. The fills may also induce settlement of materials already in AP-1 and possibly the foundation residual soils in limited areas. The design elements expected to induce settlements, and the types of settlement that can be expected include:

- *Settlement from placement of soil or CCR fill to attain closure grades* – Additional vertical compressive stress from placement of soil or CCR fill will result in further consolidation of the underlying in-place CCR and potentially the AP-1 foundation soils. Placement of fill materials is anticipated to be on the order of several feet thick in most areas of the planned consolidated closure-in-place footprint to as much as 50 ft thick in the northern slope regions. The magnitude of these settlements is proportional to the thickness of CCR and the depth of soil/CCR fill placed over them. The magnitude of any settlements of foundations soils will also depend on the fill depths and stress states of the native soils. Although the time to achieve consolidation is generally several weeks to several months, which would be within the closure construction period, longer duration post-closure settlements could occur (i.e. secondary settlement). The potential impacts of post-closure settlement can be mitigated by phasing final cover construction to minimize post closure differential settlements.

- *Settlement due to placement of the final cover soils (Alternate Cover System)* – Placement of the 2-ft final cover soils and access roadways could result in settlement, especially in areas that have not been pre-loaded or previously filled or dewatered. Since these settlements are initiated near the end of final cover construction, they could impact post-closure function of the final cover system. These settlements are expected to be relatively small and can be mitigated, if necessary, by phasing of the final cover or pre-loading areas during closure.

- *Consolidation of CCR caused by changes in stress state resulting from temporary or permanent changes in the phreatic surface* – Removal of free water, construction dewatering, and natural long-term lowering of the subsurface water surface in AP-1 (as predicted by the hydrogeological modelling) within the existing sluiced ash materials that will underlie the consolidated closure-in-place footprint will increase the effective stresses within the CCR. This stress increase is anticipated to induce significant consolidation settlement in these materials.

It is necessary to differentiate short-term (during construction) and long-term (post-construction) settlements, as these components will impact the design and construction of the closure differently. The anticipated settlements are described below, relative to the AP-1 closure:

- *Short-term settlements* are those that occur during the course of grading activities and prior to completion of the 2 final cover system “cap” materials, and can include both elastic and consolidation settlement. These settlements will affect the quantity/volume of fill materials that are necessary to construct the final cover (i.e. additional fill materials will be necessary in order to make-up short term settlements and bring grades up to the cover subgrade elevations). Short-term settlements include elastic settlement and consolidation settlement due to fill surcharge occurring during the course of construction.

- *Long term settlements* are those that occur after construction of the final cover system, and would generally include consolidation settlement that extends past final cover system construction and possibly into the post-closure period. Post-construction (long-term) settlement of the final cover surface could alter the as-constructed surface slopes and the function of the surface drainage system of the closure cap. Long-term settlements include that portion of the fill-surcharge induced settlement that occurs post-construction, and settlement that occurs due to long-term drop in the subsurface water level in the AP-1 expected from the dewatering activities.

AECOM has completed one-dimensional elastic and consolidation settlement analysis to support the planned consolidated closure approach for AP-1. Loading from the proposed consolidated closure-in-place footprint crown and cap fills were estimated based on the proposed final design grades relative to existing AP-1 grades, and compressibility parameters were established on the basis of in-situ tests completed during AECOM’s explorations and laboratory consolidation tests taken from the historic subsurface data described herein and AECOM’s previous experience with CCR materials. Settlements were calculated along three cross-sections across the planned closure-in-place footprint, which are oriented along drainage conveyances (valleys) that will be graded into the final closure system cap. The shallowest permanent slopes of the cap exist along these drainage ways and vary from 0.5% to 3%.

The results of the settlement analysis are summarized as follows:

- Maximum predicted short-term (construction) settlements are on the order of about 1 ft. Average short-term settlements are just a few inches. This indicates that the quantity of additional fill material that could be needed to balance short-term settlement will be nominal, compared to the total fill quantities that are proposed for the AP-1 closure.

- Maximum predicted long-term (post-construction) settlements range from about 7 to 12-in. In general, settlements are anticipated to increase (not decrease) the slopes of the drainage conveyances in the long term. Where slope decreases are predicted, the maximum decrease is about 0.25%. Since the minimum proposed slopes within the drainage conveyances of the cap are 0.5%, slope reversals (which could create ponding on the cover) are not anticipated.

Considering the results of the settlement analysis and relatively minor construction and post-construction settlement predicted, settlement mitigation techniques are not considered to be necessary by AECOM. However, it is recommended as a good closure construction practice that settlements be monitored during construction in the field, so that the actual settlements and subsidence behavior of the consolidated closure-in-place footprint, cap, and other finish graded areas can be compared to the predicted settlements and grade adjustments can be made when/where needed. The monitoring program can consist of a series of settlement platforms, or finish surface mounted rigid plates or monuments that are surveyed on a regular basis throughout construction.

The detailed results of AECOM’s settlement analysis are included in **Appendix A2**.

2.3 North Berm Design

The planned new north berm will be constructed over native residual foundation soils to establish the consolidated closure-in-place footprint north boundary. The north berm will be approximately 4,280 ft long with approximately 485 ft of the total length serves as an extension to connect the north berm access road to the detention basin access road. The north berm has been designed to serve multiple purposes and will function as both a visual separation and regulatory boundary between the consolidated closure-in-place footprint and the closure-by-removal, but it also provides operational function for the closure, and an engineering purpose for the designed consolidated closure-in-place footprint.

The north berm has been designed with a drivable access road along its crest to provide access around the entire consolidated closure-in-place footprint, as well as access through the closure-by-removal area via a new road that will be constructed off of the north berm access road to extend through the closure-by-removal area to the Luther Smith Road site access gate. From an engineering standpoint, the berm will provide stability support (“buttress”) to the toe of the north consolidated closure-in-place footprint perimeter and its upgrade slopes.

The closure stability analysis completed by AECOM included the planned new north berm. Geometry features of the north berm, which were considered in the AECOM stability analysis, are as follows:

North Berm Geometry:

- Height: ranges from 10 ft minimum to 40 ft maximum
- Crest elevations: range from El. 466 NAVD88 to 478 NAVD88
- Berm crest width: 24 ft
- Downstream finish slope (north exposed side): 3H:1V
- Upstream finish slope (south interior side): 2H:1V

The stability analysis completed indicates acceptable factors of safety for all loading conditions analyzed for the north berm. It should be noted that the stability analysis completed by AECOM assumed that all CCR will be excavated and removed from underneath the planned berm footprint and at least 50 ft outside of the footprint (both on interior and exposed sides). The berm was analyzed as being constructed entirely over firm native residuum site soils.

The designed north berm geometry and planned represents the minimum size earthen embankment required to serve the various purposes described above for this embankment, and it is intended that the current north berm design will be carried forward to construction unless analyses or other closure planning activities completed during the further detailed engineering and design stage reveal design changes that are needed.

3 FINAL COVER SYSTEM DESIGN

The proposed final cover system is designed to minimize surface water infiltration into the closed AP-1 consolidated footprint, and to function with a minimum maintenance effort over the post-closure period. The requirements for the final cover system as they pertain to the USEPA and EPD CCR Rules, and the proposed final cover system to be utilized for AP-1 closure, are described in the sections below.

AP-1 is an unlined impoundment, and there is no base liner system proposed for the planned consolidated closure-in-place footprint.

3.1 Final Cover Design Criteria

As required by EPD Rule 391-3-4-.10 USEPA 40 CFR §257.102(d)(3)(ii), the final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(ii)(A) through (C) and as listed below:

(A) The design of the final cover system must include an infiltration layer that achieves an equivalent reduction in infiltration layer specified in 40 CFR §257.102(d)(3)(i)(A) and (B).

(B) The design of the final cover system must include an erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in 40 CFR §257.102(d)(3)(i)(C).

(C) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

The cover system described above is an engineered geomembrane turf composite (ETC). This cover system has been demonstrated to be equal to or greater than the regulatory standard final cover system.

3.1.1 Final Cover System Design Elements

In accordance with the CCR Rule, GPC/SCS has elected to utilize a non-traditional final cover system for AP-1 closure. The planned AP-1 closure final cover system will consist of engineered turf cover (ETC) system, referred to herein as the Final Cover System. This Final Cover System consists of a manufactured composite of 40 mil LLDPE geomembrane cap surfaced with a synthetic turf as shown below in **Figure F**. Some ETC products also require sand infill to ballast the turf, while some utilize anchors to mechanically tie-down the turf to the underlying subgrade. Anchors used to tie-down the ETC differ with the various manufacturers of these systems. The proposed Final Cover system has been shown herein to exceed the infiltration performance of the USEPA regulatory standard cover system and the synthetic ETC system "turfs" have also shown to meet the performance of grass for most closure applications.

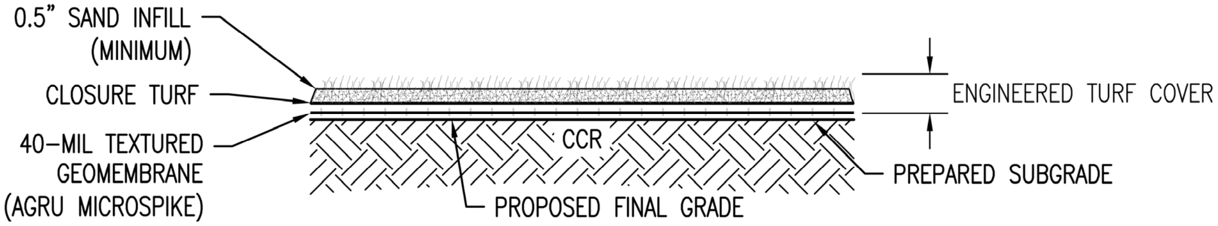

Figure F: AP-1 Final Cover System Detail

As a proposed alternate to the Final Cover System, a geomembrane cap with a soil protective layer (referred to hereafter as the Alternative Final Cover System). This system differs from the USEPA regulatory standard final cover system as shown below in **Figure G**.

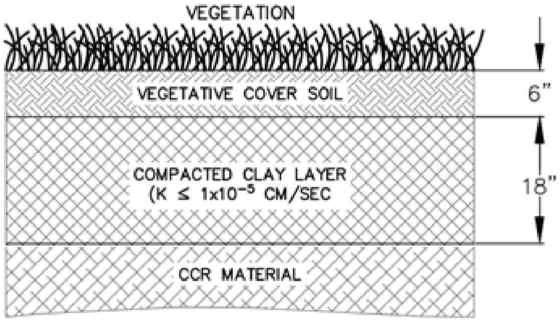

Figure G: USEPA Regulatory Standard Final Cover System

The alternative Final Cover System will consist of a geomembrane barrier layer installed on a prepared CCR surface subgrade that is finish graded per the planned consolidated closure-in-place footprint design. The geomembrane will be overlain by a drainage geocomposite, an 18-in. thick compacted soil layer, and a 6-in. thick vegetative cover soil as shown below in **Figure H**. The Alternative Final Cover System exhibits performance equal to or greater than the USEPA regulatory standard final cover system. Subsequent sections below describe the comparison between the regulatory standard final cover system and the planned AP-1 closure Final Cover System and Alternative Final Cover System.

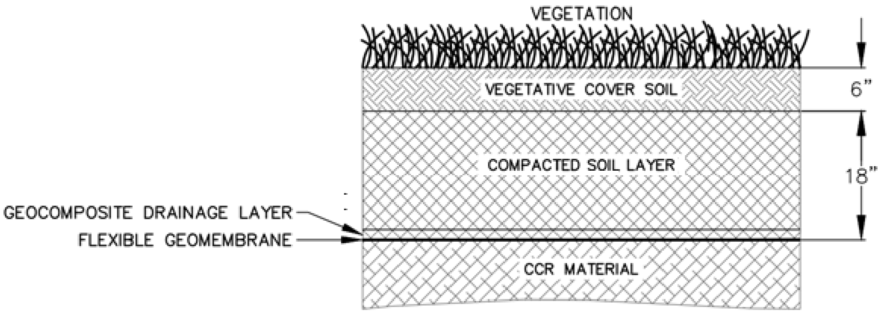

Figure H: Planned Plant Scherer Ash Pond 1 Closure Final Cover System

As stated above, GPC is proposing a Final Cover System consisting of an ETC system in lieu of the "traditional" geomembrane and soil cover like the Final Cover Systems shown in Figure G and Alternative Final Cover System shown in Figure H and described above. GPC has utilized ETC systems at other pond closures and in landfill-type applications with relative success and approval from EPD. Furthermore, an ETC system can be economically advantageous when there is a lack of site or local borrow soils, and in limiting long-term maintenance of the closure footprint during the post-closure period.

3.1.2 Final Cover System Hydrologic Analysis

Hydrologic analysis was completed to compare the USEPA regulatory standard cover system to the planned AP-1 closure Final Cover System. The hydrologic analysis was completed using the Hydrologic Evaluation of Landfill Performance (HELP) modeling program (Version 4.0). Based on a number of site specific climatic, soil, and design input parameters, HELP can be used to compare the amount of infiltration expected for various different final cover system designs (Schroeder et al., 1994). The results of the HELP modeling provide a detailed look at daily, monthly, and annual quantities of surface water runoff, evapotranspiration, and infiltration expected to be generated for a given cover system design. Therefore, the efficacy of considered cover systems can be directly compared by the quantity of infiltration estimated per acre of the final cover footprint area. A detailed engineering manual discussing the basis for the HELP modeling is available online at: https://www.epa.gov/land-research/hydrologic-evaluation-landfill-performance-help-model.

HELP requires four different groups of climate data to execute the hydrologic modeling, including evapotranspiration, precipitation, temperature, and solar radiation. Each data group is based on a specific location and can either be synthetically generated using the HELP model or manually entered. For this analysis, the most important parameter is precipitation because it directly correlates to the quantities of runoff and infiltration estimated. For all four data groups, the program was used to generate 100 years of synthetic data based on the default database associated with the closest city to the site, which is Atlanta that is approximately 60 miles northwest of Plant Scherer. The synthetic precipitation data was back checked with the National Oceanic and Atmospheric Administration's (NOAA) Summary of Monthly Normals for precipitation to determine if the actual climate values were consistent with the model data. It was determined that synthetic and Monthly Normals precipitation values were in fair agreement for purposes of this analysis. The precipitation data comparison is included in **Part 2, Appendix B1.**

The remaining model parameters included site geometry and material characteristics. A standard of 1 acre with a minimum slope of 2% with a 300-ft slope length was set up as a representative area for each cover system type analyzed. With the exception of the cover system elements modelled (cover system barrier, vegetation, etc.), all other inputs into HELP were held constant to facilitate a fair comparison. Each cover system type was input into the model and the amount of contact water measured after 100 years was compared. The modeling results present peak daily and average annual results over the 100-year simulation period. Input parameters are included in the output files in **Appendix**

B1. **Table 3.1** and **Table 3.2** below summarize the results of the final cover system hydrologic analysis and cover system type comparison.

Table 3.1: Rainfall/Runoff/Infiltration of Regulatory Standard Cover versus Proposed Final Cover

Cover System	Average Annual Precipitation (inches)	Average Annual Runoff (inches)	Average Annual Percolation (inches)
Regulatory Standard Cover	46.4	5.59	27.8
Alternative Final Cover System		4.69	0.072
Final Cover System (ETC)		28.65	0.258

Table 3.2: Hydraulic Performance of Regulatory Standard Cover versus Proposed Final Cover

Cover System	Average Daily Leakage Rate (Gallons/Acre/Day)	Peak Daily Leakage Rate (Gallons/Acre/Day)	Average Annual Leakage Rate (Gallons/Acre/Year)
Regulatory Standard Cover	2,069	12,299	755,327
Alternative Final Cover System	5.4	865	1,959
Final Cover System (ETC)	19.2	57.7	7,013

3.1.3 Alternative Final Cover System Veneer Stability

Veneer stability analysis was not performed on the Final Cover System since interfacing materials and driving forces (cover ballast force is negligible) do not occur in an ETC system.

Veneer stability analysis was completed for the Alternative Final Cover System to evaluate the potential for preferential sliding between the cover soils, underlying geosynthetics surfaces, and geosynthetic to subgrade.

Analysis of the sliding potential of relatively thin cover soil layers (veneer) placed over the geosynthetic liner layers (i.e. geomembrane and geocomposite) is important. This is because the underlying barrier materials generally represent a low interface shear strength boundary with respect to the soil placed above them, and the geosynthetics are oriented precisely in the direction of potential sliding.

The method used in AECOM's analysis of the Alternative Final Cover System closely follows the methods outlined by Koerner and Soong (Koerner and Soong, 2005). The analysis is performed using limit equilibrium procedures to balance the driving forces due to gravity pulling on the cover soils and the resistance to sliding due to friction between the soil layer contact surface with the underlying geosynthetics. Resistance to sliding is also due in part to the toe support (passive wedge) provided to the liner system at the base of the sliding mass. It is assumed in the analysis that the cover soil is of uniform thickness.

Based on the current Plant Scherer consolidated closure-in-place footprint grading plan, the Alternative Final Cover System will have a minimum slope of 3% and a maximum slope of 20% on the surface of the final cover. The maximum slope length at 20% is 160 ft and is the critical slope section for the Alternative Final Cover System. Although the majority of the alternative final cover is graded to the 3% minimum slope, the critical slope for the Alternative Final Cover System design was restricted to the interface of the 20% slope. Therefore, the results concluded from the 20% slopes analysis are conservatively applied for the 3% slopes, and any of the remaining limited number of final slopes that are between the 3% minimum and the 20% maximum.

The veneer stability analysis includes identifying the minimum strength parameters (i.e. friction angle (ϕ) and adhesion (c_a)) for a given interface to meet required factors of safety against translational failure. Conservatively assuming the ratio of cohesion/adhesion is equal to zero, the minimum required shear strength parameters for the Alternative Final Cover System are summarized for the critical slope (20%) to achieve the required minimum factor of safety.

Table 3.3: Alternative Final Cover System Minimum Calculated Required Friction Angles

Loading Condition	Minimum Factor of Safety	Minimum Required Friction Angle, Φ (degrees)
Static, Steady-State, Temporary Loading	1.25	11
Pseudostatic (Seismic)	1.00	17
Static, Post-Liquefaction	1.10	8.3

*Calculation of friction angles assumes interface adhesion (c_a) is equal to zero.

The analysis indicates that the seismic (pseudostatic) loading condition governs the design. Based on these results, a minimum interface friction angle of 17 degrees is recommended to achieve the minimum factors of safety between the geosynthetic materials (geomembrane to geocomposite materials) or the geomembrane to subgrade materials. Pre-construction testing with the actual closure materials will need to be completed to verify that the materials analyzed exhibit interface properties above the minimum shear strength envelope.

The detailed results of AECOM's veneer stability analysis are in **Appendix B2**. The minimum peak and residual shear strength parameters for each analysis condition are included in graphical form in the calculations.

4 STORMWATER MANAGEMENT EVALUATION

Stormwater features for the AP-1 closure and planned Final Cover System have been designed to promote positive surface drainage, control erosion, and minimize long-term maintenance. Design of the closure stormwater features and erosion controls was completed based on the following criteria:

- The 100-year, 24-hour duration storm event was used to design the permanent stormwater channels in the north closure-by-removal area and on the close-in-place stormwater channels with direction from GPC. This exceeds the requirements of the Environmental Protection Agency's (EPA's) Final CCR Rule (40 CFR Part 257) and Georgia Rule 391-3-4-.07, both of which only require ash pond closure designs to safely pass stormwater flows resulting from the 25-year, 24-hour duration storm event.

- The channel leading from the closure cap into Detention Basin A (Channels B0 and B1) and the north berm letdown culvert upstream of this channel to safely pass flows resulting from the 1000-year, 24-hour storm as an added factor of safety. This larger design storm was selected since the failure of this structure/channel could result in a cascading failure throughout the closure system.

- The 100-year, 24-hour storm event has been used to determine the required storage volumes for the detention basins and to determine the required dimensions and armoring for all channels and conveyance structures proposed as a part of the closure design. The 500-year, 24-hour storm event was also used to design auxiliary spillways for each of the three detention basins that are proposed as a part of the closure design.

- Permanent channels within the consolidated closure-in-place footprint have been designed with a minimum slope of 0.4%.

- Riprap lining has been utilized within the consolidated closure-in-place footprint to provide permanent swale and ditch channels suitable for both the Final Cover System (ETC) and the Alternative Final Cover System (geomembrane/soil). Riprap lining has also been utilized elsewhere based on the H&H analysis.

- Turf reinforced matting (TRM) has been utilized for permanent conveyances outside of the consolidated closure-in-place footprint (i.e. north closure-by-removal area ditch channels).

- The discharge of stormwater from construction activities to the waters of the State of Georgia will be in accordance with the limitations, monitoring requirements and other conditions set forth in NPDES Construction Stormwater General Permit for Stand Alone Construction Projects No. GAR 100001. Erosion and sediment control measures implemented during construction were selected and designed in accordance with the design specifications contained in the Manual for Erosion and Sediment Control in Georgia. Future analysis and more specific detailing of the erosion and sediment controls are anticipated to be completed during the further detailed engineering and design stage of the closure activities.

4.1 Hydrologic and Hydraulic Analysis

AECOM completed a hydrologic and hydraulic (H&H) analysis of the planned AP-1 post-closure conditions, and the analysis results and our engineering recommendations for the closure system stormwater management features and erosion controls are discussed in the sections below. The detailed results of AECOM's H&H analysis are in **Appendix C1**.

4.1.1 Hydrologic Analysis

AECOM completed post-closure conditions hydrologic analysis to estimate peak stormwater flow discharges to use for design of the closure stormwater features. The hydrologic analysis is based on the design storm event and site-specific historical rainfall data, and the planned Plant Scherer consolidated closure-in-place footprint features, finished grades, and contours shown on the Closure Drawings. Recommendations and calculations may be revised as the design is changed and if alternative closure methods are selected.

Subcatchment delineation for the hydrologic analysis was completed using the United States Geological Survey (USGS) StreamStats (v4.2.0) web tool. The StreamStats web tool can be used to estimate subcatchments and flows for existing creeks, streams, and rivers across the United States. AutoCAD Civil 3D 2019 was used to verify and update the subcatchment delineations based on design topography and updated surveys.

AECOM used HydroCAD version 10.00-25 to model the post-closure stormwater conditions at the AP-1 site. HydroCAD is a modeling software that is used to calculate hydrologic inflows for a variety of design storms. HydroCAD allows the user to create a complex network of "nodes" to simulate how stormwater flows would be routed through a site's stormwater features. AECOM created two HydroCAD models: one that discharges to the east into Berry Creek and one that discharges to the West in the Recycle Pond. These models were created to determine the peak inflows into the various stormwater features of the proposed closure design. The models were also used to determine the storage requirements for the three detention basins in the closure-by-removal area and the spillway.

Rainfall data for the design storms were obtained using precipitation estimates from NOAA's Precipitation Frequency Data Server (PFDS) web tool. Estimates provided by this web tool are calculated using the NOAA Atlas 14 publication for storms with recurrence intervals ranging between 1 year and 1,000 years, and durations ranging between 5 minutes and 60 days.

The National Resources Conservation Service (NRCS) Type II synthetic rainfall distribution (Type II Distribution) was used for temporal routing of the design storm throughout the site. The Type II distribution may be used for storms up to the 1,000-year, 24-hour duration storm event throughout most of the continental United States (including Juliette, Georgia and the Plant Scherer site).

AECOM selected an appropriate curve number (CN) for each subcatchment based on the NRCS Curve Number Method (NRCS, 1986). The two major factors that determine the appropriate curve number are the hydrologic soil group and the cover system type. Site soil data used to determine the hydrologic soil group was obtained from the NRCS Web Soil Survey database. Land use data used to determine the cover type was delineated using aerial photography.

The curve numbers for the consolidated closure-in-place footprint will be substantially different compared to existing conditions. The Final Cover System (ETC) is near impervious and results in high CN value of 95 for the closure cap subcatchments.

In addition, the curve number in the closure by removal area is assumed to increase compared to the existing conditions from grading and compaction of native soils. It is assumed that the hydrologic soil group will increase from Group B to Group C within the limits of grading, ultimately resulting in increased runoff.

Subcatchments have been delineated based on post-closure conditions and may be revised as the design is changed. There are three main subcatchments that are a part of the closure design. Two of these subcatchments are on the closure cap, and one is to the north of the closure cap in the closure-by-removal area. All but one of these subcatchments will discharge to the east into Berry Creek. The western closure cap subcatchment will discharge through the southwest outlet channel to the Recycle Pond. Table 4.1 below summarizes these subcatchments and their relevant hydrologic features. Each of these subcatchments have been split into several smaller subcatchments for a more detailed analysis of peak flows, velocities, and flow depths throughout the closure design. Additional details are provided in **Attachment B of Appendix C1.**

Table 4.1: Subcatchment Hydrologic Summary

Design Area	Drainage Area (Acres)	Receiving Water Body
Closure Cap (East)	150	Berry Creek
Closure Cap (West)	235	Recycle Pond
Closure-By-Removal Area	410	Berry Creek

The storage in the three-detention basins in the closure-by-removal area was calculated to attenuate the flows resulting from the design storm while slowly discharging the stormwater downstream to Berry Creek. The detention basins were also sized to keep the maximum height and storage capacity below 25 feet and 100 acre-feet respectively to avoid being classified as a dam as defined by Georgia Safe Dams Rule 391-3-8-.02.

A hydrologic summary of the three detention basins including the peak discharge for each pond is provided below in Table 4.2. A detailed summary of AECOM's HydroCAD modeling is provided in **Appendix C1**.

Table 4.2: Summary of Estimated Stormwater Peak Discharges

Detention Basin	Peak Inflow (CFS)		Peak Discharge (CFS)		Peak WSE (ft)		Top of Pond (ft)[1]	Freeboard (ft)	
	100-year	500-year	100-year	500-year	100-year	500-year		100-year	500-year
Basin A	1523	2028	126	274	449.2	450.6	451.0	1.8	0.4
Basin B	455	659	9	23	461.9	462.9	463.0	1.1	0.1
Basin C	387	579	10	43	464.7	465.6	466.0	1.3	0.4

Note 1: The auxiliary spillway crest for each basin is 1 foot below the top of the basin.

4.1.2 Hydraulic Analysis

AECOM completed post-closure conditions hydraulic analysis to estimate the peak stormwater flow depths and velocities, and then to design the various post-closure stormwater features to convey the estimated flows without eroding or overtopping. The hydraulic analysis utilizes the peak discharges (accounting for storage in the channels) estimated from the hydrologic analysis, which are based on the design storm event and site specific historical rainfall data, and the planned Plant Scherer consolidated closure-in-place footprint and remaining closure-by-removal area features, finish grades, and contours shown on the Closure Drawings.

Hydraulic Toolbox Version 4.4 was used to determine the stability of each channel proposed as a part of the closure design. Hydraulic Toolbox utilizes the methodology of *Hydraulic Engineering Circular No. 15* (HEC 15) to calculate the expected shear force, velocity, manning's n roughness values, Froude number, and stability of proposed armoring based on the channel geometry, minimum curve radius, and peak stormwater flows. The minimum stable stone size was selected to armor each channel proposed as a part of the closure design.

Georgia Department of Transportation (GDOT) Type 1 or Type 3 riprap or AASHTO No. 1 stone has been specified for use in all channels on the closure cap. Turf reinforced matting (TRM) has been proposed to armor all channels within the closure by removal area. A minimum channel slope of 0.3% and 0.35% was proposed within the closure by removal area and the closure cap area respectively to minimize the amount of fill required while promoting positive drainage; however, most proposed channels have a slope between 0.5% and 3%.

TRM was selected for the planned new closure-by-removal channels as a potential cost savings measure and because channel flow velocities are anticipated to be lower in this area compared with the channels on the closure-in-place Final Cover System, and erosion in the closure-by-removal area is less critical. TRM's effectiveness relies on adequate vegetation growth and proper installation, and may require additional maintenance compared to riprap and other hard channel lining options.

All three new detention basins (A, B, and C) include an emergency spillway that are a minimum of 100 ft wide will discharge into a new downstream channel leading in to Berry Creek for Detention Basin A or the post-closure channel within the closure-by-removal region for Detention Basins B and C. The detention basin emergency spillway is sized to pass storms up to the 500-year, 24-hour storm event without overtopping the detention basin embankments. Rigid reinforced concrete pavement with turndown slabs will be utilized to maintain Plant access for maintenance and inspection purposes and riprap materials are planned for the detention basin emergency spillway to protect against erosion and scour. Hydraulic calculations for the detention basin emergency spillway were completed based on its hydraulic capacity. Future detailed engineering and design efforts will include evaluation of channel stability, which could result in adjustments/refinements to the current planned emergency spillway liner design.

Table 4.3 below summarizes the minimum lining thicknesses and depths required for the stormwater channels included in the planned AP-1 closure based on the hydraulic analysis completed by AECOM. AECOM's detailed hydraulic analysis and stormwater channel lining calculations are in **Attachment C** of **Appendix C1**.

Table 4.3: Summary of Calculated Stormwater Feature Channel Linings

Stormwater Feature Channel	Lining Type	Minimum Required Lining Thickness	Minimum Required Lining Depth
Closure-In-Place Footprint Swale Channels (on eastern herringbone portion of final cover)	GDOT Type 3 Riprap	24 inches	3 ft
Closure-In-Place Footprint Swale Channels (on north portion of final cover)	GDOT Type 3 Riprap	24 inches	2 ft
Closure-In-Place Perimeter Ditch Channels	GDOT Type 3 Riprap	15 inches	5 ft
Southwest Outlet Channel (to Recycle Pond)	GDOT Type 3 Riprap	15 inches	5 ft or El. 493.0 NAVD88 (whichever is greater)
Letdown to Detention Basin A	GDOT Type 1 Riprap	36 inches	6 ft
Channels in Closure-By-Removal Area	Turf Reinforced Matting	N/A	4 ft
Detention Basin A	Turf Reinforced Matting	N/A	Up to top of basin
Detention Basin B	Turf Reinforced Matting	N/A	Up to top of basin
Detention Basin C	Turf Reinforced Matting	N/A	Up to top of basin
Detention Basins (A, B, and C) Emergency Spillway Channel	GDOT Type 1 Riprap	36 inches	2 ft
Northeast Outlet Channel (to Berry Creek)	GDOT Type 3 Riprap	24 inches	3 ft

4.2 Closure Stormwater Features

The AP-1 closure design includes a consolidated closure-in-place footprint and a closure-by-removal area. Stormwater runoff from the closure-by-removal area will discharge into three detention basins (A, B, and C) to Berry Creek as shown on the Closure Drawings. Post-closure stormwater runoff from the consolidated eastern closure-in-place footprint will also discharge to Berry Creek and the remaining western portion of the closure-in-place footprint will discharge to the Recycle Pond through the proposed southwest outlet channel. The recommendations for the stormwater features described in this section are based on the H&H analysis summarized in Section 4.1.

The finished surface of the closure cap has been designed in a herringbone pattern (series of ridges and valleys) so that stormwater runoff from the consolidated closure-in-place footprint discharges both to the east (towards Berry Creek) and to the west (towards the Recycle Pond). Stormwater runoff from the north and east portions of the closure-in-place footprint (approximately 150 acres) will be directed through shallow trapezoidal shape stormwater collection cross swales into trapezoidal shape perimeter ditches. The perimeter ditches extend along the north and east perimeters of the closure-in-place footprint, and are designed to discharge into the detention basins through riprap lined letdown as shown on the Closure Drawings.

Stormwater runoff from the south and west portions of the closure-in-place footprint (approximately 240 acres) will be directed through shallow trapezoidal stormwater collection cross swales into the southwest outlet channel as shown on the Closure Drawings. The existing morning glory spillway structure, which currently discharges into the Recycle Pond, will be completely removed and replaced with a trapezoidal channel (southwest outlet channel) as shown on the Closure Drawings.

The closure-by-removal area will be graded only as needed to convey flows to the detention basins, and east towards Berry Creek.

Table 4.4 below summarizes the stormwater feature discharge locations planned for the AP-1 closure and shown on the Closure Drawings.

Table 4.4: Summary of Stormwater Conveyance Discharge Location

Stormwater Feature	Discharge Location
North and East Consolidated Closure-In Place Footprint Areas	Letdown Channel to Detention Basin A
Closure-By-Removal Area	Detention Basin A, B, and C
Detention Basins A, B, and C	Berry Creek
South and West Consolidated Closure-In-Place Footprint Areas	Southwest Outlet Channel
Southwest Outlet Channel	Recycle Pond

4.2.1 Closure-By-Removal Area Stormwater Features

Stormwater features within the closure-by-removal area have been designed to the extent possible to mimic and utilize drainage features that were present on-site prior to constructing AP-1. The predevelopment drainage features flowed generally north to south across the site, which is the direction that they will flow in the closure-by-removal area after implementing the planned closure. The latest bathymetry survey of AP-1 indicates that old drainage swales and creek beds still exist at the north end of the pond and so these features will be utilized to manage and convey post-closure stormwater flows within the closure-by-removal area during post closure. Some grading of the closure-by-removal area is planned and necessary to construct the new channels that will convey flows across the north closure-by-removal area. All of the predevelopment drainage features will feed into several branch channels, and discharge through Detention Basins A, B, and C and eventually through the new northeast outlet channel that will breach the existing AP-1 dike and discharge into Berry Creek. The new closure-by-removal area channels will be trapezoidal shaped with variable bottom width, 4H:1V sideslopes, and sloped at approximately 0.4%. The new closure-by-removal area channels will be lined with TRM. The grading planned for the closure-by-removal area is shown on the Closure Drawings. As described above, stormwater features for the closure-by-removal area (including the two new channels) are designed for the 100-year, 24-hour storm.

4.2.2 Closure-In-Place Area Stormwater Features

As described above, the consolidated closure-in-place footprint and final cover cap have been designed in a herringbone pattern with a number of trapezoidal shaped cross swale and perimeter ditch channels that will be built into the closure cap as shown on the Closure Drawings. The consolidated closure-in-place footprint swale and ditch channels will all be lined with either GDOT Type 1 or Type 3 riprap or AASHTO No. 1 stone described previously and as shown on the Closure Drawings. Stormwater runoff from the consolidated closure-in-place footprint will drain to the east and west along channels up to 2,100 ft long. The closure cap and channels have been designed to discharge either to the west directly into the southwest outlet channel, which discharges to the Recycle Pond, or to the perimeter ditch channels that leads to the planned new letdown structure that will discharge into the letdown channel and into Detention Basin A and flow out the new northeast outlet channel east to Berry Creek as discussed above and as shown on the Closure Drawings. The perimeter ditch channels will be trapezoidal shaped with a variable bottom width and 5H:1V sideslopes. The east side perimeter ditch channel (referred to as “eastern channel”) will be approximately 6,000 ft long and sloped from 0.4% to 1%. The north side perimeter ditch channel (referred to as North Berm channel) will be approximately of 2,500 ft long and sloped at 0.4%. The letdown into Detention Basin A will be trapezoidal shape with a bottom width of 35 ft and 5H:1V sideslopes. The letdown will be approximately 650 ft long and sloped from 1.0% to 2.2%. The letdown will be lined with GDOT Type 1 riprap materials. As discussed previously, stormwater features for the consolidated closure-in-place footprint are designed for the 100-year, 24-hour storm, including the letdown into the detention basin (which is also designed for the 1000-year, 24-hour storm event).

4.2.3 Detention Basins

The purpose of the three detention basins planned for the closure-by-removal area and at the base of the consolidated closure-in-place footprint is to reduce the peak discharge of post-closure stormwater flows into Berry Creek. The planned detention basins will have an embankment crest set at the elevations stated above in **Table 4.2**. The detention basins will discharge through either an 18-inch HDPE outlet culvert (for Detention Basins B and C) or a 42-inch HDPE outlet culvert (for Detention Basin A) that will serve as the primary spillway. The detention basins will also include a trapezoidal shaped emergency spillway as shown on the Closure Drawings. The detention basins will have a maximum height and storage capacity below 25 feet and 100 acre-feet respectively to avoid being classified as a dam as defined by Georgia Rule 391-3-8-.02 at a maximum pool level. The planned Detention Basin A will discharge through the planned new northeast outlet channel that will require a breach in the existing AP-1 dike during construction and flow into Berry Creek. The planned detention basins include a low flow channel lined with GDOT Type 3 Riprap or TRM and will be lined entirely with TRM up to the top of the basin. The emergency spillways for each detention basin will be lined with GDOT Type 1 riprap. The planned new northeast outlet channel to Berry Creek will be trapezoidal shaped with a bottom width of 15 ft, 3H:1V sideslopes, and channel slope ranging from 0.5% to 4.5%. The northeast outlet channel to Berry Creek will be approximately 1,650 ft and lined with GDOT Type 3 riprap.

5 CLOSURE DEWATERING

"Removal of free water" is the process of removing ponded or free surface water in AP-1 and "dewatering" is the process of removing water from within the CCR. Removal of approximately 7,400 acre-feet (2.4 billion gallons) of free water is required as a part of implementing closure. Dewatering of the wet CCR within the planned consolidated closure-in-place footprint will need to be in-progress prior to some of the anticipated excavation activities and the placement of contouring fill and regrading of the ash delta surface.

As part of closure, sluicing to AP-1 will cease and plant process waste flows will be rerouted to a newly constructed water treatment facility (designed by others and currently being constructed). The proposed removal of CCR contact water and the proposed CCR dewatering system and measures needed for closure are described in the Closure Plan included in Part A of this permit application.

5.1 Stability During Free Water Removal

Stability of the AP-1 perimeter embankment dikes (a section of which is a Category I dam) and exposed CCR excavation or in-place slopes during removal of free water activities will be controlled by the rate that the free water is removed from AP-1. Removal of free water during closure construction activities will be controlled at a removal rate of no greater than 1-ft per week for storage fluid above El. 460 NAVD88. The rate is considered conservative to allow pore pressures within embankment soils to equalize during removal of free water activities. If evidence of sloughing of the interior slopes of the perimeter embankment dikes are observed, the rate of removal of free water may be further reduced.

The unsupported CCR face along the northern limit of the ash delta consists of finer silt and silty sand size particles within the CCR materials (as described in Section 2.1 of this report). CCR slopes may be subject to sliding, spreading, or settlement as free and interstitial water is removed. Excess pore pressure may remain within or adjacent to the exposed CCR surface resulting in sloughing or slope instability prior to and during closure activities. For this reason, dewatering is required to reduce excess pore pressure and to lower the phreatic surface in areas where CCR excavation or placement is planned. Additionally, construction measures and the construction phasing will need to account or the risks of potential mass instability of the leading edge of the CCR delta as discussed previously.

Criteria for the lowering of the phreatic surface and the maximum cut or fill CCR slopes will be established based upon stability analyses that are to be completed as a part of the further detailed engineering and design closure planning. Based upon experience, undrained conditions are assumed within the CCR and residual shear strength of the sluiced CCR will be used for analyses.

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REPORT ATTACHMENT FIGURES

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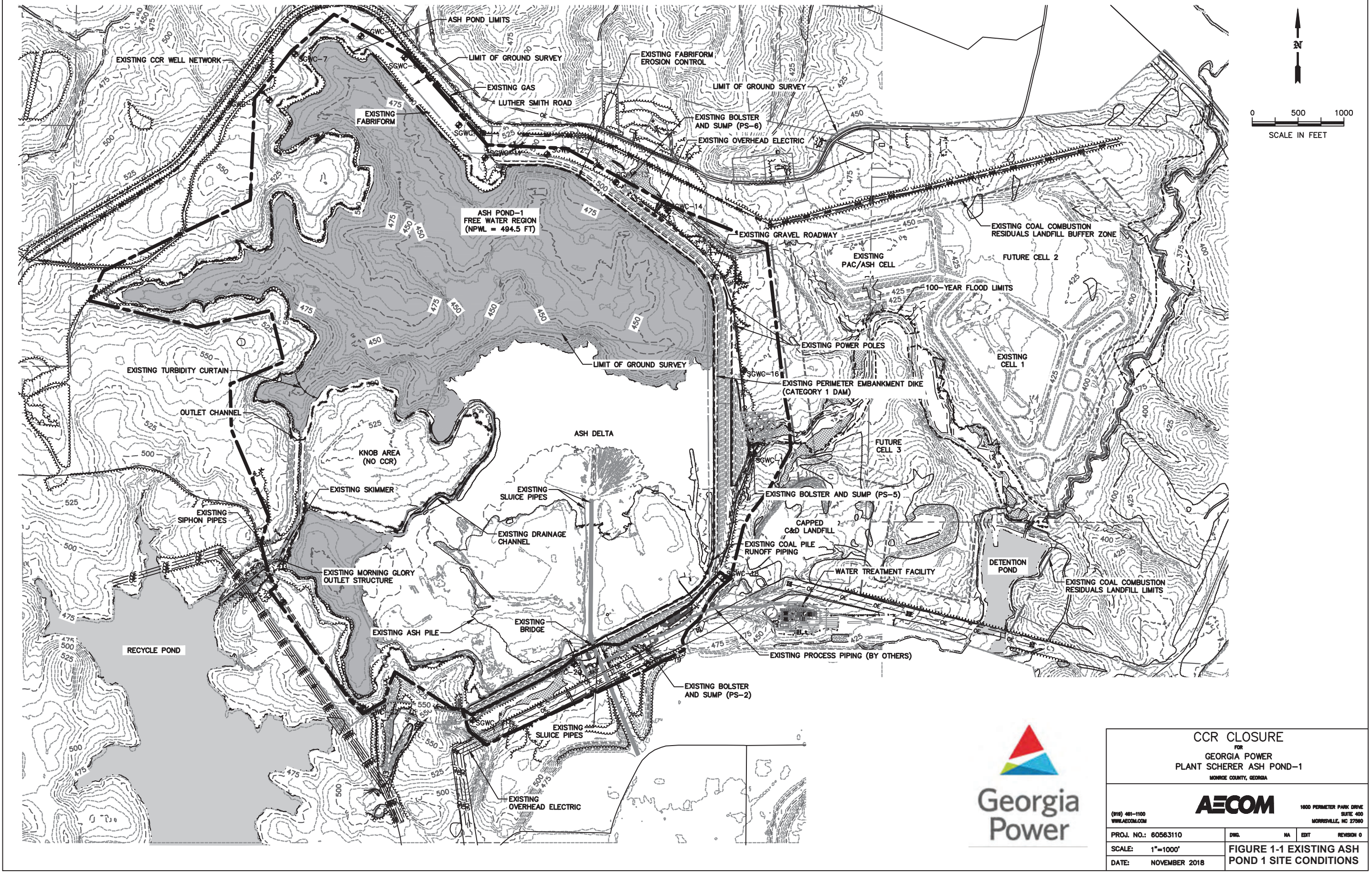
G:\Akron\DCS\Projects\ENV\60563110_SoCoSchere\900_CAD_GIS\7.0 ACAD Drawings\Figures\Figure 1-1 Existing Conditions\Fig 1-1_Existing Ash Pond Site Conditions.dwg User:Mcavinewa Nov 07, 2018 – 4:59pm



Georgia Power

CCR CLOSURE
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PLANT SCHERER ASH POND-1
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MORRISVILLE, NC 27560

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SCALE: 1"=1000'	FIGURE 1-1 EXISTING ASH POND 1 SITE CONDITIONS		
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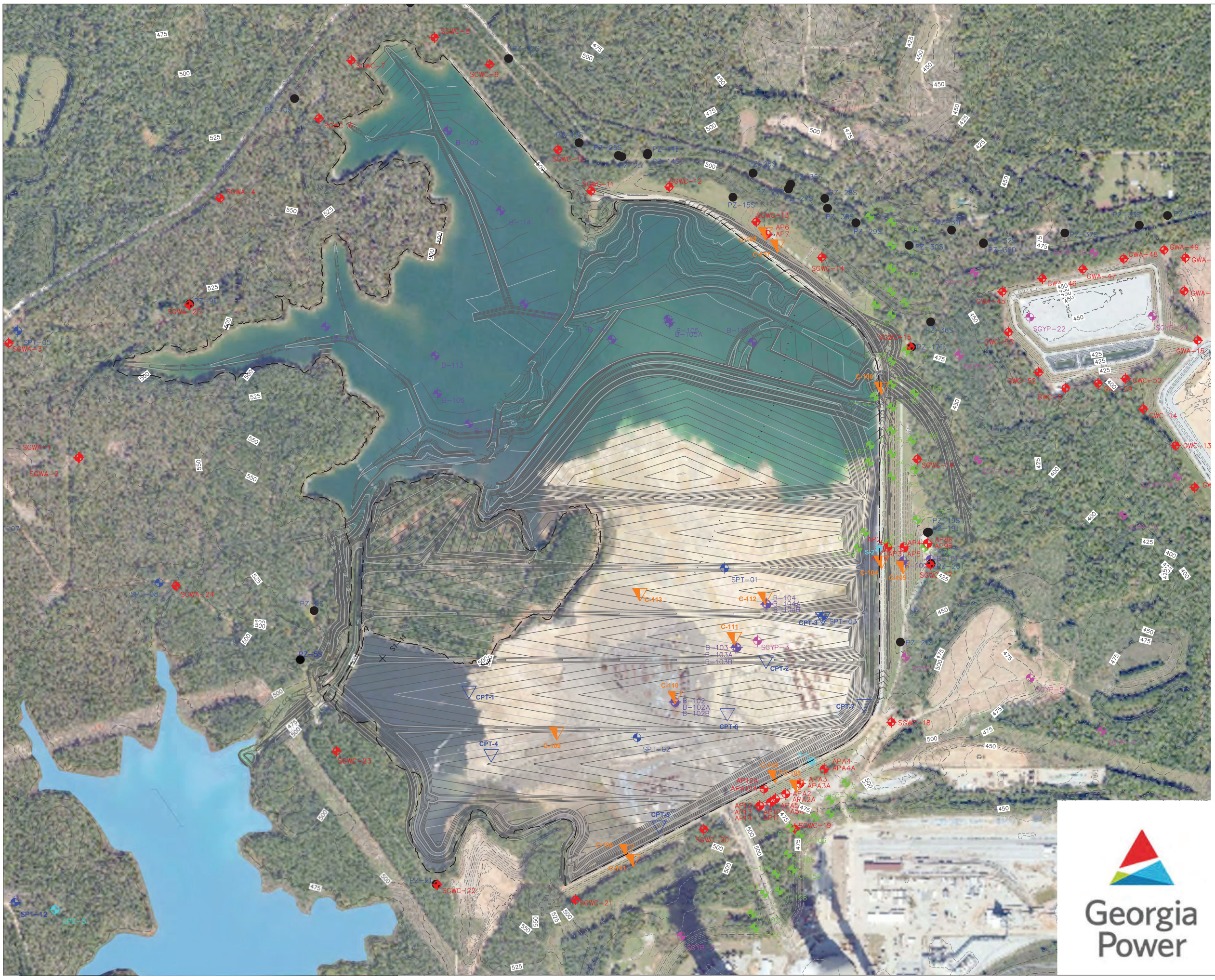

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LEGEND

SGYP-7	EASTERN LANDFILL MONITORING WELL
SGWC-18	CCR MONITORING WELLS
C-156	1974 LAW ENGINEERING TESTING COMPANY BORINGS
AP9R	1985 GEORGIA POWER BORING
● S-1	2010 SCS BORING LOCATION
LPZ-5	2015 GOLDER ASSOCIATES PIEZOMETER LOCATION
SPT-01	2015 SCS AS-BUILT SPT LOCATION
● PZ-29S	2015-2016 SCS PIEZOMETER LOCATION
▼ C-113	2016 SCS CPT LOCATION
▽ CPT-7	2016 AECOM AS-BUILT CPT LOCATION
B-103	2016 AECOM AS-BUILD BORING LOCATION
450	PROPOSED MAJOR TOPO LINE
———	PROPOSED MINOR TOPO LINE
— — 450 — —	EXISTING MAJOR TOPO LINE
- - - - - - -	EXISTING MINOR TOPO LINE

Georgia Power

CCR CLOSURE
FOR
GEORGIA POWER
PLANT SCHERER ASH POND
MONROE COUNTY, GEORGIA

AECOM

(919) 461-1100
WWW.AECOM.COM

1600 PERIMETER PARK DRIVE
SUITE 400
MORRISVILLE, NC 27560

PROJ. NO.: 60563110	DWG. XXX-X-XX	EDIT Revision 1
SCALE: 1" = 400'	**FIGURE 2-1 GEOTECHNICAL SITE PLAN**	
DATE: 09/14/2021		

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APPENDICES

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Appendix A

Geotechnical Engineering Evaluations and Analysis

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Appendix A1

Geotechnical Data and Properties

Appendix A1

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**1** of **16**
Description	**Geotechnical Data and Material**	Computed by	**SAL**	Date	**09/05/18**
	Properties	Checked by	**JLM**	Date	**05/22/18**

I. Objective

This calculation appendix to the Engineering Report summarizes the geotechnical data and material characteristics of the subsurface strata encountered from historic explorations and a review of historic construction documents of the Ash Pond at Georgia Power's Plant Scherer in Monroe County, Georgia. Selection of material properties for slope stability is also developed and summarized within this package.

II. Ash Pond Historic Subsurface Explorations

Numerous subsurface explorations were performed within the vicinity and along the perimeter of the ash pond since the 1970's. Thirty of the historic exploratory locations were performed by AECOM in 2016 in an effort to establish additional information to better evaluate closure options. Approximately 722 other known historic subsurface exploration locations were explored from 1974 to 2016. The historic exploration locations advanced near the ash pond are shown on **Attachment A – Plant Scherer Geotechnical Site Plan** of this calculation appendix.

Historic documentation of the subsurface explorations performed prior to 2016 was provided to AECOM by Georgia Power Company (GPC) and Southern Company Services (SCS) and generally consisted of exploration logs and laboratory test results in a geotechnical data format. AECOM was not given specific embankment construction records or geotechnical recommendations or analyses. AECOM has reviewed the data provided to establish a general understanding of site history and subsurface conditions and has summarized pertinent information pertaining to each of the historic subsurface explorations in the list below:

- *1974 to 1976 Law Engineering Testing Company Exploration* included forty-one (41) subsurface exploration locations that extended within and near the vicinity of the ash pond southern and eastern perimeter embankment prior to embankment construction. The subsurface exploration included split-spoon sampling via standard penetration testing (SPT) through the soil overburden with majority of the borings being terminated at auger refusal or top of rock materials. Exploration depths varied between 24 to 168 feet below the ground surface. Select borings were rock cored using an NX-size core to sample the underlying rock materials. Exploration locations for the 1974 Law Engineering investigation are denoted as C-101 through C-179 and are shown on **Attachment A**.

- *1978 and 1979 Alabama Power Company Laboratory Testing* included test results from seven different types of laboratory testing performed on materials collected at Plant Scherer for ash pond construction random fill materials. Laboratory testing included Atterberg limits, specific gravity, grain size analysis, compaction testing (standard and modified), swell testing, and direct shear testing. The location where these materials were procured and the materials utilized for embankment construction could not be verified, therefore AECOM used the results of the laboratory testing to supplement a general understanding of site soils characteristics.

- *2010 Southern Company Services* subsurface exploration included two exploration boring locations denoted S-1 and S-2. These two explorations were explored within the southern and eastern embankments.

- *2015 to 2016 Southern Company Services* subsurface exploration included twelve exploratory borings denoted SPT-01 through SPT-12 and seven cone penetration tests denoted CPT-01 through CPT-07 were explored within the ash delta, perimeter embankment, and regions surrounding the ash pond. Additionally, fifty-eight groundwater monitoring piezometers were installed across perimeter of the ash pond with majority installed near the northern and eastern perimeter embankment. Some of these wells were then converted to the CCR monitoring wells, which are denoted as SGWA-1 through SGWA-25. The SPT borings were extended to depths varying from 43 to 170 feet below the existing ground surface. Each of the SPT borings encountered granitic bedrock (predominately classified as gneiss) and representative rock samples were collected to determine rock quality designation (RQD).

- *2016 AECOM subsurface exploration* (AECOM, 2016) included a total of thirty subsurface locations extended through the ash pond ash delta, within the free water pond, and perimeter embankment. AECOM's 2016 field exploration program included performing 16 SPT borings at the site. This included 2 borings on the ash pond Dike (B-100 and B-101), 3 borings in the ash delta (B-102 through B-104), and 11 barge-based borings in the free water portions of the ash pond (B-105 through B-114, and one offset boring, B-105A). Six standpipe piezometers were also installed within the ash delta (B-102A/B through B-104A/B). AECOM's exploration also included performing 14 cone penetration tests (CPT's) with seismic shear wave velocity measurements (SCPTu) and pore pressure dissipation testing (PPD). The CPT investigation was performed by ConeTec Inc. under supervision of AECOM. This included a total of 9 CPTs on the ash pond perimeter embankment (performed on the eastern and southern dike) and 5 CPTs in the ash delta.

Tables B-3 and B-4 in **Attachment B** summarize the findings for each of the historic subsurface exploration locations and a breakdown to the materials encountered. A full set of historic boring logs, including soil descriptions, types of sampling, and choice laboratory test results, is also provided in **Attachment B** of this appendix. Cone penetrometer testing logs and a report provided by ConeTec from the 2016 AECOM exploration that summarizes the findings of the 2016 CPT exploration (including the graphical CPT logs and the results of the SCPTu and PPD tests) are also included in the attachment.

III. Subsurface Conditions

Based on AECOM's review of the historic subsurface explorations, six stratigraphic materials were identified at the site. Particular consideration for subsurface findings and conditions were made for borings collected from the 2016 AECOM exploration and historic exploration locations advanced within the ash pond and perimeter embankment. The summarized description of each of the six identified subsurface strata are briefly summarized and provided below:

Embankment Fill: Embankment fill materials were encountered in AECOM 2016 boring B-100 at the ash pond dike and in CPTs C-100 through C-103 at the ash pond south dike and C-104 through C-108 at the ash pond dike. In addition, historic borings S-1 and S-2 taken from the 2010 SCS exploration were advanced through the existing embankment crest and extended to the underlying foundation soils. Based on the results of these borings, the embankment fill primarily consists of compacted onsite fill materials, which are assumed to originate from residual soils excavated from in and around the current ash pond. Fill depths extended from up to 100 ft (C-104, at the maximum height of the ash pond dike) to a nominal thickness for CPTs advanced near the toe of the ash pond dike.

Most CPTs advanced from the crest of the ash pond dike (C-100, C-102, and C-105) identified a granular layer beneath the bottom of the embankment fill. Based on historic construction drawings provided by

SCS/GPC, it is likely that this material is the internal drainage system. Actual soil samples of this material were not collected by AECOM in the 2016 exploration, as the material was likely located between sample intervals in boring B-100, which is the only ash pond dike boring that would have penetrated the internal drainage system. Where the granular layer was not encountered (C-104, C-106, and C-107), it is likely that the CPT was advanced beyond the maximum upstream extents of the internal drainage system. A typical section of the ash pond dam showing the internal drainage system is in **Figure 1**.

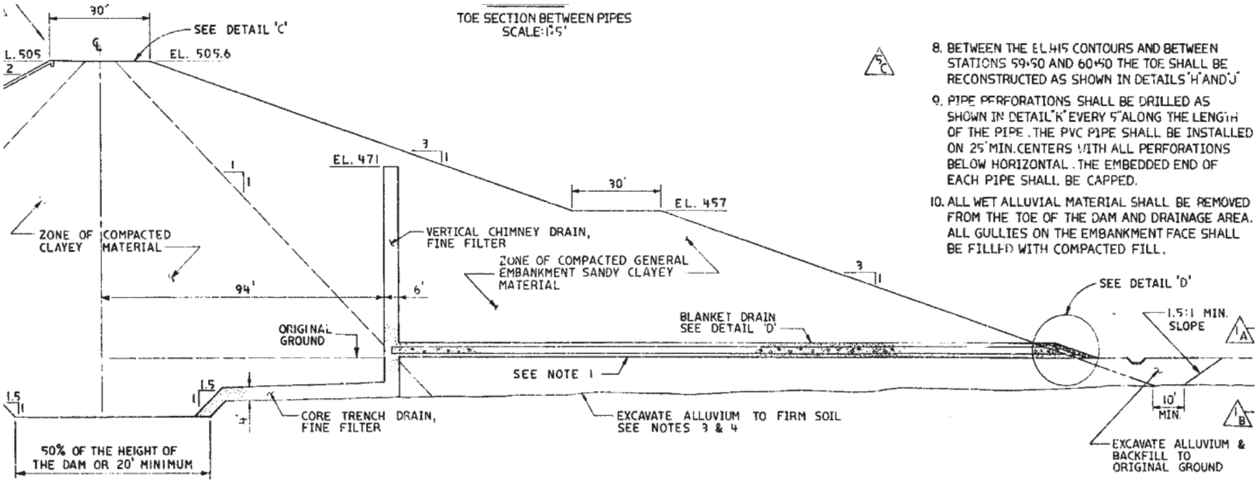


Figure 1 – Typical Section of Ash Pond Dam Showing Internal Drainge System
(from GPC Drawing E1H1002, 1982)

Based on field and laboratory testing, the fill materials generally consist of stiff to very stiff elastic silt (MH), with trace sand and mica. Some zones of fat clay (CH) and lean clay (CL) were identified as well. Both SPT and CPT penetration resistances indicate that the embankment fill is relatively uniform across the site, with typical SPT N-values of around 15 blows per foot and CPT tip resistances of around 30 tons per square foot, although isolated zones of soft soil were found. This is indicative of a well-compacted material with good compaction control during construction.

Additionally, some material classified as general fill was encountered beyond the toe of the ash pond dike in boring B-101, and was not encountered in other explorations advanced by AECOM. The general fill consists of material used to backfill excavations beyond the toe of the ash pond dike, where alluvial soils existing beyond the toe were removed during construction of the ash pond dike, as shown on historic drawings (Figure 1). At boring B-101, the fill general fill extended to a depth of 5.0 feet.

Based on field and laboratory testing, the general fill material consists of soft lean clay (CL) with trace sand and mica. SPT penetration resistances were 4 blows per foot for both SPTs performed in this material.

Alluvium: Alluvium was encountered beyond the toe of the ash pond dike in boring B-101, beneath ash in ash delta borings B-103 and B-104, and beneath a surficial layer of CCR in ash pond borings B-106, B-108, B-109, B-112, and SPT-02. Alluvium was also likely encountered in ash pond CPTs C-109 through C-112, but could not be definitively identified due to the lack of soil samples collected from the CPT's.

The alluvium consists of residual soils that were eroded and redeposited along historic creek channels that originally flowed beneath the current footprint of the ash pond. Where encountered, alluvium thicknesses were typically around 5 ft, reaching a maximum thickness of 5.7 ft in ash pond free water boring B-112.

Based on field and laboratory testing, the alluvium materials are variable in nature but generally consist of very soft to medium stiff lean clay (CL) and fat clay (CH) and very loose to medium dense, silty sand (SM) and clayey sand (SC). SPT and CPT penetration resistances are highly variable due to the variations in soil type, location, and the depositional environment where the soil was formed.

At ash pond dike boring B-101, a 10 ft thick zone of soft alluvial clay and silt was encountered beyond the toe of the dike. This material was not encountered underneath the ash pond dike in borings advanced by AECOM nor in any historic borings after the embankment was constructed. Historic slope stability analyses appeared to account for this zone (SCS, 1976 and SCS, 1986), but it is unclear if the zone was accounted for in recent slope stability analyses (SCS, 2010). In 2016 AECOM attempted to collect a Shelby tube sample of this material (B-101, S-3), but laboratory investigation found the tube to be disturbed and comprised of what appeared to be general fill and organics, as the tube was obtained near the interface between the general fill and the alluvium.

Residuum: Residuum was encountered in ash pond dike boring B-100, all of the preconstruction historic borings (C-100 and C-149), and the ash pond free water borings (B-105 through B-114). Residuum was likely encountered in most or all CPT soundings, but cannot be definitively identified or distinguished from saprolite due to the lack of obtained soil samples. Residuum was not encountered in the ash delta borings, where it had likely been eroded away as saprolite was found directly beneath alluvium and CCR materials. Where encountered, the residuum thickness varied significantly, from up to 18.2 feet in boring B-110 to 3 feet in borings B-111 and B-106.

The residuum consists of residual soils developed by the in-place weathering of the parent metamorphic bedrock, and corresponds to a reddish brown soil with trace sand and mica content. Residuum is distinguished from the less weathered saprolite and partially weathered rock materials in that the residuum does not retain relict structure from the parent bedrock (e.g. banding common in metamorphic rocks is missing and the soil has a deep orange-red appearance). In locations where the residuum was not encountered, it was likely eroded away by historic creeks that existed before the ash pond was constructed.

Based on field and laboratory testing, the residuum generally consists of sandy medium stiff to very stiff elastic silt (MH) with trace mica. Some zones of fat clay (CH), lean clay (CL), and silty sand (SM) were also identified. In some of the ash pond borings, the residuum encountered was sometimes soft to very soft, rather than stiff. CPT tip resistances were typically on the order of 30 to 50 tsf, while a zone of approximately 20 tsf material was noted in C-106, between approximately 55 and 70 feet below grade.

Saprolite: Saprolite was encountered in all the 2016 AECOM borings except ash delta boring B-104 and ash pond free water borings B-107, B-109, and B-114. The 2015 SCS borings indicated saprolite was encountered in the borings, but did not specify a distinctive material break between residuum and saprolite. All other historic borings advanced did not distinguish between residuum and saprolite materials and therefore, the limit of saprolite materials is unknown in those borings. Saprolite was likely encountered in most or all the historic CPT soundings, but cannot be definitively identified or distinguished from residuum due to the lack of obtained soil samples. Where encountered and classified, the saprolite thickness varied significantly, from up to 27 feet in borings B-101 and B-112 to 6 feet in boring B-113.

The saprolite is the product of extensive in-place weathering of the parent metamorphic bedrock. Although the saprolite can be sampled as a soil, it retains relict structure from the parent bedrock, including banding of various minerals, and a relatively high mica content. Essentially, the saprolite retains the visual appearance of bedrock, but can easily be penetrated and broken by hand due to nearly complete disintegration of the bonds between individual mineral grains. Saprolite is distinguished from the more weathered residuum by the presence of relict structure and lack of deep orange-red coloration, and from partially weathered rock by SPT N-values that are less than 50 blows per foot (Sowers, 1963). In locations where the saprolite was not encountered, it was likely eroded away by historic creeks that existed before the ash pond was constructed.

Based on field and the 2016 AECOM laboratory testing program, saprolite generally consists of very loose to very dense silty sand (SM) with mica or soft to stiff sandy silt (ML) with mica, although some zones of sandy clay (CL) were also identified.

Partially Weathered Rock (PWR): Partially weathered rock was encountered in the 2016 AECOM ash pond dike boring B-100, ash delta boring B-103, and in all ash pond free water borings except B-105, B-105A, and B-106. Most of the 2015 SCS borings (except SPT-02, 08, 11 and SPT-12) did not encounter PWR materials beneath the residual and saprolite materials. In some cases the partially weathered rock was not encountered due to the boring termination prior to auger refusal. In other cases, the PWR may have been a thin layer that the auger may have encountered refusal prior to attempting to collect a sample. Some of the borings may have also been terminated upon auger refusal and a SPT sample attempted, but no sample recovery was obtained. This effectively means that the boring was likely terminated at the top of partially weathered rock. Partially weathered rock was likely encountered in all CPT soundings, and corresponded to the material in which CPT refusal was met.

The partially weathered rock corresponds to slightly or moderately weathered parent bedrock, which was found to be gneiss. The material is distinguished from saprolite by SPT N-values that are 50 blows per foot or higher (Sowers, 1963). In some areas, auger drilling was successfully able to penetrate the partially weathered rock for up to 15.7 feet prior to auger refusal (boring B-100). In other areas, auger refusal occurred at or just a few feet below the top of the partially weathered rock.

Based on field and laboratory testing, the partially weathered rock generally classified as very dense silty sand (SM) with mica, feldspar, and gravel. SPT N-values were 50 blows per foot or higher, and CPT tip resistances were on the order of 200 tsf or higher.

CCR: CCR was encountered in all the 2016 AECOM ash delta borings, SPT-01 through SPT-03 of the 2015 SCS exploration, and all ash delta CPTs. In the 2016 AECOM ash pond free water borings, only a very limited amount of CCR was encountered. Maximum CCR thicknesses at the bottom of the ash pond were 1.6 feet in boring B-111, while the CCR was found to be 1 ft or less in thickness in all other ash pond free water borings. Within the ash delta, the CCR ranged from 68 to 83.5 feet thick. CCR was not encountered in the ash pond dike borings or could not be distinguished from the soil materials in the CPT's.

The CCR consists of fly ash and bottom ash created by coal combustion at Plant Scherer. The top 5 to 10 ft of the CCR column was found to consist of a mixture of fly ash and bottom ash, which was likely mechanically stacked rather than sluiced. Below that, the material appeared to be wet-sluiced and consisted mainly of fly ash with only limited amounts of bottom ash. Based on field and laboratory testing, the CCR generally consists of a very loose nonplastic silt (ML), with some isolated zones of medium dense material or silty sand (SM). SPT values were typically weight-of-hammer or weight-of-rods, and CPT tip resistances were on the order of 10 to 20 tsf. Both the CPTs and the SPTs identified a higher-strength crust over the top of the CCR, extending to approximately 10 feet below grade. The crust likely corresponds to desiccated or mechanically-stacked CCR, relative to the saturated sluiced CCR present at depth.

IV. Laboratory Testing Program

Historic laboratory testing was found to be predominately performed on samples collected from the 2016 AECOM exploration activities. Representative samples collected from the 2016 exploration and other historic explorations generally consisted of selected split-spoon, Shelby tube, and piston samples. Historic testing included index, permeability, strength, consolidation, and dispersion testing. AECOM reviewed the laboratory results to determine specific soil and CCR material parameters needed to perform the geotechnical analysis and evaluation of the closure design.

Historic laboratory test results are summarized in **Tables C.1, C.2, and C.3** in **Attachment C.** Based on historic laboratory information provided to AECOM, **Table A1-1** below summarizes the total number of historic laboratory tests performed on samples collected at Plant Scherer.

Table A1-1: Historic Laboratory Testing For Plant Scherer Ash Pond

	ASTM Method	Number of Tests							
		Total	CCR	Emb. Fill	Alluv-ium	Resid-uum	Saprolite	PWR	Other
Moisture Content	D2216	123	42	12	9	28	22	7	3
Atterberg Limits	D4318	37	3	6	6	14	6	-	2
Grain Size Analysis	D422	75	35	7	3	10	16	4	-
Specific Gravity	D854	8	8	-	-	-	-	-	-
Unit Weight	D7263	32	18	6	1	6	1	-	-
Consolidation	D4186	5	5	-	-	-	-	-	-
Unconsolidated Undrained (UU)	D2850	2	-	-	-	2	-	-	-
Consolidated Undrained (CIU)	D4767	15	8	3	-	3	1	-	-
Permeability	D5084	13	10	2	-	1	-	-	-
Crumb Dispersion	D6572	4	-	2	-	2	-	-	-
Double Hydrometer Dispersion	D4221	1	-	-	-	1	-	-	-

Compete results of the laboratory tests are included in **Attachment C** of the report.

V. Material Properties

Material properties for slope stability analyses were developed using both laboratory testing data (index and strength testing) and strength correlations from SPT and CPT data.

The following specific material properties were developed for the stacked ash, sluiced ash, berm fill, residuum, saprolite, and partially weathered rock materials, for use in the various stability analyses performed as part of this study:

- Unit Weight
- Drained and Undrained Shear Strength of Native Soil Strata
- Drained and Undrained Shear Strength of CCR Material
- Post-Earthquake Shear Strength of Sluiced Ash

Material properties for the stacked ash (drained), sluiced ash (undrained), residuum, and embankment fill were based material properties presented in the Geotechnical Data Report. The Geotechnical Data Report characterized these material strengths with p-q plots. The undrained material properties for stacked ash and sluiced ash were based on CPT data, while material properties for the saprolite and drained properties for the sluiced ash were based on SPT results. Partially weathered rock properties were based on regional characteristics.

Unit Weight

Unit weight for the sluiced ash, embankment fill, and residuum materials were evaluated using measured results from samples collected. **Table A1-2** below summarizes the unit weights as measured from samples collected:

Table A1-2: Total Unit Weight from Laboratory Testing Program

Strata	No. Tests	Min.	Max.	Average
Sluiced Ash Materials	18	59.9	109.5	91.8
Embankment Fill	6	114.3	127.0	117.8
Residuum	5	102.6	122.7	112.6

For predominantly granular materials that could not be directly measured for unit weight or shear strength (stacked ash, saprolite, and partially weathered rock), estimates based on the available data were utilized. The stacked ash unit weight and shear strength was based on sluiced ash materials. Typical regional values and SPT data in saprolite and partially weathered rock were used to determine the unit weight and shear strength of those materials.

Based on the results presented in the **Table A1-2** and regional values, the following total unit weights were selected for use in stability analyses:

- Stacked ash materials: 95 pounds per cubic foot (pcf),
- Sluiced ash materials: 95 pcf,
- Embankment and berm fill materials: 116 pcf,
- Residuum material: 114 pcf,
- Saprolite material: 105 pcf, and
- Partially weathered rock: 135 pcf.

Drained and Undrained Shear Strength – SPT Blow Counts

The shear strength parameters (drained) of the sluiced ash and saprolite encountered across the site were estimated using SPT-N values established in the field investigation and the piezometer logs. The parameters assigned to the materials were conservatively estimated based on engineering judgement and previous experience.

Drained and Undrained Shear Strength – Triaxial Testing

Shear Strength From Laboratory Triaxial Testing

Multiple historic laboratory triaxial tests (predominately from the 2016 AECOM exploration) were performed for the sluiced ash, embankment fill, and residuum over a range of confining pressures. In analyzing the test results, a number of definitions of failure were considered, including the point of peak deviator stress during the test, the deviator stress corresponding to an axial strain of 10%, and the point of the test with the maximum effective principle stress ratio (obliquity) from the tabulated CU test data. For both effective and total strength conditions, defining the failure point to coincide with the point of maximum deviator stress or the deviator stress at 10% strain (whichever came first) resulted in the most conservative interpretation of strength parameters, and this criterion was utilized herein. For UU testing, failure under undrained conditions was assumed to take place at the maximum deviator stress or at a maximum of 10% strain if there was no distinct maximum deviator stress.

As a result of having multiple laboratory CU tests, a failure envelope was defined for each material by plotting the failure points on a Modified Mohr-Coulomb plot (a p-q and p'-q plot), as described in Appendix D of the United States Corps of Engineers Engineer Manual EM-1110-2-1902 "Slope Stability."

For Plant Scherer, p-q and p'-q plots were constructed for each of the following materials based on multiple CU laboratory test data:

- Sluiced Ash
- Embankment Fill
- Residuum

The p-q relationship is as follows:

$$p = \tfrac{1}{2}(\sigma_3 + \sigma_1)$$
$$p' = \tfrac{1}{2}(\sigma'_3 + \sigma'_1)$$
$$q = \tfrac{1}{2}(\sigma_1 - \sigma_3)$$

Where:

σ_1 = total major principal stress at failure (axial stress)
σ'_1 = effective major principal stress at failure (axial stress)
σ_3 = total minor principal stress at failure (confining stress)
σ'_3 = effective minor principal stress at failure (confining stress)
p = mean total normal stress at failure
p' = mean effective normal stress at failure
q = shear stress at failure

A best fit line through the p-q and p'-q failure points will have an intercept of d and a slope of tangent α (or d' and α' for effective stress conditions). Equivalent Mohr-Coulomb parameters can then be computed as follows:

$\sin \phi = \tan y$ or $\sin \phi' = \tan y'$
$c = (d / \cos \phi)$ or $c' = (d' / \cos \phi')$

In fitting strength parameters to multiple test results, the US Army Corps of Engineers recommends selecting design parameters such that about two thirds of the total tests are above the failure envelope.

Total and effective stress p-q plots for the sluiced ash, embankment fill, and residuum materials are shown on **Figures 3 through 8** below. The calculated shear strength parameters are also shown.

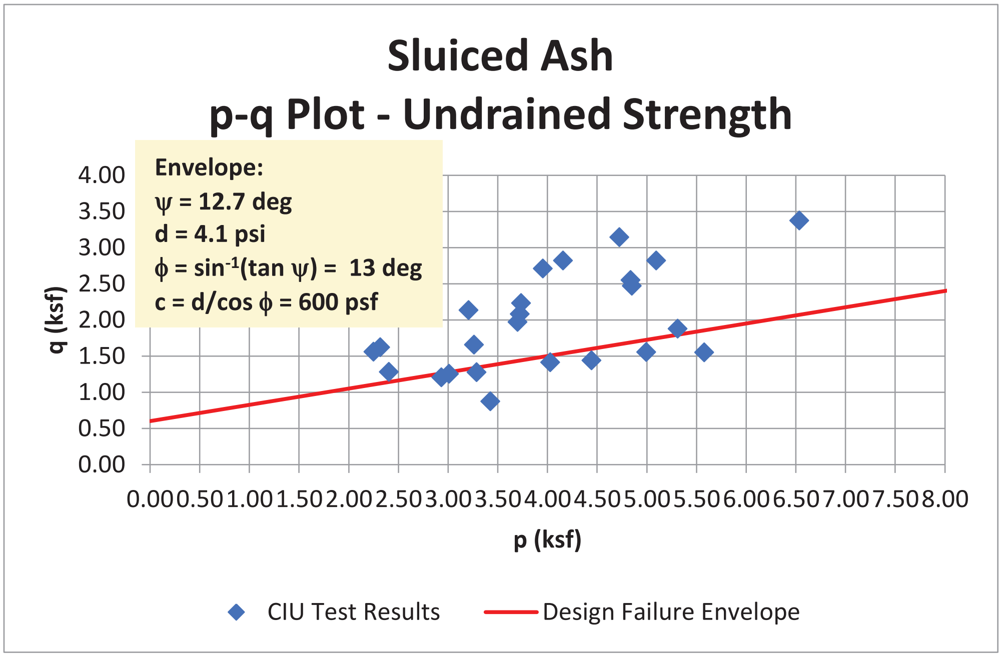


Figure 3. Total Strength P-Q Plot for Sluiced Ash at Plant Scherer

To be conservative, the results from the P-Q plot for the total stress of sluiced ash were further reduced by 30%. A conservative lower value consisting of a 10 degree friction angle with cohesion of 430 psf was used to represent the total stress of the sluiced ash.

Appendix A1

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**10** of **16**
Description	**Geotechnical Data and Material Properties**	Computed by	**SAL**	Date	**09/05/18**
		Checked by	**JLM**	Date	**05/22/18**

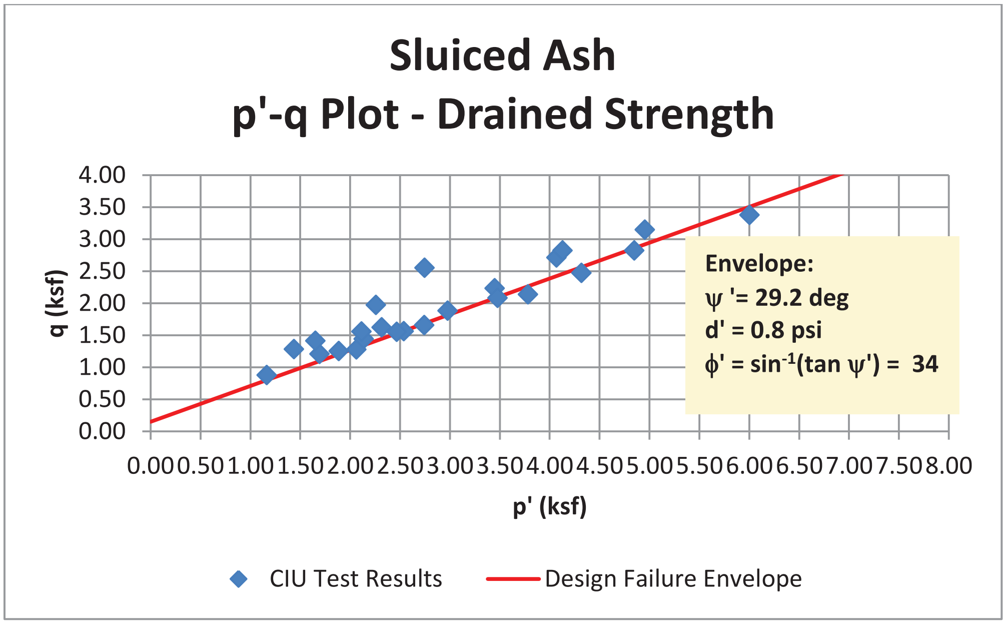


Figure 4. Effective Strength P-Q Plot for Sluiced Ash at Plant Scherer

To be conservative, the results from the P-Q plot for the effective stress of sluiced ash were applied to the proposed stacked ash for the analysis. A conservative lower value consisting of a 32 degree friction angle with no cohesion was used to represent the sluiced ash.

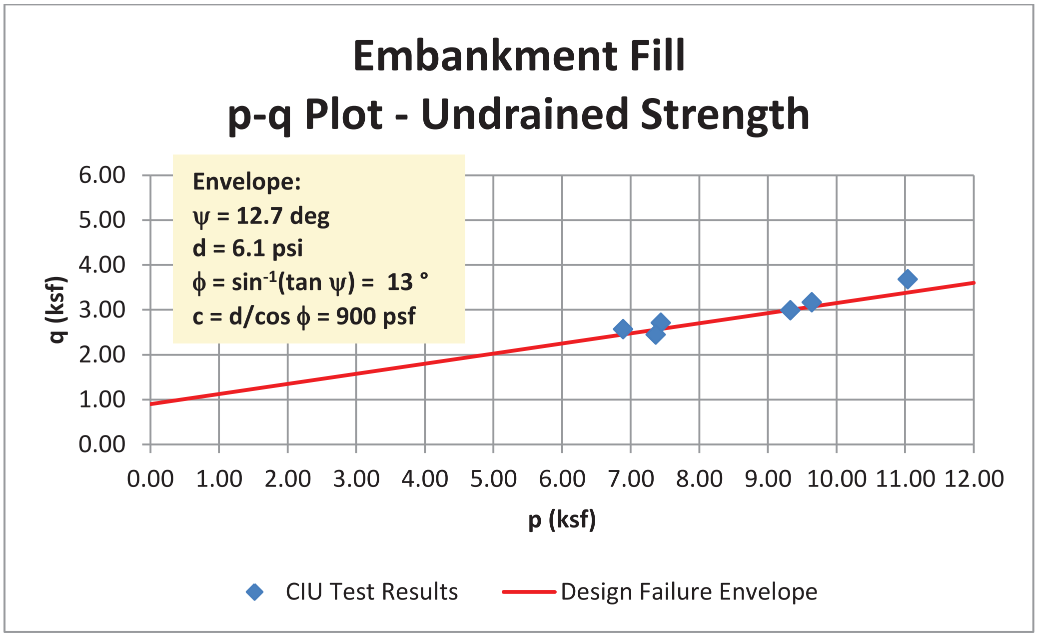


Figure 5. Total Strength P-Q Plot for Embankment FIll at Plant Scherer

Appendix A1

AECOM

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**11** of **16**
Description	**Geotechnical Data and Material**	Computed by	**SAL**	Date	**09/05/18**
	Properties	Checked by	**JLM**	Date	**05/22/18**

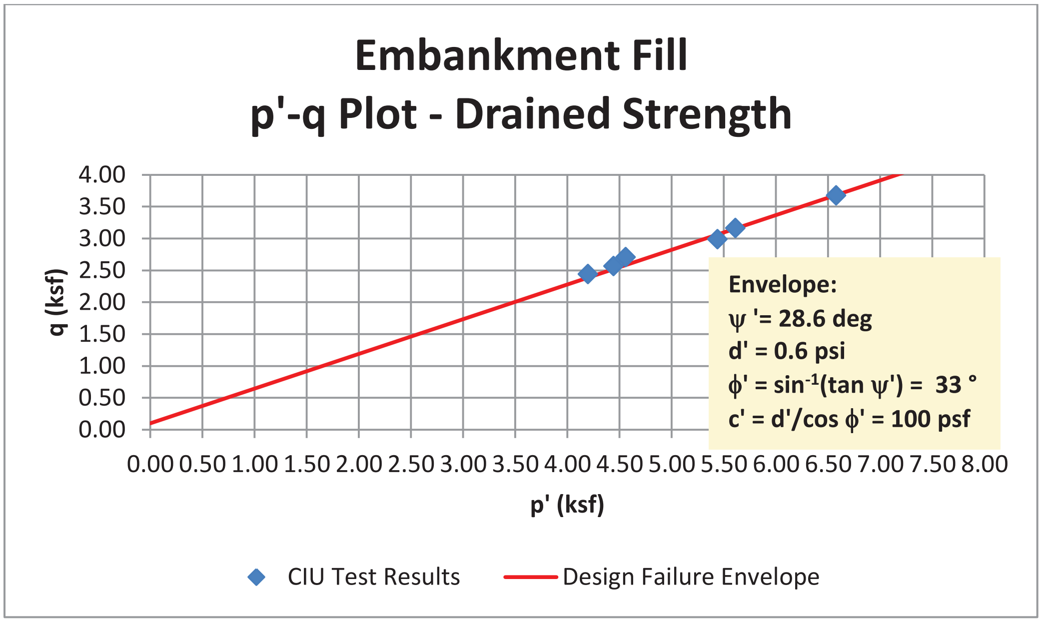


Figure 6. Effective Strength P-Q Plot for Embankment FIll at Plant Scherer

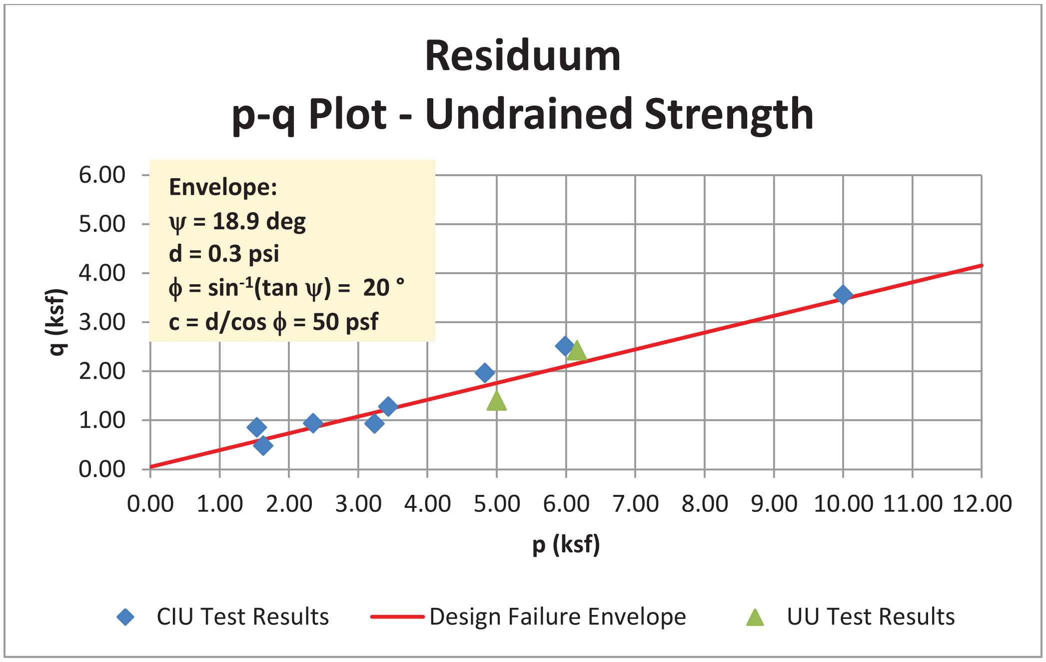


Figure 7. Total Strength P-Q Plot for Residuum at Plant Scherer

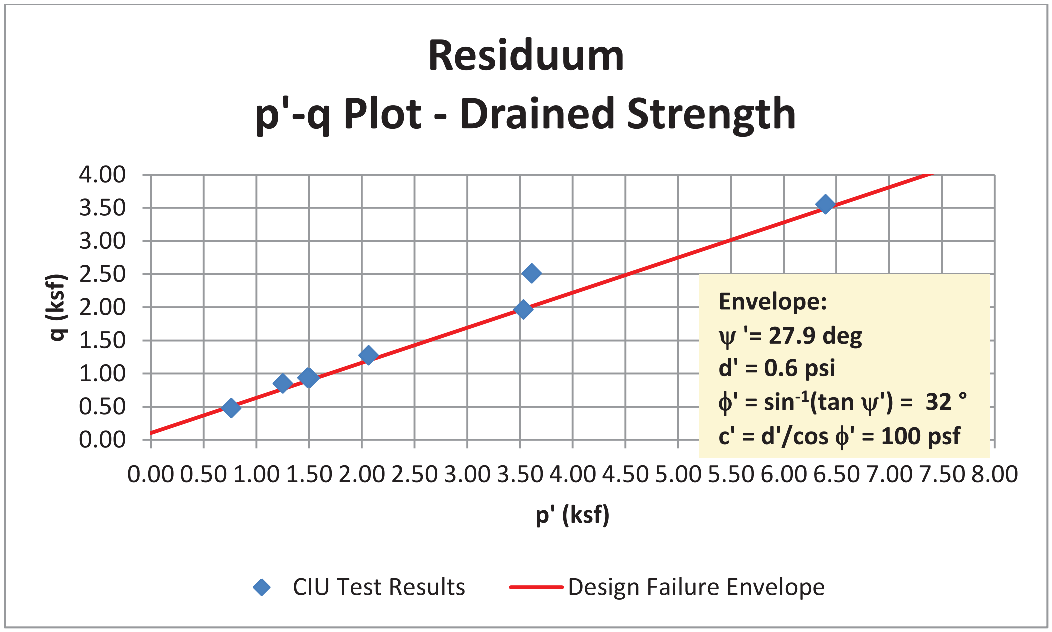
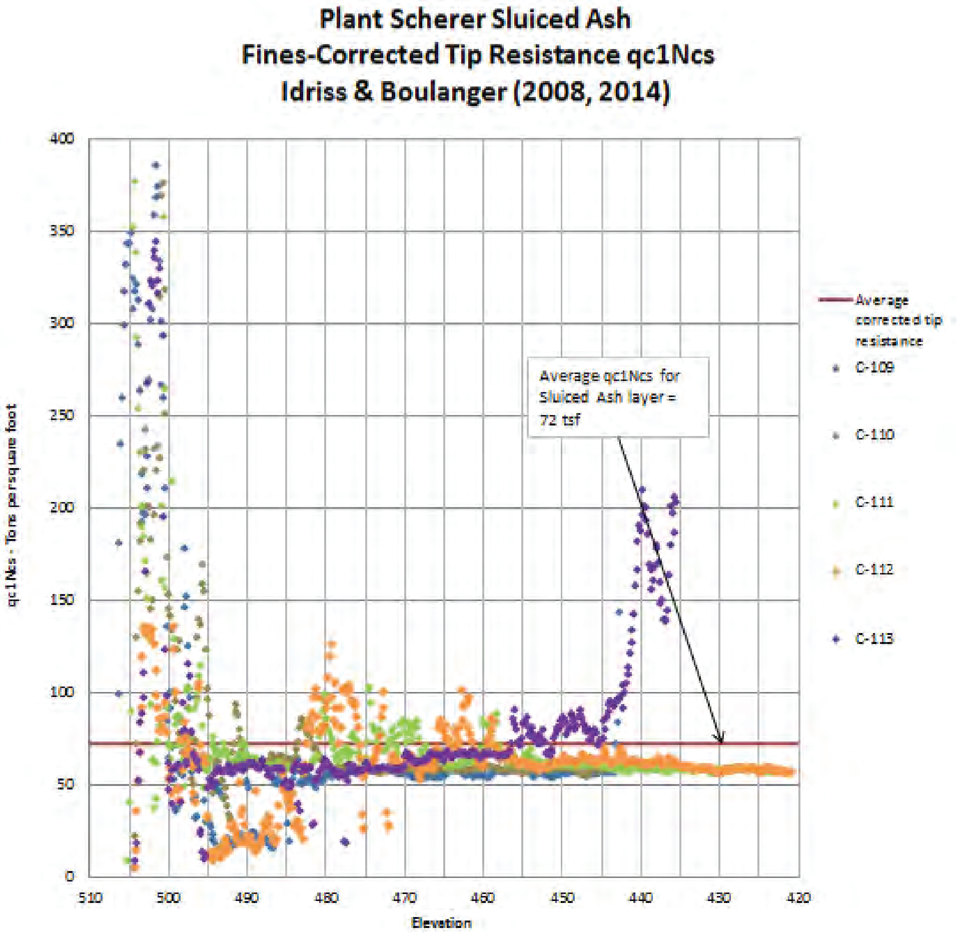


Figure 8. Effective Strength P-Q Plot for Residuum at Plant Scherer

Post-Earthquake Shear Strength of Sluiced Ash

The liquefied strength (residual strength) of ash was estimated following procedures in Idriss and Boulanger (2008, 2014). Strength estimates presented in those references are based on empirical observations and back-analyses made at actual sites that have experienced liquefaction in past earthquakes and is based on correlations with SPT and CPT results. It relates the residual strength of a liquefied sand or silt (non- or low-plasticity material) to the normalized, fines-corrected resistance (SPT N-value or CPT tip resistance). For the current evaluation, CPT-based correlations were utilized, as the available data set for CPT in the ash is substantially larger than SPT. CPT data points were taken every 0.05 meter (0.16 foot), essentially creating a continuous profile of data which were used to select the residual strength of the ash deposit.

The equivalent fines-corrected and normalized clean sand tip resistance, $q_{c1Ncs\text{ -}Sr}$ taken from each CPT data point were calculated for all intervals within the sluiced ash as part of the liquefaction triggering analyses presented in **Appendix A3**. The values were plotted on a single graph, shown in **Figure 9** below. The corrected tip resistance for which 50% of the collective data points are larger (median value) is also shown on the figure as a heavy line ($q_{c1Ncs\text{ -}Sr} = 72$). This value was conservatively selected as the basis for determining the residual strength of ash for modelling purposes.


Plant Scherer Sluiced Ash
Fines-Corrected Tip Resistance qc1Ncs
Idriss & Boulanger (2008, 2014)

Average qc1Ncs for Sluiced Ash layer = 72 tsf

Figure 9. Calculated Equivalent Clean Sand Normalized Tip Resistance – Ash Pond Sluiced Ash

Figure 10, reproduced from Idriss and Boulanger (2008), relates $q_{c1Ncs\text{ -}Sr}$ to the residual shear strength. The strength is expressed as a ratio of the existing vertical overburden stress at any point in the layer, i.e., S_r / σ'_v. For $q_{c1Ncs\text{ -}Sr}$ of 72, the estimated strength ratio is 0.075. Therefore, the ratio of 0.08 was selected to represent that portion of the sluiced ash material that is anticipated to liquefy, for use in the post-liquefaction stability analyses.

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**14** of **16**
Description	**Geotechnical Data and Material Properties**	Computed by	**SAL**	Date	**09/05/18**
		Checked by	**JLM**	Date	**05/22/18**

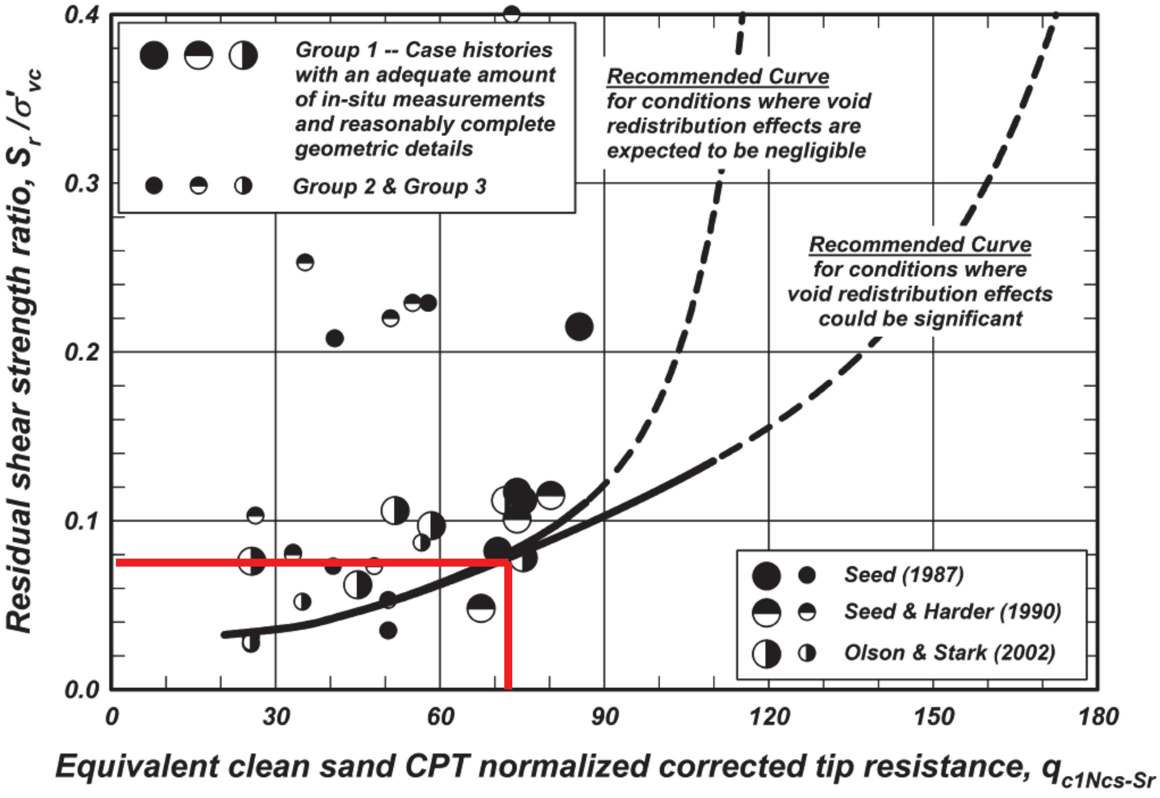


Figure 10. Steady-State Strength Ratio vs. Equivalent Clean Sand CPT Tip Resistance (Idriss and Boulanger, 2008)

VI. Material Properties for Analysis

The table below summarizes the material parameters used in the slope stability and veneer stability analyses based on the analysis and strength selection procedures and considerations presented in the preceding sections.

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**15** of **16**
Description	**Geotechnical Data and Material**	Computed by	**SAL**	Date	**09/05/18**
	Properties	Checked by	**JLM**	Date	**05/22/18**

Table F-9: Summary of Material Parameters used in Stability Analysis

Material	**Unit Weight (pcf)**	**Effective (drained) Shear Strength Parameters**		**Total (undrained) Shear Strength Parameters**		**Post-Liquefaction Shear Strength Parameters**	
		c' (psf)	Φ' (°)	c (psf)	Φ (°)	*τ/ σ ratio*	Minimum strength (psf)
Stacked Ash	95	150	34	150	34	-	-
Sluiced Ash	95	0	32	430	10	0.08	32
Embankment Fill	116	100	33	900	13	-	-
Berm Fill	116	100	33	900	13	-	-
Residuum	114	100	32	50	20	-	-
Saprolite	105	0	32	0	32	-	-
Partially Weathered Rock	135	300	35	300	35	-	-

VII. Limitations

This material properties report and AECOM geotechnical investigation was performed in accordance with the standard of care commonly used as state-of-practice in our profession. Specifically, our services have been performed in accordance with generally accepted principles and practices of the geological and geotechnical engineering profession. This warranty is in lieu of all other warranties, either express or implied. The conclusions presented in this report are professional opinions based on the indicated project criteria and data available at the time this report was prepared.

Background information, design basis, and other data have been furnished to AECOM by third parties, which AECOM has used in preparing this report. This includes logs of borings performed by other consultant for the project. AECOM has relied on this information as furnished, and is neither responsible for nor has confirmed the accuracy of this information. Our recommendations are based on available information from previous and current investigations. These recommendations will be updated as future investigations are performed.

The conclusions presented in this report are intended only for the purpose, site location, and project indicated. The recommendations made in this report are based on the assumption that the subsurface soil, rock, and groundwater conditions do not deviate appreciably from those disclosed in the site-specific exploratory borings. If any variations or undesirable conditions are encountered during construction, we should be notified so that additional recommendations can be made, if necessary.

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**16** of **16**
Description	**Geotechnical Data and Material**	Computed by	**SAL**	Date	**09/05/18**
	Properties	Checked by	**JLM**	Date	**05/22/18**

VIII. References

- AECOM (2016). Geotechnical Data Report: Phase 2 Closure Feasibility Study – Southern Company Services, Inc./Georgia Power Company Plant Scherer Ash Pond.
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- Thompson Engineering (2015). Logs for CPT-1 through CPT-7. June 11, 2015.
- United States Corps of Engineers (2003). Engineer Manual EM-1110-2-1902, Appendix D. Slope Stability.

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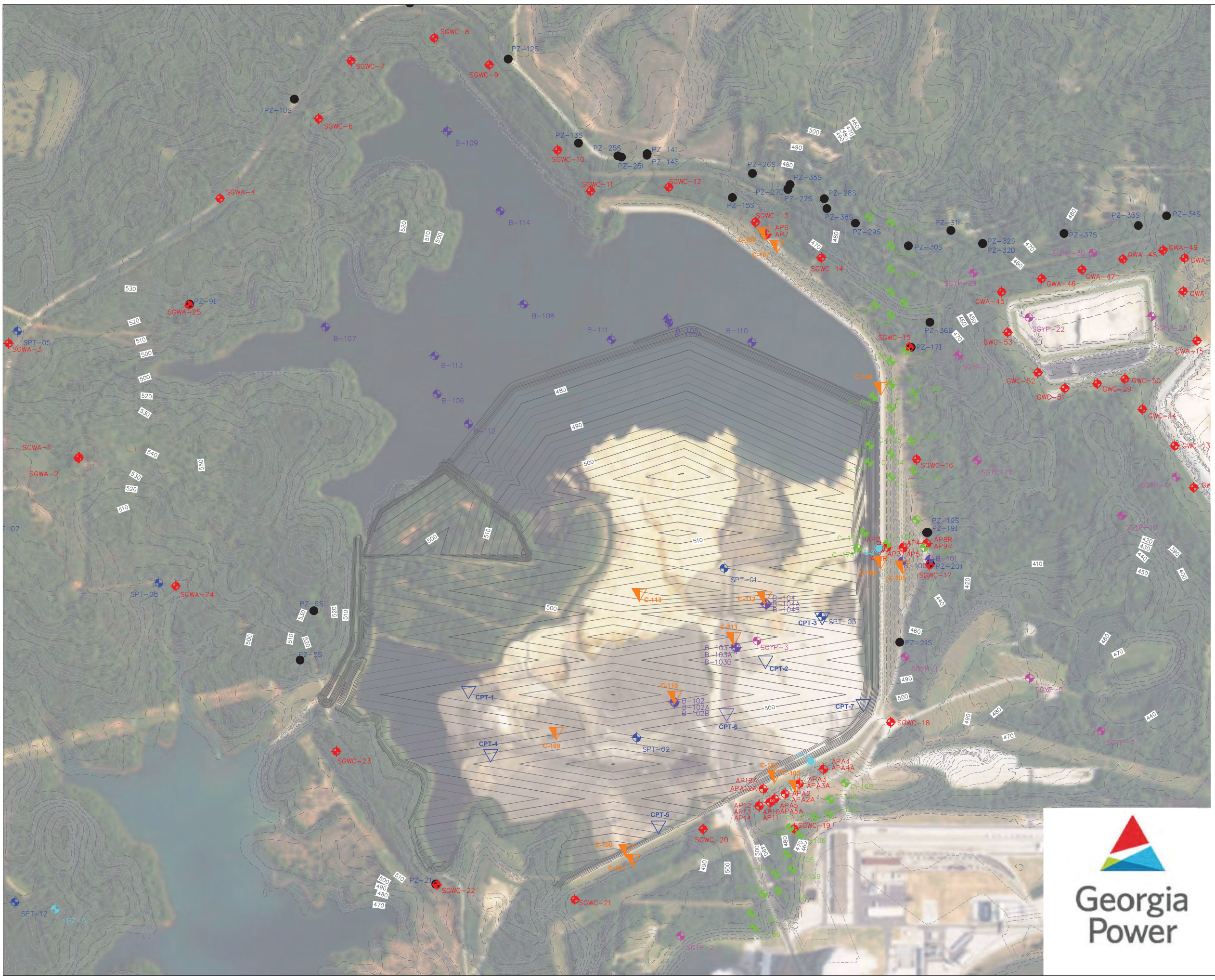

LEGEND

SGYP-7	EASTERN LANDFILL MONITORING WELL
SGWC-18	CCR MONITORING WELLS
C-156	1974 LAW ENGINEERING TESTING COMPANY BORINGS
AP9R	1985 GEORGIA POWER BORING
S-1	2010 SCS BORING LOCATION
LPZ-5	2015 GOLDER ASSOCIATES PIEZOMETER LOCATION
SPT-01	2015 SCS AS-BUILT SPT LOCATION
● PZ-29S	2015-2016 SCS PIEZOMETER LOCATION
C-103	2016 SCS CPT LOCATION
▽ CPT-7	2016 AECOM AS-BUILT CPT LOCATION
B-103	2016 AECOM AS-BUILD BORING LOCATION
——450——	PROPOSED MAJOR TOPO LINE
————	PROPOSED MINOR TOPO LINE
— — 450 — —	EXISTING MAJOR TOPO LINE
- - - - - -	EXISTING MINOR TOPO LINE

Georgia Power

CCR CLOSURE
FOR
GEORGIA POWER
PLANT SHERER ASH POND 1
MONROE COUNTY, GEORGIA

(919) 461-1100
WWW.AECOM.COM
AECOM
1600 PERIMETER PARK DRIVE
SUITE 400
MORRISVILLE, NC 27560

PROJ. NO.: 60563110	DWG.	EDIT
SCALE: 1" = 400'	GEOTECHNICAL SITE PLAN	
DATE: JUNE 5, 2018		

Table B-2
Monitoring Well and Piezometer Construction Details
Georgia EPD Engineering Permit Report
Plant Scherer
Monroe County, Georgia

Well ID	Well Previously named	Easting	Northing	TOC Elev (ft amsl)	Ground Elevation (ft amsl)	Diameter (inches)	Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Total Well Depth (ft bgs)	Lithology Screened In	Date Installed	Drilling Method	Geophysical log?
SGWA-1	APA-1/PZ-8S	2399899.287	1119232.658	546.81	543.97	2" PVC	40.5	50.5	50.9	SAP	2/11/2015	HSA/HQ Rock Core	
SGWA-2	APA-1I/PZ-8I	2399907.288	1119237.111	590.81	587.79	2" PVC	85.4	95.4	95.8	PWR	2/17/2015	HSA/HQ Rock Core	
SGWA-3	APA-2	2399295.720	1120224.560	545.65	542.47	6" PVC	40	50	50	SAP	11/18/2015	4-in Sonic	
SGWA-4	APA-3	2401124.350	1121478.042	547.27	544.25	6" PVC	50.5	60.5	60.5	SAP	11/17/2015	4-in Sonic	
SGWA-5	APA-4	2397426.720	1118087.173	508.11	505.32	6" PVC	20.2	30.2	30.2	SAP	11/18/2015	4-in Sonic	
SGWC-6	APC-1	2401979.450	1122168.292	510.57	507.94	6" PVC	15	25	25	SAP	11/12/2015	4-in Sonic	
SGWC-7	APC-2	2402259.670	1122669.570	506.05	503.02	6" PVC	25	35	35	PWR	11/11/2015	4-in Sonic	
SGWC-8	APC-3	2402979.660	1122866.662	513.93	511.05	6" PVC	30	40	40	PWR/FBR	11/10/2015	4-in Sonic	
SGWC-9	APC-4	2403455.820	1122635.284	510.37	507.61	6" PVC	25	35	35	SAP	11/6/2015	4-in Sonic	
SGWC-10	APC-5	2404047.170	1121896.649	510.37	507.61	6" PVC	20	30	30	SAP	11/5/2015	4-in Sonic	
SGWC-11	APC-6	2404332.790	1121542.388	511.28	508.6	6" PVC	30	40	40	SAP	10/28/2015	4-in Sonic	
SGWC-12	APC-7	2405009.680	1121576.067	500.29	497.35	6" PVC	37	47	47	SAP	10/30/2015	4-in Sonic	
SGWC-13	APC-8	2405760.640	1121274.076	482.58	480.05	6" PVC	25	35	35	SAP	11/4/2015	4-in Sonic	
SGWC-14	APC-9/PZ-16S	2406329.205	1120965.721	476.48	476.31	2" PVC	24.8	34.8	35.3	SAP	2/24/2015	HSA	Gamma
SGWC-15	APC-10/PZ-17S	2407092.841	1120191.238	483.27	480.04	2" PVC	34.8	44.8	45.2	SAP	2/26/2015	HSA	Gamma
SGWC-16	APC-11/PZ-18S	2407154.726	1119221.306	460.03	456.79	2" PVC	28.8	38.8	39.2	SAP	3/2/2015	HSA	Gamma
SGWC-17	APC-12/PZ-20S	2407266.725	1118309.038	417.96	414.73	2" PVC	14.1	24.1	24.5	SAP	3/11/2015	HSA	Gamma
SGWC-18	APC-13/PZ-22S	2406930.957	1116946.848	513.18	510.17	2" PVC	34.1	44.1	44.5	SAP	3/17/2015	HSA	Gamma
SGWC-19	APC-14/PZ-23S	2406096.077	1116024.669	478.67	475.71	2" PVC	24.2	34.2	34.6	SAP	3/18/2015	HSA	Gamma
SGWC-20	APC-15	2405307.580	1116020.766	504.44	501.12	6" PVC	15	25	25	SAP	11/19/2015	4-in Sonic	
SGWC-21	APC-16/PZ-1S	2404197.376	1115410.841	487.54	484.61	2" PVC	14.5	15.5	15.9	SAP	5/6/2015	HSA	Gamma
SGWC-22	APC-17/PZ-2S	2403002.383	1115540.735	518.07	515.46	2" PVC	36.5	46.5	46.9	SAP	1/22/2015	HSA	Gamma
SGWC-23	APC-18/PZ-4I	2402131.918	1116694.349	523.07	519.99	2" PVC	39.3	49.3	49.7	PWR	2/3/2015	HSA/HQ Rock Core	Gamma
SGWA-24	APA-5/PZ-7S	2400742.979	1118125.665	503.86	500.75	2" PVC	27.7	37.7	38.1	SAP	2/10/2015	HSA	Gamma
SGWA-25	APA-6/PZ-9S	2400856.491	1120556.049	526.39	923.08	2" PVC	34.6	44.6	45	SAP	2/18/2015	HSA	Gamma
PZ-2I		2402991.209	1115545.515	517.61	514.99	2" PVC	73.9	83.9	84.3	FBR	1/27/2015	HSA/HQ Rock Core	Gamma
PZ-5I		2401817.710	1117484.293	523.24	520.38	2" PVC	36.6	46.6	47	FBR	2/4/2015	HSA/HQ Rock Core	Gamma
PZ-6S		2401936.713	1117910.804	531.48	528.93	2" PVC	44.4	54.4	54.8	SAP	2/4/2015	HSA	Gamma
PZ-9i		2400862.201	1120563.315	527.49	523.25	2" PVC	69.8	79.8	80.2	PWR	2/19/2015	HSA/HQ Rock Core	Gamma
PZ-10S		2401768.261	1122338.553	516.81	513.85	2" PVC	24.5	34.5	35.9	SAP	2/2/2015	HSA	Gamma
PZ-11S		2402767.326	1123169.252	529.21	525.88	2" PVC	35.5	45.5	45.9	PWR	4/6/2015	HSA	Gamma
PZ-12S		2403619.041	1122685.579	517.65	514.53	2" PVC	34	44	44.4	SAP	3/31/2015	HSA	Gamma
PZ-13S		2404228.126	1121956.578	520.21	517.08	2" PVC	34.9	44.9	45.3	SAP	4/1/2015	HSA	Gamma
PZ-14S		2404820.413	1121852.656	511.86	508.55	2" PVC	34.5	44.5	44.9	SAP	3/26/2015	HSA	Gamma
PZ-14i		2404822.284	1121865.436	512.61	509.61	2" PVC	84.8	94.8	95.2	PWR	3/25/2015	HSA/HQ Rock Core	Gamma
PZ-15S		2405559.339	1121486.185	499.06	495.95	2" PVC	29.7	39.7	40.1	SAP	4/28/2015	HSA	Gamma
PZ-17I		2407106.304	1120190.514	483.23	480.18	2" PVC	86.7	96.7	97.3	FBR	2/27/2015	HSA/HQ Rock Core	Gamma
PZ-19S		2407241.350	1118587.897	417.67	414.66	2" PVC	14.6	24.6	25	SAP	3/4/2015	HSA	Gamma
PZ-19I		2407251.482	1118589.332	417.48	414.46	2" PVC	61.5	71.5	71.9	FBR	3/4/2015	HSA/HQ Rock Core	Gamma
PZ-20I		2407272.337	1118318.135	417.11	414.11	2" PVC	69.2	79.2	79.6	PWR	3/10/2015	HSA/HQ Rock Core	Gamma
PZ-21S		2407007.551	1117638.787	473.42	470.46	2" PVC	13	23	23.4	SAP	3/12/2015	HSA	Gamma
PZ-25S		2404567.730	1121847.250	527.91	525.47	2" PVC	45	55	55.2	SAP	5/25/2016	Rotosonic	
PZ-25I		2404573.180	1121836.940	528.09	525.7	2" PVC	115	125	125.2	SAP	5/24/2016	Rotosonic	
PZ-26S		2405730.730	1121695.550	491.36	488.88	2" PVC	35	45	45.2	SAP	6/1/2016	Rotosonic	
PZ-27S		2406028.420	1121564.130	475.57	472.96	2" PVC	35	45	45.5	PWR	5/26/2016	Rotosonic	
PZ-27D		2406021.760	1121559.390	475.18	472.41	2" PVC	104.5	124.5	124.7	FBR	6/17/2016	Rotosonic	
PZ-28I		2406375.090	1121393.050	483.91	481.32	2" PVC	59	69	69.2	FBR	6/3/2016	Rotosonic	
PZ-29S		2406618.220	1121267.680	491.02	488.43	2" PVC	35	45	45.2	PWR	5/26/2016	Rotosonic	
PZ-30I		2407079.440	1121071.970	478.03	475.42	2" PVC	75	85	85.2	PWR	6/2/2016	Rotosonic	
PZ-31i		2407445.610	1121202.950	466.56	463.8	2" PVC	64	74	74.2	FBR	6/2/2016	Rotosonic	

Table B-2

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Plant Scherer
Monroe County, Georgia

Well ID	Well Previously named	Easting	Northing	TOC Elev (ft amsl)	Ground Elevation (ft amsl)	Diameter (inches)	Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Total Well Depth (ft bgs)	Lithology Screened In	Date Installed	Drilling Method	Geophysical log?
PZ-32S		2407718.240	1121089.770	464.82	462.28	2" PVC	45	55	55.2	PWR	6/1/2016	Rotosonic	
PZ-32D		2407697.300	1121089.240	465.18	462.32	2" PVC	96	126	126.2	FBR	6/1/2016	Rotosonic	
PZ-33I		2409063.680	1121244.080	469.08	466.25	2" PVC	66	76	76.2	PWR	6/8/2016	Rotosonic	
PZ-34S		2409289.270	1121329.680	443.37	440.78	2" PVC	35.5	45.5	45.7	SAP/PWR	6/4/2016	Rotosonic	
PZ-35I		2406059.000	1121598.010	474.17	474.53	2" PVC	45	55	55.2	PWR	6/22/2016	Rotosonic	
PZ-36I		2407255.930	1120409.990	481.42	478.85	2" PVC	85	95	95.2	FBR	6/5/2016	Rotosonic	
PZ-37I		2408419.620	1121177.670	482.02	479.54	2" PVC	61	71	71.2	PWR/FBR	6/2/2016	Rotosonic	
PZ-38I		2406354.140	1121475.860	481.96	482.1	2" PVC	64	74	74.2	PWR	6/23/2016	Rotosonic	
GWC-1		2411556.160	1120077.830	374.75	371.54	2" PVC	24.69	34.69	34.99	SAP	10/28/2009	HSA	
GWC-2		2411493.240	1119816.770	380.03	376.91	2" PVC	44.78	54.78	55.08	SAP	10/8/2009	HSA	
GWC-3		2411202.800	1119614.010	410.22	407.19	2" PVC	36.4	46.4	46.7	SAP/PWR	10/29/2009	HSA	
GWC-4		2411041.630	1119256.250	411.57	408.31	2" PVC	29.7	39.7	40	SAP/PWR	11/21/2009	HSA	
GWC-5		2411025.700	1118897.720	396.50	393.18	2" PVC	20.43	30.43	30.73	SAP/PWR	10/22/2009	HSA/HQ Rock Core	
GWC-6		2410872.480	1118575.720	415.70	412.36	2" PVC	34.86	44.86	45.16	PWR	10/21/2009	HSA/HQ Rock Core	
GWC-7		2410645.830	1118243.660	418.07	414.29	2" PVC	44.57	54.57	54.87	SAP/PWR	10/20/2009	HSA	
GWC-8		2410435.830	1117934.460	407.80	404.76	2" PVC	40.18	50.18	50.48	PWR	10/20/2009	HSA	
GWC-9		2410167.440	1117955.520	386.01	383.02	2" PVC	6.79	16.79	17.09	SAP	11/4/2009	HSA	
GWC-10		2410018.160	1118306.840	392.68	389.3	2" PVC	21.39	31.39	31.69	SAP	11/3/2009	HSA	
GWC-11		2409778.450	1118649.130	402.19	399.06	2" PVC	21	31	31.3	SAP	11/3/2009	HSA	
GWC-12		2409554.100	1118978.200	412.75	409.54	2" PVC	24.22	34.22	34.52	SAP	11/3/2009	HSA	
GWC-13		2409390.710	1119338.880	419.58	416.54	2" PVC	29.99	39.99	40.29	SAP	11/2/2009	HSA	
GWC-14		2409111.270	1119655.060	403.41	400.25	2" PVC	14.07	24.07	24.37	SAP	11/4/2009	HSA	
GWA-15		2409282.000	1120009.780	414.82	411.82	2" PVC	16.19	26.19	26.49	SAP	11/4/2009	HSA	
GWA-16		2409579.590	1120248.790	444.06	440.74	2" PVC	44.2	54.2	54.5	SAP/PWR	10/13/2009	HSA	
GWA-17		2409946.330	1120211.100	445.63	442.72	2" PVC	33.55	43.55	43.85	PWR	9/28/2009	HSA	
GWC-18		2410261.900	1119998.620	439.64	436.36	2" PVC	46.81	56.81	57.11	SAP	9/29/2009	HSA	
GWC-19		2410712.920	1119645.900	429.98	426.12	2" PVC	43.84	53.84	54.14	PWR	10/2/2009	HSA	
GWC-20		2411195.260	1119950.630	426.09	422.82	2" PVC	59.13	69.13	69.43	SAP/PWR	10/6/2009	HSA	
GWA-21		2409462.770	1120675.770	422.30	419.56	2" PVC	8	18	18	SAP	6/29/2010	Sonic	
GWA-22		2409473.480	1120962.580	444.23	441.75	2" PVC	30	40	40	PWR	6/29/2010	Sonic	
GWC-29		2408717.920	1119875.660	399.39	396.69	2" PVC	14	24	24	SAP	6/28/2010	Sonic	
GWA-45		2407889.430	1120669.520	450.89	447.98	2" PVC	23	33	33	SAP	6/23/2010	Sonic	
GWA-46		2408235.720	1120783.750	460.86	458.1	2" PVC	33.5	43.5	43.5	SAP	6/23/2010	Sonic	
GWA-47		2408585.250	1120862.990	465.55	462.81	2" PVC	45	55	55	SAP/PWR	6/22/2010	Sonic	
GWA-48		2408939.900	1120953.850	461.47	458.73	2" PVC	60	70	70	FBR	6/22/2010	Sonic	
GWA-49		2409288.700	1121030.470	432.61	429.96	2" PVC	27.5	37.5	37.5	SAP	6/21/2010	Sonic	
GWC-50		2408955.890	1119917.650	406.92	404.16	2" PVC	24.5	34.5	34.5	SAP/PWR	6/28/2010	Sonic	
GWC-51		2408437.100	1119835.850	409.89	406.88	2" PVC	16.5	26.5	26.5	SAP	6/28/2010	HSA	
GWC-52		2408203.870	1119972.460	416.89	414.14	2" PVC	20	30	30	SAP	6/24/2010	Sonic	
GWC-53		2407942.970	1120319.920	435.57	432.93	2" PVC	20	30	30	SAP	6/23/2010	Sonic	
LPZ-1		2398512.884	1117001.063	553.16	549.84	2" PVC	54'	64	64	PWR/FBR	11/10/2015	HSA/HQ Rotary	
LPZ-2		2398005.522	1119972.986	513.96	510.46	2" PVC	10'	20	20	SAP	11/20/2015	HSA/HQ Rotary	
LPZ-3		2398656.589	1117884.204	515.11	511.48	2" PVC	25'	35	34.1	SAP	11/18/2015	HSA/HQ Rotary	
LPZ-4		2397083.703	1115963.340	461.06	457.83	2" PVC	18'	28	28.5	SAP	11/19/2015	HSA/HQ Rotary	
LPZ-5		2399698.731	1115329.718	524.28	520.97	2" PVC	42.1'	52.1	51.7	SAP	11/5/2015	HSA/HQ Rotary	
B-102A		2,405,054	1,117,122	507.3	504.4	2" PVC	49.7'	54.3	60	CCR	4/8/2016	HSA	
B-102B		2,405,057	1,117,126	506.6	504.4	2" PVC	15.3'	20.3	20.6	CCR	4/8/2016	HSA	
B-103A		2,405,595	1,117,590	508.9	505.8	2" PVC	55.8'	60	60.3	CCR	4/5/2016	HSA	
B-103B		2,405,594	1,117,596	508.9	525.8	2" PVC	15'	20	20	CCR	3/29/2016	HSA	
B-104A		2,405,846	1,117,967	507.5	504.2	2" PVC	55'	60	60	CCR	3/31/2016	HSA	
B-104B		2,405,851	1,117,972	507.2	504.1	2" PVC	15'	20	20	CCR	3/31/2016	HSA	

Table B-2

Monitoring Well and Piezometer Construction Details
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Well ID	Well Previously named	Easting	Northing	TOC Elev (ft amsl)	Ground Elevation (ft amsl)	Diameter (inches)	Depth to Top of Screen (ft bgs)	Depth to Bottom of Screen (ft bgs)	Total Well Depth (ft bgs)	Lithology Screened In	Date Installed	Drilling Method	Geophysical log?
AP1R		2406844.490	1118448.308	508.380	NA	4" GS	114.4	124.1	124.4	SAP	5/3/2000		
AP2		2406844.247	1118466.944	509.210	NA	NA	NA	NA	NA	NA	NA		
APA2A		2406015.430	1116326.17	473.110	NA	NA	NA	NA	NA	NA	NA		
APA2		2406017.332	1116326.835	472.820	NA	4" GS	24	29	29		5/20/1986		
AP3		2406897.847	1118458.705	495.340	NA	NA	NA	NA	NA	NA	NA		
APA3A		2406137.451	1116414.664	481.130	NA	4" GS	3	8	8	SAP	5/20/1986		
APA3		2406140.776	1116416.122	481.320	NA	4" GS	22	27	27		5/20/1986		
AP4		2407038.779	1118463.806	457.540	NA	NA	NA	NA	NA	NA	NA		
AP5		2407039.246	1118451.359	457.390	NA	NA	NA	NA	NA	NA	NA		
APA4A		2406349.895	1116540.949	483.860	NA	4" GS	8.5	13.5	13.5	SAP	5/12/1986		
APA4		2406349.675	1116541.17	485.360	NA	4" GS	35.5	40.5	40.5		5/13/1986		
APA5		2405926.811	1116282.42	475.370	472.02	4" GS	37.0	42.0	42		5/21/1986		
APA5A		2405929.020	1116283.697	475.340	471.9	4" GS	19.0	24.0	24	SAP	5/21/1986		
AP6		2405851.502	1121166.564	484.230	NA	4.5" SS	33.5	38.5	38.5		4/10/1985		
AP7		2405853.689	1121165.367	483.720	NA	4.5" SS	6.5	11.5	11.5		4/10/1985		
AP8R		2407239.783	1118493.325	413.850	411.4	4" GS	7.0	11.4	12	SAP	5/9/2000		
AP9R		2407245.201	1118491.264	414.310	411.51	4" GS	30.1	34.8	35.1	SAP	5/9/2000		
AP10		2405882.537	1116253.005	472.930	470.63	6" SS	46.0	51.0	51	SAP	4/10/1985		
AP11		2405886.985	1116254.145	474.050	471	4.5" SS	20.0	25.0	25	PWR	4/12/1985		
AP12		2405793.374	1116223.681	477.170	475.14	4" GS	38	43	43	SAP	6/3/1986		
APA12		2405827.369	1116370.212	507.110	NA	4" GS	74	79	79	SAP	6/3/1986		
APA12A		2405827.342	1116370.162	507.030	NA	4" GS	50	55	55		6/3/1986		
AP13		2405792.231	1116223.511	479.300	475.14	4" GS	23	28	28		5/29/1986		
AP14		2405789.221	1116221.073	479.690	476.01	4" GS	2	12	12		5/29/1986		

NOTES:
SAP - Saprolite
PWR - Partially Weathered Rock
FBR - Fractured Bedrock
NA - Not Available

Table B-3

Monitoring Well and Piezometer Lithology
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Well ID	Previously named	Easting	Northing	GS Elev	Unit	Depth to Top of Unit (ft bgs)	Top of Unit Elevation (ft AMSL)	Depth to Bottom of Unit (ft bgs)	Bottom of Unit Elevation (ft AMSL)
SGWA-1	APA-1/PZ-8S	2399899.287	1119232.658	543.97	RES	0	543.97	13	530.97
					SAP	13	530.97		543.97
					Bottom of borehole	50.9	493.07		543.97
SGWA-2	APA-1I/PZ-8I	2399907.288	1119237.111	587.79	RES	0	587.79	19	568.79
					SAP	19	568.79	73	514.79
					PWR	73	514.79		
					Bottom of borehole	95.8	491.99		
SGWA-3	APA-2	2399295.720	1120224.560	542.47	Overburden	0	542.47	16	526.47
					SAP	16	526.47		
					Bottom of borehole	50	492.47		
SGWA-4	APA-3	2401124.350	1121478.042	544.25	Overburden	0	544.25	5	539.25
					SAP	5	539.25		
					PWR	63	481.25		
					Bottom of borehole	67	477.25		
SGWA-5	APA-4	2397426.720	1118087.173	505.32	Overburden	0	505.32	8	497.32
					SAP	8	497.32		
					Bottom of borehole	30	475.32		
SGWC-6	APC-1	2401979.450	1122168.292	507.94	Overburden	0	507.94	5	502.94
					SAP	5	502.94		
					Bottom of borehole	25	482.94		
SGWC-7	APC-2	2402259.670	1122669.570	503.02	Overburden	0	503.02	10	493.02
					SAP	10	493.02	17	486.02
					PWR	17	486.02		
					Bottom of borehole	35	468.02		
SGWC-8	APC-3	240.2979.66	1122866.662	511.05	Overburden	0	511.05	5	506.05
					SAP	5	506.05	25	486.05
					PWR	25	486.05	35	476.05
					FBR	35	476.05		
					Bottom of borehole	40	471.05		
SGWC-9	APC-4	2403455.820	1122635.284	507.61	Overburden	0	507.61	5	502.61
					SAP	5	502.61		
					Bottom of borehole	35	472.61		
SGWC-10	APC-5	2404047.170	1121896.649	507.61	Overburden	0	507.61	10	497.61
					SAP	10	497.61		
					Bottom of borehole	30	477.61		
SGWC-11	APC-6	2404332.790	1121542.388	508.6	Overburden	0	508.6	10	498.6
					SAP	10	498.6		
					Bottom of borehole	40	468.6		
SGWC-12	APC-7	2405009.680	1121576.067	497.35	Overburden	0	497.35	5	492.35
					SAP	5	492.35		
					Bottom of borehole	47.6	449.75		
SGWC-13	APC-8	2405760.640	1121274.076	480.05	Overburden	0	480.05	10	470.05
					SAP	10	470.05		
					Bottom of borehole	35	445.05		
SGWC-14	APC-9/PZ-16S	2406329.205	1120965.721	476.31	RES	0	476.31	13	463.31
					SAP	13	463.31		
					Bottom of borehole	35.3	441.01		
SGWC-15	APC-10/PZ-17S	2407092.841	1120191.238	480.04	RES	0	480.04	9	471.04
					SAP	9	471.04		
					Bottom of borehole	45.2	434.84		
SGWC-16	APC-11/PZ-18S	2407154.726	1119221.306	456.79	RES	0	456.79	13	443.79
					SAP	13	443.79		
					Bottom of borehole	40.2	416.59		
SGWC-17	APC-12/PZ-20S	2407266.725	1118309.038	414.73	RES	0	414.73	13	401.73
					SAP	13	401.73		
					Bottom of borehole	24.5	390.23		
SGWC-18	APC-13/PZ-22S	2406930.957	1116946.848	510.17	FILL	0	510.17	18	492.17
					SAP	18	492.17		
					Bottom of borehole	44.5	465.67		
SGWC-19	APC-14/PZ-23S	2406096.077	1116024.669	475.71	FILL	0	475.71	13	462.71
					SAP	13	462.71		
					Bottom of borehole	34.6	441.11		
SGWC-20	APC-15	2405307.580	1116020.766	501.12	Overburden	0	501.12	10	491.12
					SAP	10	491.12		
					Bottom of borehole	25	476.12		
SGWC-21	APC-16/PZ-1S	2404197.376	1115410.841	484.61	RES	0	484.61	9	475.61
					SAP	9	475.61		
					Bottom of borehole	24.9	459.71		
SGWC-22	APC-17/PZ-2S	2403002.383	1115540.735	515.46	FILL	0	515.46	8	507.46
					RES	8	507.46	14	501.46
					SAP	14	501.46		
					Bottom of borehole	50.1	465.36		
SGWC-23	APC-18/PZ-4I	2402131.918	1116694.349	519.99	RES	0	519.99	8	511.99
					SAP	8	511.99	35	484.99
					PWR	35	484.99		
					Bottom of borehole	49.7	470.29		519.99
SGWA-24	APA-5/PZ-7S	2400742.979	1118125.665	500.75	RES	0	500.75	9	491.75
					SAP	9	491.75		
					Bottom of borehole	40	460.75		
SGWA-25	APA-6/PZ-9S	2400856.491	1120556.049	923.08	RES	0	923.08	19	904.08
					SAP	19	904.08		
					Bottom of borehole	45	878.08		
PZ-2I		2402991.209	1115545.515	514.99	FILL	0	514.99	18	496.99
					SAP	18	496.99	68	446.99
					PWR	68	446.99	75	439.99
					FBR	75	439.99		
					Bottom of borehole	84.3	430.69		
PZ-3S					FILL	0	0	9	-9
					SAP	9	-9		
					Bottom of borehole	50	-50		

Table B-3

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Well ID	Previously named	Easting	Northing	GS Elev	Unit	Depth to Top of Unit (ft bgs)	Top of Unit Elevation (ft AMSL)	Depth to Bottom of Unit (ft bgs)	Bottom of Unit Elevation (ft AMSL)
PZ-5I		2401817.710	1117484.293	520.38	FILL	0	520.38	9	511.38
					SAP	9	511.38	34	486.38
					PWR	34	486.38	36	484.38
					FBR	36	484.38		
					Bottom of borehole	47.2	473.18		
PZ-6S		2401936.713	1117910.804	528.93	RES	0	528.93	14	514.93
					SAP	14	514.93	54.8	474.13
					PWR	54.8	474.13		
					Bottom of borehole	54.8	474.13		
PZ-9i		2400862.201	1120563.315	523.25	RES	0	523.25	14	509.25
					SAP	14	509.25	60.5	462.75
					PWR	60.5	462.75		
					Bottom of borehole	80.2	443.05		
PZ-10S		2401768.261	1122338.553	513.85	RES	0	513.85	14	499.85
					SAP	14	499.85		
					Bottom of borehole	34.9	478.95		
PZ-11S		2402767.326	1123169.252	525.88	SAP	9	516.88	34	491.88
					PWR	34	491.88		525.88
					Bottom of borehole	45.9	479.98		
PZ-12S		2403619.041	1122685.579	514.53	SAP	9	505.53		514.53
					Bottom of borehole	44.4	470.13		
PZ-13S		2404228.126	1121956.578	517.08	FILL	0	517.08	14	503.08
					SAP	14	503.08		
					Bottom of borehole	45.3	471.78		
PZ-14S		2404820.413	1121852.656	508.55	SAP	9	499.55		
					Bottom of borehole	44.9	463.65		
PZ-14i		2404822.284	1121865.436	509.61	SAP	9	500.61	64	445.61
					PWR	64	445.61	86	423.61
					FBR	86	423.61		
					Bottom of borehole	95.2	414.41		
PZ-15S		2405559.339	1121486.185	495.95	FILL	0	495.95	14	481.95
					SAP	14	481.95		
					Bottom of borehole	40.1	455.85		
PZ-17I		2407106.304	1120190.514	480.18	RES	0	480.18	14	466.18
					SAP	14	466.18	68	412.18
					PWR	68	412.18	89	391.18
					FBR	89	391.18		
					Bottom of borehole	97.3	382.88		
PZ-19S		2407241.350	1118587.897	414.66	SAP	9	405.66		9
					Bottom of borehole	25	389.66		
PZ-19I		2407251.482	1118589.332	414.46	RES	0	414.46	13	401.46
					SAP	13	401.46	53	361.46
					PWR	53	361.46		
					Bottom of borehole	71.9	342.56		
PZ-20I		2407272.337	1118318.135	414.11	RES	0	414.11	13	401.11
					SAP	13	401.11	60	354.11
					PWR	60	354.11		
					Bottom of borehole	79.6	334.51		
PZ-21S		2407007.551	1117638.787	470.46	RES	0	470.46	14	456.46
					SAP	14	456.46		
					Bottom of borehole	25	445.46		
PZ-23I					FILL	0	0	13	-13
					SAP	13	-13	65	-65
					PWR	65	-65	87	-87
					FBR	87	-87		
					Bottom of borehole	86.8	-86.8		
PZ-24S					SAP	11	-11		
					Bottom of borehole	28.9	-28.9		
PZ-25S		1121846.860	2404569.120		Well-graded sand wi	0	0	26	-26
					Sandy Silt	26	-26	36	-36
					Elastic Silt	36	-36		
					Bottom of borehole	56	-56		
PZ-25I		1121836.050	2404599.780		Well-graded sand wi	0	0	26	-26
					Sandy Silt	26	-26	36	-36
					Elastic Silt	36	-36	56	-56
					SAP	56	-56		
					Bottom of borehole	126	-126		
PZ-26S		1121694.340	2405733.540		Lean Clay	0	0	10	-10
					Sandy Silt	10	-10	18	-18
					Poorly-graded sand v	18	-18	33	-33
					Elastic Silt	33	-33	35	-35
					Silty Sand	35	-35	43	-43
					Poorly-graded sand	43	-43	45	-45
					Silty Sand	45	-45		
					Bottom of borehole	46	-46		
PZ-27S		1121560.770	2406040.280		Clayey Sand	0	0	2	-2
					Lean Clay	2	-2	9	-9
					Well-graded sand wi	9	-9	27	-27
					Clayey Sand	27	-27	32	-32
					PWR	32	-32		
					Bottom of borehole	46	-46		
PZ-27D		1121557.130	2406040.290		Clayey Sand	0	0	2	-2
					Lean Clay	2	-2	9	-9
					Well-graded sand wi	9	-9	27	-27
					Clayey Sand	27	-27	32	-32
					PWR	32	-32	56	-56
					FBR	56	-56		
					Bottom of borehole	126	-126		
PZ-28I		1121390.920	2406377.780		RES	0	0	12	-12
					SAP	12	-12	47	-47
					PWR	47	-47	58	-58
					FBR	58	-58		
					Bottom of borehole	70	-70		
PZ-29S		1121264.410	2406623.250		Sandy Lean Clay	0	0	2	-2
					Sandy Silt	2	-2	22	-22
					PWR	22	-22		
					Bottom of borehole	46	-46		

Table B-3

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Well ID	Previously named	Easting	Northing	GS Elev	Unit	Depth to Top of Unit (ft bgs)	Top of Unit Elevation (ft AMSL)	Depth to Bottom of Unit (ft bgs)	Bottom of Unit Elevation (ft AMSL)
PZ-30I		1121069.520	2407083.370		RES	0	0	31	-31
					SAP	31	-31	56	-56
					PWR	56	-56		
					Bottom of borehole	87	-87		
PZ-31i		1121201.760	2407450.470		RES	0	0	28	-28
					SAP	28	-28	39	-39
					PWR	39	-39	68	-68
					FBR	68	-68		
					Bottom of borehole	77	-77		
PZ-32S		1121089.930	2407726.520		RES	0	0	6	-6
					Clayey Sand	6	-6	13	-13
					Sandy Silt	13	-13	15	-15
					Silty Sand	15	-15	29	-29
					Sandy Silt	29	-29	36	-36
					Poorly-graded sand v	36	-36	45	-45
					PWR	45	-45		
					Bottom of borehole	57	-57		
PZ-32D		1121086.290	2407726.530		RES	0	0	6	-6
					Clayey Sand	6	-6	13	-13
					Sandy Silt	13	-13	15	-15
					Silty Sand	15	-15	29	-29
					Sandy Silt	29	-29	36	-36
					Poorly-graded sand v	36	-36	45	-45
					PWR	45	-45	76	-76
					FBR	76	-76		
					Bottom of borehole	126.5	-126.5		
PZ-33I		1121243.790	2409073.690		Sandy Lean Clay	0	0	6	-6
					Sandy Silt	6	-6	13	-13
					Well-graded sand wit	13	-13	27	-27
					Clayey Sand	27	-27	40	-40
					Well-graded sand wit	40	-40	56	-56
					PWR	56	-56		
					Bottom of borehole	76.5	-76.5		
PZ-34S		1121328.320	2409318.430		Lean Clay	0	0	7	-7
					Sandy Silt	7	-7	8	-8
					Elastic Silt	8	-8	11	-11
					Well-graded sand wit	11	-11	15	-15
					SAP	15	-15	42	-42
					PWR	42	-42		
					Bottom of borehole	46	-46		
PZ-35I		1121597.940	2406059.150		Sandy Silt	0	0	2	-2
					Poorly-graded sand v	2	-2	5	-5
					Clayey Sand	5	-5	8	-8
					Poorly-graded sand v	8	-8	24	-24
					Well-graded sand wit	24	-24	32	-32
					Poorly-graded sand	32	-32	36	-36
					SAP	36	-36	51	-51
					PWR	51	-51		
					Bottom of borehole	56	-56		
PZ-36I		1120407.980	2407269.420		Silt	0	0	21	-21
					SAP	21	-21	65	-65
					PWR	65	-65	80	-80
					FBR	80	-80		
					Bottom of borehole	97	-97		
PZ-37I		1121176.050	2408430.710		Silt/Silty Sand	0	0	53	-53
					SAP	53	-53	63	-63
					PWR	63	-63	67	-67
					FBR	67	-67		
					Bottom of borehole	72.5	-72.5		
PZ-38I		1121475.610	2406354.220		Sandy Silt	0	0	8	-8
					Poorly-graded sand v	8	-8	11	-11
					Elastic Silt	11	-11	16	-16
					Poorly-graded sand v	16	-16	19	-19
					Well-graded sand	19	-19	20	-20
					SAP	20	-20	52.5	-52.5
					PWR	52.5	-52.5		
					Bottom of borehole	76	-76		
GWC-1		2411556.160	1120077.830	371.54	RES	0	371.54	19.5	352.04
					SAP	19.5	352.04		371.54
					Bottom of borehole	36	335.54		
GWC-2		2411493.240	1119816.770	376.91	Silty Sand	0	376.91	19.5	357.41
					SAP	19.5	357.41		376.91
					Bottom of borehole	54.5	322.41		
GWC-3		2411202.800	1119614.010	407.19	Sandy Silt	0	407.19	28.5	378.69
					SAP	28.5	378.69	38.5	368.69
					PWR	38.5	368.69		
					Bottom of borehole	46	361.19		
GWA-21		2409462.770	1120675.770	419.56	RES	0	419.56	10	409.56
					SAP	10	409.56		
					Bottom of Borehole	17	402.56		
GWA-22		2409473.480	1120962.580	441.75	RES	0	441.75	24	417.75
					SAP	24	417.75	33	408.75
					PWR	33	408.75		
					Bottom of Borehole	40	401.75		
GWC-29		2408717.920	1119875.660	396.69	RES	0	396.69	15	381.69
					SAP	15	381.69		
					Bottom of Borehole	25	371.69		
GWA-45		2407889.430	1120669.520	447.98	RES ? SAP	0	447.98		
					Bottom of Borehole	33	414.98		
GWA-46		2408235.720	1120783.750	458.1	RES ? SAP	0	458.1		
					Bottom of Borehole	43.5	414.6		
GWA-47		2408585.250	1120862.990	462.81	RES ?	0	462.81	33	429.81
					SAP	33	429.81	50	412.81
					PWR ?	50	412.81		
					Bottom of Borehole	55	407.81		

Table B-3

Monitoring Well and Piezometer Lithology
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Well ID	Previously named	Easting	Northing	GS Elev	Unit	Depth to Top of Unit (ft bgs)	Top of Unit Elevation (ft AMSL)	Depth to Bottom of Unit (ft bgs)	Bottom of Unit Elevation (ft AMSL)
GWA-48		2408939.900	1120953.850	458.73	RES ?	0	458.73	35	423.73
					SAP	35	423.73	45	413.73
					PWR	45	413.73	65	393.73
					FBR	65	393.73		
					Bottom of Borehole	72	386.73		
GWA-49		2409288.700	1121030.470	429.96	RES ?	0	429.96	24	405.96
					SAP	24	405.96		
					Bottom of Borehole	37	392.96		
GWC-50		2408955.890	1119917.650	404.16	RES ?	0	404.16	25	379.16
					SAP	25	379.16	30	374.16
					PWR ?	30	374.16		
					Bottom of Borehole	35	369.16		
GWC-51		2408437.100	1119835.850	406.88	RES ?	0	406.88	13	393.88
					SAP	13	393.88		
					Bottom of Borehole	27	379.88		
GWC-52		2408203.870	1119972.460	414.14	RES ?	0	414.14	24	390.14
					SAP	24	390.14		
					Bottom of Borehole	30	384.14		
GWC-53		2407942.970	1120319.920	432.93	RES ? SAP	0	432.93		
					Bottom of Borehole		#VALUE!		
LPZ-1		2398512.884	1117001.063	549.84	Clayey Silt	0	549.84	14.5	535.34
					PWR	14.5	535.34	58	491.84
					FBR	58	491.84		
					Bottom of borehole	65.8	484.04		
LPZ-2		2398005.522	1119972.986	510.46	Clayey Sand	0	510.46	13	497.46
					Silty Sand	13	497.46		
					Bottom of borehole	20	490.46		
LPZ-3		2398656.589	1117884.204	511.48	Clay	0	511.48	4	507.48
					Clayey Silt	4	507.48	13	498.48
					Clayey Sand	13	498.48	18	493.48
					Clayey Silt	18	493.48	30.3	481.18
					SAP	30.3	481.18		
					Bottom of borehole	35	476.48		
LPZ-4		2397083.703	1115963.340	457.83	Silty Clay	0	457.83	6	451.83
					Clay	6	451.83	10	447.83
					Clayey Sand	10	447.83	18	439.83
					Silty Sand	18	439.83	25	432.83
					SAP	25	432.83		
					Bottom of borehole	40	417.83		
LPZ-5		2399698.731	1115329.718	520.97	Silt	0	520.97	8	512.97
					Silty Clay	8	512.97	18.2	502.77
					SAP	18.2	502.77	63	457.97
					PWR	63	457.97		
					Bottom of borehole	103.4	417.57		
B-102A		2405054.068	1117121.557	504.38	CCR	0	504.38	60	444.4
B-102B		2405057.183	1117125.610	504.44	CCR	0	504.44	20.6	483.8
B-103A		2405594.902	1117590.230	505.84	CCR	0	505.84	60	445.8
B-103B		2405593.689	1117596.145	525.82	CCR	0	525.82	20	505.8
B-104A		2405845.762	1117967.140	504.16	CCR	0	504.16	60	444.2
B-104B		2405851.386	1117971.732	504.13	CCR	0	504.13	20	484.1
AP1R		2406844.490	1118448.308		Fill	0		1	
					RES	103.4		103.4	
					SAP	103.4		124.6	
					PWR	124.6			
					Bottom of borehole	124.6			
APA2		2406017.332	1116326.835		RES	0		18.5	
					SAP	18.5			
					Bottom of Borehole	29.1			
APA3		2406140.776	1116416.122		RES	0		18	
					SAP	18			
					Bottom of Borehole	55			
APA4		2406349.675	1116541.17		RES	0		8.5	
					SAP	8.5			
					Bottom of Borehole	45			
APA5		2405926.811	1116282.42	472.020	Fill	0		7.2	
					RES	7.2		24.3	
					SAP	24.3			
					Bottom of Borehole	44.3			
AP6		2405851.502	1121166.564		SAP	11.5		35	
					Bottom of borehole	38.5			
AP7		2405853.689	1121165.367		SAP	11.5			
					Bottom of borehole	11.5			
AP-9R		2407245.201	1118491.264	411.51	SAP	13		20	
					PWR	20			
					Bottom of Borehole	20			
AP10		2405882.537	1116253.005	470.630	RES	0		30	
					SAP	30			
					Bottom of borehole	51			
AP-12		2405793.374	1116223.681	475.140	RES	0			
					SAP	21.5			
					Bottom of Borehole	43.5			
AP13		2405792.231	1116223.511	475.140	No Data	0		19.5	
					SAP	19.5			
					Bottom of Borehole	26			

NOTES:

SAP - Saprolite

PWR - Partially Weathered Rock

FBR - Fractured Bedrock

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Borehole Lithology
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Boring ID	Easting	Northing	GS Elev	Unit	Depth to Top of Unit (ft bgs)	Top of Unit Elevation (ft AMSL)	Depth to Bottom of Unit (ft bgs)	Bottom of Unit Elevation (ft AMSL)
CP-1	NA	NA	455.73	Coal	0	455.73	10.5	445.23
				Res/Sap	10.5	445.23		
				Bottom of boring	11.4	444.33		
CP-8	NA	NA	459.73	Coal	0	459.73	15.2	444.53
				Res/Sap	15.2	444.53		
				Bottom of boring	16.4	443.33		
CP-12	NA	NA	461.03	Coal	0	461.03	16.5	444.53
				Res/Sap	16.5	444.53		
				Bottom of boring	18.5	442.53		
C-102	2405723.34	1115291.08	516.3	RES/SAP	0	516.3	64.4	451.9
				PWR	64.4	451.9	114	402.3
				FBR	114	402.3		
				Bottom of Borehole	139	377.3		
C-103	2405827.34	1115462.08	504.9	RES/SAP	0	504.9	61	443.9
				PWR	61	443.9	119.4	385.5
				FBR	119.4	385.5		
				Bottom of Borehole	168.5	336.4		
C-104	2405930.34	1115633.08	492.8	RES/SAP	0	492.8	89	403.8
				PWR	89	403.8	125.9	366.9
				FBR	125.9	366.9		
				Bottom of Borehole	149	343.8		
C-105	2406034.35	1115804.08	482.7	RES/SAP	0	482.7		
				Bottom of Borehole	51	431.7		
C-106	2406138.35	1115975.08	478.6	RES/SAP	0	478.6		
				Bottom of Borehole	50	428.6		
C-107	2406269.36	1116126.08	474.7	RES/SAP	0	474.7	23	451.7
				PWR	23	451.7		
				Bottom of Borehole	34.1	440.6		
C-108	2406403.36	1116274.08	477.9	RES/SAP	0	477.9		
				Bottom of Borehole	50	427.9		
C-109	2406537.36	1116422.08	484.3	RES/SAP	0	484.3	52	432.3
				PWR	52	432.3		
				Bottom of Borehole	58.8	425.5		
C-110			496.3	RES/SAP	0	496.3	55	441.3
				PWR	55	441.3		
				Bottom of Borehole	58.8	437.5		
C-120	2406901.39	1118490.07	411	RES/SAP	0	411	43	368
				PWR	43	368		
				Bottom of Borehole	49.1	361.9		
C-123	2406933.40	1119069.07	448.4	RES/SAP	0	448.4	52	396.4
				PWR	52	396.4		
				Bottom of Borehole	55.3	393.1		
C-124	2406933.40	1119269.07	454.6	RES/SAP	0	454.6	53	401.6
				PWR	53	401.6		
				Bottom of Borehole	60.9	393.7		
C-125	2406933.40	1119469.06	459.9	RES/SAP	0	459.9	61	398.9
				PWR	61	398.9		
				Bottom of Borehole	65.4	394.5		
C-126	2406933.41	1119669.06	464.7	RES/SAP	0	464.7	52.5	412.2
				PWR	52.5	412.2		
				Bottom of Borehole	60	404.7		
C-127	2406933.41	1119869.06	471.6	RES/SAP	0	471.6	69.7	401.9
				PWR	69.7	401.9		
				Bottom of Borehole	69.7	401.9		
C-128	2406933.41	1120069.06	477.4	RES/SAP	0	477.4	61	416.4
				PWR	61	416.4		
				Bottom of Borehole	61	416.4		
C-129	2406933.42	1120869.05	477	RES/SAP	0	477		
				Bottom of Borehole	60	417		
C-130	2406933.42	1120469.06	481.7	RES/SAP	0	481.7	53	428.7
				PWR	53	428.7		
				Bottom of Borehole	58	423.7		
C-131	2406933.42	1120669.05	487.7	RES/SAP	0	487.7	71	416.7
				PWR	71	416.7		
				Bottom of Borehole	78.7	409		
C-132	2406933.42	1120869.05	489.3	RES/SAP	0	489.3	72.8	416.5
				PWR	72.8	416.5		
				Bottom of Borehole	72.8	416.5		
C-133	2406933.42	1121069.05	485.5	RES/SAP	0	485.5	61	424.5
				PWR	61	424.5		
				Bottom of Borehole	64.4	421.1		
C-134	2406933.42	1121269.05	483.9	RES/SAP	0	483.9	42.5	441.4
				PWR	42.5	441.4		
				Bottom of Borehole	50	433.9		
C-135	2406741.42	1121317.05	486.3	RES/SAP	0	486.3	37	449.3
				PWR	37	449.3		
				Bottom of Borehole	47	439.3		
C-156	2405746.34	1115167.08	519.4	RES/SAP	0	519.4	62	457.4
				PWR	62	457.4		
				Bottom of Borehole	69.6	449.8		
C-158	2405955.34	1115488.08	495.4	RES/SAP	0	495.4	73	422.4
				PWR	73	422.4		
				Bottom of Borehole	109.7	385.7		
C-159	2406076.35	1115674.08	484.8	RES/SAP	0	484.8	73	411.8
				PWR	73	411.8		
				Bottom of Borehole	79.6	405.2		
C-160	2406057.35	1116034.08	478.8	RES/SAP	0	478.8	47	431.8
				PWR	47	431.8		
				Bottom of Borehole	64.7	414.1		

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Boring ID	Easting	Northing	GS Elev	Unit	Depth to Top of Unit (ft bgs)	Top of Unit Elevation (ft AMSL)	Depth to Bottom of Unit (ft bgs)	Bottom of Unit Elevation (ft AMSL)
C-162	2406398.36	1116154.08	471.1	RES/SAP	0	471.1	33	438.1
				PWR	33	438.1		
				Bottom of Borehole	49.7	421.4		
C-166	2407108.41	1119383.07	460.6	RES/SAP	0	460.6	87	373.6
				PWR	87	373.6		
				Bottom of Borehole	94.5	366.1		
C-167	2406746.40	1119342.06	451.5	RES/SAP	0	451.5	72	379.5
				PWR	72	379.5		
				Bottom of Borehole	89.7	361.8		
C-168	2406782.41	1119762.06	465.2	RES/SAP	0	465.2	43	422.2
				PWR	43	422.2		
				Bottom of Borehole	54.7	410.5		
C-169	2407130.41	1119792.07	473.3	RES/SAP	0	473.3	68	405.3
				PWR	68	405.3		
				Bottom of Borehole	74.7	398.6		
C-171	2407059.41	1120160.06	477.8	RES/SAP	0	477.8	71	406.8
				PWR	71	406.8		
				Bottom of Borehole	84.6	393.2		
C-172	2406794.41	1120554.05	489.8	RES/SAP	0	489.8	58	431.8
				PWR	58	431.8		
				Bottom of Borehole	64.6	425.2		
C-173	2407046.42	1120575.06	485.1	RES/SAP	0	485.1	62.5	422.6
				PWR	62.5	422.6		
				Bottom of Borehole	74.6	410.5		
C-174	2406738.40	1119195.06	448.1	RES/SAP	0	448.1	56	392.1
				PWR	56	392.1		
				Bottom of Borehole	59.7	388.4		
C-175	2407129.40	1119128.07	452.7	RES/SAP	0	452.7	67	385.7
				PWR	67	385.7		
				Bottom of Borehole	69.6	383.1		
C-176	2406699.39	1118588.07	423	RES/SAP	0	423	42.5	380.5
				PWR	42.5	380.5		
				Bottom of Borehole	59.6	363.4		
C-177	2407152.40	1118698.07	433.8	RES/SAP	0	433.8	62	371.8
				PWR	62	371.8		
				Bottom of Borehole	89	344.8		
C-178	2406641.39	1118452.07	408.9	RES/SAP	0	408.9	22	386.9
				PWR	22	386.9		
				Bottom of Borehole	24.6	384.3		
C-179	2407218.40	1118458.08	405.1	RES/SAP	0	405.1	33.5	371.6
				PWR	33.5	371.6		
				Bottom of Borehole	50	355.1		

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Boring ID	Easting	Northing	GS Elev	Unit	Depth to Top of Unit (ft bgs)	Top of Unit Elevation (ft AMSL)	Depth to Bottom of Unit (ft bgs)	Bottom of Unit Elevation (ft AMSL)
B-100	2407033.145	1118343.843	459.7	FILL	0	459.7	51	408.7
				RES	51	408.7	63.5	396.2
				SAP	63.5	396.2	84.5	375.2
				PWR	84.5	375.2		
				Bottom of Boring	100.2	359.5		
B-101	2407266.413	1118354.997	411.4	FILL	0	411.4	5	406.4
				ALL	5	406.4	15	396.4
				SAP	15	396.4	41.1	370.3
				PWR	41.1	370.3		
				Bottom of Boring	41.1	370.3		
B-102	2405060.315	1117113.041	504.4	CCR	0	504.4	68.5	435.9
				SAP	68.5	435.9	83.5	420.9
				PWR	83.5	420.9		
				Bottom of Boring	85	419.4		
B-103	2405582.898	1117592.715	505.3	CCR	0	505.3	82	423.3
				ALL	82	423.3	88.9	416.4
				SAP	88.9	416.4	95	410.3
				PWR	95	410.3		
				Bottom of Boring	95	410.3		
B-104	2405854.522	1117965.602	504.4	CCR	0	504.4	83.5	420.9
				ALL	83.5	420.9	93	411.4
				PWR	93	411.4		
				Bottom of Boring	93.9	410.5		
B-105	2404998.900	1120433.000	495.0	WATER	0	495.0	49.5	445.5
				CCR	49.5	445.5	51	444.0
				RES	51	444.0	67.5	427.5
				SAP	67.5	427.5		
				Bottom of Boring	85	410.0		
B-105A	2405009.500	1120401.200	495.0	WATER	0	495.0	52.4	442.6
				RES	52.4	442.6	67.5	427.5
				SAP	67.5	427.5	87	408.0
				PWR	87	408.0		
				Bottom of Boring	87	408.0		
B-106	2403003.600	1119785.900	495.0	WATER	0	495.0	29.5	465.5
				CCR	29.5	465.5	30.5	464.5
				ALL	30.5	464.5	32.5	462.5
				RES	32.5	462.5	35.5	459.5
				SAP	35.5	459.5	42.5	452.5
				PWR	42.5	452.5		
				Bottom of Boring	42.5	452.5		
B-107	2402037.300	1120366.300	495.0	WATER	0	495.0	20.5	474.5
				CCR	20.5	474.5	21	474.0
				TOPSOIL	21	474.0	22.5	472.5
				RES	22.5	472.5	30	465.0
				PWR	30	465.0		
				Bottom of Boring	30.25	464.8		

Table B-4

Borehole Lithology
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Boring ID	Easting	Northing	GS Elev	Unit	Depth to Top of Unit (ft bgs)	Top of Unit Elevation (ft AMSL)	Depth to Bottom of Unit (ft bgs)	Bottom of Unit Elevation (ft AMSL)
B-108	2403754.100	1120563.100	495.0	WATER	0	495.0	46.8	448.2
				CCR	46.8	448.2	47.5	447.5
				TOPSOIL	47.5	447.5	49	446.0
				ALL	49	446.0	52	443.0
				RES	52	443.0	58	437.0
				SAP	58	437.0	85	410.0
				PWR	85	410.0		
				Bottom of Boring	91	404.0		
B-109	2403091.200	1122059.000	495.0	WATER	0	495.0	31	464.0
				CCR	31	464.0	31.8	463.2
				ALL	31.8	463.2	36	459.0
				RES	36	459.0	40.3	454.7
				PWR	40.3	454.7		
				Bottom of Boring	43.5	451.5		
B-110	2405728.000	1120234.300	495.0	WATER	0	495.0	47.8	447.2
				CCR	47.8	447.2	48.3	446.7
				TOPSOIL	48.3	446.7	50.3	444.7
				RES	50.3	444.7	68.5	426.5
				SAP	68.5	426.5	78.5	416.5
				PWR	78.5	416.5		
				Bottom of Boring	87	408.0		
B-111	2404512.400	1120256.500	495.0	WATER	0	495.0	58.4	436.6
				CCR	58.4	436.6	60	435.0
				RES	60	435.0	63	432.0
				SAP	63	432.0	73	422.0
				PWR	73	422.0		
				Bottom of Boring	91.5	403.5		
B-112	2403275.500	1119527.300	495.0	WATER	0	495.0	42	453.0
				CCR	42	453.0	43	452.0
				RES	43	452.0	48.3	446.7
				ALL	48.3	446.7	54	441.0
				SAP	54	441.0	81	414.0
				PWR	81	414.0		
				Bottom of Boring	82.2	412.8		
B-113	2402983.500	1120116.000	495.0	WATER	0	495.0	12	483.0
				CCR	12	483.0	13	482.0
				RES	13	482.0	26	469.0
				SAP	26	469.0	32	463.0
				PWR	32	463.0		
				Bottom of Boring	40.67	454.3		
B-114	2403549.700	1121368.900	495.0	WATER	0	495.0	28.5	466.5
				CCR	28.5	466.5	29	466.0
				TOPSOIL	29	466.0	30	465.0
				RES	30	465.0	46	449.0
				PWR	46	449.0		
				Bottom of Boring	49.5	445.5		
SPT-01	2405487.212	1118279.083	505.31	ASH	0	505.31	73	432.31
				SAP	73	432.31	104	401.31
				PWR	104	401.31	113	392.31
				FBR	113	392.31		
				Bottom of boring	140	365.31		
SPT-02	2404730.362	1116812.557	509.49	ASH	0	509.49	3	506.49
				GYP	3	506.49	28	481.49
				ASH	28	481.49	73	436.49
				ALL	73	436.49	78	431.49
				SAP	78	431.49	88.5	420.99
				PWR	88.5	420.99	92.5	416.99
				FBR	92.5	416.99		
				Bottom of boring	114.8	394.69		
SPT-03	2406333.051	1117861.453	499.93	GYP	0	499.93	17	482.93
				ASH	17	482.93	68	431.93
				SAP	68	431.93	79.5	420.43
				PWR	79.5	420.43	117	382.93
				FBR	117	382.93		
				Bottom of boring	146.5	353.43		
SPT-04	2398535.023	1120931.901	540.7	Lean Clay	0	540.7	8	532.7
				Sandy Silt	8	532.7	18	522.7
				SAP	18	522.7	36	504.7
				FBR	36	504.7		
				Bottom of boring	53.9	486.8		
SPT-05	2399372.682	1120330.704	543.43	Silty Clay	0	543.43	33	510.43
				Lean Clay	33	510.43	43	500.43
				Elastic Silt	43	500.43	48	495.43
				Sandy Silt	48	495.43	63	480.43
				PWR	63	480.43	125	418.43
				FBR	125	418.43		
				Bottom of boring	132.9	410.53		
SPT-06	2396864.081	1117987.019	540.02	Silty Clay	0	540.02	3	537.02
				Sandy Silt	3	537.02	5.5	534.52
				Silty Sand	5.5	534.52	14	526.02
				PWR	14	526.02	36	504.02
				FBR	36	504.02		
				Bottom of boring	43.3	496.72		
SPT-07	2399101.183	1118720.707	554.51	Sandy Lean Clay	0	554.51	28	526.51
				Clayey Sand	28	526.51	33	521.51
				Elastic Silt	33	521.51	58	496.51
				Sandy Elastic Silt	58	496.51	65.5	489.01
				PWR	65.5	489.01	96.5	458.01
				FBR	96.5	458.01		
				Bottom of boring	170.1	384.41		
SPT-08	2400596.337	1118152.288	493.11	Fat Clay	0	493.11	3	490.11
				Lean Clay	3	490.11	13	480.11
				Silt	13	480.11	18	475.11
				Silty Sand	18	475.11	23	470.11
				Sandy Lean Clay	23	470.11	33	460.11
				Silt	33	460.11	38	455.11
				Clayey Sand	38	455.11	43	450.11
				SAP	43	450.11	83	410.11
				PWR	83	410.11	106.5	386.61
				FBR	106.5	386.61		
				Bottom of boring	144.2	348.91		

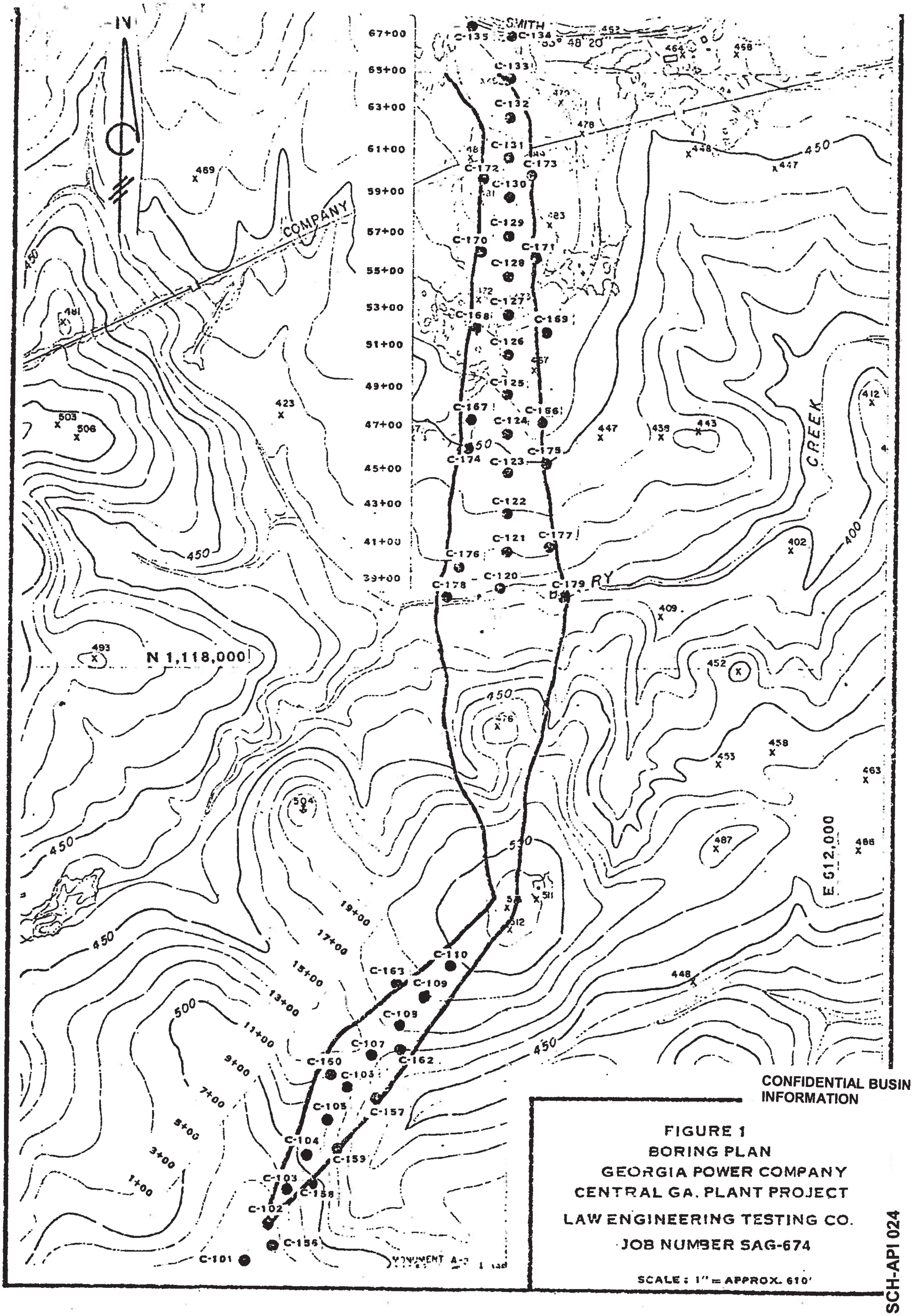
Table B-4

Borehole Lithology
Georgia EPD Engineering Permit Report
Plant Scherer
Monroe County, Georgia

Boring ID	Easting	Northing	GS Elev	Unit	Depth to Top of Unit (ft bgs)	Top of Unit Elevation (ft AMSL)	Depth to Bottom of Unit (ft bgs)	Bottom of Unit Elevation (ft AMSL)
SPT-09	2396216.766	1116500.735	505.06	Silty Clay	0	505.06	5.5	499.56
				Well-graded Sand with	5.5	499.56	38	467.06
				PWR	38	467.06	56.5	448.56
				FBR	56.5	448.56		
				Bottom of boring	58.9	446.16		
SPT-10	2398471.939	1117063.328	547.31	RES	0	547.31	18	529.31
				Silt	18	529.31	23	524.31
				Elastic Silt	23	524.31	27	520.31
				Silt	27	520.31	48	499.31
				Silty Sand	48	499.31	56	491.31
				PWR	56	491.31	67	480.31
				FBR	67	480.31		
				Bottom of boring	74.7	472.61		
SPT-11	2397675.588	1116287.368	526.69	Clayey Sand	0	526.69	3	523.69
				Well-graded Sand with	3	523.69	28	498.69
				PWR	28	498.69	45.5	481.19
				FBR	45.5	481.19		
				Bottom of boring	54.6	472.09		
SPT-12	2399348.624	1115389.817	511.51	Lean Clay	0	511.51	13	498.51
				Sandy Silt	13	498.51	23	488.51
				Sandy Elastic Silt	23	488.51	28	483.51
				Sandy Silt	28	483.51	38	473.51
				SAP	38	473.51	52	459.51
				PWR	52	459.51	66	445.51
				FBR	66	445.51		
				Bottom of boring	69.3	442.21		

NOTES:
SAP - Saprolite
PWR - Partially Weathered Rock
FBR - Fractured Bedrock

1974 Law Engineering Testing Company Exploration Borings



CONFIDENTIAL BUSINESS INFORMATION

FIGURE 1
BORING PLAN
GEORGIA POWER COMPANY
CENTRAL GA. PLANT PROJECT

LAW ENGINEERING TESTING CO.

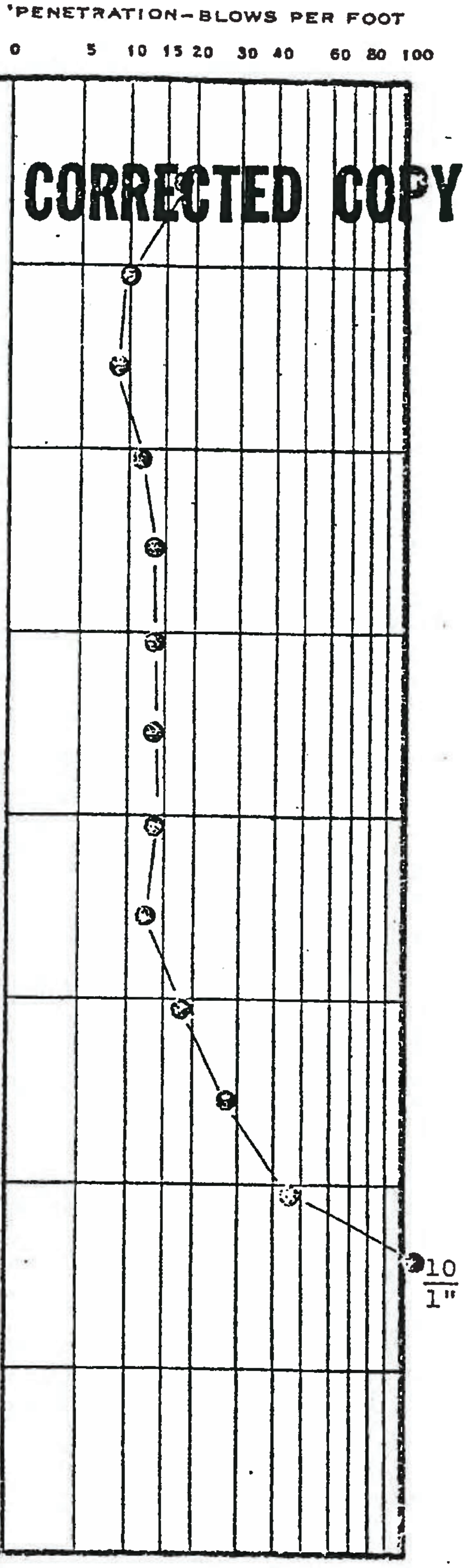
JOB NUMBER SAG-674

SCALE : 1" = APPROX. 610'

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
516.3		VERY STIFF RED BROWN MEDIUM TO FINE SANDY VERY SILTY CLAY		
			29.7	GS
	7.5			
506.3				
			32.5	GS
		STIFF RED BROWN MICACEOUS SLIGHTLY CLAYEY FINE SANDY SILT TO STIFF YELLOW BROWN SANDY MICACEOUS MEDIUM TO FINE SANDY SILT WITH LENSES OF WHITE COARSE TO FINE VERY SANDY SILT	40.6	
496.3				
			26.1	
			25.8	
				GS C,T
486.3				
			32.5	
			41.0	
476.3				
			31.9	
			27.7	
	47.0			
466.3		VERY STIFF YELLOW BROWN GRAY TO GRAY AND WHITE VERY MICACEOUS MEDIUM TO FINE SANDY SILT		
			40.4	
			26.6	
	57.0			
456.3		HARD BROWN AND GREEN VERY MICACEOUS FINE VERY SANDY SILT		
			25.0	
	64.6			
		REFUSAL AT 64.6' SEE CORE BORING RECORD		
446.3				

CORRECTED COPY



REMARKS:

LOCATION: N 1115206
E 609113

DRILLED BY	RS
LOGGED BY	CB
CHECKED BY	EBE

BORING NUMBER	C-102
DATE STARTED	4-19-74
DATE COMPLETED	4-20-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

PAGE 1 OF 2

DEPTH FT.	DESCRIPTION	CORE %	RQD	ELEV.	REMARKS
64.6				452.3	
	MODERATELY HARD AND HARD GRAY AND TAN BIOTITE GNEISS			447.3	
		NX 58	.20		
74.1				442.3	
					77.2-JOINT,80^{0}SE,STAINED
		NX 78	.46	437.3	
	MODERATELY HARD AND HARD DARK GREEN HORNBLENDE GNEISS				
				432.3	84.7-JOINT,70^{0}E,STAINED
					86.7-JOINT,70^{0}NE,STAINED
					87.3-JOINT,70^{0}NE,STAINED
		NX 85	.64	427.3	
				422.3	
		NX 68	.30		
				417.3	99.0-JOINT,60^{0}NW,STAINED
					100.0-JOINT,90^0,STAINED
					103.2-JOINT,60^{0}NW,STAINED
				412.3	

CONFIDENTIAL BUSINESS INFORMATION

DRILLED BY RS
LOGGED BY DM
CHECKED BY DM

CORE BORING RECORD

BORING NO. C-102
JOB NO. SAG-674

LAW ENGINEERING TESTING COMPANY

PAGE 2 OF 2

DEPTH FT.	DESCRIPTION	CORE %	RQD	ELEV.	REMARKS
104.0	SOFT GRAY GREEN AND TAN HORNBLENDE GNEISS	NX 05	.00	412.3 407.3 402.3	
114.0	VERY HARD DARK GREEN AND GRAY HORNBLENDE GNEISS	NX 100	.68	397.3	
		NX 100	.73	392.3 387.3	120.9-JOINT, 45° NW, STAINED 121.4-JOINT, 90°, STAINED 123.7-JOINT, 70° S, STAINED 128.3-JOINT, 50° S, STAINED
128.6	VERY HARD DARK GREEN AMPHIBOLITE				
130.2	VERY HARD DARK GREEN AND GRAY HORNBLENDE GNEISS	NX 98	.91	382.3 377.3	
139.0	CORING TERMINATED			372.3	DIP OF FOLIATION APPROXIMATELY 45° (ASSUMED SE)

CONFIDENTIAL BUSINESS INFORMATION

DRILLED BY RS
LOGGED BY DM
CHECKED BY DM

CORE BORING RECORD

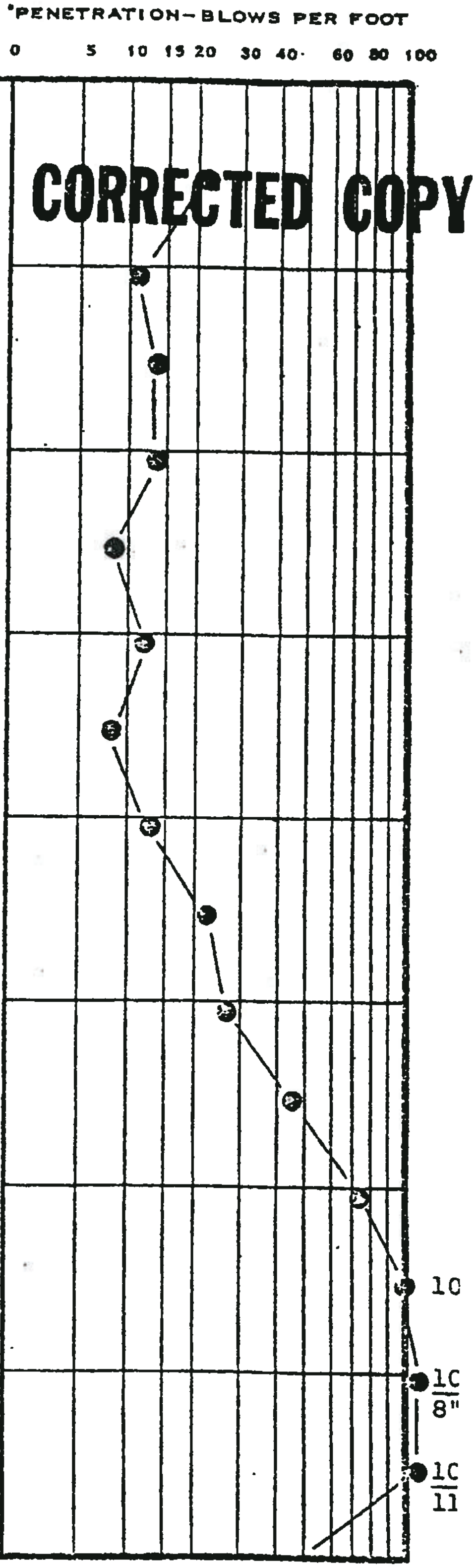
BORING NO. C-102
JOB NO. SAG-674

LAW ENGINEERING TESTING COMPANY

TEST BORING RECORD

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
504.9		VERY STIFF RED BROWN SLIGHTLY MICACEOUS SLIGHTLY CLAYEY MEDIUM TO FINE SANDY SILT		
			24.8	
	8.0			
494.9				
			19.3	
		STIFF LIGHT BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE VERY SANDY SILT TO YELLOW BROWN AND WHITE MICACEOUS MEDIUM TO FINE SANDY SILT	15.9	
484.9				
			47.1	
				GS C,T GS
			49.7	
474.9				
			51.3	
			52.4	
464.9				
			48.8	
	43.0			
		VERY STIFF YELLOW BROWN SLIGHTLY MICACEOUS FINE SANDY SILT TO LIGHT GRAY MICACEOUS COARSE TO FINE VERY SANDY SILT	42.9	
454.9				
			17.5	
	52.5			
		HARD GREEN AND GRAY VERY MICACEOUS COARSE TO FINE VERY SANDY SILT TO VERY HARD GREEN AND WHITE MEDIUM TO FINE VERY SANDY SILT	20.8	
444.9				
	61.0		16.4	
		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GREEN AND WHITE SILTY MEDIUM TO FINE SAND WITH WEATHERED ROCK FRAGMENTS	17.2	
434.9				
			15.2	
			22.5	
424.9			24.1	



REMARKS:

LOCATION: N 1115377
E 609217

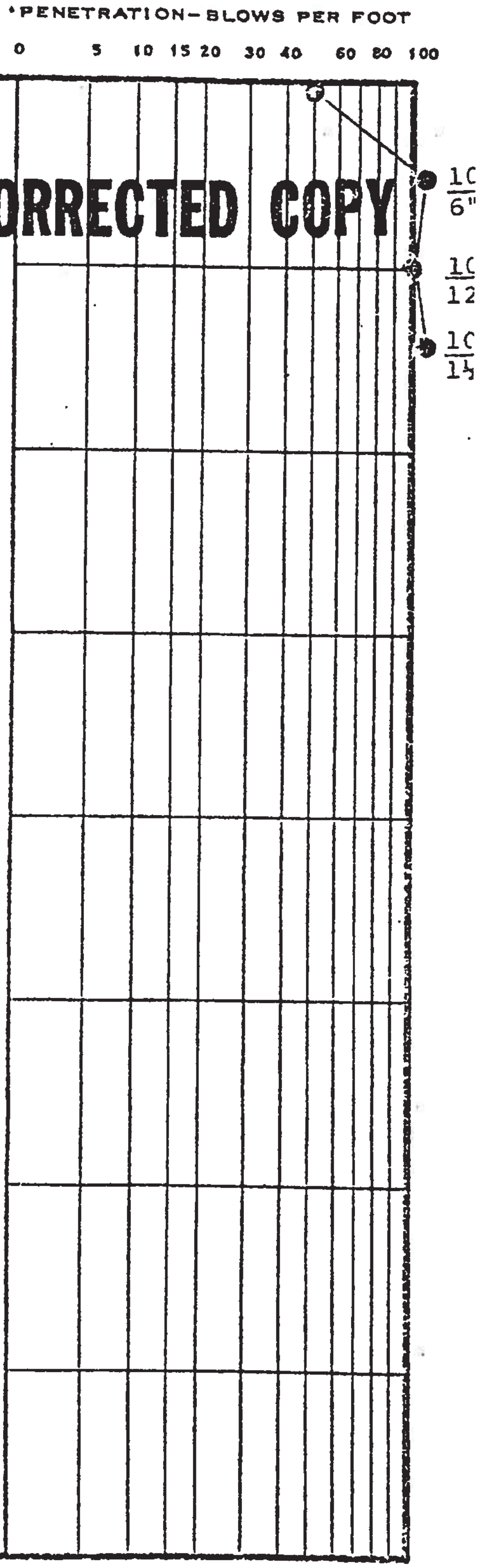
DRILLED BY GP
LOGGED BY CB
CHECKED BY

BORING NUMBER C-103
DATE STARTED 4-21-74
DATE COMPLETED 4-23-74
JOB NUMBER SAG-674
PAGE 1 of 2

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
424.9	80.0		15.9
		PARTIALLY WEATHERED ROCK SAMPLED AS VERY HARD GREENISH GRAY AND WHITE VERY MICACEOUS FINE SANDY SILT TO GREENISH GRAY COARSE TO FINE VERY SANDY SILT WITH WEATHERED ROCK FRAGMENTS	15.5
414.9			10.9
	94.6		
404.9		REFUSAL AT 94.6' SEE CORE BORING RECORD	



CORRECTED COPY

REMARKS:

Drilled By GP
Logged By CB
Checked By EBE

Boring Number C-103
Date Started 4-22-74
Date Completed
Job Number SAG-674
PAGE 2 of 2

CONFIDENTIAL BUSINESS INFORMATION

PAGE 1 OF 2

DEPTH FT.	DESCRIPTION	CORE %	RQD	ELEV.	REMARKS
94.6	SOFT AND MODERATELY HARD DARK GRAY AND TAN HORNBLENDE GNEISS WITH SOME NARROW (1"-2") BANDS OF AMPHIBOLITE	NX 31	0	410.3	98.2-JOINT,75°NW, ZEOLITE COATED
		NX 80	.12	405.3	94.6-119.4-HIGHLY FRACTURED
				400.3	
		NX 37	.00	395.3	
				390.3	
119.4	HARD GRAY HORNBLENDE GNEISS	NX 79	.09	385.3	
				380.3	126.5-JOINT,60°SE, ZEOLITE COATED
		NX 100	.37	375.3	
134.6				370.3	

CONFIDENTIAL BUSINESS INFORMATION

DRILLED BY GP
LOGGED BY DM
CHECKED BY ______

CORE BORING RECORD

BORING NO. C-103
JOB NO. SAG-674

LAW ENGINEERING TESTING COMPANY

PAGE 2 OF 2

DEPTH FT.	DESCRIPTION	CORE %	RQD	ELEV.	REMARKS
134.6					
135.5	VERY HARD LIGHT GRAY HORNBLENDE GNEISS			370.3	
				365.3	
		NX 100	11	360.3	
				355.3	
		NX 100	09	350.3	
				345.3	
		NX 100	69	340.3	DIP OF FOLIATION AVERAGES 40° (ASSUMED SE)
168.5	CORING TERMINATED			335.3	
				330.3	

CONFIDENTIAL BUSINESS INFORMATION

DRILLED BY GP
LOGGED BY DM
CHECKED BY

CORE BORING RECORD

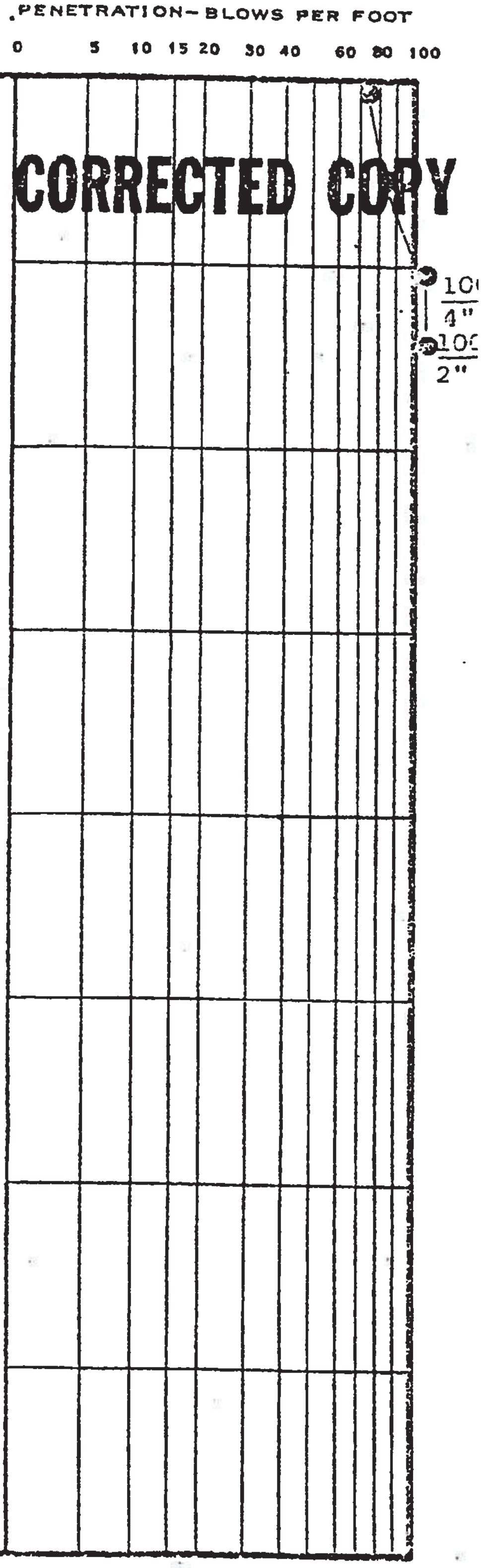
BORING NO. C-103
JOB NO. SAG-674

LAW ENGINEERING TESTING COMPANY

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION
412.8		VERY HARD WHITE AND GREEN COARSE TO FINE VERY SANDY SILT TO GREEN FINE VERY SANDY SILT
402.8	89.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY HARD GREEN FINE VERY SANDY SILT
	94.7	
392.8		REFUSAL AT 94.7' SEE CORE BORING RECORD

CORRECTED COPY



REMARKS:

Drilled By RS
Logged By CB
Checked By

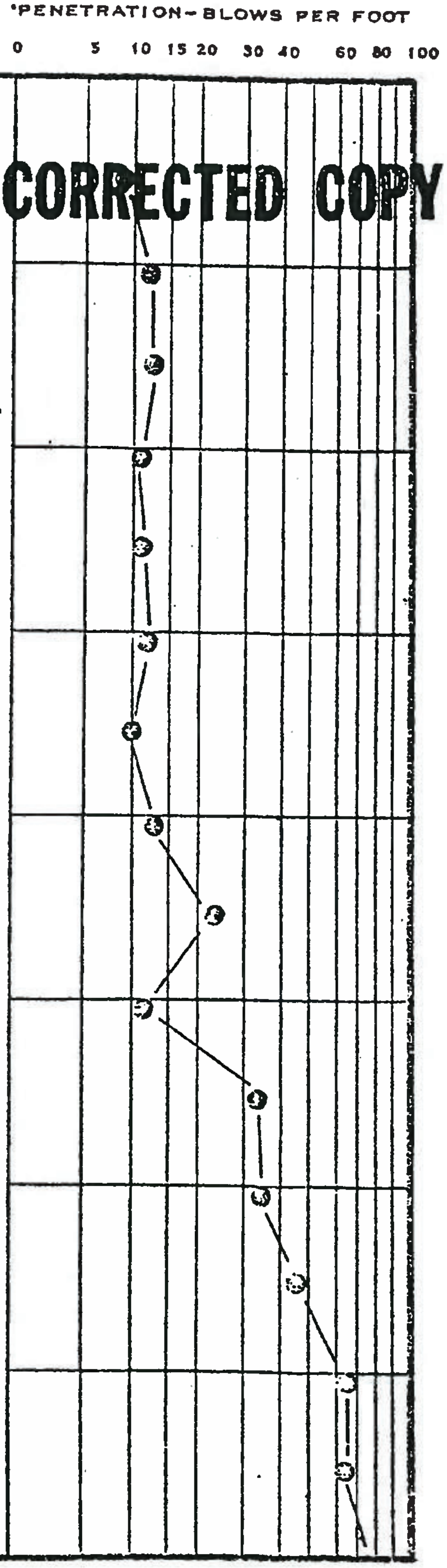
Boring Number C-104
Date Started 4-21-74
Date Completed
Job Number SAG-674
PAGE 2 OF 2

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
492.8		STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY CLAYEY SILT	25.9	
482.8 472.8 462.8 452.8	8.0	STIFF PURPLE BROWN COARSE TO FINE SANDY SLIGHTLY CLAYEY SILT WITH WEATHERED ROCK FRAGMENTS TO GRAY TAN MICACEOUS MEDIUM TO FINE SANDY SILT	31.2 40.4 41.8 29.4 49.7 26.6 48.4	GS,T
442.8	44.0	VERY STIFF YELLOW BROWN MICACEOUS FINE SANDY SILT TO STIFF WHITE AND GREEN COARSE TO FINE SANDY SILT	42.9 34.2	
432.8 422.8	53.1	HARD WHITE AND GREEN FINE SANDY SILT	30.9 28.2 20.2	
412.8	72.0	VERY HARD WHITE AND GREEN COARSE TO FINE VERY SANDY SILT TO GREEN FINE VERY SANDY SILT	16.8 19.9	



REMARKS:

LOCATION: N 1115548
E 609320
HOLE CAVED AT 8.0' AFTER 24 HOURS

Drilled By RS
Logged By CB
Checked By

Boring Number C-104 ✓
Date Started 4-21-74
Date Completed 4-23-74
Job Number SAG-674
PAGE 1 OF 2

CONFIDENTIAL BUSINESS INFORMATION

PAGE 1 OF 2

DEPTH FT.	DESCRIPTION	CORE %	RQD	ELEV.	REMARKS
94.7				398.1	
		NX 31	.08		
				393.1	
	SOFT AND MODERATELY HARD DARK GREEN AND TAN BIOTITE GNEISS				
		NX 65	.44	388.1	
					107.2-JOINT,65°NW,STAINED
				383.1	
		NX 17	.13	378.1	
				373.1	
		NX 33	.28	368.1	
125.9					
				363.1	129.9-JOINT,80°NW,STAINED
	VERY HARD DARK GREEN AND WHITE HORNBLENDE GNEISS				
		NX 92	.81		
134.7				358.1	

CONFIDENTIAL BUSINESS INFORMATION

DRILLED BY RS
LOGGED BY DM
CHECKED BY DM

CORE BORING RECORD

BORING NO. C-104
JOB NO. SAG-674

LAW ENGINEERING TESTING COMPANY

PAGE 2 OF 2

DEPTH FT.	DESCRIPTION	CORE %	RQD	ELEV.	REMARKS
134.7				358.1	
				353.1	139.1-JOINT, 50°NE 140.2-2 JOINTS, 80°NE, STAINED
		NX 99	.73		
				348.1	
149.0	CORING TERMINATED			343.1	DIP OF FOLIATION AVERAGES 35° (ASSUMED SE)

CONFIDENTIAL BUSINESS INFORMATION

DRILLED BY RS
LOGGED BY DM
CHECKED BY DM

CORE BORING RECORD

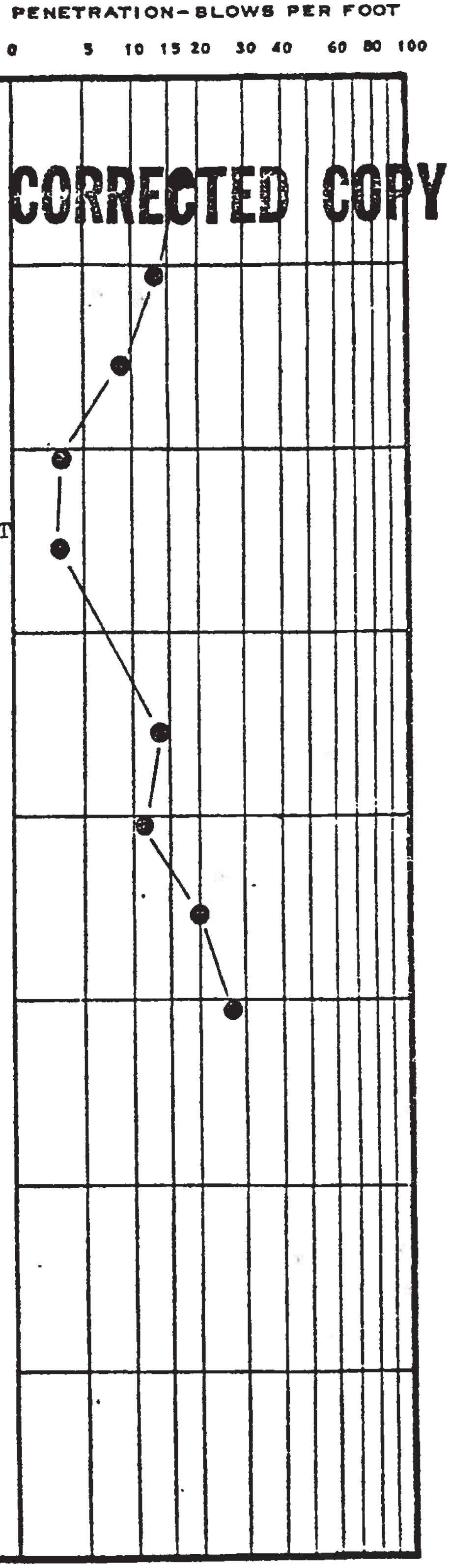
BORING NO. C-104
JOB NO. SAG-674

LAW ENGINEERING TESTING COMPANY

TEST BORING RECORD

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
482.7				
		VERY STIFF TO STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT	33.5	
472.7			40.4	
	12.0	FIRM RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT	47.1	
	17.4			
462.7			61.3	
		SOFT RED BROWN TO YELLOW BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT	65.3	GS C,T
452.7	28.2	STIFF GRAY TAN AND BLACK SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT WITH WEATHERED ROCK FRAGMENTS TO VERY STIFF MOTTLED GREEN TAN AND WHITE SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT	41.6	
			45.6	
442.7			43.7	
	42.0	VERY FIRM MOTTLED RED AND GREEN SLIGHTLY MICACEOUS VERY SILTY COARSE TO FINE SAND TO MOTTLED BLUISH GRAY AND WHITE MICACEOUS VERY SILTY MEDIUM TO FINE SAND	30.7	
432.7	51.0		29.7	
		BORING TERMINATED AT 51.0'		
422.7				



REMARKS:

LOCATION: N 1115719
E 609424

Drilled By RS
Logged By MB
Checked By

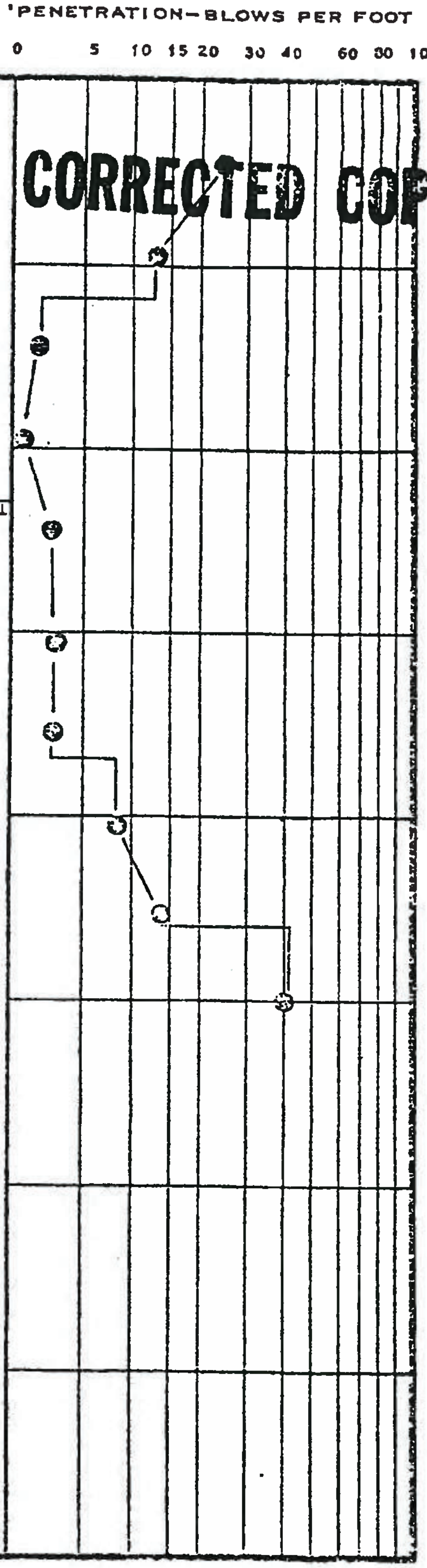
Boring Number C-105
Date Started 4-24-74
Date Completed 4-29-74
Job Number SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
478.6		VERY STIFF TO STIFF RED BROWN FINE SANDY VERY SILTY CLAY		
468.6				GS
	12.0	VERY SOFT YELLOW BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT		GS
458.6				C,T
				GS,T
448.6				
	32.0	SOFT YELLOW BLUE SLIGHTLY MICACEOUS FINE SANDY SILT TO YELLOW BROWN AND WHITE MICACEOUS COARSE TO FINE SANDY SILT		
	37.0	LOOSE YELLOW BROWN AND WHITE MICACEOUS VERY SILTY COARSE TO FINE SAND TO FIRM GREEN AND WHITE MICACEOUS SILTY MEDIUM TO FINE SAND		
438.6				
	46.0	DENSE GREEN AND WHITE MICACEOUS SILTY MEDIUM TO FINE SAND		
428.6	50.0			
		BORING TERMINATED AT 50.0'		
418.6				



REMARKS:

LOCATION: N 1115890
E 609528

DRILLED BY	GPC(RK)
LOGGED BY	CB
CHECKED BY	

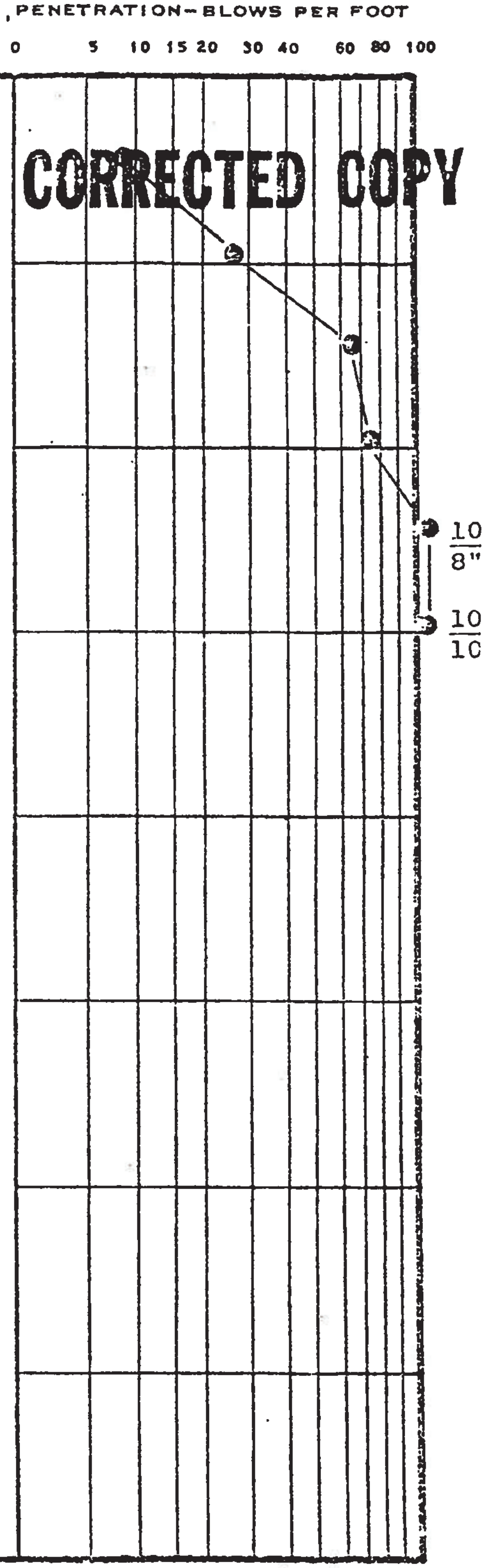
BORING NUMBER	C-106
DATE STARTED	4-24-74
DATE COMPLETED	4-24-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC
474.7		LOOSE RED BROWN AND YELLOW SLIGHTLY MICACEOUS SILTY MEDIUM TO FINE SAND	16.0
	6.0		
		VERY FIRM GREEN SLIGHTLY SILTY MEDIUM TO FINE SAND	
464.7			12.6
	12.0		
		VERY DENSE YELLOW BROWN TO GRAY BROWN SILTY MEDIUM TO FINE SAND	19.9
454.7			14.4
	23.0		
			15.3
		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GRAY BROWN SILTY MEDIUM TO FINE SAND	
444.7			12.7
	34.1		
		REFUSAL AT 34.1' BORING TERMINATED	
434.7			



REMARKS:

LOCATION: N 1116041
E 609659

DRILLED BY	GPC(RK)
LOGGED BY	MB
CHECKED BY	CBE

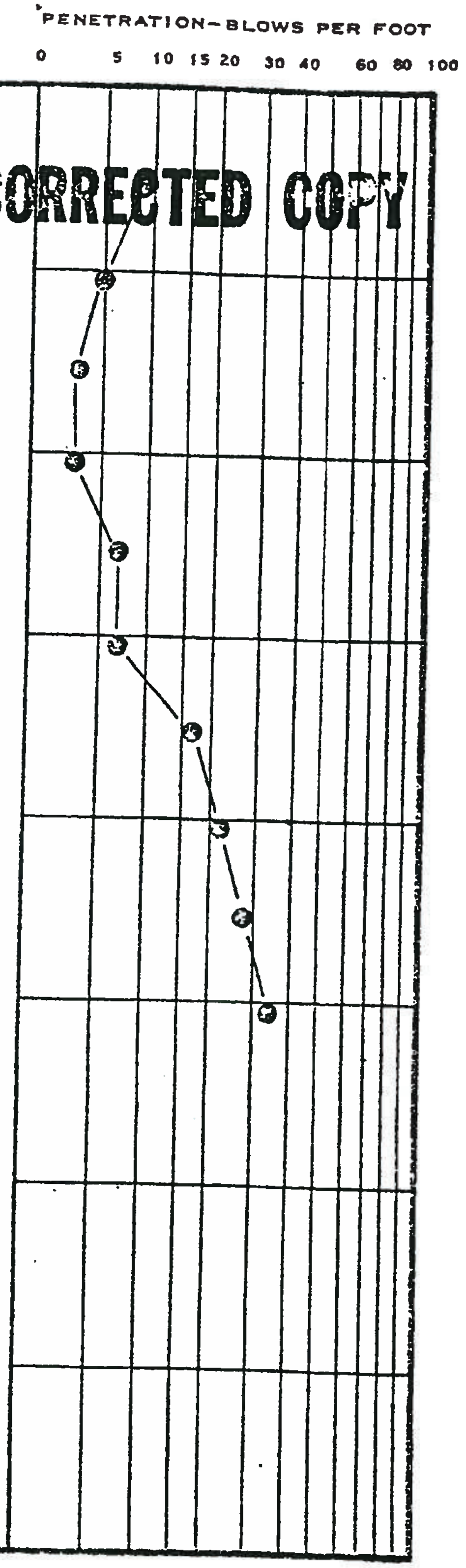
BORING NUMBER	C-107
DATE STARTED	4-26-74
DATE COMPLETED	
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS
INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
477.9			
		STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SLIGHTLY CLAYEY SILT	28.2
467.9			
	12.0		35.0
		SOFT TAN VERY MICACEOUS MEDIUM TO FINE SANDY SILT	31.9
457.9			
			34.0
	23.0		
		LOOSE TO FIRM TAN VERY MICACEOUS VERY SILTY MEDIUM TO FINE SAND	62.3
447.9			
			34.6
			22.0
	37.0		
437.9			
		VERY FIRM TAN AND WHITE MICACEOUS SILTY MEDIUM TO FINE SAND TO DENSE GREEN AND TAN SILTY MEDIUM TO FINE SAND	23.2
			27.9
427.9	50.0		
		BORING TERMINATED AT 50.0'	26.1
417.9			

CORRECTED COPY



REMARKS:

LOCATION: N 1116189
E 609793

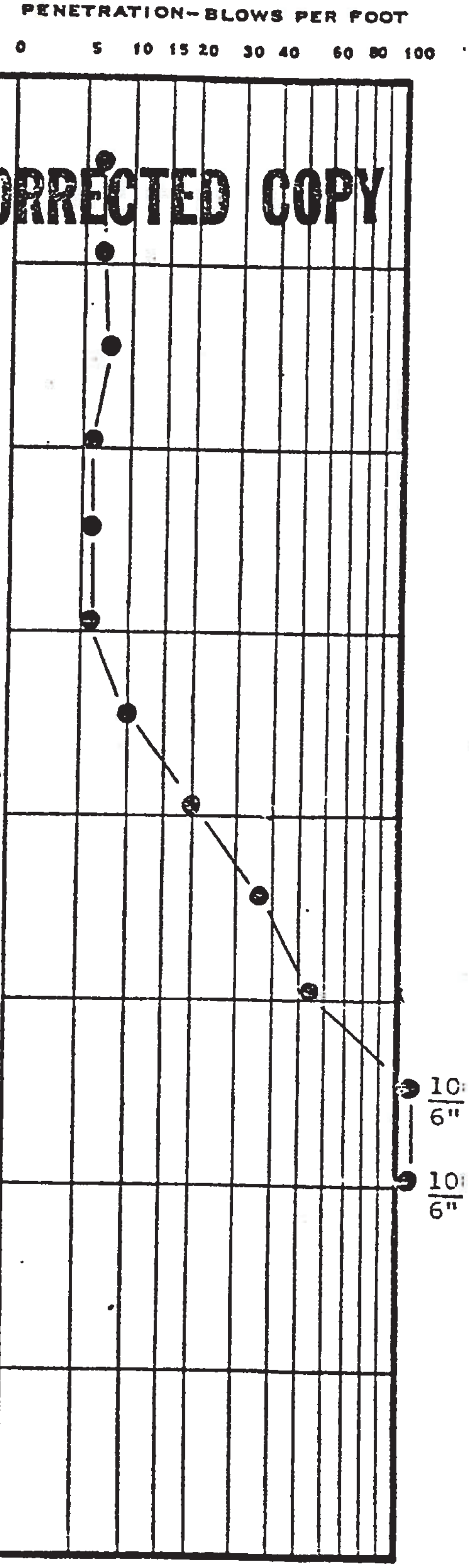
DRILLED BY GPC (RK)
LOGGED BY CB
CHECKED BY

BORING NUMBER	C-108
DATE STARTED	4-24-74
DATE COMPLETED	
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
484.3		FIRM RED BROWN MEDIUM TO FINE SANDY SILT	17.1	
	7.0			
474.3		LOOSE PINK RED SLIGHTLY MICACEOUS VERY SILTY MEDIUM TO FINE SAND	21.4 24.4	
	18.0			
464.3		LOOSE GRAY BROWN AND WHITE SLIGHTLY MICACEOUS SILTY MEDIUM TO FINE SAND	33.7	GS GS C,T
454.3			52.0	
	31.0			
		FIRM MOTTLED GREEN TAN AND WHITE SLIGHTLY MICACEOUS VERY SILTY MEDIUM TO FINE SAND	31.8 20.8	GS,T
444.4				
	42.0			
		DENSE MOTTLED GREEN AND TAN SLIGHTLY MICACEOUS VERY SILTY MEDIUM TO FINE SAND TO VERY DENSE GRAY BROWN SLIGHTLY MICACEOUS VERY SILTY MEDIUM TO FINE SAND	17.0 14.2	
434.3				
	52.0			
		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GRAY BROWN SLIGHTLY MICACEOUS VERY SILTY MEDIUM TO FINE SAND	13.8	
424.3	58.8		14.7	
		BORING TERMINATED AT 58.8'		



CORRECTED COPY

REMARKS:

LOCATION: N 1116337
E 609927

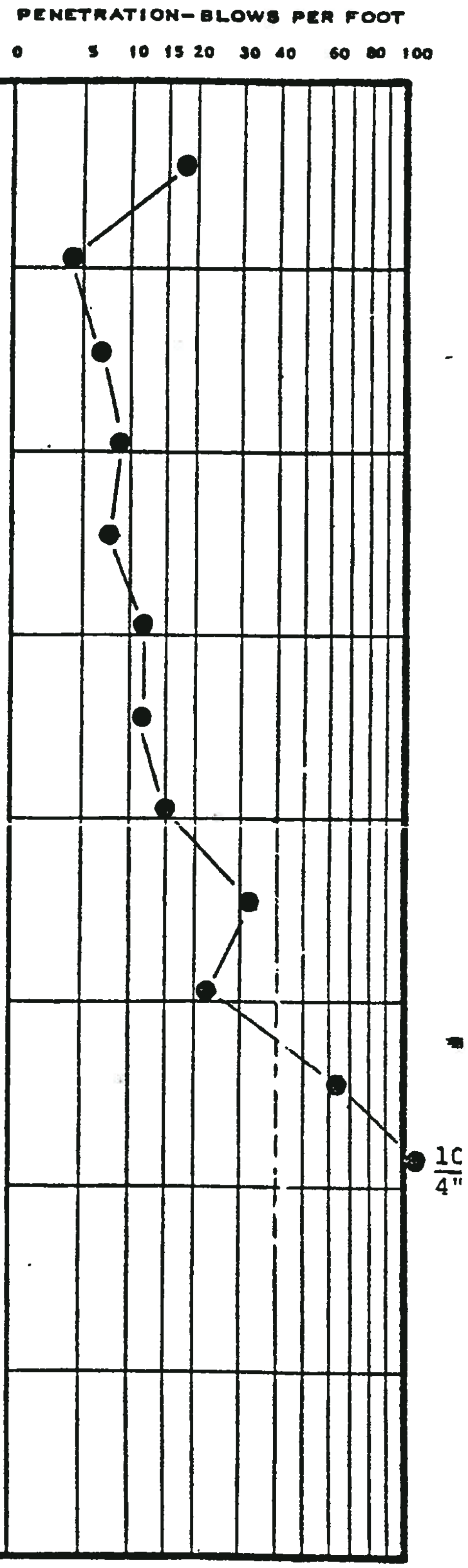
DRILLED BY GPC (RK)
LOGGED BY MB
CHECKED BY JJJ/15.

BORING NUMBER C-109
DATE STARTED 4-25-74
DATE COMPLETED
JOB NUMBER SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
496.3		VERY STIFF RED BROWN FINE SANDY SLIGHTLY CLAYEY SILT		
	8.0			
486.3		LOOSE YELLOW BROWN SLIGHTLY MICACEOUS SILTY MEDIUM TO FINE SAND TO RED BROWN AND WHITE SLIGHTLY MICACEOUS VERY SILTY COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS		
476.3				
	21.0			
		LOOSE RED BROWN AND WHITE SLIGHTLY MICACEOUS VERY SILTY MEDIUM TO FINE SAND TO FIRM MOTTLED GREEN TAN AND WHITE VERY SILTY MEDIUM TO FINE SAND		GS
466.3				
456.3				
	43.0	DENSE TO VERY FIRM MOTTLED GREEN TAN AND WHITE VERY SILTY MEDIUM TO FINE SAND		
446.3				
	51.0	VERY DENSE MOTTLED GREEN TAN AND WHITE VERY SILTY MEDIUM TO FINE SAND		
	55.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED GREEN TAN AND WHITE VERY SILTY MEDIUM TO FINE SAND		
436.3	58.8			
426.3		BORING TERMINATED AT 58.8'		



REMARKS:
LOCATION:

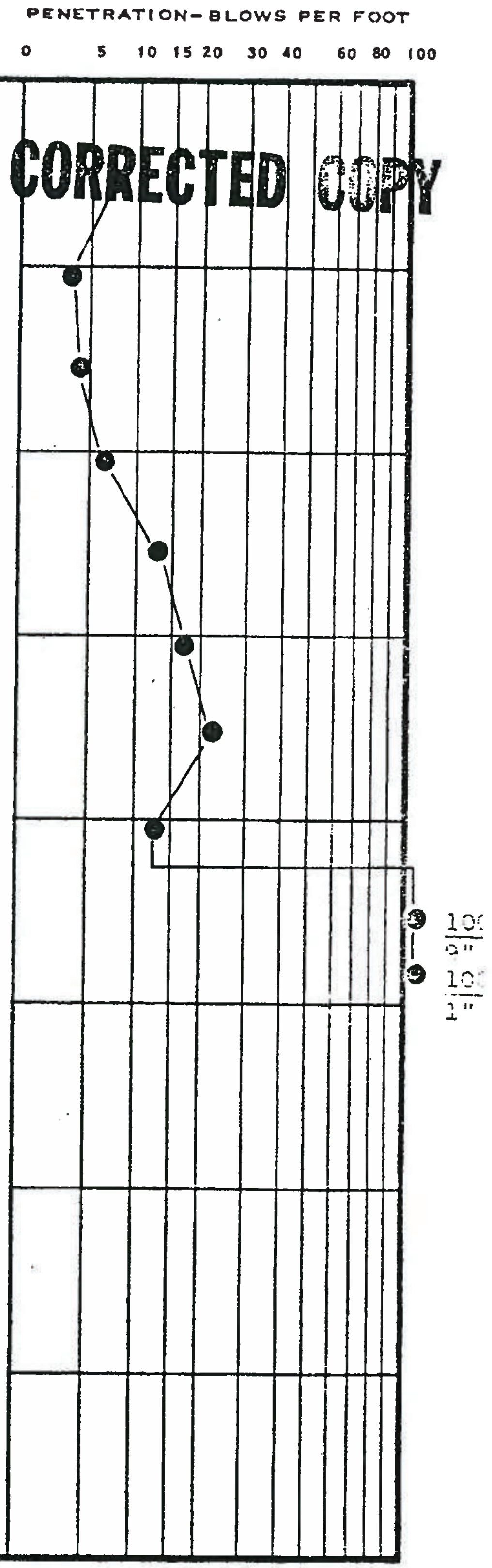
Drilled By GPC(RK)
Logged By MB
Checked By ____

Boring Number C-110
Date Started 4-25-74
Date Completed ____
Job Number SAG-674

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
411.0		FIRM MOTTLED GREEN AND TAN MEDIUM TO FINE SAND	
	6.8	VERY LOOSE GRAY BROWN SLIGHTLY MICACEOUS VERY SILTY COARSE TO FINE SAND TO LOOSE MOTTLED BLUE GREEN AND WHITE VERY SILTY MEDIUM TO FINE SAND	
401.0			
391.0			
	22.5	FIRM TO VERY FIRM MOTTLED BLUE GREEN AND WHITE VERY SILTY MEDIUM TO FINE SAND	
381.0			
371.0			
	43.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE BLACK TAN AND WHITE SILTY COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS	
361.0	49.1	REFUSAL AT 49.1' BORING TERMINATED	

CORRECTED COPY



REMARKS:

LOCATION: N 1118405
E 610291

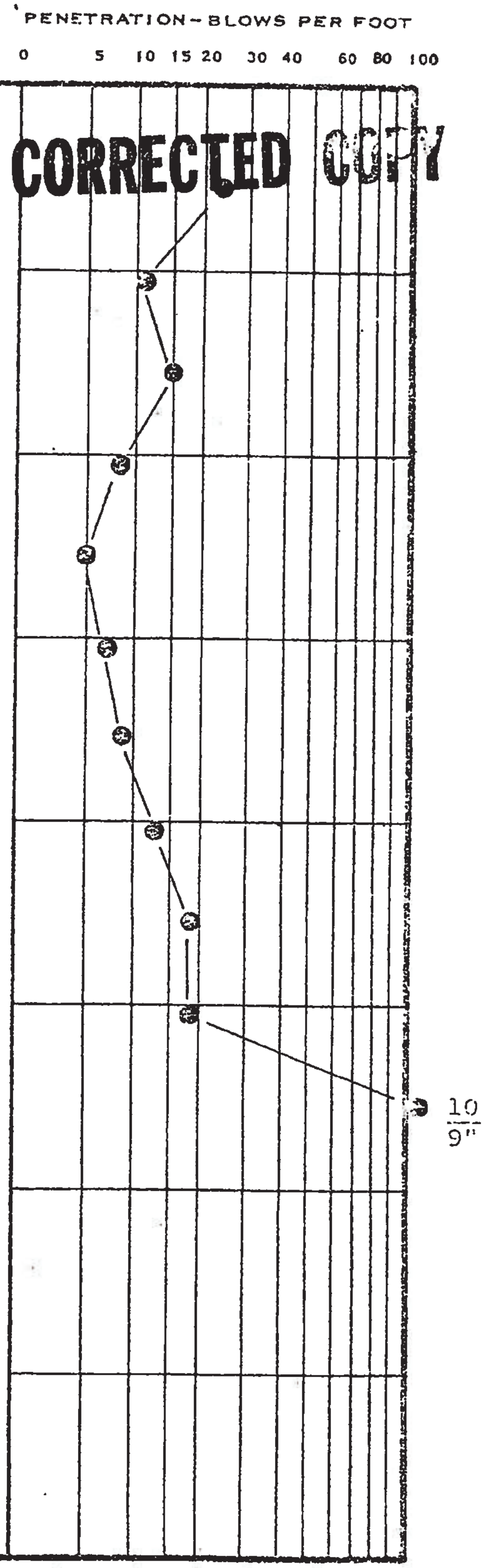
DRILLED BY	GP
LOGGED BY	MB
CHECKED BY	
BORING NUMBER	C-120
DATE STARTED	6-3-74
DATE COMPLETED	
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECOF

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
448.4		VERY STIFF RED BROWN FINE SLIGHTLY SANDY VERY SILTY CLAY		
			33.0	GS
	8.0			
438.4		FIRM RED BROWN MICACEOUS SLIGHTLY CLAYEY SILTY MEDIUM TO FINE SAND TO YELLOW BROWN MICACEOUS SILTY MEDIUM TO FINE SAND	30.0	
			35.9	GS
	17.0			
428.4		LOOSE YELLOW BROWN VERY MICACEOUS SILTY MEDIUM TO FINE SAND TO GRAY MICACEOUS SILTY COARSE TO FINE SAND	31.9 ▽	
			62.9	
418.4			34.8	
			70.1	
	37.0			
408.4		FIRM GRAY TO WHITE SILTY COARSE TO FINE SAND WITH SEAMS OF RED BROWN VERY MICACEOUS SILTY FINE SAND	26.9	
			27.4	
398.4			22.7	
	52.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE BROWN SILTY COARSE TO FINE SAND	14.9	
	53.3			
388.4		BORING TERMINATED AT 55.3'		



REMARKS:

LOCATION: N 1118984
E 610323

HOLE CAVED AT 20.0'
AFTER 24 HOURS

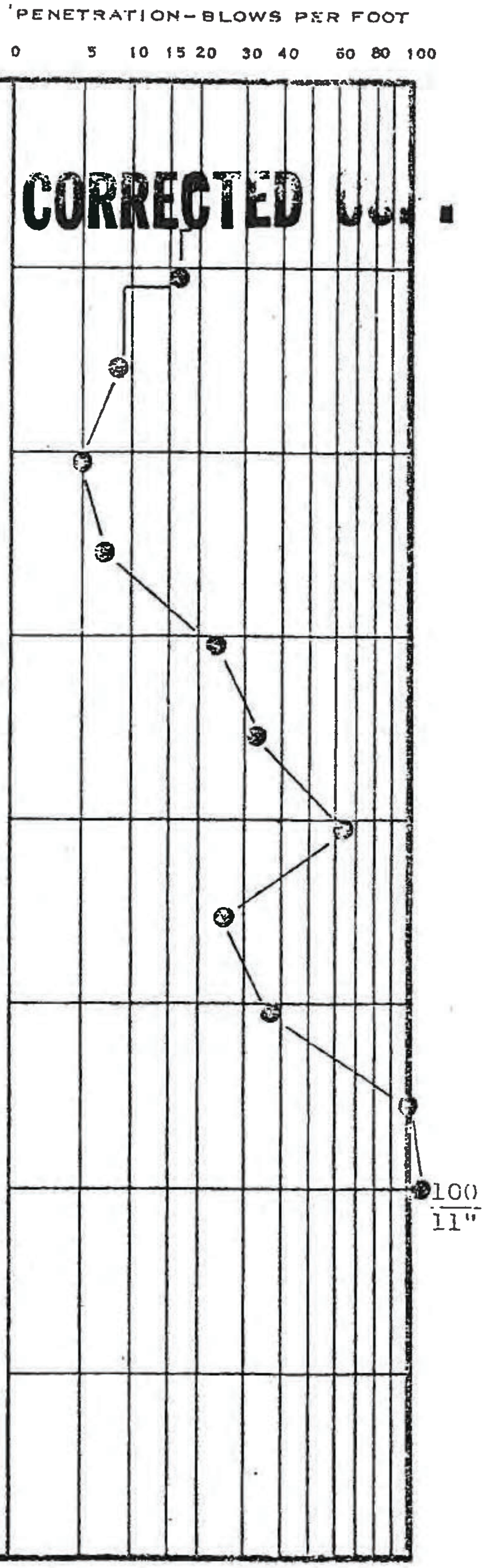
DRILLED BY	RS
LOGGED BY	CB
CHECKED BY	EBE

BORING NUMBER	C-123
DATE STARTED	4-30-74
DATE COMPLETED	4-30-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECOF

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
454.6		VERY STIFF RED BROWN FINE SANDY SILTY CLAY		
			30.7	
	8.0	VERY STIFF RED BROWN FINE SANDY SILT		
444.6			28.7	
	11.0	STIFF RED BROWN MEDIUM TO FINE SANDY SILT TO FIRM YELLOW BROWN MEDIUM TO FINE VERY SANDY SILT	35.0	
434.6			43.7	
	26.0		59.2	GS
424.6		VERY FIRM YELLOW BROWN SILTY MEDIUM TO FINE SAND TO VERY DENSE TAN AND YELLOW COARSE TO FINE SAND	17.1	
			22.9	
414.6			17.6	
	42.0	VERY FIRM TO DENSE TAN AND YELLOW COARSE TO FINE SAND	14.3	
404.6			18.3	
	53.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE YELLOW COARSE TO FINE SAND	13.4	
394.6			14.2	
	60.9	BORING TERMINATED AT 60.9'		
384.6				



CORRECTED

REMARKS:

LOCATION: N 1119184
E 610323

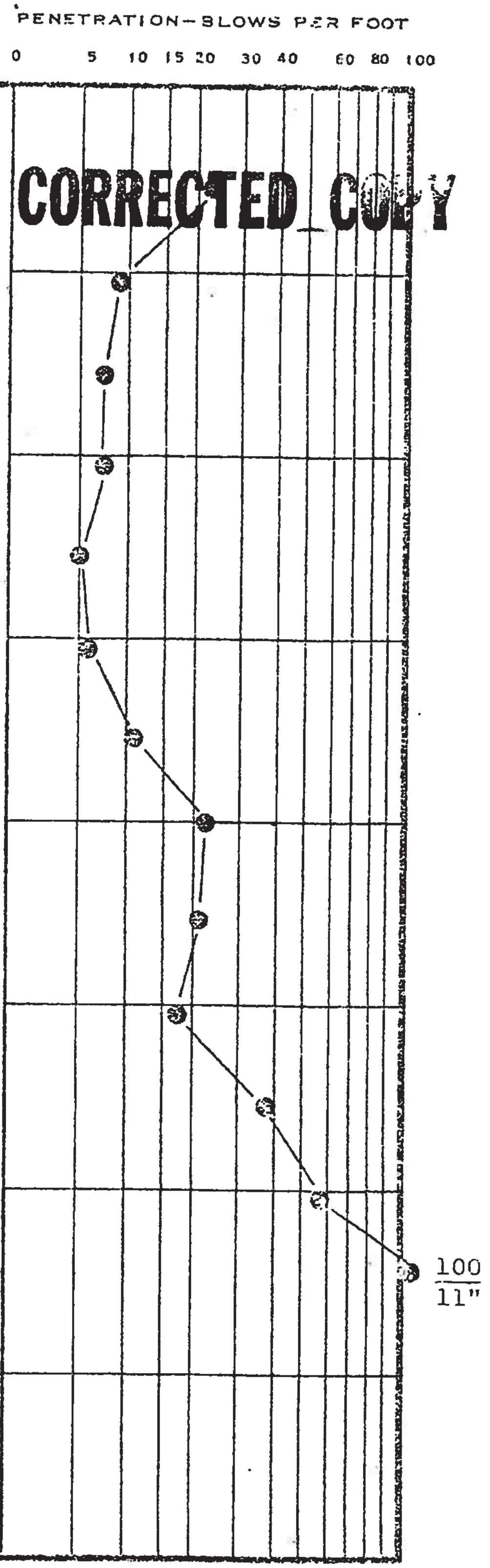
Drilled By GP
Logged By JMS
Checked By JMS

Boring Number C-124
Date Started 5-1-74
Date Completed 5-1-74
Job Number SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
459.9		VERY STIFF RED BROWN FINE SANDY SILTY CLAY		
	7.5			
449.9		STIFF RED BROWN MICACEOUS MEDIUM TO FINE SANDY SILT	38.3	GS
	12.5			
			47.5	
439.9		FIRM RED BROWN TO YELLOW BROWN MICACEOUS MEDIUM TO FINE SANDY SILT	45.6	
			49.3	
429.9				
	31.0		53.8	
			60.3	
419.9		STIFF TO VERY STIFF YELLOW BROWN MICACEOUS MEDIUM TO FINE SANDY SILT	28.4	
			41.2	
409.9			38.5	
	53.0			
		HARD TO VERY HARD GREEN WHITE AND BROWN MICACEOUS COARSE TO FINE VERY SANDY SILT	32.8	
399.9				
	61.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE WHITE AND BROWN SILTY COARSE TO FINE SAND	25.8	
	65.4		24.2	
389.9		BORING TERMINATED AT 65.4'		



CORRECTED COPY

REMARKS:
LOCATION : N 1119384
E 610323

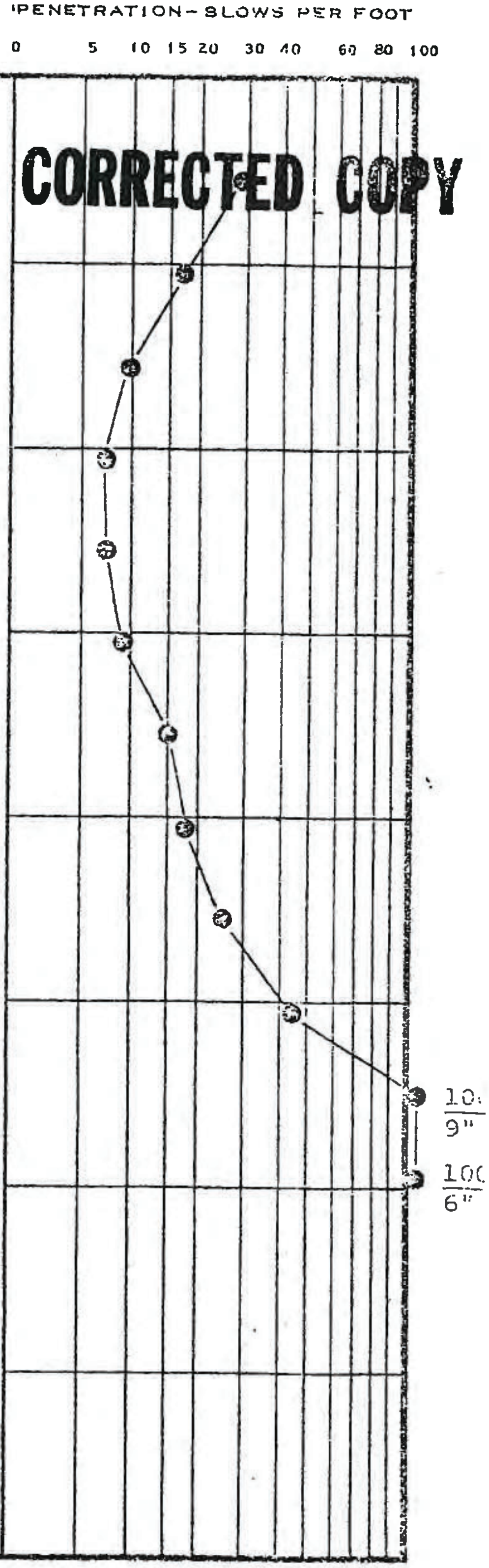
Drilled By PS
Logged By MB
Checked By CBE

Boring Number C-125
Date Started 5-1-74
Date Completed
Job Number SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
464.7			
		VERY STIFF RED BROWN FINE SANDY SILTY CLAY	32.5
454.7			37.2
	12.0		
			39.7
444.7		STIFF YELLOW BROWN FINE SANDY SLIGHTLY CLAYEY SILT	55.3
	27.0		43.5
434.7			54.3
		STIFF TO VERY STIFF TAN MEDIUM TO FINE SANDY SILT	45.8
424.7			43.5
	42.0	VERY FIRM TO DENSE MOTTLED TAN AND GRAY SILTY MEDIUM TO FINE SAND	
414.7			27.9
	52.5	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE WHITE AND GRAY SILTY COARSE TO FINE SAND	14.0
404.7			7.9
	60.0	BORING TERMINATED AT 60.0'	
394.7			



CORRECTED COPY

REMARKS:

LOCATION: N 1119584
E 610323
HOLE CAVED AT 9.0'
AFTER 24 HOURS

DRILLED BY	GP
LOGGED BY	JMS
CHECKED BY	EBE

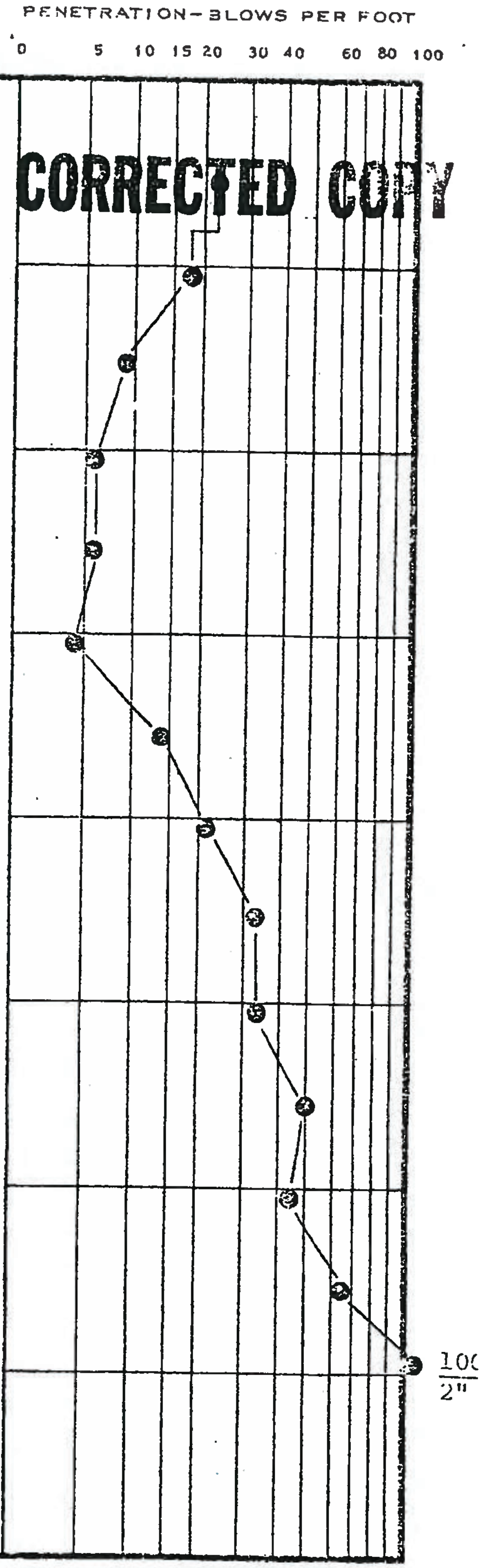
BORING NUMBER	C-126
DATE STARTED	4-30-74
DATE COMPLETED	4-30-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC		
471.6		VERY STIFF RED BROWN FINE SANDY SILTY CLAY			
			28.9		
461.6	8.0				
		VERY STIFF TO STIFF TAN MEDIUM TO FINE SANDY SILT	22.4	▽	
			48.1		
	17.5				
451.6					
			45.6		
		FIRM TO STIFF TAN MEDIUM TO FINE SANDY SILT		▽	
			57.0		
441.6					
			49.7		
			50.4		GS
	37.5				
431.6		VERY FIRM TAN AND YELLOW SILTY MEDIUM TO FINE SAND			
			27.6		
	43.5				
			40.6		
421.6					
		DENSE GREEN AND YELLOW TO GRAY AND WHITE MEDIUM TO FINE SILTY SAND	19.3		
			23.3		
411.6					
			20.2		
			14.9		
401.6	69.7				
		REFUSAL AT 69.7' BORING TERMINATED			
391.6					



REMARKS:
LOCATION: N 1119784
E 610323
HOLE CAVED AT 9.0'
AFTER 24 HOURS

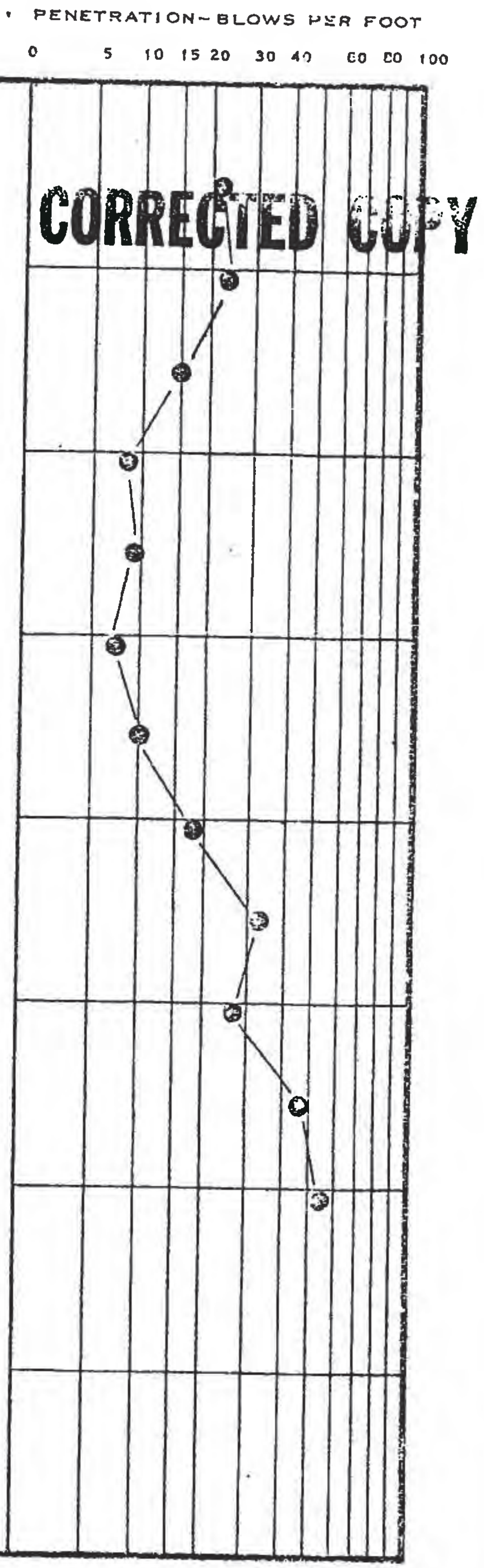
DRILLED BY	GP
LOGGED BY	JMS
CHECKED BY	EGE

BORING NUMBER	C-127
DATE STARTED	4-30-74
DATE COMPLETED	4-30-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
477.4			
		VERY STIFF RED BROWN MEDIUM TO FINE SANDY SILTY CLAY	25.8
	8.0		
467.4			
		VERY STIFF TO STIFF RED BROWN MEDIUM TO FINE SANDY CLAYEY SILT	24.1
			25.0
	17.5		
457.4			
			34.6
		STIFF TAN MEDIUM TO FINE SANDY SILT TO FIRM TAN AND BLACK COARSE TO FINE SANDY SILT	33.3
447.4			
			32.8
	32.0		
		STIFF TO VERY STIFF TAN AND BLACK MEDIUM TO FINE SANDY SILT	25.6
437.4			
			36.4
	43.0		
		DENSE TO VERY FIRM MOTTLED GREEN AND TAN SILTY MEDIUM TO FINE SAND	26.7
427.4			
			25.3
	54.0		
		DENSE TO VERY DENSE MOTTLED GREEN AND TAN SLIGHTLY SILTY COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS	29.7
417.4			
	61.0		19.8
		REFUSAL AT 61.0' BORING TERMINATED	
407.4			



CORRECTED COPY

REMARKS:

LOCATION: N 1119984
E 610323

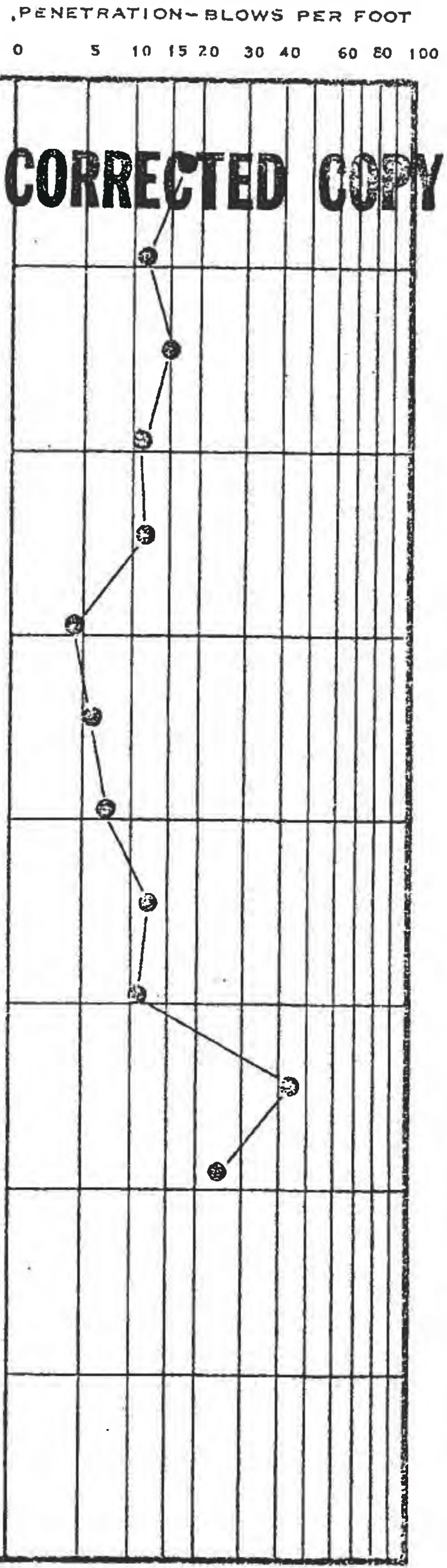
DRILLED BY	CP
LOGGED BY	MB
CHECKED BY	JMS.

BORING NUMBER	C-128
DATE STARTED	4-29-74
DATE COMPLETED	4-29-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
477.0			
		VERY STIFF RED BROWN SLIGHTLY MICACEOUS FINE SANDY CLAYEY SILT	14.3
	8.0		
467.0		STIFF RED BROWN MICACEOUS MEDIUM TO FINE SANDY SILT TO PINK SLIGHTLY MICACEOUS MEDIUM TO FINE VERY SANDY SILT	25.0
			20.8
	17.0		
457.0			25.3
		FIRM PINK SLIGHTLY MICACEOUS SILTY MEDIUM TO FINE SAND TO LOOSE TAN AND BLUE SLIGHTLY MICACEOUS SILTY MEDIUM TO FINE SAND	26.3
447.0			41.8
	33.5		
		FIRM YELLOW BROWN AND BLACK SLIGHTLY MICACEOUS MEDIUM TO FINE SAND	58.7
437.0			57.2
	42.0		
		STIFF TAN AND WHITE MEDIUM TO FINE SANDY SILT TO HARD YELLOW BROWN AND WHITE MICACEOUS MEDIUM TO FINE SANDY SILT	44.1
427.0			16.7
			44.3
	57.0		
417.0		VERY FIRM MOTTLED GREEN AND TAN SILTY MEDIUM TO FINE SAND	35.5
	60.0		
		BORING TERMINATED AT 60.0'	
407.0			



CORRECTED COPY

REMARKS:
LOCATION: N 1120184
E 610323

DRILLED BY GPC(RK)
LOGGED BY MB
CHECKED BY CBE

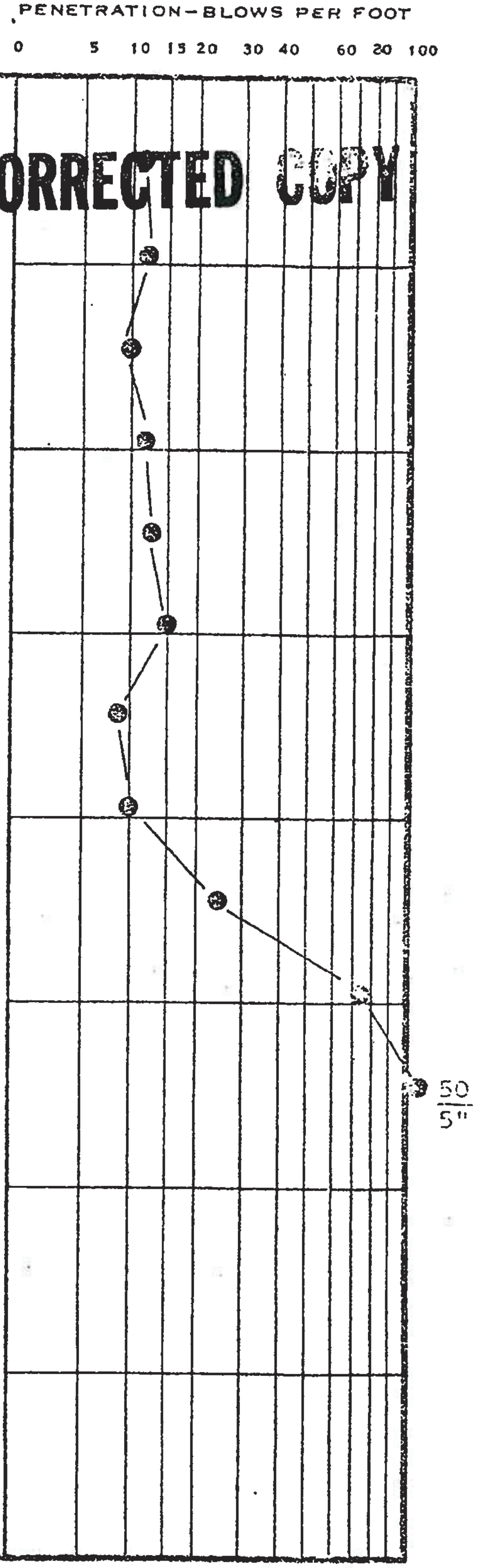
BORING NUMBER C-129
DATE STARTED 4-29-74
DATE COMPLETED
JOB NUMBER SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
481.7		STIFF RED BROWN MICACEOUS FINE VERY SANDY SLIGHTLY CLAYEY SILT	19.9
	8.0		
471.7			18.6
			42.9
461.7			37.3
		STIFF RED BROWN TO YELLOW BROWN MICACEOUS MEDIUM TO FINE SANDY SILT	23.6
451.7			24.5
			36.6
441.7			47.7
	41.0	VERY STIFF GRAY AND WHITE MICACEOUS MEDIUM TO FINE VERY SANDY SILT	27.4
	47.0	VERY DENSE DARK GREEN VERY MICACEOUS VERY SILTY MEDIUM TO FINE SAND	
431.7			17.6
	53.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GREEN AND TAN MICACEOUS SILTY MEDIUM TO FINE SAND	18.8
	58.0		
421.7		REFUSAL AT 58.0' BORING TERMINATED	

CORRECTED COPY



REMARKS:

LOCATION: N 1120384
E 610323

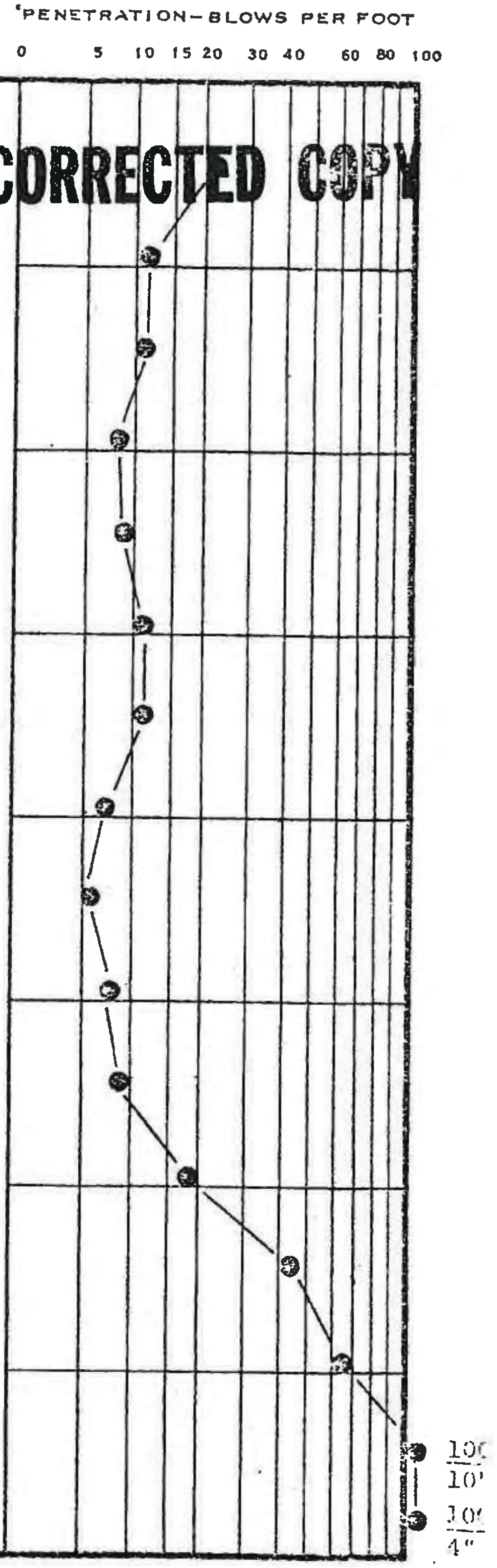
Drilled By GPC(RK)
Logged By CB
Checked By JMS.

Boring Number C-130
Date Started 4-30-74
Date Completed
Job Number SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECOF

ELEV.	DEPTH FEET	DESCRIPTION	NMC
487.7		VERY STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY CLAYEY SILT	24.7
477.7 467.7 457.7	8.0	STIFF RED BROWN TO YELLOW BROWN MICACEOUS MEDIUM TO FINE SANDY SILT	25.3 29.9 48.8 42.9 31.2 34.2
447.7 437.7	37.0	FIRM YELLOW BROWN MICACEOUS MEDIUM TO FINE SANDY SILT TO STIFF YELLOW BROWN VERY MICACEOUS MEDIUM TO FINE SANDY SILT	38.9 50.8 47.7
427.7	57.0	FIRM GREEN AND WHITE VERY MICACEOUS VERY SILTY MEDIUM TO FINE SAND	21.2
417.7	62.0	DENSE TO VERY DENSE GREEN AND WHITE VERY MICACEOUS VERY SILTY MEDIUM TO FINE SAND	23.3 17.0
	71.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GREEN AND WHITE MICACEOUS SILTY MEDIUM TO FINE SAND	23.3
407.7	78.7	REFUSAL AT 78.7'-BORING TERMINATED	14.5



CORRECTED COPY

REMARKS:

LOCATION: N 1120584
E 610323

HOLE CAVED AT 44.5'
AFTER 24 HRS.

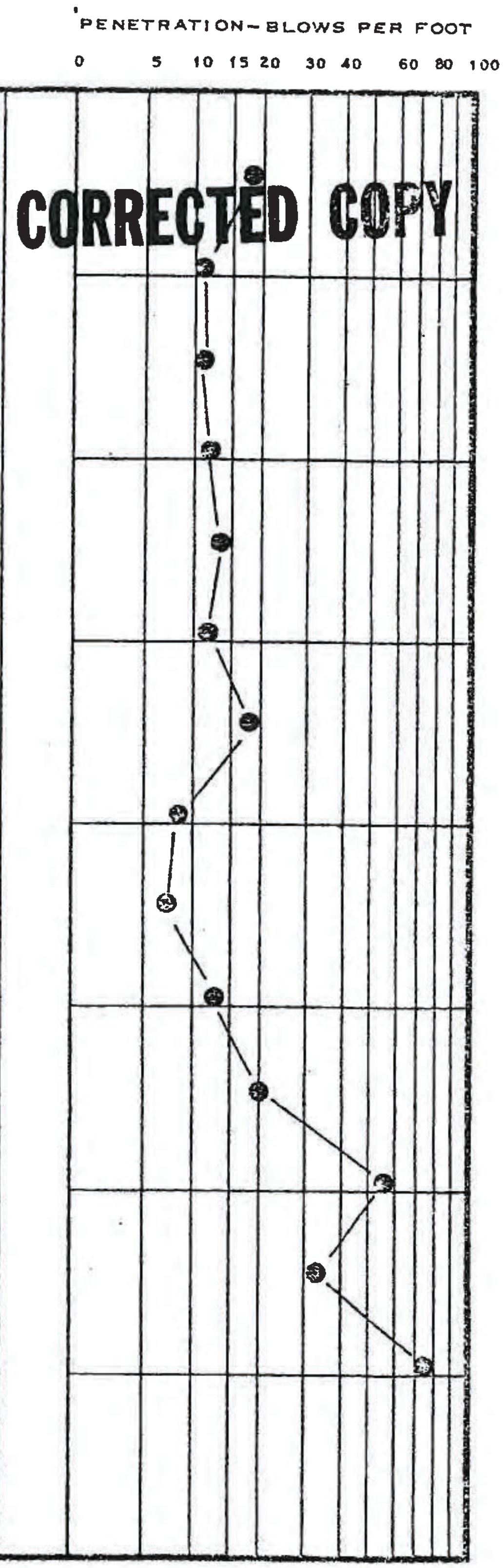
DRILLED BY	GPC (RK)
LOGGED BY	CB
CHECKED BY	EBE

CONFIDENTIAL BUSINESS INFORMATION

BORING NUMBER	C-131
DATE STARTED	4-30-74
DATE COMPLETED	
JOB NUMBER	SAG-674

TEST BORING RECOF

ELEV.	DEPTH FEET	DESCRIPTION	NMC
489.3		VERY STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SLIGHTLY SANDY CLAYEY SILT	26.4
479.3 469.3 459.3	8.0	STIFF PURPLE BROWN SLIGHTLY MICACEOUS FINE SANDY SILT TO PINK AND BROWN COARSE TO FINE VERY SANDY SILT	18.5 32.5 37.9 32.5 42.9
	31.0	VERY STIFF PURPLE BROWN MICACEOUS FINE SLIGHTLY SANDY SILT	43.5
449.3	37.0	FIRM PURPLE BROWN TO YELLOW BROWN MICACEOUS FINE SLIGHTLY SANDY SILT	40.0 53.1
439.3	46.0	STIFF TO VERY STIFF YELLOW BROWN MICACEOUS FINE SLIGHTLY SANDY SILT	47.0 35.1
429.3	57.0	VERY HARD GREENISH GRAY VERY MICACEOUS FINE SANDY SILT TO GREEN AND YELLOW MEDIUM TO FINE VERY SANDY SILT	27.6 28.0
419.3	66.0	VERY DENSE GREEN AND YELLOW SILTY MEDIUM TO FINE SAND	17.2
409.3	72.8	REFUSAL AT 72.8' BORING TERMINATED	



CORRECTED COPY

REMARKS:

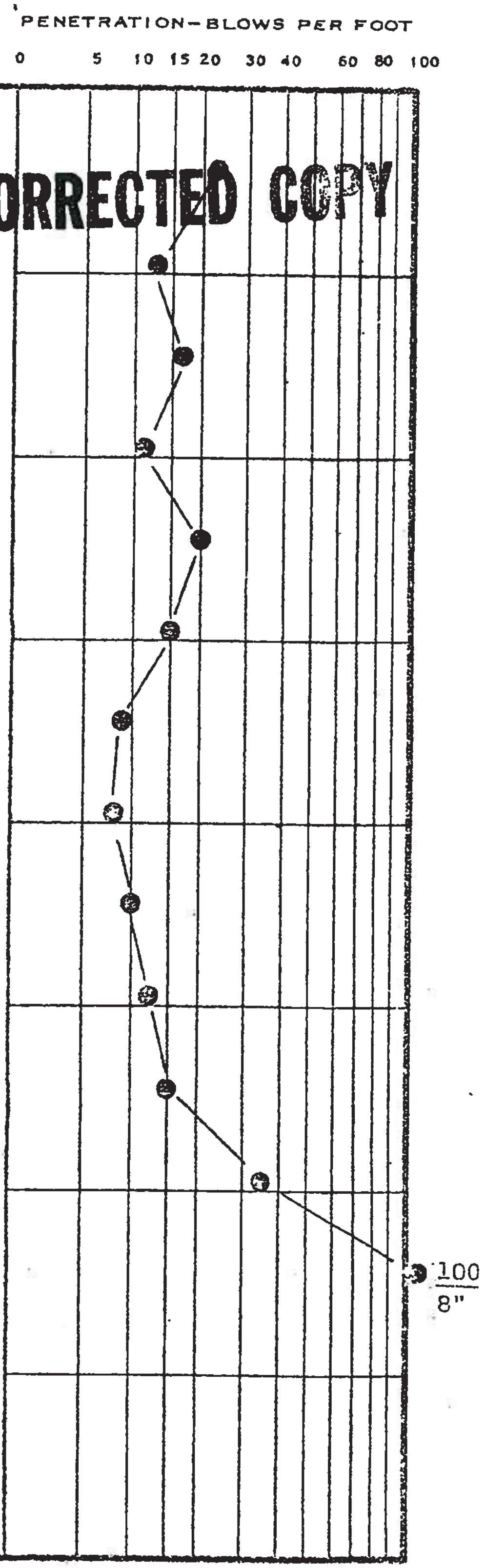
LOCATION: N 1120784
E 610323
HOLE CAVED AT 46.5'
AFTER 24 HRS.

DRILLED BY	GPC (RK)
LOGGED BY	CB
CHECKED BY	JMS
BORING NUMBER	C-132
DATE STARTED	5-1-74
DATE COMPLETED	
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECOF

ELEV.	DEPTH FEET	DESCRIPTION	NMC
485.5		VERY STIFF RED BROWN MEDIUM TO FINE SANDY CLAYEY SILT	
			25.0
	7.0		
475.5			21.5
		STIFF PURPLE BROWN MICACEOUS FINE SANDY SILT	
			31.6
465.5			34.0
	21.0		
			40.3
		VERY STIFF PURPLE BROWN MICACEOUS FINE SANDY SILT	
455.5			36.4
	32.0		
			39.3
		STIFF PURPLE TO GOLD AND WHITE VERY MICACEOUS FINE SANDY SILT	
445.5			29.2
			25.8
435.5			29.0
	52.0	VERY STIFF TO HARD TAN WHITE AND GREEN VERY MICACEOUS MEDIUM TO FINE SANDY SILT	
			30.7
425.5			25.0
	61.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY HARD GREENISH BROWN MICACEOUS COARSE TO FINE SANDY SILT WITH WEATHERED ROCK FRAGMENTS	
	64.4		22.9
415.5			
		BORING TERMINATED AT 64.4'	



CORRECTED COPY

REMARKS:
LOCATION: N 1120964
E 610323
HOLE CAVED AT 42.5'
AFTER 24 HOURS

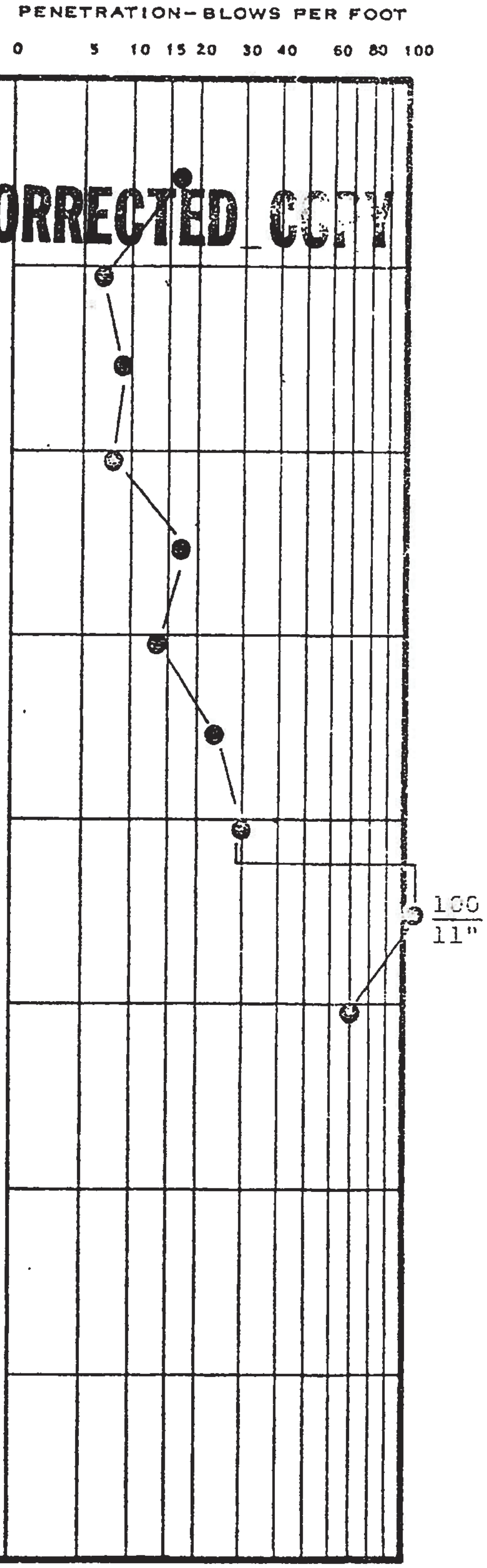
DRILLED BY GPC(RK)
LOGGED BY CB
CHECKED BY CBE

CONFIDENTIAL BUSINESS INFORMATION

BORING NUMBER C-133
DATE STARTED 5-1-74
DATE COMPLETED
JOB NUMBER SAG-674

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
483.9		VERY STIFF RED BROWN MICACEOUS CLAYEY SILT	
	7.0		
473.9		FIRM RED BROWN MICACEOUS MEDIUM TO FINE SANDY SLIGHTLY CLAYEY SILT	
	13.0		
463.9		LOOSE TAN SILTY MEDIUM TO FINE SAND	
	23.0		
453.9		VERY STIFF TAN FINE VERY SANDY SILT TO STIFF GREENISH TAN FINE SANDY SILT	
	33.0		
443.9		VERY FIRM GREENISH TAN SLIGHTLY SILTY MEDIUM TO FINE SAND TO DENSE GRAY AND WHITE MEDIUM TO FINE SAND	
	42.5	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GRAY AND WHITE MEDIUM TO FINE SAND	
	48.0		
433.9	50.0		
		BORING TERMINATED AT 50.0'	
423.9			



CORRECTED COPY

REMARKS:

LOCATION: N 1121184
E 610323
HOLE CAVED AT 29.5'
AFTER 24 HRS.

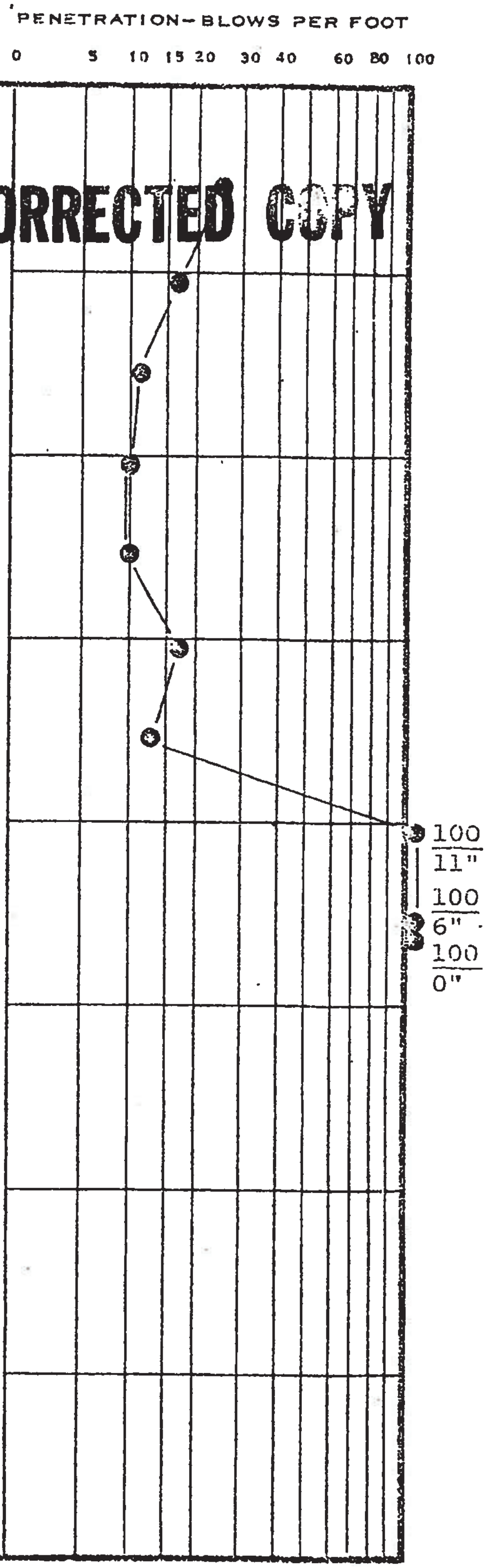
DRILLED BY GP
LOGGED BY JMS
CHECKED BY

CONFIDENTIAL BUSINESS INFORMATION

BORING NUMBER C-134
DATE STARTED 5-1-74
DATE COMPLETED 5-2-74
JOB NUMBER SAG-674

TEST BORING RECOF

ELEV.	DEPTH FEET	DESCRIPTION	NMC
486.3		VERY STIFF RED BROWN COARSE TO FINE SANDY SILTY CLAY WITH SMALL WEATHERED ROCK FRAGMENTS	
476.3	8.5		
		VERY STIFF YELLOW BROWN MEDIUM TO FINE SANDY SLIGHTLY CLAYEY SILT TO STIFF YELLOW BROWN MICACEOUS MEDIUM TO FINE SANDY SILT	
466.3			
456.3			
	37.0		
446.3		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GREEN AND TAN MICACEOUS SILTY MEDIUM TO FINE SAND	
	47.0		
436.3		REFUSAL AT 47.0' BORING TERMINATED	



CORRECTED COPY

REMARKS:

LOCATION: N 1121232
E 610131

HOLE CAVED AT 20.0'
AFTER 24 HOURS

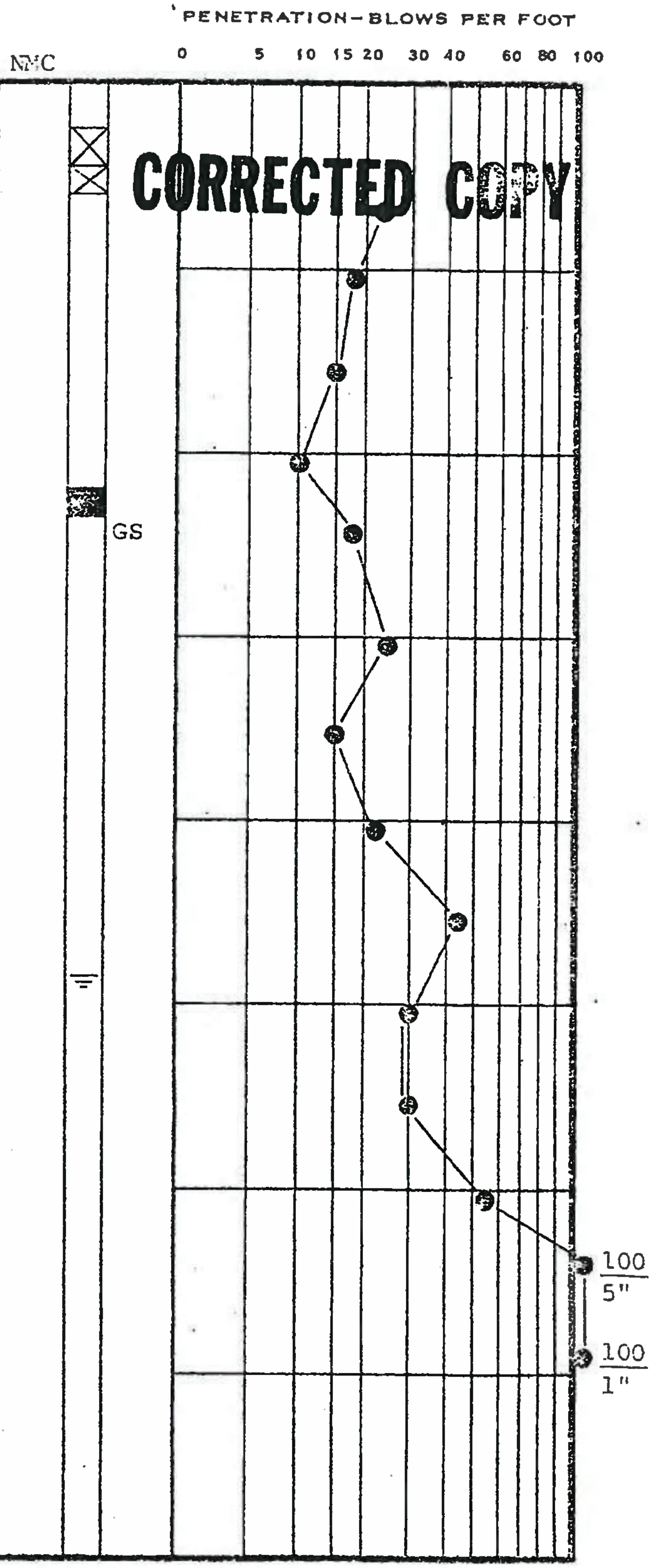
DRILLED BY	RS
LOGGED BY	CB
CHECKED BY	FBC.

BORING NUMBER	C-135
DATE STARTED	5-2-74
DATE COMPLETED	5-2-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECOF

ELEV.	DEPTH FEET	DESCRIPTION
519.4		VERY STIFF RED BROWN FINE SANDY SILTY CLAY
509.4	9.0	
		VERY STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SLIGHTLY CLAYEY SILT TO STIFF YELLOW BROWN AND BLACK MEDIUM TO FINE SANDY SILT
499.4		
	23.0	
		FIRM PINK RED SLIGHTLY MICACEOUS SILTY MEDIUM TO FINE SAND
	26.0	
489.4		
		VERY STIFF YELLOW BROWN AND BLACK MEDIUM TO FINE SANDY SILT TO GRAY BROWN AND BLACK MEDIUM TO FINE SANDY SILT
479.4		
	43.0	
		DENSE MOTTLED GREEN AND TAN SILTY MEDIUM TO FINE SAND TO VERY FIRM GRAY TAN SILTY COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS
469.4		
459.4		
	62.0	
		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GRAY SILTY COARSE TO FINE SAND
449.4	69.6	
		REFUSAL AT 69.6' BORING TERMINATED



CORRECTED COPY

REMARKS:
LOCATION: N 1115082
609136
HOLE CAVED AT 48.5' AFTER
24 HOURS

DRILLED BY RS
LOGGED BY MB
CHECKED BY JM

BORING NUMBER C-156
DATE STARTED 5-14-74
DATE COMPLETED 5-15-74
JOB NUMBER SAG-674

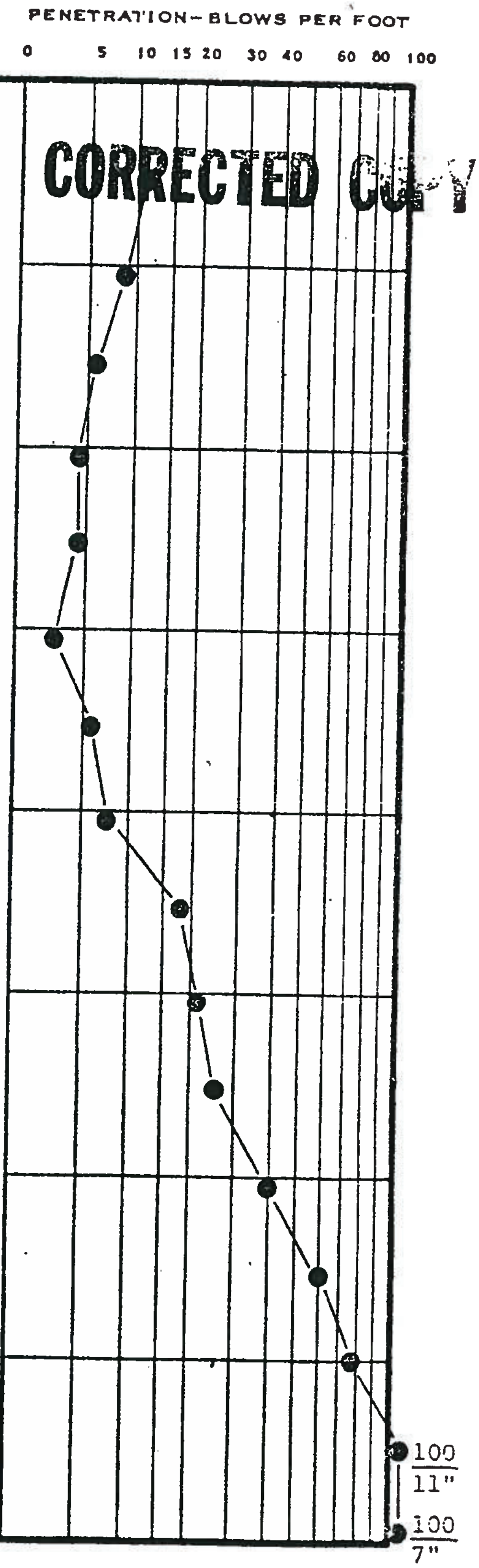
CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

PAGE 1 OF 2

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	
495.4		STIFF RED BROWN FINE SANDY SILTY CLAY	
485.4	7.0	STIFF RED BROWN COARSE TO FINE SANDY SLIGHTLY CLAYEY SILT	
475.4 465.4	12.5	FIRM RED BROWN AND TAN FINE SANDY CLAYEY SILT TO SOFT RED TAN AND GRAY MEDIUM TO FINE SANDY CLAYEY SILT	GS
455.4	33.5	FIRM YELLOW BROWN MEDIUM TO FINE SANDY CLAYEY SILT	
	42.0	VERY STIFF YELLOW BROWN MEDIUM TO FINE SANDY SILT	
445.4	47.5	VERY FIRM GREEN GRAY AND WHITE VERY SILTY MEDIUM TO FINE SAND TO GREEN AND GRAY BROWN VERY SILTY COARSE TO FINE SAND	
435.4 425.4	58.0	DENSE MOTTLED GREEN AND TAN SILTY MEDIUM TO FINE SAND TO VERY DENSE GREEN BROWN AND WHITE SLIGHTLY MICACEOUS SILTY COARSE TO FINE SAND	
415.4	73.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GRAY AND WHITE COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS TO BLUE GREEN COARSE TO FINE SAND	



REMARKS:
LOCATION: N 1115403
E 609345
HOLE CAVED AT 29.0' AFTER
24 HOURS

DRILLED BY GP
LOGGED BY MB
CHECKED BY EBE

BORING NUMBER C-158
DATE STARTED 5-15-74
DATE COMPLETED 5-17-74
JOB NUMBER SAG-674

CONFIDENTIAL BUSINESS
INFORMATION

TEST BORING RECORD

PAGE 2 OF 2

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC	PENETRATION–BLOWS PER FOOT 0 5 10 15 20 30 40 60 80 100
415.4				
				100/8"
405.4				100/3"
		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GRAY AND WHITE COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS TO BLUE GREEN COARSE TO FINE SAND		100/6"
395.4				100/4"
				100/6"
385.4	109.7			100/2"
		REFUSAL AT 109.7' BORING TERMINATED		

REMARKS:

Drilled By GP

Logged By MB

Checked By CBE

Boring Number C-158

Date Started 5-15-74

Date Completed

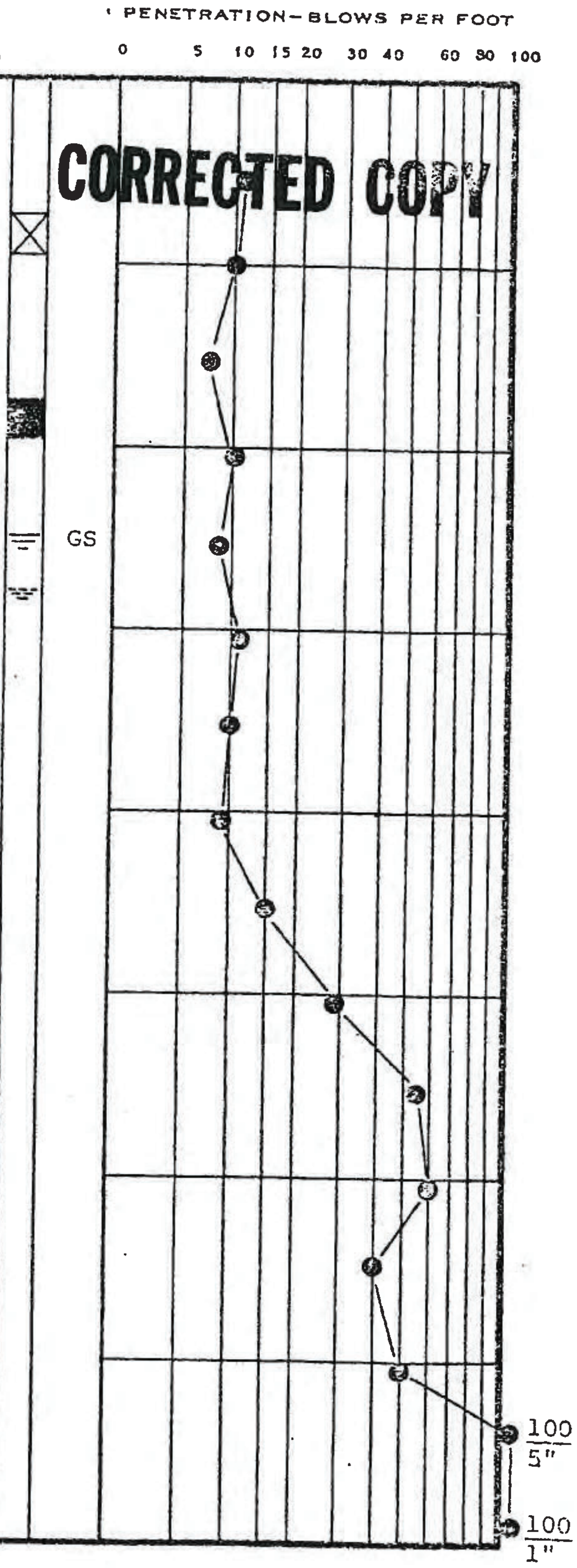
Job Number SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
484.8			
		STIFF RED BROWN SLIGHTLY MICACEOUS COARSE TO FINE SANDY CLAYEY SILT	
474.8			
	13.0		
		LOOSE PINK TO GRAY TAN MICACEOUS VERY SILTY COARSE TO FINE SAND	
464.8			
	24.0		
454.8			
		FIRM PINK TAN AND BLACK SLIGHTLY MICACEOUS CLAYEY MEDIUM TO FINE SANDY SILT TO STIFF GRAY AND TAN MICACEOUS MEDIUM TO FINE SANDY SILT	
444.8			
	44.0		
		FIRM TO VERY FIRM GRAY AND WHITE MICACEOUS SILTY COARSE TO FINE SAND	
434.8			
	52.5		
424.8		DENSE TO VERY DENSE GRAY AND WHITE MICACEOUS SILTY COARSE TO FINE SAND	
414.8			
	73.0		
		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE GREEN AND TAN SILTY COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS	
404.8	79.6	REFUSAL AT 79.6'	

CORRECTED COPY



REMARKS: BORING TERMINATED

LOCATION: N 1115589
E 609466

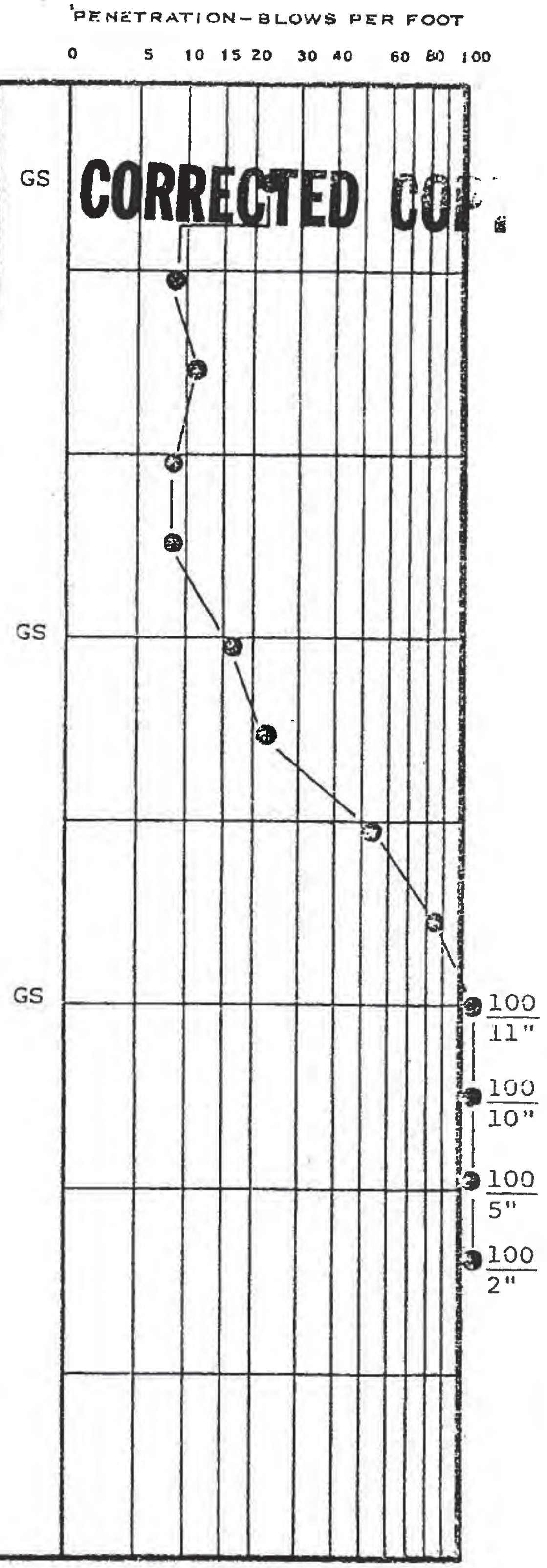
DRILLED BY	GP
LOGGED BY	MB
CHECKED BY	MS

BORING NUMBER	C-159
DATE STARTED	5-17-74
DATE COMPLETED	5-18-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECOR

ELEV.	DEPTH FEET	DESCRIPTION	NMC
473.8		VERY STIFF RED BROWN FINE SANDY SILTY CLAY	
	7.5		
468.8		STIFF RED BROWN FINE SANDY CLAYEY SILT TO MOTTLED TAN PINK AND BLACK COARSE TO FINE SANDY SILT	
458.8			
	28.0		
448.8		VERY STIFF MOTTLED GREEN AND TAN MEDIUM TO FINE SANDY SILT	
438.8	39.0	VERY DENSE GRAY BROWN AND WHITE SLIGHTLY SILTY COARSE TO FINE SAND	
	47.0		
428.8		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED BLUE TAN AND WHITE SILTY COARSE TO FINE SAND	
418.8			
	64.7		
		REFUSAL AT 64.7' BORING TERMINATED	
408.8			



CORRECTED CO

REMARKS:

LOCATION: N 1115949
E 609447
HOLE CAVED AT 18.0' AFTER
24 HOURS

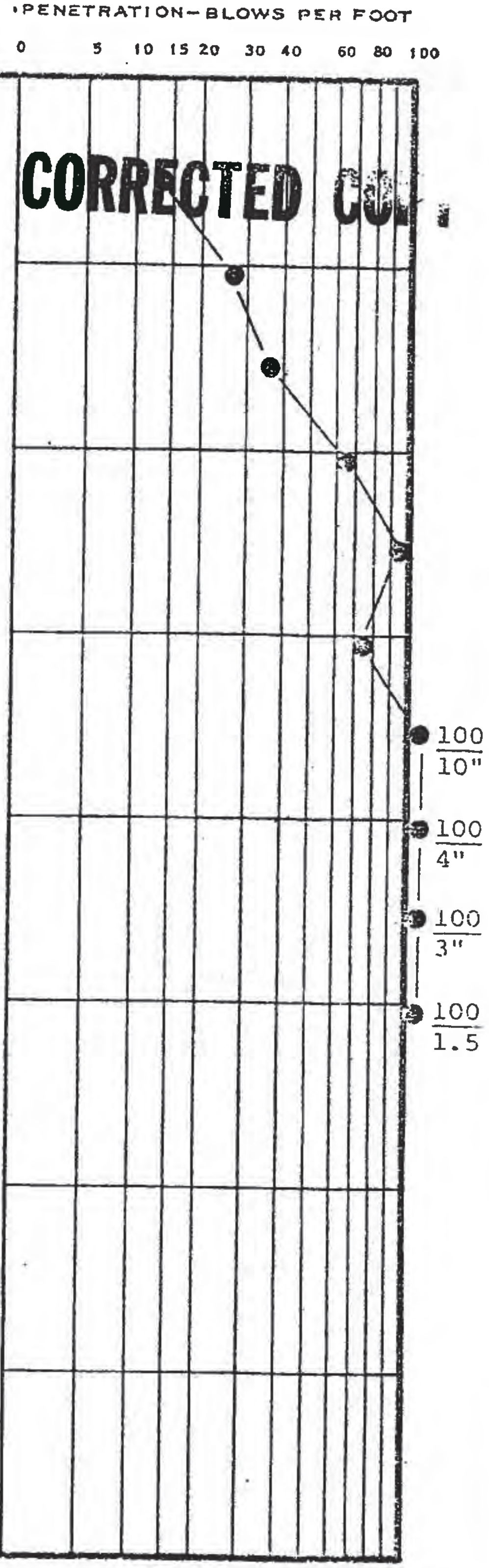
DRILLED BY RS
LOGGED BY MB
CHECKED BY JMB

CONFIDENTIAL BUSINESS INFORMATION

BORING NUMBER C-160
DATE STARTED 5-17-74
DATE COMPLETED 5-18-74
JOB NUMBER SAG-674

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
471.1				
		FIRM TO VERY FIRM MICACEOUS VERY SILTY COARSE TO FINE SAND		GS
461.1				
	13.0		▽	
		HARD GREEN AND TAN FINE VERY SANDY VERY MICACEOUS SILT		
451.1	18.0			GS
		VERY DENSE BROWN GRAY AND WHITE SILTY COARSE TO FINE SAND		
441.1				
	33.0			
		PARTIALLY WEATHERED ROCK SAMPLED AS TAN BROWN SILTY COARSE TO FINE SAND		
431.1				
421.1	49.7			
		REFUSAL AT 49.7' BORING TERMINATED		



CORRECTED CO

REMARKS:

LOCATION: N 1116069
E 609788

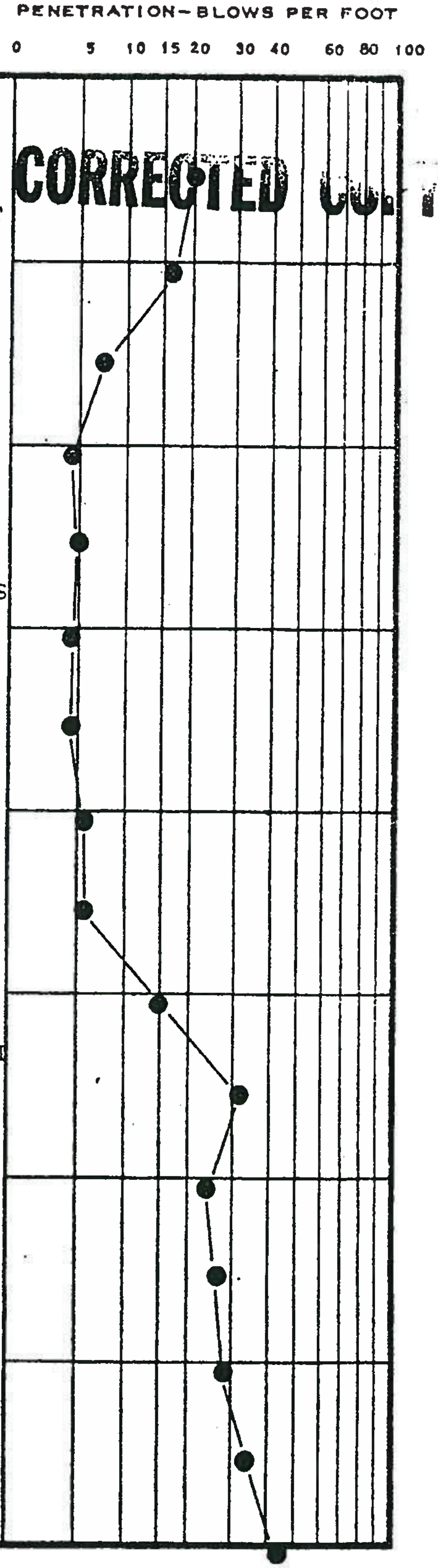
Drilled By RS
Logged By CB
Checked By JMS

CONFIDENTIAL BUSINESS INFORMATION

Boring Number	C-162
Date Started	5-15-74
Date Completed	5-15-74
Job Number	SAG-674

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
460.6		VERY STIFF RED BROWN TO TAN FINE SANDY CLAYEY SILT		
				GS,T CON
450.6				
	13.0			
		FIRM TAN FINE SANDY CLAYEY SILT TO TAN AND RED MICACEOUS MEDIUM TO FINE SANDY SILT		CON GS
440.6				
	27.0			
				T,GS P
430.6		SOFT TO FIRM TAN MEDIUM TO FINE SANDY SILT		
420.6				
	48.0			
410.6		FIRM TO DENSE TAN AND WHITE VERY SILTY COARSE TO FINE SAND		
				CON,T GS
	57.5			
400.6		VERY FIRM MOTTLED GREEN TAN VERY SILTY COARSE TO FINE SAND TO LIGHT GREEN AND GRAY VERY SILTY MEDIUM TO FINE SAND		
390.6				
	77.5	DENSE MOTTLED BLUE GREEN AND TAN		
380.6	80.0	VERY SILTY MEDIUM TO FINE SAND		



CORRECTED COPY

REMARKS:

LOCATION: N 1119298
E 610498
HOLE CAVED AT 18.0' AFTER
24 HOURS

DRILLED BY	GP
LOGGED BY	MB
CHECKED BY	CBE

CONFIDENTIAL BUSINESS INFORMATION

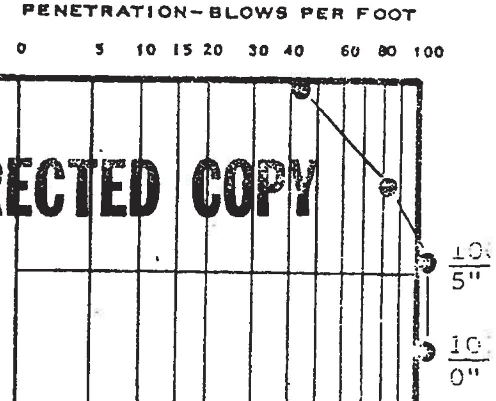
BORING NUMBER	C-166
DATE STARTED	5-20-74
DATE COMPLETED	
JOB NUMBER	SAG-674

PAGE 1 OF 2

TEST BORING RECOR

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC
380.6		VERY DENSE MOTTLED GRAY GREEN AND WHITE SILTY COARSE TO FINE SAND	
	87.0		
370.6		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE BLUE GREEN SILTY COARSE TO FINE SAND	
	94.5		
360.6		REFUSAL AT 94.5' BORING TERMINATED	



REMARKS:

Drilled By GP
Logged By MB
Checked By CBE

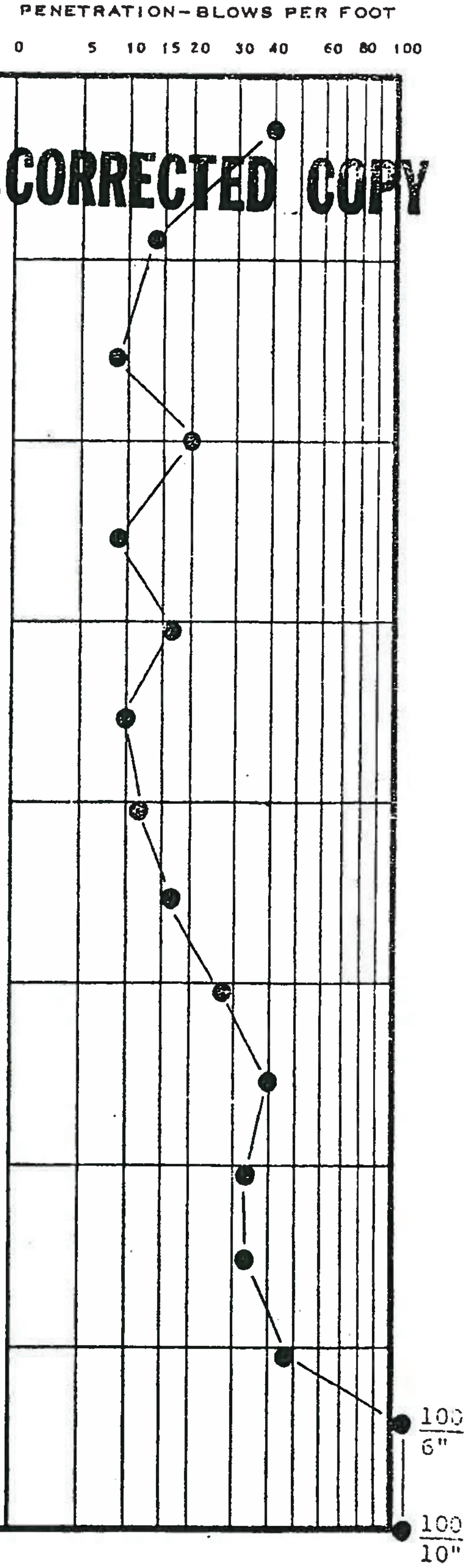
Boring Number C-166
Date Started 5-20-74
Date Completed
Job Number SAG-674
PAGE 2 OF 2

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

PAGE 1 OF 2

ELEV.	DEPTH FEET	DESCRIPTION	NMC
451.5		HARD RED BROWN COARSE TO FINE SANDY CLAYEY SILT	
	5.5		P,T GS
441.5		STIFF RED BROWN MEDIUM TO FINE SANDY SILT TO VERY STIFF GRAY BROWN COARSE TO FINE SANDY SILT WITH WEATHERED ROCK FRAGMENTS	
431.5			
	23.0		
421.5		STIFF GRAY BROWN AND WHITE COARSE TO FINE SANDY SILT TO VERY STIFF GRAY TAN AND BLACK MEDIUM TO FINE SANDY SILT	
411.5			
401.5			
	53.0		
391.5		HARD MOTTLED GREEN TAN AND WHITE MEDIUM TO FINE SANDY SILT TO MOTTLED YELLOW AND BROWN MEDIUM TO FINE SANDY SILT WITH WEATHERED ROCK FRAGMENTS	
381.5			
	72.0		
371.5		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE YELLOW BROWN TO DARK BROWN SILTY COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS	



CORRECTED COPY

REMARKS:

LOCATION: N 1119257
E 610136

DRILLED BY	RS
LOGGED BY	MB
CHECKED BY	

BORING NUMBER	C-167
DATE STARTED	6-1-74
DATE COMPLETED	6-1-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECOF

PAGE 2 OF 2

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC	PENETRATION–BLOWS PER FOOT 0 5 10 15 20 30 40 60 80 100
371.5		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE YELLOW BROWN TO DARK BROWN SILTY COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS		
361.5	89.7	REFUSAL AT 89.7' BORING TERMINATED		
351.5				

REMARKS:

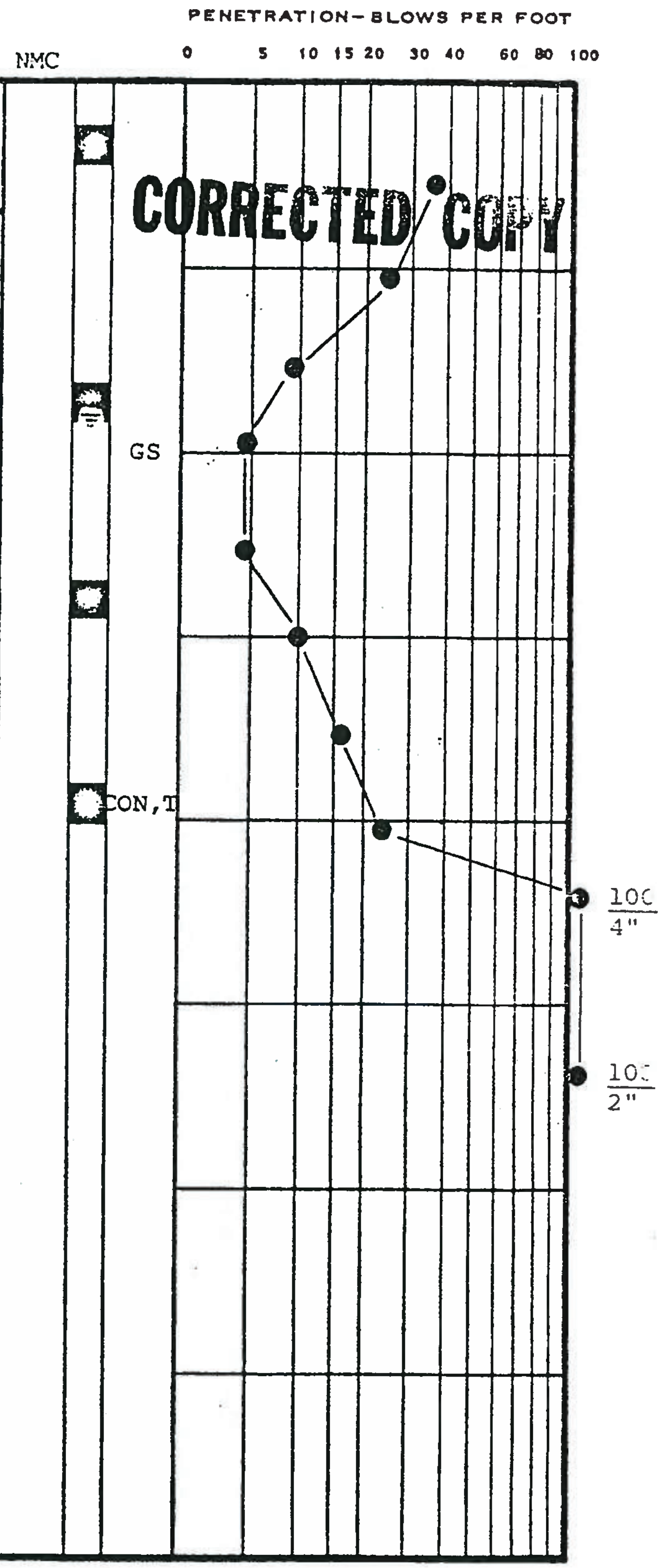
Drilled By RS
Logged By MB
Checked By MWM

Boring Number C-167
Date Started 6-1-74
Date Completed 6-1-74
Job Number SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION
465.2		HARD RED AND BROWN FINE SANDY SILTY CLAY
	7.0	
455.2		VERY STIFF YELLOW BROWN FINE SANDY CLAYEY SILT TO STIFF RED BROWN COARSE TO FINE SANDY SILT
	18.0	
445.2		SOFT TAN AND BLACK COARSE TO FINE SANDY SILT
	27.0	
435.2		STIFF TO VERY STIFF TAN BLACK AND WHITE COARSE TO FINE SANDY SILT
	37.5	
425.2		VERY FIRM MOTTLED BLUE GREEN AND TAN SILTY MEDIUM TO FINE SAND
	43.0	
415.2		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED BLUE GREEN AND WHITE SILTY COARSE TO FINE SAND
	54.7	
405.2		REFUSAL AT 54.7' BORING TERMINATED
395.2		



CORRECTED COPY

REMARKS:
LOCATION: N 1119677
E 610172
HOLE CAVED AT 18.0' AFTER 24 HOURS

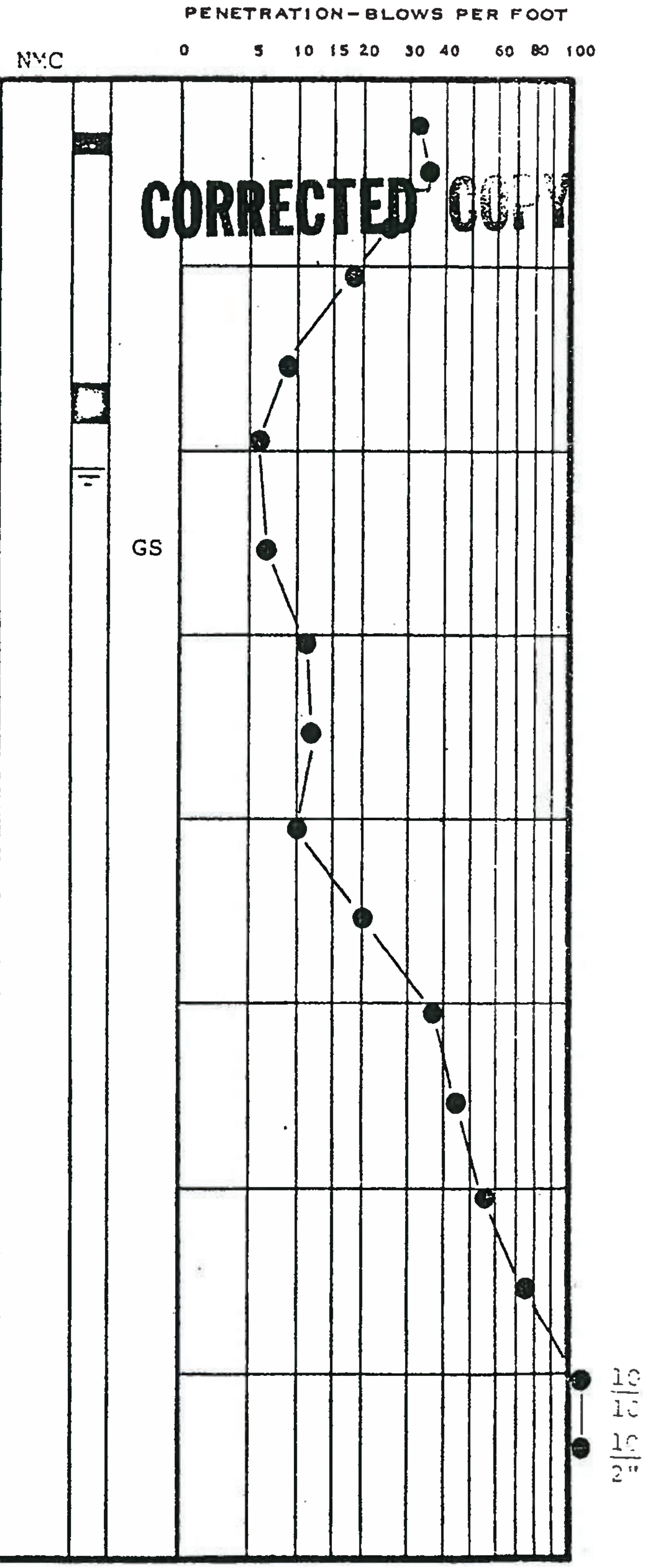
Drilled By RS
Logged By MB
Checked By JMS

CONFIDENTIAL BUSINESS INFORMATION

Boring Number C-168
Date Started 5-20-74
Date Completed 5-21-74
Job Number SAG-674

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION
473.3		HARD RED BROWN FINE SANDY SILTY CLAY
	6.0	VERY STIFF RED BROWN FINE SANDY CLAYEY SILT TO STIFF TAN MEDIUM TO FINE SANDY SILT
463.3		
	18.0	
453.3		FIRM RED BROWN MEDIUM TO FINE SANDY SILT WITH WEATHERED ROCK FRAGMENTS TO STIFF GRAY BROWN MICACEOUS COARSE TO FINE SANDY SILT
443.3		
433.3		
	43.0	VERY FIRM GRAY BROWN SLIGHTLY MICACEOUS SILTY MEDIUM TO FINE SAND TO DENSE MOTTLED TAN GREEN AND WHITE SILTY COARSE TO FINE SAND
423.3		
	57.0	VERY DENSE MOTTLED TAN GREEN AND WHITE SILTY COARSE TO FINE SAND
413.3		
	68.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED BLUE AND TAN SILTY COARSE TO FINE SAND
403.3		
	74.7	REFUSAL AT 74.7' BORING TERMINATED
393.3		



CORRECTED COPY

REMARKS:

LOCATION: N 1119707
E 610520
HOLE CAVED AT 21.0' AFTER 24 HOURS

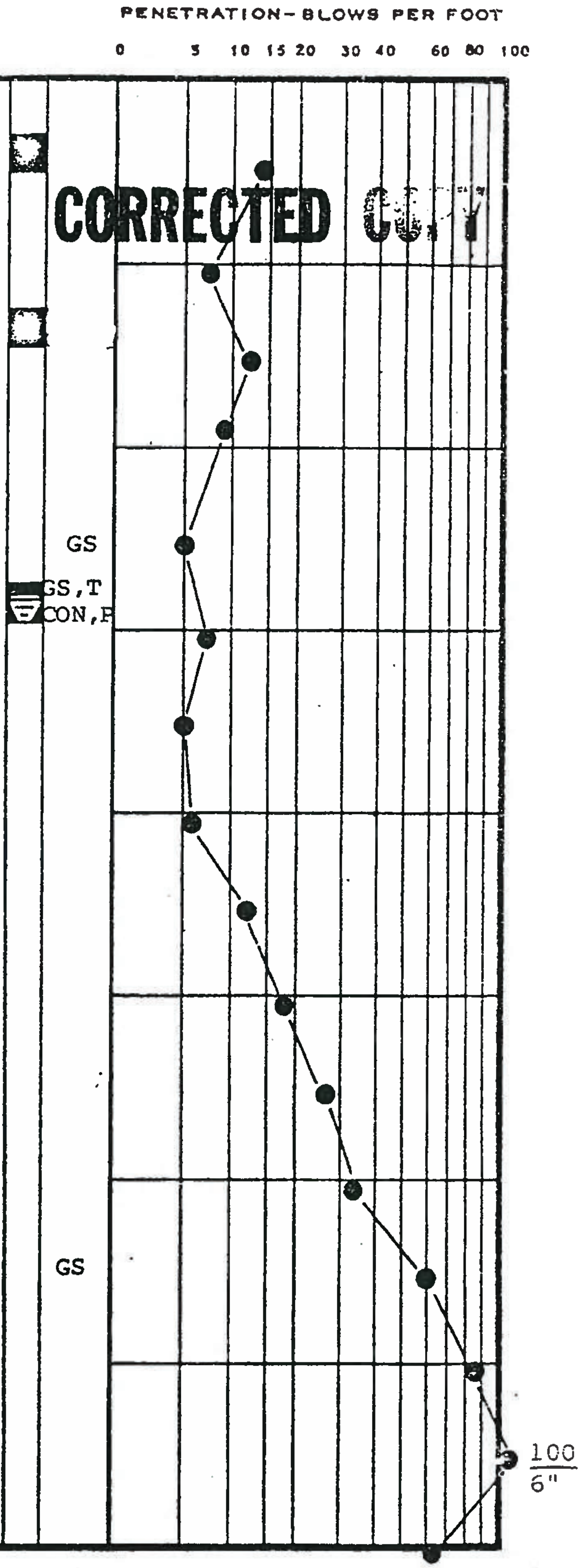
DRILLED BY	RS
LOGGED BY	MB
CHECKED BY	

CONFIDENTIAL BUSINESS INFORMATION

BORING NUMBER	C-169
DATE STARTED	5-29-74
DATE COMPLETED	5-30-74
JOB NUMBER	SAG-674

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC
477.8		STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY CLAYEY SILT	
	7.0		
467.8		FIRM TO STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT	
	17.5		
457.8		FIRM TAN BLACK COARSE TO FINE VERY SANDY SILT	
447.8			
437.8			
	44.0	STIFF TAN AND BLACK MEDIUM TO FINE SANDY SILT TO VERY STIFF MOTTLED GREEN TAN AND WHITE COARSE TO FINE SANDY SILT	
427.8			
	52.0	VERY FIRM MOTTLED GREEN TAN AND WHITE COARSE TO FINE SANDY SILT TO DENSE MOTTLED BLUE AND WHITE VERY SILTY COARSE TO FINE SAND	
417.8			
	63.0	VERY DENSE BLUE AND WHITE VERY SILTY COARSE TO FINE SAND	
407.8			
	71.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE BLUE AND WHITE VERY SILTY COARSE TO FINE SAND	
	76.0	VERY DENSE BLUE AND WHITE VERY SILTY COARSE TO FINE SAND	
397.8			



CORRECTED COPY

REMARKS:
LOCATION: N 1120075
E 610449
HOLE CAVED AT 28.5' AFTER
24 HOURS

DRILLED BY	GP
LOGGED BY	MB
CHECKED BY	EBE

CONFIDENTIAL BUSINESS INFORMATION

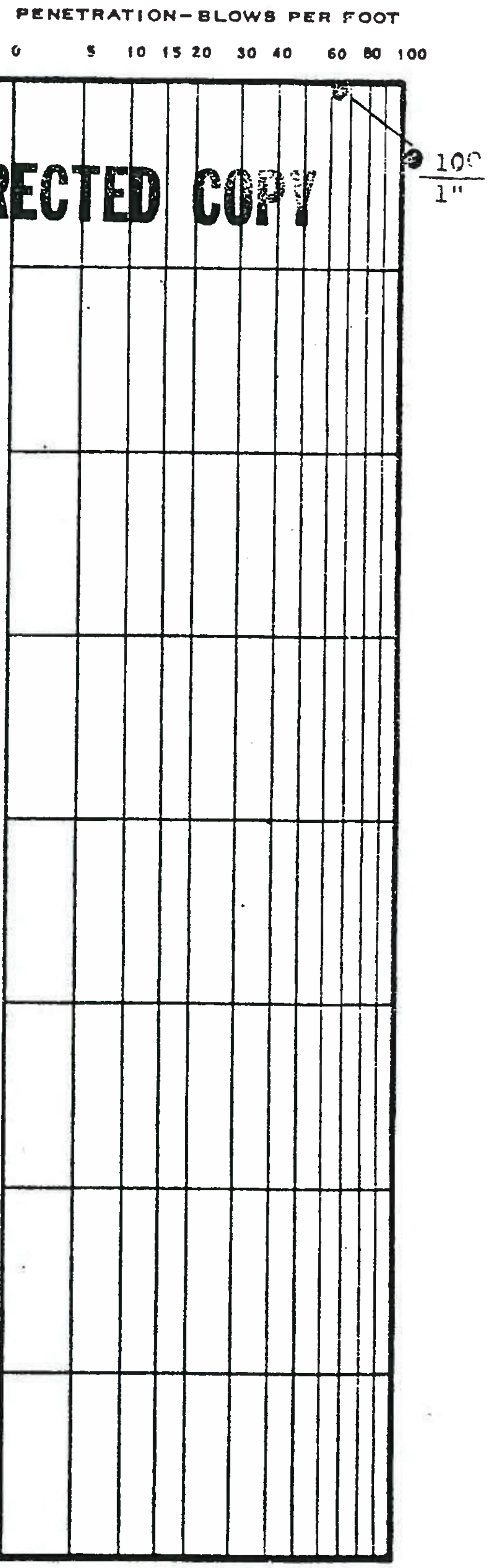
BORING NUMBER	C-171
DATE STARTED	5-20-74
DATE COMPLETED	5-20-74
JOB NUMBER	SAG-674

PAGE 1 OF 2

TEST BORING RECORD

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION
397.8	82.0	VERY DENSE BLUE AND WHITE VERY SILTY COARSE TO FINE SAND
	84.6	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE BLUE AND WHITE VERY SILTY COARSE TO FINE SAND
387.8		
		REFUSAL AT 84.6' BORING TERMINATED



REMARKS:

Drilled By GP
Logged By MB
Checked By EBE

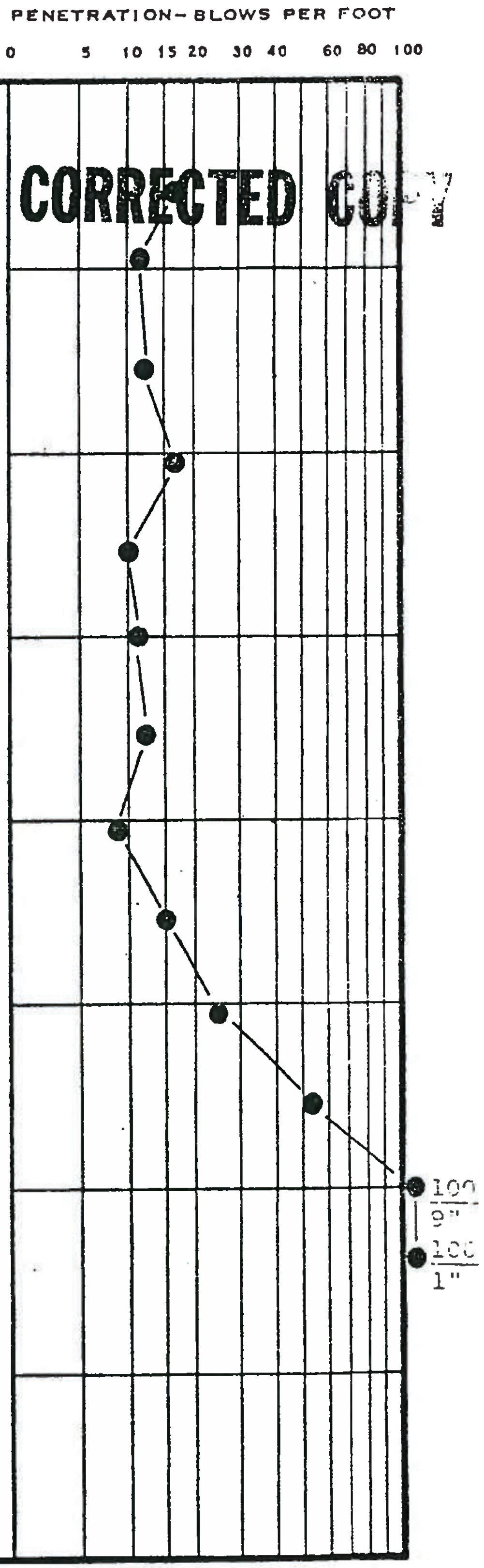
CONFIDENTIAL BUSINESS INFORMATION

Boring Number C-171
Date Started 5-20-74
Date Completed 5-20-74
Job Number SAG-674

PAGE 2 OF 2

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
489.8				C,T GS
		VERY STIFF TO STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT		
479.8				
469.8				
	24.0			
459.8				
		STIFF YELLOW BROWN AND BLACK SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT		
449.8				T
	48.0			
439.8		VERY FIRM GRAY GREEN SLIGHTLY MICACEOUS VERY SILTY MEDIUM TO FINE SAND		
	53.0	VERY DENSE GRAY BROWN AND WHITE SILTY COARSE TO FINE SAND		
	58.0			
429.8		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE BLUE GREEN AND GRAY MICACEOUS SILTY COARSE TO FINE SAND		
	64.6			
		REFUSAL AT 64.6' BORING TERMINATED		
419.8				



CORRECTED COPY

REMARKS:
LOCATION: N 1120469
E 610184
HOLE CAVED AT 17.0'
AFTER 24 HOURS

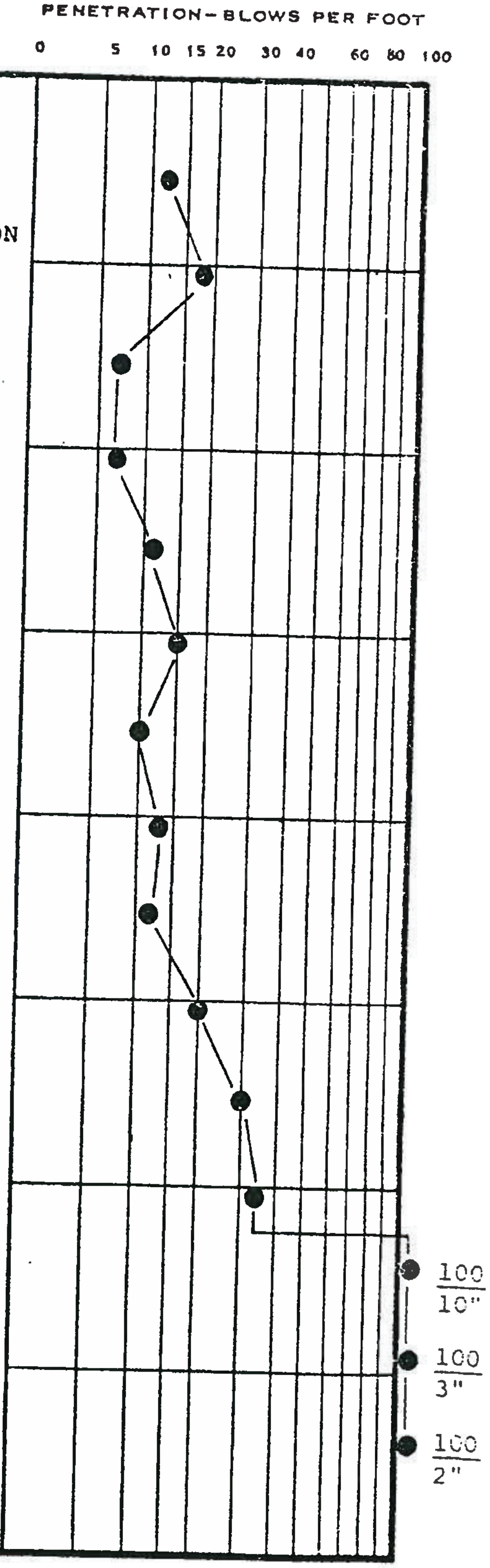
DRILLED BY	RS
LOGGED BY	MB
CHECKED BY	JMS

BORING NUMBER	C-172
DATE STARTED	5-21-74
DATE COMPLETED	5-29-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
485.1		STIFF RED BROWN FINE SANDY CLAYEY SILT		
	6.5	VERY STIFF PINK MICACEOUS MEDIUM TO FINE SANDY SILT		CON
475.1				
	13.0	FIRM PINK TO TAN AND BLACK SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT		
465.1				
	23.0	STIFF TAN AND BLACK SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT TO MOTTLED GRAY AND TAN VERY MICACEOUS MEDIUM TO FINE SANDY SILT		
455.1				
445.1				
	47.0	VERY STIFF GRAY BROWN MICACEOUS MEDIUM TO FINE SANDY SILT		
435.1				
	53.0	VERY FIRM GREEN AND GRAY SLIGHTLY MICACEOUS VERY SILTY MEDIUM TO FINE SAND TO DENSE MOTTLED GREEN AND TAN SLIGHTLY MICACEOUS SILTY MEDIUM TO FINE SAND		
425.1				
	62.5	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED GREEN AND TAN VERY SILTY MEDIUM TO FINE SAND TO GRAY BROWN AND WHITE SILTY COARSE TO FINE SAND		
415.1				
	74.6	REFUSAL AT 74.6' BORING TERMINATED		
405.1				



REMARKS:

LOCATION: N 1120490
E 610436

HOLE CAVED AT 13.0' AFTER 24 HOURS

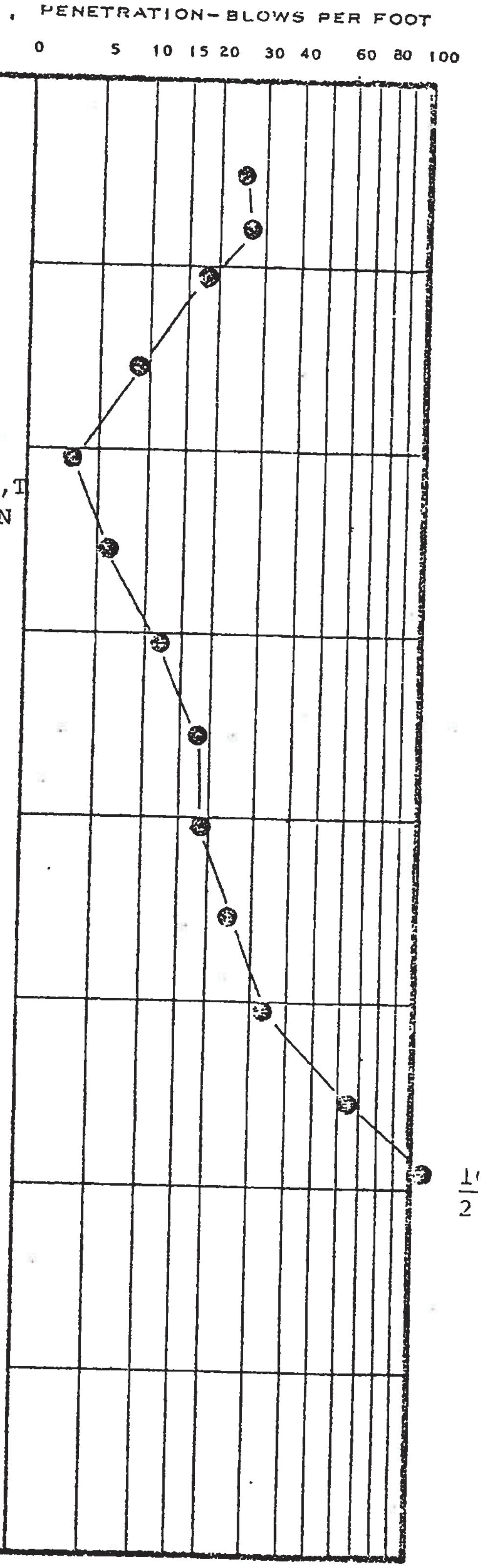
DRILLED BY GP
LOGGED BY MB
CHECKED BY

BORING NUMBER C-173
DATE STARTED 5-29-74
DATE COMPLETED
JOB NUMBER SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

ELEV.	DEPTH FEET	DESCRIPTION	NMC	
448.1		VERY STIFF RED BROWN FINE SANDY SILTY CLAY WITH WEATHERED ROCK FRAGMENTS		
	7.0			
438.1		VERY STIFF TO STIFF RED BROWN FINE SANDY CLAYEY SILT		
	18.0			
428.1		SOFT TO FIRM TAN AND BLACK COARSE TO FINE SANDY SILT		GS,T CON
	27.5			
418.1		STIFF TAN AND BLACK COARSE TO FINE SANDY SILT		
	32.0			
408.1		FIRM TO VERY FIRM MOTTLED GREEN AND TAN SILTY MEDIUM TO FINE SAND		
	48.0			
398.1		DENSE TO VERY DENSE MOTTLED GREEN AND TAN SILTY COARSE TO FINE SAND		
	56.0			
388.1	59.7	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED GREEN AND TAN SILTY COARSE TO FINE SAND		
378.1		REFUSAL AT 59.7' BORING TERMINATED		



REMARKS:

LOCATION: N 1119110
E 610128

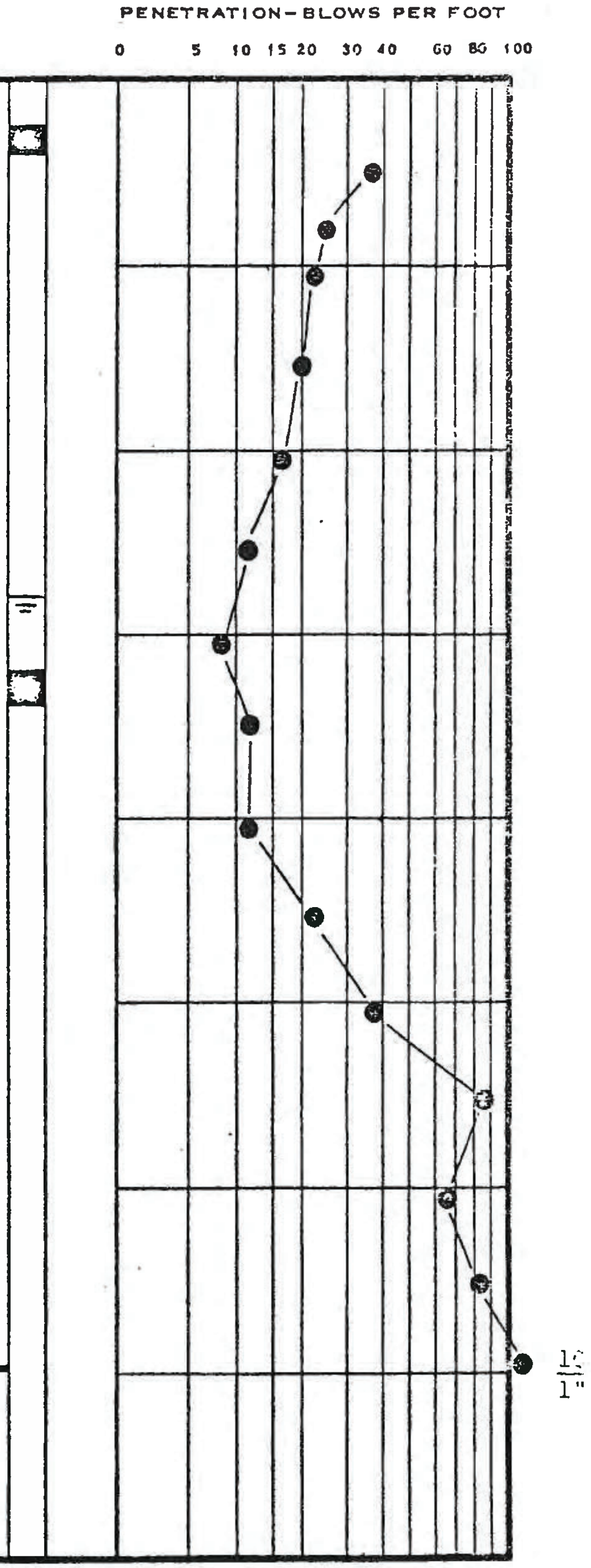
DRILLED BY	RS
LOGGED BY	MB
CHECKED BY	[illegible]

BORING NUMBER	C-174
DATE STARTED	6-2-74
DATE COMPLETED	
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECOR

ELEV.	DEPTH FEET	DESCRIPTION	NMC
452.7		HARD RED BROWN FINE SANDY CLAYEY SILT	
	6.0		
442.7			
		VERY STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT WITH WEATHERED ROCK FRAGMENTS	
432.7			
	23.5		
		FIRM PINK SILTY COARSE TO FINE SAND TO LOOSE GRAY BROWN AND RED MICACEOUS VERY SILTY MEDIUM TO FINE SAND	
422.7			
	33.0		
		FIRM GRAY BROWN MICACEOUS VERY SILTY MEDIUM TO FINE SAND WITH WEATHERED ROCK FRAGEMENTS TO VERY FIRM GRAY BROWN SILTY COARSE TO FINE SAND	
412.7			
	48.0		
402.7		DENSE MOTTLED GREEN AND TAN SILTY MEDIUM TO FINE SAND	
	55.0		
		VERY DENSE MOTTLED GREEN TAN AND WHITE SLIGHTLY SILTY COARSE TO FINE SAND	
392.7			
	67.0		
		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE DARK GREEN AND TAN SLIGHTLY SILTY MEDIUM TO FINE SAND	
382.7	69.6		
		REFUSAL AT 69.6' BORING TERMINATED	
372.7			



REMARKS:

LOCATION: N 1119043
E 610519

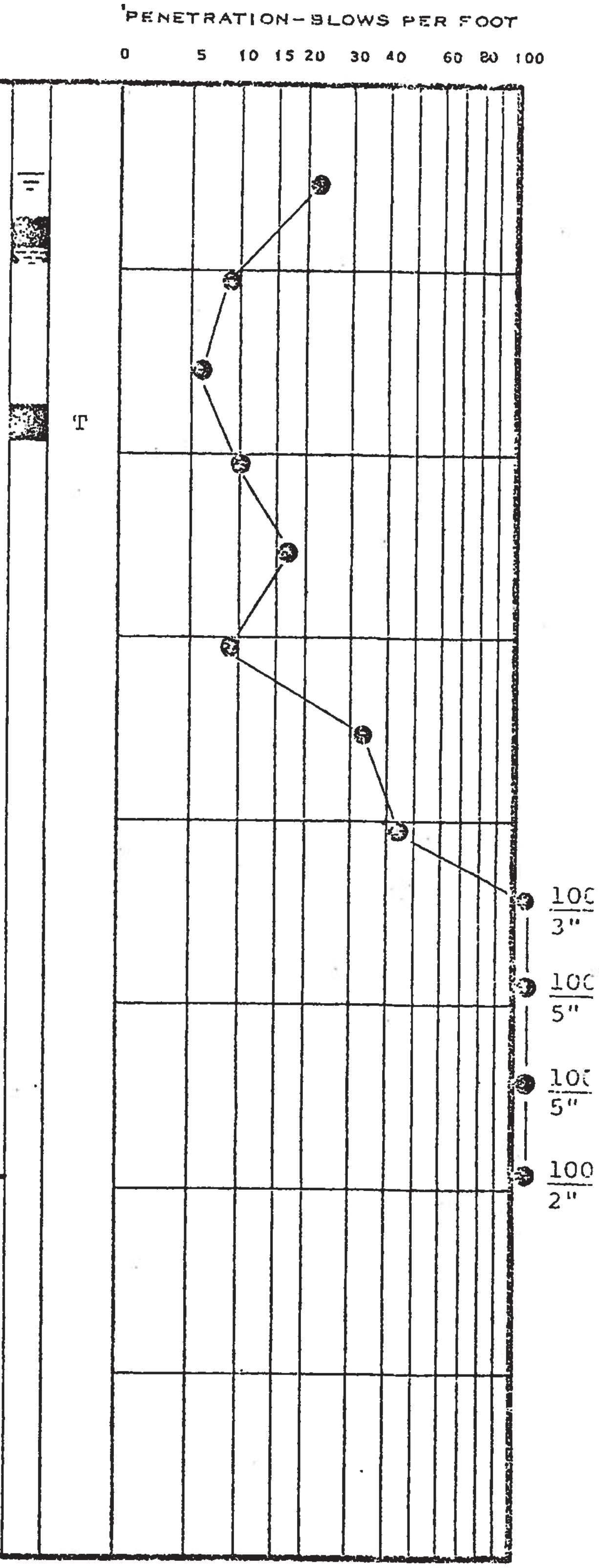
Drilled By	RS
Logged By	MB
Checked By	

CONFIDENTIAL BUSINESS INFORMATION

Boring Number	C-175
Date Started	6-3-74
Date Completed	6-4-74
Job Number	SAG-674

TEST BORING RECOR

ELEV.	DEPTH FEET	DESCRIPTION	NMC
423.0			
		VERY STIFF RED BROWN FINE SANDY CLAYEY SILT TO MOTTLED TAN AND BLACK MEDIUM TO FINE SANDY SILT	
413.0			
	11.5		
		FIRM TAN MEDIUM TO FINE SANDY SILT TO STIFF MOTTLED GREEN AND TAN MEDIUM TO FINE SANDY SILT WITH WEATHERED ROCK FRAGMENTS	
403.0			
	23.0		
		FIRM MOTTLED GREEN AND TAN SILTY MEDIUM TO FINE SAND	
	28.0		
393.0			
		STIFF TO VERY STIFF MOTTLED GREEN TAN AND WHITE MEDIUM TO FINE SANDY SILT	
	32.5		
		DENSE MOTTLED GREEN TAN AND BLACK SILTY MEDIUM TO FINE SAND	
383.0			
	42.5		
373.0		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED DARK GREEN AND WHITE SILTY MEDIUM TO FINE SAND	
363.0	59.6		
		REFUSAL AT 59.6' BORING TERMINATED	
353.0			



REMARKS:

LOCATION: N 1118503
E 610089

HOLE CAVED AT 5.0' AFTER 24 HOURS

DRILLED BY	GP
LOGGED BY	MB
CHECKED BY	

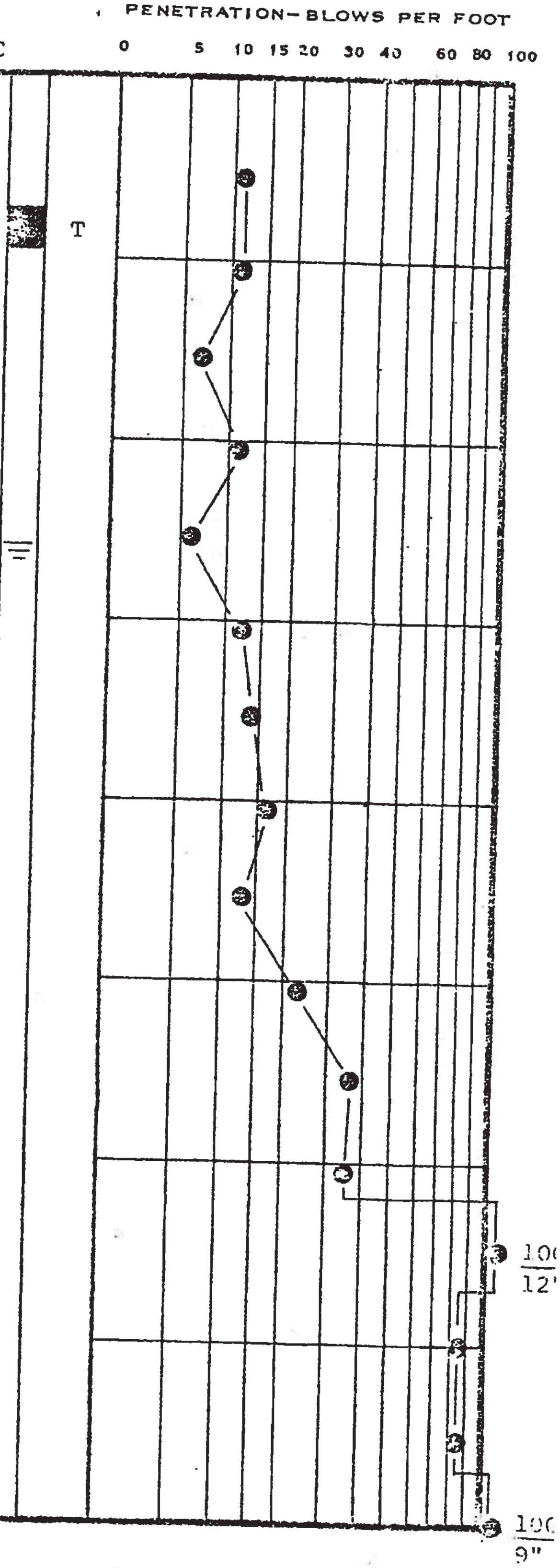
BORING NUMBER	C-176
DATE STARTED	5-31-74
DATE COMPLETED	5-31-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

PAGE 1 OF 2

ELEV.	DEPTH FEET	DESCRIPTION	NMC
433.8			
		STIFF RED BROWN SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY SILT	
423.8			T
	13.0		
413.8		FIRM TO STIFF GRAY TAN MICACEOUS MEDIUM TO FINE SANDY SILT	
	28.0		
403.8			
		FIRM TO VERY FIRM MOTTLED GREEN AND TAN SILTY COARSE TO FINE SAND	
393.8			
383.8			
	53.0		
		DENSE MOTTLED GREEN AND TAN SILTY MEDIUM TO FINE SAND	
373.8			
	62.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED GREEN AND TAN SILTY MEDIUM TO FINE SAND	
	67.0	VERY DENSE MOTTLED GREEN AND TAN MEDIUM TO FINE SAND WITH WEATHERED ROCK FRAGMENTS	
363.8			
	77.0		
353.8		SEE NEXT PAGE	



REMARKS:

LOCATION: N 1118613
E 610542

DRILLED BY	GP
LOGGED BY	MB
CHECKED BY	JMS

BORING NUMBER	C-177
DATE STARTED	6-1-74
DATE COMPLETED	6-2-74
JOB NUMBER	SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

PAGE 2 OF 2

ELEV.	DEPTH FEET	DESCRIPTION	NMC	PENETRATION—BLOWS PER FOOT 0 5 10 15 20 30 40 60 80 100
353.8		PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED GREEN AND TAN TO DARK GREEN SILTY MEDIUM TO FINE SAND		1/9 1/3 1/0'
343.8	89.0	REFUSAL AT 89.0' BORING TERMINATED		

REMARKS:

Drilled By GP
Logged By MB
Checked By JMS

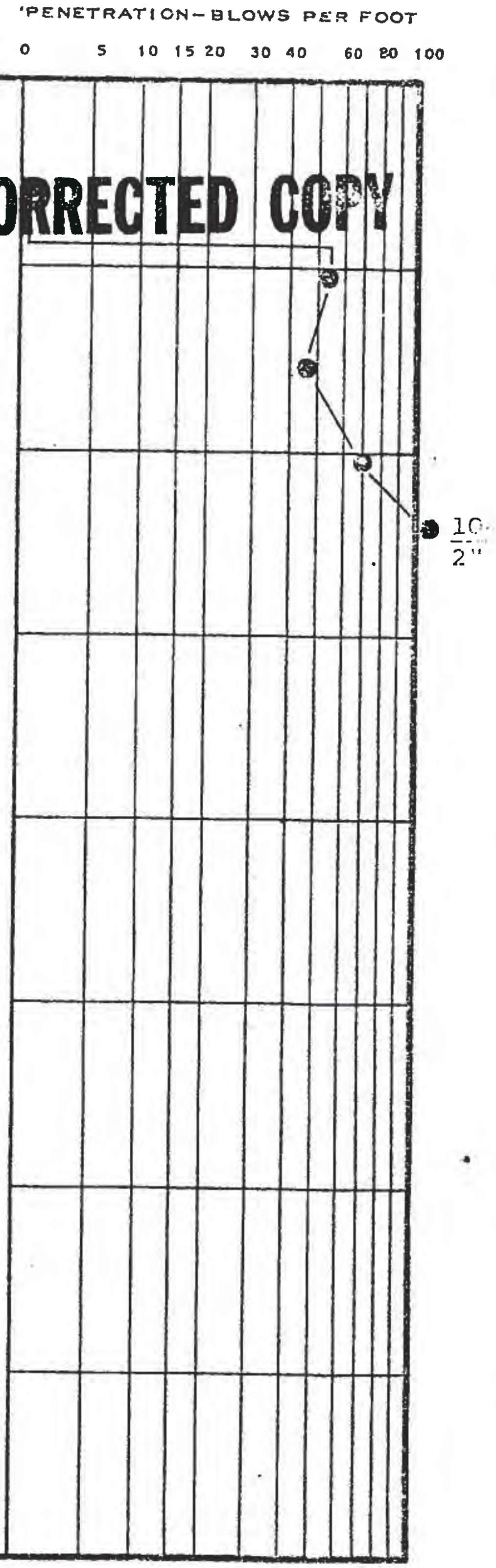
Boring Number C-177
Date Started 6-1-74
Date Completed 6-2-74
Job Number SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECOR

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC
408.9		ALLUVIUM-VERY SOFT GRAY BLUE SLIGHTLY MICACEOUS MEDIUM TO FINE SANDY CLAYEY SILT	
398.9	9.0	DENSE TO VERY DENSE MOTTLED GREEN TAN AND WHITE SILTY COARSE TO FINE SAND	
388.9			
	22.0	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED GREEN AND TAN COARSE TO FINE SAND	
	24.6		
378.9		REFUSAL AT 24.6' BORING TERMINATED	



REMARKS:
LOCATION: N 1118367
E 610031

Drilled By GP
Logged By MB
Checked By

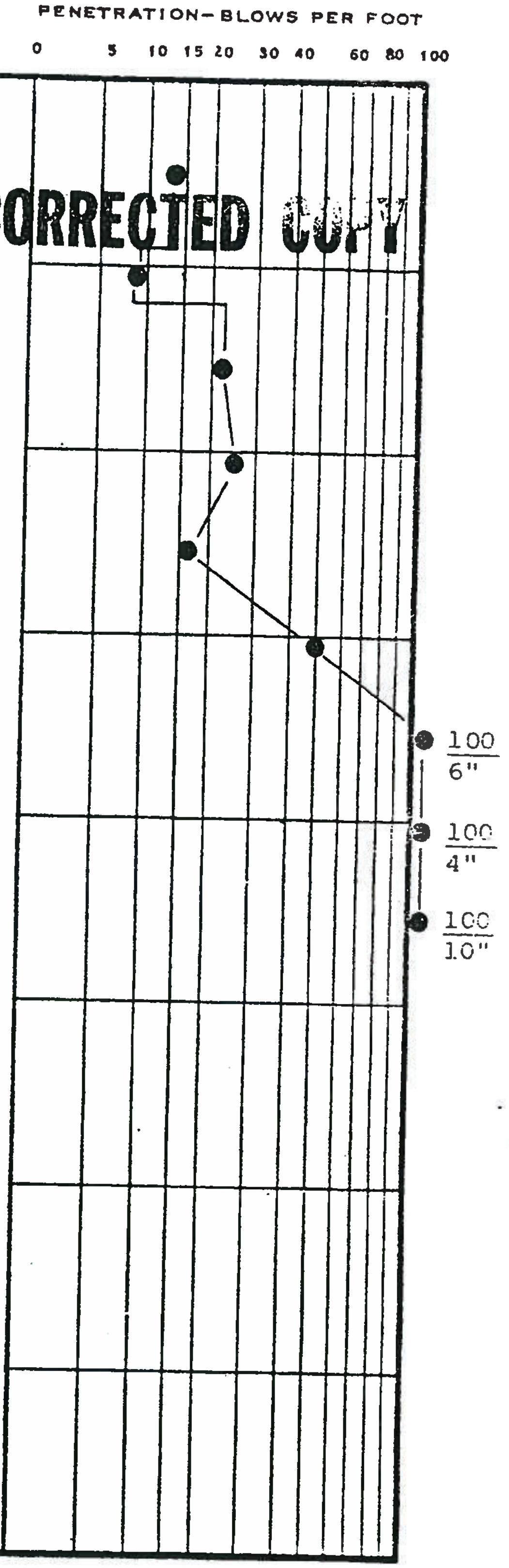
Boring Number C-178
Date Started 6-1-74
Date Completed 6-1-74
Job Number SAG-674

CONFIDENTIAL BUSINESS INFORMATION

TEST BORING RECORD

CORRECTED COPY

ELEV.	DEPTH FEET	DESCRIPTION	NMC
405.1		ALLUVIUM-STIFF BLUE AND TAN FINE SANDY SILTY CLAY	
395.1	9.0	ALLUVIUM-LOOSE BLUE GRAY COARSE TO FINE SAND WITH GRAVEL	
	12.0	VERY STIFF MOTTLED GREEN AND TAN MEDIUM TO FINE SANDY SILT	
385.1			
	24.0	FIRM MOTTLED BLUE AND WHITE SILTY MEDIUM TO FINE SAND	
375.1	29.0	VERY DENSE MOTTLED GRAY AND WHITE SILTY MEDIUM TO FINE SAND	
	33.5	PARTIALLY WEATHERED ROCK SAMPLED AS VERY DENSE MOTTLED GREEN AND WHITE SILTY COARSE TO FINE SAND WITH WEATHERED ROCK FRAGMENTS	
365.1			
355.1	50.0	REFUSAL AT 50.0' BORING TERMINATED	
345.1			



REMARKS:

LOCATION: N 1118373
E 610608

DRILLED BY CI
LOGGED BY MB
CHECKED BY [illegible]

BORING NUMBER C-179
DATE STARTED 6-3-74
DATE COMPLETED 6-3-74
JOB NUMBER SAG-674

CONFIDENTIAL BUSINESS INFORMATION

2010 Southern Company Services Subsurface Exploration Borings

SOUTHERN COMPANY
Energy to Serve Your World™

DRILLING LOG
GEOLOGICAL SERVICES

Hole No. S-1
Sheet 1 of 3

SITE **Plant Sherer Ash Pond** HOLE DEPTH **66** SURF.ELEV. N/A
LOCATION Plant Scherer Ash Pond Dam Section B-B COORDINATES N N/A E N/A
ANGLE 0 BEARING 0 CONTRACTOR MACTEC DRILL NO. N/A
DRILLING METHOD Mud Rotory NO. SAMPLES 14 NO. U.D. SAMPLES 3
CASING SIZE N/A LENGTH N/A CORE SIZE N/A TOTAL % REC. N/A
WATER TABLE DEPTH N/A ELEV. N/A TIME AFTER COMP. N/A DATE TAKEN N/A
TYPE GROUT Portland QUANTITY N/A MIX 1:1 DRILLING START DATE 6/21/2010
DRILLER Larry Carter RECORDER Javier Lopez APPROVED Luke Garland DRILLING COMP. DATE 6/21/2010

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	% Rec	RQD
0									
1									
2									
3		reddish orange clayey SILT (ML)	1	1-2.5	4-6-8	14			
4									
5		reddish orange clayey SILT (ML)	2	3.5-5	4-5-7	12			
6									
7									
8		reddish orange clayey SILT (ML)	3	6-7.5	4-7-9	16			
9									
10		reddish orange clayey SILT (ML)	4	8.5-10	4-5-6	11			
11									
12									
13									
14									
15									
16		reddish orange clayey SILT (ML)	5	14.5-16	3-3-6	9			
17							Shelby tube from 16.5' to 18.5'		
18									
19									
20									
21		reddish orange clayey SILT (ML)	6	19.5-21	4-5-10	15			
22									
23									
24									

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DRILLING LOG
GEOLOGICAL SERVICES

Hole No. S-1
Sheet 2 of 3

SITE **Plant Sherer Ash Pond** TOTAL DEPTH **66** SURF.ELEV. N/A

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	% Rec	RQD
25									
26		reddish orange clayey SILT (ML)	7	24.5-26	4-7-13	20			
27									
28									
29									
30									
31		reddish orange clayey SILT (ML)	8	29.5-31	4-5-7	12			
32									
33									
34									
35									
36		reddish orange clayey SILT (ML)	9	34.5-36	3-3-5	8	fill		
37									
38									
39									
40							Shelby tube from 39.5-41.5		
41							Shelby tube from 41.5-43.5		
42									
43									
44									
45									
46		multi colored sandy SILT (ML)	10	44.5-46	2-2-4	6	Native? Or Fill?		
47									
48									
49									
50									
51		multi colored sandy SILT (ML)	11	49.5-51	3-6-8	14	native		
52									
53									
54									
55									
56		multi colored sandy SILT (ML)	12	54.5-56	10-12-11	23			

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DRILLING LOG
GEOLOGICAL SERVICES

Hole No. S-1
Sheet 3 of 3

SITE **Plant Sherer Ash Pond** TOTAL DEPTH **66** SURF.ELEV. N/A

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	% Rec	RQD
57									
58									
59									
60									
61		multi colored sandy SILT (ML)	13	59.5-61	18-19-24	43			
62									
63									
64									
65									
66		multi colored sandy SILT (ML)	14	64.5-66	25-32-42	74			
67		Boring Completed @ 66'							
68									
69									
70									
71									
72									
73									
74									
75									
76									
77									
78									
79									
80									
81									
82									
83									
84									
85									
86									
87									
88									

Form GS9901 7-26-2004

SOUTHERN COMPANY
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DRILLING LOG
GEOLOGICAL SERVICES

Hole No. S-2
Sheet 1 of 5

SITE Plant Sherer Ash Pond
HOLE DEPTH 126
SURF.ELEV. N/A
LOCATION Plant Scherer Ash Pond Dam Section A-A
COORDINATES N N/A
E N/A
ANGLE 0
BEARING 0
CONTRACTOR MACTEC
DRILL NO. N/A
DRILLING METHOD Mud Rotory
NO. SAMPLES 26
NO. U.D. SAMPLES 3
CASING SIZE N/A
LENGTH N/A
CORE SIZE N/A
TOTAL % REC. N/A
WATER TABLE DEPTH N/A
ELEV. N/A
TIME AFTER COMP. N/A
DATE TAKEN N/A
TYPE GROUT Portland
QUANTITY N/A
MIX 1:1
DRILLING START DATE 6/22/2010
DRILLER Larry Carter
RECORDER Javier Lopez
APPROVED Luke Garland
DRILLING COMP. DATE 6/23/2010

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	% Rec	RQD
0									
1									
2									
3		reddish orange clayey SILT (ML)	1	1-2.5	3-4-6	10			
4									
5		reddish orange clayey SILT (ML)	2	3.5-5	3-5-6	11			
6									
7									
8		reddish orange clayey SILT (ML)	3	6.5-8	3-2-4	6			
9									
10									
11		reddish orange clayey SILT (ML)	4	9.5-11	3-5-7	12			
12									
13									
14									
15									
16		reddish orange clayey SILT (ML)	5	14.5-16	4-7-9	16			
17									
18									
19									
20									
21		reddish orange clayey SILT (ML)	6	19.5-21	4-7-9	16			
22									
23							Shelby Tube from 21.5-23.5		
24									

Form GS9901 7-26-2004

SOUTHERN COMPANY
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DRILLING LOG
GEOLOGICAL SERVICES

Hole No. S-2
Sheet 2 of 5

SITE **Plant Sherer Ash Pond** TOTAL DEPTH **126** SURF.ELEV. N/A

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	% Rec	RQD
25									
26		reddish orange clayey SILT (ML)	7	24.5-26	3-6-6	12			
27									
28									
29									
30									
31		reddish orange clayey SILT (ML)	8	29.5-31	4-5-8	13			
32									
33									
34									
35									
36		reddish orange clayey SILT (ML)	9	34.5-36	4-6-7	13			
37									
38									
39									
40									
41		reddish orange clayey SILT (ML)	10	39.5-41	4-9-9	18			
42									
43									
44									
45									
46		reddish orange clayey SILT (ML)	11	44.5-46	5-7-10	17			
47									
48									
49									
50									
51		reddish orange clayey SILT (ML)	12	49.5-51	7-9-12	21			
52									
53									
54									
55									
56		reddish orange clayey SILT (ML)	13	54.5-56	5-7-8	15			

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SOUTHERN COMPANY
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DRILLING LOG
GEOLOGICAL SERVICES

Hole No. S-2
Sheet 3 of 5

SITE Plant Sherer Ash Pond
TOTAL DEPTH 126
SURF.ELEV. N/A

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	% Rec	RQD
57									
58									
59									
60									
61		reddish orange clayey SILT (ML)	14	59.5-61	6-8-12	20			
62									
63									
64									
65							Shelby Tube from 63.5-65.5		
66									
67							Shelby Tube from 65.5-67.5		
68									
69									
70									
71		reddish orange clayey SILT (ML)	15	69.5-71	8-8-12	20			
72									
73									
74									
75									
76		reddish orange clayey SILT (ML)	16	74.5-76	6-8-10	18			
77									
78									
79									
80									
81		reddish orange clayey SILT (ML)	17	79.5-81	6-9-12	21			
82									
83									
84									
85									
86		reddish orange clayey SILT (ML)	18	84.5-86	4-9-9	18			
87									
88									

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SOUTHERN COMPANY
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DRILLING LOG
GEOLOGICAL SERVICES

Hole No. S-2
Sheet 4 of 5

SITE Plant Sherer Ash Pond
TOTAL DEPTH 126
SURF.ELEV. N/A

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test			Comments	% Rec	RQD
				From To	Blows	N			
89									
90									
91		reddish orange clayey SILT (ML)	19	89.5-91	6-8-10	18			
92									
93									
94									
95									
96		reddish orange clayey SILT (ML)	20	94.5-96	8-11-17	28			
97									
98									
99									
100									
101		reddish orange clayey SILT (ML)	21	99.5-101	5-10-14	24			
102									
103									
104									
105									
106		reddish orange clayey SILT (ML)	22	104.5-106	6-9-13	22	fill		
107									
108									
109									
110									
111		gray and yellow sandy SILT (ML)	23	109.5-111	8-10-13	23	residual		
112									
113									
114									
115									
116		gray and yellow sandy SILT (ML)	24	114.5-116	6-12-16	28			
117									
118									
119									
120									

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SOUTHERN COMPANY
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DRILLING LOG
GEOLOGICAL SERVICES

Hole No. S-2
Sheet 5 of 5

SITE **Plant Sherer Ash Pond** TOTAL DEPTH **126** SURF.ELEV. N/A

Depth	Elev.	Material Description, Classification and Remarks	Sample No.	Standard Penetration Test From To	Blows	N	Comments	% Rec	RQD
121		gray and yellow sandy SILT (ML)	25	119.5-121	13-17-20	37			
122									
123									
124									
125									
126		gray and white silty SAND (SM)	26	124.5-126	34-50/5	100+			
127		Boring Completed @ 126'							
128									
129									
130									
131									
132									
133									
134									
135									
136									
137									
138									
139									
140									
141									
142									
143									
144									
145									
146									
147									
148									
149									
150									
151									
152									

Form GS9901 7-26-2004

2015 Southern Company Services Subsurface Exploration Borings

SOUTHERN COMPANY

LOG OF TEST BORING

BORING SPT-01
PAGE 1 OF 3
ECS37441

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 4/15/2015 **COMPLETED** 4/16/2015 **SURF. ELEV.** 505.3 **COORDINATES:** N:33.073895 E:83.811142
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Mud Rotary; Casing Advance; NQ Diamond Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 140 ft. **GROUND WATER DEPTH: DURING** 5 ft. **COMP.** 2 ft. **DELAYED** 8.5 ft. after 24 hrs.
NOTES

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
		Coal Combustion Byproduct (ASH)					
		▽					
5		- black, wet, loose, coarse grain, sand size material ▽		SS -1	3.5-5.0	6-3-4 (**7**)	
		▼					
10		- pale gray-yellow, wet, stiff, clayey silt size material		SS -2	8.5-10.0	7-4-3 (**7**)	
15		- light gray, wet, stiff, clayey silt size material		SS -3	13.5-15.0	3-5-5 (**10**)	
20		- pale brown, wet, stiff, clayey silt size material		SS -4	18.5-20.0	3-6-6 (**12**)	
25		- dark gray-brown, wet, medium stiff, clayey silt size material		SS -5	23.5-25.0	3-3-3 (**6**)	
30		- pale brown, wet, very soft, clayey silt size material		SS -6	28.5-30.0	2-1-1 (**2**)	
35		- light gray, wet, medium stiff, clayey silt size material		SS -7	33.5-35.0	2-2-5 (**7**)	
40		- gray, wet, very soft, silt with some sand size material		SS -8	38.5-40.0	WH-1-1 (**2**)	

(Continued Next Page)

2012 GEOTECH ENGINEERING LOGS - ESEE2012DATABASE.GDT - 5/11/15 15:43 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER GEOTECHNICAL INVESTIGATION 2015\SCHERER GEOTECH.GPJ

LOG OF TEST BORING

BORING SPT-01
PAGE 2 OF 3
ECS37441

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** **PERCENT RECOVERY** (RQD)	COMMENTS
	Coal Combustion Byproduct (ASH)*(Con't)*					
45						Rod drop due to very soft material, no sample collected.
50						Rod drop due to very soft material, no sample collected.
55	- dark gray and gray, wet, medium stiff, silty clay size material		SS -9	53.5-55.0	2-2-3 (**5**)	
60	- dark gray and gray, wet, very soft, silty clay size material		SS -10	58.5-60.0	WH-1-1 (**2**)	
65						Rod drop due to very soft material, no sample collected.
70						Rod drop due to very soft material, no sample collected.
		432.3				
75	**Elastic Silt (MH)** - red-yellow with black mottles, wet, stiff, medium plasticity, *saprolite*, with clay		SS -11	73.5-75.0	3-5-7 (**12**)	
80	- yellow-brown with black mottles, wet, stiff, medium plasticity, *saprolite*, with clay		SS -12	78.5-80.0	3-4-7 (**11**)	
85	- dark olive-brown with black mottles, wet, very stiff, medium plasticity, *saprolite*, with clay		SS -13	83.5-85.0	4-6-10 (**16**)	
		417.3				
90	**Sandy Silt (ML)** - light olive-brown with black mottles, damp, very stiff, *saprolite*, with mica		SS -14	88.5-90.0	11-12-18 (**30**)	

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SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
	Sandy Silt (ML)*(Con't)*					
95	- light gray with black mottles, damp, very hard, *saprolite*		SS -15	93.5-94.8	15-30-50/4" (**100+**)	
100						Advance casing to 104'.
105		401.3				
	Gneiss					
	- black and white banding, coarse grain, soft, highly weathered, with biotite, feldspar, and quartz		RC -16	104.0-110.0	**8** (0)	
110						
115	- dark brown-gray with white banding, fine to coarse grain, soft to medium hard, moderately to highly weathered, intensely fractured, with biotite, feldspar, and quartz		RC -17	110.0-115.0	**64** (8)	
120	- gray and white banding, fine to coarse grain, hard, not to slightly weathered, moderately to intensely fractured, with biotite, feldspar, and quartz		RC -18	115.0-120.0	**54** (26)	
125	- dark gray and white banding, fine to coarse grain, soft to medium hard, moderately to highly weathered, intensely fractured, with biotite, feldspar, and quartz		RC -19	120.0-125.0	**34** (0)	
130	- gray and white banding, fine to coarse grain, medium hard, moderately weathered, intensely fractured, with biotite, feldspar, and quartz		RC -20	125.0-130.0	**46** (16)	
135	- gray and white banding, fine to coarse grain, hard, not to slightly weathered, intensely fractured with near-vertical fractures, with biotite, feldspar, and quartz		RC -21	130.0-135.0	**100** (46)	
140	- gray and white banding, fine to coarse grain, hard, not to slightly weathered, intensely fractured with near-vertical fractures, with biotite, massive feldspar, quartz, and amphibolite	365.3	RC -22	135.0-140.0	**98** (68)	

Bottom of borehole at 140.0 feet.

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SOUTHERN COMPANY

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BORING SPT-02
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED	4/8/2015	**COMPLETED**	4/14/2015	**SURF. ELEV.**	509.5	**COORDINATES:**	N:33.069872 E:83.813629
CONTRACTOR	SCS Field Services	**EQUIPMENT**	CME 550	**METHOD**	Mud Rotary; Casing Advance; NQ Diamond Core		
DRILLED BY	T. Milam	**LOGGED BY**	W. Shaughnessy	**CHECKED BY**	L. Millet	**ANGLE**	
BEARING		**BORING DEPTH**	114.8 ft.	**GROUND WATER DEPTH: DURING**	3 ft.	**COMP.**	3 ft.
DELAYED	4 ft. after 48 hrs.	**NOTES**					

DEPTH (ft)	GRAPHIC LOG	**STRATA DESCRIPTION**	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** **PERCENT RECOVERY** (RQD)	**COMMENTS**
		Coal Combustion Byproduct (ASH)					
	▽ ▼	**Coal Combustion Byproduct (Gypsum) (GYPSUM)** - dark brown-black, wet, loose, coarse grain, gravelly sand size material	506.5	SS -1	3.5-5.0	3-3-3 (**6**)	
5							
10		- dark brown and yellow-brown laminations, wet, medium dense, fine to coarse grain, clayey sand size material		SS -2	8.5-10.0	6-7-7 (**14**)	
15		- dark gray and yellow laminations, wet, very soft, silty clay size material		SS -3	13.5-15.0	WH-1-1 (**2**)	
20							Rod drop due to very soft material, no sample collected.
25		- pale brown, wet, medium stiff, sandy clay size material		SS -4	23.5-25.0	1-2-3 (**5**)	
30		**Coal Combustion Byproduct (ASH)** - gray and dark gray laminations, wet, medium stiff, silt size material	481.5	SS -5	28.5-30.0	2-4-3 (**7**)	
35		- gray, wet, medium stiff, clayey silt size material		SS -6	33.5-35.0	2-2-3 (**5**)	

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BORING SPT-02

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PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
40		**Coal Combustion Byproduct (ASH)***(Con't)* - gray and light gray laminations, wet, very soft, silty clay size material		SS -7	38.5-40.0	1-1-1 (**2**)	
45							Rod drop due to very soft material, no sample collected.
50		- no recovery		SS -8	48.5-50.0	WH-WH-WH (**0**)	
55		- no recovery		SS -9	53.5-55.0	WH-WH-WH (**0**)	
60							Rod drop due to very soft material, no sample collected.
65		- gray, wet, very soft, silty clay size material, some sand size material		SS -10	63.5-65.0	1-1-1 (**2**)	
70							Rod drop due to very soft material, no sample collected.
		Sandy Elastic Silt (MH) - brown, wet, medium stiff, *alluvium*	436.5				
75		**Clayey Sand (SC)** - gray, wet, medium stiff, fine to medium grain, *alluvium*, with woody debris	435.5	SS -11	73.5-75.0	2-3-2 (**5**)	
80		**Sandy Silt (ML)** - black, white, and pale brown, damp, very hard, *saprolite*	431.5	SS -12	78.5-79.3	31-50/3" (**100+**)	

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
85		**Sandy Silt (ML)***(Con't)*	421.1				Advance casing to 93'.
90		**Gneiss** - dark gray-brown and white, fine to coarse grain, soft to medium hard, moderately to highly weathered, intensely fractured, with biotite, feldspar, quartz	419.4	RC -13	88.4-89.7	**108** (0)	
		Partially Weathered Rock	416.9				
95		**Gneiss** - dark gray and white banding, fine to coarse grain, hard, not to slightly weathered, thin foliation, moderately fractured, with biotite, feldspar, quartz		RC -14	92.6-99.8	**89** (51)	
100		- dark gray and white banding, fine to coarse grain, hard, not to slightly weathered, thin foliation, moderately fractured, with biotite, feldspar, and quartz		RC -15	99.8-104.8	**88** (38)	
105 110		- gray and white banding, fine to medium grain, hard to very hard, not to slightly weathered, thin to medium foliation, slightly to moderately fractured, with biotite, feldspar, quartz	394.7	RC -16	104.8-114.8	**101** (78)	

Bottom of borehole at 114.8 feet.

SOUTHERN COMPANY

LOG OF TEST BORING

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 4/7/2015 **COMPLETED** 4/8/2015 **SURF. ELEV.** 499.9 **COORDINATES:** N:33.072740 E:83.808385
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Mud Rotary; Casing Advance; NQ Diamond Core
DRILLED BY T. Milam **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 146.5 ft. **GROUND WATER DEPTH: DURING** 5 ft. **COMP.** 2 ft. **DELAYED** 2 ft. after 100 hrs.
NOTES

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
		Coal Combustion Byproduct (Gypsum) (GYPSUM)					
		▼					
5		▽ - gray and yellow-brown, wet, very loose, fine to coarse grain, silty gravel size material		SS -1	3.5-5.0	2-1-1 (**2**)	
10		- gray and yellow-brown, wet, very loose, fine to medium grain, sandy gravel size material		SS -2	8.5-10.0	1-1-1 (**2**)	
15		- gray and yellow-brown, wet, very loose, fine to medium grain, sandy gravel size material		SS -3	13.5-15.0	0-1-1 (**2**)	
			482.9				
		Coal Combustion Byproduct (ASH)					
20		- very dark gray, wet, very soft, silt size material		SS -4	18.5-20.0	WH-WH-WH (**0**)	
25		- dark gray, wet, very soft, clay and silt size material		SS -5	23.5-25.0	WR-WR-WR (**0**)	
30							Rod drop due to very soft material, no sample collected.
35							

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LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
	Coal Combustion Byproduct (ASH)*(Con't)*					Rod drop due to very soft material, no sample collected.
40						Rod drop due to very soft material, no sample collected.
45	- dark gray, wet, very soft, clay size material		SS-6	43.5-45.0	WR-WR-WR (**0**)	
50	- light green-gray, gray, and dark gray, wet, very soft, clay and silt size material		SS-7	48.5-50.0	WR-WR-WR (**0**)	
55						Rod drop due to very soft material, no sample collected.
60						Rod drop due to very soft material, no sample collected.
65	- dark gray, wet, very soft, clay size material		SS-8	63.5-65.0	2-1-1 (**2**)	
		431.9				
70	**Silty Sand (SM)** - dark green-gray with olive mottles, damp, very dense, fine to coarse grain, *saprolite*		SS-9	68.5-69.3	28-50/4" (**100+**)	
		427.0				
75	**Gneiss** - dark gray and white, fine to coarse grain, medium hard,		RC-10	72.9-79.5		

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LOG OF TEST BORING

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
		moderately to completely weathered, amphibolite **Gneiss***(Con't)*	420.4	RC -10	72.9- 79.5	**17**	
80		**Partially Weathered Rock**					
		- no recovery		RC -11	79.5- 84.5	**0**	
85 90		- no recovery		RC -12	84.5- 94.5	**0**	
95 100		- no recovery		RC -13	94.5- 104.5	**0**	
105		- black, medium to coarse grain, completely weathered, disintegrated to sand	390.4	RC -14	104.5- 109.5	**62** (0)	
110		**Gneiss**					
		- dark gray with white banding, medium grain, hard, slightly to highly weathered, moderately to intensely fractured, with amphibolite, feldspar, quartz		RC -15	109.5- 114.5	**30** (8)	
115		- gray with light gray banding, fine to coarse grain, hard,		RC -16	114.5- 119.5	**80**	

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
		not to slightly weathered, moderately to slightly fractured, with amphibolite, feldspar, massive quartz **Gneiss***(Con't)*		RC-16	114.5-119.5	(50)	
120		- gray, light gray, and white, medium grain, hard, moderately to highly weathered, intensely fractured, with amphibolite, massive quartz, feldspar		RC-17	119.5-124.5	**26** (0)	
125		- very dark gray to black with light gray banding, medium to coarse grain, hard, moderately to highly weathered, intensely fractured, with amphibolite, biotite, quartz, feldspar		RC-18	124.5-129.5	**70** (8)	
130		- black with white banding, medium grain, medium hard to hard, moderately weathered, intensely fractured, with amphibolite, feldspar, quartz		RC-19	129.5-134.5	**62** (14)	
135		- gray with white banding, fine to medium grain, hard, not to moderately weathered, slightly fractured, with biotite, feldspar, quartz		RC-20	134.5-139.5	**96** (74)	
140		- gray with white banding, fine to medium grain, hard, not to moderately weathered, slightly fractured, with biotite, feldspar, quartz		RC-21	139.5-144.5	**98** (94)	
145		- gray with white banding, fine to medium grain, hard, not to moderately weathered, slightly fractured, with biotite, feldspar, quartz	353.4	RC-22	144.5-146.5	**105** (85)	

Bottom of borehole at 146.5 feet.

SOUTHERN COMPANY

LOG OF TEST BORING

BORING SPT-04
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 3/26/2015 **COMPLETED** 3/31/2015 **SURF. ELEV.** 540.7 **COORDINATES:** N:33.081249 E:83.833810
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Casing Advance; NQ Diamond Core
DRILLED BY D. Wideman **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 53.9 ft. **GROUND WATER DEPTH: DURING** 30 ft. **COMP.** 26 ft. **DELAYED** 27 ft. after 48 hrs.
NOTES

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** / **PERCENT RECOVERY** (RQD)	**COMMENTS**
		Lean Clay (CL)					
		- red with black mottles, damp, stiff, with sand		SS-1	1.0-2.5	2-4-5 (**9**)	
5		- red, damp, medium stiff, with mica		SS-2	3.5-5.0	3-3-3 (**6**)	
		- red and yellow with black mottles, damp, stiff, with mica	532.7	SS-3	6.0-7.5	3-4-6 (**10**)	
10		**Sandy Silt (ML)** - red, white and yellow-brown with black mottles, damp, stiff, with mica		SS-4	8.5-10.0	3-4-5 (**9**)	
15		- red, white and yellow-brown with black mottles, damp, stiff, with mica	522.7	SS-5	13.5-15.0	4-4-6 (**10**)	
20		**Well-graded Sand with Silt (SW-SM)** - olive-brown, gray, and red-brown layers, very damp, medium dense, fine to medium grain, *saprolite*, with mica		SS-6	18.5-20.0	4-9-11 (**20**)	
25		- black and white with brown layers, very damp, medium dense, fine to medium grain, *saprolite*, with mica		SS-7	23.5-25.0	5-5-7 (**12**)	
	▽ ▼						
30	▽	- white and gray-brown with dark gray layers, wet, very dense, fine to coarse grain, *saprolite*, with mica		SS-8	28.5-30.0	9-24-39 (**63**)	
35		- gray-brown and black with white layers, wet, very dense, fine to coarse grain, *saprolite*, with mica		SS-9	33.5-34.8	4-28-50/4" (**100+**)	

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SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

BORING SPT-04

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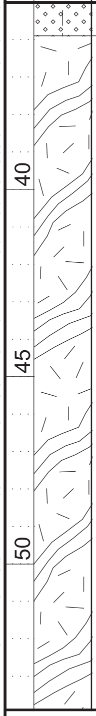
PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** **PERCENT RECOVERY** (RQD)	**COMMENTS**
		**Well-graded Sand with Silt (SW-SM)***(Con't)*	504.8				
		Gneiss - gray with light gray banding, medium to coarse grain, medium hard to hard, not to slightly weathered, inclined, slightly to moderately fractured, with biotite, quartz, feldspar		RC -10	35.9-38.9	**100** (83)	
40 45		- interlayered gray/light gray banding, medium to coarse grain, hard, not to slightly weathered, inclined, unfractured to slightly fractured, with biotite, quartz and feldspar, massive quartz-feldspar seam (40-42')		RC -11	38.9-48.9	**91** (87)	
50		- gray with light gray banding, medium to coarse grain, hard, not to slightly weathered, inclined, unfractured to slightly fractured, with biotite, quartz, feldspar	486.8	RC -12	48.9-53.9	**100** (100)	

Bottom of borehole at 53.9 feet.

BORING SPT-05

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 4/1/2015 **COMPLETED** 4/9/2015 **SURF. ELEV.** 543.4 **COORDINATES:** N:33.079590 E:83.831082
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Casing Advance; NQ Diamond Core
DRILLED BY D. Wideman **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 132.9 ft. **GROUND WATER DEPTH: DURING** 35 ft. **COMP.** 33 ft. **DELAYED**
NOTES

DEPTH (ft)	GRAPHIC LOG	**STRATA DESCRIPTION**	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** **PERCENT RECOVERY** (RQD)	**COMMENTS**
		Silty Clay (CL)					
		- dark red, very damp, medium stiff		SS -1	1.0-2.5	2-4-4 (**8**)	
5		- red, very damp, medium stiff, with sand		SS -2	3.5-5.0	2-3-3 (**6**)	
		- red, damp, stiff		SS -3	6.0-7.5	4-6-7 (**13**)	
10		- red, damp, stiff		SS -4	8.5-10.0	2-6-6 (**12**)	
15		- yellow-red, damp, medium stiff, with mica		SS -5	13.5-15.0	2-3-4 (**7**)	
20		- yellow-red with red-yellow and black mottles, damp, medium stiff, with mica		SS -6	18.5-20.0	2-2-3 (**5**)	
25		- red and red-yellow with black and white mottles, damp, medium stiff, with mica		SS -7	23.5-25.0	2-3-3 (**6**)	
30		- red-yellow and yellow with black mottles, very damp, medium stiff, with mica		SS -8	28.5-30.0	2-3-3 (**6**)	
		▽	510.4				
		Lean Clay (CL)					
35		▽ - red-yellow and yellow with black mottles, very moist, medium stiff, medium plasticity, with mica		SS -9	33.5-35.0	WH-2-4 (**6**)	
40		- olive-yellow with black and white mottles, very moist, medium stiff, medium plasticity, with silt and sand		SS -10	38.5-40.0	2-3-5 (**8**)	
			500.4				

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PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	**STRATA DESCRIPTION**	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** / **PERCENT RECOVERY** (RQD)	**COMMENTS**
45		**Elastic Silt (MH)** - pale brown with black and white mottles, very moist, stiff, medium plasticity, with sand		SS -11	43.5-45.0	3-4-7 (**11**)	
			495.4				
50		**Sandy Silt (ML)** - black and white with pale brown mottles, very moist, very stiff		SS -12	48.5-50.0	5-7-10 (**17**)	
55		- gray and pale brown with white mottles, very moist, very stiff		SS -13	53.5-55.0	10-12-15 (**27**)	
60		- gray and pale yellow with white mottles, damp, very stiff		SS -14	58.5-60.0	8-9-11 (**20**)	
			480.5				
65 70		- no recovery		RC -15	62.9-72.9	**0**	
75 80		- black and white, coarse grain, medium hard, highly weathered, with amphibolite and quartz		RC -16	72.9-82.9	**2** (0)	
85 90		- no recovery		RC -17	82.9-92.9	**0**	

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LOG OF TEST BORING

BORING SPT-05
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PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
95 100	*(Con't)* - black and white, coarse grain, medium hard, highly weathered, with amphibolite and feldspar		RC -18	92.9-102.9	**2** (0)	
105 110	- white and dark gray with white banding, coarse grain, soft to medium hard, moderately weathered, thin to thick foliation, intensely fractured, with massive feldspar, quartz, amphibolite, biotite		RC -19	102.9-112.9	**32** (4)	
115 120	- brown-black and gray with light gray banding, medium to coarse grain, medium hard to hard, slightly to highly weathered, moderately fractured, medium foliation, with biotite, quartz, feldspar, pyrite		RC -20	112.9-122.9	**67** (35)	
125 130	- gray with light gray banding, fine to medium grain, hard, not to slightly weathered, slightly to moderately fractured, with biotite, quartz, feldspar	410.5	RC -21	122.9-132.9	**95** (71)	

Bottom of borehole at 132.9 feet.

SOUTHERN COMPANY

LOG OF TEST BORING

BORING SPT-06
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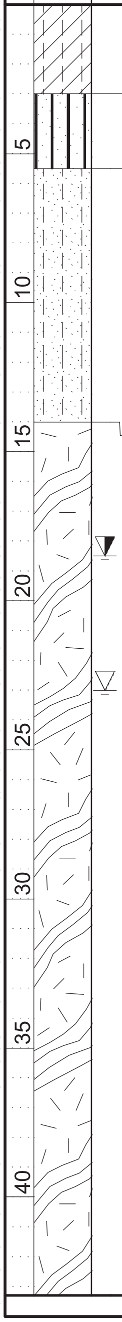
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 4/14/2015 **COMPLETED** 4/15/2015 **SURF. ELEV.** 540.0 **COORDINATES:** N:33.073170 E:83.839295
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Hollow Stem Auger; Casing Advance; NQ Diamond Core
DRILLED BY D. Wideman **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 43.3 ft. **GROUND WATER DEPTH: DURING** **COMP.** 23 ft. **DELAYED** 18.5 ft. after 48 hrs.
NOTES



DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** **PERCENT RECOVERY** (RQD)	**COMMENTS**
	Silty Clay (CL-ML) - red with yellow-brown mottles, dry, very stiff	537.0	SS -1	1.0-2.5	7-7-12 (**19**)	
5	**Sandy Silt (ML)** - brown and yellow-brown with yellow-red mottles, dry, very hard, with sand	534.5	SS -2	3.5-5.0	14-20-32 (**52**)	
	Silty Sand (SM) - gray-brown with dark brown mottles, dry, very dense, fine to coarse grain		SS -3	6.0-7.5	18-20-30 (**50**)	
10	- gray-brown with dark brown mottles, dry, very dense, fine to coarse grain, with medium grained residual amphibolite rock		SS -4	8.5-9.3	32-50/4" (**100+**)	
15	- brown, dry, very dense, fine grain, coarse grained mica	526.0	SS -5	13.5-13.8	50/4" (**100+**)	
20	**Granitic Gneiss** - white and light gray with dark gray banding, medium to coarse grain, medium hard, slightly to highly weathered, intensely fractured, some near-vertical fractures, with quartz, feldspar, biotite, amphibolite		RC -6	14.0-23.3	**68** (13)	
25 30	- light gray-brown with light gray banding, medium to coarse grain, soft to medium hard, moderately to highly weathered, intensely fractured, with quartz, feldspar, biotite		RC -7	23.3-33.3	**50** (9)	
35 40	- light gray and dark gray banding, fine to coarse grain, medium hard to hard, not to slightly weathered, moderately fractured, with quartz, feldspar, biotite	496.7	RC -8	33.3-43.3	**99** (55)	

Bottom of borehole at 43.3 feet.

SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 3/18/2015 **COMPLETED** 3/25/2015 **SURF. ELEV.** 554.5 **COORDINATES:** N:33.075167 E:83.831985
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Casing Advance; NQ Diamond Core
DRILLED BY D. Wideman **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 170.1 ft. **GROUND WATER DEPTH: DURING** 33 ft. **COMP.** **DELAYED**
NOTES

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** / **PERCENT RECOVERY** (RQD)	COMMENTS
		Sandy Lean Clay (CL)					
		- red, dry, very stiff		SS-1	1.0-2.5	7-8-10 (**18**)	
5		- red, dry, stiff		SS-2	3.5-5.0	2-3-8 (**11**)	
		- red, damp, very stiff		SS-3	6.0-7.5	5-10-15 (**25**)	
10		- red, damp, stiff, with silt		SS-4	8.5-10.0	4-5-7 (**12**)	
15		- red with red-yellow mottles, damp, stiff, with silt		SS-5	13.5-15.0	7-7-8 (**15**)	
20		- red-brown with black mottles, damp, stiff, with silt, clayey sand lense @ 19.5', pink with white mottles, damp		SS-6	18.5-20.0	4-5-7 (**12**)	
25		- strong brown with black mottles, damp, stiff		SS-7	23.5-25.0	5-6-7 (**13**)	
			526.5				
30		**Clayey Sand (SC)** - pink with red-yellow mottles, damp, loose		SS-8	28.5-30.0	4-4-6 (**10**)	
	▽		521.5				
35		**Elastic Silt (MH)** - light brown and strong brown with black and white mottles, wet, stiff, medium plasticity, with clay		SS-9	33.5-35.0	4-4-6 (**10**)	
40		- brown and light brown with white mottles, wet, stiff, medium plasticity, with clay		SS-10	38.5-40.0	4-7-7 (**14**)	

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DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
45	**Elastic Silt (MH)** - brown and light brown with white mottles, wet, stiff, medium plasticity, with clay		SS -11	43.5-45.0	3-5-10 (**15**)	
50	- light olive-brown and dark gray-green with white mottles, wet, stiff, medium plasticity, with clay, some sand		SS -12	48.5-50.0	3-4-8 (**12**)	
55	- olive with black mottles, wet, very stiff, medium plasticity, with clay, some sand	496.5	SS -13	53.5-55.0	6-7-10 (**17**)	
60	**Sandy Elastic Silt (MH)** - light brown and olive brown with white mottles, wet, hard, medium plasticity		SS -14	58.5-60.0	12-14-33 (**47**)	
65	- light brown and olive brown with white mottles, wet, very hard, medium plasticity	489.0	SS -15	63.5-64.3	15-50/4" (**100+**)	
	Gneiss - pink, white and yellow-brown, medium to coarse grain, soft to hard, not to highly weathered, banded, thin to medium foliation, intensely fractured, with coarse feldspar, quartz	484.5	RC -16	65.5-69.2	**54** (0)	
70	**Fat Clay (CH)** - brown, wet, high plasticity, with sand	480.3	RC -17	69.2-74.2	**4** (0)	
75, 80	**Granitic Gneiss** - light red to brown-yellow, fine to coarse grain, moderately to highly weathered, with quartz, feldspar, biotite		RC -18	74.2-84.2	**4** (0)	
85	- gray-brown with white mottles, damp, very dense, medium grain, silty sand		SS -19	84.2-84.3	50/1" (**100+**)	
90	- light pink, white, and gray-brown, fine to coarse grain, soft to hard, moderately to highly weathered, inclined, banded, intensely fractured, with coarse feldspar, quartz, mica		RC -20	84.3-94.2	**24** (8)	

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SOUTHERN COMPANY

LOG OF TEST BORING

BORING SPT-07
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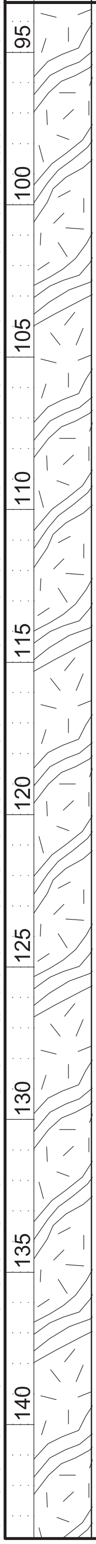
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer



DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** / **PERCENT RECOVERY** (RQD)	**COMMENTS**
	Granitic Gneiss					
95 100	- white, gray and light pink, fine to coarse grain, medium hard to hard, moderately weathered, inclined, banded, moderately to intensely fractured, with coarse feldspar, quartz, mica		RC -21	94.2-104.2	**63** (11)	
105 110	- gray, white, pink, and black, medium to coarse grain, soft to hard, moderately weathered, inclined, banded, thin to medium foliation, moderately to intensely fractured, with feldspar, quartz, mica		RC -22	104.2-114.2	**37** (13)	
115 120	- gray, white and pink, fine to coarse grain, hard, slightly to moderately weathered, inclined, banded, thin to medium foliation, intensely fractured, with coarse feldspar, biotite, quartz		RC -23	114.2-124.2	**22** (0)	
125 130	- light red and red-gray, fine to coarse grain, hard, slightly to moderately weathered, inclined, banded, intensely fractured, some near-vertical fractures		RC -24	124.2-134.2	**59** (13)	
135 140	- white, dark gray, black, light gray, pink, and gray-brown, fine to coarse grain, not to moderately weathered, inclined, banded, thin to medium foliation, moderately fractured, some near-vertical fractures, interlayered biotite seams		RC -25	134.2-144.2	**92** (52)	

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SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

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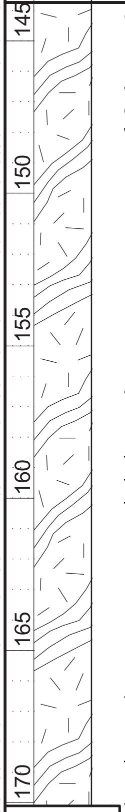
PROJECT Geotechnical Investigation
LOCATION Plant Scherer



DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
145	**Granitic Gneiss**					
150	- brown-gray, white, pink, light gray and gray, fine to coarse grain, medium hard to hard, not to moderately weathered, inclined, banded, thin to massive foliation, moderately fractured, with feldspar, quartz, biotite		RC -26	144.2-154.2	**100** (68)	
155						
160	- light gray, light red, and white, fine to medium grain, medium hard to hard, not to highly weathered, inclined, banded, thin to medium foliation, slightly to moderately fractured, few near-vertical fractures healed with feldspar, completely weathered at 163', with coarse feldspar		RC -27	154.2-164.2	**98** (56)	
165	- gray, white and light pink, fine to medium grain, hard, not weathered, inclined, banded, medium foliation, moderately fractured, with distinct biotite, quartz and feldspar seams		RC -28	164.2-169.2	**100** (80)	
170	- gray, white and light pink, fine to medium grain, hard, not weathered, inclined, banded, medium foliation, moderately fractured, with distinct biotite, quartz and feldspar seams	384.4	RC -29	169.2-170.1	**100** (100)	

Bottom of borehole at 170.1 feet.

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

BORING SPT-08
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PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 3/10/2015 **COMPLETED** 3/12/2015 **SURF. ELEV.** 493.1 **COORDINATES:** N:33.073591 E:83.827110
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Mud Rotary; Casing Advance; NQ Diamond Core
DRILLED BY S. Denty **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 144.2 ft. **GROUND WATER DEPTH: DURING** 25 ft. **COMP.** 22.5 ft. **DELAYED** 8.5 ft. after 75 hrs.
NOTES

DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
	Fat Clay (CH) - yellow-red, wet, stiff, high plasticity, with silt	490.1	SS-1	1.0-2.5	4-4-7 (**11**)	
5	**Lean Clay (CL)** - yellow-red with gray and red mottling, damp, stiff		SS-2	3.5-5.0	4-6-9 (**15**)	
	- yellow-red with gray and red mottling, damp, very stiff		SS-3	6.0-7.5	6-8-13 (**21**)	
10	▼ - pale yellow with red and brown laminations, dry, very stiff	480.1	SS-4	8.5-10.0	12-9-9 (**18**)	
15	**Silt (ML)** - gray with light gray laminations, dry, very stiff	475.1	SS-5	13.5-15.0	3-4-5 (**9**)	
20	**Silty Sand (SM)** - light brown-gray with dark gray mottling, damp, medium dense, fine to medium grain ▽	470.1	SS-6	18.5-20.0	7-7-10 (**17**)	
25	**Sandy Lean Clay (CL)** - dark gray-brown with white mottling, very damp, very ▽ stiff		SS-7	23.5-25.0	9-9-16 (**25**)	
30	- dark gray-brown with white mottling, wet, very stiff	460.1	SS-8	28.5-30.0	5-7-9 (**16**)	
35	**Silt (ML)** - dark green-gray and red-yellow, damp, very stiff		SS-9	33.5-35.0	9-9-16 (**25**)	

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SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
		Silt (ML)*(Con't)*	455.1				
40		**Clayey Sand (SC)** - gray-brown with dark red mottling, very damp, very dense, fine grain	450.1	SS -10	38.5-40.0	12-24-45 (**69**)	
45		**Sandy Silt (ML)** - dark gray with white mottling, wet, very hard, *saprolite*		SS -11	43.5-43.8	6-7-10/-8" (**100+**)	
50		- dark gray to black and yellow-brown with white mottling, wet, very hard	440.1	SS -12	48.5-48.6	4-5-7/-10" (**100+**)	
55		**Silty Sand (SM)** - dark green-gray with yellow-brown mottling, wet, very dense, fine grain		SS -13	53.5-53.8	6-4-6/-9" (**100+**)	
60		- gray and yellow-brown with white mottling, very moist, dense, fine grain		SS -14	58.5-60.0	11-16-30 (**46**)	
65		- yellow-brown with white mottling, wet, dense, fine to coarse grain		SS -15	63.5-65.0	7-13-24 (**37**)	
70		- yellow-brown and dark gray with white mottling, wet, dense, fine to coarse grain, *saprolite*	420.1	SS -16	68.5-70.0	7-13-24 (**37**)	
75		**Sandy Silt (ML)** - dark gray with yellow-brown and white mottling, damp, very hard, *saprolite*	415.1	SS -17	73.5-75.0	21-24-36 (**60**)	
80		**Sandy Elastic Silt (MH)** - dark green-gray with white mottling, wet, very stiff, high plasticity		SS -18	78.5-80.0	12-14-16 (**30**)	

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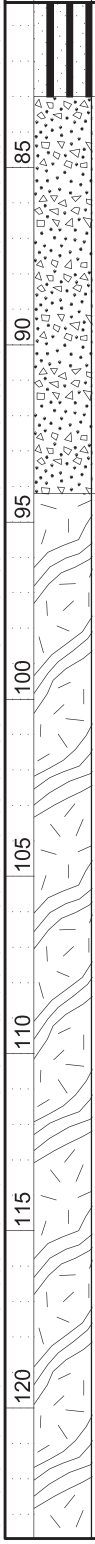
SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer



DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
	Sandy Elastic Silt (MH)*(Con't)*	410.1				
85	**Partially Weathered Rock (PWR)** - dark green-gray with white mottling, wet, very hard, high plasticity		SS -19	83.5-83.8	50/4" (**100+**)	
90						casing advance to 90.8'.
	- no core recovery	398.9	RC -20	90.8-94.2	**0** (0)	
95	**Gneiss** - black and white, coarse grain		RC -21	94.2-99.2	**4** (0)	
100	- black and white, coarse grain, banded, with amphibolite, quartz, and feldspar		RC -22	99.2-104.2	**28** (0)	
105	- gray-brown, black and white, fine to coarse grain, medium hard, moderately weathered, inclined, banded, intensely fractured, with amphibolite, feldspar, and quartz		RC -23	104.2-109.2	**62** (0)	
110	- gray with white banding, fine to medium grain, medium hard, slightly to moderately weathered, inclined, intensely fractured, near-vertical fractures, iron stained fractures, thinly foliated, with amphibolite, quartz, feldspar		RC -24	109.2-114.2	**62** (8)	
115	- dark gray, gray and black, fine to coarse grain, medium hard to hard, not to slightly weathered, inclined, banded, intensely fractured, near-vertical iron stained fractures, with amphibolite, quartz, feldspar		RC -25	114.2-119.2	**100** (20)	
120	- dark gray and light gray, coarse grain, soft to medium hard, moderately to highly weathered, intensely fractured, with amphibolite, quartz, feldspar,		RC -26	119.2-124.2	**14** (0)	

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2012 GEOTECH ENGINEERING LOGS - ESEE2012DATABASE.GDT - 5/11/15 15:44 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER GEOTECH\SCHERER GEOTECHNICAL INVESTIGATION 2015\SCHERER GEOTECH.GPJ

LOG OF TEST BORING

BORING SPT-08

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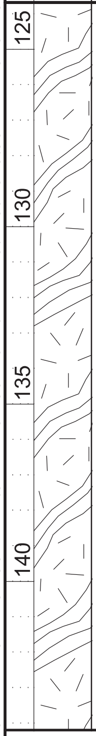
PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** **PERCENT RECOVERY** (RQD)	**COMMENTS**
125		**Gneiss***(Con't)*					
		- dark gray, gray and white, fine to coarse grain, not to slightly weathered, medium to thick foliation, moderately fractured, 2-inch quartz seam at 119.5'		RC -27	124.2-129.2	**80** (34)	
130		- black and white, coarse grain, medium hard, moderately weathered, intensely fractured, with amphibolite, quartz, feldspar		RC -28	129.2-134.2	**54** (10)	
135		- gray and dark gray with white banding, fine to coarse grain, medium hard to hard, not to slightly weathered, inclined, interlayered with dark green biotite schist (3" seam at 136'), moderately to slightly fractured, quartz filled vertical fractures, pyrite on foliation planes, with amphibolite, quartz, feldspar		RC -29	134.2-139.2	**100** (80)	
140		- gray and dark gray with light gray banding, fine to medium grain, hard, not weathered, inclined, thin to thick foliation, slightly fractured, with amphibolite, quartz, feldspar	348.9	RC -30	139.2-144.2	**100** (90)	

Bottom of borehole at 144.2 feet.

2012 GEOTECH ENGINEERING LOGS - ESEE2012DATABASE.GDT - 5/11/15 15:44 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER\SCHERER GEOTECHNICAL INVESTIGATION 2015\SCHERER GEOTECH.GPJ

BORING SPT-09

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SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation

LOCATION Plant Scherer

DATE STARTED 3/31/2015 **COMPLETED** 3/31/2015 **SURF. ELEV.** 505.1 **COORDINATES:** N:33.069090 E:83.841424

CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Casing Advance; NQ Diamond Core

DRILLED BY D. Wideman **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**

BORING DEPTH 58.9 ft. **GROUND WATER DEPTH: DURING** 35 ft. **COMP.** 20 ft. **DELAYED** 36.5 ft. after 48 hrs.

NOTES

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** **PERCENT RECOVERY** (RQD)	COMMENTS
		Silty Clay (CL-ML)					
		- red with red-yellow and black mottles, dry, medium stiff		SS -1	1.0-2.5	2-3-4 (**7**)	
5		- dark red with black and yellow-red mottles, damp, medium stiff	499.6	SS -2	3.5-5.0	2-3-3 (**6**)	
		Well-graded Sand with Silt (SW-SM) - pale brown and yellow-brown with white mottles, damp, loose, fine to coarse grain, with mica		SS -3	6.0-7.5	4-4-5 (**9**)	
10		- pale brown with white mottles, dry, medium dense, fine to medium grain, with mica		SS -4	8.5-10.0	5-7-7 (**14**)	
15		- light brown-gray with white and black mottles, dry, medium dense, fine to medium grain, with mica		SS -5	13.5-15.0	4-8-6 (**14**)	
20	▽	- light brown-gray with white and black mottles, dry, medium dense, fine to medium grain, with mica		SS -6	18.5-20.0	5-7-8 (**15**)	
25		- brown and dark brown with white layers, dry, medium dense, fine to medium grain, with mica		SS -7	23.5-25.0	8-14-16 (**30**)	
30		- very dark gray-brown with white layers, dry, very dense, fine to coarse grain, with mica		SS -8	28.5-29.9	19-41-50/5" (**100+**)	
35	▽	- dark brown and brown with white layers and black mottles, wet, very dense, fine to medium grain		SS -9	33.5-33.8	50/4" (**100+**)	
	▼		467.0				

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LOG OF TEST BORING

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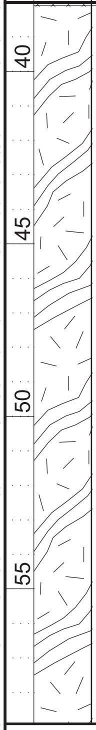
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
40		**Gneiss** - gray with light gray banding, medium to coarse grain, medium hard to hard, not to highly weathered, with biotite, quartz, feldspar		RC -10	38.1-43.9	**14** (9)	
45 50		- gray with light gray banding, fine to coarse grain, soft to hard, not to highly weathered, inclined, banded, highly weathered at 44.5' and 48.5', slightly to moderately fractured, with biotite, quartz, feldspar		RC -11	43.9-53.9	**95** (81)	
55		- dark gray with light gray banding, fine to coarse grain, hard, not to slightly weathered, inclined, banded, medium foliation, moderately fractured, with biotite, quartz, feldspar	446.2	RC -5	53.9-58.9	**116** (116)	

Bottom of borehole at 58.9 feet.

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LOG OF TEST BORING

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 3/12/2015 **COMPLETED** 3/17/2015 **SURF. ELEV.** 547.3 **COORDINATES:** N:33.070617 E:83.834056
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Casing Advance; NQ Diamond Core
DRILLED BY S. Denty **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 74.7 ft. **GROUND WATER DEPTH: DURING** 50 ft. **COMP.** 28.5 ft. **DELAYED** 51 ft. after 48 hrs.
NOTES

DEPTH (ft)	GRAPHIC LOG	**STRATA DESCRIPTION**	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** **PERCENT RECOVERY** (RQD)	**COMMENTS**
		Lean Clay (CL)					
		- red, damp, medium stiff, *residuum*		SS -1	1.0-2.5	2-3-5 (**8**)	
5		- red, damp, very stiff, *residuum*	541.8	SS -2	3.5-5.0	7-12-18 (**30**)	
		Silty Clay (CL-ML) - red, dry, very stiff, *residuum*		SS -3	6.0-7.5	5-6-11 (**17**)	
10		- red, dry, stiff, *residuum*		SS -4	8.5-10.0	3-5-8 (**13**)	
15		- yellow-red, dry, medium stiff	529.3	SS -5	13.5-15.0	1-3-3 (**6**)	
20		**Silt (ML)** - yellow-red with yellow-brown laminations, dry, medium stiff, with clay and sand	524.3	SS -6	18.5-20.0	2-3-3 (**6**)	
25		**Elastic Silt (MH)** - yellow-brown and yellow-red with black mottles, wet, medium stiff, medium plasticity	520.3	SS -7	23.5-25.0	1-3-5 (**8**)	
		Silt (ML)					
30	▽	- brown with black and white mottling, damp, stiff, with clay and mica		SS -8	28.5-30.0	4-5-7 (**12**)	
35		- brown with black and white mottling, dry, very stiff, with sand		SS -9	33.5-35.0	7-8-8 (**16**)	
40		- brown and light gray-brown with black and white mottling, damp, very stiff, with sand		SS -10	38.5-40.0	7-11-13 (**24**)	

(Continued Next Page)

LOG OF TEST BORING

BORING SPT-10
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PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
		Silt (ML)(*Con't*)					
45		- gray-brown with black mottling, very damp, very hard, with sand and mica		SS -11	43.5-43.8	50/4" (**100+**)	
			499.3				
50		**Silty Sand (SM)** - dark gray-brown with black mottling, wet, very dense, fine grain, with mica ▽ ▼		SS -12	48.5-48.6	50/1" (**100+**)	
55		- dark gray-brown with black mottling, wet, very dense, fine grain, with mica		SS -13	53.5-53.8	50/3" (**100+**)	
			491.2				
60		**Gneiss** - dark gray-brown to 62.5 ft. then gray with light gray banding, fine to coarse grain, soft to hard, not to highly weathered, inclined, slightly to intensely fractured, with biotite, quartz, feldspar		RC -14	56.1-64.7	**57** (10)	
65							
70		- gray with light gray banding, fine to coarse grain, hard, not to slightly weathered, inclined, slightly fractured, slightly weathered fractures at 64.5' and 74.5', quartz seams, with biotite, quartz, feldspar		RC -15	64.7-74.7	**100** (81)	
			472.6				

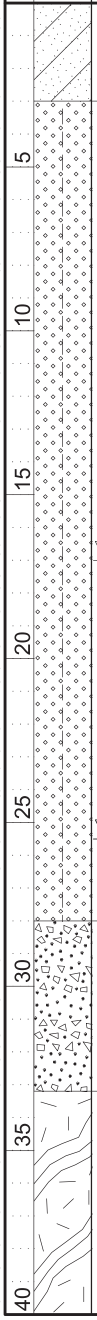
Bottom of borehole at 74.7 feet.

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 3/18/2015 **COMPLETED** 3/18/2015 **SURF. ELEV.** 526.7 **COORDINATES:** N:33.068491 E:83.836664
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Casing Advance; NQ Diamond Core
DRILLED BY S. Denty **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 54.6 ft. **GROUND WATER DEPTH: DURING** 17 ft. **COMP.** 25.5 ft. **DELAYED** 25.5 ft. after 48 hrs.
NOTES



DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) PERCENT RECOVERY (RQD)	COMMENTS
	Clayey Sand (SC) - yellow with red-yellow mottles, damp, loose, fine grain	523.7	SS -1	1.0-2.5	3-4-3 (**7**)	
5	**Well-graded Sand with Silt (SW-SM)** - light brown with red-yellow mottles, wet, very dense, fine to coarse grain, with clay, some residual rock fragments		SS -2	3.5-4.6	15-32-50/1" (**100+**)	
	- light brown with red-yellow mottles, wet, very dense, fine to coarse grain, with clay, some residual rock fragments		SS -3	6.0-6.5	50 (**100+**)	
10	- pink, wet, very dense, fine to coarse grain, some rock fragments		SS -4	8.5-9.3	16-50/4" (**100+**)	
15	- very pale brown with pink mottles, damp, very dense, fine to coarse grain, some fine rock fragments		SS -5	13.5-13.6	50/1" (**100+**)	
	▽					
20	- very pale brown and brown, wet, very dense, fine to coarse grain, with silt and rock fragments		SS -6	18.5-19.1	12-50/1" (**100+**)	
25	- black and white, then green-black, wet, very dense, fine to coarse grain, with silt		SS -7	23.5-23.8	50/3" (**100+**)	
	▼	498.7				
30	**Partially Weathered Rock (PWR)** - no recovery	493.5	SS -8	28.5-28.5	50/0" (**100+**)	
35	**Granitic Gneiss**		SS -9	33.5-33.5	50/0" (**100+**)	
	- dark brown-gray and light gray banding, pink, very soft to soft, moderately to highly weathered, intensely fractured, near-vertical fractures, interlayered with biotite gneiss		RC -10	33.2-39.6	**66** (16)	
40						

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SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

BORING SPT-11
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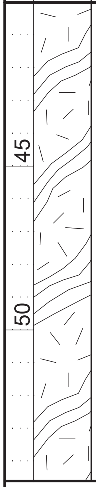
PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** / **PERCENT RECOVERY** (RQD)	COMMENTS
45 50		**Granitic Gneiss***(Con't)* - white and gray banding, fine to coarse grain, soft to medium hard, moderately to highly weathered, medium to thin foliation, interlayered with biotite gneiss - gray, light gray and white banding, fine to coarse grain, hard, not to slightly weathered, inclined, top of fresh rock at 43 ft.,thick to medium foliation, slightly to moderately fractured, pyrite on foliation planes, interlayered with biotite gneiss, coarse feldspar		RC -11	39.6-49.6	**94** (43)	
		- gray, light gray and white banding, fine to coarse grain, hard, not weathered, inclined, slightly fractured, thin to medium foliation, interlayered with biotite gneiss	472.1	RC -12	49.6-54.6	**100** (94)	

Bottom of borehole at 54.6 feet.

2012 GEOTECH ENGINEERING LOGS - ESEE2012DATABASE.GDT - 5/11/15 15:44 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER GEOTECHNICAL INVESTIGATION 2015\SCHERER GEOTECH.GPJ

SOUTHERN COMPANY

LOG OF TEST BORING

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DATE STARTED 3/17/2015 **COMPLETED** 3/17/2015 **SURF. ELEV.** 511.5 **COORDINATES:** N:33.066010 E:83.831212
CONTRACTOR SCS Field Services **EQUIPMENT** CME 550 **METHOD** Casing Advance; NQ Diamond Core
DRILLED BY S. Denty **LOGGED BY** W. Shaughnessy **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 69.3 ft. **GROUND WATER DEPTH: DURING** 25 ft. **COMP.** 19 ft. **DELAYED**
NOTES

DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS (N-VALUE) / PERCENT RECOVERY (RQD)	COMMENTS
	Lean Clay (CL)					
	- red with black mottles, dry, stiff		SS -1	1.0-2.5	4-4-5 (**9**)	
5	- red with red-yellow mottles, damp, stiff		SS -2	3.5-5.0	4-6-8 (**14**)	
	- red, very damp, stiff, with mica		SS -3	6.0-7.5	3-5-6 (**11**)	
10	- red, very damp, stiff, with mica		SS -4	8.5-10.0	4-5-6 (**11**)	
		498.5				
	Sandy Silt (ML) - yellow-brown and pale yellow with red mottling, wet, soft, with clay		SS -5	13.5-15.0	1-1-3 (**4**)	
15						
20	▽ - light brown and brown layered, damp, medium stiff, with mica		SS -6	18.5-20.0	3-3-4 (**7**)	
		488.5				
25	**Sandy Elastic Silt (MH)** - light gray-brown and yellow-red, with dark brown and ▽ white mottling, wet, medium stiff, with clay		SS -7	23.5-25.0	3-3-4 (**7**)	
		483.5				
30	**Sandy Silt (ML)** - pale brown with pale yellow mottling, damp, very stiff		SS -8	28.5-30.0	8-10-9 (**19**)	
35	- no recovery		SS -9	33.5-35.0	3-4-5 (**9**)	
		473.5				

(Continued Next Page)

LOG OF TEST BORING

BORING SPT-12
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PROJECT Geotechnical Investigation
LOCATION Plant Scherer

DEPTH (ft)	STRATA DESCRIPTION	ELEV.	SAMPLE TYPE NUMBER	SAMPLE DEPTH (ft.)	BLOW COUNTS **(N-VALUE)** / **PERCENT RECOVERY** (RQD)	**COMMENTS**
40	**Sandy Elastic Silt (MH)** - gray-brown with white and yellow-brown mottling, wet, very stiff, medium plasticity, *saprolite*		SS -10	38.5-40.0	4-7-10 (**17**)	
		468.5				
45	**Silty Sand (SM)** - gray and pale yellow-brown with white mottles, wet, dense, fine to coarse grain, some fine gravel (residual quartz)		SS -11	43.5-45.0	3-10-30 (**40**)	
50	- gray with black mottles then pale brown with mottles, wet, very dense, fine to coarse grain		SS -12	48.5-50.0	10-20-31 (**51**)	
		459.5				
55	**Partially Weathered Rock (PWR)** - fine to medium grain, residual quartz		SS -13	53.5-53.6	50/1" (**100+**)	
		455.3				
60	**Gneiss** - light brown and white to 58 ft. then gray with white banding, fine to coarse grain, soft to hard, slightly to highly weathered, inclined, intensely fractured, with biotite, quartz seams, feldspar		RC -14	56.2-64.3	**93** (93)	
65	- gray, white and pink, fine to coarse grain, hard, not weathered, inclined, banded, slightly to moderately fractured, with biotite, quartz seams, feldspar		RC -15	64.3-69.3	**100** (50)	
		442.2				

Bottom of borehole at 69.3 feet.

WELL: PZ-01S
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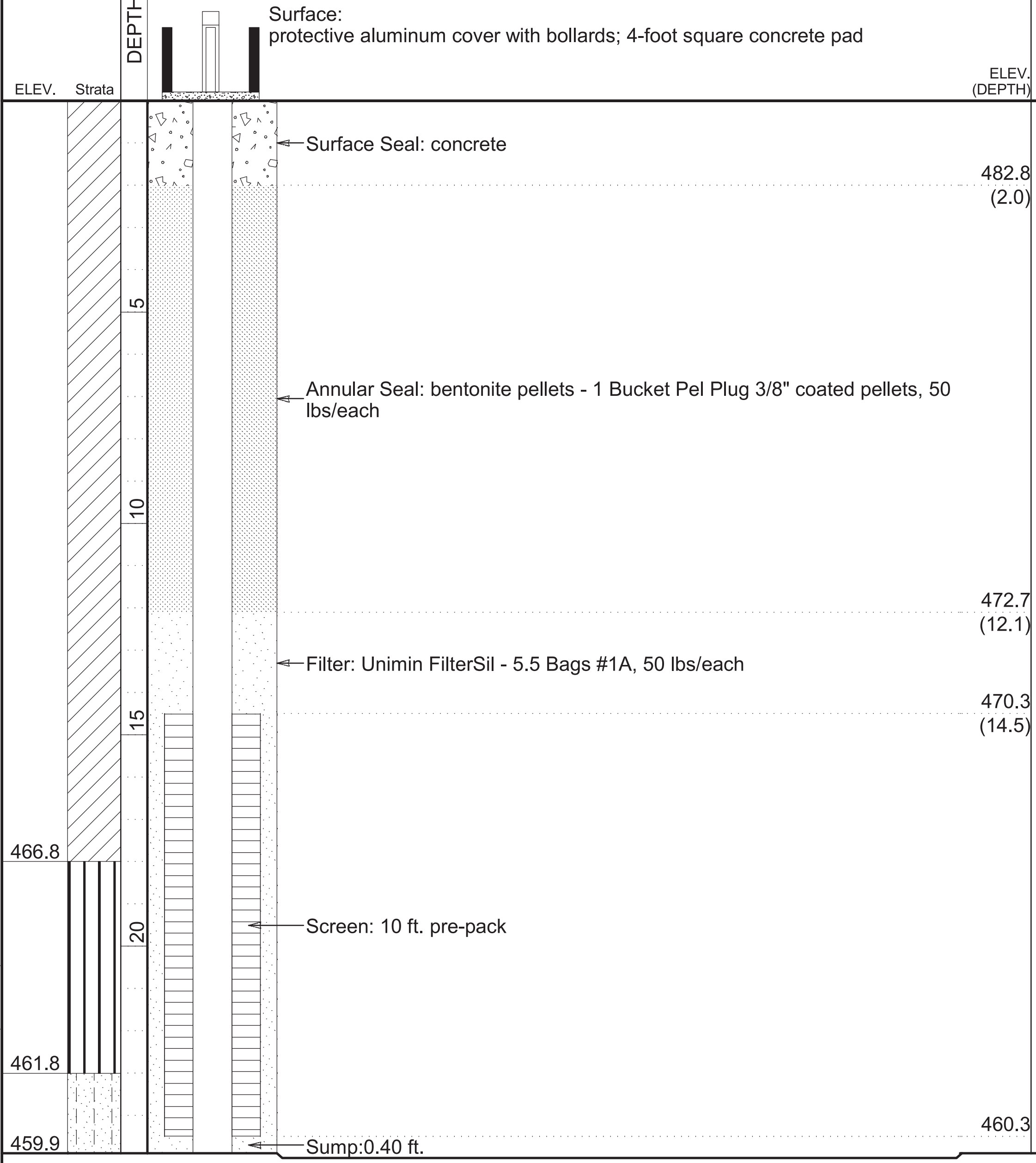
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 5/6/2015 **COMPLETED** 5/6/2015 **SURF. ELEV.** 484.8 **COORDINATES:** N:33.066024 E:-83.815384
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 24.9 ft. **GROUND WATER DEPTH: DURING** 14.4 ft. **COMP.** 0 ft. **DELAYED** 2.7 ft. after 24 hrs.
NOTES

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

Filter: Unimin FilterSil - 5.5 Bags #1A, 50 lbs/each

Screen: 10 ft. pre-pack

Sump:0.40 ft.

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

WELL: PZ-02I
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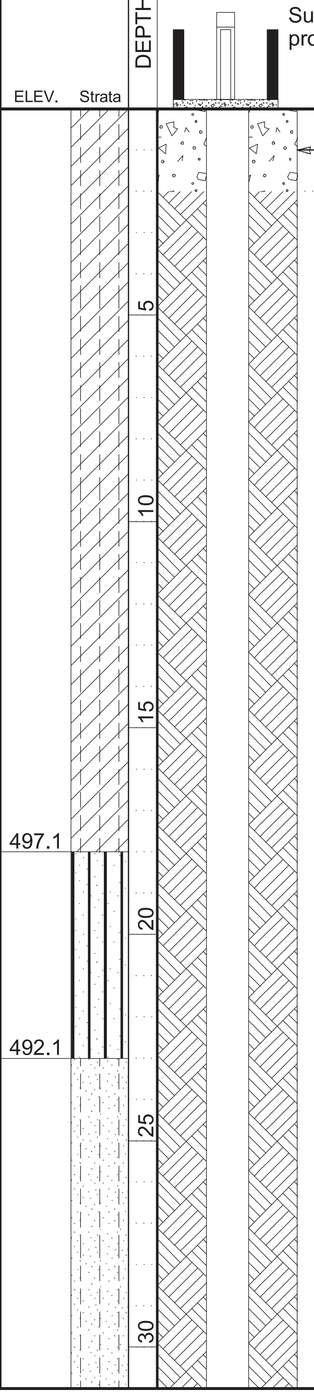
PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 1/22/2015 **COMPLETED** 1/27/2015 **SURF. ELEV.** 515.1 **COORDINATES:** N:33.066405 E:-83.819320
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 84.3 ft. **GROUND WATER DEPTH: DURING** 23.51 ft. **COMP.** 25.61 ft. **DELAYED** 25.41 ft. after 24 hrs.
NOTES

BOREHOLE DATA	**WELL DATA**	**COMMENTS**



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV.
(DEPTH)

Surface Seal: concrete

513.1
(2.0)

Annular Fill: Cement-Bentonite Grout - 9 bags TypeI I/II Portland Cement, 94 lbs/each

Well: 2" OD PVC (SCH 40)

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2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

WELL: PZ-02I
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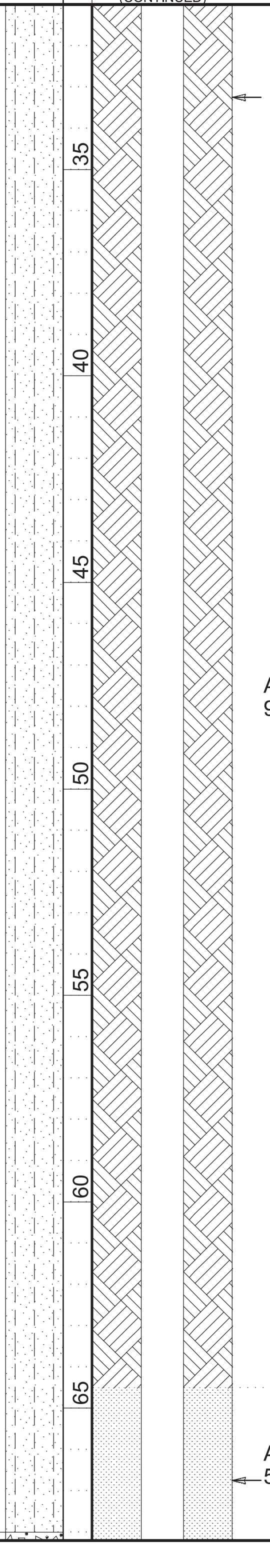
PROJECT Piezometer Installation

LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. / Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



Annular Fill: Cement-Bentonite Grout - 9 bags TypeI I/II Portland Cement, 94 lbs/each

450.6
(64.5)

Annular Seal: bentonite pellets - 0.5 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

447.1

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WELL: PZ-02I
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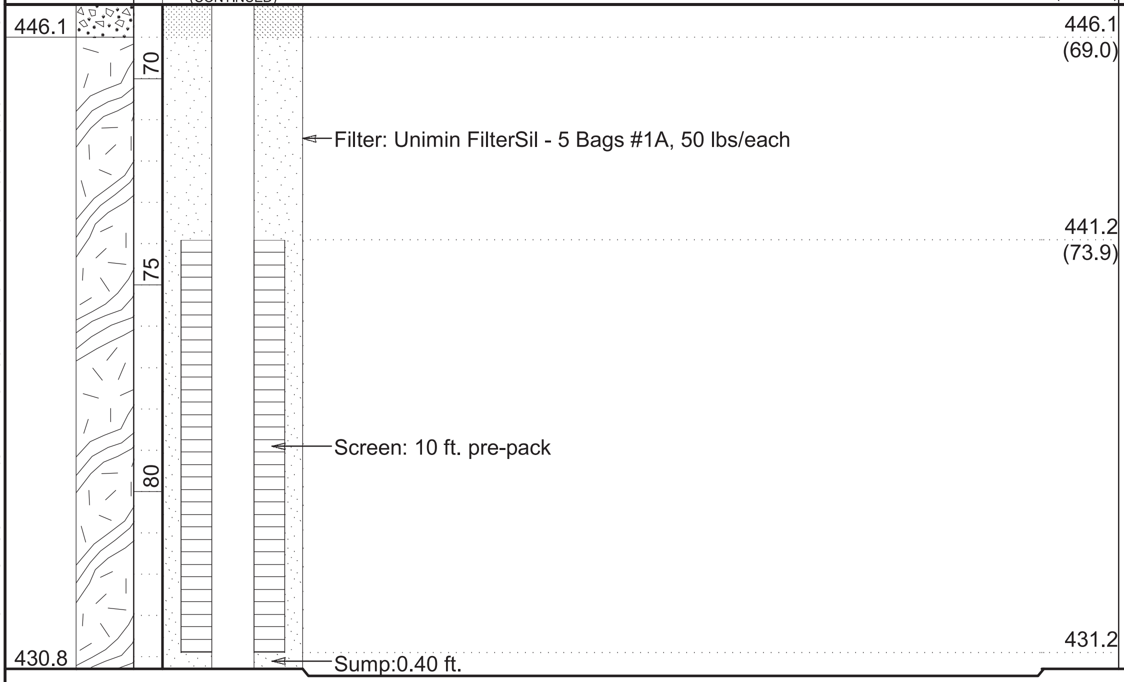
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. / Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



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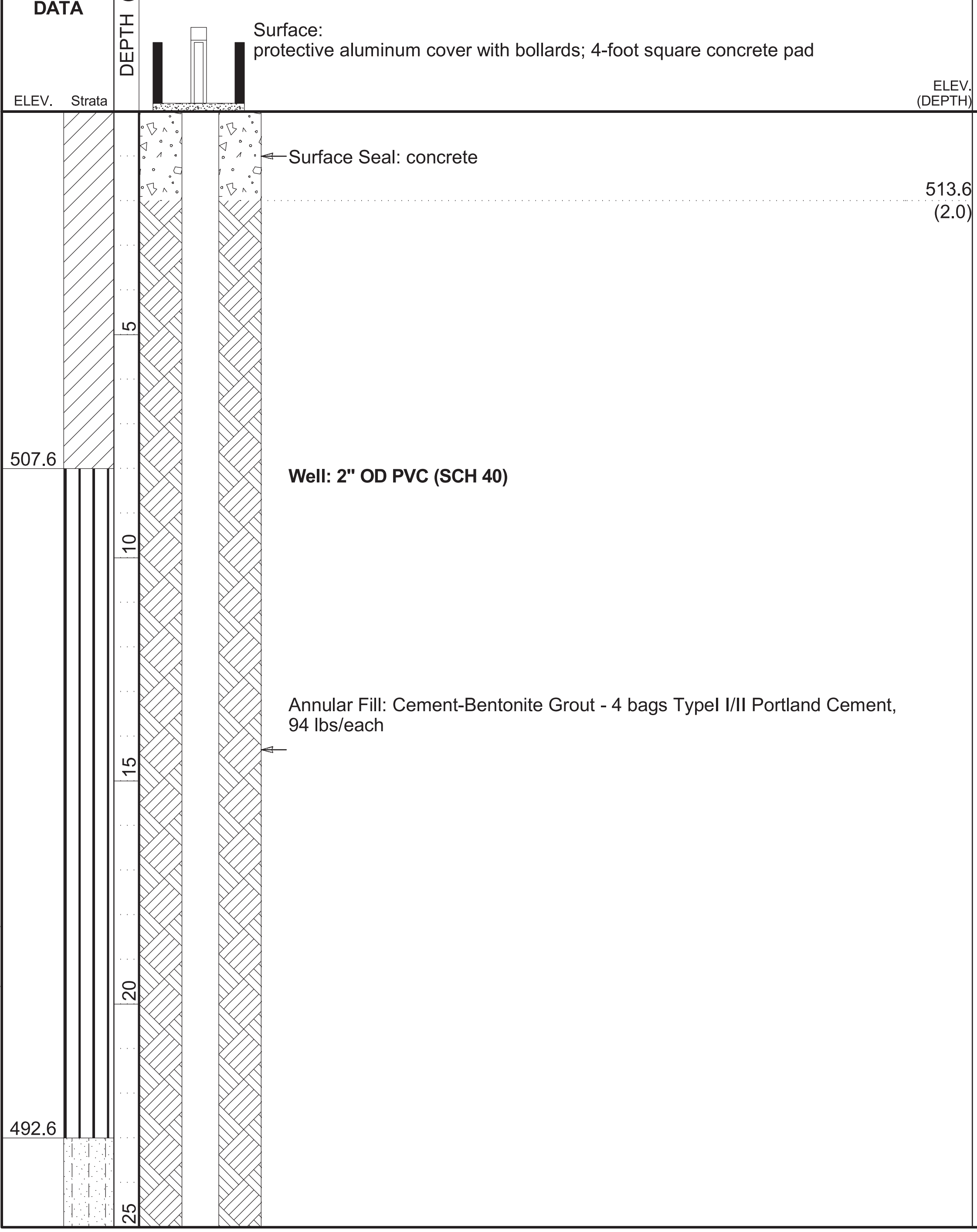
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 1/21/2015 **COMPLETED** 1/22/2015 **SURF. ELEV.** 515.6 **COORDINATES:** N:33.066392 E:-83.819283
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 50.1 ft. **GROUND WATER DEPTH: DURING** 25.5 ft. **COMP.** 25.5 ft. **DELAYED** 24.51 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

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SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

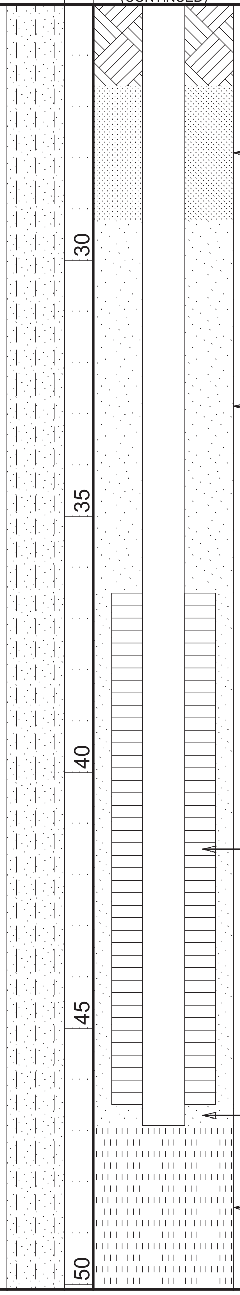
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. | Strata | (CONTINUED) | ELEV. (DEPTH)



Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

489.0
(26.6)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

486.4
(29.2)

Filter: Unimin FilterSil - 6 Bags #1A, 50 lbs/each

479.1
(36.5)

Screen: 10 ft. pre-pack

469.1
(46.5)

Sump:0.40 ft.

468.7
(46.9)

Backfill:

465.5

RECORD OF WELL CONSTRUCTION

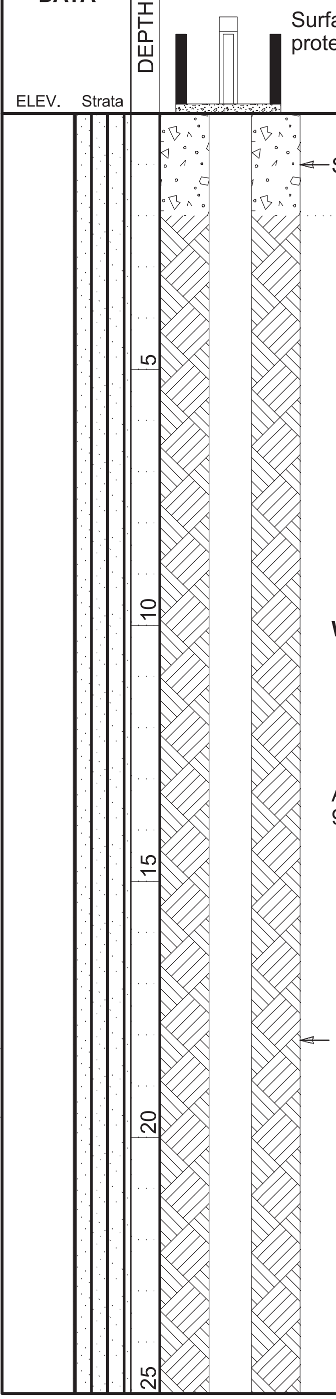
SOUTHERN COMPANY
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 1/28/2015 **COMPLETED** 1/29/2015 **SURF. ELEV.** 514.6 **COORDINATES:** N:33.067894 E:-83.820805
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 50 ft. **GROUND WATER DEPTH: DURING** 48.5 ft. **COMP.** 28.31 ft. **DELAYED** 30.11 ft. after 24 hrs.
NOTES

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

ELEV. Strata



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV.
(DEPTH)

Surface Seal: concrete

512.6
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 7 bags TypeI I/II Portland Cement, 94 lbs/each

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SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

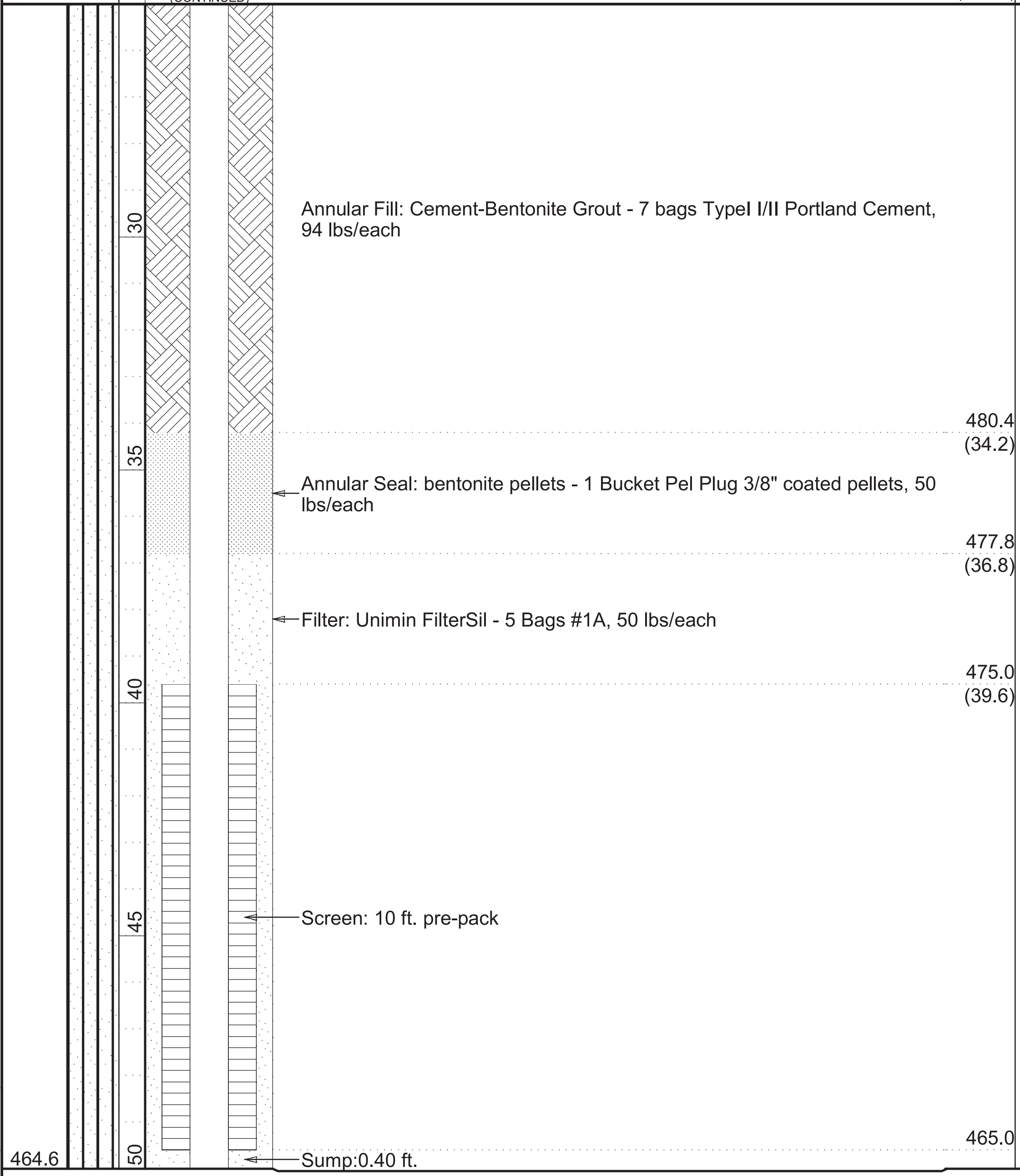
RECORD OF WELL CONSTRUCTION

PROJECT Piezometer Installation

LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad



Annular Fill: Cement-Bentonite Grout - 7 bags TypeI I/II Portland Cement, 94 lbs/each

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

Filter: Unimin FilterSil - 5 Bags #1A, 50 lbs/each

Screen: 10 ft. pre-pack

Sump:0.40 ft.

WELL: PZ-04I
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RECORD OF WELL CONSTRUCTION

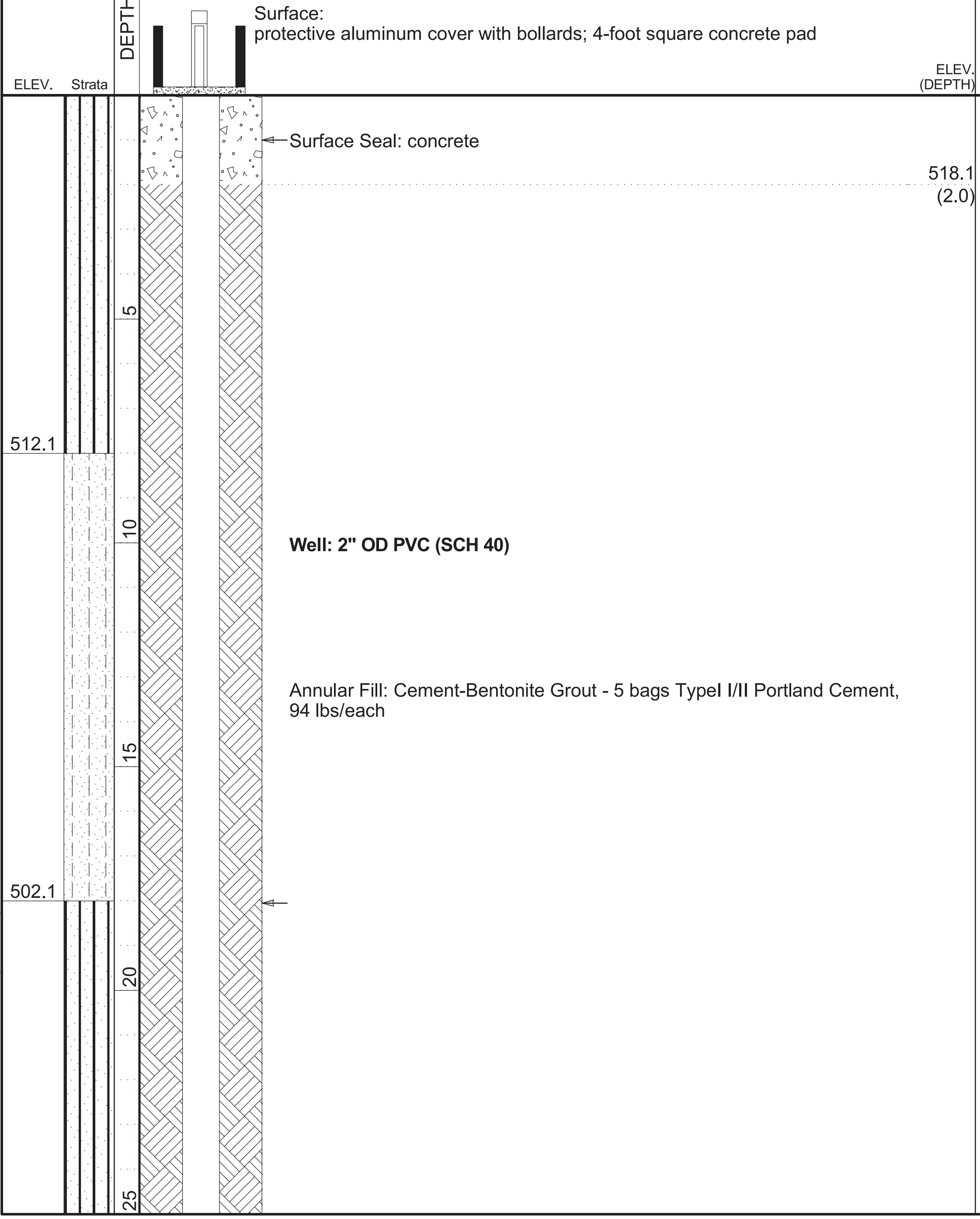
SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 1/29/2015 **COMPLETED** 2/3/2015 **SURF. ELEV.** 520.1 **COORDINATES:** N:33.069571 E:-83.822112
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 49.7 ft. **GROUND WATER DEPTH: DURING** 34.9 ft. **COMP.** 33.1 ft. **DELAYED** 33.9 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 5 bags TypeI I/II Portland Cement, 94 lbs/each

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2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

WELL: PZ-04I
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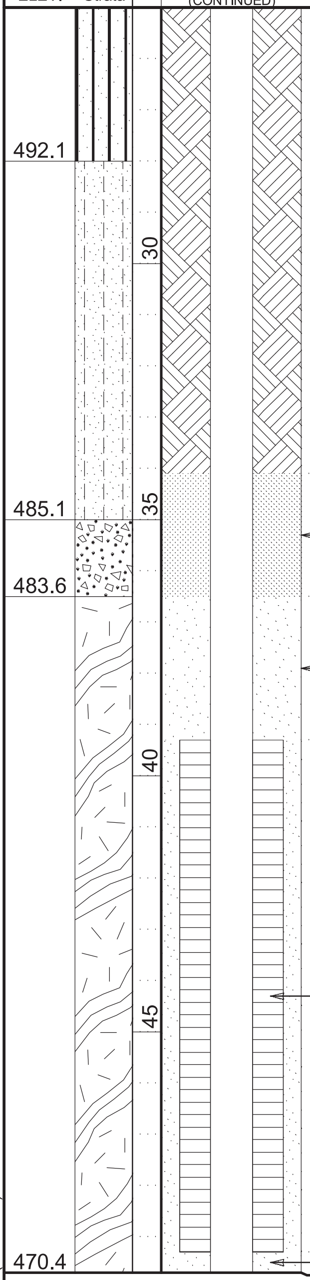
PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad	

(CONTINUED)



Annular Fill: Cement-Bentonite Grout - 5 bags TypeI I/II Portland Cement, 94 lbs/each

486.0 (34.1)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

483.6 (36.5)

Filter: Unimin FilterSil - 1 Bag #1A, 50 lbs/each

480.8 (39.3)

Screen: 10 ft. pre-pack

470.8

Sump:0.40 ft.

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

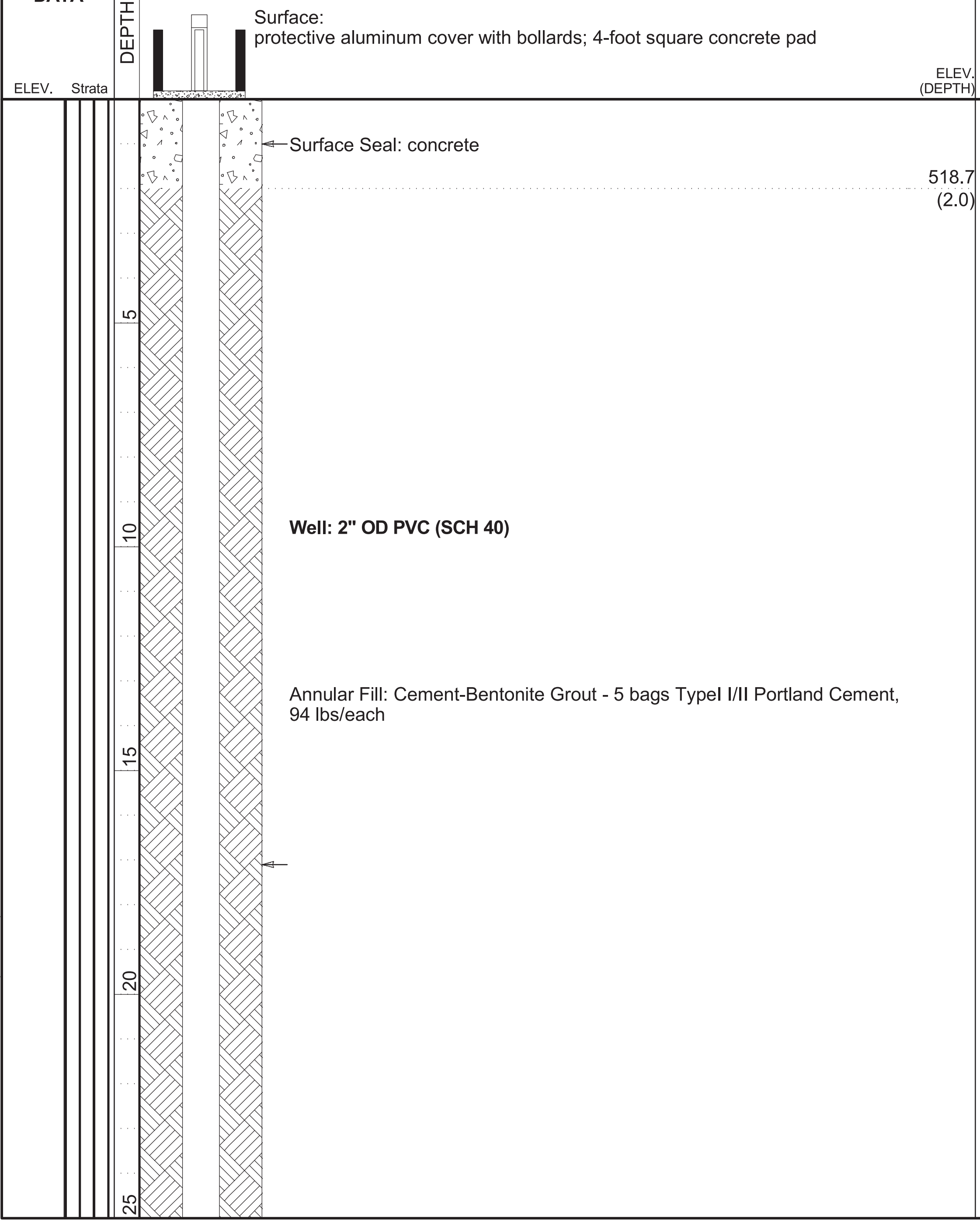
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 2/3/2015 **COMPLETED** 2/4/2015 **SURF. ELEV.** 520.7 **COORDINATES:** N:33.071745 E:-83.823130
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 47.2 ft. **GROUND WATER DEPTH: DURING** 35.1 ft. **COMP.** 41.5 ft. **DELAYED** 36.8 ft. after 24 hrs.
NOTES

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

ELEV. Strata



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

518.7
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 5 bags TypeI I/II Portland Cement, 94 lbs/each

(Continued Next Page)

WELL: PZ-05I
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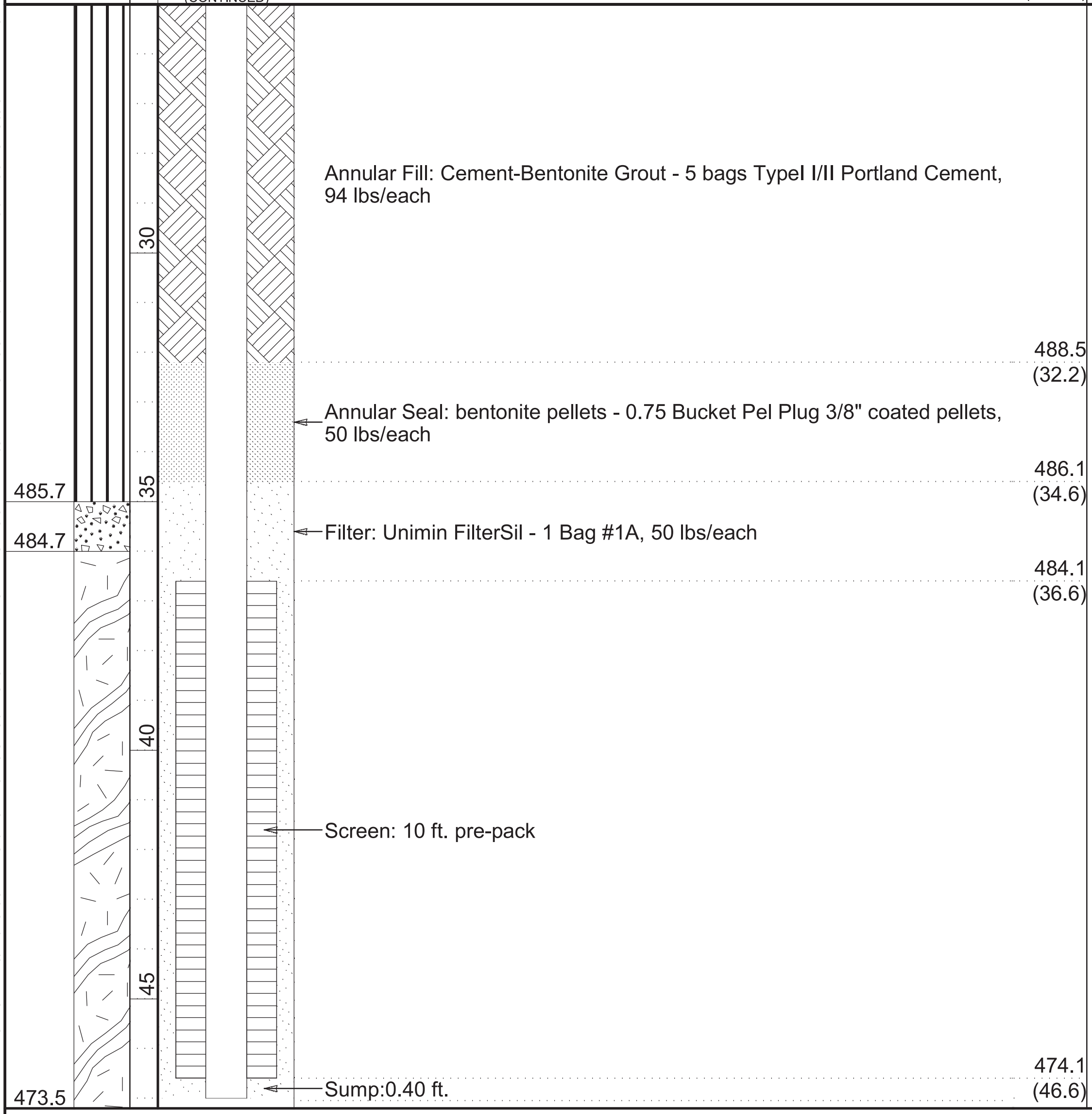
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	**WELL DATA**	**COMMENTS**
ELEV. Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



Annular Fill: Cement-Bentonite Grout - 5 bags TypeI I/II Portland Cement, 94 lbs/each

488.5 (32.2)

Annular Seal: bentonite pellets - 0.75 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

486.1 (34.6)

Filter: Unimin FilterSil - 1 Bag #1A, 50 lbs/each

484.1 (36.6)

Screen: 10 ft. pre-pack

474.1 (46.6)

Sump:0.40 ft.

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

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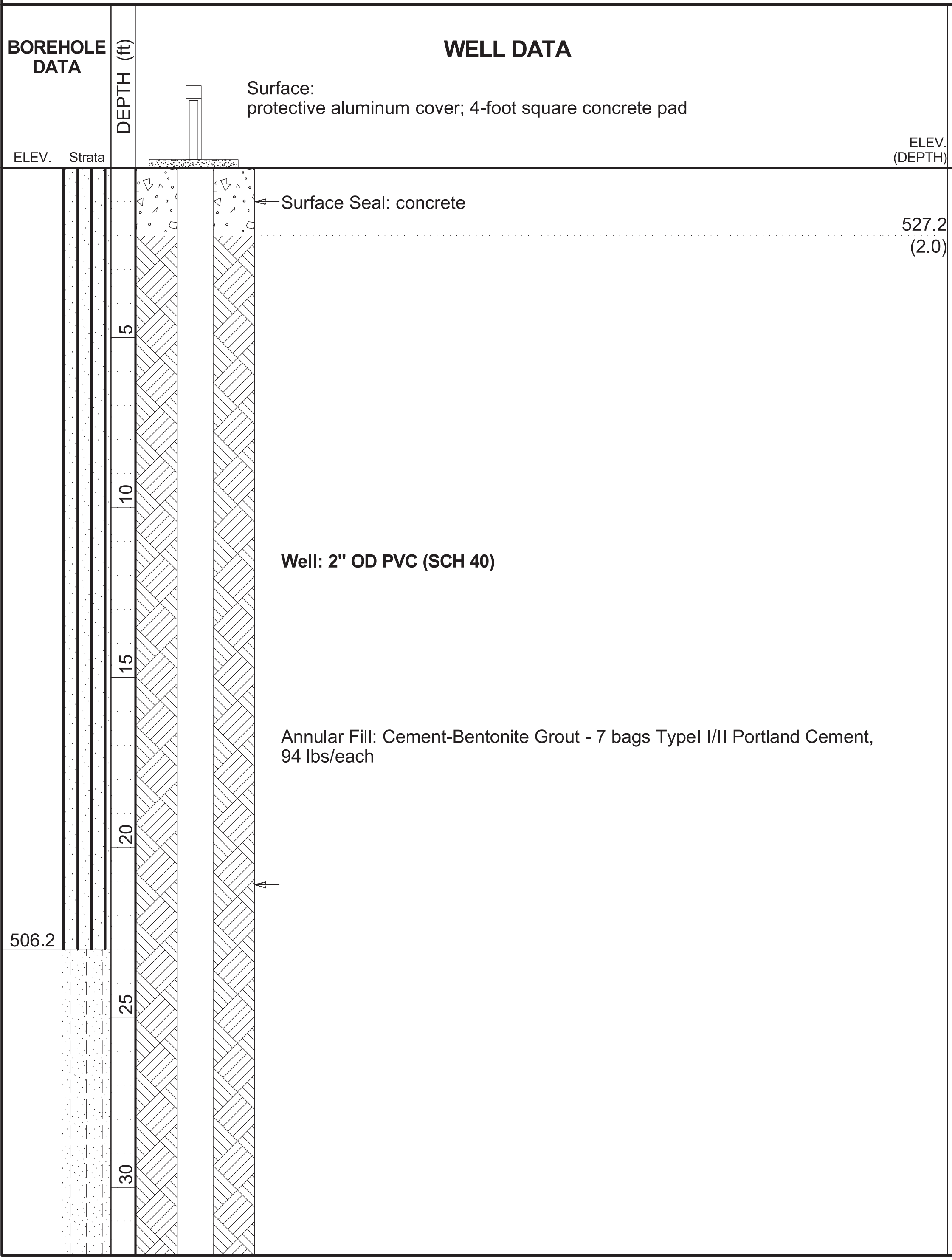
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 2/4/2015 **COMPLETED** 2/4/2015 **SURF. ELEV.** 529.2 **COORDINATES:** N:33.072916 E:-83.822737
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 54.8 ft. **GROUND WATER DEPTH: DURING** 43.15 ft. **COMP.** 43.15 ft. **DELAYED** 42.11 ft. after 24 hrs.
NOTES

BOREHOLE DATA	**DEPTH (ft)**	**WELL DATA**	**COMMENTS**



Surface:
protective aluminum cover; 4-foot square concrete pad

Surface Seal: concrete

527.2
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 7 bags TypeI I/II Portland Cement, 94 lbs/each

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2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

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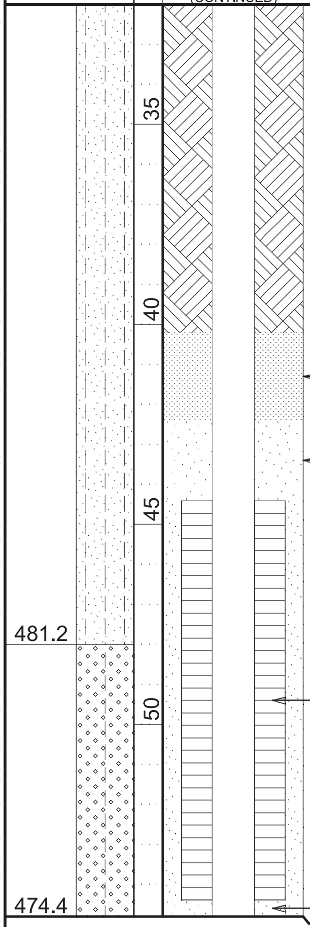
BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. Strata		Surface: protective aluminum cover; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



Annular Fill: Cement-Bentonite Grout - 7 bags TypeI I/II Portland Cement, 94 lbs/each

489.0
(40.2)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

486.8
(42.4)

Filter: Unimin FilterSil - 8 Bags #1A, 50 lbs/each

484.8
(44.4)

Screen: 10 ft. pre-pack

474.8

Sump:0.40 ft.

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EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

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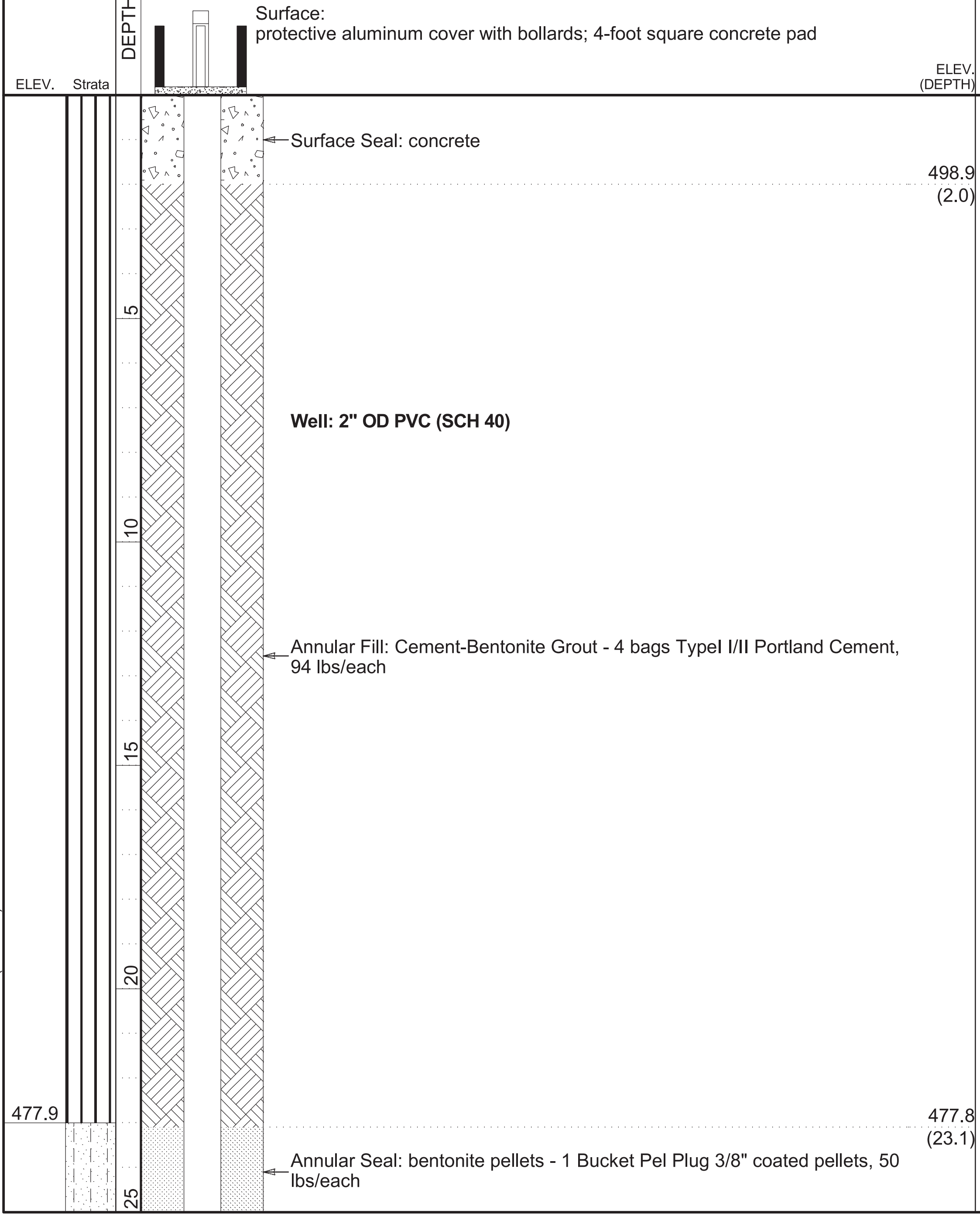
PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 2/10/2015 **COMPLETED** 2/10/2015 **SURF. ELEV.** 500.9 **COORDINATES:** N:33.073517 E:-83.826631
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 40 ft. **GROUND WATER DEPTH: DURING** 33.5 ft. **COMP.** 12.1 ft. **DELAYED** 12.25 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

498.9
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

477.8
(23.1)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

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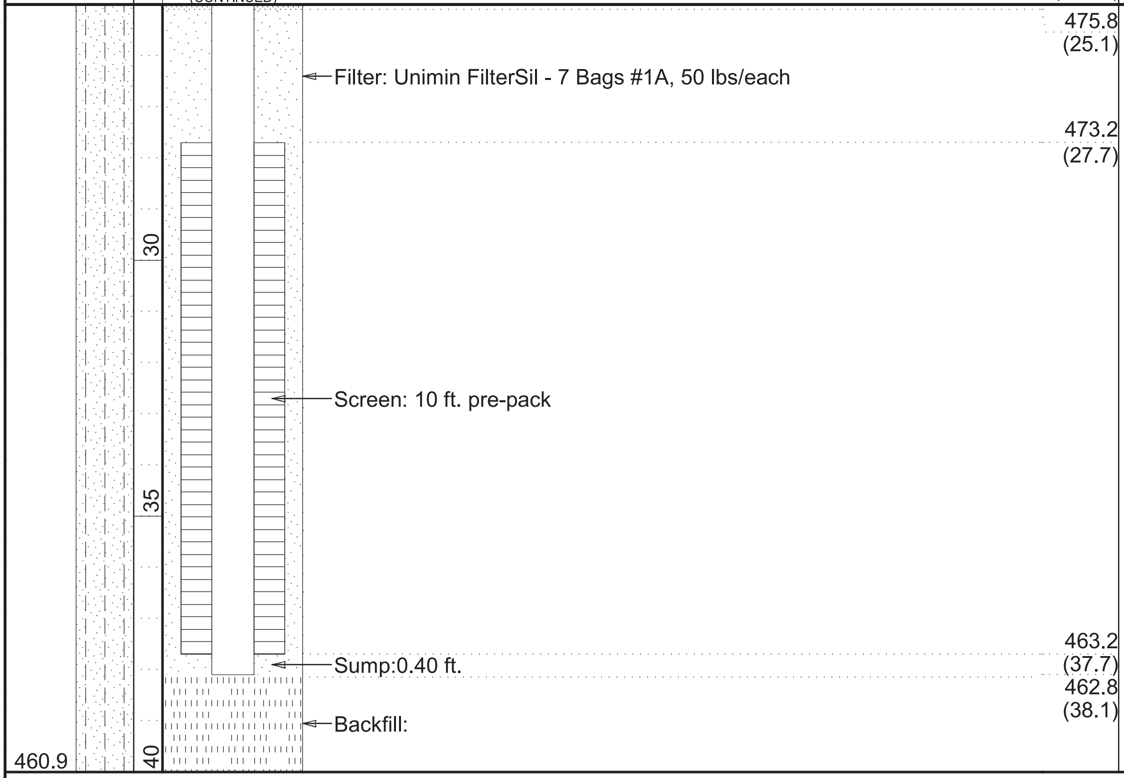
BOREHOLE DATA ELEV. Strata	DEPTH (ft)	WELL DATA	COMMENTS
		Surface: protective aluminum cover with bollards; 4-foot square concrete pad	

(CONTINUED)

ELEV.
(DEPTH)



475.8
(25.1)

Filter: Unimin FilterSil - 7 Bags #1A, 50 lbs/each

473.2
(27.7)

Screen: 10 ft. pre-pack

463.2
(37.7)

Sump:0.40 ft.

462.8
(38.1)

Backfill:

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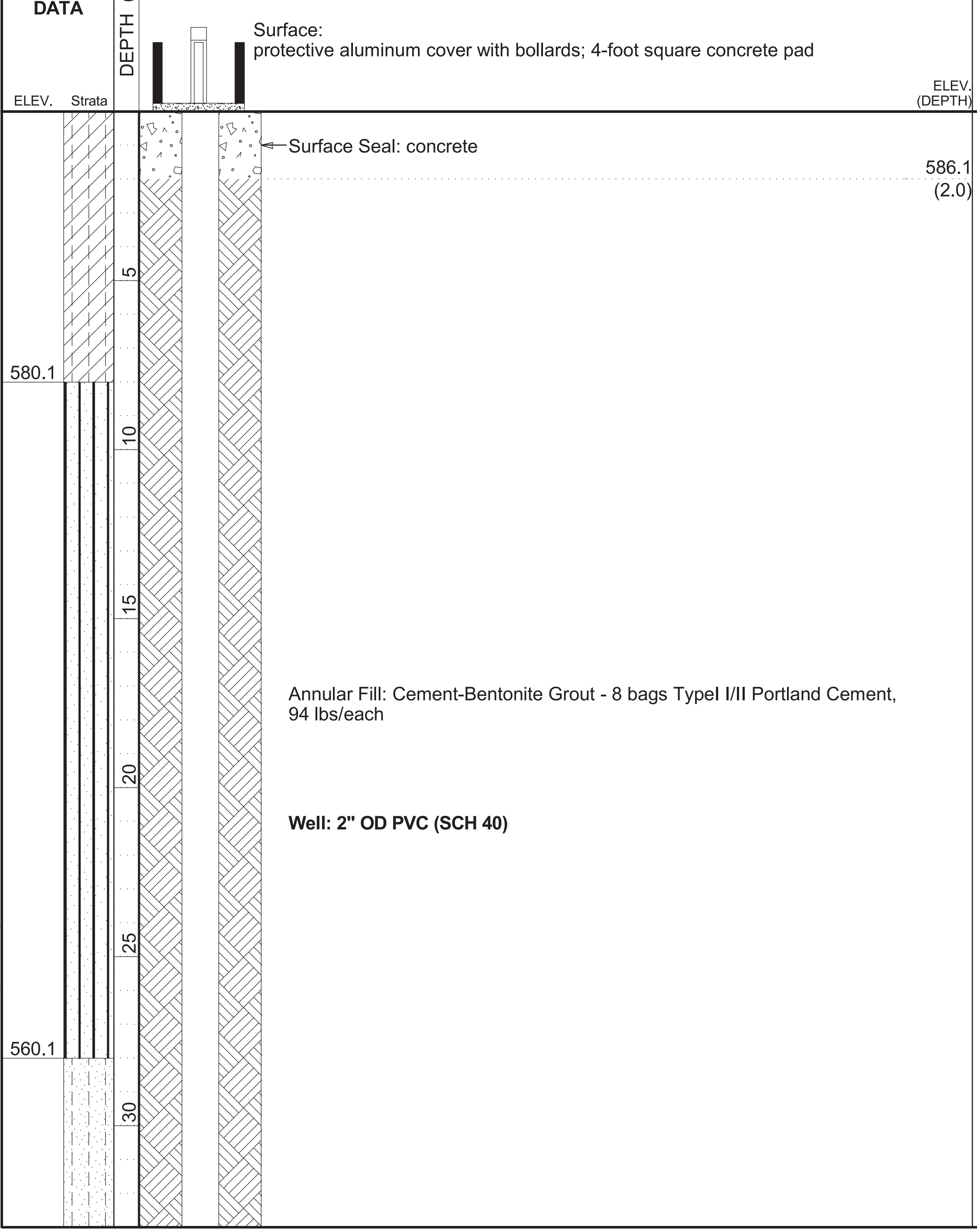
PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 2/12/2015 **COMPLETED** 2/17/2015 **SURF. ELEV.** 588.1 **COORDINATES:** N:33.076579 E:-83.829348
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 95.8 ft. **GROUND WATER DEPTH: DURING** 38.5 ft. **COMP.** 37.5 ft. **DELAYED** 37.3 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each

Well: 2" OD PVC (SCH 40)

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RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation

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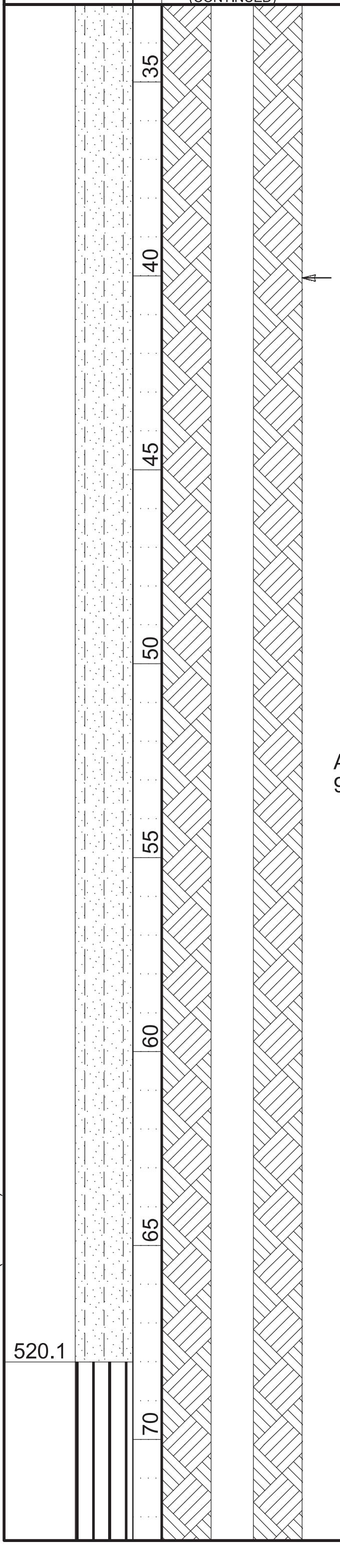
BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. Strata (CONTINUED) ELEV. (DEPTH)



Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each

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EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

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PROJECT Piezometer Installation

LOCATION Plant Scherer

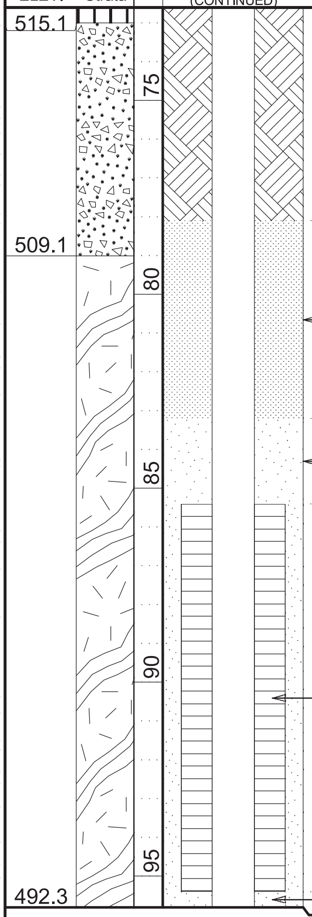
BOREHOLE DATA

WELL DATA

COMMENTS

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

(CONTINUED)



Well data	ELEV. (DEPTH)
Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each	510.0 (78.1)
Annular Seal: bentonite pellets - 0.75 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each	504.9 (83.2)
Filter: Unimin FilterSil - 1 Bag #1A, 50 lbs/each	502.7 (85.4)
Screen: 10 ft. pre-pack	492.7
Sump:0.40 ft.	

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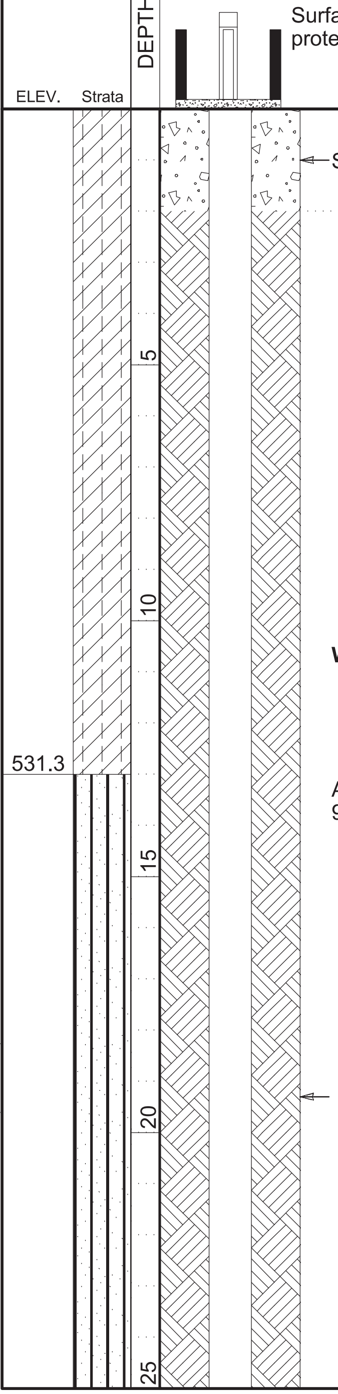
DATE STARTED 2/11/2015 **COMPLETED** 2/11/2015 **SURF. ELEV.** 544.3 **COORDINATES:** N:33.076567 E:-83.829374
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 50.9 ft. **GROUND WATER DEPTH: DURING** 35 ft. **COMP.** 37.3 ft. **DELAYED** 37.2 ft. after 24 hrs.
NOTES

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. (DEPTH)

Surface Seal: concrete

542.3 (2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 6 bags TypeI I/II Portland Cement, 94 lbs/each

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2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

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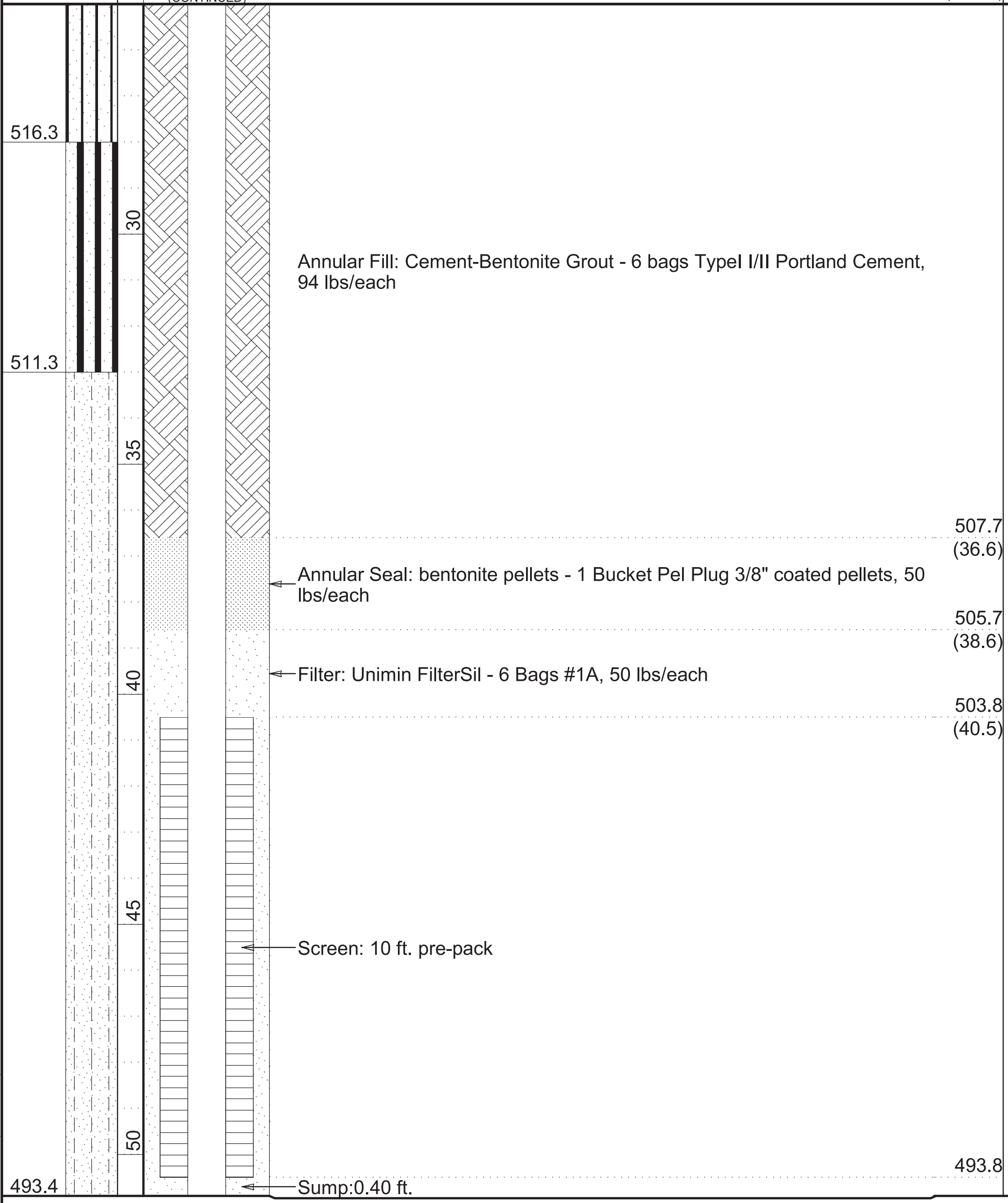
PROJECT Piezometer Installation

LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad ELEV. (DEPTH)	

(CONTINUED)



Annular Fill: Cement-Bentonite Grout - 6 bags TypeI I/II Portland Cement, 94 lbs/each

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

Filter: Unimin FilterSil - 6 Bags #1A, 50 lbs/each

Screen: 10 ft. pre-pack

Sump:0.40 ft.

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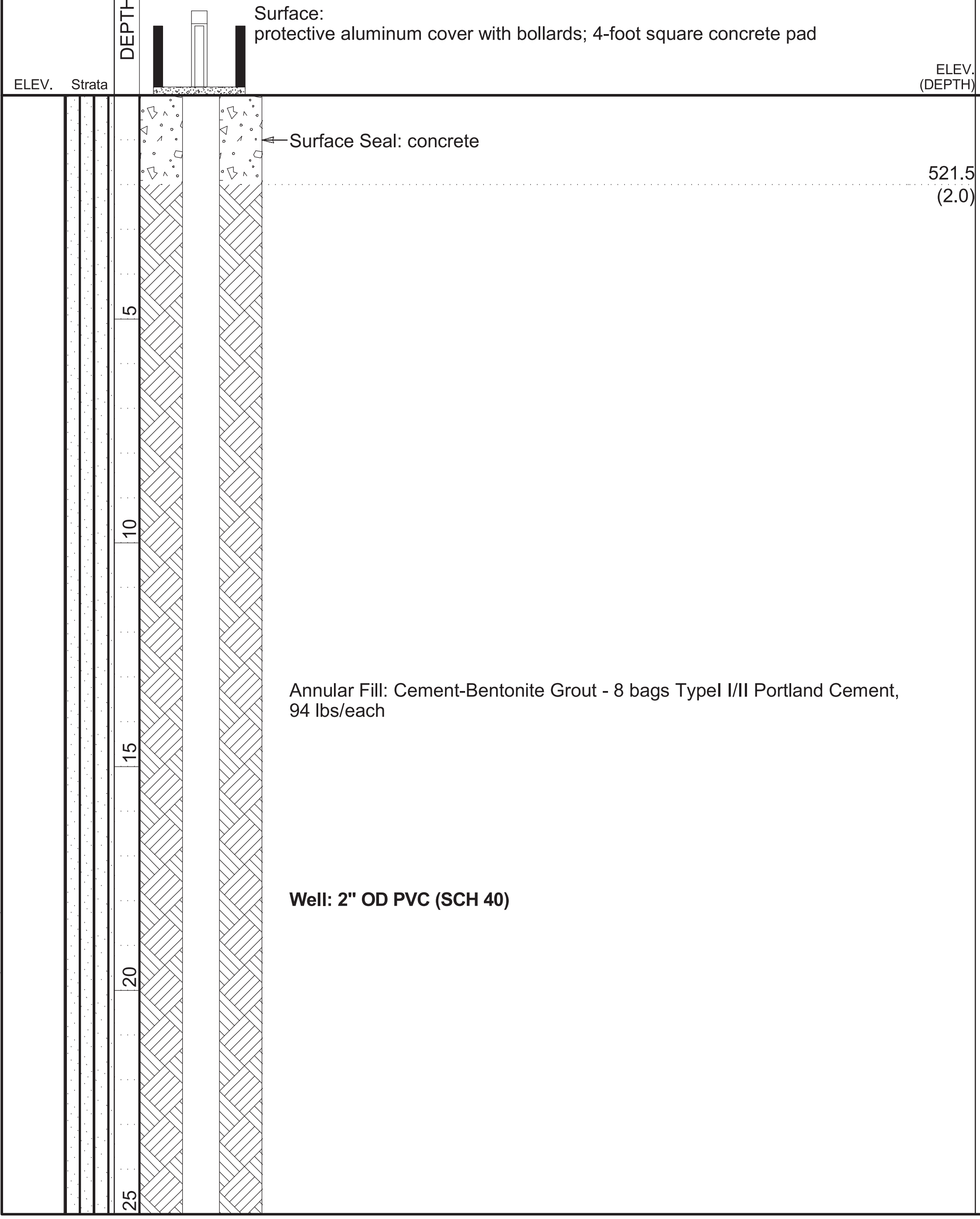
PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 2/18/2015 **COMPLETED** 2/19/2015 **SURF. ELEV.** 523.5 **COORDINATES:** N:33.080216 E:-83.826216
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 80.2 ft. **GROUND WATER DEPTH: DURING** 28.5 ft. **COMP.** 24.6 ft. **DELAYED** 24.41 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

521.5
(2.0)

Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each

Well: 2" OD PVC (SCH 40)

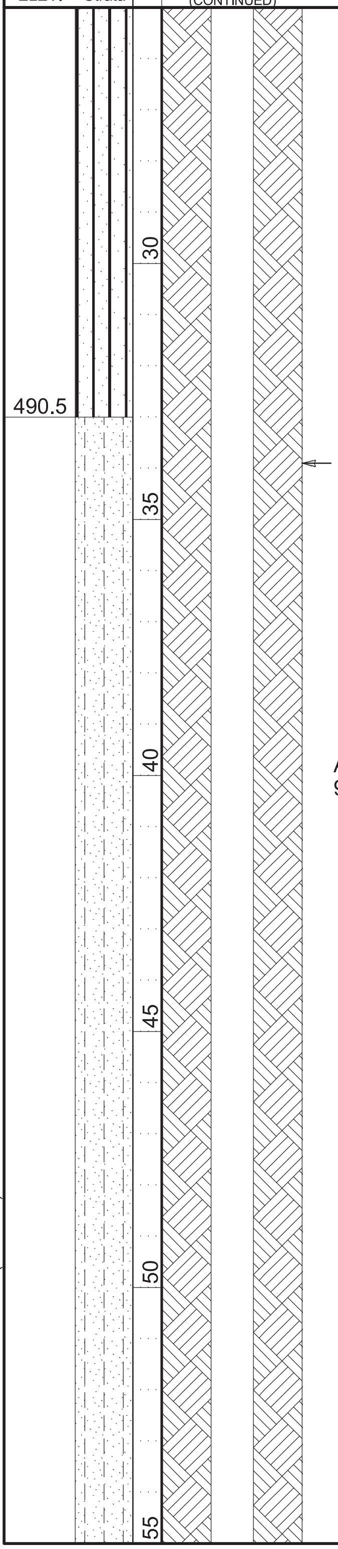
(Continued Next Page)

RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each

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RECORD OF WELL CONSTRUCTION

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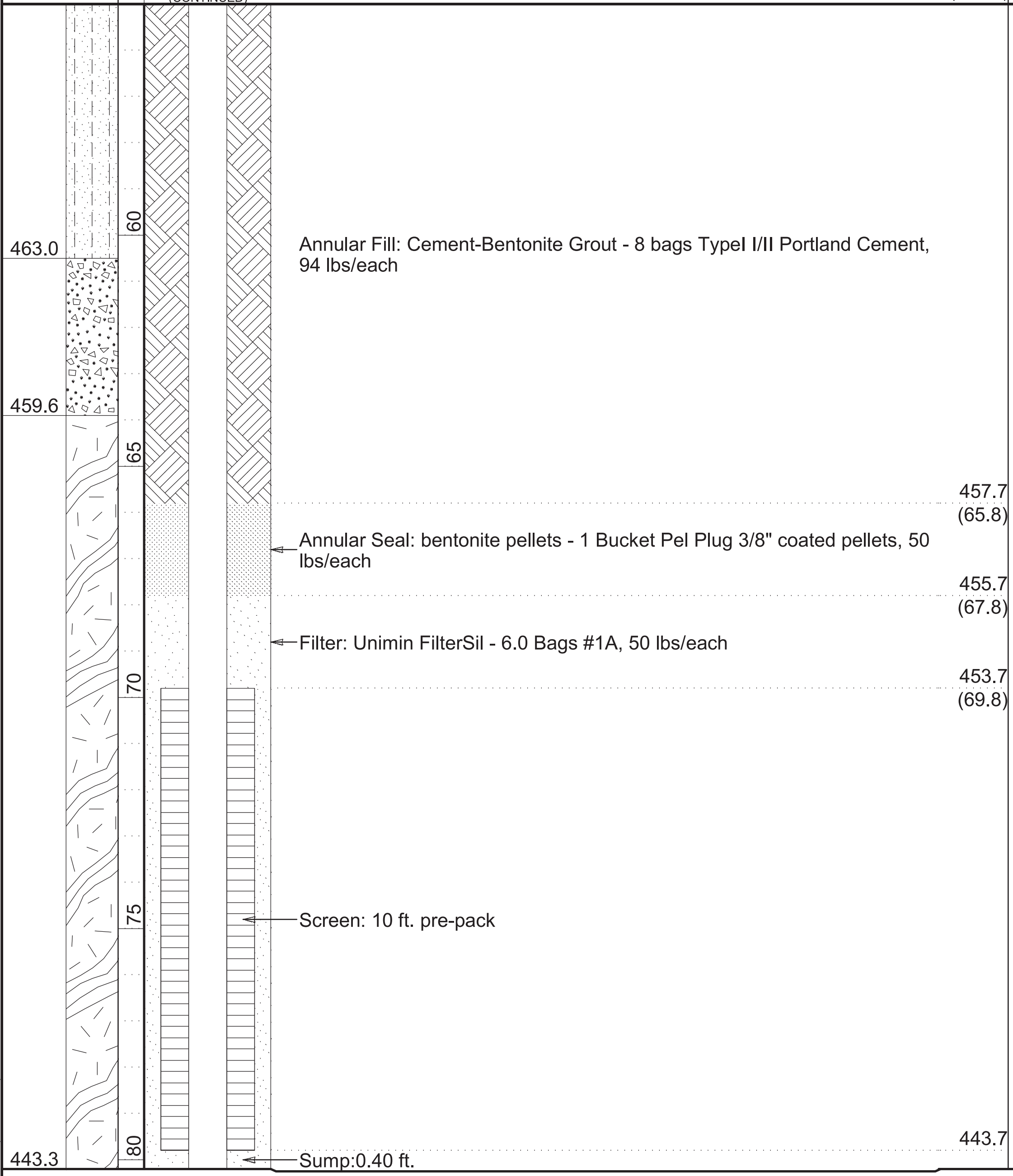
BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. / Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

Filter: Unimin FilterSil - 6.0 Bags #1A, 50 lbs/each

Screen: 10 ft. pre-pack

Sump:0.40 ft.

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

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PROJECT Piezometer Installation
LOCATION Plant Scherer

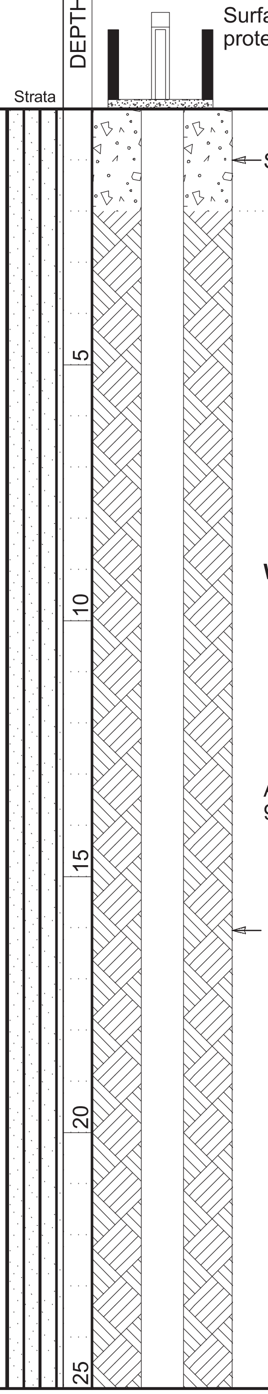
DATE STARTED 2/17/2015 **COMPLETED** 2/18/2015 **SURF. ELEV.** 523.4 **COORDINATES:** N:33.080196 E:-83.826235
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** B. Smelser **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 45 ft. **GROUND WATER DEPTH: DURING** 33.5 ft. **COMP.** 25.9 ft. **DELAYED** 25.5 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS

ELEV. Strata

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. (DEPTH)



Surface Seal: concrete

521.4
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

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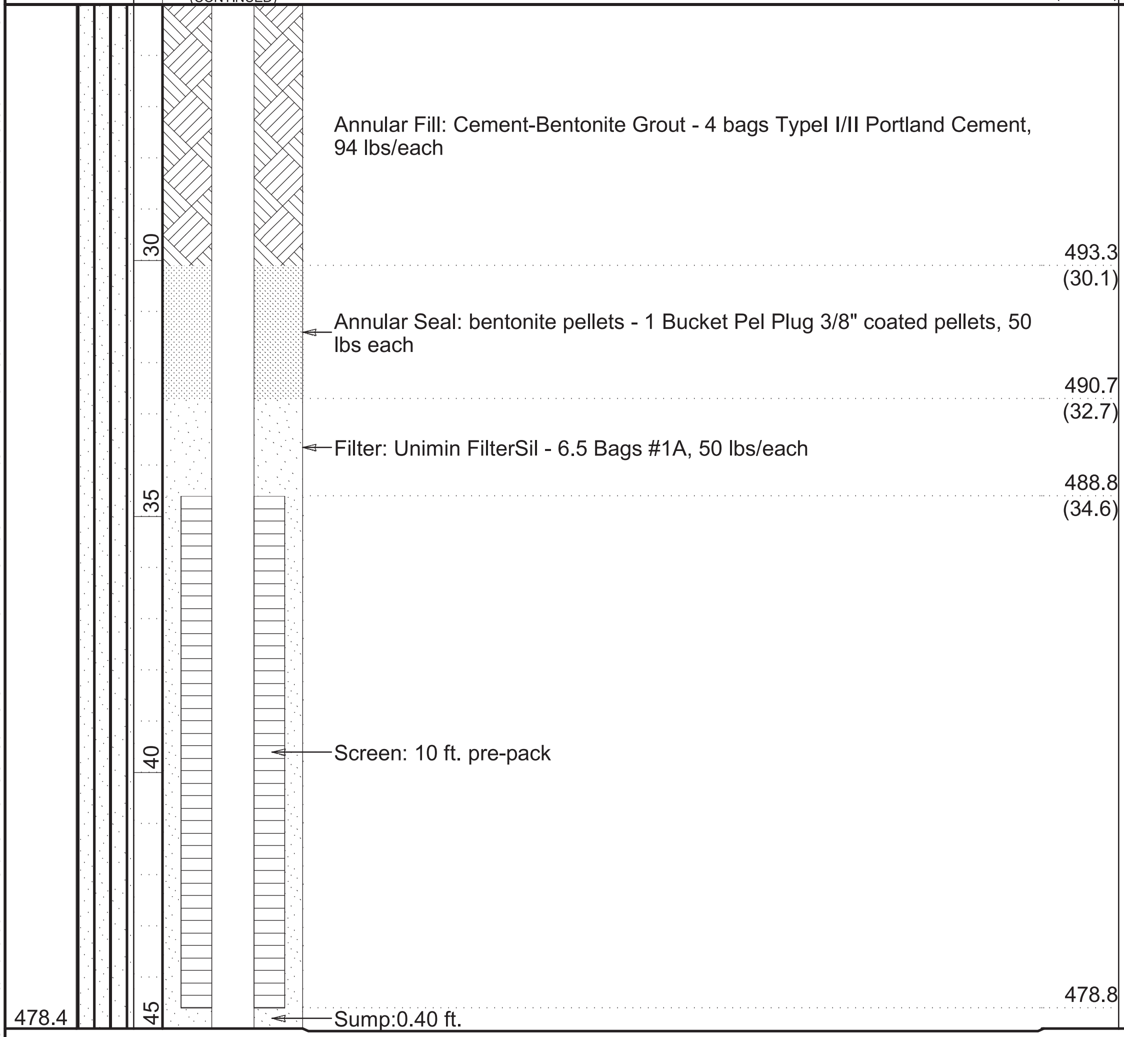
BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

493.3 (30.1)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs each

490.7 (32.7)

Filter: Unimin FilterSil - 6.5 Bags #1A, 50 lbs/each

488.8 (34.6)

Screen: 10 ft. pre-pack

478.8

Sump:0.40 ft.

WELL: PZ-10S
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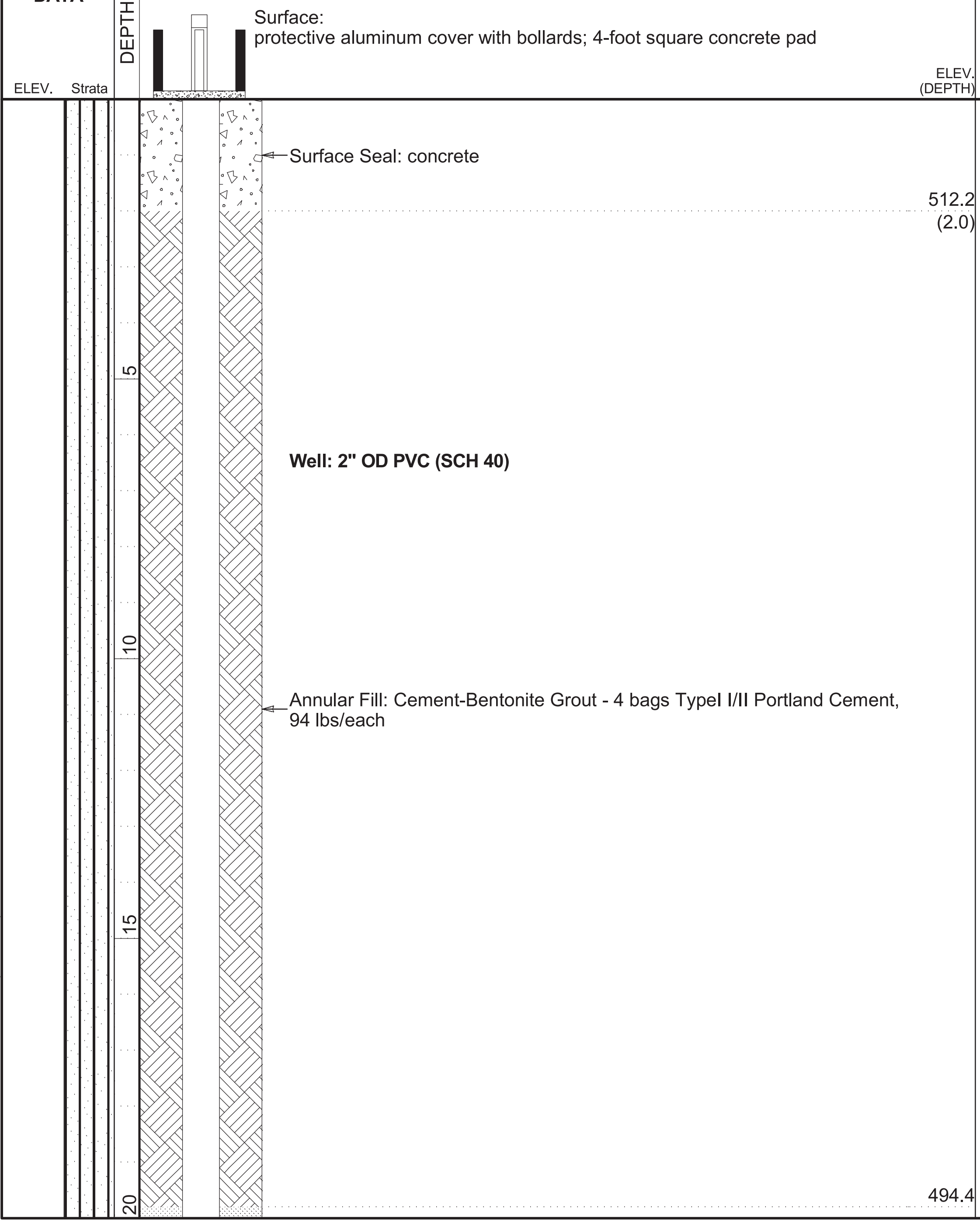
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 5/5/2015 **COMPLETED** 5/5/2015 **SURF. ELEV.** 514.2 **COORDINATES:** N:33.085087 E:-83.823239
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 34.9 ft. **GROUND WATER DEPTH: DURING** 23.5 ft. **COMP.** 19.3 ft. **DELAYED** 17.1 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

512.2 (2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

494.4

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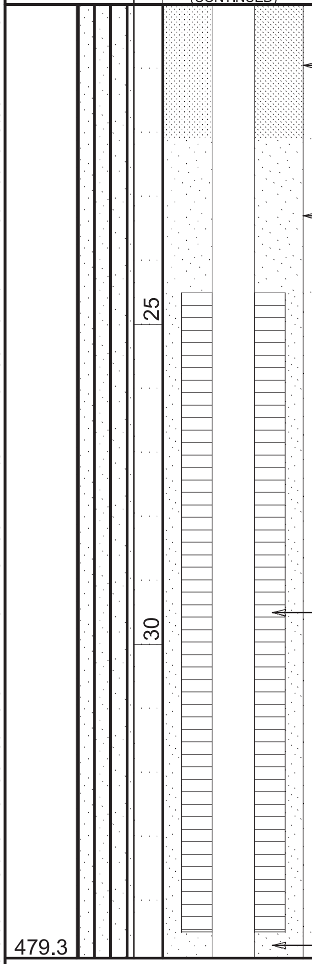
PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



(19.8)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

492.1
(22.1)

Filter: Unimin FilterSil - 6 Bags #1A, 50 lbs/each

489.7
(24.5)

Screen: 10 ft. pre-pack

479.7
Sump:0.40 ft.
(34.5)

WELL: PZ-11S
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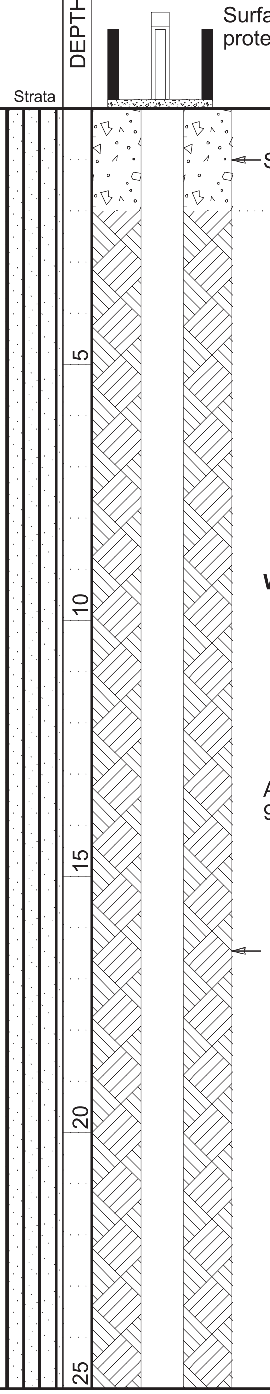
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 4/1/2015 **COMPLETED** 4/6/2015 **SURF. ELEV.** 526.1 **COORDINATES:** N:33.087361 E:-83.819968
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 45.9 ft. **GROUND WATER DEPTH: DURING** 37.3 ft. **COMP.** 34.3 ft. **DELAYED** 33.2 ft. after 24 hrs.
NOTES

BOREHOLE DATA (ELEV. / Strata)	DEPTH (ft)	**WELL DATA**	ELEV. (DEPTH)	**COMMENTS**



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

524.1
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each

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WELL: PZ-11S
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RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
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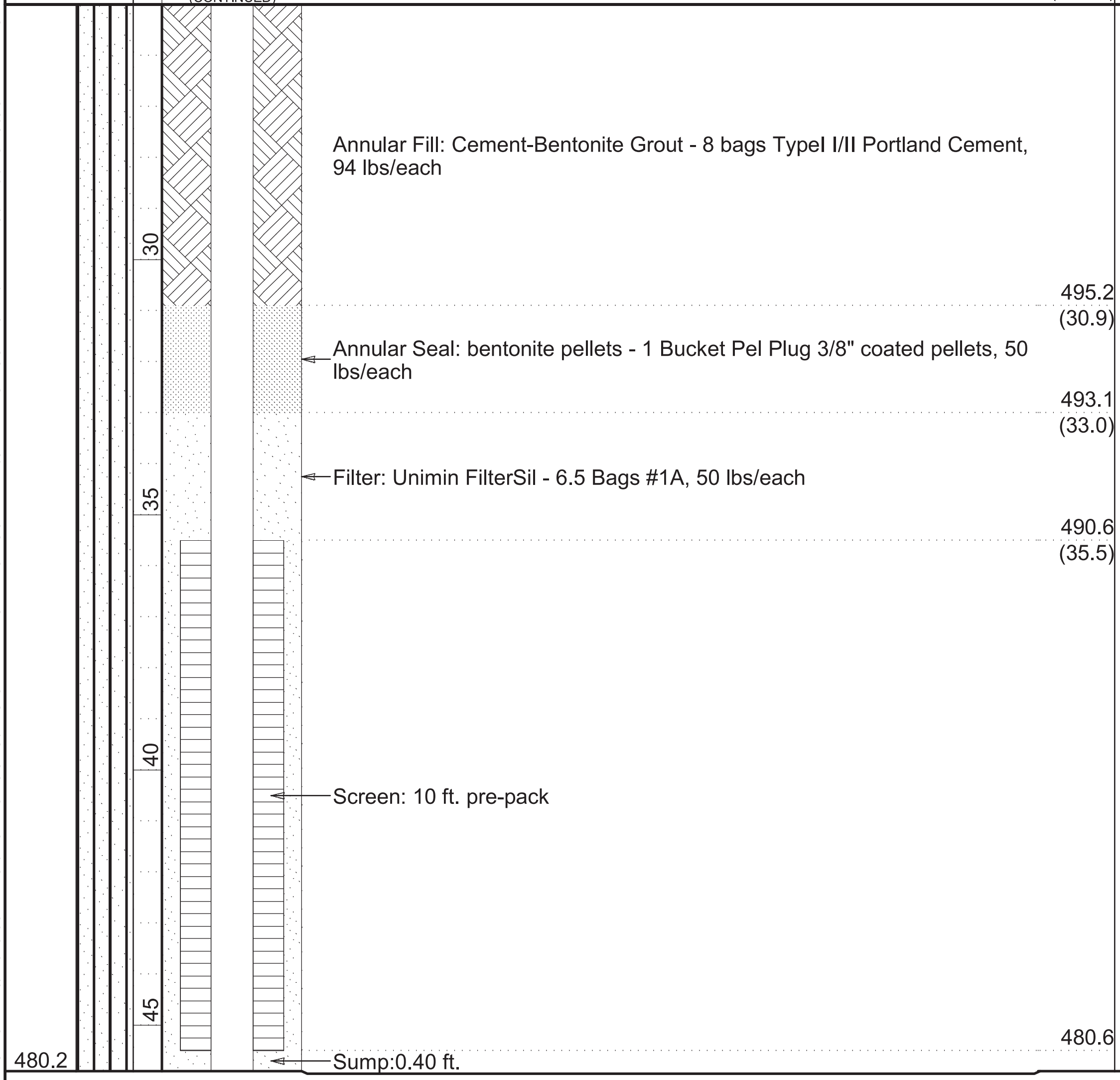
BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

ELEV. Strata

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

(CONTINUED)

ELEV. (DEPTH)



Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each

495.2 (30.9)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

493.1 (33.0)

Filter: Unimin FilterSil - 6.5 Bags #1A, 50 lbs/each

490.6 (35.5)

Screen: 10 ft. pre-pack

480.6

Sump:0.40 ft.

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

RECORD OF
WELL CONSTRUCTION

WELL: PZ-12S
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ECS38467

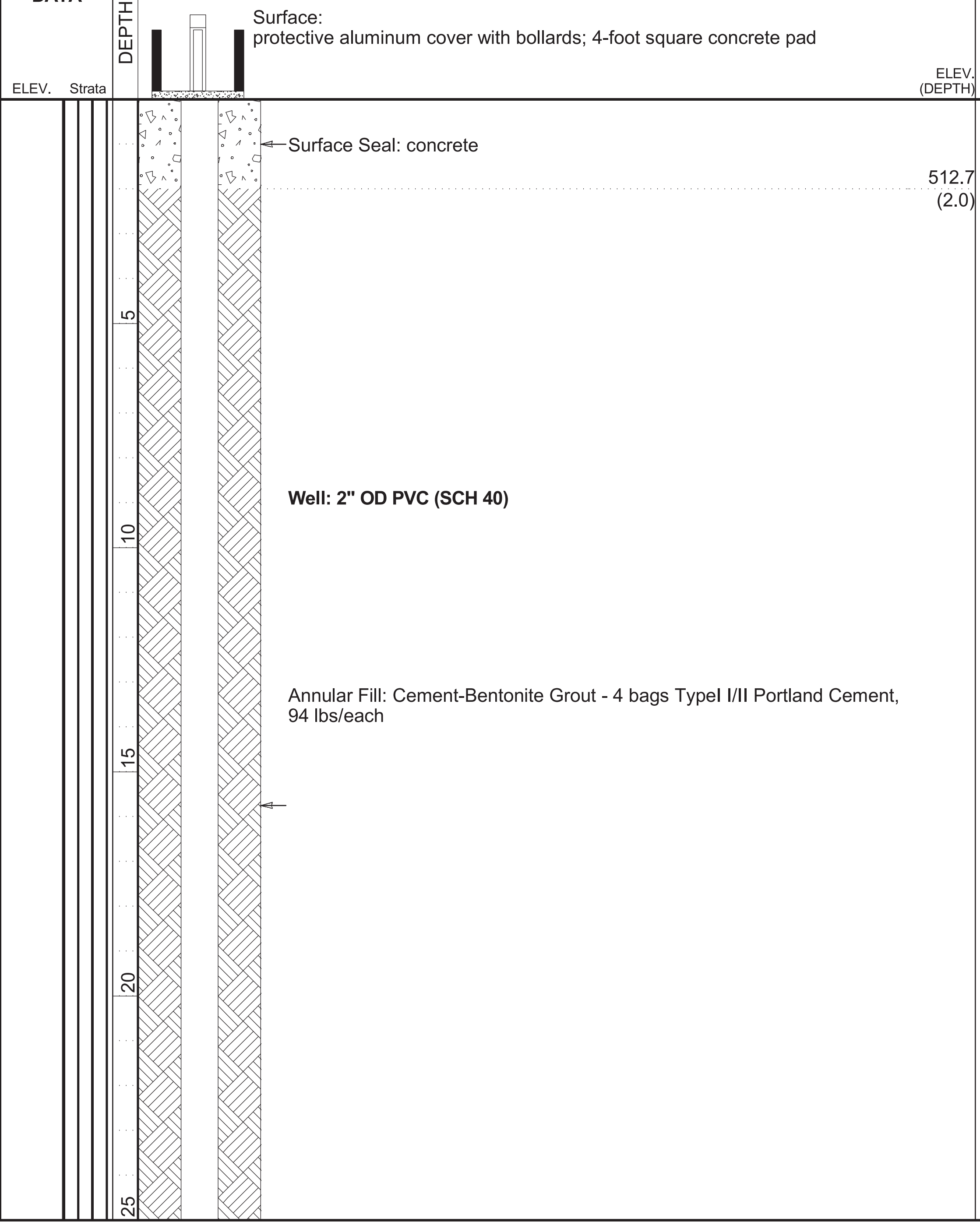
SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/31/2015 **COMPLETED** 4/1/2015 **SURF. ELEV.** 514.7 **COORDINATES:** N:33.086024 E:-83.817193
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 44.4 ft. **GROUND WATER DEPTH: DURING** 33.5 ft. **COMP.** 26.2 ft. **DELAYED** 25.1 ft. after 24 hrs.
NOTES

BOREHOLE DATA			WELL DATA	COMMENTS
ELEV.	Strata	DEPTH (ft)	ELEV. (DEPTH)	



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

512.7
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

(Continued Next Page)

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

WELL: PZ-12S
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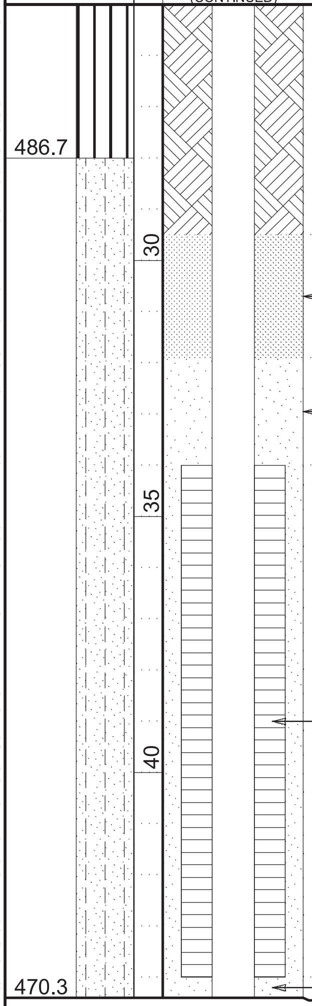
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. Strata (CONTINUED) ELEV. (DEPTH)



Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

485.2
(29.5)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs each

482.8
(31.9)

Filter: Unimin FilterSil - 5.5 Bags #1A, 50 lbs/each

480.7
(34.0)

Screen: 10 ft. pre-pack

470.7

Sump:0.40 ft.

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

WELL: PZ-13S
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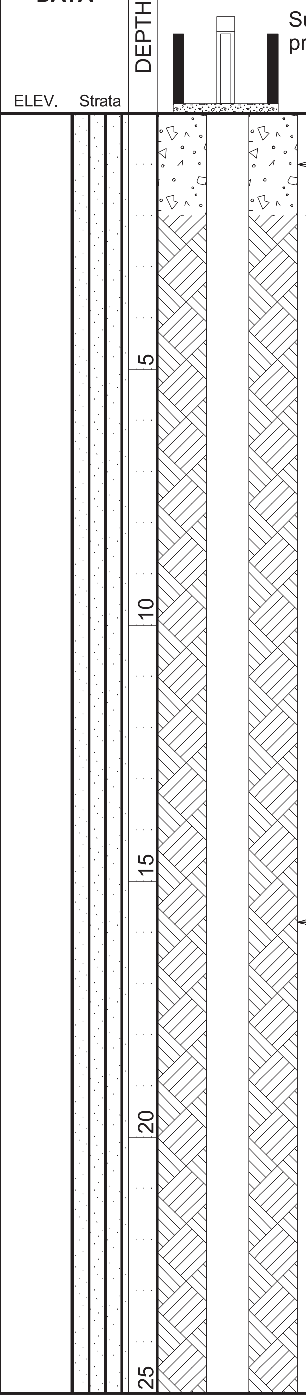
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/31/2015 **COMPLETED** 4/1/2015 **SURF. ELEV.** 517.4 **COORDINATES:** N:33.084015 E:-83.815212
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 45.3 ft. **GROUND WATER DEPTH: DURING** 33.5 ft. **COMP.** 28.6 ft. **DELAYED** 26.5 ft. after 24 hrs.
NOTES

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV.
(DEPTH)

Surface Seal: concrete

515.4
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

(Continued Next Page)

WELL: PZ-13S
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RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA
ELEV. Strata

DEPTH (ft)

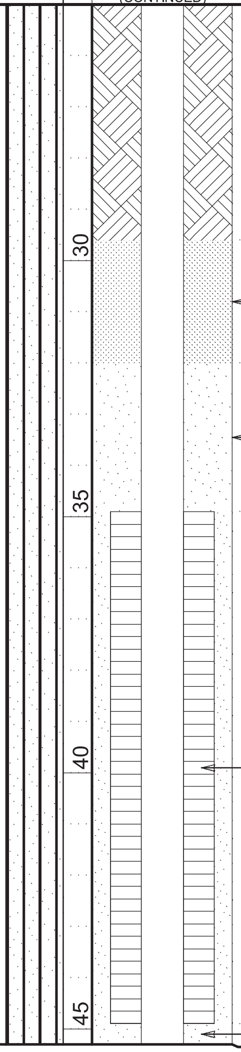
WELL DATA

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

(CONTINUED)

ELEV.
(DEPTH)

COMMENTS



Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

487.8
(29.6)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

485.4
(32.0)

Filter: Unimin FilterSil - 6.5 Bags #1A, 50 lbs/each

482.5
(34.9)

Screen: 10 ft. pre-pack

472.5

Sump:0.40 ft.

472.1

WELL: PZ-14I
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SOUTHERN COMPANY

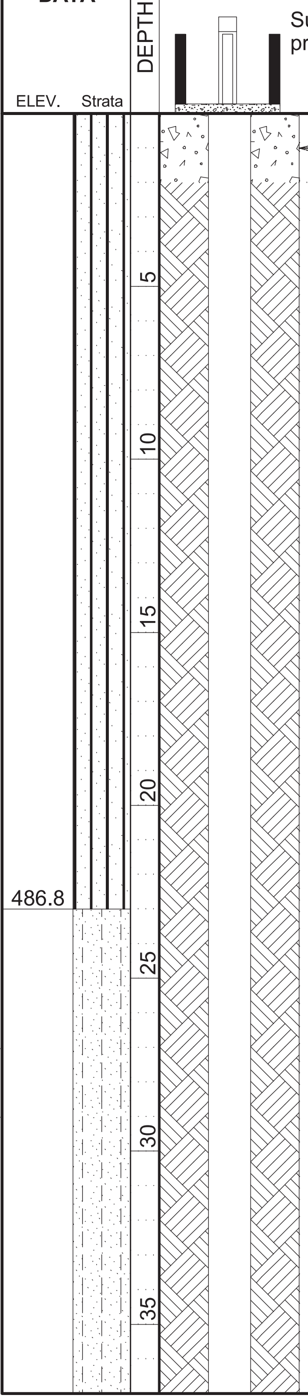
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/24/2015 **COMPLETED** 3/25/2015 **SURF. ELEV.** 509.8 **COORDINATES:** N:33.083759 E:-83.813273
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BOREHOLE DEPTH 95.2 ft. **GROUND WATER DEPTH: DURING** 28.5 ft. **COMP.** 18.5 ft. **DELAYED** 28.3 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. (DEPTH)

Surface Seal: concrete

507.8 (2.0)

Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each
Well: 2" OD PVC (SCH 40)

(Continued Next Page)

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

WELL: PZ-14I
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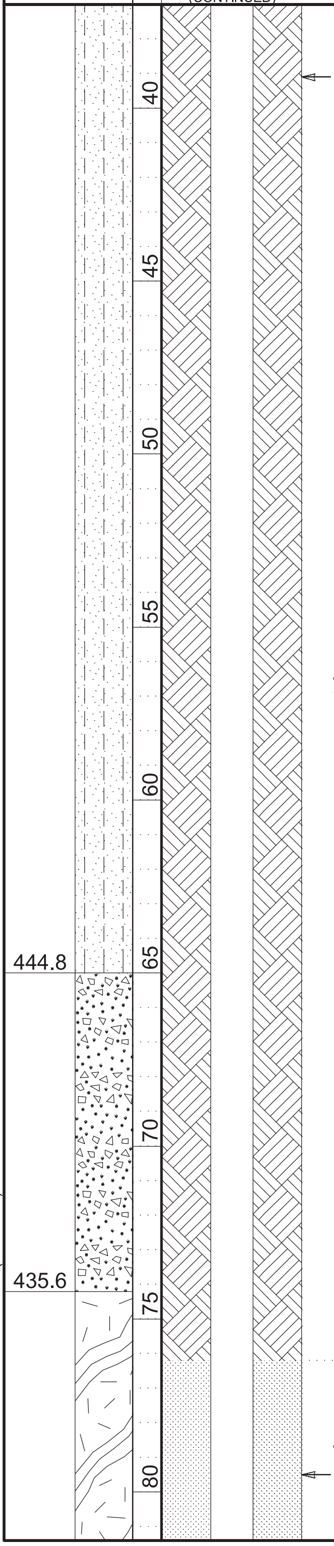
PROJECT Piezometer Installation

LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS
ELEV. Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each

433.6
(76.2)

Annular Seal: bentonite pellets - 0.5 Bucket Pel Plug 3/8" coated pellets, 50 lbs each

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2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation

LOCATION Plant Scherer

BOREHOLE DATA

ELEV. Strata

DEPTH (ft)

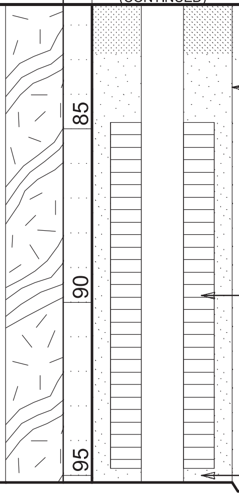
WELL DATA

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

(CONTINUED)

ELEV. (DEPTH)

COMMENTS



Annular Seal: bentonite pellets - 0.5 Bucket Pel Plug 3/8" coated pellets, 50 lbs each — 427.0 (82.8)

Filter: Unimin FilterSil - 1.5 Bags #1A, 50 lbs/each — 425.0 (84.8)

Screen: 10 ft. pre-pack

415.0

Sump:0.40 ft.

414.6

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

WELL: PZ-14S
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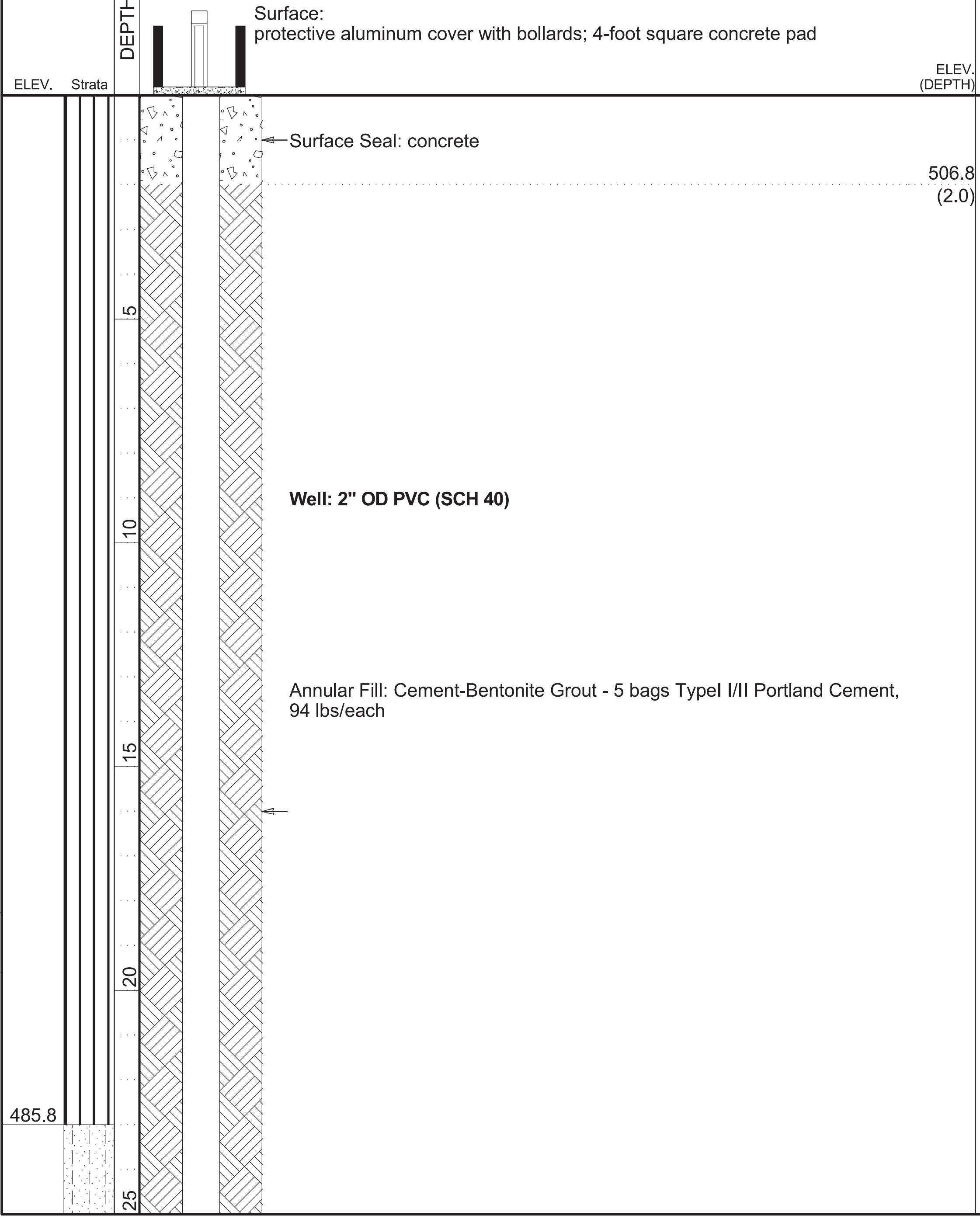
PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/25/2015 **COMPLETED** 3/26/2015 **SURF. ELEV.** 508.8 **COORDINATES:** N:33.083724 E:-83.813279
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 44.9 ft. **GROUND WATER DEPTH: DURING** 28.5 ft. **COMP.** 28.8 ft. **DELAYED** 18.8 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

506.8
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 5 bags TypeI I/II Portland Cement, 94 lbs/each

(Continued Next Page)

RECORD OF WELL CONSTRUCTION

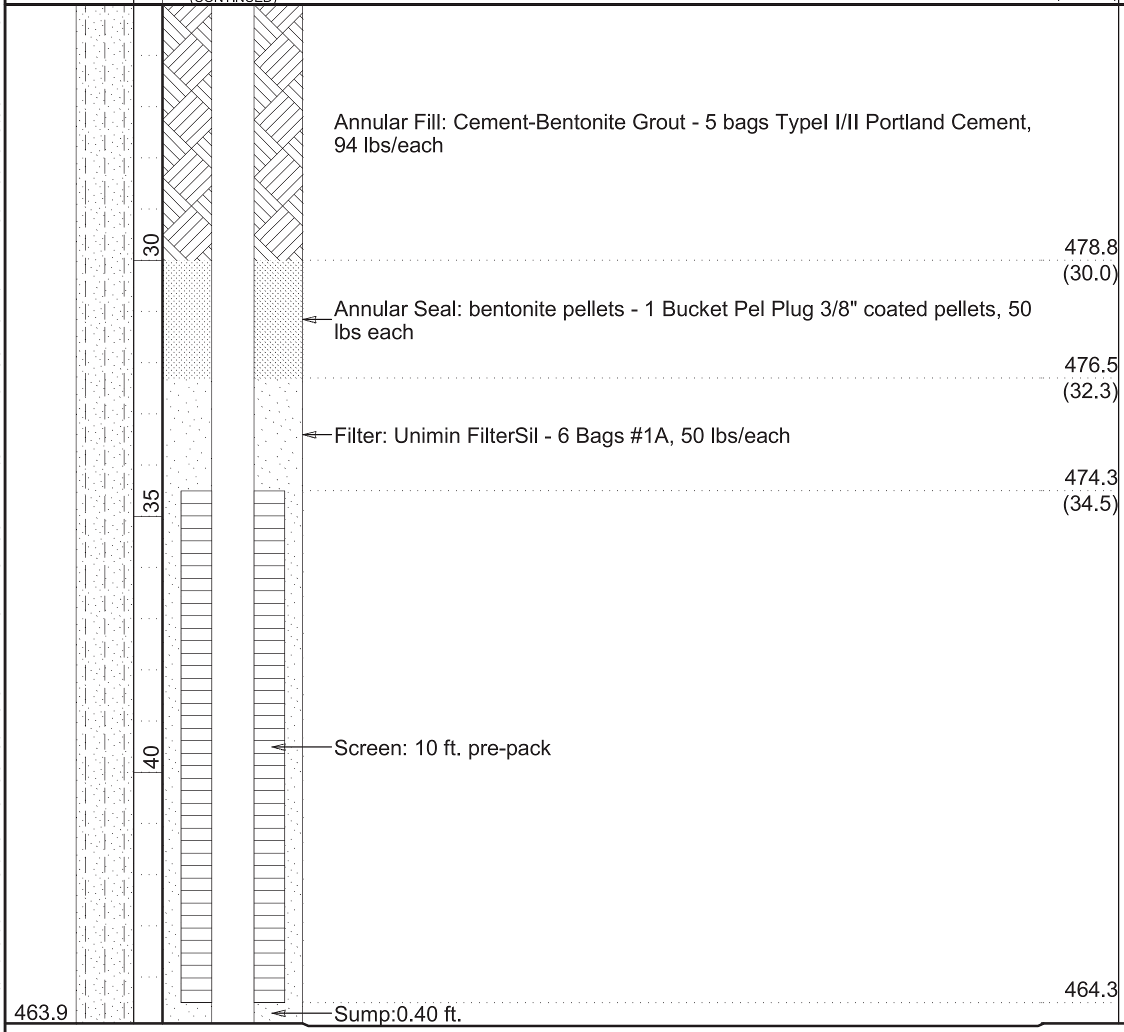
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. Strata (CONTINUED) ELEV. (DEPTH)



Annular Fill: Cement-Bentonite Grout - 5 bags TypeI I/II Portland Cement, 94 lbs/each

478.8 (30.0)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs each

476.5 (32.3)

Filter: Unimin FilterSil - 6 Bags #1A, 50 lbs/each

474.3 (34.5)

Screen: 10 ft. pre-pack

464.3

Sump:0.40 ft.

WELL: PZ-15S
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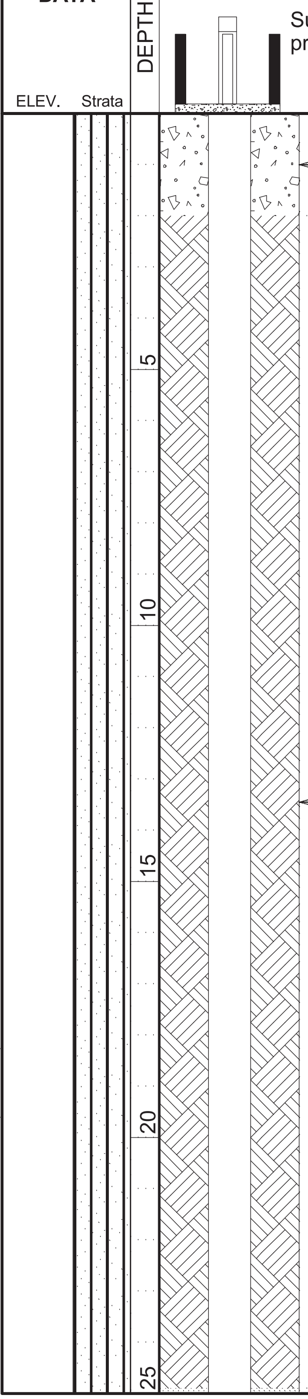
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 4/28/2015 **COMPLETED** 4/28/2015 **SURF. ELEV.** 496.1 **COORDINATES:** N:33.082710 E:-83.810871
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 40.1 ft. **GROUND WATER DEPTH: DURING** 23.5 ft. **COMP.** 19.6 ft. **DELAYED** 19.6 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. (DEPTH)

Surface Seal: concrete

494.1
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 6 bags Type I/II Portland Cement, 94 lbs/each

471.2

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2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

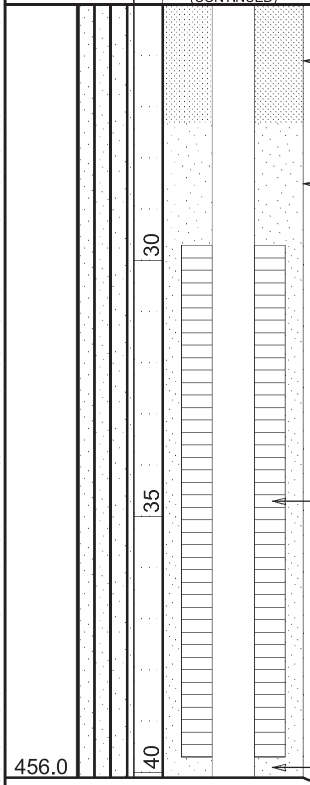
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA — ELEV. — Strata | DEPTH (ft) | **WELL DATA** (CONTINUED) — ELEV. (DEPTH) | **COMMENTS**

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad



(24.9)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

468.8
(27.3)

Filter: Unimin FilterSil - 6 Bags #1A, 50 lbs/each

466.4
(29.7)

Screen: 10 ft. pre-pack

456.4

Sump:0.40 ft.

SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

WELL: PZ-16S
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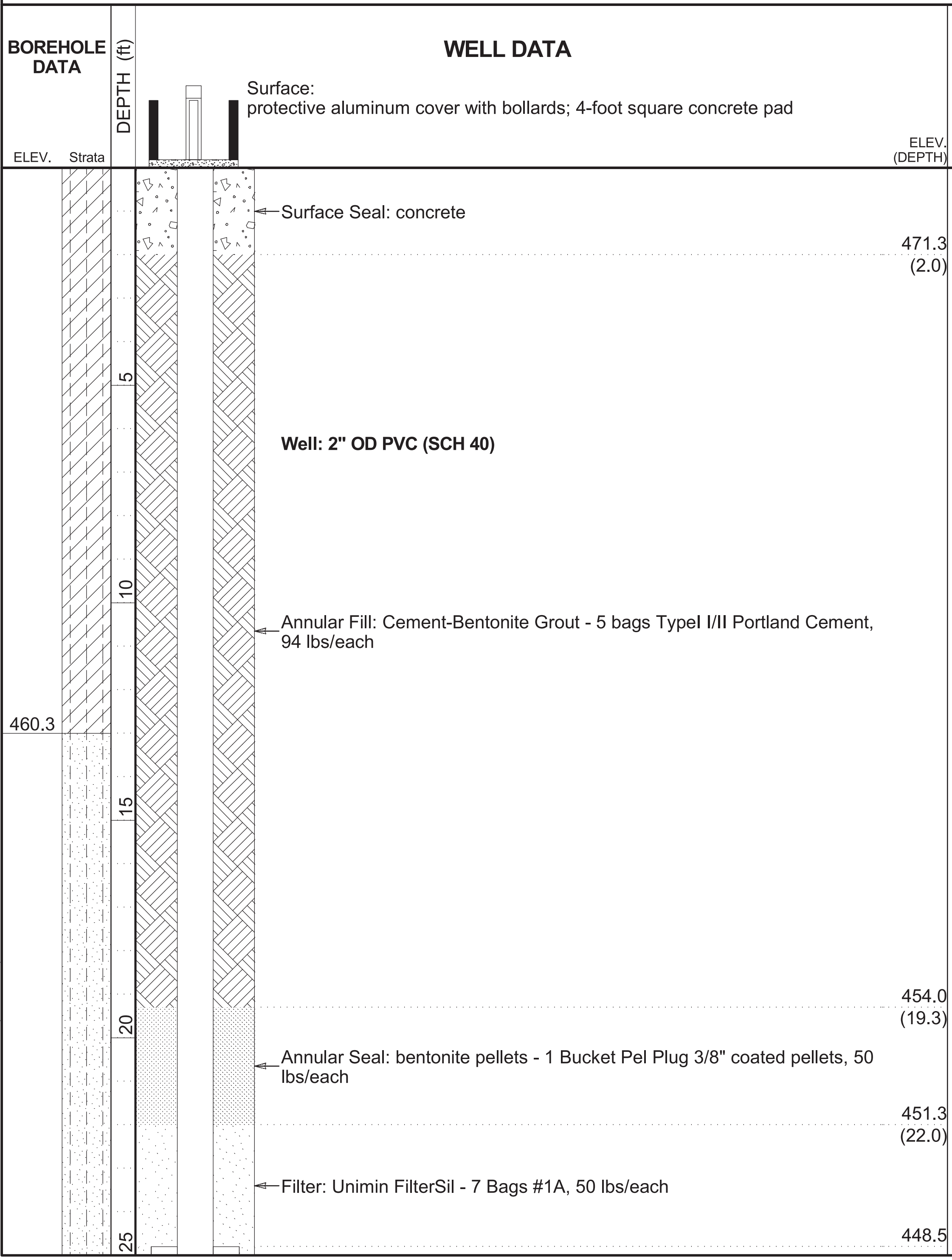
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 2/24/2015 **COMPLETED** 2/24/2015 **SURF. ELEV.** 473.3 **COORDINATES:** N:33.081272 E:-83.808363
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 35.3 ft. **GROUND WATER DEPTH: DURING** 18.5 ft. **COMP.** 9.91 ft. **DELAYED** 9.91 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

471.3 (2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 5 bags TypeI I/II Portland Cement, 94 lbs/each

454.0 (19.3)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

451.3 (22.0)

Filter: Unimin FilterSil - 7 Bags #1A, 50 lbs/each

448.5

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2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

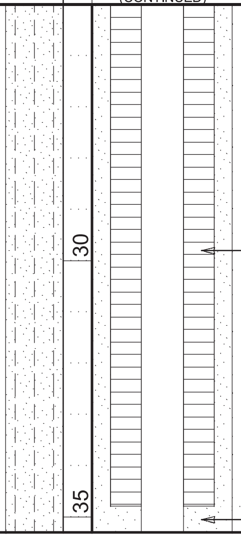
BOREHOLE DATA

WELL DATA

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

COMMENTS

ELEV.	Strata	DEPTH (ft)	(CONTINUED)	ELEV. (DEPTH)	COMMENTS
			Screen: 10 ft. pre-pack	(24.8)	
		30	Screen: 10 ft. pre-pack		
		35		438.5	
438.0			Sump:0.50 ft.	(34.8)	



SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

WELL: PZ-17I
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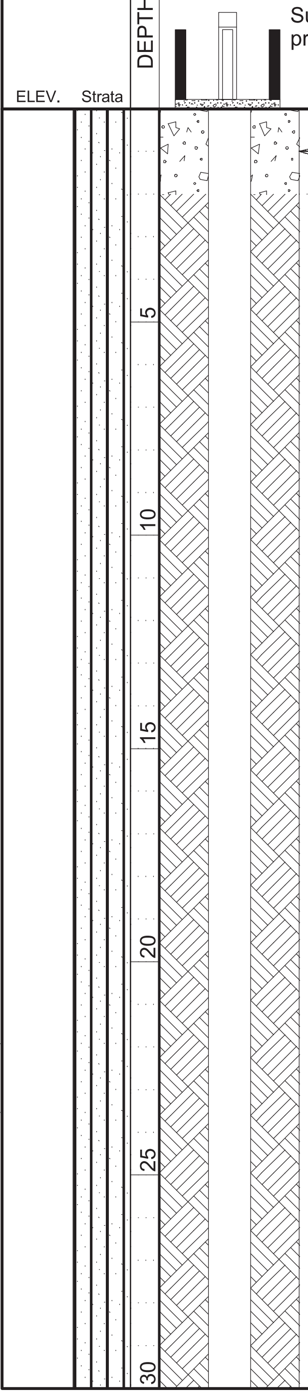
PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 2/26/2015 **COMPLETED** 2/27/2015 **SURF. ELEV.** 480.4 **COORDINATES:** N:33.079134 E:-83.805835
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** S .Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 97.3 ft. **GROUND WATER DEPTH: DURING** 23.5 ft. **COMP.** 28.51 ft. **DELAYED** 24.75 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV.
(DEPTH)

Surface Seal: concrete

478.4
(2.0)

Annular Fill: Cement-Bentonite Grout - 10 bags TypeI I/II Portland Cement, 94 lbs/each

Well: 2" OD PVC (SCH 40)

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RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

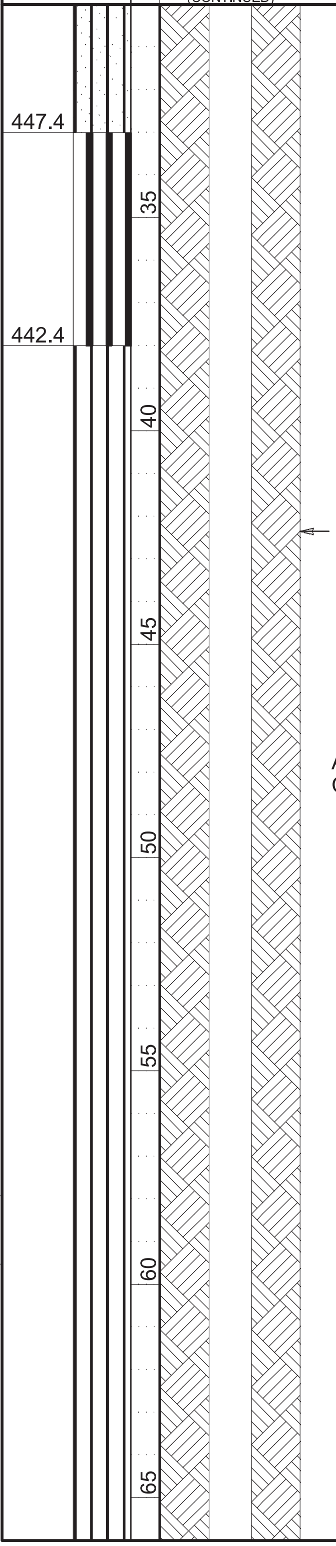
BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

ELEV. Strata

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. (DEPTH)

(CONTINUED)



Annular Fill: Cement-Bentonite Grout - 10 bags TypeI I/II Portland Cement, 94 lbs/each

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RECORD OF WELL CONSTRUCTION

WELL: PZ-17I
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PROJECT Piezometer Installation

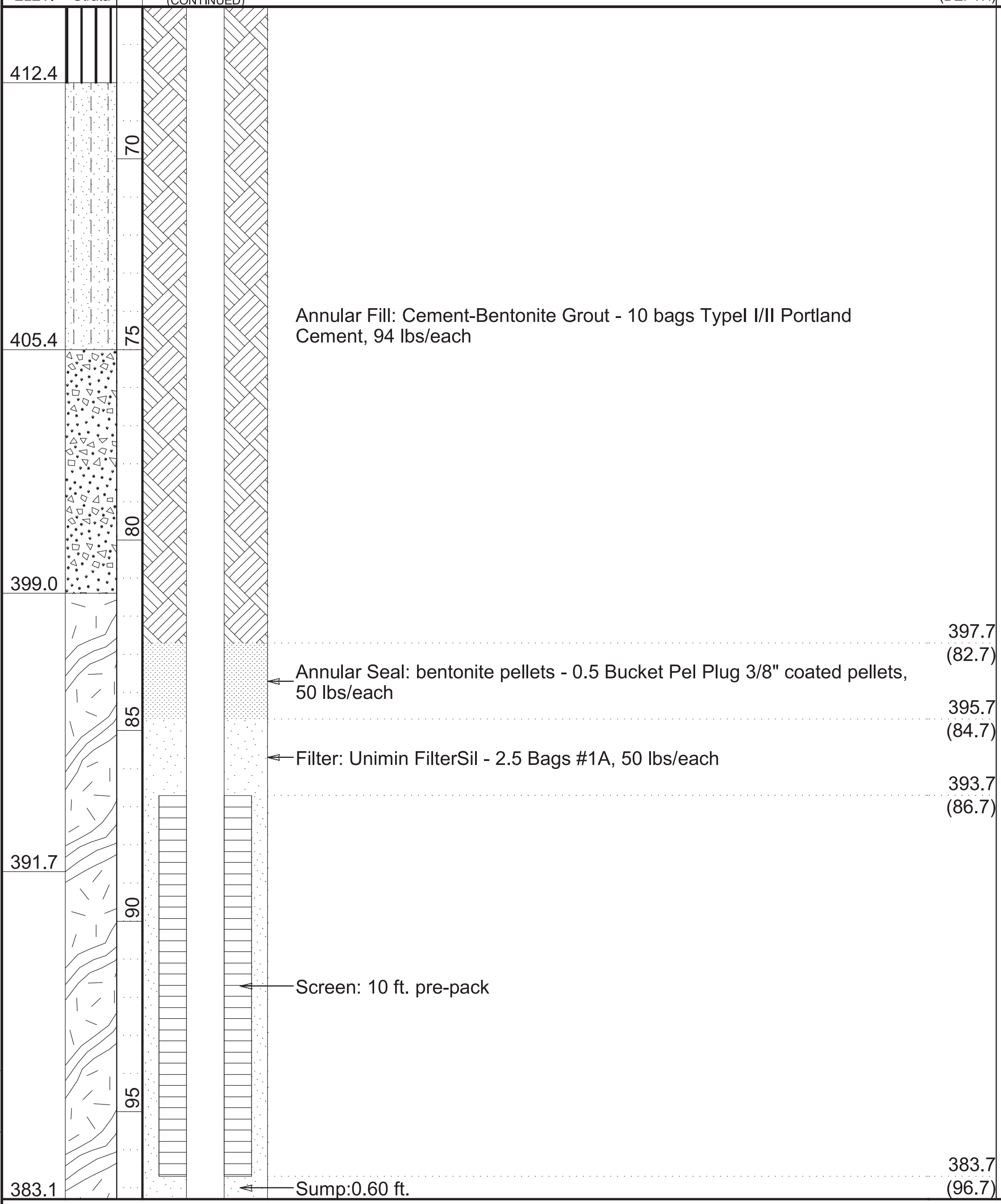
LOCATION Plant Scherer

BOREHOLE DATA

WELL DATA

COMMENTS

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad



Annular Fill: Cement-Bentonite Grout - 10 bags TypeI I/II Portland Cement, 94 lbs/each

Annular Seal: bentonite pellets - 0.5 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

Filter: Unimin FilterSil - 2.5 Bags #1A, 50 lbs/each

Screen: 10 ft. pre-pack

Sump:0.60 ft.

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

WELL: PZ-17S
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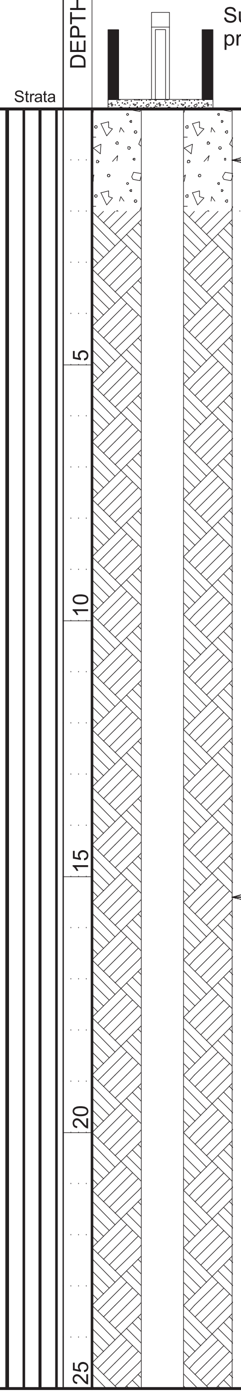
PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 2/25/2015 **COMPLETED** 2/26/2015 **SURF. ELEV.** 480.3 **COORDINATES:** N:33.079136 E:-83.805879
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 45.2 ft. **GROUND WATER DEPTH: DURING** 23.5 ft. **COMP.** 33.81 ft. **DELAYED** 31.66 ft. after 24 hrs.
NOTES

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

ELEV. Strata

ELEV. (DEPTH)



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

478.3
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 6 bags TypeI I/II Portland Cement, 94 lbs/each

(Continued Next Page)

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

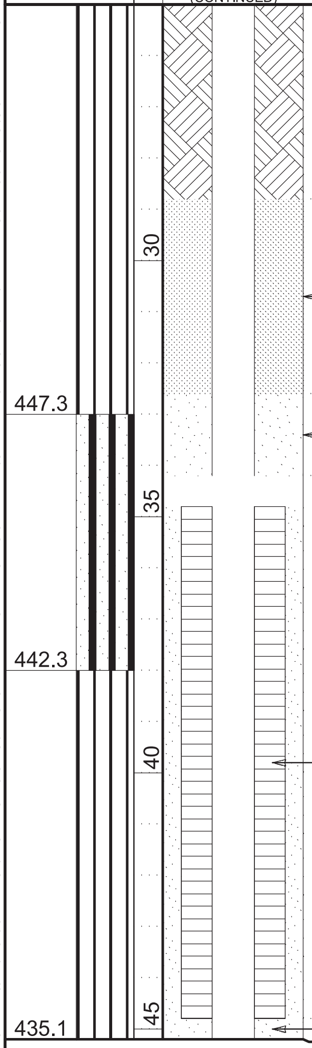
PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

ELEV. | Strata | ELEV. (DEPTH)

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

(CONTINUED)



Annular Fill: Cement-Bentonite Grout - 6 bags TypeI I/II Portland Cement, 94 lbs/each

451.5
(28.8)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

447.7
(32.6)

Filter: Unimin FilterSil - 5.5 Bags #1A, 50 lbs/each

445.5
(34.8)

Screen: 10 ft. pre-pack

435.5

Sump:0.40 ft.

WELL: PZ-18S
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RECORD OF WELL CONSTRUCTION

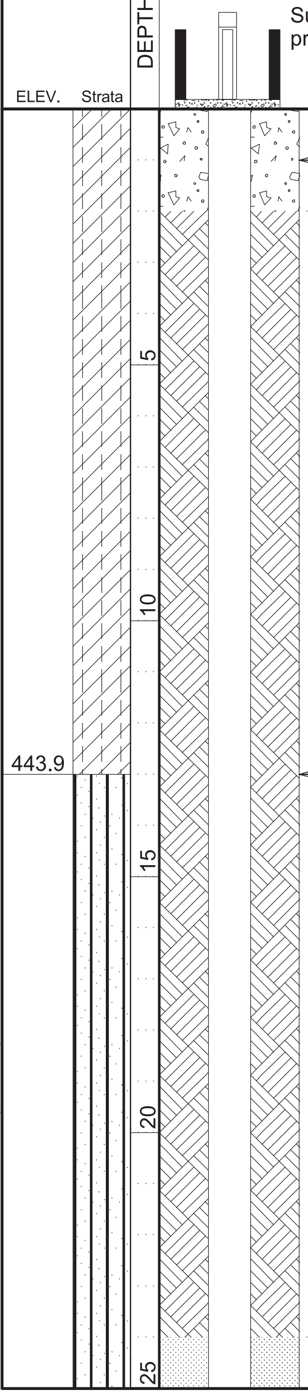
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/3/2015 **COMPLETED** 3/3/2015 **SURF. ELEV.** 456.9 **COORDINATES:** N:33.076470 E:-83.805688
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 40.2 ft. **GROUND WATER DEPTH: DURING** 18.5 ft. **COMP.** 29.95 ft. **DELAYED** 29.33 ft. after 24 hrs.
NOTES

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad



ELEV. (DEPTH)

Surface Seal: concrete

454.9 (2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

432.9 (24.0)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

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SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

WELL: PZ-18S
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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA

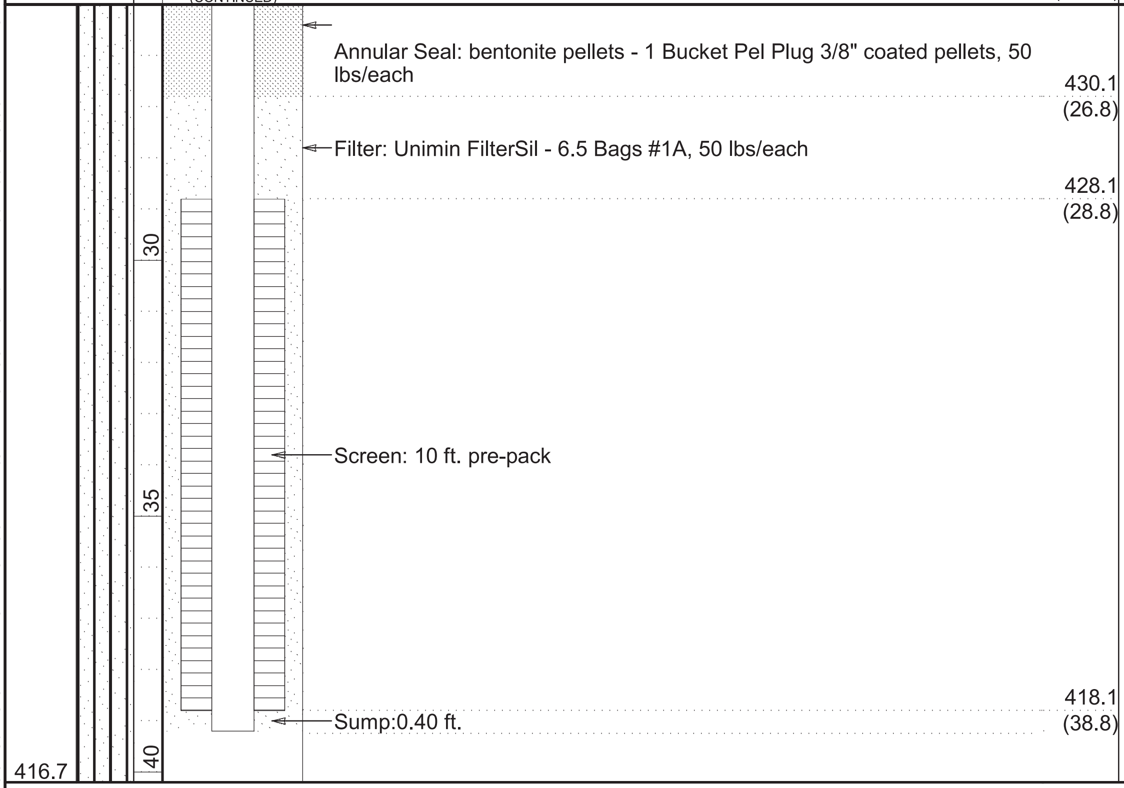
DEPTH (ft)

WELL DATA

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

COMMENTS

ELEV. Strata (CONTINUED) ELEV. (DEPTH)



Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

430.1 (26.8)

Filter: Unimin FilterSil - 6.5 Bags #1A, 50 lbs/each

428.1 (28.8)

Screen: 10 ft. pre-pack

418.1 (38.8)

Sump:0.40 ft.

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

WELL: PZ-19I
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PROJECT Piezometer Installation
LOCATION Plant Scherer

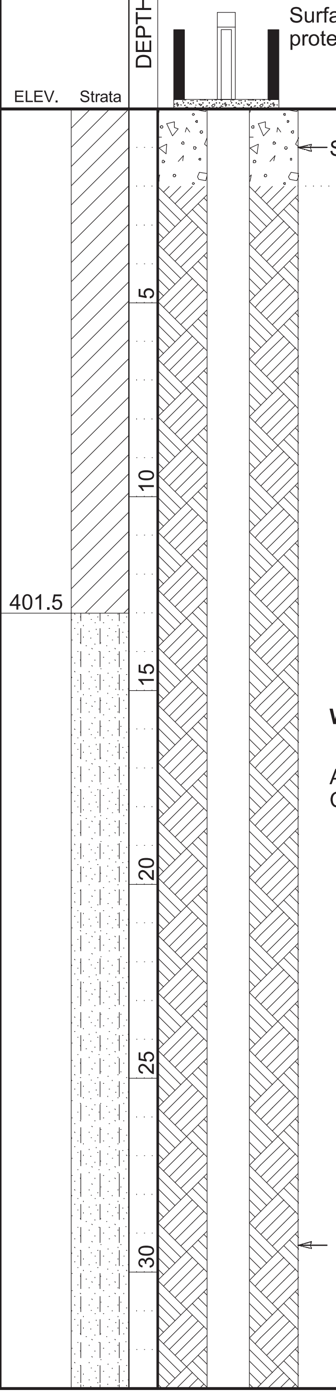
DATE STARTED 3/3/2015 **COMPLETED** 3/4/2015 **SURF. ELEV.** 414.5 **COORDINATES:** N:33.074732 E:-83.805379
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 71.9 ft. **GROUND WATER DEPTH: DURING** 1.5 ft. **COMP.** 0 ft. **DELAYED** 0.5 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS

ELEV. Strata

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. (DEPTH)



Surface Seal: concrete

412.5
(2.0)

401.5

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 7.5 bags TypeI I/II Portland Cement, 94 lbs/each

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SOUTHERN COMPANY

RECORD OF WELL CONSTRUCTION

WELL: PZ-19I
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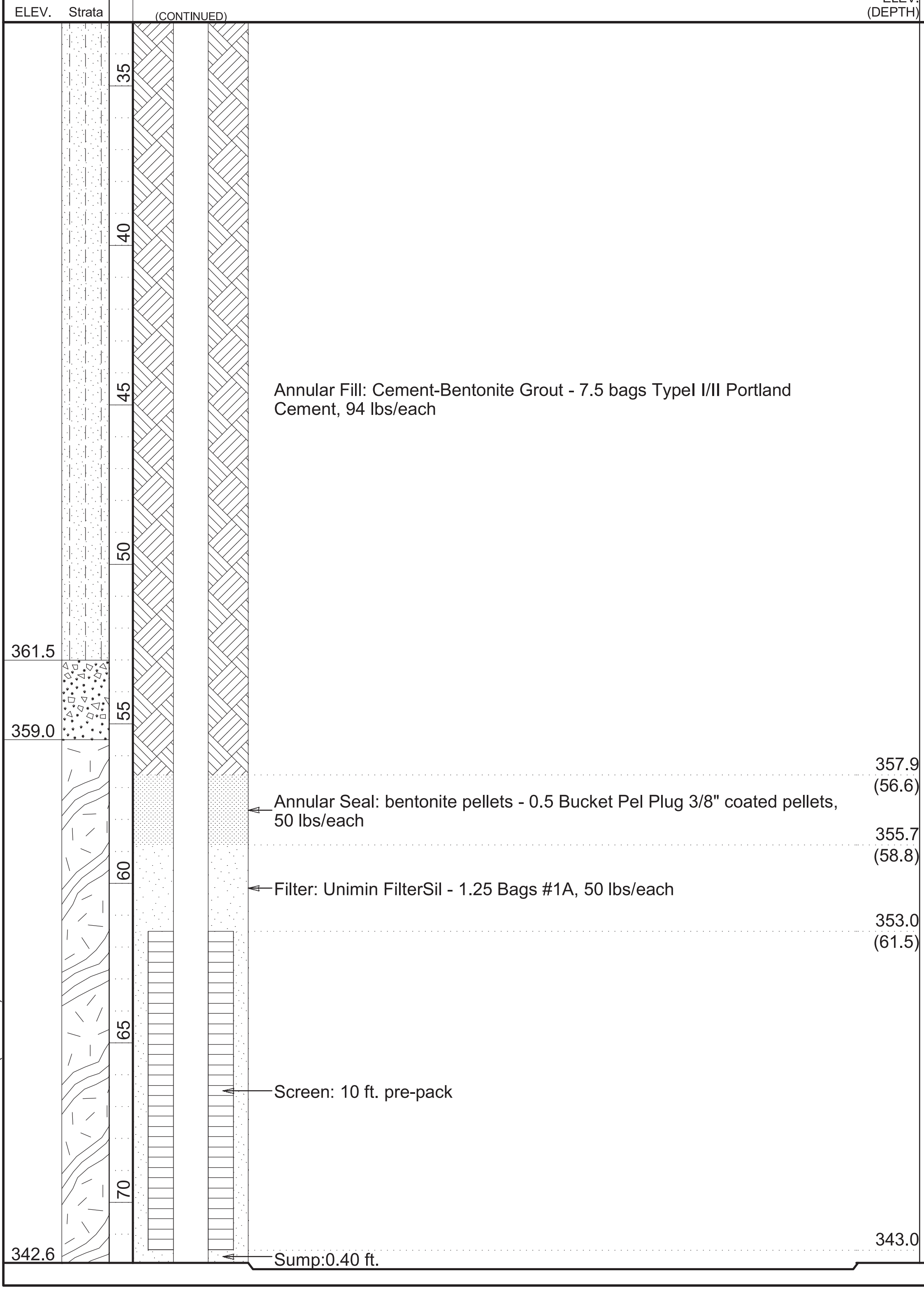
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS

WELL DATA

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad



Annular Fill: Cement-Bentonite Grout - 7.5 bags TypeI I/II Portland Cement, 94 lbs/each

Annular Seal: bentonite pellets - 0.5 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

Filter: Unimin FilterSil - 1.25 Bags #1A, 50 lbs/each

Screen: 10 ft. pre-pack

Sump:0.40 ft.

COMMENTS

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RECORD OF WELL CONSTRUCTION

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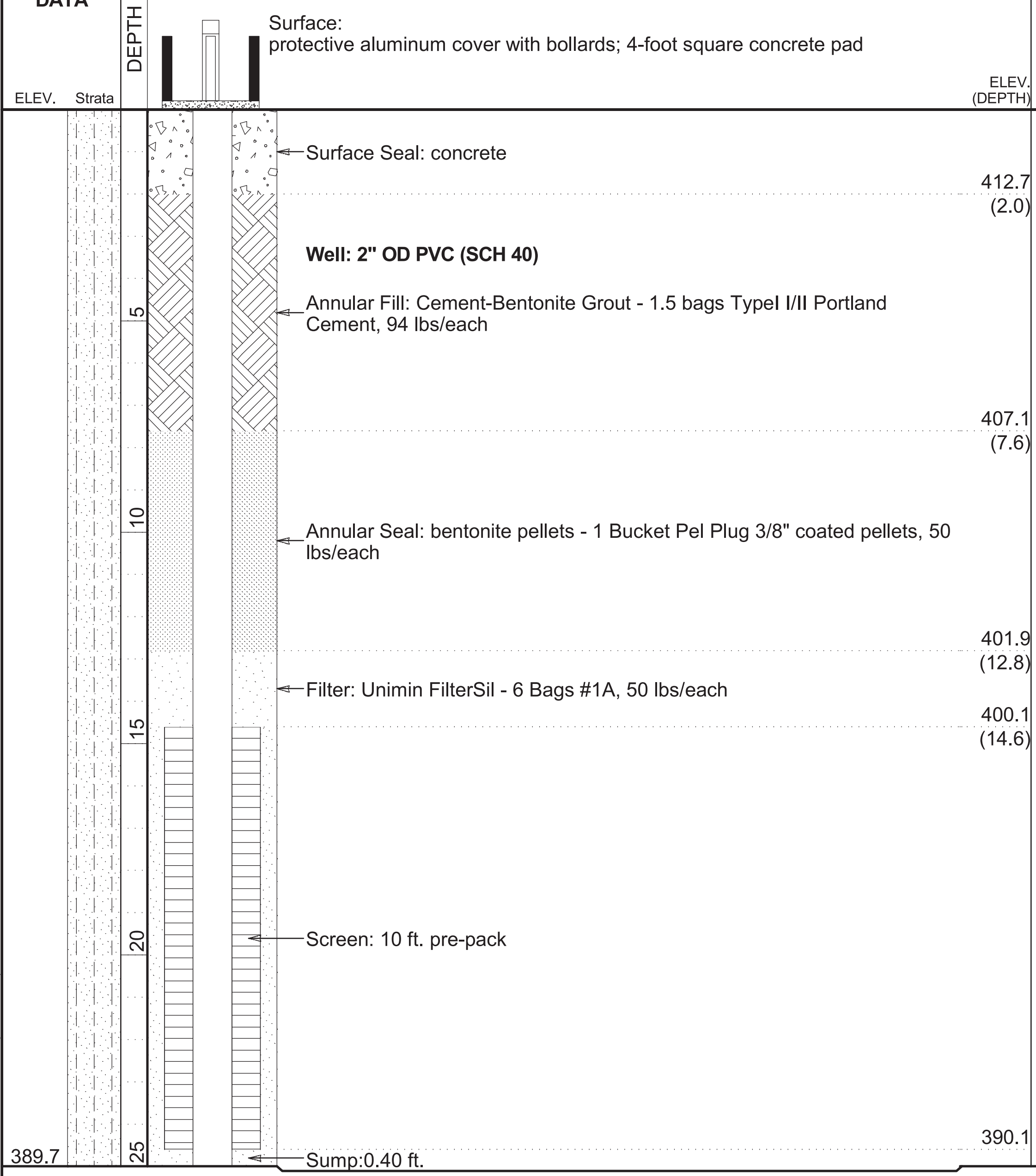
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/4/2015 **COMPLETED** 3/4/2015 **SURF. ELEV.** 414.7 **COORDINATES:** N:33.074728 E:-83.805412
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 25 ft. **GROUND WATER DEPTH: DURING** 0.5 ft. **COMP.** 1.5 ft. **DELAYED** 0.5 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 1.5 bags TypeI I/II Portland Cement, 94 lbs/each

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

Filter: Unimin FilterSil - 6 Bags #1A, 50 lbs/each

Screen: 10 ft. pre-pack

Sump:0.40 ft.

RECORD OF WELL CONSTRUCTION

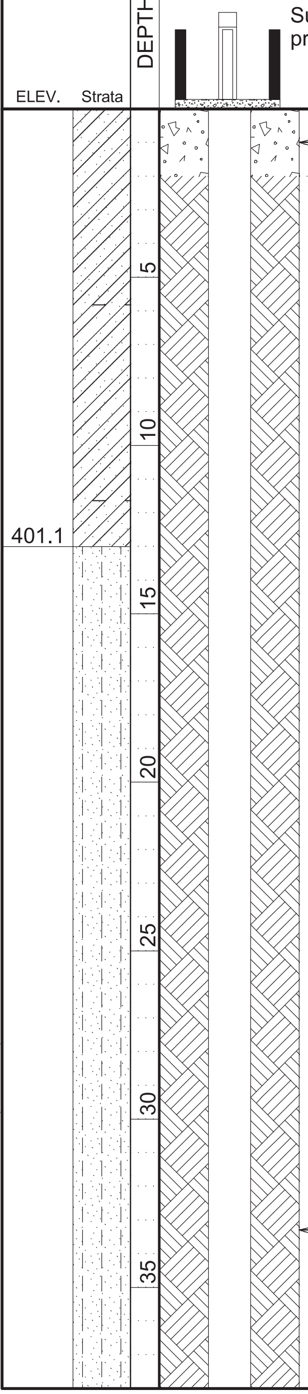
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/10/2015 **COMPLETED** 3/10/2015 **SURF. ELEV.** 414.1 **COORDINATES:** N:33.073986 E:-83.805314
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 79.6 ft. **GROUND WATER DEPTH: DURING** 5 ft. **COMP.** 3.2 ft. **DELAYED** 3.2 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS

ELEV. Strata



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV.
(DEPTH)

Surface Seal: concrete

412.1
(2.0)

401.1

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 9 bags TypeI I/II Portland Cement, 94 lbs/each

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SOUTHERN COMPANY SERVICES, INC.
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RECORD OF WELL CONSTRUCTION

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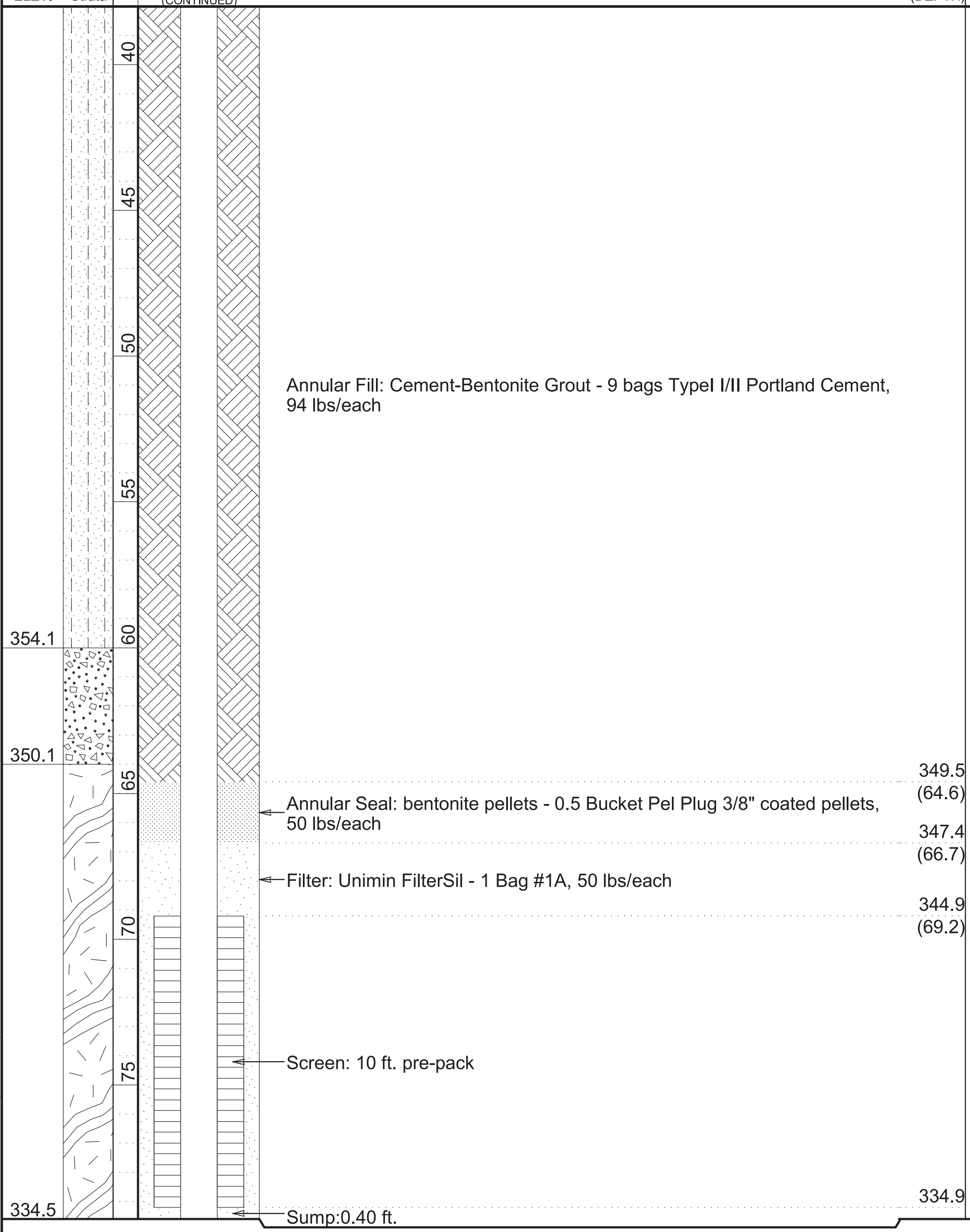
PROJECT Piezometer Installation

LOCATION Plant Scherer

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad



Annular Fill: Cement-Bentonite Grout - 9 bags TypeI I/II Portland Cement, 94 lbs/each

Annular Seal: bentonite pellets - 0.5 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

Filter: Unimin FilterSil - 1 Bag #1A, 50 lbs/each

Screen: 10 ft. pre-pack

Sump:0.40 ft.

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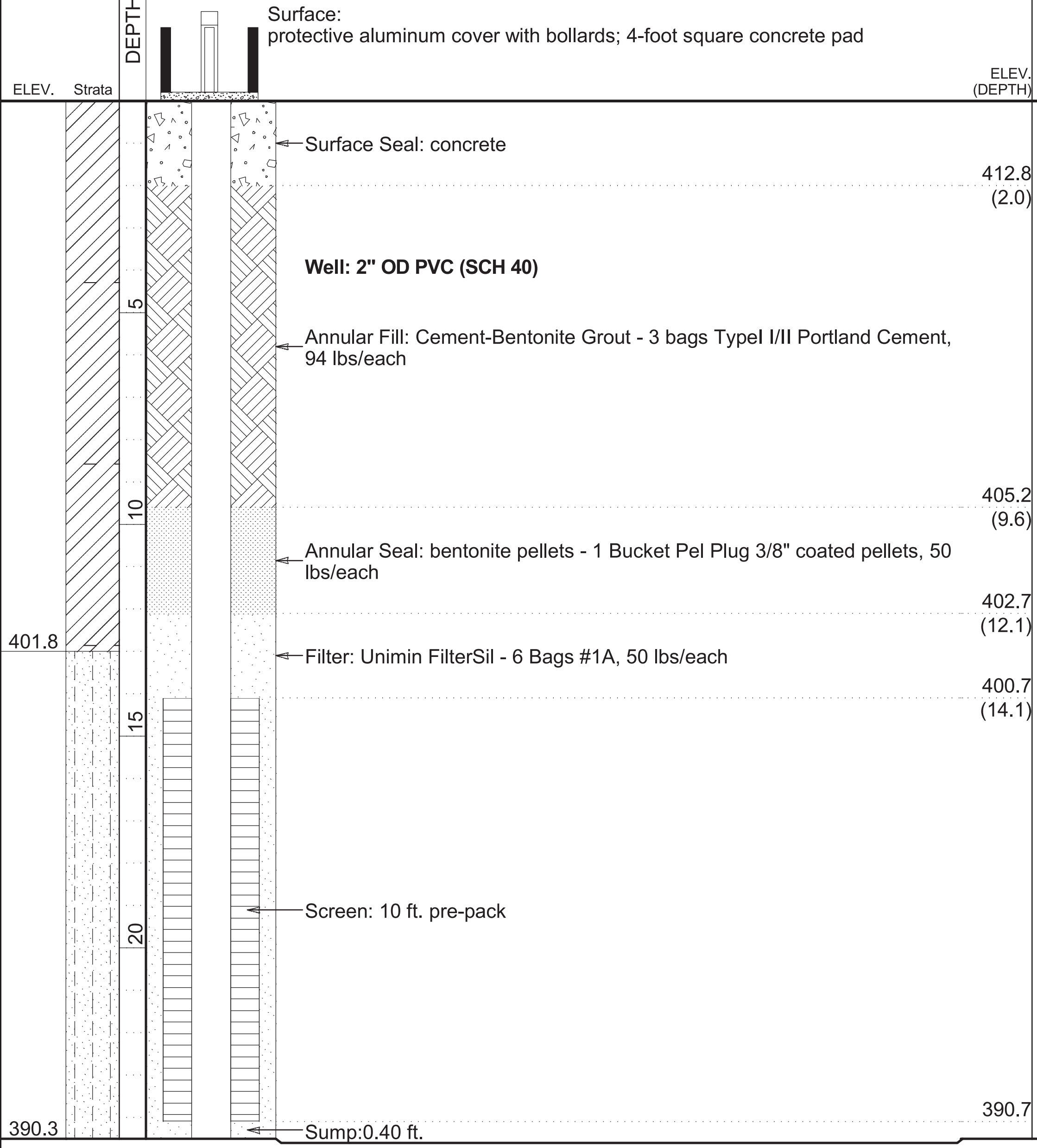
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED	3/11/2015	**COMPLETED**	3/11/2015	**SURF. ELEV.**	414.8	**COORDINATES:**	N:33.073961 E:-83.805332
CONTRACTOR	Civil Field Services	**EQUIPMENT**	CME550	**METHOD**	Hollow Stem Auger		
DRILLED BY	T. Milam	**LOGGED BY**	S. Baxter	**CHECKED BY**	L. Millet	**ANGLE**	
BEARING							
BORING DEPTH	24.5 ft.	**GROUND WATER DEPTH: DURING**	0.5 ft.	**COMP.**	6.1 ft.	**DELAYED**	5.9 ft. after 24 hrs.
NOTES							

BOREHOLE DATA	**DEPTH (ft)**	**WELL DATA**	**COMMENTS**



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

412.8 (2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 3 bags TypeI I/II Portland Cement, 94 lbs/each

405.2 (9.6)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

402.7 (12.1)

Filter: Unimin FilterSil - 6 Bags #1A, 50 lbs/each

400.7 (14.1)

Screen: 10 ft. pre-pack

390.7

Sump:0.40 ft.

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RECORD OF WELL CONSTRUCTION

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EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

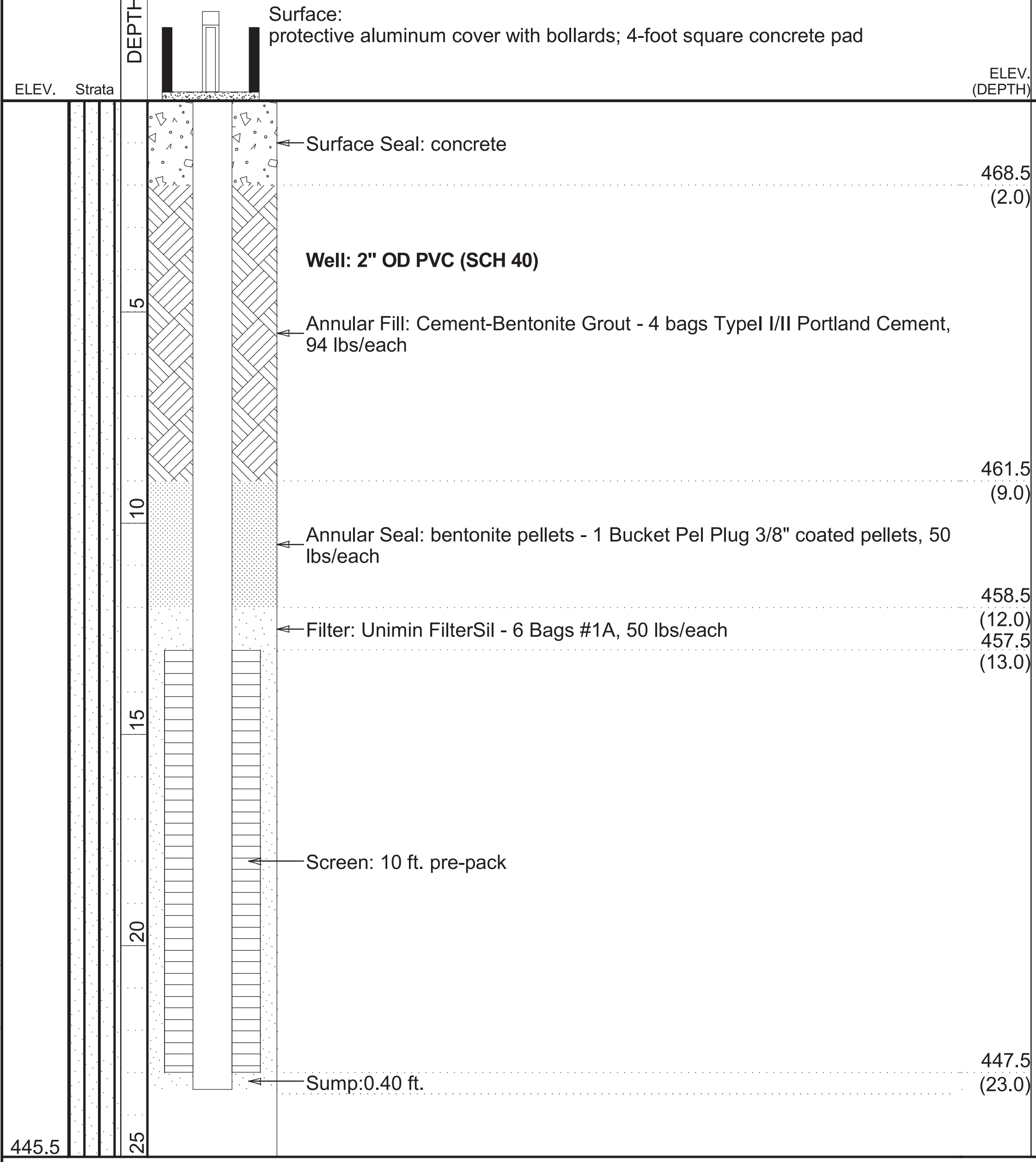
PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/11/2015 **COMPLETED** 3/12/2015 **SURF. ELEV.** 470.5 **COORDINATES:** N:33.072121 E:-83.806186
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 25 ft. **GROUND WATER DEPTH: DURING** 1.5 ft. **COMP.** 3.2 ft. **DELAYED** 3.2 ft. after 24 hrs.
NOTES

BOREHOLE DATA

WELL DATA

COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

468.5 (2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 4 bags TypeI I/II Portland Cement, 94 lbs/each

461.5 (9.0)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

458.5 (12.0)

Filter: Unimin FilterSil - 6 Bags #1A, 50 lbs/each

457.5 (13.0)

Screen: 10 ft. pre-pack

447.5 (23.0)

Sump:0.40 ft.

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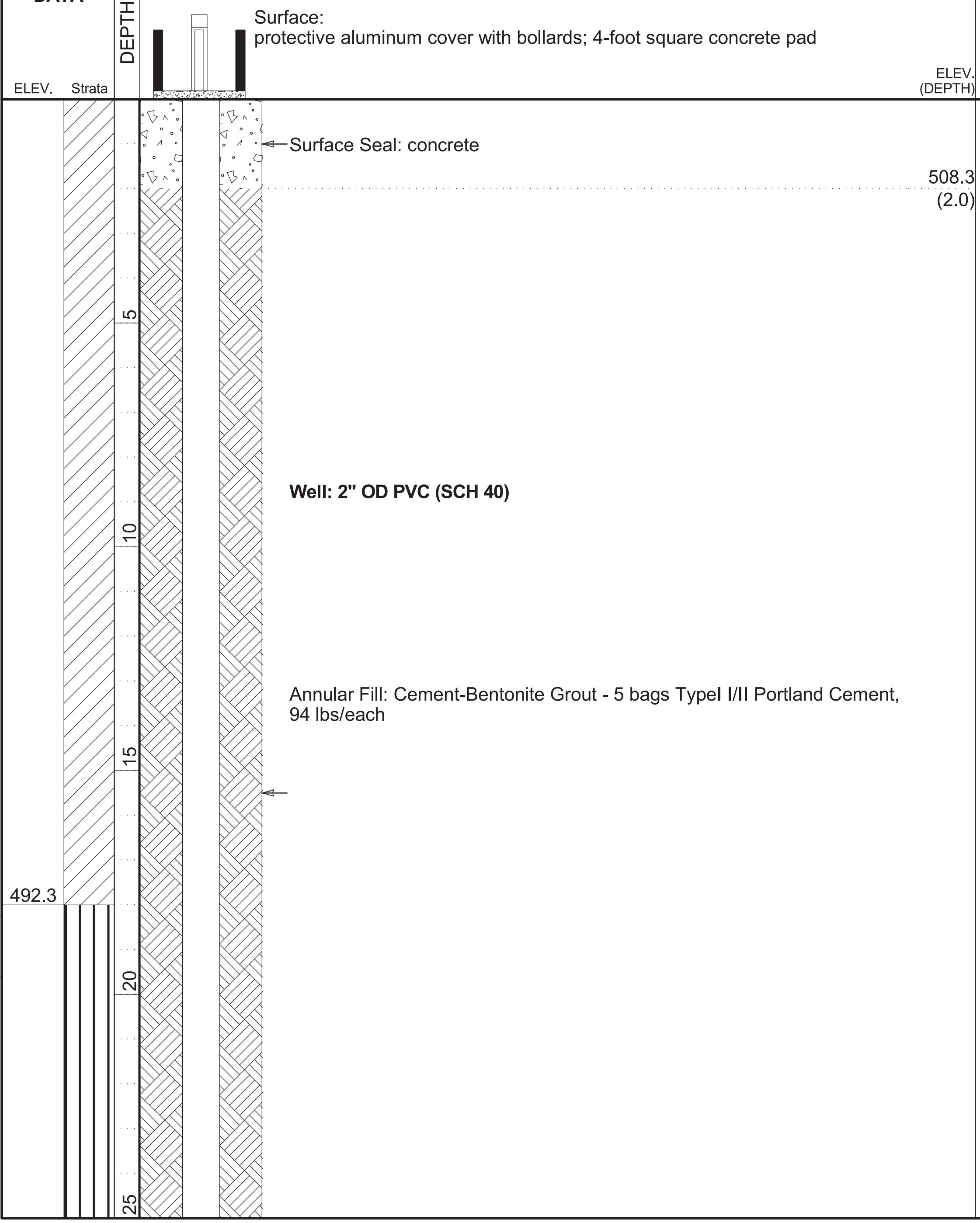
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/16/2015 **COMPLETED** 3/17/2015 **SURF. ELEV.** 510.3 **COORDINATES:** N:33.070220 E:-83.806444
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 44.5 ft. **GROUND WATER DEPTH: DURING** 28.5 ft. **COMP.** 31.4 ft. **DELAYED** 31.1 ft. after 24 hrs.
NOTES

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 5 bags TypeI I/II Portland Cement, 94 lbs/each

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

RECORD OF WELL CONSTRUCTION

WELL: PZ-22S
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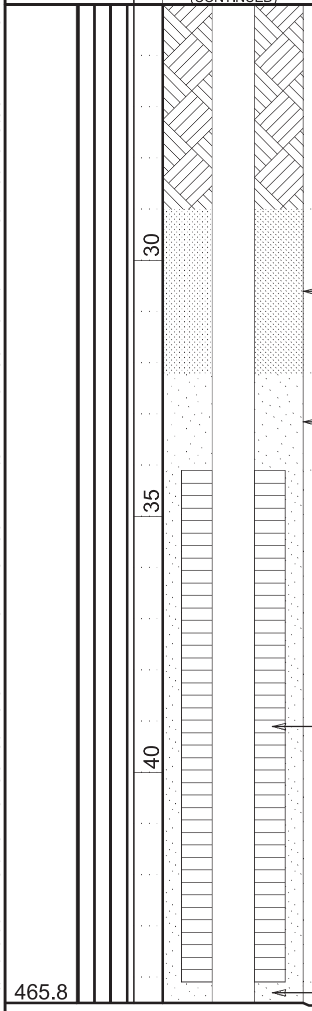
PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV. Strata (CONTINUED) ELEV. (DEPTH)



Annular Fill: Cement-Bentonite Grout - 5 bags TypeI I/II Portland Cement, 94 lbs/each

481.3 (29.0)

Annular Seal: bentonite pellets - 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

478.1 (32.2)

Filter: Unimin FilterSil - 6 Bags #1A, 50 lbs/each

476.2 (34.1)

Screen: 10 ft. pre-pack

466.2

Sump:0.40 ft.

WELL: PZ-23I
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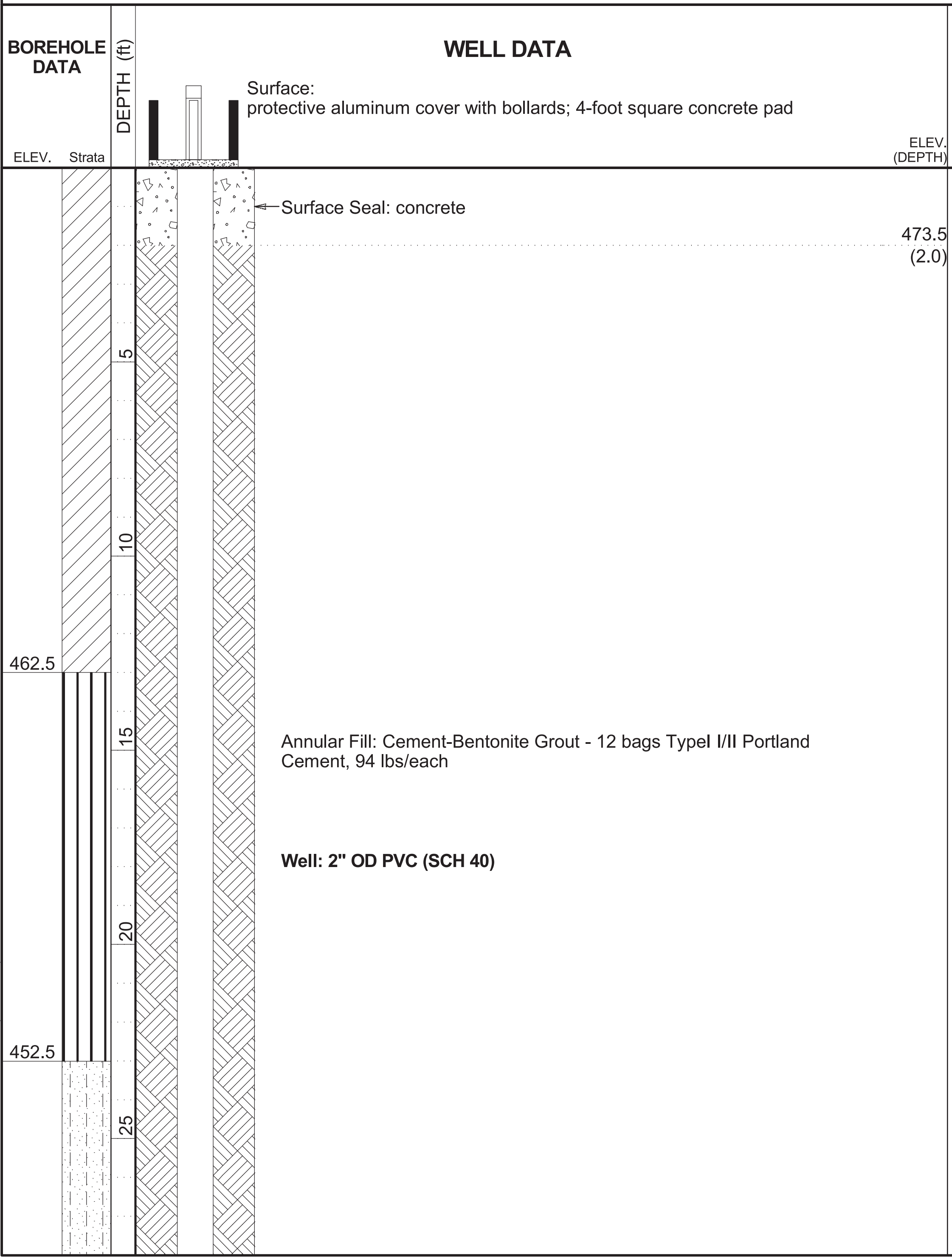
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/17/2015 **COMPLETED** 3/18/2015 **SURF. ELEV.** 475.5 **COORDINATES:** N:33.067686 E:-83.809137
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger; HQ Rock Core
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 86.8 ft. **GROUND WATER DEPTH: DURING** 13.5 ft. **COMP.** 12.1 ft. **DELAYED** 12.8 ft. after 24 hrs.
NOTES Well abandoned

BOREHOLE DATA	DEPTH (ft)	WELL DATA	COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

Annular Fill: Cement-Bentonite Grout - 12 bags TypeI I/II Portland Cement, 94 lbs/each

Well: 2" OD PVC (SCH 40)

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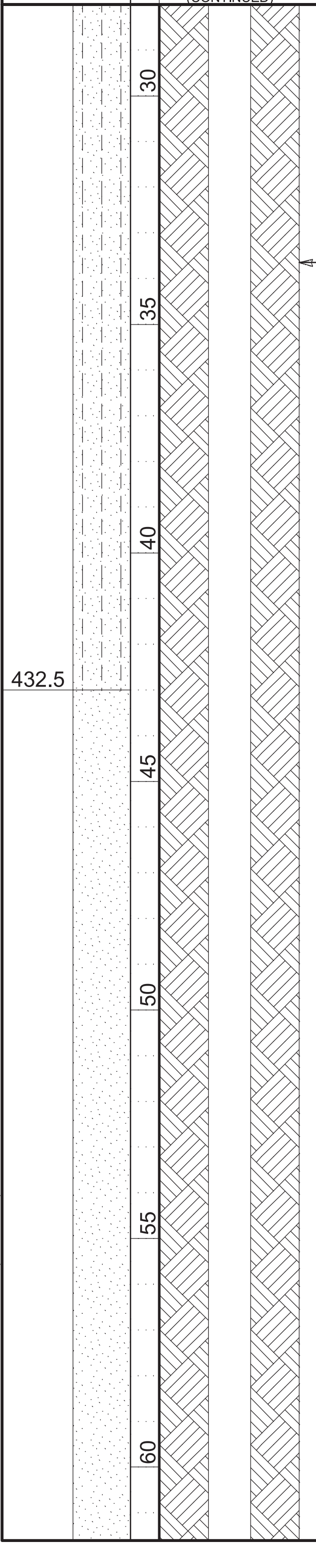
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	**WELL DATA**	**COMMENTS**
ELEV. Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



Annular Fill: Cement-Bentonite Grout - 12 bags TypeI I/II Portland Cement, 94 lbs/each

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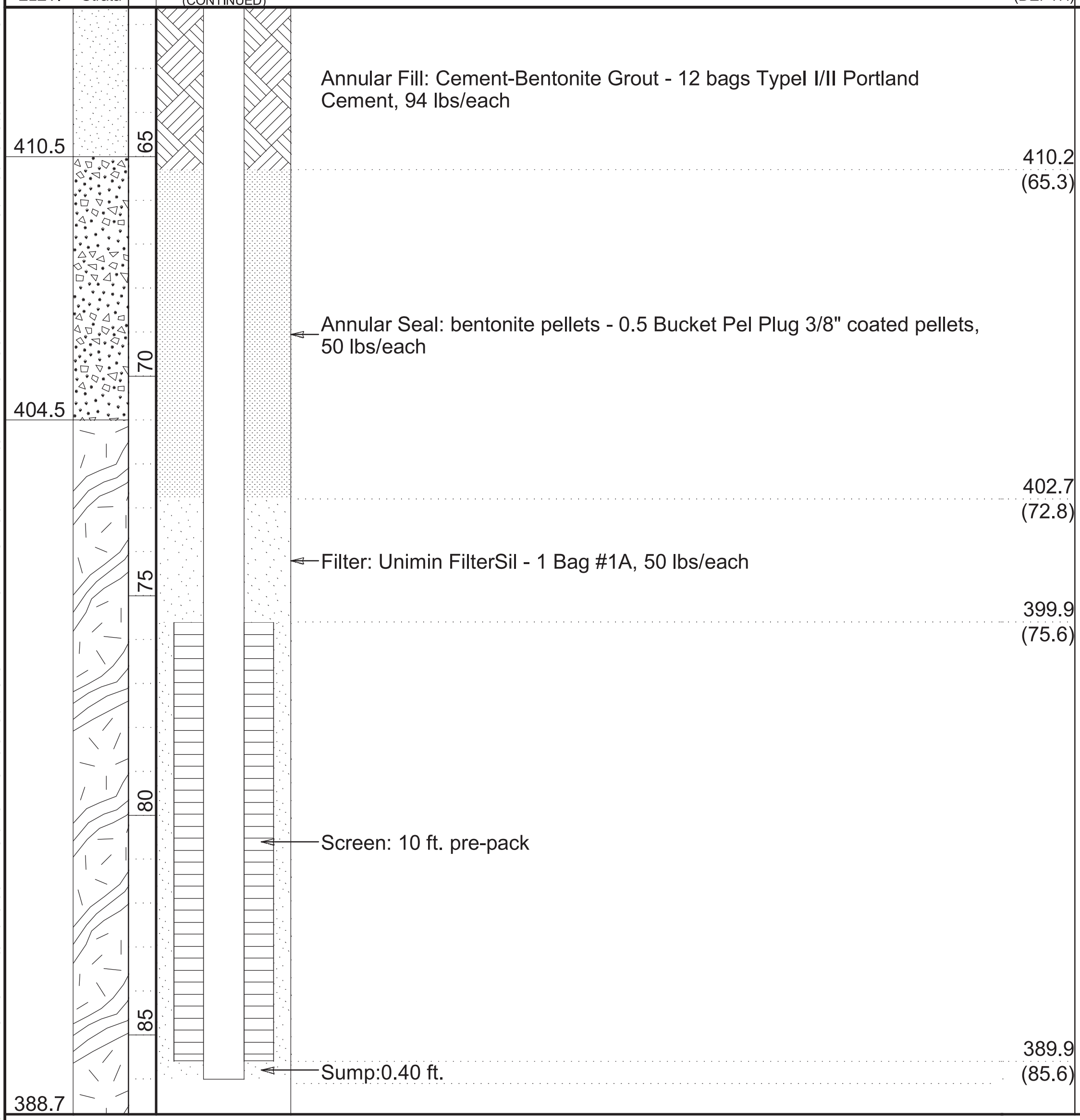
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad



Annular Fill: Cement-Bentonite Grout - 12 bags TypeI I/II Portland Cement, 94 lbs/each

Annular Seal: bentonite pellets - 0.5 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

Filter: Unimin FilterSil - 1 Bag #1A, 50 lbs/each

Screen: 10 ft. pre-pack

Sump:0.40 ft.

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

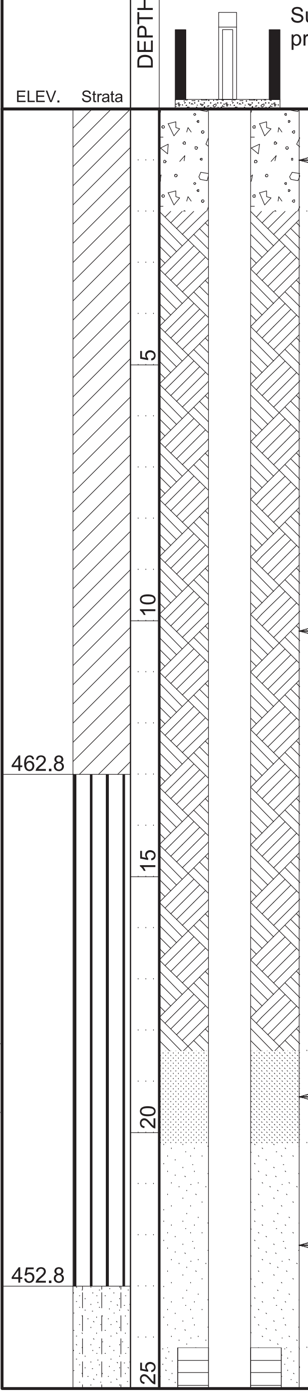
DATE STARTED 3/18/2015 **COMPLETED** 3/18/2015 **SURF. ELEV.** 475.8 **COORDINATES:** N:33.067693 E:-83.809179
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 34.6 ft. **GROUND WATER DEPTH: DURING** 13.5 ft. **COMP.** 15.1 ft. **DELAYED** 12.1 ft. after 24 hrs.
NOTES

BOREHOLE DATA | **DEPTH (ft)** | **WELL DATA** | **COMMENTS**

ELEV. Strata

Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

ELEV.
(DEPTH)



Surface Seal: concrete

473.8
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 6 bags TypeI I/II Portland Cement, 94 lbs/each

457.4
(18.4)

Annular Seal: bentonite pellets- 1 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

455.6
(20.2)

Filter: Unimin FilterSil - 3.5 Bags #1A, 50 lbs/each

451.6
(24.2)

Screen: 10 ft. pre-pack

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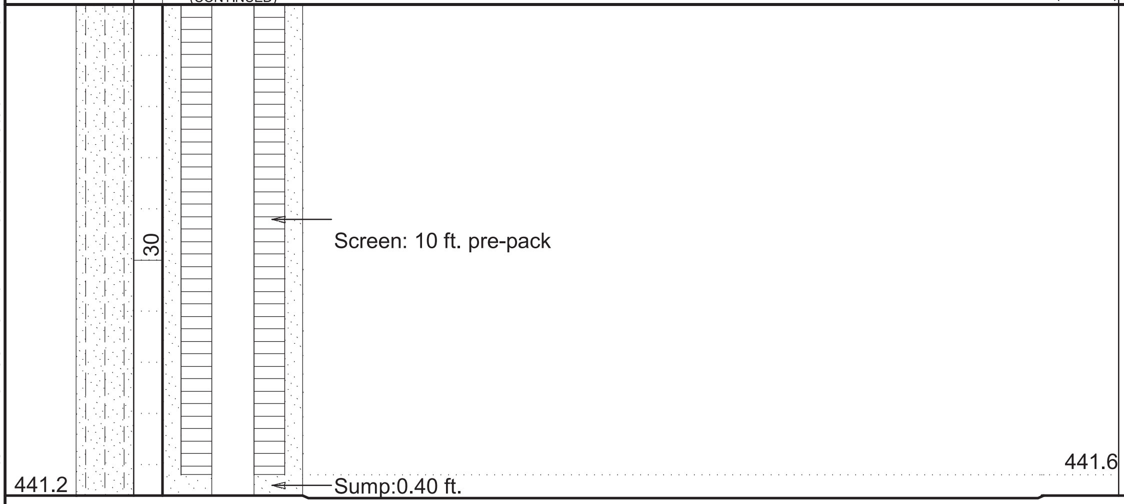
RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Piezometer Installation
LOCATION Plant Scherer

BOREHOLE DATA	DEPTH (ft)	**WELL DATA**	**COMMENTS**
ELEV. Strata		Surface: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED) ELEV. (DEPTH)	



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RECORD OF WELL CONSTRUCTION

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

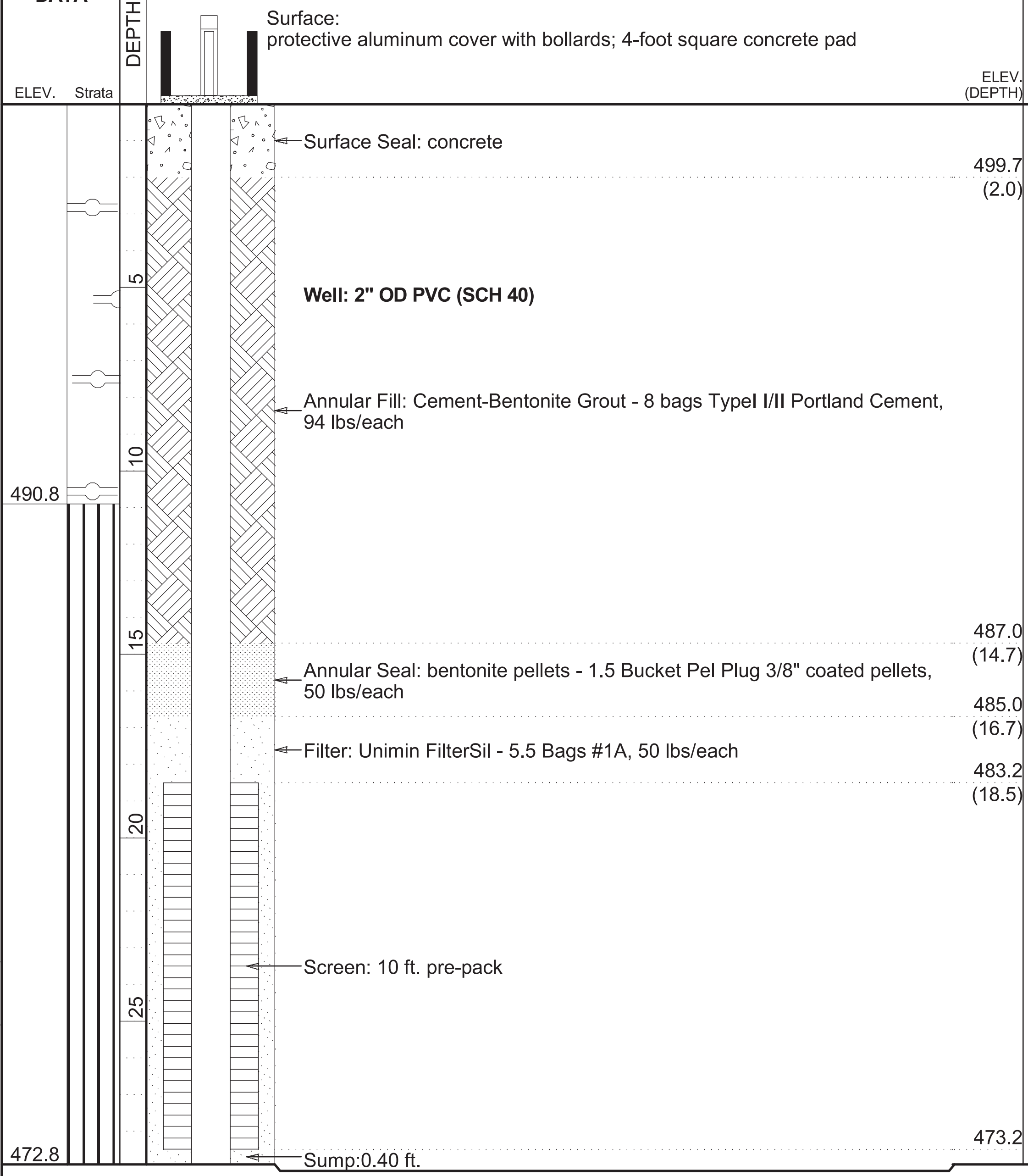
PROJECT Piezometer Installation
LOCATION Plant Scherer

DATE STARTED 3/23/2015 **COMPLETED** 3/24/2015 **SURF. ELEV.** 501.7 **COORDINATES:** N:33.067736 E:-83.811738
CONTRACTOR Civil Field Services **EQUIPMENT** CME550 **METHOD** Hollow Stem Auger
DRILLED BY T. Milam **LOGGED BY** S. Baxter **CHECKED BY** L. Millet **ANGLE** **BEARING**
BORING DEPTH 28.9 ft. **GROUND WATER DEPTH: DURING** 10 ft. **COMP.** 7.8 ft. **DELAYED** 7.6 ft. after 24 hrs.
NOTES Well abandoned

BOREHOLE DATA

WELL DATA

COMMENTS



Surface:
protective aluminum cover with bollards; 4-foot square concrete pad

Surface Seal: concrete

499.7
(2.0)

Well: 2" OD PVC (SCH 40)

Annular Fill: Cement-Bentonite Grout - 8 bags TypeI I/II Portland Cement, 94 lbs/each

487.0
(14.7)

Annular Seal: bentonite pellets - 1.5 Bucket Pel Plug 3/8" coated pellets, 50 lbs/each

485.0
(16.7)

Filter: Unimin FilterSil - 5.5 Bags #1A, 50 lbs/each

483.2
(18.5)

Screen: 10 ft. pre-pack

473.2

Sump:0.40 ft.

2012 WELL CONSTRUCTION RCRD (NO COM) - ESEE DATABASE.GDT - 6/24/15 08:11 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\SCHERER ASH POND PIEZ\DRAFT LOGS\SCHERER LOGS.GPJ

SOUTHERN COMPANY

LOG OF TEST BORING

BORING PZ-25 I
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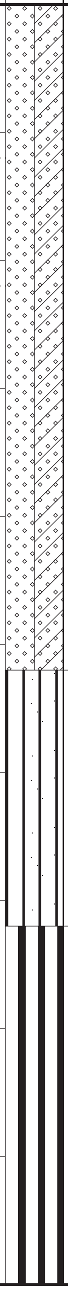
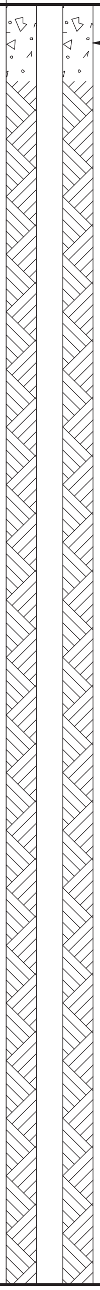
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 5/22/2016 **COMPLETED** 5/24/2016 **SURF. ELEV.** 525.7 **COORDINATES:** N:33.083680 E:-83.814000
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY M. Pope **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 126 ft. **GROUND WATER DEPTHDURING** **COMP.** 32.5 ft. **DELAYED** 30.6 ft. after 24 hrs.
NOTES





DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
	Well-graded Sand with Clay (SW-SC) - mottled red (2.5YR 4/6) dry, fine to medium-grained, with magnetite and illmenite				Surface Seal: concrete
5					
	- yellowish red (5YR 4/6) dry, with silt				
10					
	- reddish yellow (7.5YR 6/8) with black and white mottling, weathered feldspar				
15					
	- mottled strong brown (7.5YR 5/8), light gray (2.5Y 7/2) and pale red (10R 6/3) dry, fine to coarse-grained, trace fine quartz gravel - with magnetite and illmenite				
20					
	- strong brown (7.5YR 5/8), black (7.5YR 2.5/1) and very pale brown / grayish orange (10YR 7/4) with mica				
25					Annular Fill: Cement-Bentonite Grout (8 - 94# bags PC, 1 - 55# bag gel, 210 gal. water)
	Sandy Silt (ML) - mottled dark reddish brown (2.5YR 3/4) and dark reddish gray (2.5YR 3/1) moist, with sandy clay (CL) bedding				
30				▽	
	- mottled strong brown (7.5YR 5/8) and black (7.5YR 2.5/1)			▼	
	- dark red (2.5YR 3/6), red (2.5YR 4/6) and reddish gray (2.5YR 5/1) wet, flow-banded fabric				
35					
	Elastic Silt (MH) - mottled weak red (10R 5/3) and reddish black (10R 2.5/1) wet, medium, with sandy clay (CH) bedding				
40					
	- mottled strong brown (7.5YR 5/8), light brownish gray (2.5Y 6/2) and black (2.5Y 2.5/1)				
45					
	- reddish brown (2.5YR 4/4), reddish yellow (7.5YR 6/6) and black (7.5YR 2.5/1) wet, with sandy clay (CH) bedding				
50					

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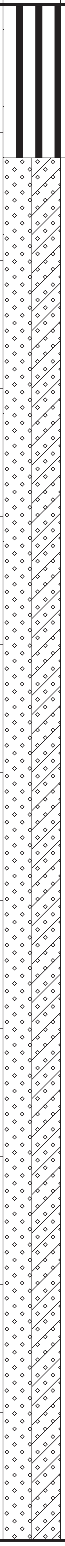
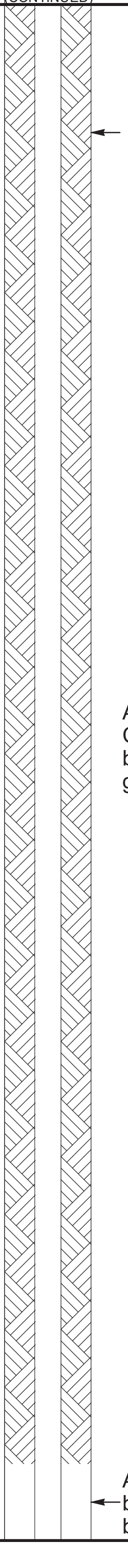
LOG OF TEST BORING

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer





DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak Moderate Strong)	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED)
		Elastic Silt (MH)*(Con't)*				
55		- yellowish red / light brown (5YR 5/6)				
		Well-graded Sand with Clay (SW-SC) - yellowish red / light brown (5YR 5/6) saprolite wet, medium dense, fine to coarse-grained, cohesive				
60						
		- dark grayish brown / dark yellowish brown (10YR 4/2) with gravel (residual diabase)				
65						
		- dark gray / olive gray (5Y 4/1) and strong brown (7.5YR 5/6) moist				
70						
		- mottled very dark gray (5Y 3/1) and white (N9)				
75						
		- dark brown (10YR 3/3) with interlayered clay bedding				Annular Fill: Cement-Bentonite Grout (8 - 94# bags PC, 1 - 55# bag gel, 210 gal. water)
80		- gray (10YR 5/1) moist				
85						
		- very dark gray (2.5Y 3/1) regolith moist, dense				
90						
		- very dark gray (5Y 3/1)				
95						
		- with interlayered clay bedding				
100						
		- dark yellowish brown (10YR 4/6) and olive (5Y 5/4)				
105						
		- mottled black (2.5Y 2.5/1), dark gray (2.5Y 4/1) and white (N9)				Annular Seal: bentonite pellets (1 - 5 gal. buckect 3/8" pellets)
110						

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SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

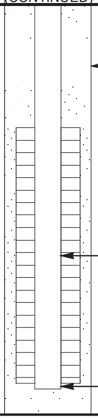
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS
		Well-graded Sand with Clay (SW-SC) *(Con't)*			
115		- grayish brown (2.5Y 5/2)			
		- dark yellowish brown (10YR 3/6)			
120					
		- very dark gray (2.5Y 3/1)			
125					
		Bottom of borehole at 126.0 feet.			
130					
135					
140					
145					
150					
155					
160					
165					
170					

WELL DATA

Completion:
protective aluminum cover with bollards;
4-foot square concrete pad

(CONTINUED)



Filter:
20/40 silica filter sand (6 - 0.5 cubic ft. bags)

Standpipe:
2" OD PVC (SCH 40)
Screen:
10 ft; 0.010" Slot Prepack

Sump:0.200000000000003 ft.
Cave-in to 126 ft.

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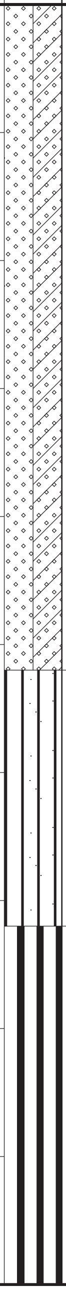
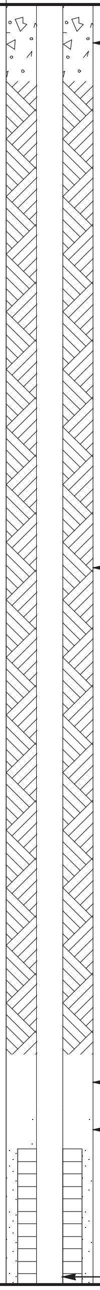
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 5/24/2016 **COMPLETED** 5/25/2016 **SURF. ELEV.** 525.5 **COORDINATES:** N:33.083710 E:-83.814100
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY M. Pope **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 56 ft. **GROUND WATER DEPTHDURING** **COMP.** **DELAYED** 32.6 ft. after 48 hrs.
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		**Well-graded Sand with Clay (SW-SC)** - mottled red (2.5YR 4/6) dry, fine to medium-grained, with magnetite and illmenite				 Surface Seal: concrete
5						
		- yellowish red (5YR 4/6) dry, with silt				
10						
		- reddish yellow (7.5YR 6/8) with black and white mottling, weathered feldspar				
15						
		- mottled strong brown (7.5YR 5/8), light gray (2.5Y 7/2) and pale red (10R 6/3) dry, fine to coarse-grained, trace fine quartz gravel - with magnetite and illmenite				
20						
						Annular Fill: Cement-Bentonite Grout (2 - 94# bags PC, 1/4 - 55# bag gel, 55 gal. water)
		- strong brown (7.5YR 5/8), black (7.5YR 2.5/1) and very pale brown / grayish orange (10YR 7/4) with mica				
25						
		Sandy Silt (ML) - mottled dark reddish brown (2.5YR 3/4) and dark reddish gray (2.5YR 3/1) moist, with sandy clay (CL) bedding				
30						
		▽ - mottled strong brown (7.5YR 5/8) and black (7.5YR 2.5/1)				
35		- dark red (2.5YR 3/6), red (2.5YR 4/6) and reddish gray (2.5YR 5/1) wet, flow-banded fabric				
		Elastic Silt (MH) - mottled weak red (10R 5/3) and reddish black (10R 2.5/1) wet, medium, with sandy clay (CH) bedding				
40						
		- mottled strong brown (7.5YR 5/8), light brownish gray (2.5Y 6/2) and black (2.5Y 2.5/1)				Annular Seal: bentonite pellets (1/2 - 5 gal. buckect 3/8" pellets)
45						Filter: 20/40 silica filter sand (5 - 0.5 cubic ft. bags)
		- reddish brown (2.5YR 4/4), reddish yellow (7.5YR 6/6) and black (7.5YR 2.5/1) wet, with sandy clay (CH) bedding				**Standpipe:** **2" OD PVC (SCH 40)**
50						Screen: 10 ft; 0.010" Slot Prepack

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SOUTHERN COMPANY

LOG OF TEST BORING

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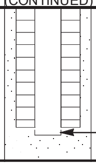
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Elastic Silt (MH)*(Con't)*				(CONTINUED) **Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack
55		- yellowish red / light brown (5YR 5/6)				Sump:0.200000000000003 ft. Cave-in to 56 ft.
		Bottom of borehole at 56.0 feet.				
60						
65						
70						
75						
80						
85						
90						
95						
100						
105						
110						



SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

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LOG OF TEST BORING

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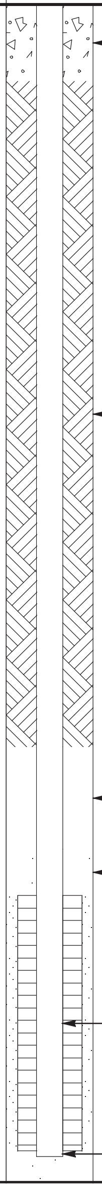
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 6/1/2016 **COMPLETED** 6/1/2016 **SURF. ELEV.** 488.9 **COORDINATES:** N:33.083280 E:-83.810300
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY J. Asua **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 46 ft. **GROUND WATER DEPTHDURING** **COMP.** **DELAYED** 12.5 ft. after 72 hrs.
NOTES

WELL DATA

Completion:
protective aluminum cover with bollards;
4-foot square concrete pad



DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS	WELL DATA
	Lean Clay (CL) - dark red (2.5YR 3/6) dry, with silt				Surface Seal: concrete
5	- red (2.5YR 4/6) - red (2.5YR 4/8)				
10	**Sandy Silt (ML)** - red (2.5YR 4/6) and reddish black (2.5YR 2.5/1) dry, with mica			▼	
15	- yellowish red (5YR 4/6) damp, with mica - red (2.5YR 4/6) wet				Annular Fill: Cement-Bentonite Grout (3 - 94# bags PC, 1/4 - 55# bag gel, 50 gal. water)
20	**Poorly-graded Sand with Silt (SP-SM)** - mottled yellowish red (5YR 5/8) and black (5YR 2.5/1) fine-grained, with mica				
25	- mottled strong brown (7.5YR 4/6) and black (7.5YR 2.5/1)				
30					Annular Seal: bentonite pellets (1 - 5 gal. buckect 3/8" pellets)
35	**Elastic Silt (MH)** - olive brown (2.5Y 4/4) wet, with fine sand, micaceous **Silty Sand (SM)** - light olive brown (2.5Y 5/6) fine-grained, micaceous				Filter: 20/40 silica filter sand (5 - 0.5 cubic ft. bags)
40					**Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack
45	**Poorly-graded Sand (SP)** - gray / light olive gray (5Y 6/1) and white / yellowish gray (5Y 8/1) fine to coarse-grained **Silty Sand (SM)** - light olive brown (2.5Y 5/6) fine-grained, micaceous				Sump:0.200000000000003 ft. Cave-in to 46 ft.
50	Bottom of borehole at 46.0 feet.				

SOUTHERN COMPANY

LOG OF TEST BORING

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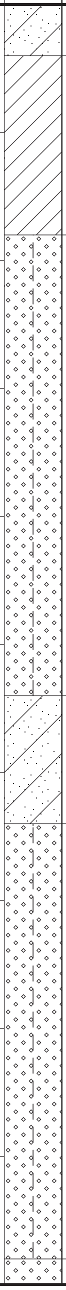
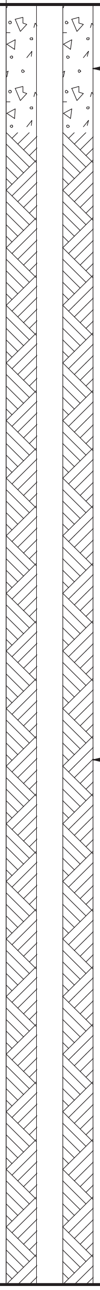
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 6/14/2016 **COMPLETED** 6/17/2016 **SURF. ELEV.** 472.4 **COORDINATES:** N:33.082900 E:-83.809300
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY M. Pope **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** ______ **BEARING** ______
BORING DEPTH 126 ft. **GROUND WATER DEPTH DURING** ______ **COMP.** ______ **DELAYED** 10 ft. after 24 hrs.
NOTES ______





DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
	Clayey Sand (SC) - dark brown (7.5YR 3/3) damp, fine to medium-grained				
	Lean Clay (CL) - mottled yellowish red (5YR 4/6) and yellowish brown (10YR 5/6) damp, medium, with mica				Surface Seal: concrete
5					
	- dark brown (10YR 3/3) with fine quartz gravel				
10	▽ **Well-graded Sand with Silt (SW-SM)** - yellowish red / light brown (5YR 5/6) and yellowish brown (10YR 5/6) moist, fine to coarse-grained, with mica				
15	- very dark gray (10YR 3/1) black (10YR 3/1) oxidation mottling				
20	- dark brown (7.5YR 3/4) wet				
25	- brown (7.5YR 4/3) and strong brown (7.5YR 4/6) fine to coarse-grained - dark yellowish brown (10YR 4/4) wet				
	Clayey Sand (SC) - grayish brown (2.5Y 5/2) wet, with mica				Annular Fill: Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 75 gal. water)
30					
	Well-graded Sand with Silt (SW-SM) - grayish brown (2.5Y 5/2) and white / yellowish gray (5Y 8/1) partially weathered rock biotite gneiss, fine to coarse-grained,				
35	- olive gray (5Y 4/2) wet, fine to coarse-grained				
40					
	- mottled olive gray (5Y 4/2) and white / yellowish gray (5Y 8/1)				
45					
	- UD tube attempted, crushed due to dense soils - dark grayish brown (2.5Y 4/2) and yellow (2.5Y 7/6) saprolite wet, fine to coarse-grained, with mica				
50	**Well-graded Sand (SW)**				

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LOG OF TEST BORING

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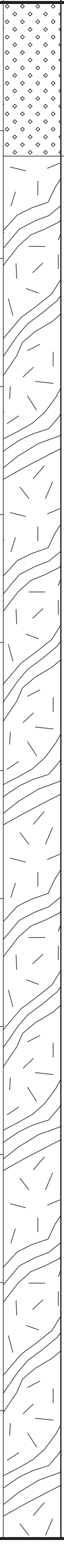
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer



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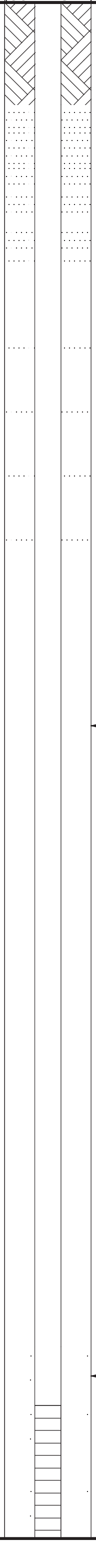

DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
	Well-graded Sand (SW)*(Con't)* - very dark gray (2.5Y 3/1) and dark grayish brown (2.5Y 4/2) wet, fine to coarse-grained, with mica - very dark greenish gray (10Y 3/1) and greenish black (10Y 2.5/1) with gravel and clay (pulverized rock), biotite gneiss, fresh to highly weathered				Annular Fill: Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 75 gal. water)
55					
	Biotite Gneiss - dark gray / olive gray (5Y 4/1) and light gray (5Y 7/1) coarse grain, medium hard to hard, not to slightly weathered, banded, moderately fractured, sub-horizontal fractures				
60					
	- medium hard to hard, inclined, white feldspar and quartz banding, thin to medium bedded - increased granitic composition 61 to 63 ft., light gray with black banding				
65					
	- very dark gray (5Y 3/1) and black (5Y 2.5/2) coarse grain, medium hard to very hard, not weathered, inclined, intensely to moderately fractured, white banding, thin bedded				
70					
	- increased granitic composition 71 to 73 ft., light gray with black banding				
75					
	- gray (2.5Y 5/1) coarse grain, medium hard to very hard, folded, moderately fractured, black and white banding				Annular Seal: bentonite pellets (1 - 5 gal. buckect 3/8" pellets (98-102.5 ft.), 6 - 50# bags 3/8" chips (54-98 ft.)
80					
85					
	- gray (2.5Y 5/1) coarse grain, soft to hard, not weathered, moderately fractured, black and white banding, thin to medium bedded				
90					
	- very dark gray (2.5Y 3/1) completely weathered, 93 to 95 ft.				
95					
	- light gray (2.5Y 7/1) hard, inclined and folded bedding, moderately fractured, white and dark gray banding, thin to medium bedded, sub-vertical fractures				
100	- intensely fractured, 100 to 101 ft.				
					Filter: 20/40 silica filter sand (10 - 0.5 cubic ft. bags)
105					**Standpipe:** **2" OD PVC (SCH 40)** Screen: 20 ft; 0.010" Slots
	- gray (2.5Y 5/1) and very dark gray (2.5Y 3/1) coarse grain, hard, not weathered, inclined and folded bedding, moderately fractured, white banding				
110	- near vertical bedding 109 to 111 ft.				

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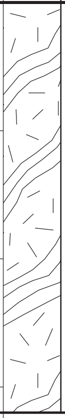
LOG OF TEST BORING

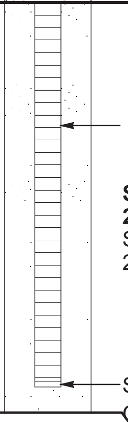
SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Biotite Gneiss *(Con't)*				(CONTINUED)
115		- gray (2.5Y 6/1) coarse grain, hard, not weathered, inclined, intensely fractured, white and dark gray banding, near horizontal fractures				**Standpipe:** **2" OD PVC (SCH 40)** Screen: 20 ft; 0.010" Slots
120						
125		- soft				Sump:0.200000000000003 ft. Cave-in to 126 ft.





Bottom of borehole at 126.0 feet.

130

135

140

145

150

155

160

165

170

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

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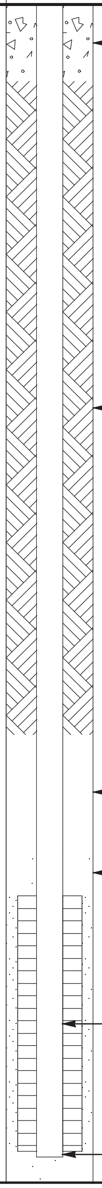
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 5/25/2016 **COMPLETED** 5/26/2016 **SURF. ELEV.** 473.0 **COORDINATES:** N:33.082910 E:-83.809300
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY M. Pope **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 46 ft. **GROUND WATER DEPTHDURING** **COMP.** 3.5 ft. **DELAYED** 5.8 ft. after 200 hrs.
NOTES



DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Clayey Sand (SC) - dark brown (7.5YR 3/3) damp, fine to medium-grained				Surface Seal: concrete
	▼	**Lean Clay (CL)** - mottled yellowish red (5YR 4/6) and yellowish brown (10YR 5/6) damp, medium, with mica				
5	▽					
		- dark brown (10YR 3/3) with fine quartz gravel				
10		**Well-graded Sand with Silt (SW-SM)** - yellowish red / light brown (5YR 5/6) and yellowish brown (10YR 5/6) moist, fine to coarse-grained, with mica				
15		- very dark gray (10YR 3/1) black (10YR 3/1) oxidation mottling				Annular Fill: Cement-Bentonite Grout (2 - 94# bags PC, 1/4 - 55# bag gel, 55 gal. water)
20		- dark brown (7.5YR 3/4) wet				
25		- brown (7.5YR 4/3) and strong brown (7.5YR 4/6) fine to coarse-grained - dark yellowish brown (10YR 4/4) wet				
		Clayey Sand (SC) - grayish brown (2.5Y 5/2) wet, with mica				
30						Annular Seal: bentonite pellets (1 - 5 gal. buckect 3/8" pellets)
		Well-graded Sand with Silt (SW-SM) - grayish brown (2.5Y 5/2) and white / yellowish gray (5Y 8/1) partially weathered rock biotite gneiss, fine to coarse-grained,				Filter: 20/40 silica filter sand (4 1/2 - 0.5 cubic ft. bags)
35		- olive gray (5Y 4/2) wet, fine to coarse-grained				
40						**Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack
		- mottled olive gray (5Y 4/2) and white / yellowish gray (5Y 8/1)				
45						Sump:0.200000000000003 ft. Cave-in to 46 ft.
		Bottom of borehole at 46.0 feet.				
50						

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

BORING PZ-28 I
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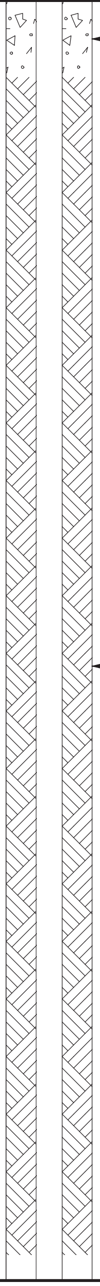
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 6/3/2016 **COMPLETED** 6/3/2016 **SURF. ELEV.** 481.3 **COORDINATES:** N:33.082440 E:-83.808200
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY T. Ardito **LOGGED BY** P. Alexander **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 70 ft. **GROUND WATER DEPTHDURING** **COMP.** **DELAYED** 15.5 ft. after 24 hrs.
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS
	Silt (ML) - red (2.5YR 5/8) residuum dry, medium stiff, no, micaceous			
5				
10				
	Poorly-graded Sand with Silt (SP-SM) - yellowish red (5YR 5/8) saprolite moist, loose, fine-grained, with mica, oxidation			
15	▽			
20				
	Silt (ML) - mottled red (2.5YR 5/6), reddish gray (10R 6/1) and reddish yellow (5YR 6/6) saprolite moist, medium stiff, no, fine-grained, some mica, oxidation			
25				
	Poorly-graded Sand with Silt (SP-SM) - mottled light gray (2.5Y 7/2), olive brown (2.5Y 4/3) and dusky yellow green (5GY 5/2) saprolite moist, loose			
30				
35				
40				
	- greenish gray (10Y 5/1) moist			
45				
	Well-graded Sand (SW) - greenish gray (10Y 5/1), black (N1) and white (N9) moist, loose, biotite and feldspar, some mica			
50				

WELL DATA

Completion:
protective aluminum cover with bollards;
4-foot square concrete pad



Surface Seal:
concrete

Annular Fill:
Cement-Bentonite Grout (5 - 94# bags PC, 1/4 - 55# bag gel, 55 gal. water)

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EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

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PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS	WELL DATA

WELL DATA

Completion:
protective aluminum cover with bollards;
4-foot square concrete pad

(CONTINUED)

- yellowish brown / moderate yellowish brown (10YR 5/4) and white (2.5Y 8/1) very soft, highly weathered, banded

Biotite Gneiss *(Con't)*

- yellowish brown / moderate yellowish brown (10YR 5/4), white (2.5Y 8/1) and dark greenish gray (10Y 4/1) very soft to soft, banded, horizontal to sub-vertical fractures

55

- dark bluish gray (5PB 4/1) and very light gray (N8) hard to very hard, slightly weathered, banded, horizontal to sub-vertical fractures, intensely fractured

60

65

- greenish black (5GY 2.5/1) and medium light gray (N6) slightly to moderately weathered, banded, horizontal to sub-vertical fractures, intensely fractured

70

Bottom of borehole at 70.0 feet.

75

80

85

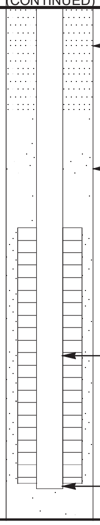
90

95

100

105

110



Annular Seal:
bentonite pellets (3/4 - 5 gal. buckect 3/8" pellets)

Filter:
20/40 silica filter sand (4 1/2 - 0.5 cubic ft. bags)

Standpipe:
2" OD PVC (SCH 40)
Screen:
9.99999999999999 ft; 0.010" Slot Prepack

Sump:0.200000000000003 ft.

Cave-in to 70 ft.

SOUTHERN COMPANY

LOG OF TEST BORING

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SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

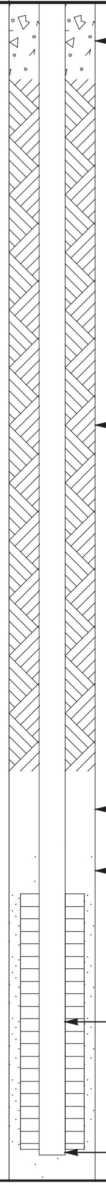
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 5/26/2016 **COMPLETED** 5/26/2016 **SURF. ELEV.** 488.4 **COORDINATES:** N:33.082090 E:-83.807400
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY M. Pope **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 46 ft. **GROUND WATER DEPTHDURING** **COMP.** 22 ft. **DELAYED** 26.9 ft. after 100 hrs.
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS
		Sandy Lean Clay (CL) - red (2.5YR 4/8) dry, with mica			
		Sandy Silt (ML) - red (2.5YR 4/8) with mica			
5					
10		- mottled strong brown (7.5YR 5/6) and black (7.5YR 2.5/1) dry			
15					
20					
		▼			
		Well-graded Sand with Silt (SW-SM) - dark yellowish brown (10YR 4/4) damp, fine to medium-grained			
25					
		▽ - olive brown (2.5Y 4/4)			
30		- light olive brown (2.5Y 5/6)			
		- mottled olive (5Y 4/3) and pale yellow (5Y 7/4)			
35					
		- olive brown (2.5Y 4/3)			
40					
45		- mottled olive gray / light olive gray (5Y 5/2) and dark greenish gray (10Y 4/1) weathered biotite gneiss			
		Bottom of borehole at 46.0 feet.			
50					

WELL DATA

Completion:
protective aluminum cover with bollards; 4-foot square concrete pad



Surface Seal:
concrete

Annular Fill:
Cement-Bentonite Grout (2 - 94# bags PC, 1/4 - 55# bag gel, 55 gal. water)

Annular Seal:
bentonite pellets (1 - 5 gal. buckect 3/8" pellets)
Filter:
20/40 silica filter sand (5 - 0.5 cubic ft. bags)

Standpipe:
2" OD PVC (SCH 40)
Screen:
10 ft; 0.010" Slot Prepack

Sump:0.200000000000003 ft.
Cave-in to 46 ft.

BORING PZ-30 I

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EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)

LOCATION Plant Scherer

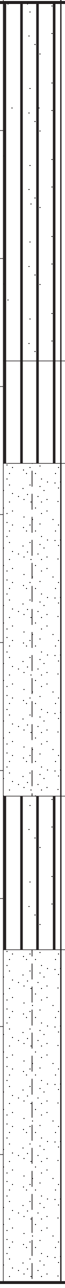
DATE STARTED 6/2/2016 **COMPLETED** 6/2/2016 **SURF. ELEV.** 475.4 **COORDINATES:** N:33.081550 E:-83.805900

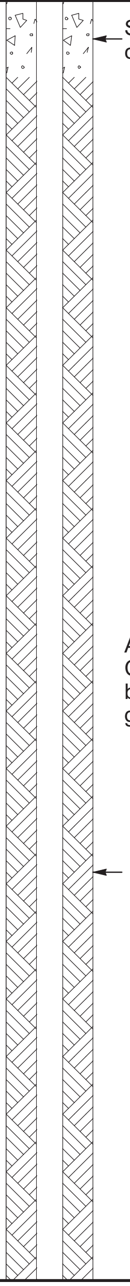
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic

DRILLED BY T. Ardito **LOGGED BY** P. Alexander **CHECKED BY** B. Smelser **ANGLE** **BEARING**

BORING DEPTH 87 ft. **GROUND WATER DEPTHDURING** **COMP.** **DELAYED** 18.9 ft. after 24 hrs.

NOTES





DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak, Moderate, Strong)	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
0–14	**Sandy Silt (ML)** - red (2.5YR 5/6) residuum dry, stiff, no, fine-grained, trace mica - damp				Surface Seal: concrete
14–18	**Silt (ML)** - mottled yellowish red / light brown (5YR 5/6) and strong brown (7.5YR 5/6) residuum dry, soft, low, fine-grained, trace mica, oxidation				
18–31	▽ **Poorly-graded Sand with Silt (SP-SM)** - brown (7.5YR 5/4) residuum moist, loose, fine-grained, with mica				Annular Fill: Cement-Bentonite Grout (6 - 94# bags PC, 1/2 - 55# bag gel, 70 gal. water)
31–37	**Sandy Silt (ML)** - mottled brown (7.5YR 5/4) and reddish yellow (7.5YR 8/6) saprolite moist, no, with mica, oxidation				
37–50	**Poorly-graded Sand with Silt (SP-SM)** - light brownish gray (2.5Y 6/2) moist, loose, fine-grained - sub-vertical fractures - mottled light red / moderate reddish orange (10R 6/6) and very pale brown / very pale orange (10YR 8/2) saprolite folded fabric - white (N9), very pale brown (10YR 7/3) and reddish brown (2.5YR 4/4) - very dark grayish brown (2.5Y 3/2) moist, fine-grained, some mica				

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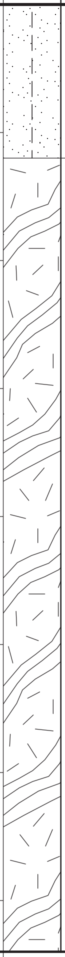
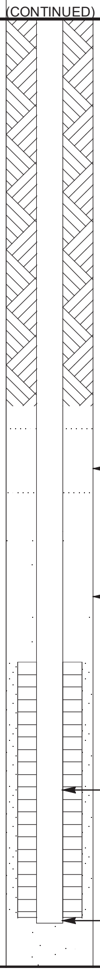
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad





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Depth scale (ft): 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110

Poorly-graded Sand with Silt (SP-SM) *(Con't)*

Biotite Gneiss
- olive gray / light olive gray (5Y 5/2) and pale yellow (2.5Y 8/4) very soft, highly weathered, banded

- dark gray (N3) and very light gray (N8) soft, highly weathered, banded

- black (5Y 2.5/1) and light olive brown (2.5Y 5/4) moderately to highly weathered

- very dark greenish gray (10Y 3/1) and very light gray (N8) soft, moderately weathered, foliated

Bottom of borehole at 87.0 feet.

Annular Fill:
Cement-Bentonite Grout (6 - 94# bags PC, 1/2 - 55# bag gel, 70 gal. water)

Annular Seal:
bentonite pellets (1 - 5 gal. buckect 3/8" pellets)

Filter:
20/40 silica filter sand (6 - 0.5 cubic ft. bags)

Standpipe:
2" OD PVC (SCH 40)
Screen:
10 ft; 0.010" Slot Prepack

Sump:0.200000000000003 ft.

Cave-in to 87 ft.

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LOG OF TEST BORING

SOUTHERN COMPANY

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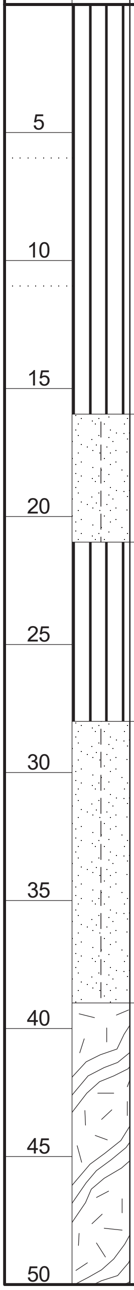
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED	6/1/2016	**COMPLETED**	6/2/2016	**SURF. ELEV.**	463.8	**COORDINATES:**	N:33.081910 E:-83.804700
CONTRACTOR	Cascade	**EQUIPMENT**	Tracked	**METHOD**	Rotosonic		
DRILLED BY	T. Ardito	**LOGGED BY**	P. Alexander	**CHECKED BY**	B. Smelser	**ANGLE** / **BEARING**	
BORING DEPTH	77 ft.	**GROUND WATER DEPTHDURING**		**COMP.**	24 ft.	**DELAYED**	28.1 ft. after 200 hrs.
NOTES							

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad



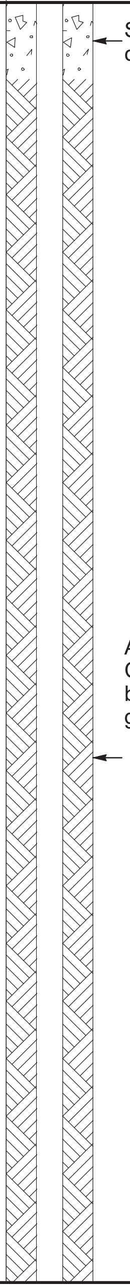
Silt (ML)
- red (10R 5/6) residuum dry, stiff, no, trace mica
- red (2.5YR 5/8) residuum dry, some mica
- oxidation

Poorly-graded Sand with Silt (SP-SM)
- mottled reddish yellow (7.5YR 6/6) and pink / moderate orange pink (5YR 8/4) residuum damp, loose, fine-grained

Silt (ML)
- strong brown (7.5YR 4/6) and white (N9) residuum moist, soft, fine-grained, feldspar and biotite

Poorly-graded Sand with Silt (SP-SM)
- greenish gray (5G 5/1) and very light gray (N8) saprolite moist, fine-grained, some mica

Biotite Gneiss
- yellowish brown / moderate yellowish brown (10YR 5/4), light greenish gray (10Y 7/1) and white (N9) highly weathered, felspar banding
- greenish gray (5GY 5/1) and greenish black (5GY 2.5/1) soft, highly weathered, felspar banding



Surface Seal:
concrete

Annular Fill:
Cement-Bentonite Grout (6 - 94# bags PC, 1/2 - 55# bag gel, 70 gal. water)

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SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

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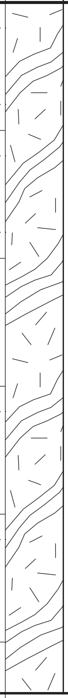
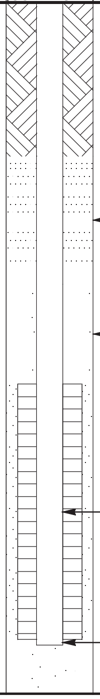
LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		**Biotite Gneiss***(Con't)*				(CONTINUED) 
55						Annular Fill: Cement-Bentonite Grout (6 - 94# bags PC, 1/2 - 55# bag gel, 70 gal. water)
60		- dark gray (N3) and very light gray (N8) soft to medium hard, moderately weathered, felspar banding				Annular Seal: bentonite pellets (3/4 - 5 gal. buckect 3/8" pellets)
65						Filter: 20/40 silica filter sand (7 1/2 - 0.5 cubic ft. bags)
70		- bluish black (10B 2.5/1) and white (N9) very hard, slightly weathered, horizontal and sub-vertical fractures, felspar banding				**Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack
75						Sump:0.199999999999989 ft.
		Bottom of borehole at 77.0 feet.				Cave-in to 77 ft.
80						
85						
90						
95						
100						
105						
110						

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

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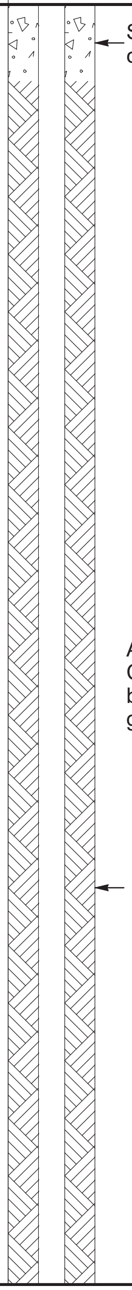
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 5/31/2016 **COMPLETED** 6/1/2016 **SURF. ELEV.** 462.3 **COORDINATES:** N:33.081590 E:-83.803800
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY J. Asua **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 126.5 ft. **GROUND WATER DEPTHDURING** **COMP.** 23.5 ft. **DELAYED** 24.5 ft. after 24 hrs.
NOTES



DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
5		**Silt (ML)** - red (2.5YR 4/6) residuum dry, stiff, no				Surface Seal: concrete
10		**Clayey Sand (SC)** - red (10R 5/6) dry, loose, fine-grained, some oxidation				
15		**Sandy Silt (ML)** - reddish yellow (5YR 6/6) dry				
20 25		**Silty Sand (SM)** - mottled reddish brown (5YR 5/4) and very dark gray (7.5YR 3/1) dry, loose, fine-grained, trace mica - strong brown (7.5YR 5/8) moist - light brown (7.5YR 6/4) - mottled light yellowish brown (10YR 6/4) and light olive brown (2.5Y 5/4)			▼ ▽	Annular Fill: Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 80 gal. water)
30 35		**Sandy Silt (ML)** - bluish gray (10B 5/1) and white (N9) moist, medium stiff, some clay, varying amounts of sand				
40 45		**Poorly-graded Sand with Clay (SP-SC)** - white (7.5YR 8/1), very dark bluish gray (10B 3/1) and very dark gray (10YR 3/1) moist, loose, fine-grained - 2" sand (SW) seam at 41 ft.				
50		**Well-graded Sand (SW)** - greenish black (10GY 2.5/1) saprolite medium to coarse-grained, weathered biotite gneiss, some silt, pulverized rock (sand with gravel)				

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SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

BORING PZ-32 D

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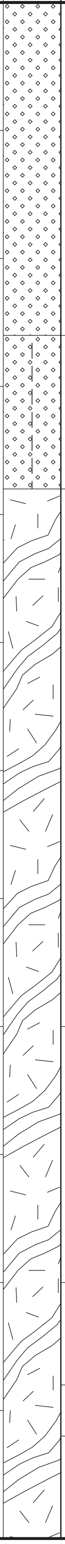
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad



Well-graded Sand (SW)*(Con't)*

- SW:
- greenish black (10GY 2.5/1) medium to coarse-grained, weathered biotite gneiss, some silt
- very dark greenish gray (5GY 3/1)

Well-graded Sand with Silt (SW-SM)
- very dark gray (7.5YR 3/1) medium to coarse-grained, some gravel (slightly decomposed biotite gneiss)
- mottled very dark greenish gray (10GY 3/1) and white (7.5YR 8/1) weathered biotite gneiss

Biotite Gneiss
- dark gray (7.5YR 4/1) medium to coarse grain, medium hard to hard, slightly to highly weathered, thin to medium bedding, vuggy, moderately fractured, white feldspar and quartz banding
- yellowish red (5YR 5/8) water staining
- dark gray / brownish gray (5YR 4/1) and black (5YR 2.5/1) medium to coarse grain, not to slightly weathered, inclined, white banding
- slightly fractured
- not to moderately weathered
- slightly fractured, feldspar rich 84-86 ft.

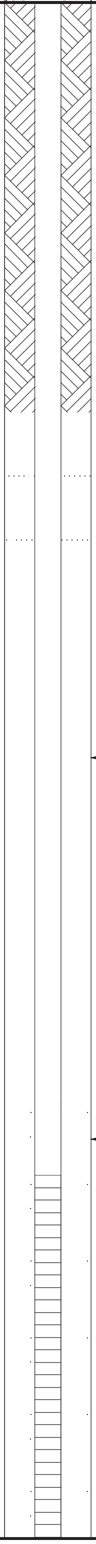
Granitic Gneiss
- white (10YR 8/1) and gray (10YR 6/1) medium to coarse grain, hard, not to slightly weathered, inclined, banded, slightly fractured

Biotite Gneiss
- dark gray (10YR 4/1) and black (10YR 2/1) medium to coarse grain, not to slightly weathered, medium bedded, white banding

Granitic Gneiss
- gray (10YR 6/1) and pink (5YR 7/3) medium to coarse grain, not weathered

Biotite Gneiss
- dark gray (10YR 4/1), black (10YR 2/1) and white (10YR 8/1) not weathered, medium bedded, slightly to moderately fractured, sub-

WELL DATA (CONTINUED)



Annular Fill:
Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 80 gal. water)

Annular Seal:
bentonite pellets (1 - 5 gal. buckect 3/8" pellets (89-93 ft.), 6 - 50# bags 3/8" chips (66-89 ft.)

Filter:
20/40 silica filter sand (15 1/2 - 0.5 cubic ft. bags)

Standpipe:
2" OD PVC (SCH 40)
Screen:
30 ft; 0.010" Slots

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SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

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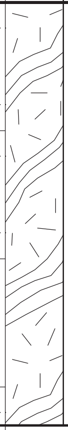
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

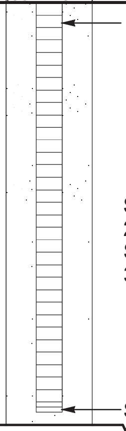
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: protective aluminum cover with bollards; 4-foot square concrete pad



(CONTINUED)

horizontal fractures
Biotite Gneiss *(Con't)*
- quartz healed fractures (sub-vertical)
- medium to coarse sand in fractures

- coarse grain, not to highly weathered, medium bedded, moderately fractured, alternating competent rock and sand filled fractures



Standpipe:
2" OD PVC (SCH 40)
Screen:
30 ft; 0.010" Slots

Sump:0.200000000000003 ft.
Cave-in to 126.5 ft.

Bottom of borehole at 126.5 feet.

115
120
125
130
135
140
145
150
155
160
165
170

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

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LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

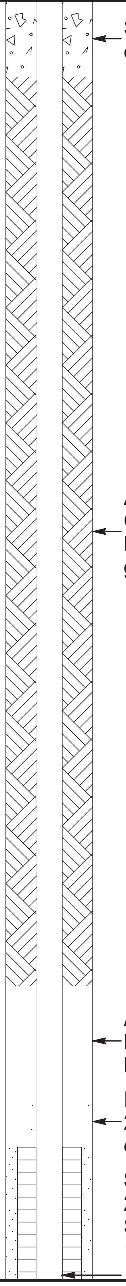
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 5/31/2016 **COMPLETED** 6/1/2016 **SURF. ELEV.** 462.3 **COORDINATES:** N:33.081600 E:-83.803800
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY J. Asua **LOGGED BY** P. Alexander **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 57 ft. **GROUND WATER DEPTHDURING** 26 ft. **COMP.** 21.3 ft. **DELAYED** 23.8 ft. after 200 hrs.
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS
0–6 (5)	**Silt (ML)** - red (2.5YR 4/6) residuum dry, stiff, no			
6–13 (10)	**Clayey Sand (SC)** - red (10R 5/6) dry, loose, fine-grained, some oxidation			
13–15 (15)	**Sandy Silt (ML)** - reddish yellow (5YR 6/6) dry			
15–29 (20, 25)	**Silty Sand (SM)** - mottled reddish brown (5YR 5/4) and very dark gray (7.5YR 3/1) dry, loose, fine-grained, trace mica - strong brown (7.5YR 5/8) moist ▼ ▼ - light brown (7.5YR 6/4) ▽ - mottled light yellowish brown (10YR 6/4) and light olive brown (2.5Y 5/4)			
29–36 (30, 35)	**Sandy Silt (ML)** - bluish gray (10B 5/1) and white (N9) moist, medium stiff, some clay, varying amounts of sand			
36–45 (40, 45)	**Poorly-graded Sand with Clay (SP-SC)** - white (7.5YR 8/1), very dark bluish gray (10B 3/1) and very dark gray (10YR 3/1) moist, loose, fine-grained - 2" sand (SW) seam at 41 ft.			
45–50 (50)	**Well-graded Sand (SW)** - greenish black (10GY 2.5/1) saprolite medium to coarse-grained, weathered biotite gneiss, some silt, pulverized rock (sand with gravel)			

WELL DATA

Completion:
protective aluminum cover with bollards; 4-foot square concrete pad



Surface Seal:
concrete

Annular Fill:
Cement-Bentonite Grout (2 - 94# bags PC, 1/4 - 55# bag gel, 55 gal. water)

Annular Seal:
bentonite pellets (1 - 5 gal. buckect 3/8" pellets)

Filter:
20/40 silica filter sand (5 - 0.5 cubic ft. bags)

Standpipe:
2" OD PVC (SCH 40)
Screen:
10 ft; 0.010" Slot Prepack

(Continued Next Page)

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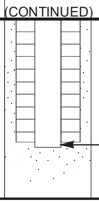
SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
55		**Well-graded Sand (SW)***(Con't)*				(CONTINUED) **Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack Sump:0.200000000000003 ft. Cave-in to 57 ft.
		Bottom of borehole at 57.0 feet.				
60						
65						
70						
75						
80						
85						
90						
95						
100						
105						
110						



SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

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SOUTHERN COMPANY

LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)

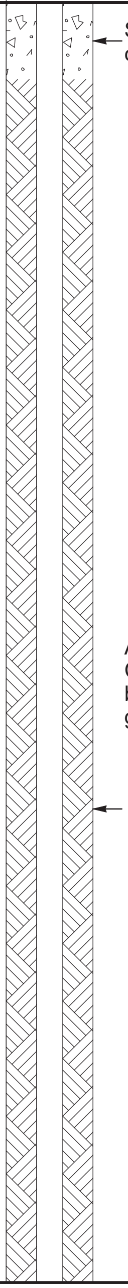
LOCATION Plant Scherer

DATE STARTED	6/7/2016	**COMPLETED**	6/8/2016	**SURF. ELEV.**	466.3	**COORDINATES:**	N:33.082010 E:-83.799400
CONTRACTOR	Cascade	**EQUIPMENT**	Tracked	**METHOD**	Rotosonic		
DRILLED BY	J. Asua	**LOGGED BY**	W. Shaughnessy	**CHECKED BY**	B. Smelser	**ANGLE**	
						BEARING	
BORING DEPTH	76.5 ft.	**GROUND WATER DEPTHDURING**		**COMP.**		**DELAYED**	39 ft. after 100 hrs.
NOTES							

DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS
	Sandy Lean Clay (CL) - red (2.5YR 4/6) dry, no			
5				
	Sandy Silt (ML) - red (2.5YR 4/6) dry, no			
10				
	- yellowish red / light brown (5YR 5/6)			
	Well-graded Sand with Silt (SW-SM) - mottled yellowish red / light brown (5YR 5/6) and black (5YR 2.5/1) dry, fine to coarse-grained			
15				
20				
25				
	Clayey Sand (SC) - mottled strong brown (7.5YR 5/8), yellowish brown (10YR 5/8) and white (10YR 8/1) dry, fine to medium-grained			
30				
35				
	▽			
40				
	Well-graded Sand with Silt (SW-SM) - mottled light olive brown (2.5Y 5/3), white (2.5Y 8/1) and black (2.5Y 2.5/1) damp, fine to coarse-grained, with mica			
45				
	Well-graded Sand (SW) - olive gray / light olive gray (5Y 5/2), greenish gray (5GY 5/1) and white (2.5Y 8/1) saprolite wet, fine to coarse-grained, weathered gneiss			
50				

WELL DATA

Completion:
protective aluminum cover with bollards;
4-foot square concrete pad



Surface Seal:
concrete

Annular Fill:
Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 90 gal. water)

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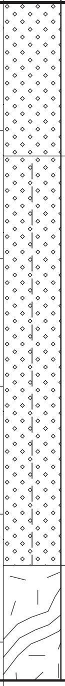
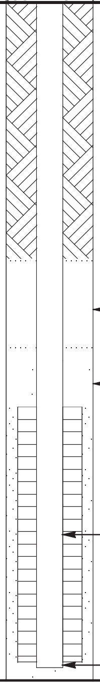
SOUTHERN COMPANY
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
55		**Well-graded Sand (SW)***(Con't)* - mottled dark gray (7.5YR 4/1) and white (N9)				Completion: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED)
60 65 70		**Well-graded Sand with Silt (SW-SM)** - very dark greenish gray (10Y 3/1) wet, fine to coarse-grained, with gravel (pulverized rock/biotite gneiss)				
75		**Biotite Gneiss** - dark greenish gray (10G 4/1) coarse grain, medium hard to soft, moderately to highly weathered, vuggy, black and white banding, quartz and feldspar - Driller indicated competent rock at 76.5 ft.				
80 85 90 95 100 105 110		Bottom of borehole at 76.5 feet.				





Annular Fill:
Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 90 gal. water)

Annular Seal:
bentonite pellets (1 - 5 gal. buckect 3/8" pellets)

Filter:
20/40 silica filter sand (4 1/2 - 0.5 cubic ft. bags)

Standpipe:
2" OD PVC (SCH 40)
Screen:
10 ft; 0.010" Slot Prepack

Sump:0.200000000000003 ft.
Cave-in to 76.5 ft.

SOUTHERN COMPANY

LOG OF TEST BORING

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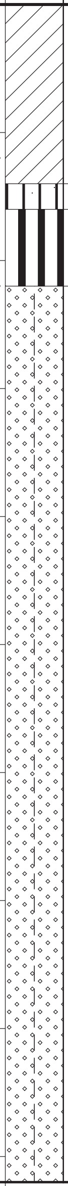
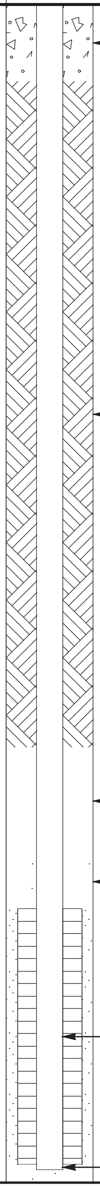
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 6/3/2016 **COMPLETED** 6/4/2016 **SURF. ELEV.** 440.8 **COORDINATES:** N:33.082240 E:-83.798600
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY J. Asua **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 46 ft. **GROUND WATER DEPTHDURING** **COMP.** 13 ft. **DELAYED**
NOTES

WELL DATA
Completion:
protective aluminum cover with bollards;
4-foot square concrete pad





DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak, Moderate, Strong)	GROUNDWATER OBSERVATIONS	WELL DATA
	Lean Clay (CL) - red (2.5YR 4/6) dry, no				Surface Seal: concrete
5					
	Sandy Silt (ML) - reddish brown (2.5YR 4/4)				
10	**Elastic Silt (MH)** - mottled strong brown (7.5YR 5/6) and black (7.5YR 2.5/1) damp, medium				
	▼ **Well-graded Sand with Silt (SW-SM)** - mottled yellowish brown (10YR 5/6), black (10YR 2/1) and white (10YR 8/1) damp, fine to medium-grained				
15	- mottled light olive brown (2.5Y 5/4), black (10YR 2/1) and white (10YR 8/1) saprolite				Annular Fill: Cement-Bentonite Grout (3 - 94# bags PC, 1/2 - 55# bag gel, 60 gal. water)
20					
	- light olive brown (2.5Y 5/3) moist				
25	- mottled olive (5Y 5/3) and strong brown (7.5YR 5/6) wet				
	- olive gray / light olive gray (5Y 5/2)				
30	- mottled olive gray / light olive gray (5Y 5/2), strong brown (7.5YR 5/6) and white (7.5YR 8/1) weathered feldspar				Annular Seal: bentonite pellets (1 - 5 gal. buckect 3/8" pellets) Filter: 20/40 silica filter sand (5 - 0.5 cubic ft. bags)
35					
40	- mottled dark gray (2.5Y 4/1) and white (7.5YR 8/1) weathered biotite gneiss				**Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack
45					Sump:0.200000000000003 ft.
	Bottom of borehole at 46.0 feet.				Cave-in to 46 ft.
50					

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

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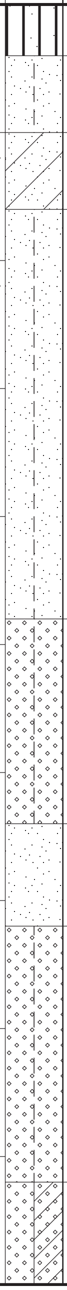
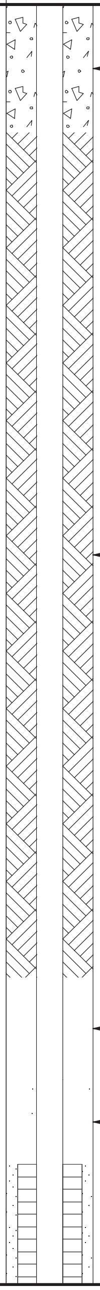
LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 6/22/2016 **COMPLETED** 6/22/2016 **SURF. ELEV.** 474.5 **COORDINATES:** N:33.083012 E:-83.809238
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY J. Asua **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 56 ft. **GROUND WATER DEPTH DURING** **COMP.** **DELAYED** 5.3 ft. after 100 hrs.
NOTES





DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS	WELL DATA Completion: flush-mount 8" diameter steel cover; 4-foot square concrete pad
	Sandy Silt (ML) - dark red (2.5YR 3/6) dry				
	Poorly-graded Sand with Silt (SP-SM) - dark red (10R 3/6) dry				Surface Seal: concrete
5	▽ **Clayey Sand (SC)** - dark reddish brown (2.5YR 3/4) dry, cohesive - yellowish red / light brown (5YR 5/6)				
10	**Poorly-graded Sand with Silt (SP-SM)** - mottled red (2.5YR 4/6) and brown (7.5YR 4/4) moist, fine-grained, micaceous				
15	- mottled light yellowish brown (10YR 6/4), red (2.5YR 4/6) and black (N1) micaceous (biotite and muscovite), oxidation - mottled brown (7.5YR 4/4), yellowish red / light brown (5YR 5/6) and black (N1) saprolite wet, micaceous				
20	- mottled light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/8)				Annular Fill: Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 60 gal. water)
25	**Well-graded Sand with Silt (SW-SM)** - mottled strong brown (7.5YR 4/6) and black (N1) wet, fine to coarse-grained, micaceous				
30	- mottled brown (10YR 5/3) and white (N9) weathered feldspar				
35	**Poorly-graded Sand (SP)** - mottled dark gray (2.5Y 4/1) and light olive brown (2.5Y 5/6) fine-grained				
40	**Well-graded Sand with Silt (SW-SM)** - damp - olive brown (2.5Y 4/3) fine to coarse-grained - SW: - olive brown (2.5Y 4/3), white (N9) and light gray (10YR 7/1) with gravel (residual/pulverized rock)				Annular Seal: bentonite pellets (1 - 5 gal. buckect 3/8" pellets)
45					Filter: 20/40 silica filter sand (4 1/2 - 0.5 cubic ft. bags)
50	**Well-graded Sand with Clay (SW-SC)** - dark greenish gray (10Y 4/1) with gravel (residual/pulverized rock)				**Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack

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SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

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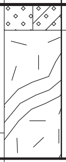
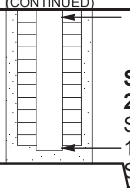
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: flush-mount 8" diameter steel cover; 4-foot square concrete pad
		**Biotite Gneiss** - dark gray (10YR 4/1) and light gray (10YR 7/1) medium to coarse grain, medium hard to hard, slightly to highly weathered, inclined, moderate to intensely fractured, white banding				(CONTINUED)  **Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack Sump:0.200000000000003 ft. Cave-in to 56 ft.
55						
		Bottom of borehole at 56.0 feet.				
60						
65						
70						
75						
80						
85						
90						
95						
100						
105						
110						

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SOUTHERN COMPANY

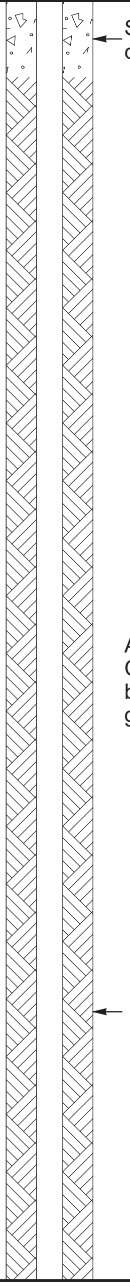
LOG OF TEST BORING

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 6/4/2016 **COMPLETED** 6/5/2016 **SURF. ELEV.** 478.9 **COORDINATES:** N:33.079730 E:-83.805300
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY T. Ardito **LOGGED BY** P. Alexander **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 97 ft. **GROUND WATER DEPTHDURING** **COMP.** **DELAYED** 49.8 ft. after 24 hrs.
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad
		Silt (ML) - red (2.5YR 4/6) dry, stiff, no				Surface Seal: concrete
5						
10						
		- red (2.5YR 5/6) dry, stiff, some mica				
15						
20						
		- saprolite				
		Poorly-graded Sand with Silt (SP-SM)				
25		- mottled reddish brown (5YR 5/4) and white (N9) damp, loose - mottled strong brown (7.5YR 5/6), pink (5YR 7/3) and light red (2.5YR 6/6)				Annular Fill: Cement-Bentonite Grout (6 - 94# bags PC, 1/2 - 55# bag gel, 70 gal. water)
		- slight oxidation				
30		**Well-graded Sand with Silt (SW-SM)** - red (2.5YR 5/6), pink (2.5YR 8/4) and strong brown (7.5YR 5/6) saprolite moist, loose, banded, some mica				
35		- mottled brown (7.5YR 5/3), reddish brown (2.5YR 5/4) and light gray (2.5Y 7/2) moist, horizontal and sub-vertical banding				
		- relict fractures 38 to 43 ft.				
40						
		Poorly-graded Sand with Silt (SP-SM) - mottled reddish yellow (7.5YR 6/6), yellow (10YR 7/6) and light yellowish brown (2.5Y 6/3) saprolite wet, very loose, some mica				
45						
		- relict fractures 46 to 48 ft. (horizontal and sub-vertical)				
		Poorly-graded Sand with Clay (SP-SC)				
50		▽ - mottled light gray (10YR 7/2), light reddish brown (2.5YR 6/3) and light				



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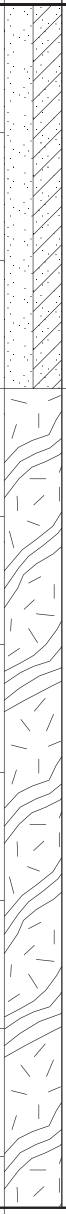
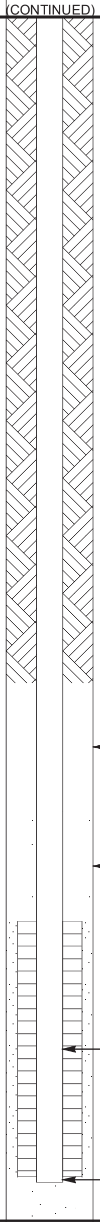




DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS	WELL DATA Completion: protective aluminum cover with bollards; 4-foot square concrete pad (CONTINUED)
	reddish brown (2.5YR 7/4) saprolite moist, loose, some mica, some oxidation 47 to 56 ft., foliation 55 to 57 ft. **Poorly-graded Sand with Clay (SP-SC)** *(Con't)*				
55					
	- mottled gray (2.5Y 6/1), olive gray / light olive gray (5Y 5/2) and very dark gray (5Y 3/1) saprolite moist, loose, some mica				
60					
65					Annular Fill: Cement-Bentonite Grout (6 - 94# bags PC, 1/2 - 55# bag gel, 70 gal. water)
	Biotite Gneiss - greenish gray (10Y 6/1), white (7.5YR 8/1) and dark greenish gray (10GY 4/1) very soft to soft, highly weathered, banded - bluish gray (10B 5/1) and light bluish gray (5PB 8/1) soft, highly weathered, banded, water staining, moderately disintegrated				
70					
75	- white (10YR 8/1) and greenish gray (5BG 5/1) very soft to soft, moderately weathered, banded, water staining, moderately disintegrated				
					Annular Seal: bentonite pellets (1 - 5 gal. buckect 3/8" pellets)
80	- medium light gray (N6), white (N9) and dark bluish gray (10B 4/1) hard, slightly weathered, banded, horizontal and sub-vertical fractures, water staining, slightly disintegrated				
					Filter: 20/40 silica filter sand (6 - 0.5 cubic ft. bags)
85	- dark bluish gray (10B 4/1) hard, slightly weathered, banded, slightly disintegrated				
90	- white (N9) and bluish gray (10B 5/1) hard, slightly weathered, banded, sub-vertical fractures, water staining, slightly disintegrated				**Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack
	- intensly fractured				
95	- hard, not to slightly weathered, massive, horizontal and sub-vertical fractures, slightly disintegrated				Sump:0.200000000000003 ft.
	Bottom of borehole at 97.0 feet.				Cave-in to 97 ft.
100					
105					
110					

SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

SOUTHERN COMPANY

LOG OF TEST BORING

BORING PZ-37 I
PAGE 1 OF 2
ECS38467

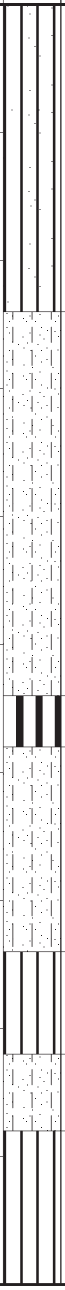
SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 6/2/2016 **COMPLETED** 6/2/2016 **SURF. ELEV.** 479.5 **COORDINATES:** N:33.081830 E:-83.801500
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY J. Asua **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 72.5 ft. **GROUND WATER DEPTHDURING** **COMP.** **DELAYED** 43 ft. after 48 hrs.
NOTES

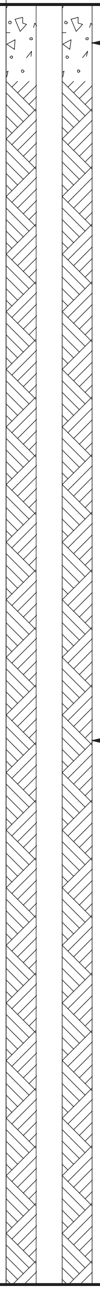
DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS
	Sandy Silt (ML) - dark red (2.5YR 3/6) dry			
5	- red (2.5YR 4/6)			
10	- yellowish red (5YR 4/6)			
	Silty Sand (SM) - red (10R 5/6) dry, fine-grained, with mica			
15	- weak red (10R 5/3)			
20	- mottled reddish brown (2.5YR 4/4) and reddish black (2.5YR 2.5/1) dry, weathered schist - weak red (2.5YR 5/2)			
25	- mottled reddish brown (2.5YR 4/4) and strong brown (7.5YR 5/6)			
	Elastic Silt (MH) - reddish brown (2.5YR 4/4) wet			
30	**Silty Sand (SM)** - reddish brown (2.5YR 5/4) fine to coarse-grained. with mica			
	- yellowish red (5YR 4/6) and reddish brown (2.5YR 4/4) with coarse gravel (residual quartz+feldspar viens)			
35	- mottled grayish brown (10YR 5/2) and white (10YR 8/1)			
	Silt (ML) - mottled strong brown (7.5YR 5/8) and black (7.5YR 2.5/1)			
40	**Silty Sand (SM)** - light brown (7.5YR 6/4) fine to coarse-grained. with mica			▽
45	**Silt (ML)** - strong brown (7.5YR 4/6) and black (7.5YR 2.5/1) - dark yellowish brown (10YR 4/4)			
50				

GRAPHIC LOG



WELL DATA

Completion:
protective aluminum cover with bollards;
4-foot square concrete pad

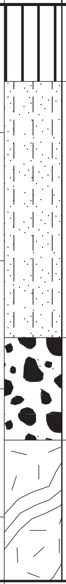


Surface Seal:
concrete

Annular Fill:
Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 90 gal. water)

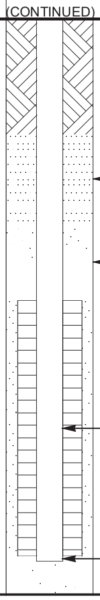
(Continued Next Page)

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS
		Silt (ML) *(Con't)*			
55 60		**Silty Sand (SM)** - olive brown (2.5Y 4/4) and olive gray / light olive gray (5Y 5/2) saprolite fine to coarse-grained, with mica			
65		**Well-graded Sandy Gravel (GW)** - dark gray (10YR 4/1) and white (10YR 8/1) transition zone pulverized rock, biotite gneiss, feldspar and quartz			
70		**Biotite Gneiss** - black (5Y 2.5/1) and white / yellowish gray (5Y 8/1) coarse grain, hard, not to slightly weathered, banded, moderately fractured, sub-horizontal fractures - yellowish red (5YR 5/8) water staining			
		Bottom of borehole at 72.5 feet.			
75					
80					
85					
90					
95					
100					
105					
110					



WELL DATA

Completion:
protective aluminum cover with bollards;
4-foot square concrete pad



Annular Fill:
Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 90 gal. water)

Annular Seal:
bentonite pellets (1 - 5 gal. buckect 3/8" pellets)

Filter:
20/40 silica filter sand (5 - 0.5 cubic ft. bags)

Standpipe:
2" OD PVC (SCH 40)
Screen:
10 ft; 0.010" Slot Prepack

Sump:0.200000000000003 ft.

Cave-in to 72.5 ft.

SOUTHERN COMPANY

SOUTHERN COMPANY SERVICES, INC.
EARTH SCIENCE AND ENVIRONMENTAL ENGINEERING

LOG OF TEST BORING

BORING PZ-38 I
PAGE 1 OF 2
ECS38467

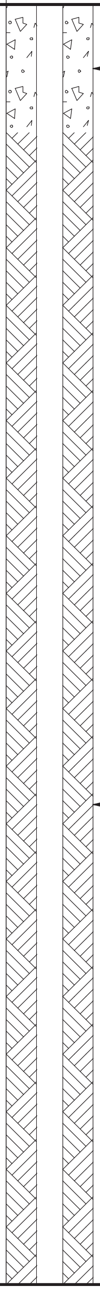
PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DATE STARTED 6/22/2016 **COMPLETED** 6/23/2016 **SURF. ELEV.** 482.1 **COORDINATES:** N:33.082673 E:-83.808276
CONTRACTOR Cascade **EQUIPMENT** Tracked **METHOD** Rotosonic
DRILLED BY J. Asua **LOGGED BY** W. Shaughnessy **CHECKED BY** B. Smelser **ANGLE** **BEARING**
BORING DEPTH 76 ft. **GROUND WATER DEPTHDURING** **COMP.** **DELAYED** 16.3 ft. after 100 hrs.
NOTES

WELL DATA

Completion:
flush-mount 8" diameter steel cover; 4-foot square concrete pad

DEPTH (ft)	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION (Weak / Moderate / Strong)	GROUNDWATER OBSERVATIONS
0–8	**Sandy Silt (ML)** - dark red (2.5YR 3/6) dry - with mica			
8–11	**Poorly-graded Sand with Silt (SP-SM)** - yellowish red / light brown (5YR 5/6) dry, fine-grained			
11–16	**Elastic Silt (MH)** - yellowish red / light brown (5YR 5/6) and brown (7.5YR 5/4) micaceous - brown (7.5YR 5/3) damp			▽
16–19	**Poorly-graded Sand with Silt (SP-SM)** - grayish brown (10YR 5/2) fine-grained, micaceous			
19–22	**Well-graded Sand (SW)** - black (N1) and very light gray (N8) coarse-grained, weathered feldspar seam			
22–36	**Poorly-graded Sand with Silt (SP-SM)** - grayish brown (10YR 5/2) and strong brown (7.5YR 4/6) saprolite wet, fine-grained, white banding, interbedded by weathered feldspar and quartz seams			
36–50	**Well-graded Sand with Silt (SW-SM)** - mottled olive gray / light olive gray (5Y 5/2) and pale yellow (5Y 8/2) saprolite wet, fine to coarse-grained - mottled grayish olive (10Y 4/2) and pale yellow (2.5Y 7/4) - mottled grayish brown (2.5Y 5/2) and pale yellow (2.5Y 7/4) with mica			



Surface Seal:
concrete

Annular Fill:
Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 90 gal. water)

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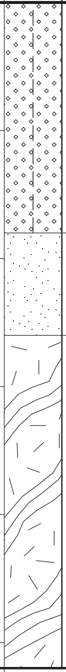
SIMPLE GEOLOGY WITH WELL - ESEE DATABASE.GDT - 9/7/16 11:23 - S:\WORKGROUPS\APC GENERAL SERVICE COMPLEX\CIVIL TECH SUPPORT\DRILLING\PROJECTS\GA-SCHERER\SCHERER ADDITIONAL HYDROGEOLOGIC INVESTIGATION (2016)\BORING LOG

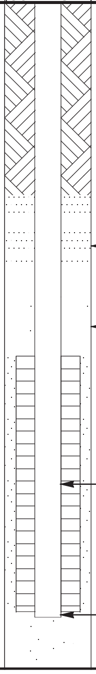
LOG OF TEST BORING

BORING PZ-38 I
PAGE 2 OF 2
ECS38467

PROJECT Additional Hydrogeological Investigation (2016)
LOCATION Plant Scherer

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION	HCL REACTION Weak Moderate Strong	GROUNDWATER OBSERVATIONS	WELL DATA
						Completion: flush-mount 8" diameter steel cover; 4-foot square concrete pad
55		**Well-graded Sand with Silt (SW-SM)***(Con't)* - mottled olive gray / light olive gray (5Y 5/2), brown (7.5YR 4/4) and white (N9) weathered biotite gneiss - mottled dark grayish brown (2.5Y 4/2) and white (N9) - mottled black (N1) and white (N9)				(CONTINUED) Annular Fill: Cement-Bentonite Grout (4 - 94# bags PC, 1/2 - 55# bag gel, 90 gal. water)
60		**Poorly-graded Sand (SP)** - yellowish brown (10YR 5/6) and dark grayish brown (2.5Y 4/2) fine-grained				Annular Seal: bentonite pellets (1 - 5 gal. buckect 3/8" pellets) Filter: 20/40 silica filter sand (4 1/2 - 0.5 cubic ft. bags)
65 70 75		**Biotite Gneiss** - grayish brown (2.5Y 5/2) fine to coarse grain, gravelly sand (pulverized weathered rock)				**Standpipe:** **2" OD PVC (SCH 40)** Screen: 10 ft; 0.010" Slot Prepack Sump:0.200000000000003 ft. Cave-in to 76 ft.





Bottom of borehole at 76.0 feet.

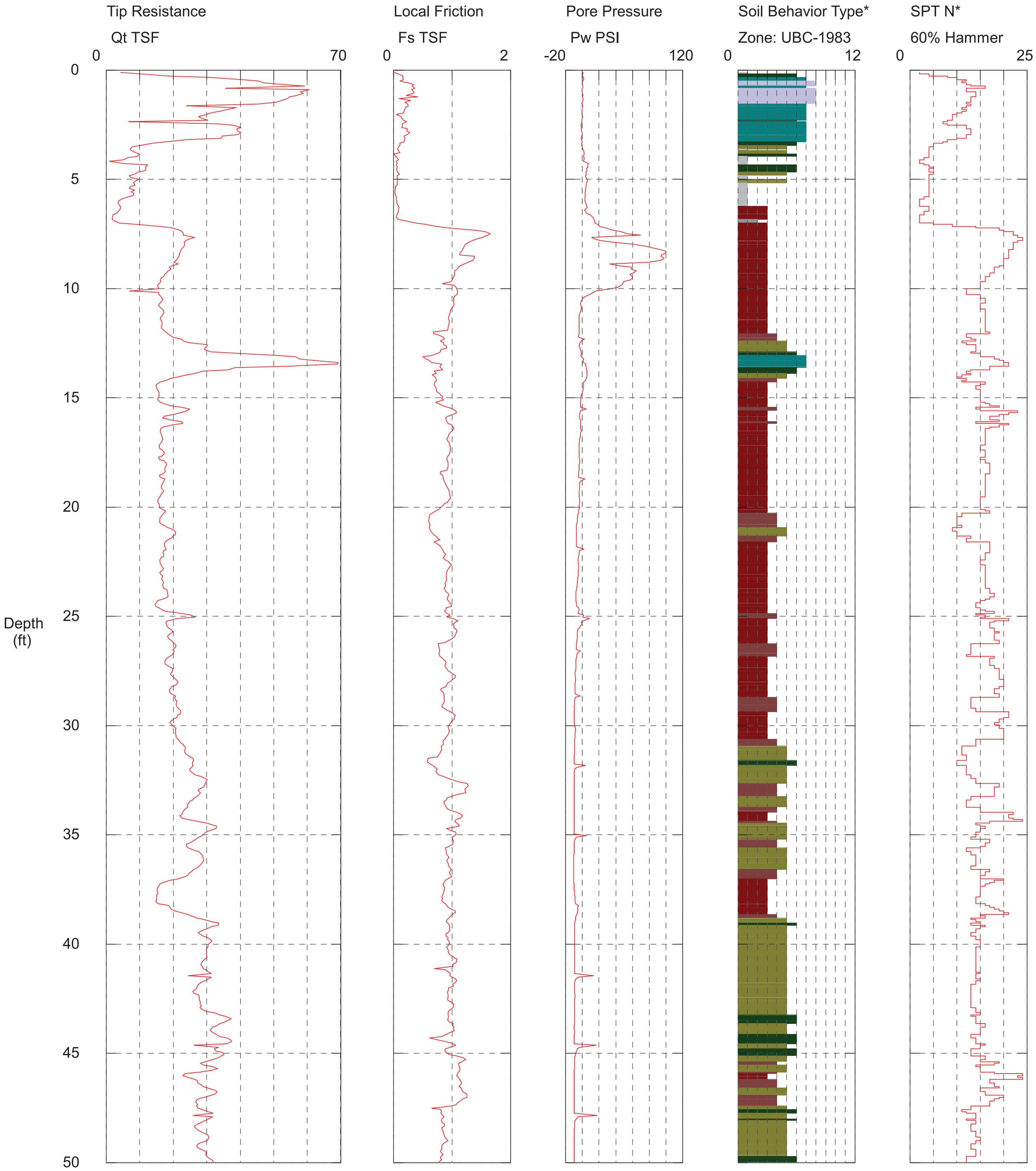
80
85
90
95
100
105
110

2015 Southern Company Services Subsurface Exploration CPT Logs

Thompson Engineering

Operator: B. Ellis
Sounding: CPT-1
Cone Used: DPG1256

CPT Date/Time: 6/10/2015 11:14:36 AM
Location: Plant Scherer
Job Number: 1511020045



Maximum Depth = 50.85 feet

Depth Increment = 0.066 feet

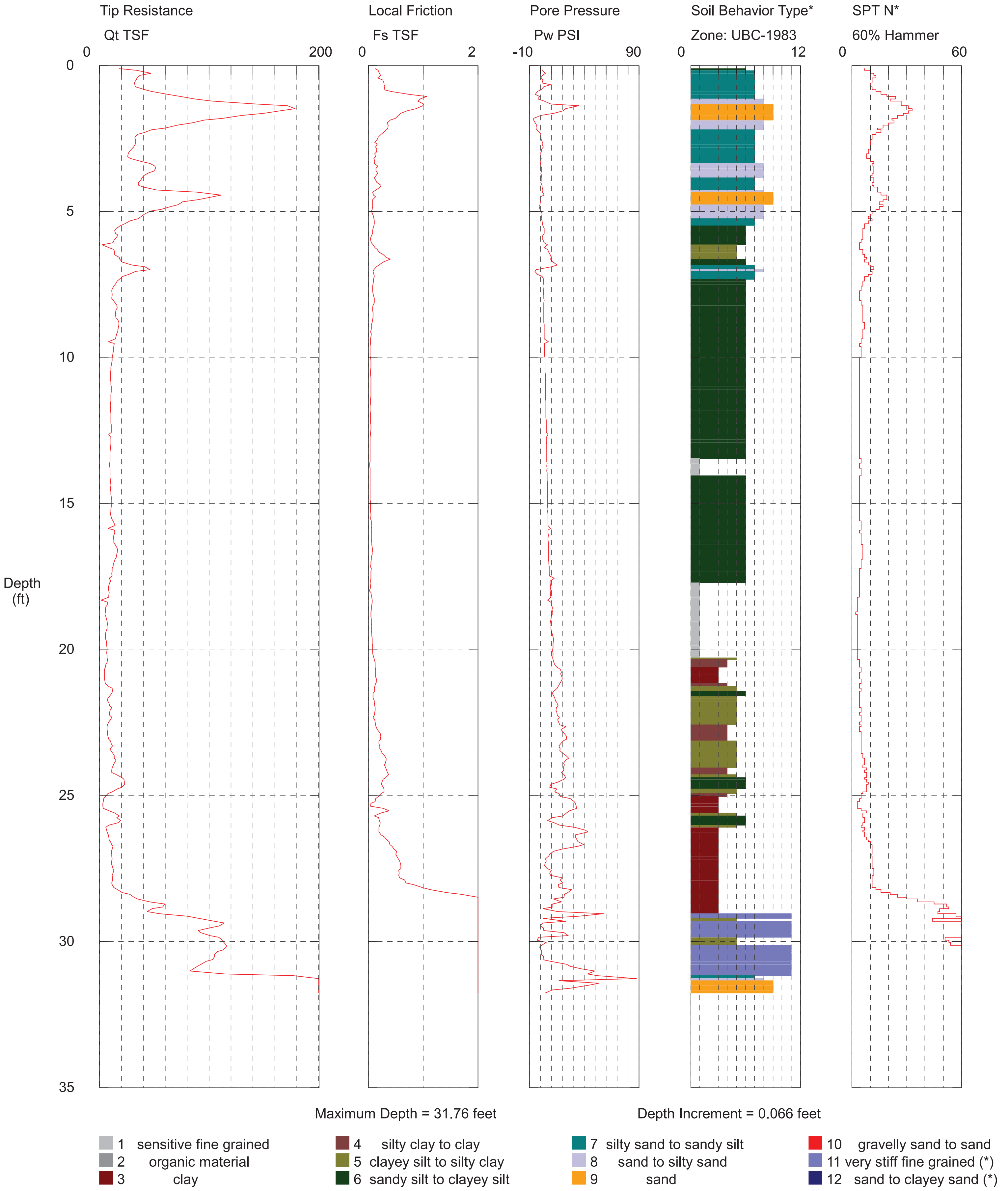
1 sensitive fine grained	4 silty clay to clay	7 silty sand to sandy silt	10 gravelly sand to sand
2 organic material	5 clayey silt to silty clay	8 sand to silty sand	11 very stiff fine grained (*)
3 clay	6 sandy silt to clayey silt	9 sand	12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

Thompson Engineering

Operator: B. Ellis
Sounding: CPT-2
Cone Used: DPG1256

CPT Date/Time: 6/10/2015 8:02:02 AM
Location: Plant Scherer
Job Number: 1511020045



Maximum Depth = 31.76 feet

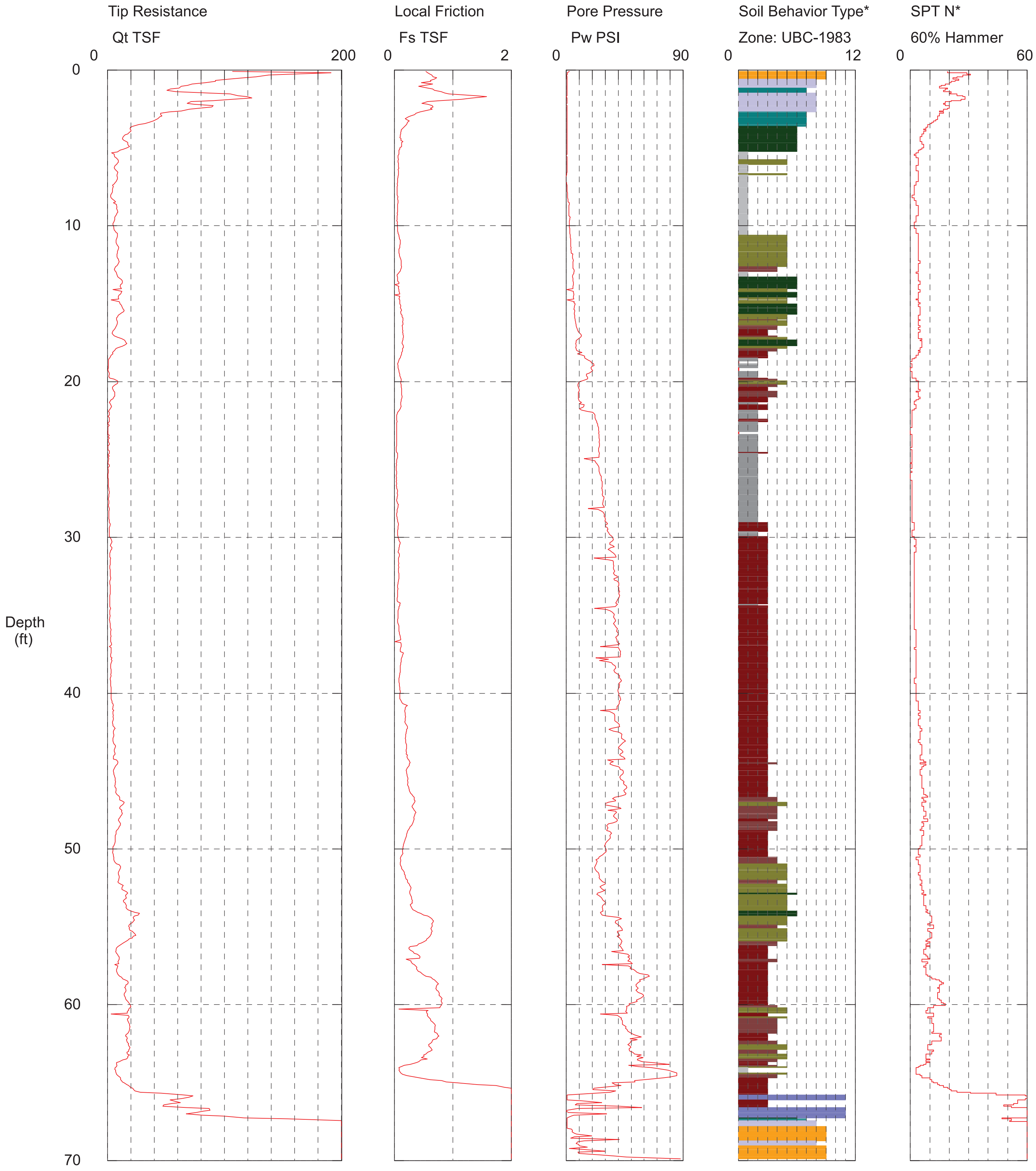
Depth Increment = 0.066 feet

*Soil behavior type and SPT based on data from UBC-1983

Thompson Engineering

Operator: B. Ellis
Sounding: CPT-3
Cone Used: DPG1256

CPT Date/Time: 6/9/2015 2:48:42 PM
Location: Plant Scherer, Juliette, GA
Job Number: 1511020045



Maximum Depth = 69.88 feet

Depth Increment = 0.066 feet

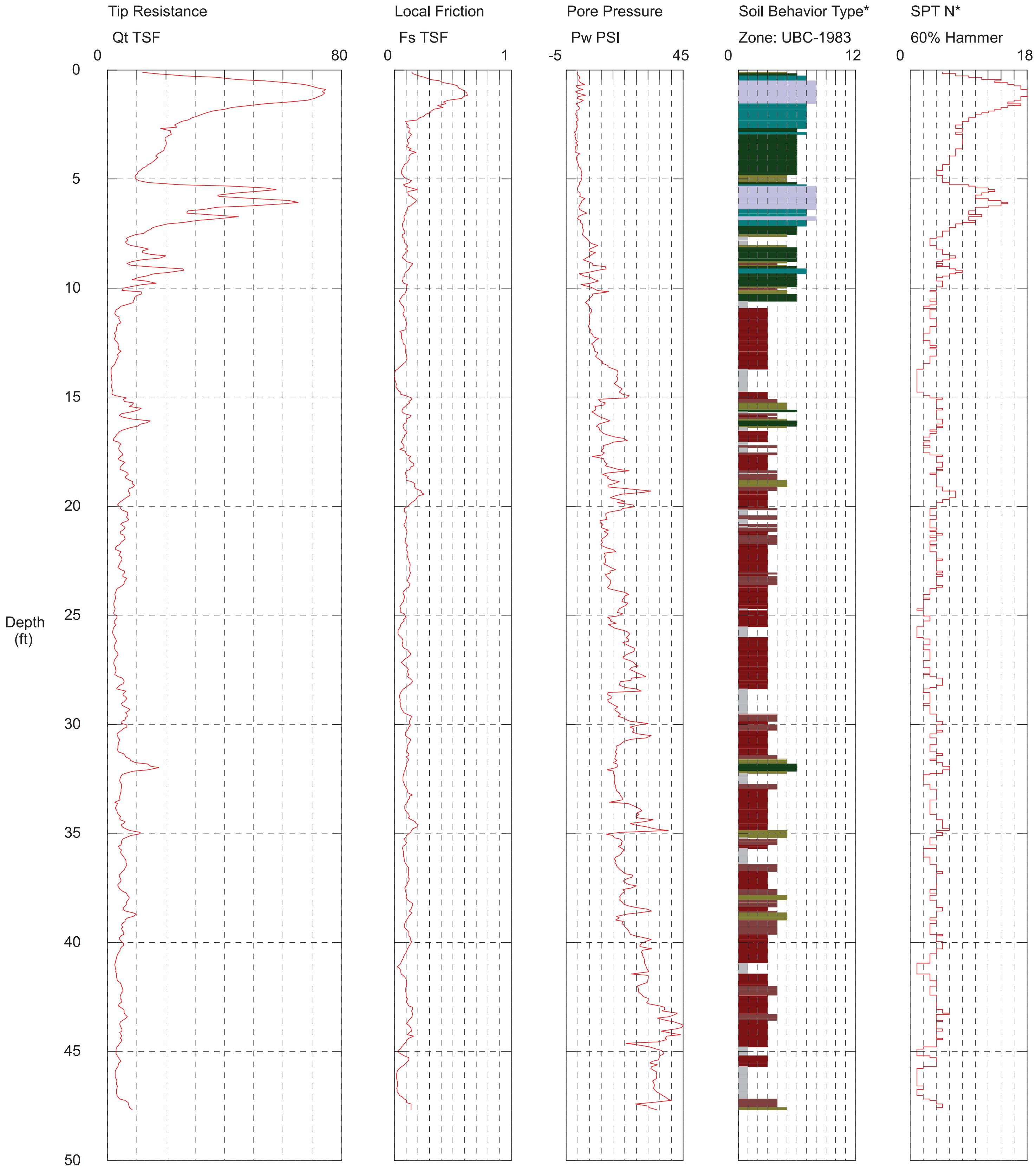
- ■ 1 sensitive fine grained
- ■ 2 organic material
- ■ 3 clay
- ■ 4 silty clay to clay
- ■ 5 clayey silt to silty clay
- ■ 6 sandy silt to clayey silt
- ■ 7 silty sand to sandy silt
- ■ 8 sand to silty sand
- ■ 9 sand
- ■ 10 gravelly sand to sand
- ■ 11 very stiff fine grained (*)
- ■ 12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

Thompson Engineering

Operator: B. Ellis
Sounding: CPT-4
Cone Used: DPG1256

CPT Date/Time: 6/10/2015 1:26:53 PM
Location: Plant Scherer
Job Number: 1511020045



Maximum Depth = 47.67 feet

Depth Increment = 0.066 feet

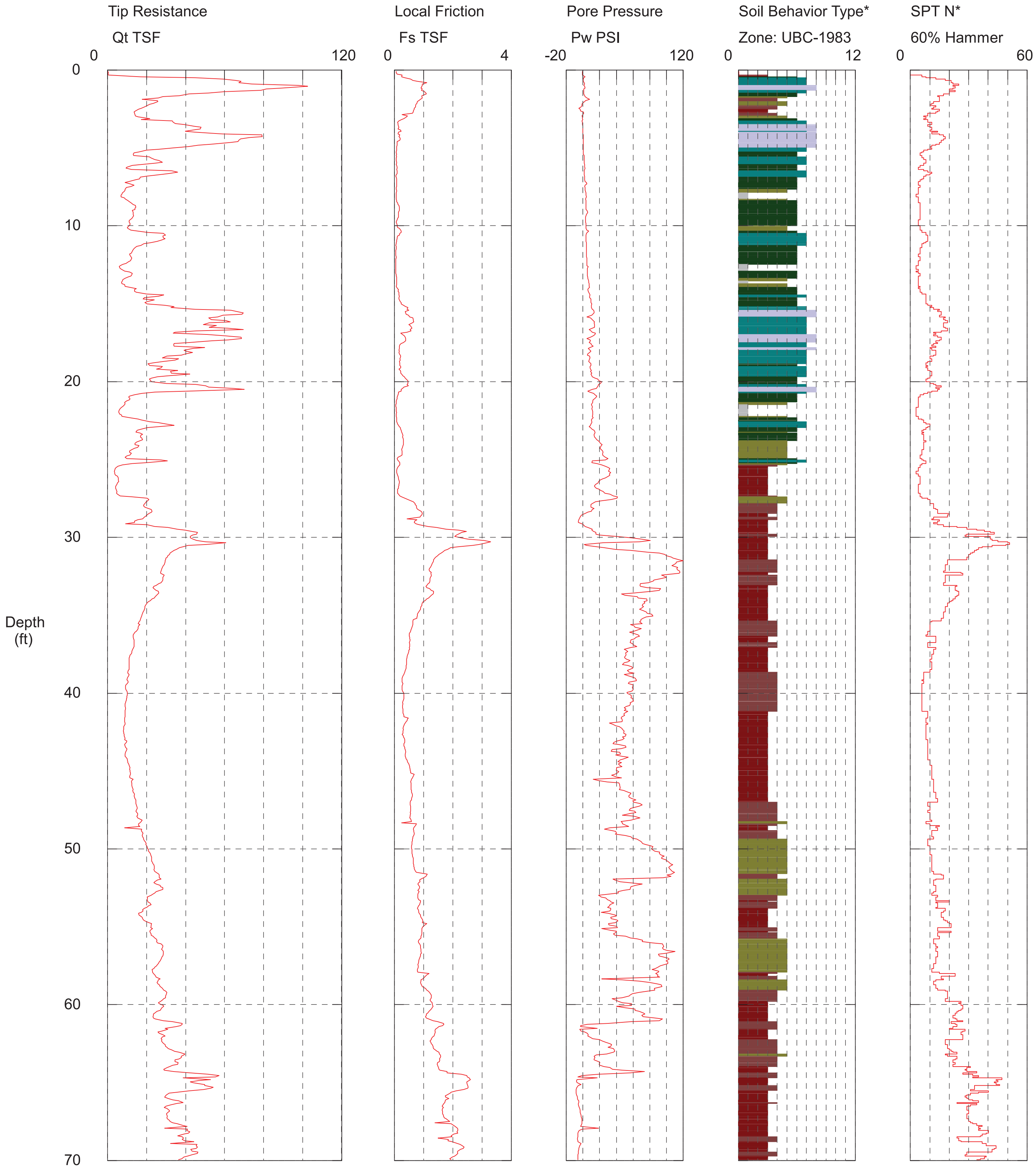
- 1 sensitive fine grained
- 2 organic material
- 3 clay
- 4 silty clay to clay
- 5 clayey silt to silty clay
- 6 sandy silt to clayey silt
- 7 silty sand to sandy silt
- 8 sand to silty sand
- 9 sand
- 10 gravelly sand to sand
- 11 very stiff fine grained (*)
- 12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

Thompson Engineering

Operator: B. Ellis
Sounding: CPT-5
Cone Used: DDG1200

CPT Date/Time: 6/10/2015 3:18:54 PM
Location: Plant Scherer
Job Number: 1511020045



Maximum Depth = 70.54 feet

Depth Increment = 0.066 feet

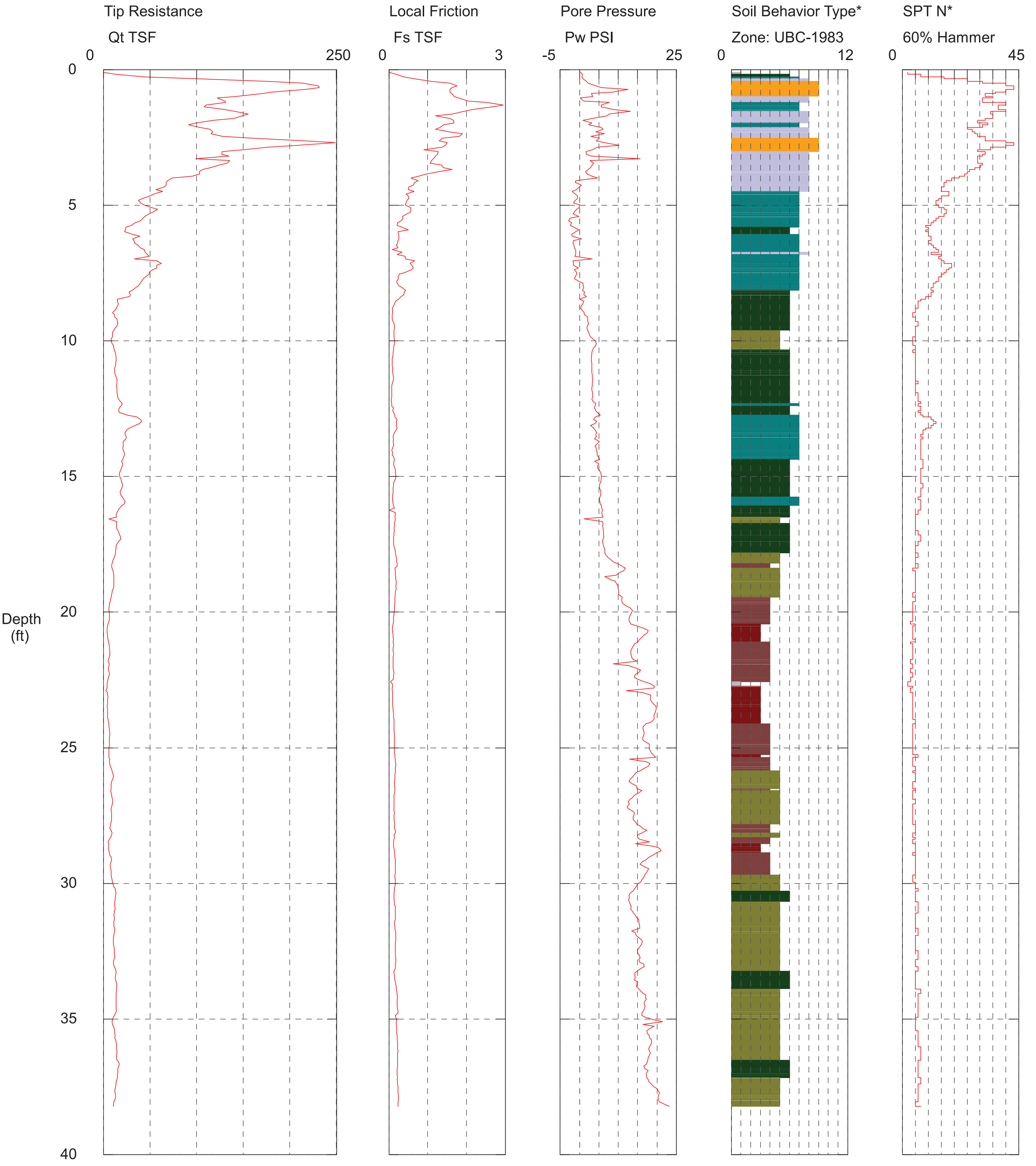
- ▨ 1 sensitive fine grained
- ▨ 2 organic material
- ▨ 3 clay
- ▨ 4 silty clay to clay
- ▨ 5 clayey silt to silty clay
- ▨ 6 sandy silt to clayey silt
- ▨ 7 silty sand to sandy silt
- ▨ 8 sand to silty sand
- ▨ 9 sand
- ▨ 10 gravelly sand to sand
- ▨ 11 very stiff fine grained (*)
- ▨ 12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

Thompson Engineering

Operator: B. Ellis
Sounding: CPT-6
Cone Used: DPG1256

CPT Date/Time: 6/10/2015 9:11:53 AM
Location: Plant Scherer
Job Number: 1511020045



Maximum Depth = 38.22 feet

Depth Increment = 0.066 feet

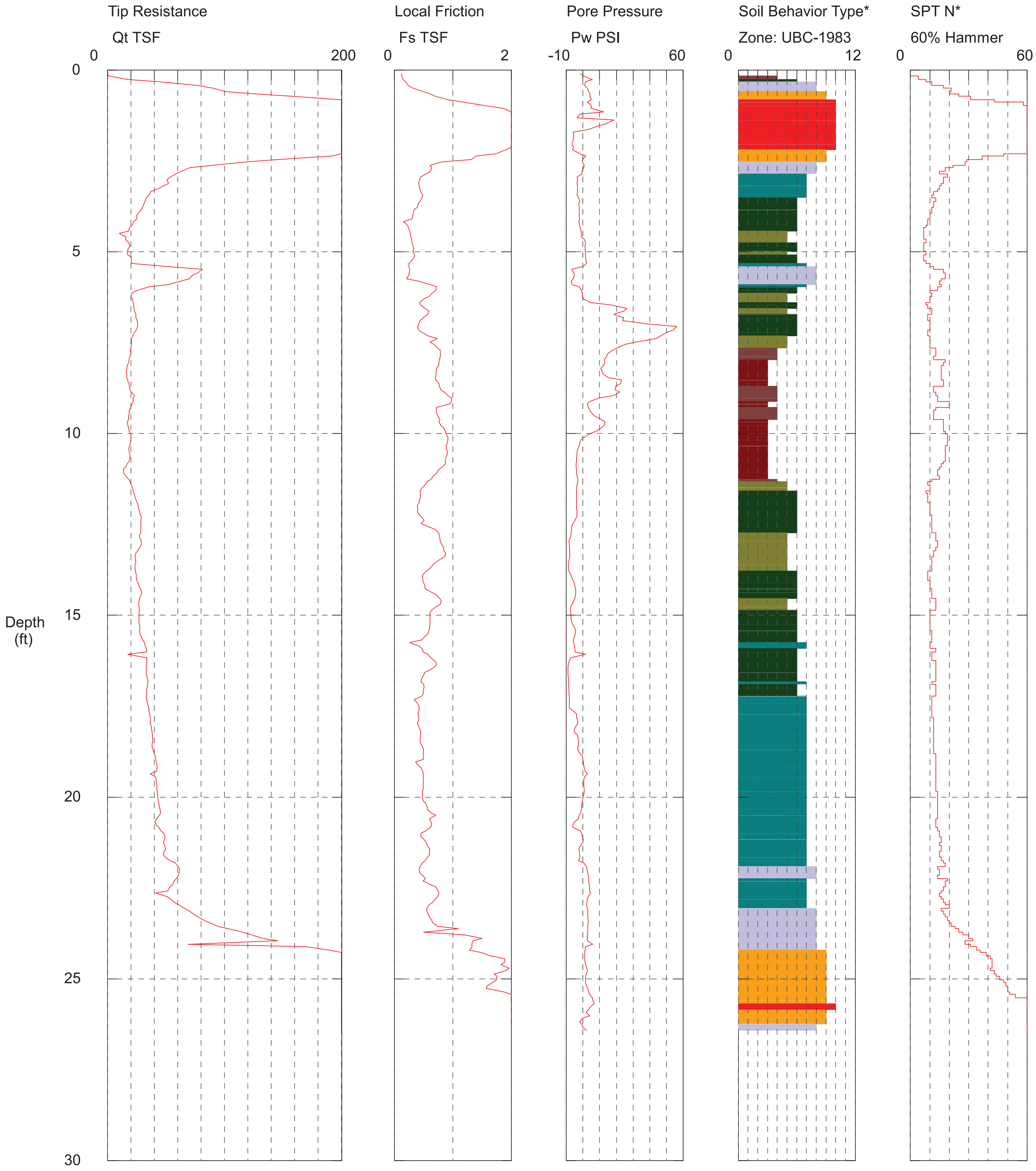
- ■ 1 sensitive fine grained
- ■ 2 organic material
- ■ 3 clay
- ■ 4 silty clay to clay
- ■ 5 clayey silt to silty clay
- ■ 6 sandy silt to clayey silt
- ■ 7 silty sand to sandy silt
- ■ 8 sand to silty sand
- ■ 9 sand
- ■ 10 gravelly sand to sand
- ■ 11 very stiff fine grained (*)
- ■ 12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

Thompson Engineering

Operator: B. Ellis
Sounding: CPT-7
Cone Used: DDG1200

CPT Date/Time: 6/11/2015 7:16:12 AM
Location: Plant Scherer
Job Number: 1511020045



Maximum Depth = 26.41 feet

Depth Increment = 0.066 feet

⬜ 1 sensitive fine grained
▩ 2 organic material
🟥 3 clay

🟫 4 silty clay to clay
🟨 5 clayey silt to silty clay
🟩 6 sandy silt to clayey silt

🟦 7 silty sand to sandy silt
🟪 8 sand to silty sand
🟧 9 sand

🟥 10 gravelly sand to sand
🟦 11 very stiff fine grained (*)
🟦 12 sand to clayey sand (*)

*Soil behavior type and SPT based on data from UBC-1983

2016 AECOM Subsurface Exploration Borings

KEY TO BORING LOGS

	Graphic Symbol	Description	USCS Classification
GRAVEL	▩	POORLY OR WELL GRADED GRAVEL	GP or GW
	▩	SILTY GRAVEL	GM
	▨	CLAYEY GRAVEL	GC
	▩	SAND and GRAVEL	SP/GP
SAND	▒	POORLY GRADED SAND	SP
	▒	WELL GRADED SAND	SW
	▥	SILTY SAND	SM
	▨	CLAYEY SAND	SC
LOW PLASTIC SILTS AND CLAYS	▥	Inorganic SILT	ML
	▨	Inorganic LEAN CLAY	CL
	▨	Gravelly LEAN CLAY	CL
	▥	Organic low plastic SILT or CLAY	OL
HIGH PLASTIC SILTS AND CLAYS	▥	Elastic SILT	MH
	▨	Fat CLAY	CH
ROCKS	▩	PARTIALLY WEATHERED ROCK	
	▤	SHALE	
	▦	LIMESTONE	
SURFACE MATERIALS	■	Asphalt Pavement	
	▒	Concrete	
	▩	CCR	

TERMS DESCRIBING DENSITY OR CONSISTENCY

Coarse grained soils (major portion retained on No. 200 sieve) include gravels and sands. Density is based on the Standard Penetration Test (SPT).

Density	SPT Blowcount (Blows per Foot)
Very loose	0 – 5
Loose	5 – 10
Medium dense	10 – 30
Dense	30 – 50
Very dense	Greater than 50

Fine grained soils (major portion passing No. 200 sieve) include clays and silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

Consistency Term	SPT Blowcount (Blows per Foot)	Undrained Shear Strength, (ksf)	Hand Test
Very soft	0–2	< 0.25	Extrudes between fingers
Soft	2–4	0.25–0.5	Molded by slight pressure
Medium stiff	4–8	0.5–1.0	Molded by strong pressure
Stiff	8–15	1.0–2.0	Indented by thumb
Very stiff	15–30	2.0–4.0	Indented by thumbnail
Hard	> 30	> 4.0	Difficult to indent

SAMPLING SYMBOLS AND ABBREVIATIONS

▨	Standard Penetration Test (SPT) split barrel sample
▤	Undisturbed sample, obtained by penetration of thin wall tube
▩	Ring or liner sample, obtained by penetration of split barrel thick wall sampler containing rings or liners (California Sampler, Dames & Moore Sampler)
⬇	Piston Tube Sample
⧗	Grab sample
‖	NQ core

SAMPLING RESISTANCE

650 psi	Hydraulic pressure required to push thin wall tube
3 6 9	Numbers indicate blows per 6 in. of sampler penetration. Standard Penetration Test (SPT) sampler, (2 in. O.D.) is driven by a 140 lb hammer falling freely 30 in. The SPT resistance is the number of blows for the last 12 in. of penetration (e.g., SPT resistance = 6 + 9 = 15)
50/2"	Number of blows (50) to drive penetration sampler a certain number of inches (2)
WR, WH	Weight of rods, weight of hammer

LABORATORY TEST ABBREVIATIONS

Qu	Unconfined compressive strength
% Finer #200	(% passing #200 sieve)
SA(%)	Sieve analysis (% passing #200)
LV Su	Undrained shear strength by laboratry vane
TXUU Su	Undrained shear strength by unconsolidated undrained triaxial compression test
UC Su	Undrained shear strength by unconfined compression test on soil
Torvane Su	Undrained shear strength by pocket torvane test
Pocket Pen. Su	Undrained shear strength by pocket penetrometer test

ROCK DRILLING ABBREVIATIONS

RQD=80%	Rock Quality Designation Percentage
DP	Down pressure
WP	Water pressure
WR	Water return

OTHER SYMBOLS AND ABBREVIATIONS

HSA = Hollow Stem Auger
SSA = Solid Stem Auger
ATD = At Time of Drilling
AD = After Drilling

▽ Depth Groundwater enters at time of drilling
▼ Groundwater Level at some specified time after drilling

AECOM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-100

Sheet 1 of 4

Date(s) Drilled	**3/22/16 to 3/23/2016**	Logged By	**L. Carr**	Checked By	**L. Finnefrock**
Drilling Method	**6.25" O.D./3.25" I.D. Hollow Stem Augers**	Drill Bit Size/Type	**Fishtail**	Total Depth of Borehole	**100.2´ bgs**
Drill Rig Type	**Acker Renegade Track-Mounted (SN 019184)**	Drilling Contractor	**Terracon - Richard Preston**	Surface Elevation	**459.65 ft. NAVD88**
Borehole Backfill	**Cement-bentonite grout**	Sampling Method(s)	**2 inch split-spoon/3 inch shelby tube**	Hammer Data	**Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)**
Boring Location	**N 1118344 E 2407033 (ft. NAD83)**	Groundwater Level(s)	**53.5 ft bgs ATD, 44.65 ft bgs at 16 hrs**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
459.7 459.2	0 0.0 0.5							Crushed GRAVEL [ROADWAY FILL].					
								Stiff, moist, reddish brown, Elastic SILT (MH) with trace sand and mica [EMBANKMENT FILL].					
		◣	1	3 4 5	78	4.0 3.5 2.0							
455	5	◣	2	3 5 8	>100	3.5 3.0 3.5					16.9		
		◣	3	3 5 8	>100	2.5 4.5 2.5							
450	10	▯	4		25				69	38	27.2		*S-4: ~5 min wait before extracting tube TV = 1.5, 2.5, 1.0 tsf (Su)*
445	15	◣	5	3 4 5	>100	3.0 2.5 2.5		Becomes with trace gravel.			28.3		
440	20	▯	6	300 psi	50				64	42	28.3	62.7	*S-6: ~5 min wait before extracting tube PP and TV not performed due to low recovery*
435	25	◣	7	3 5 8	>100	4.5+ 3.5 3.0					26.9	59.0	
		▯	8	350 psi	>100	2.0 3.0 2.0			66	42	28.3	67.0	*S-8: Water added to tube before pushing to improve recovery ~15 min wait before extracting tube TV = 2.5, 2.0, 2.0 tsf (Su)*
431.2	28.5							Stiff, moist, reddish brown, Fat CLAY (CH), trace sand and mica [EMBANKMENT FILL].					
430	30	◣	9	3 5 9	>100	3.5 2.0 2.0							

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:42:31 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-100

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
	30	▯	10	500 psi	>100	2.5 2.0 2.5			52	20	20.5	67.2	*S-10: ~15 min wait before extracting tube TV = 2.5, 3.0, 3.5 tsf (Su)*
427.7	32.0							Very stiff, moist, reddish borwn, Elastic SILT (MH), with trace sand and mica [EMBANKMENT FILL].					
425		◣	11	3 7 9	>100	4.0 4.0 3.5					28.0		
	35	▯	12	500 psi	>100	4.5+ 4.5+ 4.5+		With some sand.	71	39	30.2	78.5	*S-12: ~20 min wait before extracting tube TV = 4.5, 3.5, 3.5 tsf (Su)*
420		◣	13	3 5 10	>100	2.5 2.0 2.5					27.8	65.4	
	40	▯	14	500 psi	>100	4.5 4.5 4.5			68	37	27.7	69.5	*S-14: ~15 min wait before extracting tube TV = 3.5, 2.5, 3.5 tsf (Su)*
415	45	◣	15	3 7 8	>100	4.0 4.5							
410	50	◣	16	4 6 8	>100	4.0 3.5 3.0		Becomes stiff.			29.5		*50': Drilling became rougher, chatter in augers, tube not attempted at 53' due to likelihood of refusal/tube damage*
408.7	51.0							Medium dense, wet, light to dark gray, Silty SAND (SM) with gravel and mica [RESIDUUM].					
405	55	◣	17	7 7 13	78						10.6	5.4	*53.5': Groundwater encountered*
401.2	58.5							Stiff, moist, reddish brown, SILT (ML), with trace sand and mica [RESIDUUM].					
400	60	◣	18	3 5 8	94	2.0 3.0 4.0					28.0		
396.2	63.5							Medium dense, wet, light gray to dark gray, Silty SAND (SM) with mica, trace gravel, and relict rock structure [SAPROLITE].					
395	65	◣	19	5 8 13	94								

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-100

Sheet 3 of 4

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
390	70		20	5 8 10	94						27.5	41.4	
385	75		21	9 12 24	94			Becomes dense.					
380	80		22	14 21 27	94								
375	85		23	13 29 50/5"	100								
375.2	84.5							Very dense, wet, dark gray, Silty SAND (SM) with mica, trace gravel, relict structure [PARTIALLY WEATHERED ROCK].					
370	90		24	13 21 26	>100			Becomes dense.			20.8	42.0	
365	95		25	18 20 20	>100								
360	100		26	10 13 50/3"	>100						25.5		

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:42:32 PM

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
359.5	100.2							Auger refusal at 100.2 feet bgs. End of Boring at 100.2´ bgs					*Borehole backfilled with cement-bentonite grout*
355													
350													
345													
340													
335													
330													
325													

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-101

Sheet 1 of 2

Date(s) Drilled	**3/23/2016**	Logged By	**L. Carr**	Checked By	**L. Finnefrock**
Drilling Method	**6.25" O.D./3.25" I.D. Hollow Stem Augers**	Drill Bit Size/Type	**Fishtail**	Total Depth of Borehole	**42.0´ bgs**
Drill Rig Type	**Acker Renegade Track-Mounted (SN 019184)**	Drilling Contractor	**Terracon - Richard Preston**	Surface Elevation	**411.42 ft. NAVD88**
Borehole Backfill	**Cement-bentonite grout**	Sampling Method(s)	**2 inch split-spoon/3 inch shelby tube**	Hammer Data	**Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)**
Boring Location	**N 1118355 E 2407266 (ft. NAD83)**	Groundwater Level(s)	**8.5 ft bgs ATD, 13.9 ft bgs at 0.5 hrs**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
411.4	0.0							Crushed GRAVEL [ROADWAY FILL].					
410.4	1.0	◣	1	2 2 2	72	1.5 0.5 1.5		Soft, moist, dark brown, Lean CLAY (CL), with trace sand and mica [GENERAL FILL].	33	23	22.5		
		◣	2	2 2 2	78	2.5 1.0 1.5							
406.4	5.0	▯	3	250 psi	71	1.0 0.5 0.5		Soft, moist, dark brown, Lean CLAY (CL), trace sand and organics [ALLUVIUM].					*S-3: ~10 min wait before extracting tube* *TV = 1.0, 1.0, 0.5 tsf (Su)*
		◣	4	WOH WOH WOH	>100	1.0 0.5 0.5			39	21	31.8		*8.5': Groundwater encountered*
401.9	9.5	▯	5	200 psi	0			Very soft, moist, dark brown, Sandy SILT (ML) [ALLUVIUM].					*S-5: ~15 min wait before extracting tube*
399.4	12.0	◣	6	3 4 5	>100	2.0 3.0 3.5		Medium stiff, moist, light gray, Fat CLAY (CH) with trace silt and roots [ALLUVIUM].	51	19	24.2		
		▯	7	200 psi	>100	2.5 1.5 2.5			26	21	26.2	50.2	*S-7: ~15 min wait before extracting tube* *TV = 1.0, 1.5, 1.5 tsf (Su)*
396.4	15.0							Medium stiff, moist, light and dark gray, Sandy and Silty CLAY (CL-CH), with relict structure [SAPROLITE].					
392.9	18.5	◣	8	2 5 7	>100			Medium dense, wet, light to dark gray, Silty SAND (SM) with trace mica and relict structure [SAPROLITE].			27.5	38.7	*18.5': Drilling becomes rough*
		◣	9	5 11 18	78			Becomes dense with feldspar.					
		◣	10	5 10 11	>100			Becomes medium dense.					

AECOM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-101

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
	30												
380													
	35	◣	11	20 26 20	>100			Becomes dense.			13.2		
375													
	40	◣	12	9 10 9	94			Becomes medium dense.					
370		◣	13	23 50/5"	>100			Becomes very dense.			16.9		
369.4	42.0							Auguer refusal at 41.1 feet bgs. End of Boring at 42´ bgs					*Borehole backfilled with cement-bentonite grout*
365													
360													
355													
350													

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-102

Sheet 1 of 3

Date(s) Drilled	3/29/2016 to 3/30/2016	Logged By	L. Finnefrock	Checked By	L. Carr
Drilling Method	6.25" O.D./3.25" I.D. Hollow Stem Augers	Drill Bit Size/Type	Fishtail	Total Depth of Borehole	85.0´ bgs
Drill Rig Type	Acker Renegade Track-Mounted (SN 019184)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	504.36 ft. NAVD88
Borehole Backfill	Cement-bentonite grout	Sampling Method(s)	2 inch split-spoon/3 inch shelby tube and piston sampler	Hammer Data	Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1117113 E 2405060 (ft. NAD83)	Groundwater Level(s)	2.5 ft bgs ATD		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
504.4	0							Loose, moist, brownish gray with tan mottling, Silty SAND (SM), trace gravel [CCR]. (0.0)					
			1	3 4 5	72								
													Groundwater encountered at 2.5'
500	5		2	6 7 3	78			Becomes wet, gravelly.			24.6	21.4	
498.4	6.0							Very soft, moist, light grey, SILT (ML) [CCR].					
			3		83						50.3	53.0	*S-3: ~20 min wait before extracting tube*
495	10		4	1 1 2	>100								
490	15		5		>100						40.8	97.2	*S-5: ~20 min wait before extracting tube*
485	20		6	WOR WOR WOH	>100								
								Becomes grey.					
480	25		8		>100								*S-8: ~20 min wait before extracting tube*
475	30		9	WOR WOR WOR	>100						62.6	85.3	

AECOM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-102

Sheet 2 of 3

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
	30												
470	35		10		96						40.2	93.2	*S-10: ~25 min wait before extracting tube*
465	40		11		96						41.9	90.0	*S-11: ~20 min wait before extracting tube*
460	45		12		96						49.0	84.5	*S-12: ~20 min wait before extracting tube*
455	50		13	WOR WOR WOR	>100			Becomes light gray.			47.4	82.7	
450	55		14	WOR WOR WOR	>100								
445	60		15	WOR WOR WOR	>100						51.3	87.7	
440	65		16		96			Becomes grey.			59.0	91.9	*S-16: ~20 min wait before extracting tube*

AECOM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-102

Sheet 3 of 3

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
435.9	68.5	◣	17	2 3 4	89			Medium stiff, wet, light gray, Sandy Lean CLAY (CL-ML), with relict structure [SAPROLITE].	41	15	22.9	55.7	
430.9	73.5	◣	18	WOH 1 3		0.0 0.75 0.5		Soft, wet, reddish brown, Sandy SILT (ML), with mica, trace sand and relict structure [SAPROLITE].					
425.9	78.5	◣	19	WOH 2 4		0.0 0.0 1.5		Loose, wet, reddish brown, Silty SAND (SM) with relict structure [SAPROLITE].	NP	NP	43.1	21.6	*80.0': Stopped drilling* *Resumed drilling 8am 3/30/16*
420.9	83.5	◣	20	50/5"				Very dense, wet, reddish brown, Silty SAND (SM) [PARTIALLY WEATHERED ROCK].					*83': Hard drilling*
419.4	85.0							Auger refusal at 85 feet bgs. End of Boring at 85´ bgs					*Borehole backfilled cement-bentonite grout*

Elevation scale: 435, 430, 425, 420, 415, 410, 405. Depth scale: 70, 75, 80, 85.

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-102A

Sheet 1 of 2

Date(s) Drilled	4/7/16 to 4/08/16	Logged By	L. Finnefrock	Checked By	L. Carr
Drilling Method	8.25" O.D./4.25" I.D. Hollow Stem Augers	Drill Bit Size/Type	Fishtail	Total Depth of Borehole	60.0´ bgs
Drill Rig Type	Acker Renegade Track-Mounted (SN 019184)	Drilling Contractor	Terracon - Richard Preston	Surface Elevation	504.38 ft. NAVD88
Borehole Backfill	Piezometer	Sampling Method(s)	Not sampled	Hammer Data	Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1117122 E 2405054 (ft. NAD83)	Groundwater Level(s)	4.5 ft bgs ATD		

Elevation, feet	Depth, feet	SAMPLES					Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
		Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)							
	0							504.4 — 0.0 Boring advanced to 60.0 feet without sampling for installing a standpipe piezometer. See B-102 log for soil descriptions.					
500	5												
495	10												
490	15												
485	20												
480	25												
475	30												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-102A

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
	30												
470	35												
465	40												
460	45												
455	50												
450	55												
445	60							444.4 60.0 End of Boring at 60´ bgs					
440													

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:43:05 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2 **Project Location:** **Monroe County, GA** **Project Number:** **60478286**	**Log of B-102B** Sheet 1 of 1

Date(s) Drilled	**4/8/16**	Logged By	**L. Finnefrock**	Checked By	**L. Carr**
Drilling Method	**8.25" O.D./4.25" I.D. Hollow Stem Augers**	Drill Bit Size/Type	**Fishtail**	Total Depth of Borehole	**20.6´ bgs**
Drill Rig Type	**Acker Renegade Track-Mounted (SN 019184)**	Drilling Contractor	**Terracon - Richard Preston**	Surface Elevation	**504.4 ft. NAVD88**
Borehole Backfill	**Piezometer**	Sampling Method(s)	**Not sampled**	Hammer Data	**Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)**
Boring Location	**N 1117126 E 2405057 (ft. NAD83)**	Groundwater Level(s)	**4.5 ft bgs ATD**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
	0							504.4 0.0 Boring advanced to 20.6 feet without sampling for installing a standpipe piezometer. See B-102 log for soil descriptions.					
500	5												
495	10												
490	15												
485	20												
								483.8 20.6 End of Boring at 20.6´ bgs					
480													
475													

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:43:12 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

Log of B-103

Sheet 1 of 3

Date(s) Drilled	3/24/2016 to 3/25/2016	Logged By	L. Carr	Checked By	L. Finnefrock
Drilling Method	6.25" O.D./3.25" I.D. Hollow Stem Augers	Drill Bit Size/Type	Fishtail	Total Depth of Borehole	95.0´ bgs
Drill Rig Type	Acker Renegade Track-Mounted (SN 019184)	Drilling Contractor	Terracon - Richard Preston	Surface Elevation	505.29 ft. NAVD88
Borehole Backfill	Cement-bentonite grout	Sampling Method(s)	2 inch split-spoon/3 inch shelby tube and piston sampler	Hammer Data	Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1117593 E 2405583 (ft. NAD83)	Groundwater Level(s)	1.5 ft bgs ATD, 4.0 ft bgs at 14 hrs		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
505	0						505.3 — 0.0 Soft, wet, light to dark gray, Sandy SILT (ML) with trace gravel [CCR].					
			1	2 2 1	>100							1.5': Groundwater encountered SB-A bulk bag sample collected from 0'-5'
500	5		2	1 1 2	>100					66.5	65.3	Note: Most SPT's are driven past 18", last hammer blow, due to loose. saturated conditions
			3	3 4 4	>100							
495	10		4	500 psi	92					31.8	54.6	S-4: ~5 min wait before extracting tube
							491.8 — 13.5 Very soft, wet, dark gray, Sandy SILT (ML) [CCR].					
490	15		5	WOH 1 0	>100							
			6	250 psi	0							S-6: ~20 min wait before extracting tube SB-B bulk bag sample collected from 18'-20'
485	20		7		0							
			8	1 0 2 3	>100		Becomes medium stiff.			82.7	81.7	
480	25											
	30		9	1 1 1 2	>100		Becomes very soft.					

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

Log of B-103

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
475	30												
			10	WOH WOH WOH 1	>100								
470	35												
			11		>100						77.3	77.7	*S-11: Pushed tube 18" instead of 24" ~15 min wait before extracting tube*
465	40												
			12	500 psi	>100						61.8	93.6	*S-12: ~15 min wait before extracting tube*
460	45												
			13	200 psi	>100						69.1	84.9	*S-13: Tube driven 18" under WOR ~20 min wait before extracting tube*
455	50												
			14	375 psi	>100						54.5	95.1	*S-14: ~10 min wait before extracting tube*
450	55												
			15	375 psi	96			Becomes dark to light gray.			40.2	87.9	*S-15: ~10 min wait before extracting tube*
445	60												
			16	WOR WOR WOR	>100								
	65												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**

Project Number: **60478286**

Log of B-103

Sheet 3 of 3

Elevation, feet	Depth, feet	Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
440													
435	70		17	WOR WOR WOR	>100						53.3	66.6	
430	75		18	WOR WOR WOR	>100								
425	80		19	WOR WOR WOR	>100						64.4	75.0	
423.3	82.0							Very loose, wet, medium brown, Silty SAND (SM) trace mica and organics [ALLUVIUM].					*82': Drilling resistance increases*
420	85		20	WOH WOH WOH	>100						26.6	11.7	*S-20: Approx. 4 ft of blow-in when drill string was pulled from augers. 22" blew into S20 sample. Second sample attempted at same depth after adding water to auger and had 1" of recovery of same material*
416.4	88.9		21	7 10 15	>100			Medium desne, moist, light to dark gray, Silty SAND (SM) with mica and relict strcuture [SAPROLITE].					*S-21: Approximately 2' of blow-in when drill string was pulled. Auger cleared before sampling.* *89': Dilling resistance increases*
415	90												
410.3	95.0		22	36 31 24	94			Becomes very dense.			13.3	34.2	
410	95							End of Boring at 95´ bgs					*Borehole backfilled with cement-bentonite grout*

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:43:17 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

Log of B-103A

Sheet 1 of 2

Date(s) Drilled	3/28/2016	Logged By	L. Finnefrock	Checked By	L. Carr
Drilling Method	8.25" O.D./4.25" I.D. Hollow Stem Augers	Drill Bit Size/Type	Fishtail	Total Depth of Borehole	60.0´ bgs
Drill Rig Type	Acker Renegade Track-Mounted (SN 019184)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	505.8 ft. NAVD88
Borehole Backfill	Piezometer	Sampling Method(s)	Not sampled	Hammer Data	Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1117590 E 2405595 (ft. NAD83)	Groundwater Level(s)	10.0 ft bgs ATD		

Elevation, feet	Depth, feet	SAMPLES					Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
		Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)							
505.8	0.0							Boring advanced to 60.0 feet without sampling for installing a standpipe piezometer. See B-103 log for soil descriptions.					

Elevation, feet: 505, 500, 495, 490, 485, 480

Depth, feet: 0, 5, 10, 15, 20, 25, 30

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

Log of B-103A

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
475	30												
470	35												
465	40												
460	45												
455	50												
450	55												
445	60							445.8 60.0 End of Boring at 60´ bgs					

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-103B

Sheet 1 of 1

Date(s) Drilled	3/28/2016 to 3/29/2016	Logged By	L. Finnefrock	Checked By	L. Carr
Drilling Method	8.25" O.D./4.25" I.D. Hollow Stem Augers	Drill Bit Size/Type	Fishtail	Total Depth of Borehole	20.0´ bgs
Drill Rig Type	Acker Renegade Track-Mounted (SN 019184)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	505.8 ft. NAVD88
Borehole Backfill	Piezometer	Sampling Method(s)	Not sampled	Hammer Data	Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1117596 E 2405594 (ft. NAD83)	Groundwater Level(s)	10.0 ft bgs ATD		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
505.8	0.0							Boring advanced to 20.0 feet without sampling for installing a standpipe piezometer. See B-103 log for soil descriptions.					
505													
500	5												
495	10												
490	15												
485.8	20.0							End of Boring at 20´ bgs					
485													
480													

AECOM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-104

Sheet 1 of 3

Date(s) Drilled	3/30/2016 to 3/31/2016	Logged By	L. Finnefrock	Checked By	L. Carr
Drilling Method	6.25" O.D./3.25" I.D. Hollow Stem Augers	Drill Bit Size/Type	Fishtail	Total Depth of Borehole	93.9´ bgs
Drill Rig Type	Acker Renegade Track-Mounted (SN 019184)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	504.38 ft. NAVD88
Borehole Backfill	Cement-bentonite grout	Sampling Method(s)	2 inch split-spoon/3 inch shelby tube and piston sampler	Hammer Data	Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1117966 E 2405855 (ft. NAD83)	Groundwater Level(s)	4.0 ft bgs ATD		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
504.4	0 / 0.0							Loose, wet, tan to yellow, Clean SAND (SP) [CCR].					
			1	3 4 5	72								
500	5		2 3	2 3 1	67	4					19.1	9.8	
			4		>100								S-4: ~20 min wait before extracting tube
495	10		5	2 1 1	72	0.25 0.5 0.0		Becomes whitish tan, bottom 3" becomes light gray.					
492.4	12.0							Loose, wet, light gray, Silty SAND (SM) [CCR].					
490	15		6		>100			With some Gravel.			41.5	35.9	13': 24" heave into augers. Charged augers with water and redrilled S-6: ~45 min wait before extracting tube
485	20		7	3 3 1	89								
480.9	23.5							Medium stiff, wet, light gray, Sandy SILT (ML), [CCR].					
480	25		8	1 2 3	>100								
475	30		9		>100	4.25		Becomes stiff.			60.0	88.4	S-9: ~20 min wait before extracting tube

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-104

Sheet 2 of 3

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
	30												
470	35		10			2.5					67.5	65.7	
465	40		11	WOH 1 1	>100	0.0 0.0 0.0		Becomes very soft.					
460	45		12	WOH WOH 1	>100	0.0 0.0 0.0					79.0	81.6	
455	50		13		96						30.3	69.7	*S-13: ~20 min wait before extracting tube*
450	55		14	WOH WOH WOH	>100	0.0 0.0 0.0		With tan mottling.					
445	60		15		96	0.5					83.5	83.7	*S-14: ~25 min wait before extracting tube*
440	65		16	WOH WOH WOH	>100								

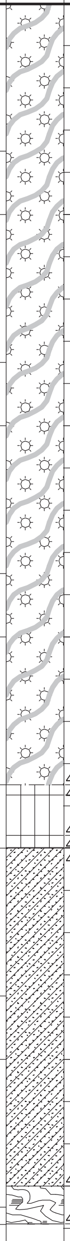
Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-104

Sheet 3 of 3



Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
435	70		17	WOR WOR WOR	>100					48.3	84.3	
430	75		18	WOR WOR WOR	>100							*75.0': Stopped drilling Resumed drilling 8:30am 3/31/16*
425	80		19	WOR WOR WOR	>100					45.4	79.2	
420.9	83.5											
420.6	83.8		20 21 22	WOH WOH WOH	89		Very soft, wet, brown, SILT (ML), trace sand [ALLUVIUM].	NP	NP	52.5 72.7 24.9		
419.7	84.7						Soft, wet, dark brown to black Sandy SILT (ML), with decayed wood seams [ALLUVIUM].					
419.4	85.0											
419.4	85.0						Soft, wet, reddish brown, Sandy SILT (ML) [ALLUVIUM]. Medium dense, wet, reddish brown, Clayey SAND (SC), trace gravel [ALLUVIUM].					*85.0': Increased drilling resistance*
420	85											
415	90		23	WOH 4 4	83	1.75 2.0 0.5		35	19	24.3	46.1	
411.4	93.0		24	50/3" 50/2"	>100		Very dense, wet, yellow with tan mottling, Silty SAND (SM), relict structure [PARTIALLY WEATHERED ROCK].			17.2	20.8	*93.0': Grinding in augers*
410.5	93.9						End of Boring at 93.9´ bgs					*Borehole backfilled with cement-bentonite grout*
410												
405												

Project: Southern Company- Plant Scherer Ash Pond Phase 2 **Project Location: Monroe County, GA** **Project Number: 60478286**	**Log of B-104A** Sheet 1 of 2

Date(s) Drilled	**3/31/2016**	Logged By	**M. Hutchinson**	Checked By	**L. Carr**
Drilling Method	**8.25" O.D./4.25" I.D. Hollow Stem Augers**	Drill Bit Size/Type	**Fishtail**	Total Depth of Borehole	**60.0´ bgs**
Drill Rig Type	**Acker Renegade Track-Mounted (SN 019184)**	Drilling Contractor	**Terracon - Richard Preston**	Surface Elevation	**504.2 ft. NAVD88**
Borehole Backfill	**Piezometer**	Sampling Method(s)	**Not sampled**	Hammer Data	**Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)**
Boring Location	**N 1117967 E 2405846 (ft. NAD83)**	Groundwater Level(s)	**Not Measured**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
504.2	0.0							Boring advanced to 60.0 feet without sampling for installing a standpipe piezometer. See B-104 log for soil descriptions.					
500	5												
495	10												
490	15												
485	20												
480	25												
475	30												

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:43:50 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-104A

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
	30												
470													
	35												
465													
	40												
460													
	45												
455													
	50												
450													
	55												
445													
	60							444.2 End of Boring at 60´ bgs 60.0					
440													

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-104B

Sheet 1 of 1

Date(s) Drilled	3/31/2016	Logged By	M. Hutchinson	Checked By	L. Carr
Drilling Method	8.25" O.D./4.25" I.D. Hollow Stem Augers	Drill Bit Size/Type	Fishtail	Total Depth of Borehole	20.0´ bgs
Drill Rig Type	Acker Renegade Track-Mounted (SN 019184)	Drilling Contractor	Terracon - Richard Preston	Surface Elevation	504.1 ft. NAVD88
Borehole Backfill	Piezometer	Sampling Method(s)	Not sampled	Hammer Data	Automatic 140 lb/30" drop - 87.2% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1117972 E 2405851 (ft. NAD83)	Groundwater Level(s)	Not Measured		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
504.1	0 (0.0)							Boring advanced to 20.0 feet without sampling for installing a standpipe piezometer. See B-104 log for soil descriptions.					
500	5												
495	10												
490	15												
485													
484.1	20 (20.0)							End of Boring at 20´ bgs					
480													
475													

AECOM

Project: Southern Company- Plant Scherer Ash Pond Phase 2 **Project Location: Monroe County, GA** **Project Number: 60478286**	**Log of B-105** Sheet 1 of 3

Date(s) Drilled	**4/08/2016**	Logged By	**C. Dicke**	Checked By	**L. Carr**
Drilling Method	**0-53': 4.5" O.D. Casing - 53-85': Mud Rotary**	Drill Bit Size/Type	**49.5-54.5': 3.75" Drag Bit - 54.5-84.5': 2.9375" Roller Bit**	Total Depth of Borehole	**85.0´ bgs**
Drill Rig Type	**Simco 2800 HS HT Truck-Mounted (SN 072068)**	Drilling Contractor	**Terracon - Craig Penton**	Surface Elevation	**495 ft. NAVD88**
Borehole Backfill	**Cement-bentonite grout**	Sampling Method(s)	**2 inch and 3 inch split-spoon/3 inch shelby tube**	Hammer Data	**Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)**
Boring Location	**N 1120433 E 2404999 (ft. NAD83)**	Groundwater Level(s)	**Pond Surface**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	0							495.0 0.0 0.0 - 49.5': Water.					*Surface elevation based on assumed normal ash pond elevation.* *Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
480	15												
475	20												
470	25												
465	30												

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:44:01 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

Log of B-105

Sheet 2 of 3

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30												
460	35												
455	40												
450	45												
								445.5 Mudline. 49.5					
445	50		SS-1	WOR WOR WOR WOR	83	0.0 0.0 0.0 0.0		Very soft, wet, gray to black, SILT (ML) with sand and organics [CCR and LAKE BED].			38.9		*SS-1: 3" I.D. split spoon used All other samples used 2" I.D. split spoon*
			SS-2	0 3 7	67	0 1.0 1.0		444.0 51.0 Very soft, wet, reddish brown, Elastic SILT (MH), trace sand and traces of organics and roots [RESIDUUM].					
			T-1		86				94	41	40.2	80.0	
440	55		SS-3	12 8 9	67	3.0 3.0		440.5 54'-54.5' Cobble layer. 54.5 Very stiff, wet, reddish and yellowish brown mottled, Elastic SILT (MH), trace mica [RESIDUUM]. 55.4': 1" yellowish brown clayey sand layer.	85	45	39.2		*54.5': Drag bit could not penetrate through cobbles Driller switched to a 2.9375" roller bit and could not obtain shelby tubes due to cobbles in borehole sidewalls*
			SS-4	4 5 5	56	2.25							
			SS-5	6 6 9	44	2.5 2.5					47.1		
			SS-6	3 6 7	>100	2.5 2.5 2.5					43.7		
435	60		SS-7	3 3 4	0								
			SS-8	1 2 3	>100	1.0 1.0 1.0		433.5 61.5 Medium stiff, moist, reddish brown with tan mottling and black spots, Elastic SILT (MH), with fine sand and mica [RESIDUUM]. 63.0': Becomes very soft, sandy, yellowish brown, trace coarse gravel.	78	58	59.9	75.8	*61.5': Loss of drilling fluid noted. likely due to leakage at bottom of casing from movement of barge during windy conditions*
			SS-9	0 0 2	>100	<0.25 <0.25 <0.25							
430	65		SS-10								54.1		

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-105

Sheet 3 of 3

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
			SS-10	0 1 3	56	<0.25 0.5					54.1		
			SS-11	4 5 5	22	<0.25							
427.5	67.5												
			SS-12	1 2 3	>100			Medium stiff, wet, reddish and yellowish brown, SILT (ML) with sand, relict structure, and mica [SAPROLITE].			53.8	42.2	
425	70												
			SS-13	1 1 3	>100						68.5	54.9	
420	75												
			SS-14	0 1 2	89	0.5 0.5 0.5		Becomes yellowish brown and tan with black and white bands.	NP	NP	63.8		
415	80												
			SS-15	WOR WOR 3	>100	<0.25 <0.25 <0.25					42.8		
410 / 410.0	85 / 85.0							End of Boring at 85´ bgs					*85.0': High winds caused excessive barge movement Borehole was terminated See B-105A for soil descriptions below 85 feet Borehole backfilled with cement-bentonite grout*
405													
400													
395													

AECOM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-105A

Sheet 1 of 3

Date(s) Drilled	4/11/16	Logged By	C. Dicke	Checked By	L. Carr
Drilling Method	0-55.5': 4.5" O.D. Casing - 55-87': Mud Rotary	Drill Bit Size/Type	55-83': 3.75" Drag Bit - 83-87': 2.9375" Roller Bit	Total Depth of Borehole	87.0´ bgs
Drill Rig Type	Simco 2800 HS HT Truck-Mounted (SN 072068)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	495 ft. NAVD88
Borehole Backfill	Cement-bentonite grout	Sampling Method(s)	2 inch split-spoon/3 inch shelby tube	Hammer Data	Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1120401 E 2405010 (ft. NAD83)	Groundwater Level(s)	Pond Surface		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	0							495.0 0.0 0 - 52.4': Water.					*Surface elevation based on assumed normal ash pond elevation.* *Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
480	15												
475	20												
470	25												
465	30												

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:44:12 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

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Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30												
460	35												
455	40												
450	45												
445	50												
442.6	52.4							Mudline. Very stiff, moist, reddish brown with yellowish brown mottling, Lean to Fat CLAY (CL-CH), trace sand and gravel [RESIDUUM].					
440	55												
			T-1		75	2.75			62	24	30.9		
435	60		T-2		79	2.75							
433.5	61.5							Medium stiff, moist, reddish brown with tan mottling, Elastic SILT (MH), with sand and mica.					*Assume change in stratigraphic layer based on boring B-105.*
			T-3		>100	0.75			57	39	61.6		
430	65												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-105A

Sheet 3 of 3

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
427.5	67.5							Medium dense, wet, reddish and yellow brown, Silty SAND (SM), trace mica [SAPROLITE].					*Assume change in stratigraphic layer based on boring B-105.*
425	70												
			T-4		48				NP	NP	62.1	29.5	
420	75												
			T-5		25								
415	80												
			T-6		13								
412.0	83.0							Stiff, moist, yellowish brown, Sandy SILT (ML), with relict structure [SAPROLITE].					*83.0': Switch to roller bit.*
			SS-1	3 6 5 7	92						53.7	59.2	
410	85												
408.0	87.0		SS-2	50/0.5"	0			Drilling refusal at 87.0 feet. End of Boring at 87´ bgs					*Borehole backfilled with cement-bentonite grout.*
405													
400													
395													

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:44:12 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

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Sheet 1 of 2

Date(s) Drilled	4/06/2016	Logged By	C. Dicke	Checked By	L. Carr
Drilling Method	0-32': 4.5" O.D. Casing - 32-42.5': Mud Rotary	Drill Bit Size/Type	32-40': 3.75" Drag Bit - 40-42.5': 2.9375" Roller Bit	Total Depth of Borehole	42.5´ bgs
Drill Rig Type	Simco 2800 HS HT Truck-Mounted (SN 072068)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	495 ft. NAVD88
Borehole Backfill	Cement-bentonite grout	Sampling Method(s)	2 inch split-spoon/3 inch shelby tube	Hammer Data	Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1119786 E 2403004 (ft. NAD83)	Groundwater Level(s)	Pond Surface		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	0							495.0 0.0 0.0 - 29.5': Water.					*Surface elevation based on assumed normal ash pond elevation. Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
480	15												
475	20												
470	25												
								465.5 Mudline. 29.5					
465	30	◣	SS-1			0		Very soft, wet, black, SILT (ML) with sand and organics [CCR			34.5		

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

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Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30		SS-1	WOR WOR WOR	50	0		464.5 and LAKE BED]. 30.5 Very soft, wet, reddish brown, Sandy Lean CLAY (CL) with organics, trace roots [ALLUVIUM].			34.5		
			SS-2	2 2 3	>100	1.0 0.5 0.5		462.5 32.0': Becomes medium stiff, trace mica, without organics and roots. 32.5 Loose, moist, reddish brown, Silty SAND (SM), with mica [RESIDUUM].					
460	35		T-1		56	0.5			49	40	32.8	41.2	
			SS-3	2 2 2	78			459.5 35.5 Very loose, moist, reddish brown and black, Silty SAND (SM), with mica [SAPROLITE].					
			SS-4	1 2 3	83			Becomes loose, grayish brown.			42.0	26.3	
455	40												
			SS-5	50/0"	0			452.5 Becomes very dense. 42.5					
								Auger Refusal at 42.5'. End of Boring at 42.5´ bgs					*Boring backfilled with cement-bentonite grout*
450													
445													
440													
435													
430													

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

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Sheet 1 of 2

Date(s) Drilled	4/05/2016	Logged By	C. Dicke	Checked By	L. Carr
Drilling Method	0-25': 4.5" O.D. Casing - 25-30.3': Mud Rotary	Drill Bit Size/Type	25-28': 3.75" Drag Bit - 28-30.3': 2.9375" Roller Bit	Total Depth of Borehole	30.3´ bgs
Drill Rig Type	Simco 2800 HS HT Truck-Mounted (SN 072068)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	495 ft. NAVD88
Borehole Backfill	Cement-bentonite grout	Sampling Method(s)	2 inch split-spoon/3 inch shelby tube	Hammer Data	Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1120366 E 2402037 (ft. NAD83)	Groundwater Level(s)	Pond Surface		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	0							495.0 0.0 0.0 - 20.5': Water.					*Surface elevation based on assumed normal ash pond elevation.* *Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
480	15												
475	20							474.5 Mudline. 20.5					
			SS-1		75			474.0 Wet, dark gray to black, SILT (ML) with sand and organics [CCR]. 21.0			66.6		
			SS-2	0 0 2 4	75	0 0.25 2.0 2.0		Very soft to soft, moist, brown, Sandy Lean CLAY (CL) to Clayey SAND (SC) with trace organics [TOPSOIL]. 472.5 22.5			36.7		
								Stiff to very stiff, moist, reddish brown with gray mottling, Lean to Fat CLAY (CL-CH), trace sand, trace roots and organics. [RESIDUUM].					
470	25		T-1		71	3.0					37.8	53.0	
			SS-3	4 6 12	89	2.5 2.5 3.0		466.5 28.5					
			SS-4	7 11 12	>100	4.5+ 4.5+ 4.5+		Hard, moist, gray, Lean CLAY (CL), trace sand [RESIDUUM].			20.4		
465	30							465.0 30.0					

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

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Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES					Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
		Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)							
465	30	◣	SS-5 SS-6	50/3.25" 50/0"				464.7 Very dense, gray, dry to moist, Silty SAND (SM) with gravel and relict structure [PARTIALLY WEATHERED ROCK]. 30.3 Auger refusal at 30.3 ft. End of Boring at 30.25´ bgs					*Boring backfilled with cement-bentonite grout*
460													
455													
450													
445													
440													
435													
430													

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:44:31 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2	**Log of B-108**
Project Location: Monroe County, GA	Sheet 1 of 3
Project Number: 60478286	

Date(s) Drilled	**4/12/2016**	Logged By	**C. Dicke**	Checked By	**L. Carr**
Drilling Method	**0-52': 4.5" O.D. Casing - 52-91': Mud Rotary**	Drill Bit Size/Type	**52-60': 3.75" Drag Bit - 60-91': 2.9375" Roller Bit**	Total Depth of Borehole	**91.0´ bgs**
Drill Rig Type	**Simco 2800 HS HT Truck-Mounted (SN 072068)**	Drilling Contractor	**Terracon - Craig Penton**	Surface Elevation	**495 ft. NAVD88**
Borehole Backfill	**Cement-bentonite grout**	Sampling Method(s)	**2 inch split-spoon/3 inch shelby tube**	Hammer Data	**Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)**
Boring Location	**N 1120563 E 2403754 (ft. NAD83)**	Groundwater Level(s)	**Pond Surface**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	**0**							495.0 0.0 0-46.8': Water.					*Surface elevation based on assumed normal ash pond elevation.* *Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	**5**												
485	**10**												
480	**15**												
475	**20**												
470	**25**												
465	**30**												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-108

Sheet 2 of 3

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30												
460	35												
455	40												
450	45												
								448.3 Mudline. 46.8					
			SS-1	WOR/4" 1 2	89	0.75 0.75		447.5 Soft, wet, blue to dark gray, SILT (ML), with sand and organics [CCR]. 47.5 Soft to medium stiff, wet, reddish brown, Sandy Lean CLAY (CL), with trace organics [TOPSOIL].	44	21	61.7 33.8	73.1	
			SS-2	WOH WOH WOH	94	0.0 0.0 0.0		446.0 Becomes very soft. 49.0 Very soft, wet, grayish brown, sandy, Lean CLAY (CL), with organics [ALLUVIUM].	36	18	30.3		
445	50												
			SS-3	1 2 4	83	1.25 1.5 1.25		443.0 52.0 Medium stiff, moist to wet, yellowish brown with gray mottling, Lean CLAY (CL), trace sand [RESIDIUM].					
			ST-1		71	2.0							
440	55												
			SS-4	2 6 7		2.25 2.0 2.0		Becomes very stiff, moist, bluish gray with yellowish brown mottling.	40	17	24.5		
			ST-2		58	1.0		437.0 58.0 Very loose, wet, light brown and tan with white and reddish brown banding, Silty SAND (SM), with relict structure, trace mica [SAPROLITE].					
			SS-5	1 1 2	83								
435	60												
			SS-6	0 1 2	72				NP	NP	48.5	29.9	*Switched to roller bit at 61.0 ft*
430	65												

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:44:38 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-108

Sheet 3 of 3

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
429.5	65.5												
			SS-7	3 3 9	83			Medium dense, wet, bluish gray with yellowish gray and black banding, Silty SAND (SM), with micas and relict structure [SAPROLITE].					
425	70												
			SS-8	1 4 7	67			Becomes brown with bluish dark gray banding.			41.8	25.5	
420	75												
			SS-9	8 11 17	78			Becomes olive gray with yellowish brown and black banding, trace gravel.					
415	80												
			SS-10	10 11 14	89			Becomes tan and gray with white and black banding					
410.0	85.0												
			SS-11	50/5.5"	72			Very dense, wet, tan grey and white, Silty SAND (SM), with mica and relict structure [PARTIALLY WEATHERED ROCK].					
405	90												
			SS-12	50/0.5"	0								
404.0	91.0							Drilling refusal at 91' bgs. End of Boring at 91´ bgs					*Borehole backfilled with cement-bentonite grout*
400													
395													

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:44:38 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-109

Sheet 1 of 2

Date(s) Drilled	**4/05/2016**	Logged By	**C. Dicke**	Checked By	**L. Carr**
Drilling Method	**0-37': 4.5" O.D. Casing - 37-43.5': Mud Rotary**	Drill Bit Size/Type	**37-40': 3.75" Drag Bit - 40-43.5': 2.9375" Roller Bit**	Total Depth of Borehole	**43.5´ bgs**
Drill Rig Type	**Simco 2800 HS HT Truck-Mounted (SN 072068)**	Drilling Contractor	**Terracon - Craig Penton**	Surface Elevation	**495 ft. NAVD88**
Borehole Backfill	**Cement-bentonite grout**	Sampling Method(s)	**2 inch split-spoon/3 inch shelby tube**	Hammer Data	**Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)**
Boring Location	**N 1122059 E 2403091 (ft. NAD83)**	Groundwater Level(s)	**Pond Surface**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	0							495.0 0.0 0 - 31': Water.					*Surface elevation based on assumed normal ash pond elevation.* *Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
480	15												
475	20												
470	25												
465	30												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

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Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30												
464.0	31.0							Mudline.					
			SS-1	WOR WOR WOR WOR	92			Soft, wet, dark gray SILT (ML) with sand and organics [CCR].					
463.3	31.8							Loose, wet, brown, clayey SAND (SC), trace oraganics [ALLUVIUM].			90.8		
460	35												
459.0	36.0							Very stiff, moist, blueish gray, sandy lean CLAY (CL), trace gravel, trace wood/roots [RESIDUUM]. 37.5': 3" sand layer.					
			SS-2	4 4 5	78	2.5 2.5 2.75					24.6		
455	40		SS-3	5 12 50/3.25"	92								
454.8	40.3							Dense to very dense, wet, dark brown silty SAND (SM) with mica and relict structure [PARTIALLY WEATHERED ROCK].			17.3		
451.5	43.5		SS-4	50/0.5"	100			Drilling refusal at 43.5' bgs. End of Boring at 43.5´ bgs					*Boring backfilled with cement-bentonite grout*
450													
445													
440													
435													
430													

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

Log of B-110

Sheet 1 of 3

Date(s) Drilled	04/11/16	Logged By	C. Dicke	Checked By	L. Carr
Drilling Method	0-50': 4.5" O.D. Casing - 50-87': Mud Rotary	Drill Bit Size/Type	50-73.5': 3.75" Drag Bit - 73.5-87': 2.9375" Roller Bit	Total Depth of Borehole	87.0´ bgs
Drill Rig Type	Simco 2800 HS HT Truck-Mounted (SN 072068)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	495 ft. NAVD88
Borehole Backfill	Cement-bentonite grout	Sampling Method(s)	2 inch split-spoon/3 inch shelby tube	Hammer Data	Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1120234 E 2405728 (ft. NAD83)	Groundwater Level(s)	Pond Surface		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	0							495.0 0.0 0 - 47.75': Water.					*Surface elevation based on assumed normal ash pond elevation.* *Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
480	15												
475	20												
470	25												
465	30												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

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Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30												
460	35												
455	40												
450	45												
								447.3 Mudline. 47.8					
								446.8 Medium stiff,wet, black, SILT (ML), with sand and organics [CCR]. 48.3					
			SS-1	4 7 11	93	1.0 2.0 2.25		Medium stiff to very stiff, wet to moist, reddish brown, lean CLAY (CL), trace sand and organics [TOPSOIL].			86.6	73.9	*3" spoon used on SS-1*
445	50		SS-2	4 6 11	83	2.75 2.5 2.75		444.8 Very stiff, wet to moist, yellowish to reddish brown with gray mottling, Elastic SILT (MH), trace gravel [RESIDUUM]. 50.3					
			ST-1		92	3.75			73	35	20.1		
440	55		SS-3	5 9 15	89	3.25 3.25 3.25		Becomes reddish brown to brownish red with yellowish brown mottling, with sand.					
			SS-4	4 9 14	78	3.75 4.0 4.0		Becomes hard.					
			SS-5	4 8 12	89	4.0 4.25 4.5							
			SS-6	3 6 8	83	2.25 3.0 2.5		Becomes stiff, gray with reddish brown and yellowish brown mottling.					
435	60												
			SS-7	0 3 4	83	1.25 1.5 1.25		Becomes medium stiff.	70	35	40.3	76.8	
430	65												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-110

Sheet 3 of 3

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
			ST-2		0								
426.5	68.5		SS-8	2 3 5	89			Loose, wet, light brown and gray with reddish brown and white banding, silty SAND (SM), with mica and relict structure [SAPROLITE].					
425	**70**												
			SS-9	6 10 15	72			Becomes medium dense, grayish brown white and black banding.			25.7	21.5	
420	**75**												
416.5	78.5		SS-10	50/5"				Very dense, wet, black and white, Silty SAND (SM), with mica and relict structure [PARTIALLY WEATHERED ROCK].					
415	**80**												
			SS-11	20 50/4"	70								
410	**85**												
408.0	87.0		SS-12	50/1"	0			Drilling refusal at 87' bgs. End of Boring at 87´ bgs					*Boring backfilled with cement-bentonite grout*
405													
400													
395													

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:44:57 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

Log of B-111

Sheet 1 of 3

Date(s) Drilled	4/07/2016	Logged By	C. Dicke	Checked By	L. Carr
Drilling Method	0-65': 4.5" O.D. Casing - 65-91.5': Mud Rotary	Drill Bit Size/Type	65-73': 3.75" Drag Bit - 73-91.5': 2.9375" Roller Bit	Total Depth of Borehole	91.5´ bgs
Drill Rig Type	Simco 2800 HS HT Truck-Mounted (SN 072068)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	495 ft. NAVD88
Borehole Backfill	Cement-bentonite grout	Sampling Method(s)	2 inch split-spoon/3 inch shelby tube	Hammer Data	Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1120257 E 2404512 (ft. NAD83)	Groundwater Level(s)	Pond Surface		

Elevation, feet	Depth, feet	SAMPLES					Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
		Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)							
495	0							495.0 0.0 0-58.4': Water.					*Surface elevation based on assumed normal ash pond elevation. Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
480	15												
475	20												
470	25												
465	30												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

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Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30												
460	35												
455	40												
450	45												
445	50												
440	55												
								436.6 Mudline 58.4					
								Soft, wet, black to dark gray, SILT (ML) with sand, organics and trace roots [CCR]. 435.0 60.0					
435	60		SS-1	WOR WOR 5 10	83	2.0		Stiff, wet, reddish brown, sandy, fat CLAY (CH), trace gravel and organics [RESIDUUM].			25.6	44.3	*3" spoon used to collect SS-1 sample*
			SS-2	1 3 7	67	1.5 2.5 3.0		432.0 62.6': 5" grayish blue, sandy lean clay layer. 63.0	65	28	36.4		
								Medium dense, moist, yellowish brown with reddish brown and gray banding, clayey SAND (SC), with mica and relict structure [SAPROLITE].					
430	65												

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:45:08 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

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Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
			SS-3	6 10 25	83	4.0 4.0 4.5+		Becomes dense.			22.1	38.7	
			SS-4	10 27 36	72			Becomes very dense with white and tan banding.					
			SS-5	30 33 50/5"	94								
425	70												
422.0	73.0		SS-6	27 30 21	78			Very dense, moist. white and tan with black banding, silty SAND (SM), trace gravel and sand with relict structure [PARTIALLY WEATHERED ROCK].			13.7	18.5	
420	75												
			SS-7	30 50/4.75"									
415	80												
			SS-8	25 37 38	67								
410	85												
			SS-9	27 38 50/2.5"	76			Becomes brownish gray and white with black and brown banding.			15.9		
405	90												
403.5	91.5		SS-10	50/0"				Drilling refusal at 91.5' bgs. End of Boring at 91.5´ bgs					*Borehole backfilled with cement-bentonite grout*
400													
395													

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

Log of B-112

Sheet 1 of 3

Date(s) Drilled	4/06/2016	Logged By	C. Dicke	Checked By	L. Carr
Drilling Method	0-44.5': 4.5" O.D. Casing - 44.5-82.2': Mud Rotary	Drill Bit Size/Type	44.5-61': 3.75" Drag Bit - 61-82.2': 2.9375" Roller Bit	Total Depth of Borehole	82.2´ bgs
Drill Rig Type	Simco 2800 HS HT Truck-Mounted (SN 072068)	Drilling Contractor	Terracon - Craig Penton	Surface Elevation	495 ft. NAVD88
Borehole Backfill	Cement-bentonite grout	Sampling Method(s)	2 inch split-spoon/3 inch shelby tube	Hammer Data	Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)
Boring Location	N 1119527 E 2403276 (ft. NAD83)	Groundwater Level(s)	Pond Surface		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	0							495.0 0.0 0 - 42.0': Water					*Surface elevation based on assumed normal ash pond elevation.* *Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
480	15												
475	20												
470	25												
465	30												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**

Project Number: **60478286**

Log of B-112

Sheet 2 of 3

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30												
460	35												
455	40												
453.0	42.0							Mudline					
			SS-1	WOR WOR WOR	72	0 0 0		Very soft, wet, black to dark gray SILT (ML) with sand and organics [CCR].			53.3	71.7	
452.0	43.0							Soft, wet reddish brown, Fat CLAY (CH) with sand [RESIDUUM].	60	26	40.7		
450.5	44.5												
450	45		SS-2	2 3 5	56	1.5 1.5 2.0		Stiff, moist, reddish-yellowish brown with gray mottling, Lean CLAY (CL), with sand [RESIDUUM].	49	22	26.4	40.0	
			SS-3	4 7 9	>100	2.0 2.0 2.0		Becomes very stiff, sandy.					
								Becomes stiff.					
446.8	48.3		SS-4	2 1 2	94	1.5 1.5 0.25		Very loose, wet, light gray with brown mottling, Silty SAND (SM), trace roots [ALLUVIUM].			25.0		
445	50		T-1		0								
			SS-5	0 1 2	0								
			SS-6	1 2 2	0								
441.0	54.0							Very soft, moist, grayish brown and tan, SILT (ML) with sand and mica and relict structure [SAPROLITE].					
440	55		T-2		50	0			NP	NP	56.2	25.2	
			SS-7	1 1 1	>100			Becomes, wet, light gray and tan.					
435.0	60.0							Loose, wet, tan and grayish brown, silty SAND (SM) with mica and relict structure [SAPROLITE].					*60.0': Drilling resistance increases*
435	60												
			SS-8	1 3 5	78						35.9	20.1	
430	65												

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA
Project Number: 60478286

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Sheet 3 of 3

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
			SS-9	6 8 16	67			Becomes medium dense					
425	70												
			SS-10	15 17 15	72			Becomes dense			19.9		
420	75												
			SS-11	6 7 10	61			Becomes medium dense					
415	80												
414.0	81.0		SS-12	50/1"	>100			Very dense, wet, tan and grayish brown, Silty SAND (SM), with mica and relict structure [PARTIALLY WEATHERED ROCK].					
412.8	82.2		SS-13	50/0"				Drilling refusal at 82.2' bgs. End of Boring at 82.17´ bgs					*Borehole backfilled with cement-bentonite grout*
410													
405													
400													
395													

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:45:19 PM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: Monroe County, GA

Project Number: 60478286

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Sheet 1 of 2

Date(s) Drilled	**4/05/2016 to 04/06/2016**	Logged By	**C. Dicke**	Checked By	**L. Carr**
Drilling Method	**0-15': 4.5" O.D. Casing - 15-40.7': Mud Rotary**	Drill Bit Size/Type	**15-27': 3.75" Drag Bit - 27-40.7': 2.9375" Roller Bit**	Total Depth of Borehole	**40.7´ bgs**
Drill Rig Type	**Simco 2800 HS HT Truck-Mounted (SN 072068)**	Drilling Contractor	**Terracon - Craig Penton**	Surface Elevation	**495 ft. NAVD88**
Borehole Backfill	**Cement-bentonite grout**	Sampling Method(s)	**2 inch split-spoon/3 inch shelby tube**	Hammer Data	**Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)**
Boring Location	**N 1120116 E 2402984 (ft. NAD83)**	Groundwater Level(s)	**Pond Surface**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	0							495.0 0.0 0 - 12.0': Water.					*Surface elevation based on assumed normal ash pond elevation. Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
								483.0 Mudline. 12.0					
								Soft, wet, dark grayish brown to brown, SILT (ML) with sand and organics [CCR]. 482.0 13.0					
			SS-1	1 3 3	83	0 0.25 1.25		Soft to stiff, wet to moist, reddish brown, Elastic SILT (MH), trace sand [RESIDUUM]			31.5	46.9	
480	15		T-1		75	2.0			66	37	34.2	52.5	
			SS-2	2 3 4	89	1.5 1.75 1.75		Becomes reddish brown to yellowish brown with gray mottling					*17.0': Stop drilling for day. Resume drilling on 04/06/2016*
			SS-3	3 4 5	>100	2.0 3.25 3.25					43.4		
								474.8 20.3					
475	20		SS-4	2 3 4	89			Loose, wet, reddish brown, Silty SAND (SM), trace mica [RESIDUUM].			48.1	52.2	
			SS-5	2 3 5	83			Becomes moist.					
			SS-6	2 4 6	94								
470	25												
								469.0 26.0					
								Medium dense, moist, tan to grayish brown, Silty SAND (SM), with relict structure [SAPROLITE].					
			SS-7	6 12 14	67						18.5		
465	30												

AECOM

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Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-113

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30												
463.0	32.0		SS-8	14 35 50/2.5"	76			Very dense, moist, tan to grayish brown, Silty SAND (SM), with relict structure [PARTIALLY WEATHERED ROCK].					*32.0': Drilling resistance increases*
460	35												
			SS-9	50/5.5"									
455	40												
454.3	40.7		SS-10	50/0"				Drilling refusal at 40.67' bgs. End of Boring at 40.67´ bgs					*Boring backfilled with cement-bentonite grout*
450													
445													
440													
435													
430													

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-114

Sheet 1 of 2

Date(s) Drilled	**4/05/2016**	Logged By	**C. Dicke**	Checked By	**L. Carr**
Drilling Method	**0-32': 4.5" O.D. Casing - 32-49.5': Mud Rotary**	Drill Bit Size/Type	**32-42': 3.75" Drag Bit - 42-49.5': 2.9375" Roller Bit**	Total Depth of Borehole	**49.5´ bgs**
Drill Rig Type	**Simco 2800 HS HT Truck-Mounted (SN 072068)**	Drilling Contractor	**Terracon - Craig Penton**	Surface Elevation	**495 ft. NAVD88**
Borehole Backfill	**Cement-bentonite grout**	Sampling Method(s)	**2 inch split-spoon/3 inch shelby tube**	Hammer Data	**Automatic 140 lb/30" drop - 78.6% Hammer Efficiency (Meas. Jun 2015)**
Boring Location	**N 1121369 E 2403550 (ft. NAD83)**	Groundwater Level(s)	**Pond Surface**		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Sampling Resist. Blows/6" OR CORE% RQD	SAMPLES Recovery, %	SAMPLES Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
495	0							495.0 0.0 0 - 28.5': Water.					*Surface elevation based on assumed normal ash pond elevation.* *Boring location obtained with hand-held GPS device. assumed accuracy is +/- 5 ft.*
490	5												
485	10												
480	15												
475	20												
470	25												
								466.5 Mudline. 28.5					
		◣	SS-1	WOR WOR WOR	56		▨	466.0 Very soft, wet, dark gray to black, SILT (ML) with sand and organics [CCR]. 29.0			70.2 30.5	32.7	
465	30							465.0 30.0					

AECOM

Project: Southern Company- Plant Scherer Ash Pond Phase 2

Project Location: **Monroe County, GA**
Project Number: **60478286**

Log of B-114

Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES Type	Number	Sampling Resist. Blows/6" OR CORE% RQD	Recovery, %	Pocket Pen. Qu (tsf)	Graphic Log	MATERIAL DESCRIPTION	Liquid Limit	Plastic Limit	Natural Moisture Content (%)	% Finer #200	REMARKS AND OTHER DETAILS
465	30		SS-2		89	1.75 2.0 2.0		Very soft, wet, brown to reddish brown, Clayey SAND (SC) with organics [TOPSOIL]. Stiff, moist, yellowish and reddish brown, Lean to Fat CLAY (CL-CH), trace sand and gravel [RESIDUUM].			24.7		
			SS-3	5 9 11	83	4.5 4.0 4.0		Becomes hard, light brown to yellowish brown with gray mottling, trace mica.					
460	35		SS-4	4 6 9	89	4.0 3.25 3.0		Becomes very stiff.			32.4		
458.0	37.0		T-1			1.0		Medium dense, moist, yellowish and reddish brown mottled, Silty SAND (SM), trace gravel and mica [RESIDUUM].	NP	NP	29.9	23.0	
455	40												
			SS-5	4 4 5	11			With gravel.					*42.0': Cobbles encountered*
450	45												
449.0	46.0							Very dense, moist, gray and white, Silty SAND (SM) with gravel and mica and relict structure [PARTIALLY WEATHERED ROCK].					*46.0': Drilling resistance increased*
			SS-6	14 20 35	78						18.1	23.1	
445.5	49.5		SS-7	50/0"				Drilling refusal at 49.5' bgs. End of Boring at 49.5´ bgs					*Borehole backfilled with cement-bentonite grout*
445													
440													
435													
430													

Report: GEO_CR_TEST; File P:\PROJECTS\GEOTECH\60478286_SCS_SCHERER_PHASE_2\7.0_CAD_GIS\7.06_GINT\SCS LOGS.GPJ; 5/26/2016 2:45:38 PM

2016 AECOM Subsurface Exploration - CPT Sounding Report (ConeTec)

PRESENTATION OF SITE INVESTIGATION RESULTS

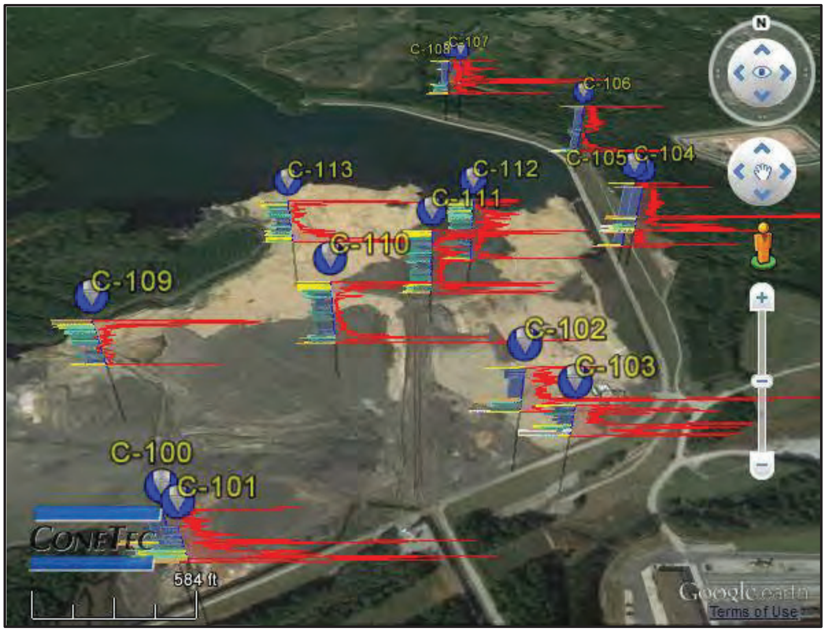
Plant Scherer – Juliette, GA

Prepared for:

AECOM

ConeTec Job No: 16-54030

Project Start Date: 16-Mar-2016
Project End Date: 24-Mar-2016
Report Date: 7-Apr-2016



Prepared by:

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www.conetecdataservices.com

Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec, Inc. for AECOM at Plant Scherer (Georgia Power) in Juliette, GA. The program consisted of 14 seismic cone penetration tests (SCPTu) at locations selected and labeled under the direction of AECOM. The purpose of the program was to evaluate existing site conditions.

Project Information

Project	
Client	AECOM
Project	Plant Scherer
ConeTec project number	16-54030

A map from Google earth including the SCPTu test locations is presented below.

Rig Description	Deployment System	Test Type
15 Ton CPT Track Rig	Integrated CPT Ramset	SCPTu

Coordinates		
Test Type	Collection Method	EPSG Number
SCPTu	Handheld GPS	4326

Cone Penetration Test (CPT)	
Depth reference	Depths are referenced to the existing ground surface at the time of each test.
Tip and sleeve data offset	0.1 meter This has been accounted for in the CPT data files.
Additional plots	Normalized CPTu plots are provided for all soundings.

Cone Penetrometers Used for this Project						
Cone Description	Cone Number	Cross Sectional Area (cm^2)	Sleeve Area (cm^2)	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (psi)
304:T1500F15U500	AD304	15	225	1500	15	500
437:T1500F15U1000	AD437	15	225	1500	15	1000
The CPT summary indicates which cone was used for each sounding.						

Interpretation Tables	
Additional information	The Soil Behaviour Type (SBT) classification chart (Robertson et al., 1986 presented by Lunne, Robertson and Powell, 1997) was used to classify the soil for this project.

Limitations

This report has been prepared for the exclusive use of AECOM (Client) for the project titled "Plant Scherer". The report's contents may not be relied upon by any other party without the express written permission of ConeTec, Inc. (ConeTec). ConeTec has provided site investigation services, prepared the factual data reporting, and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to ConeTec by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

The cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd. of Richmond, British Columbia, Canada.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and a geophone sensor for recording seismic signals. All signals are amplified down hole within the cone body and the analog signals are sent to the surface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The specific piezocone used for each test is described in the CPT summary table presented in the first Appendix. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 mm diameter over a length of 32 mm with tapered leading and trailing edges) located at a distance of 585 mm above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is 6 mm thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. ConeTec's calibration criteria also meet or exceed those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

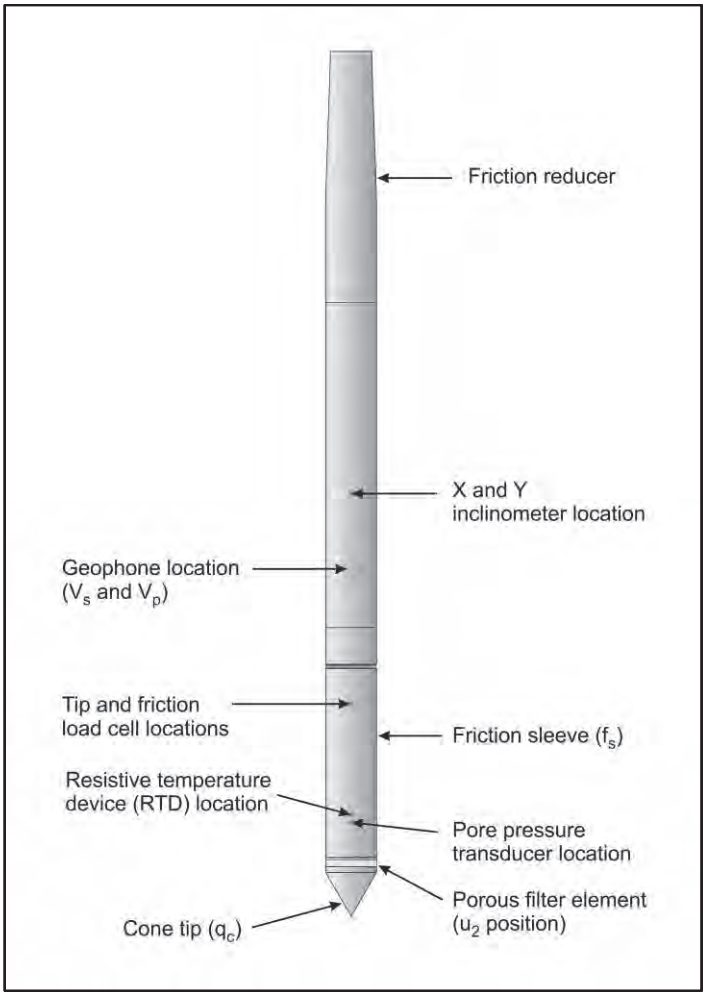

Figure CPTu. Piezocone Penetrometer (15 cm^2)

The ConeTec data acquisition systems consist of a Windows based computer and a signal conditioner and power supply interface box with a 16 bit (or greater) analog to digital (A/D) converter. The data is recorded at fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording intervals are either 2.5 cm or 5.0 cm depending on project requirements; custom recording intervals are possible. The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPT operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with either glycerin or silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of 2 cm/s, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil or glycerin under vacuum pressure prior to use
- Recorded baselines are checked with an independent multi-meter
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of piezocone data for this report is based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson (1990) and Robertson (2009). It should be noted that it is not always possible to accurately identify a soil type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al, 1986:

$$q_t = q_c + (1-a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (Rf) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

A summary of the CPTu soundings along with test details and individual plots are provided in the appendices. A set of interpretation files were generated for each sounding based on published correlations and are provided in Excel format in the data release folder. Information regarding the interpretation methods used is also included in the data release folder.

For additional information on CPTu interpretations, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

Shear wave velocity testing is performed in conjunction with the piezocone penetration test (SCPTu) in order to collect interval velocities. For some projects seismic compression wave (Vp) velocity is also determined.

ConeTec's piezocone penetrometers are manufactured with a horizontally active geophone (28 hertz) that is rigidly mounted in the body of the cone penetrometer, 0.2 meters behind the cone tip.

Shear waves are typically generated by using an impact hammer horizontally striking a beam that is held in place by a normal load. In some instances an auger source or an imbedded impulsive source maybe used for both shear waves and compression waves. The hammer and beam act as a contact trigger that triggers the recording of the seismic wave traces. For impulsive devices an accelerometer trigger may be used. The traces are recorded using an up-hole integrated digital oscilloscope which is part of the SCPTu data acquisition system. An illustration of the shear wave testing configuration is presented in Figure SCPTu-1.

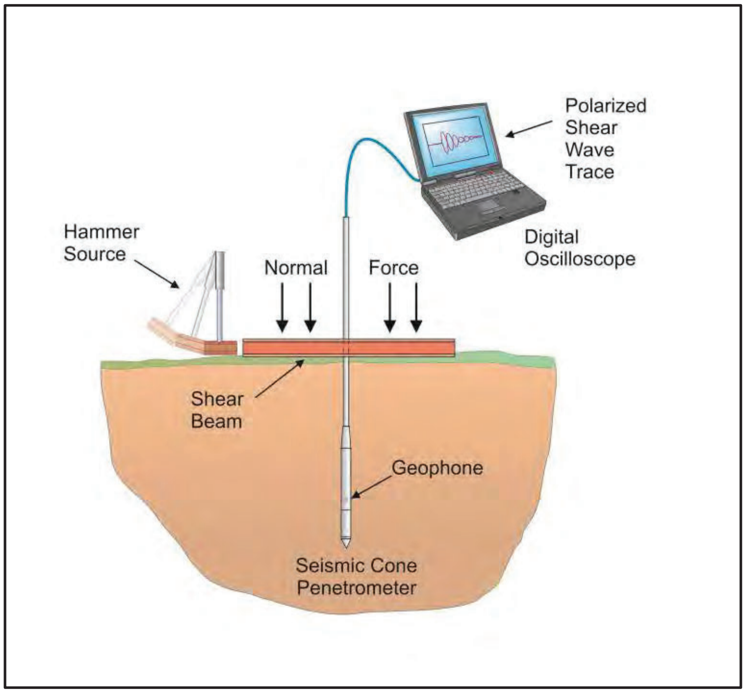

Figure SCPTu-1. Illustration of the SCPTu system

All testing is performed in accordance to ConeTec's SCPTu operating procedures.

Prior to the start of a SCPTu sounding, the procedures described in the Cone Penetration Test section are followed. In addition, the active axis of the geophone is aligned parallel to the beam (or source) and the horizontal offset between the cone and the source is measured and recorded.

Prior to recording seismic waves at each test depth, cone penetration is stopped and the rods are decoupled from the rig to avoid transmission of rig energy down the rods. Multiple wave traces are recorded for quality control purposes. After reviewing wave traces for consistency the cone is pushed to the next test depth (typically one meter intervals or as requested by the client). Figure SCPTu-2 presents an illustration of a SCPTu test.

For additional information on seismic cone penetration testing refer to Robertson et.al. (1986).

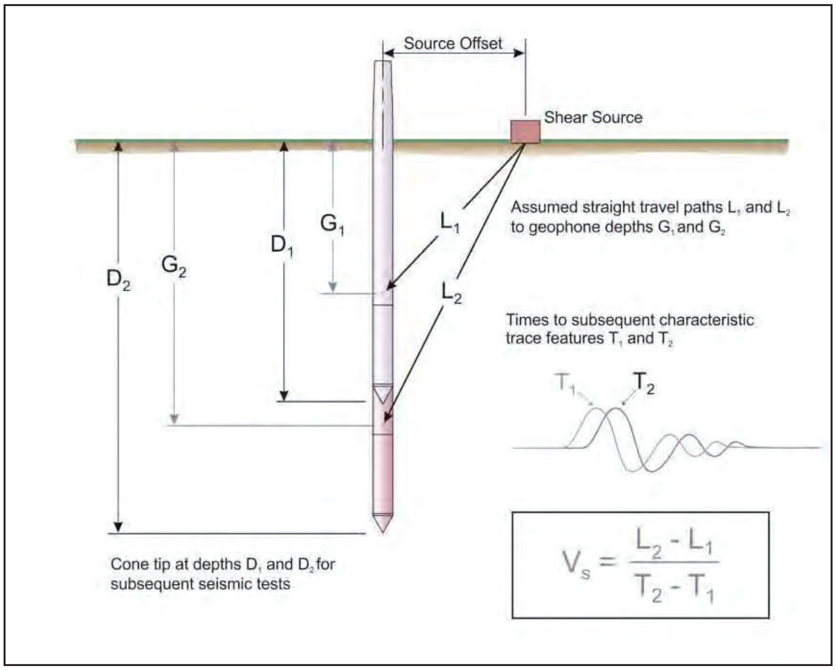

Figure SCPTu-2. Illustration of a seismic cone penetration test

Calculation of the interval velocities are performed by visually picking a common feature (e.g. the first characteristic peak, trough, or crossover) on all of the recorded wave sets and taking the difference in ray path divided by the time difference between subsequent features. Ray path is defined as the straight line distance from the seismic source to the geophone, accounting for beam offset, source depth and geophone offset from the cone tip.

The average shear wave velocity to a depth of 100 feet (30 meters) ($\bar{v}_s$) has been calculated and provided for all applicable soundings using the following equation presented in ASCE, 2010.

$$\bar{v}_s = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{v_{si}}}$$

where: $\bar{v}_s$ = average shear wave velocity ft/s (m/s)
d_i = the thickness of any layer between 0 and 100 ft (30 m)
v_{si} = the shear wave velocity in ft/s (m/s)
$\sum_{i=1}^{n} d_i$ = 100 ft (30 m)

Average shear wave velocity, $\bar{v}_s$ is also referenced to V_{s100} or V_{s30}.

The layer travel times refers to the travel times propagating in the vertical direction, not the measured travel times from an offset source.

Tabular results and SCPTu plots are presented in the relevant appendix.

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

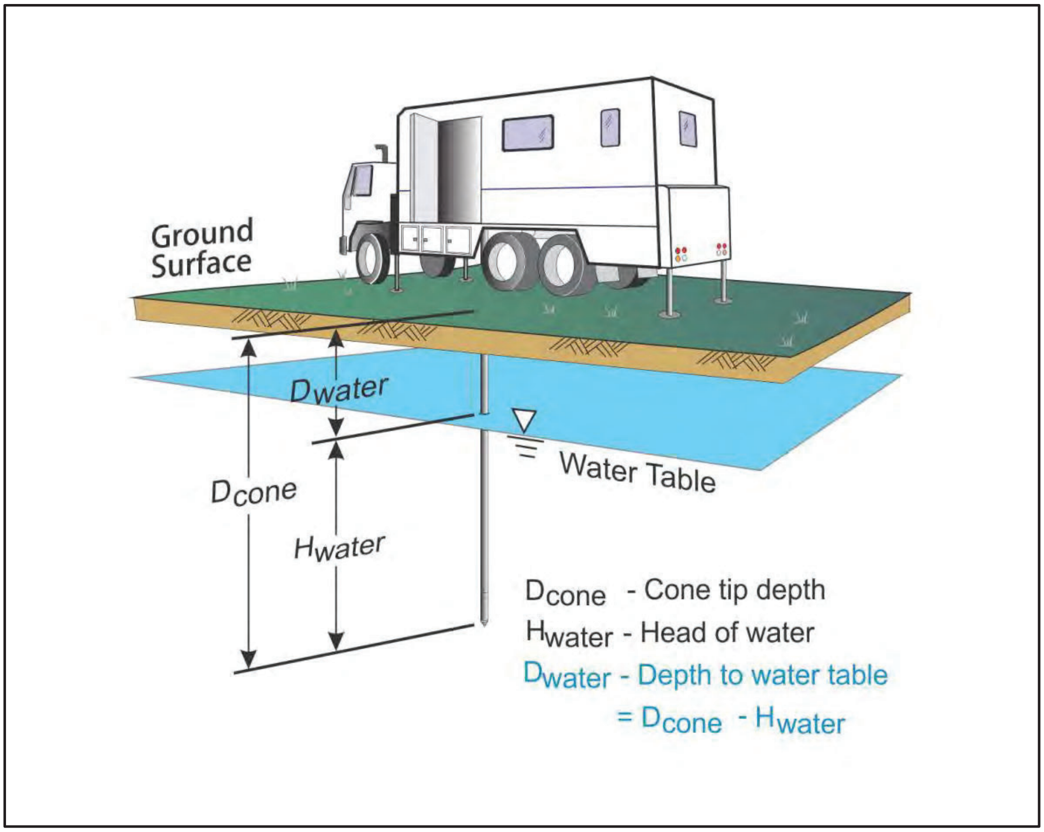

Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behavior.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

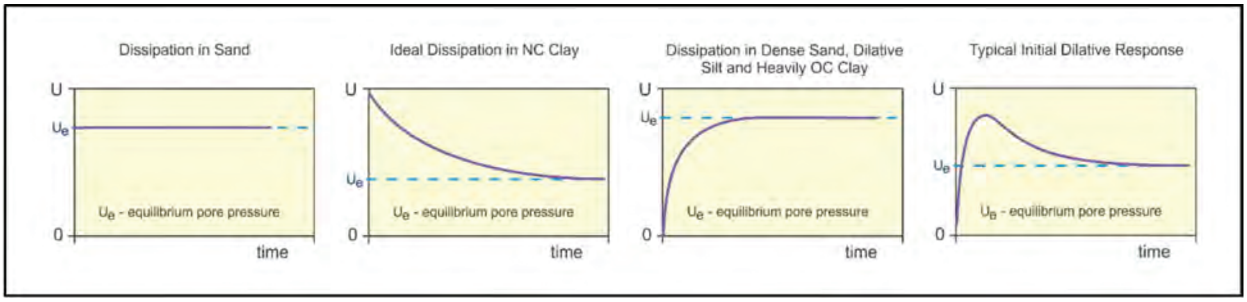

Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve of Figure PPD-2.

In fine grained deposits the point at which 100% of the excess pore pressure has dissipated is known as t_{100}. In some cases this can take an excessive amount of time and it may be impractical to take the dissipation to t_{100}. A theoretical analysis of pore pressure dissipations by Teh and Houlsby (1991) showed that a single curve relating degree of dissipation versus theoretical time factor (T*) may be used to calculate the coefficient of consolidation (c_h) at various degrees of dissipation resulting in the expression for c_h shown below.

$$c_h = \frac{T^* \cdot a^2 \cdot \sqrt{I_r}}{t}$$

Where:

T* is the dimensionless time factor (Table Time Factor)
a is the radius of the cone
I_r is the rigidity index
t is the time at the degree of consolidation

Table Time Factor. T* versus degree of dissipation (Teh and Houlsby, 1991)

Degree of Dissipation (%)	20	30	40	50	60	70	80
T* (u_2)	0.038	0.078	0.142	0.245	0.439	0.804	1.60

The coefficient of consolidation is typically analyzed using the time (t_{50}) corresponding to a degree of dissipation of 50% (u_{50}). In order to determine t_{50}, dissipation tests must be taken to a pressure less than u_{50}. The u_{50} value is half way between the initial maximum pore pressure and the equilibrium pore pressure value, known as u_{100}. To estimate u_{50}, both the initial maximum pore pressure and u_{100} must be known or estimated. Other degrees of dissipations may be considered, particularly for extremely long dissipations.

At any specific degree of dissipation the equilibrium pore pressure (u at t_{100}) must be estimated at the depth of interest. The equilibrium value may be determined from one or more sources such as measuring the value directly (u_{100}), estimating it from other dissipations in the same profile, estimating the phreatic surface and assuming hydrostatic conditions, from nearby soundings, from client provided information, from site observations and/or past experience, or from other site instrumentation.

For calculations of c_h (Teh and Houlsby, 1991), t_{50} values are estimated from the corresponding pore pressure dissipation curve and a rigidity index (I_r) is assumed. For curves having an initial dilatory response in which an initial rise in pore pressure occurs before reaching a peak, the relative time from the peak value is used in determining t_{50}. In cases where the time to peak is excessive, t_{50} values are not calculated.

Due to possible inherent uncertainties in estimating I_r, the equilibrium pore pressure and the effect of an initial dilatory response on calculating t_{50}, other methods should be applied to confirm the results for c_h.

Additional published methods for estimating the coefficient of consolidation from a piezocone test are described in Burns and Mayne (1998, 2002), Jones and Van Zyl (1981), Robertson et al. (1992) and Sully et al. (1999).

A summary of the pore pressure dissipation tests and dissipation plots are presented in the relevant appendix.

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Robertson, P.K., Sully, J.P., Woeller, D.J., Lunne, T., Powell, J.J.M. and Gillespie, D.G., 1992, “Estimating coefficient of consolidation from piezocone tests”, Canadian Geotechnical Journal, 29(4): 551-557.

Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J., 1999, “An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils”, Canadian Geotechnical Journal, 36(2): 369-381.

Teh, C.I., and Houlsby, G.T., 1991, “An analytical study of the cone penetration test in clay”, Geotechnique, 41(1): 17-34.

The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Normalized Cone Penetration Test Plots
- Seismic Cone Penetration Test Plots
- Seismic Cone Penetration Test Tabular Results
- Seismic Cone Penetration Test Wave Traces
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots

Cone Penetration Test Summary and Standard Cone Penetration Test Plots

CONETEC

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Start Date: 16-Mar-2016
End Date: 24-Mar-2016

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface (ft)	Final Depth (ft)	Shear Wave Velocity Tests	Latitude[2] (degrees)	Longitude (degrees)
C-100	16-54030_SPC-100	3/21/2016	304:T1500F15U500	19	71.4	22	33.06703	-83.81399
C-101	16-54030_SPC-101	3/18/2016	304:T1500F15U500	15 Note 3	45.1	14	33.06689	-83.81379
C-102	16-54030_SPC-102	3/22/2016	304:T1500F15U500	35	61.0	19	33.06886	-83.80977
C-103	16-54030_SPC-103	3/22/2016	304:T1500F15U500	5	43.8	14	33.06860	-83.80911
C-104	16-54030_SPC-104	3/24/2016	304:T1500F15U500	70	111.2	34	33.07389	-83.80670
C-105	16-54030_SPC-105	3/23/2016	304:T1500F15U500	47	78.2	23	33.07387	-83.80652
C-106	16-54030_SPC-106	3/24/2016	304:T1500F15U500	40	94.7	29	33.07801	-83.80669
C-107	16-54030_SPC-107	3/24/2016	304:T1500F15U500	24	75.1	22	33.08140	-83.80998
C-108	16-54030_SPC-108	3/23/2016	304:T1500F15U500	5 Note 3	48.1	15	33.08169	-83.80958
C-109	16-54030_SPC-109	3/16/2016	437:T1500F15U1000	6	63.8	19	33.06985	-83.81589
C-110	16-54030_SPC-110	3/17/2016	304:T1500F15U500	3	92.8	29	33.07069	-83.81252
C-111	16-54030_SPC-111	3/16/2016	304:T1500F15U500	5	98.4	30	33.07204	-83.81087
C-112	16-54030_SPC-112	3/23/2016	304:T1500F15U500	5	100.4	31	33.07311	-83.81004
C-113	16-54030_SPC-113	3/17/2016	304:T1500F15U500	4	68.9	19	33.07312	-83.81356
Totals	14 Soundings				1053.0	320		

1. Phreatic surface was estimated using representative pore pressure dissipation tests. Hydrostatically increasing pore water pressures with depth were used for interpretation tables.

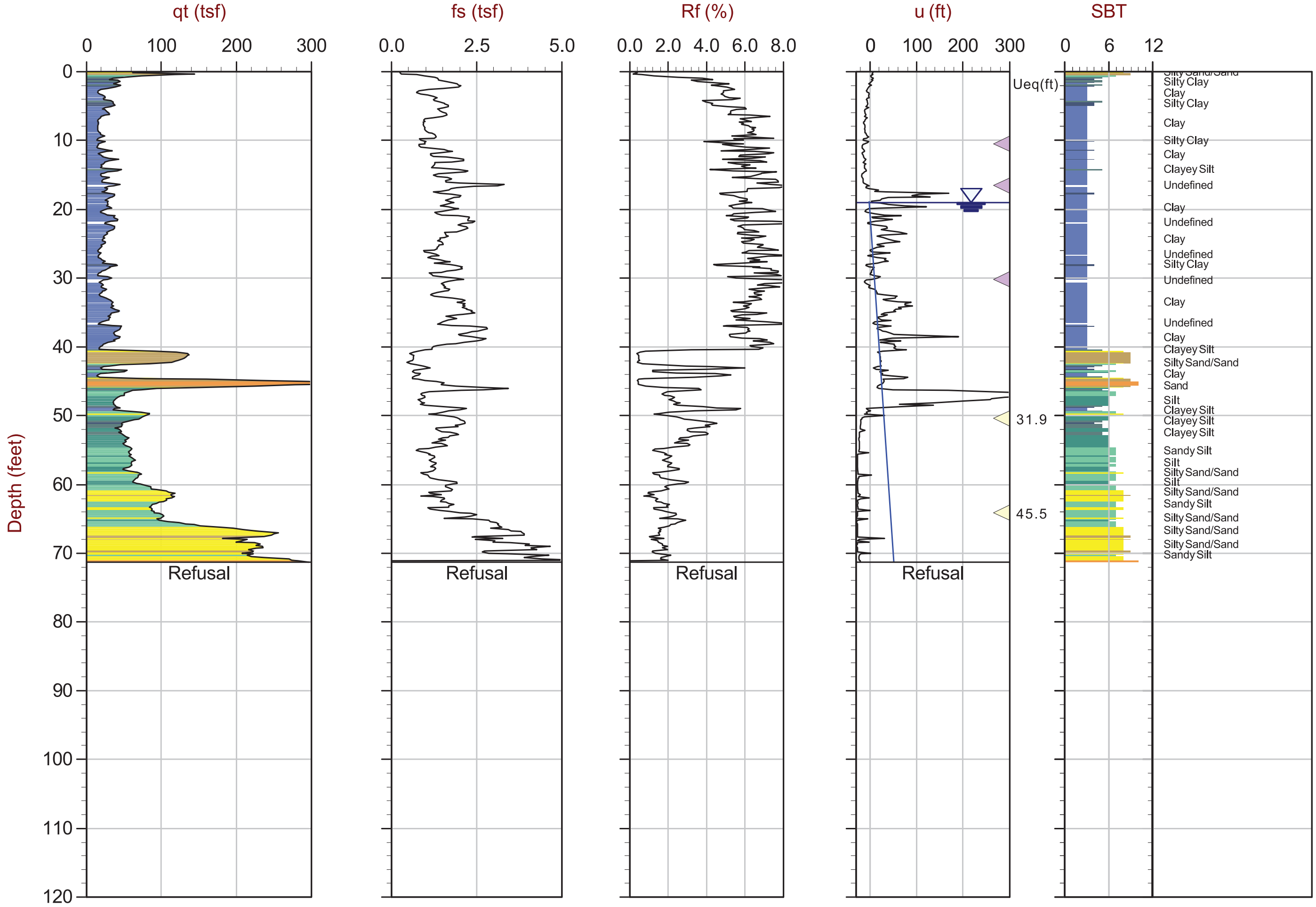
2. WGS84- Latitude/Longitude. Coordinates were taken with a handheld GPS and should be considered approximate.

3. Due to the location of the sounding at the toe of the dike, dissipation data indicates influence from higher water pressures in contained ash deposits. The phreatic surface measured by AECOM's electronic water level indicator is shown instead.

AECOM

Job No: 16-54030
Date: 03:21:16 13:47
Site: Plant Scherer

Sounding: C-100
Cone: 304:T1500F15U500



Max Depth: 21.750 m / 71.36 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-100.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06703 E: -83.81399

△ Dissipation with estimated Ueq value

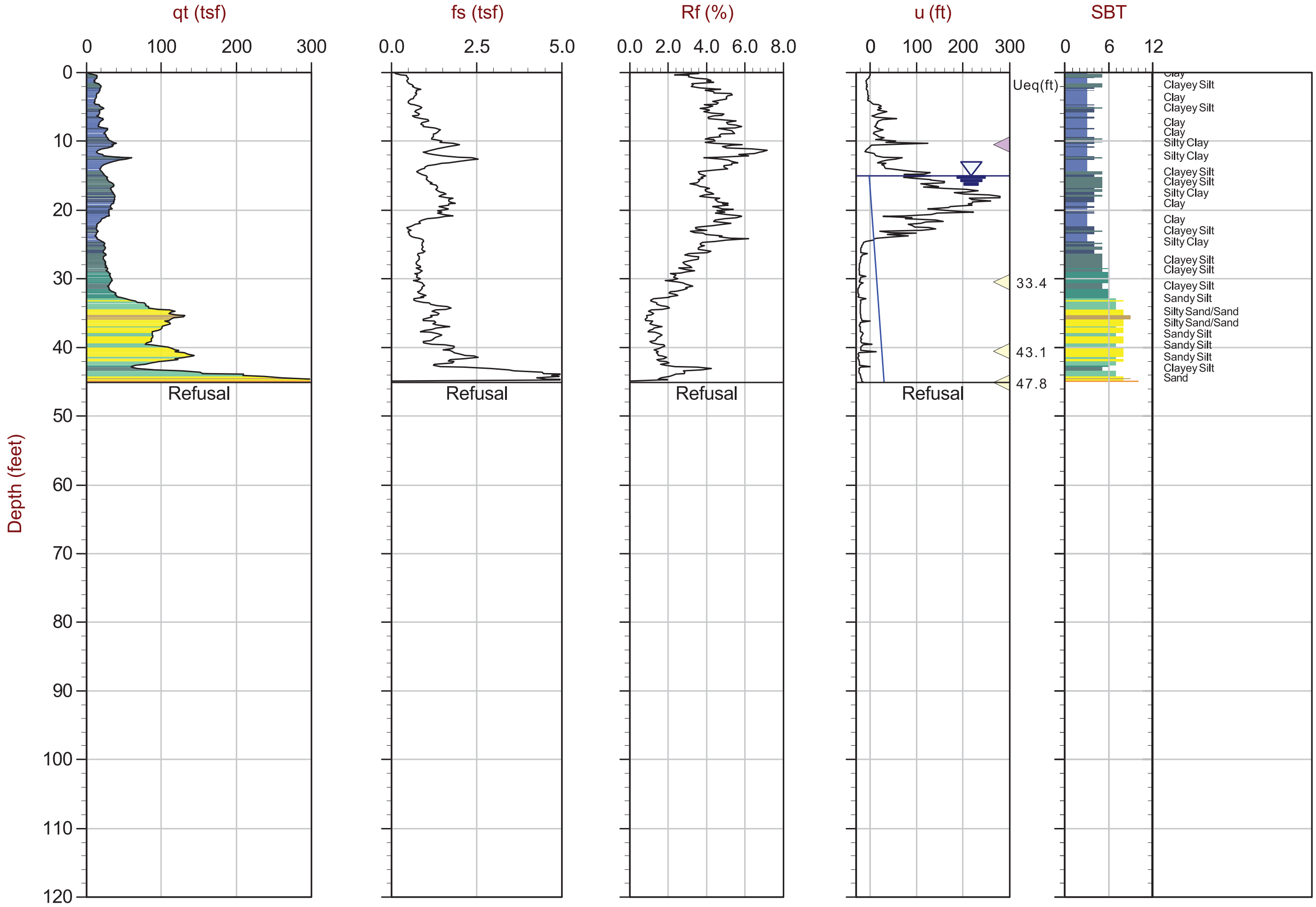
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:18:16 08:48
Site: Plant Scherer

Sounding: C-101
Cone: 304:T1500F15U500



Max Depth: 13.750 m / 45.11 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-101.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06689 E: -83.81379

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

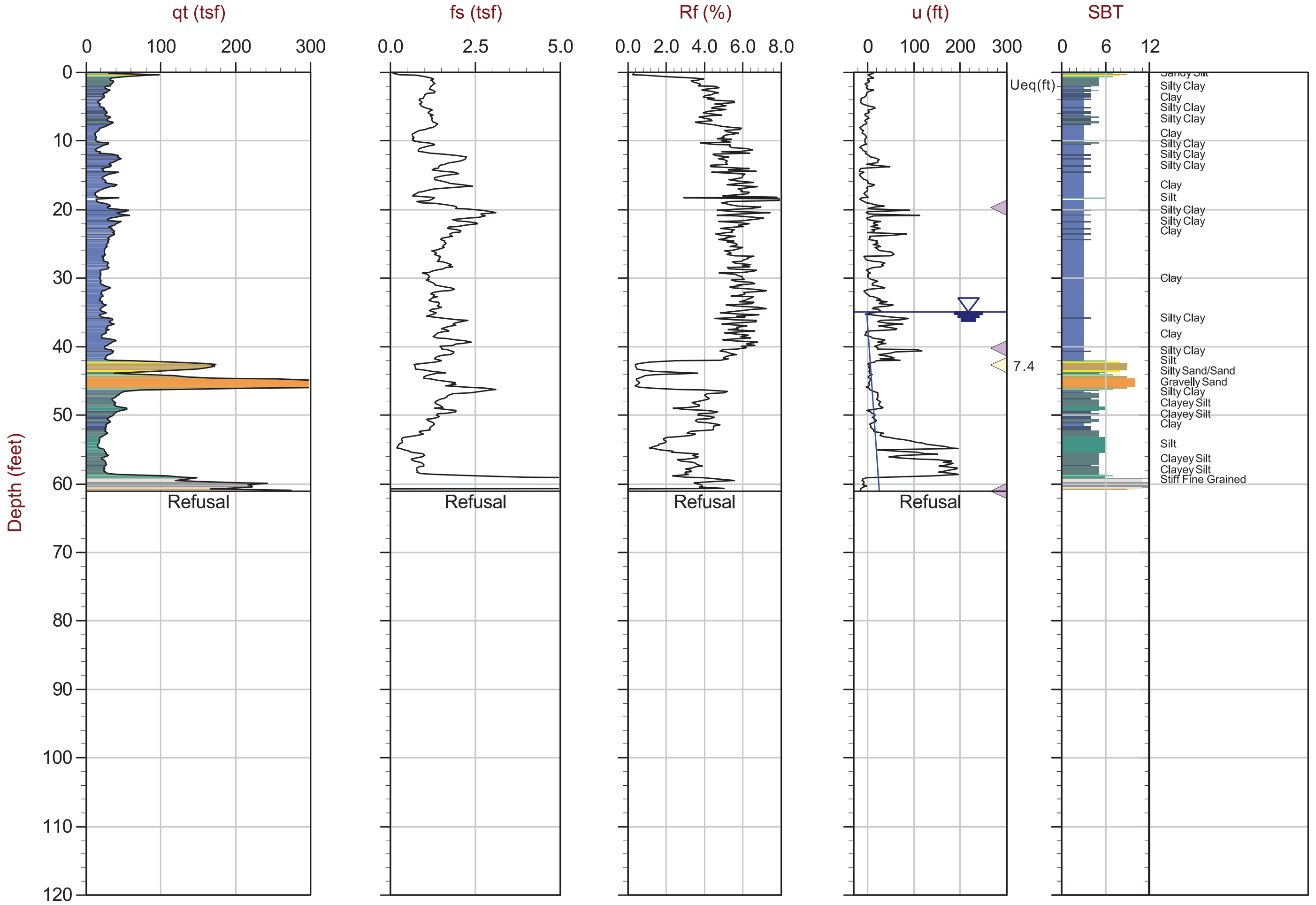
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:22:16 08:51
Site: Plant Scherer

Sounding: C-102
Cone: 304:T1500F15U500



Max Depth: 18.600 m / 61.02 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-102.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06886 E: -83.80977

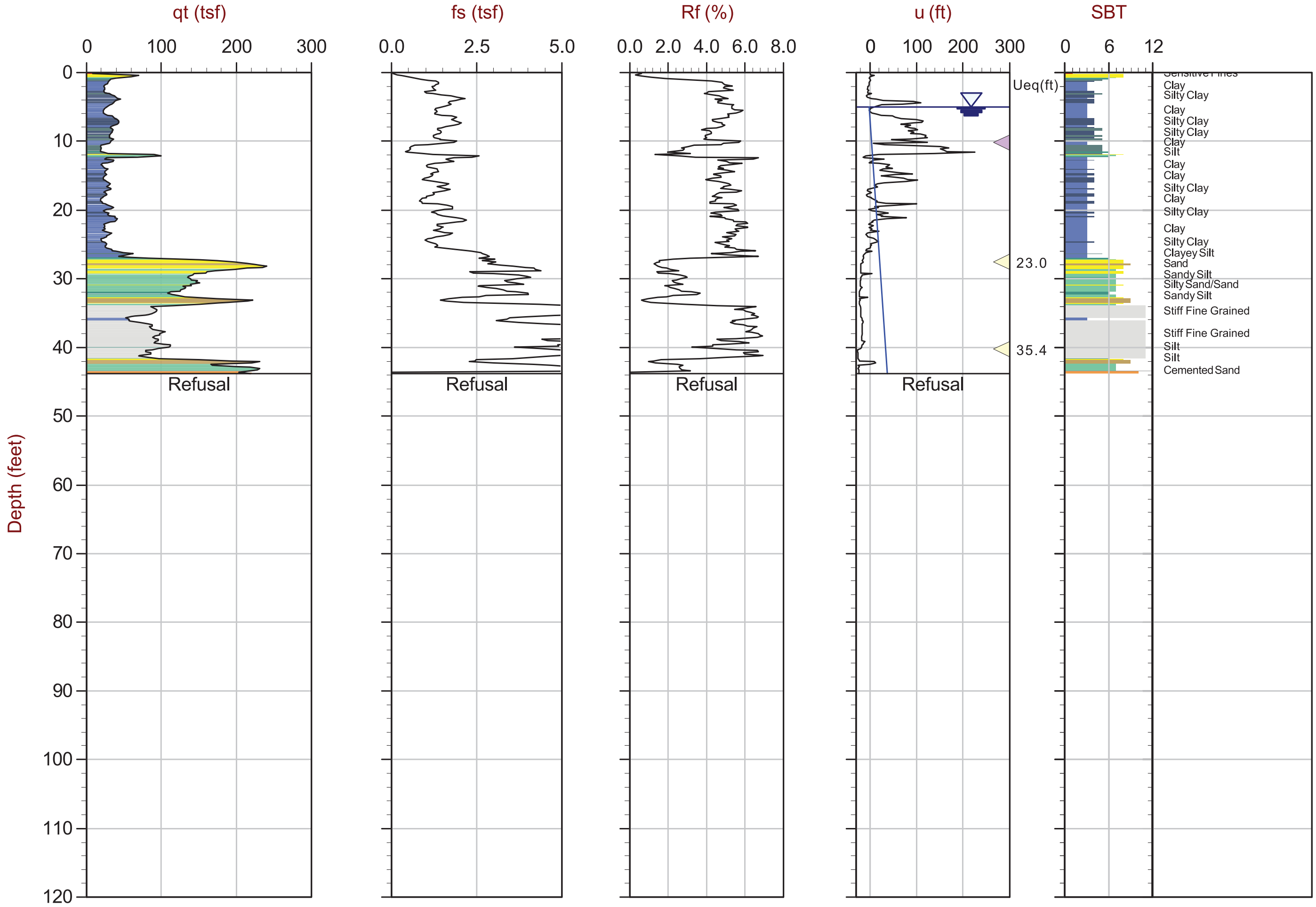
△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM	Job No: 16-54030	Sounding: C-103
	Date: 03:22:16 14:13	Cone: 304:T1500F15U500
	Site: Plant Scherer	



Max Depth: 13.350 m / 43.80 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-103.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06860 E: -83.80911

△ Dissipation with estimated Ueq value

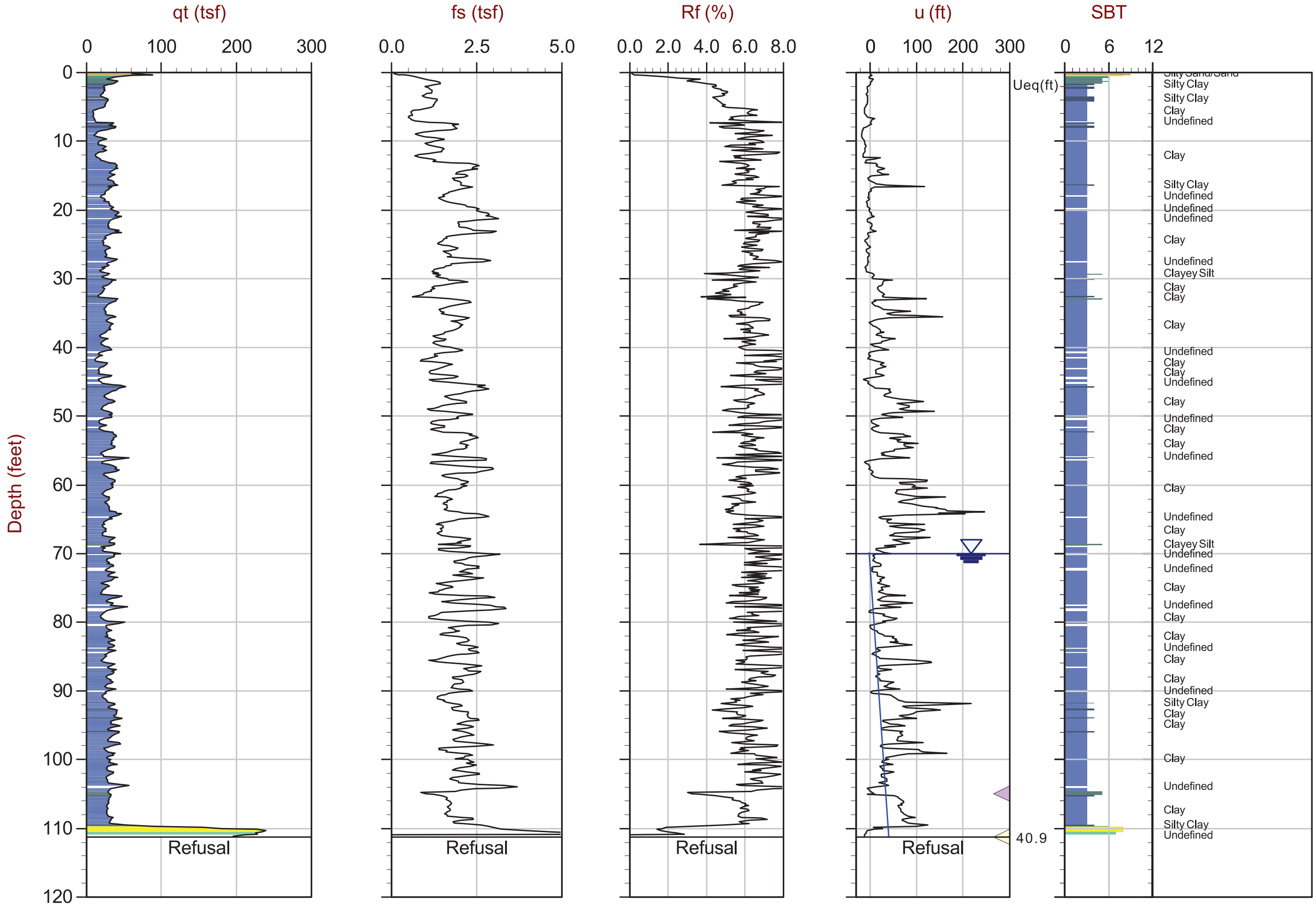
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:24:16 14:16
Site: Plant Scherer

Sounding: C-104
Cone: 304:T1500F15U500



Max Depth: 33.900 m / 111.22 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-104.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07389 E: -83.80670

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

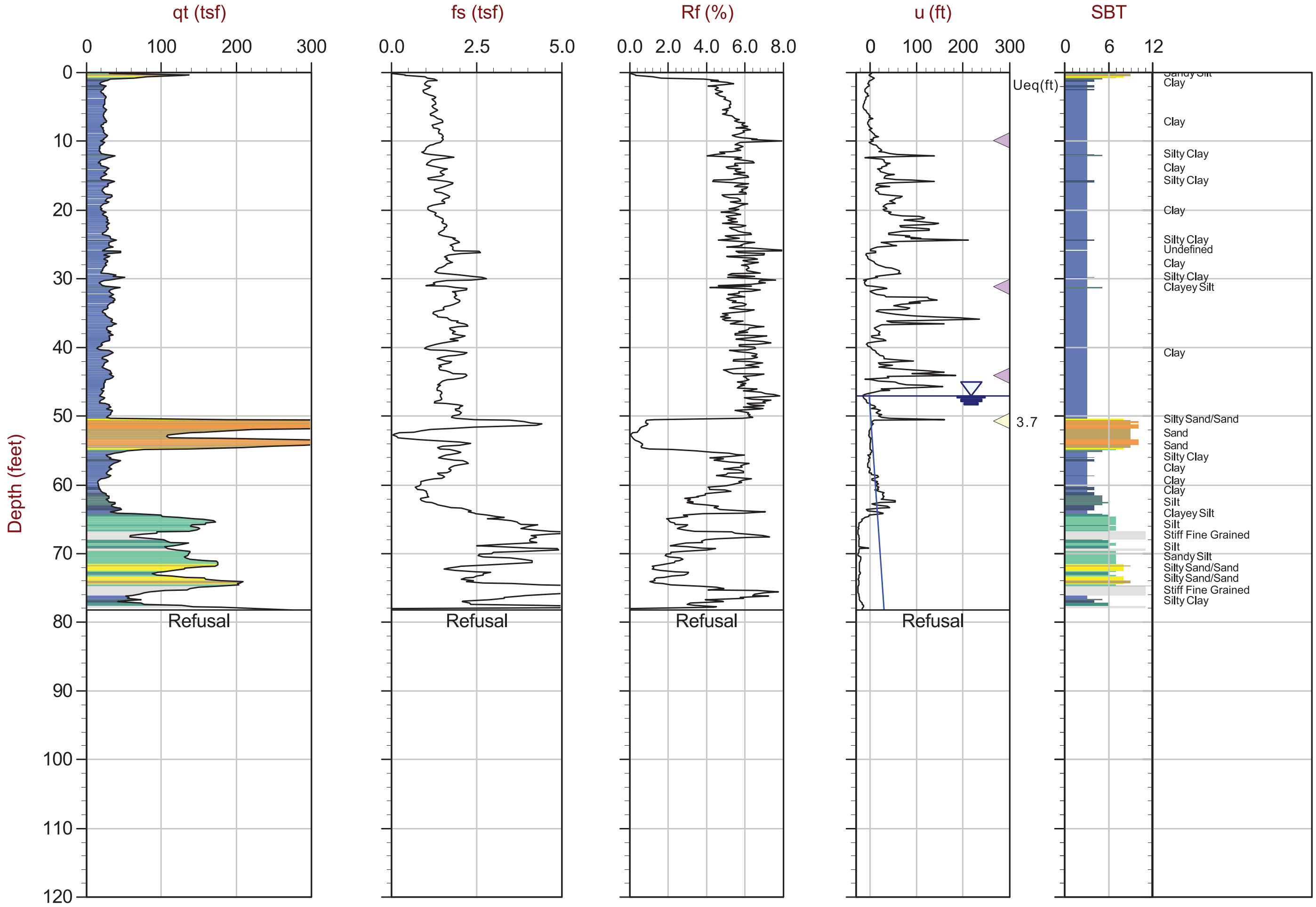
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:23:16 12:45
Site: Plant Scherer

Sounding: C-105
Cone: 304:T1500F15U500



Max Depth: 23.850 m / 78.25 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-105.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07387 E: -83.80652

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

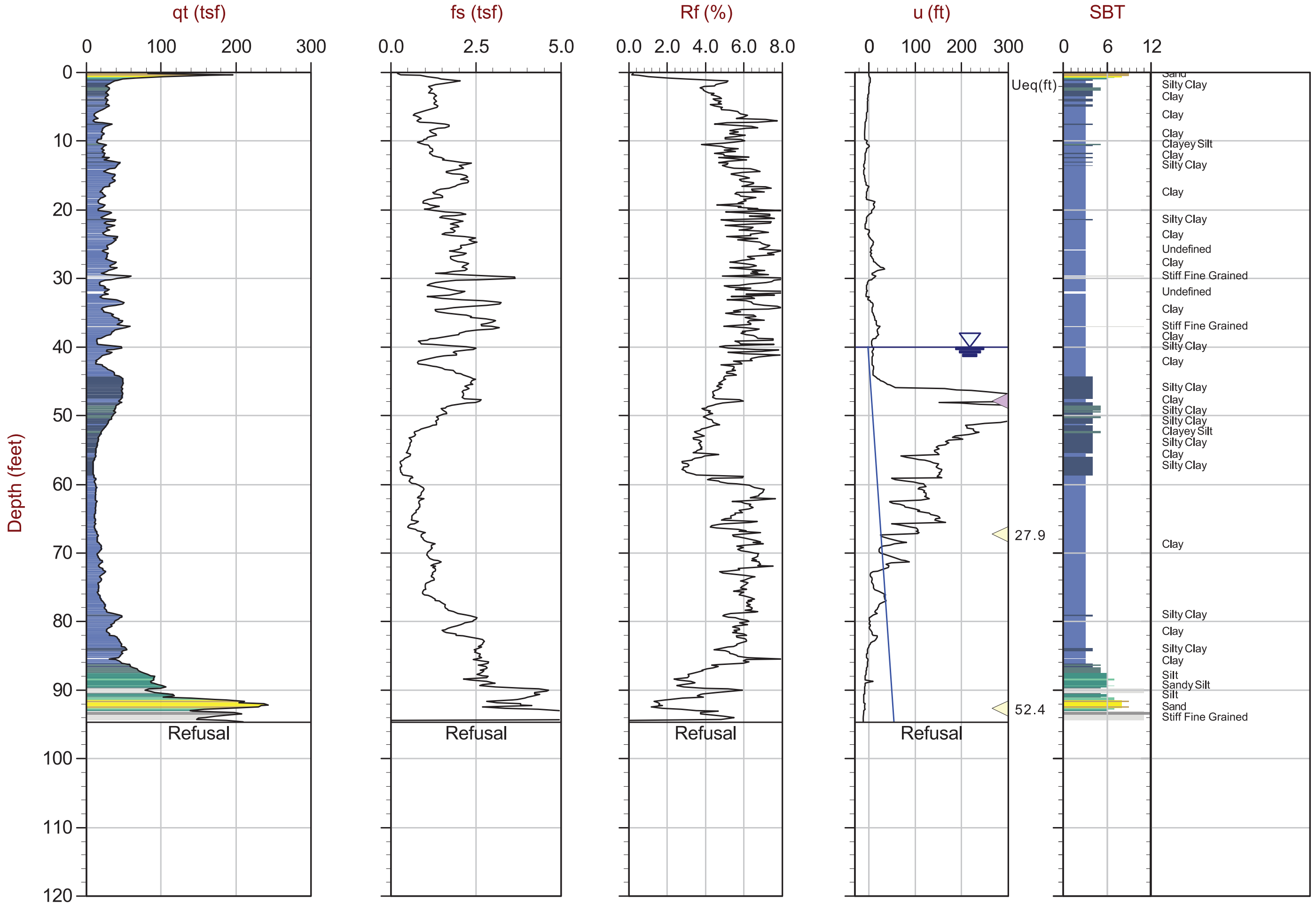
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:24:16 11:06
Site: Plant Scherer

Sounding: C-106
Cone: 304:T1500F15U500



Max Depth: 28.850 m / 94.65 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-106.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07801 E: -83.80669

△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

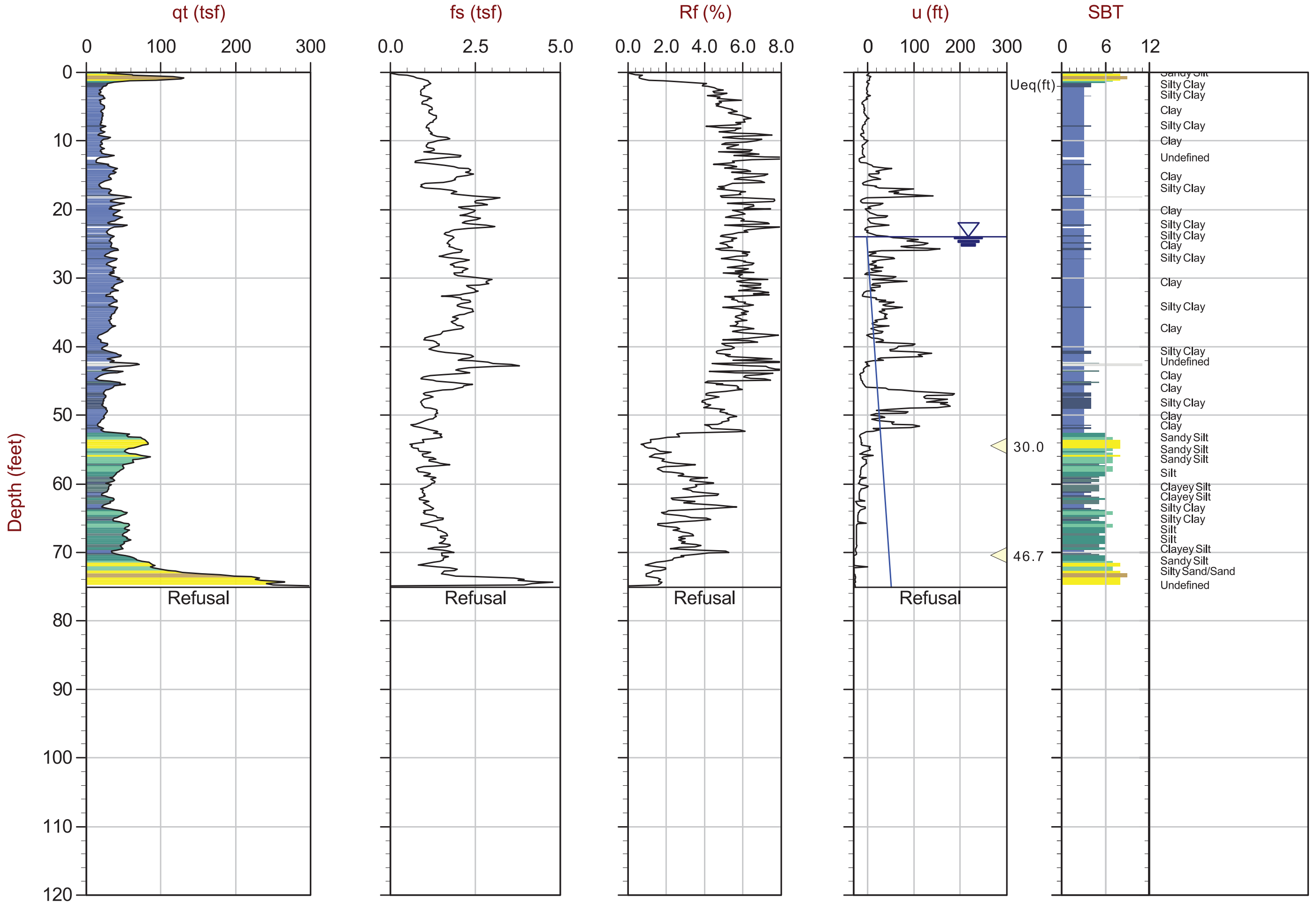
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:24:16 09:14
Site: Plant Scherer

Sounding: C-107
Cone: 304:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-107.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.08140 E: -83.80998

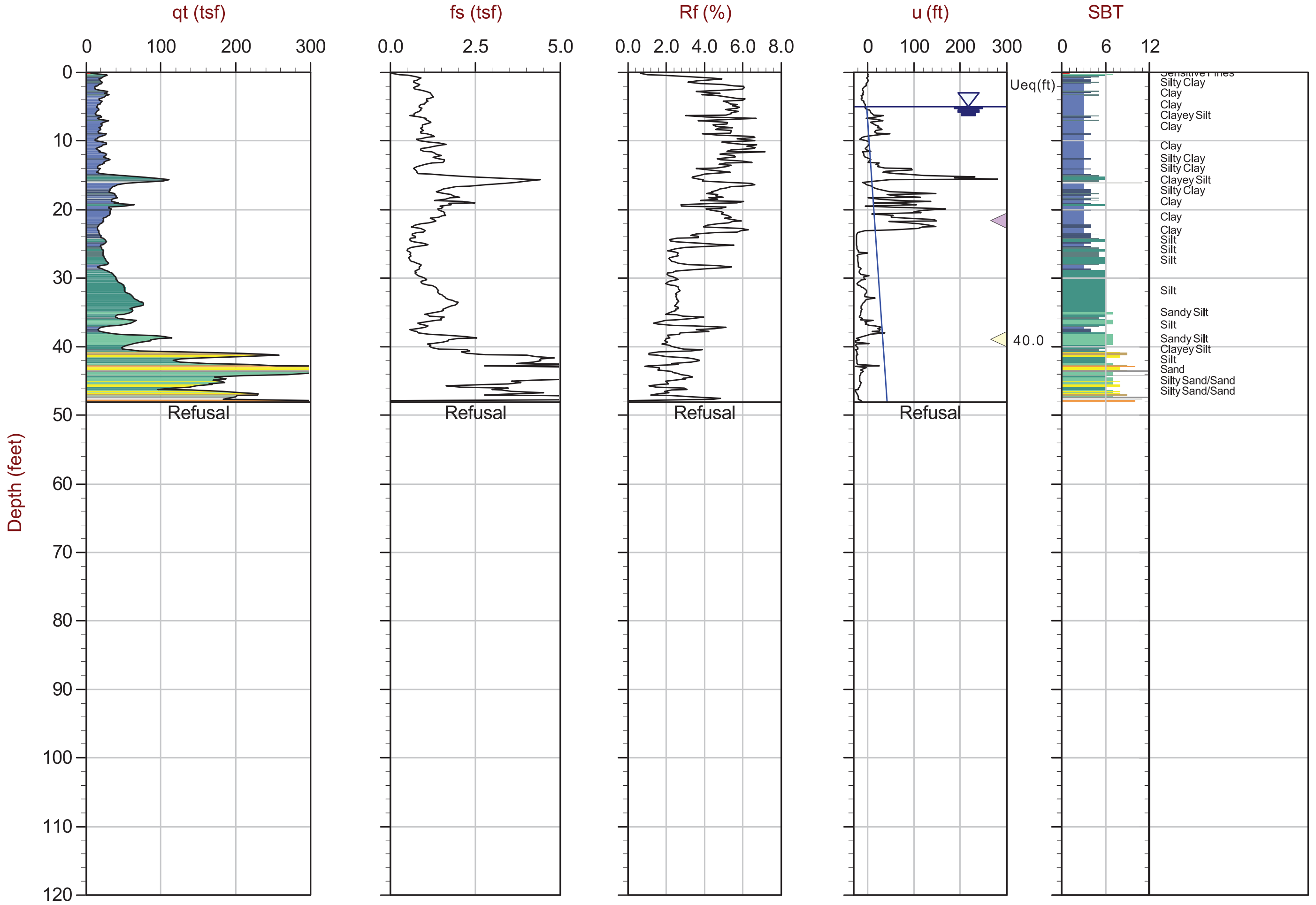
△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:23:16 16:29
Site: Plant Scherer

Sounding: C-108
Cone: 304:T1500F15U500



Max Depth: 14.650 m / 48.06 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-108.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.08169 E: -83.80958

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

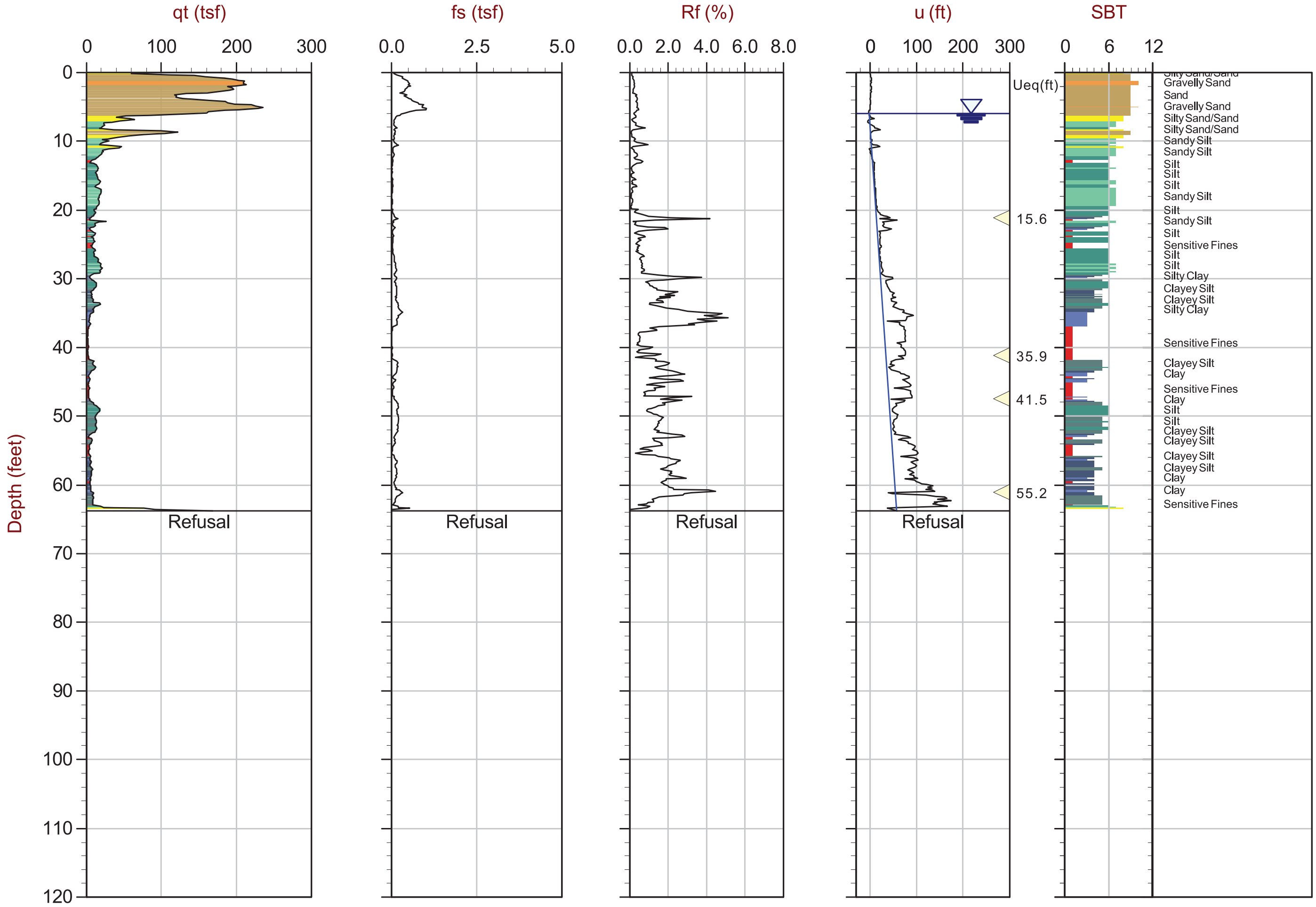
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:16:16 15:33
Site: Plant Scherer

Sounding: C-109
Cone: 437:T1500F15U1K



Max Depth: 19.450 m / 63.81 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-109.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06985 E: -83.81589

△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

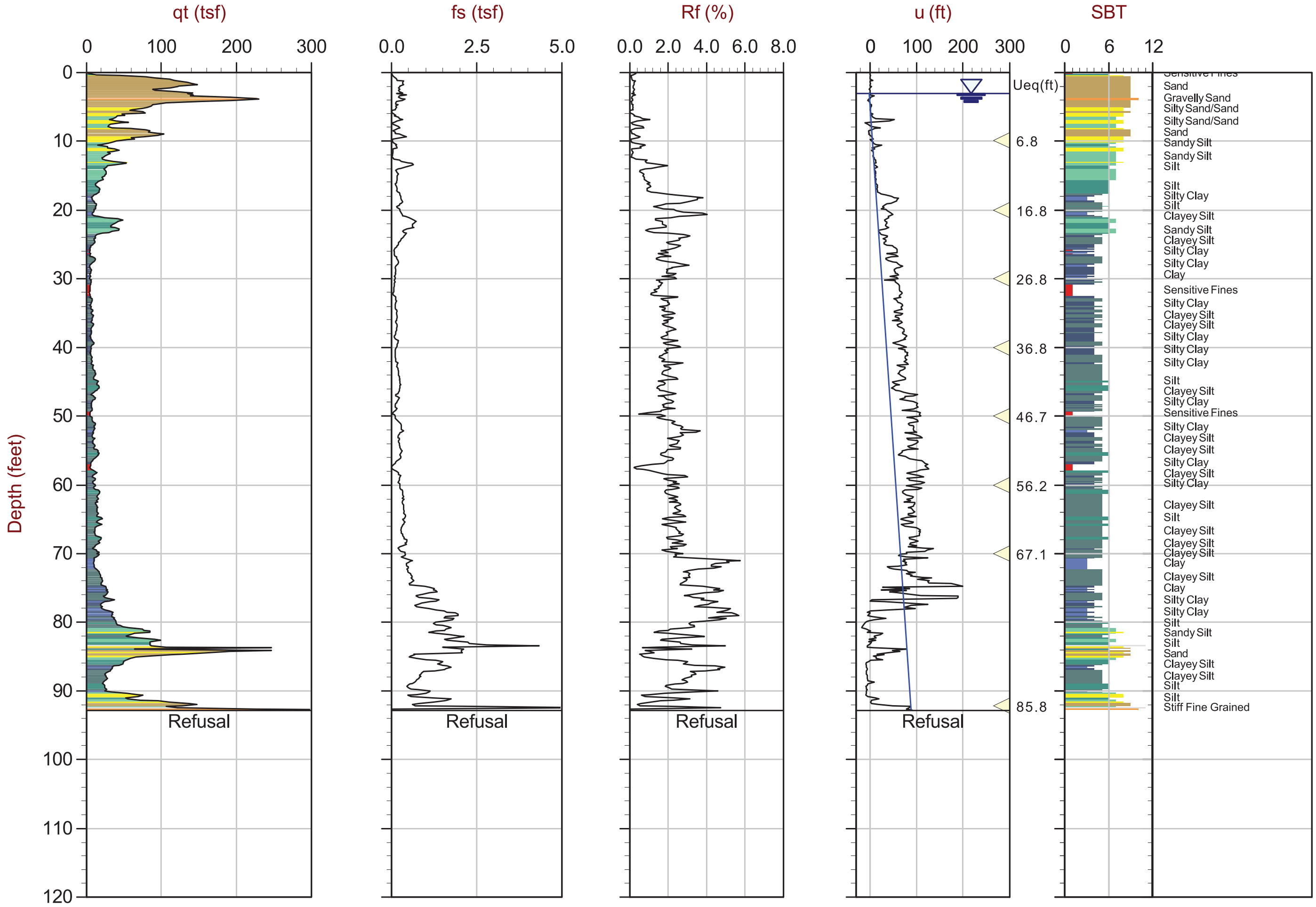
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

AECOM

Job No: 16-54030
Date: 03:17:16 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500



Max Depth: 28.300 m / 92.85 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-110.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07069 E: -83.81252

△ Dissipation with estimated Ueq value

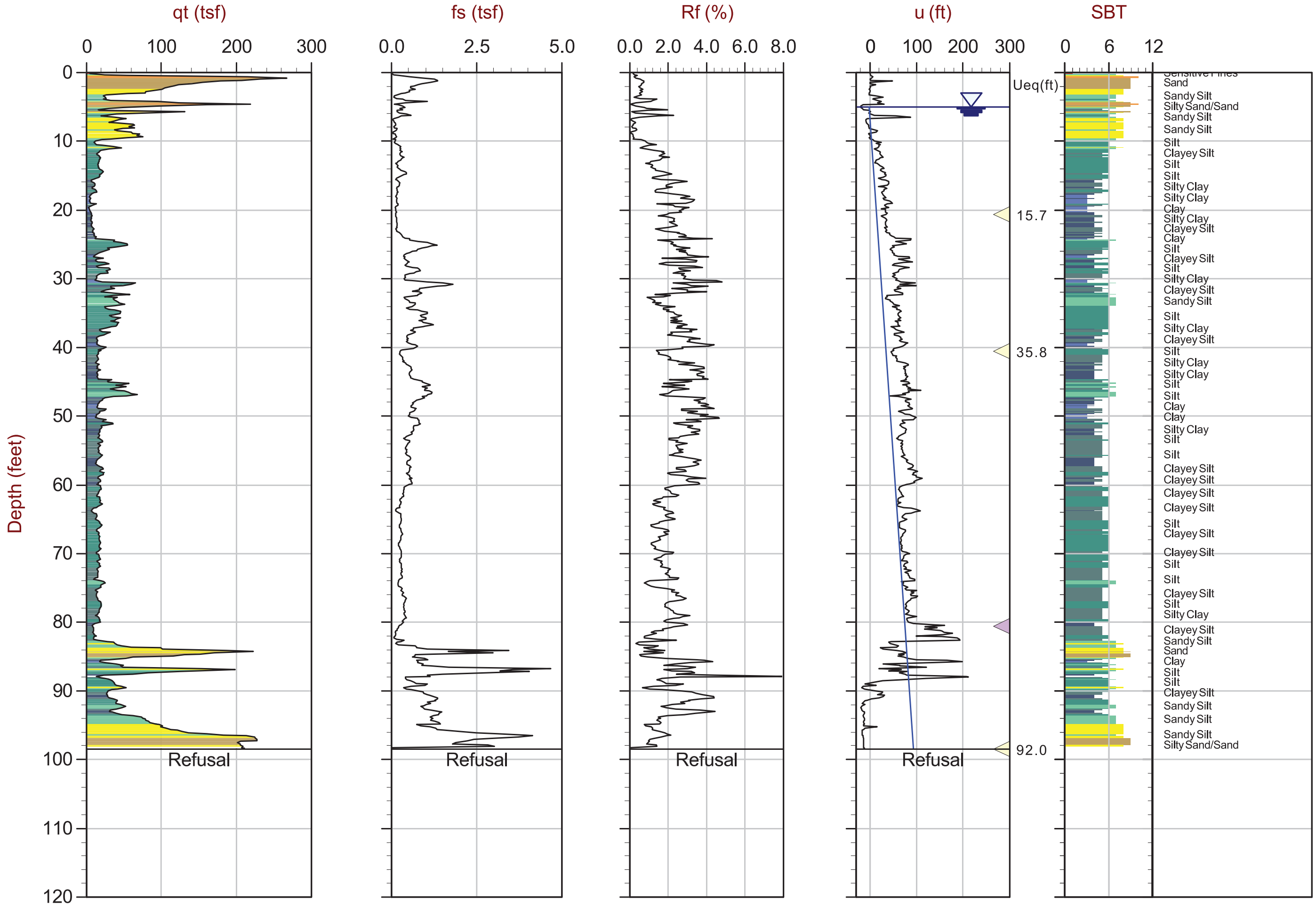
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:16:16 09:01
Site: Plant Scherer

Sounding: C-111
Cone: 304:T1500F15U500



Max Depth: 30.000 m / 98.42 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-111.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07204 E: -83.81087

△ Dissipation with estimated Ueq value

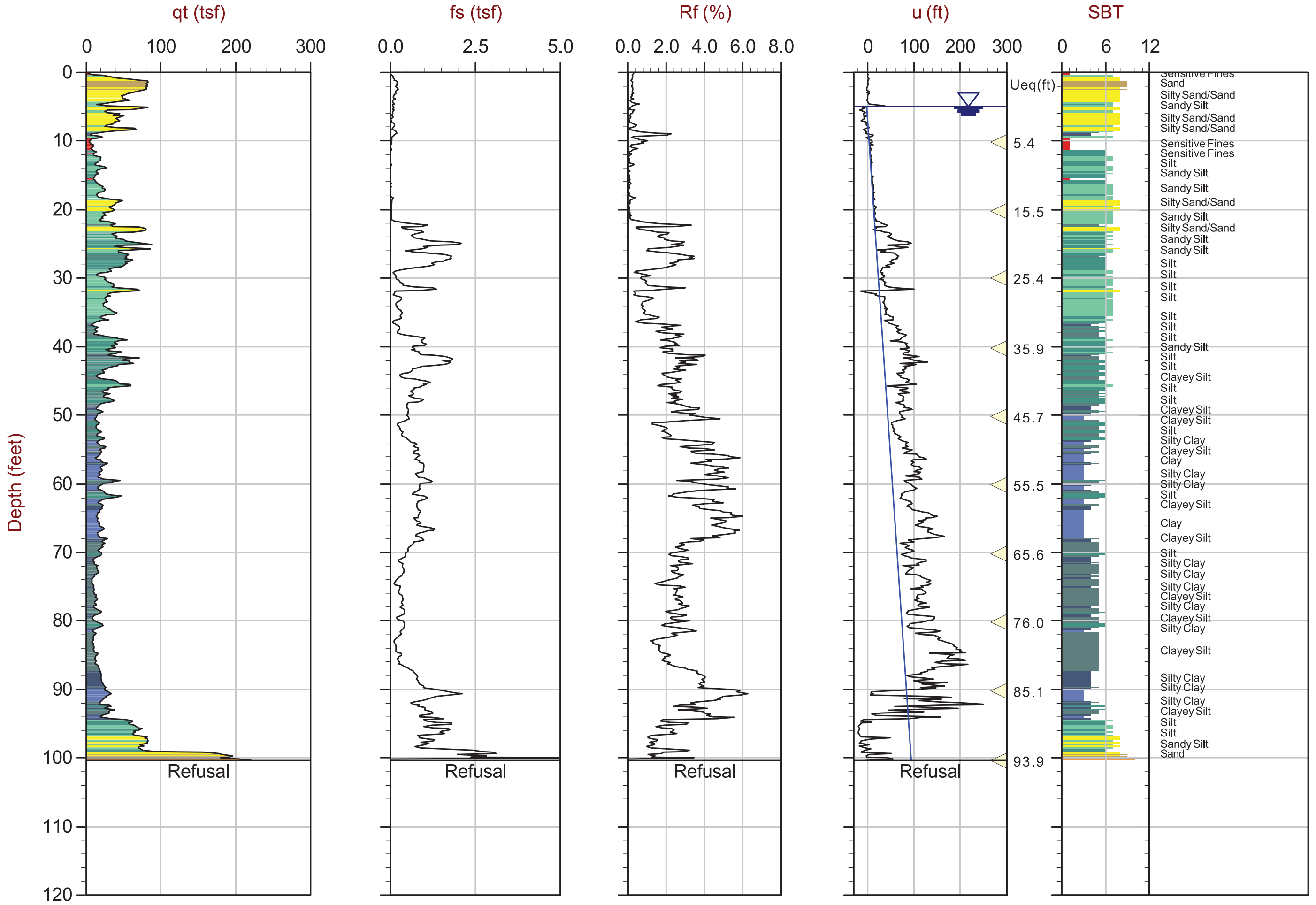
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:23:16 09:06
Site: Plant Scherer

Sounding: C-112
Cone: 304:T1500F15U500



Max Depth: 30.600 m / 100.39 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-112.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07311 E: -83.81004

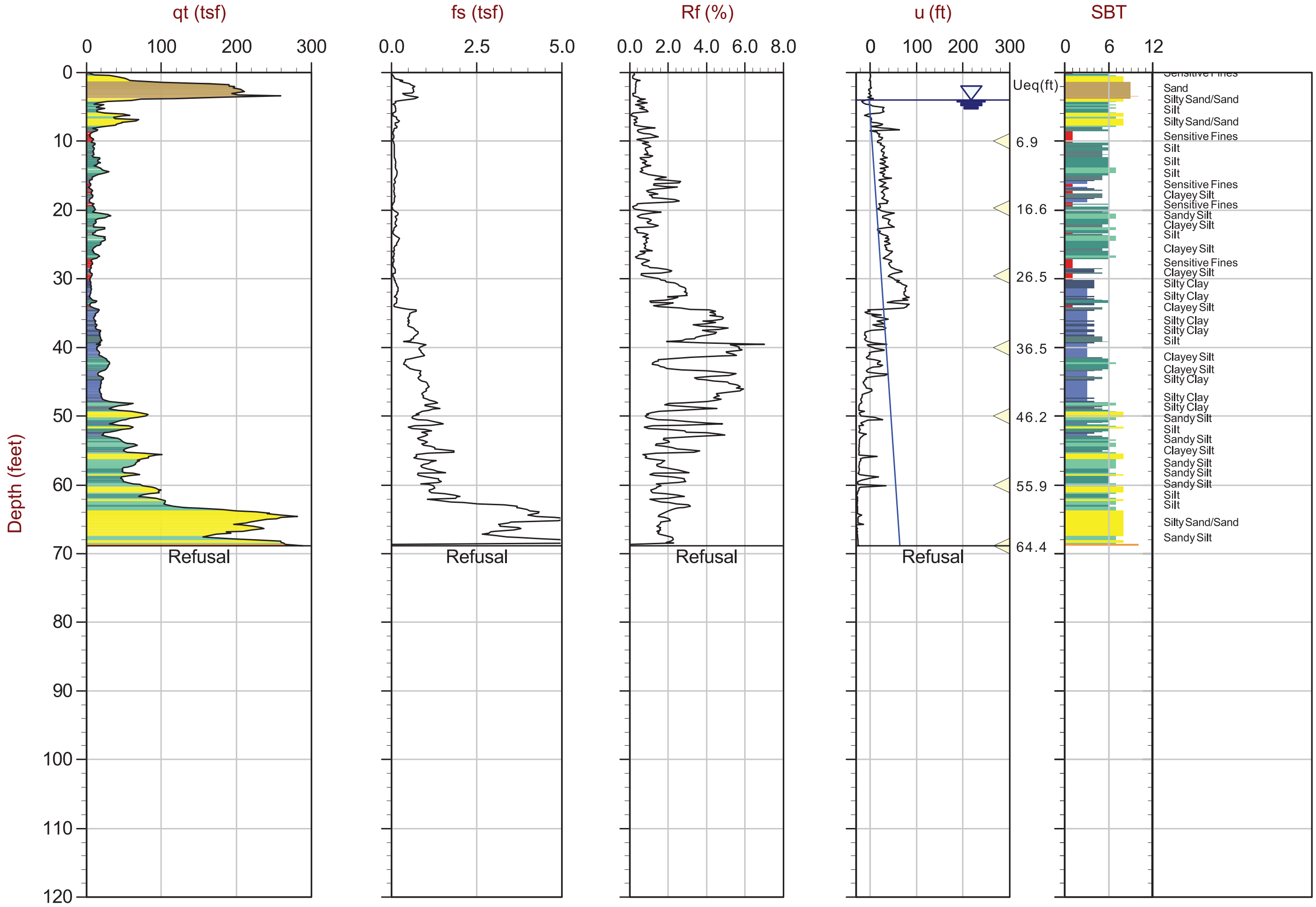
△ Dissipation with estimated Ueq value   △ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC **AECOM**

Job No: 16-54030
Date: 03:17:16 09:32
Site: Plant Scherer

Sounding: C-113
Cone: 304:T1500F15U500



Max Depth: 21.000 m / 68.90 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-113.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07312 E: -83.81356

△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

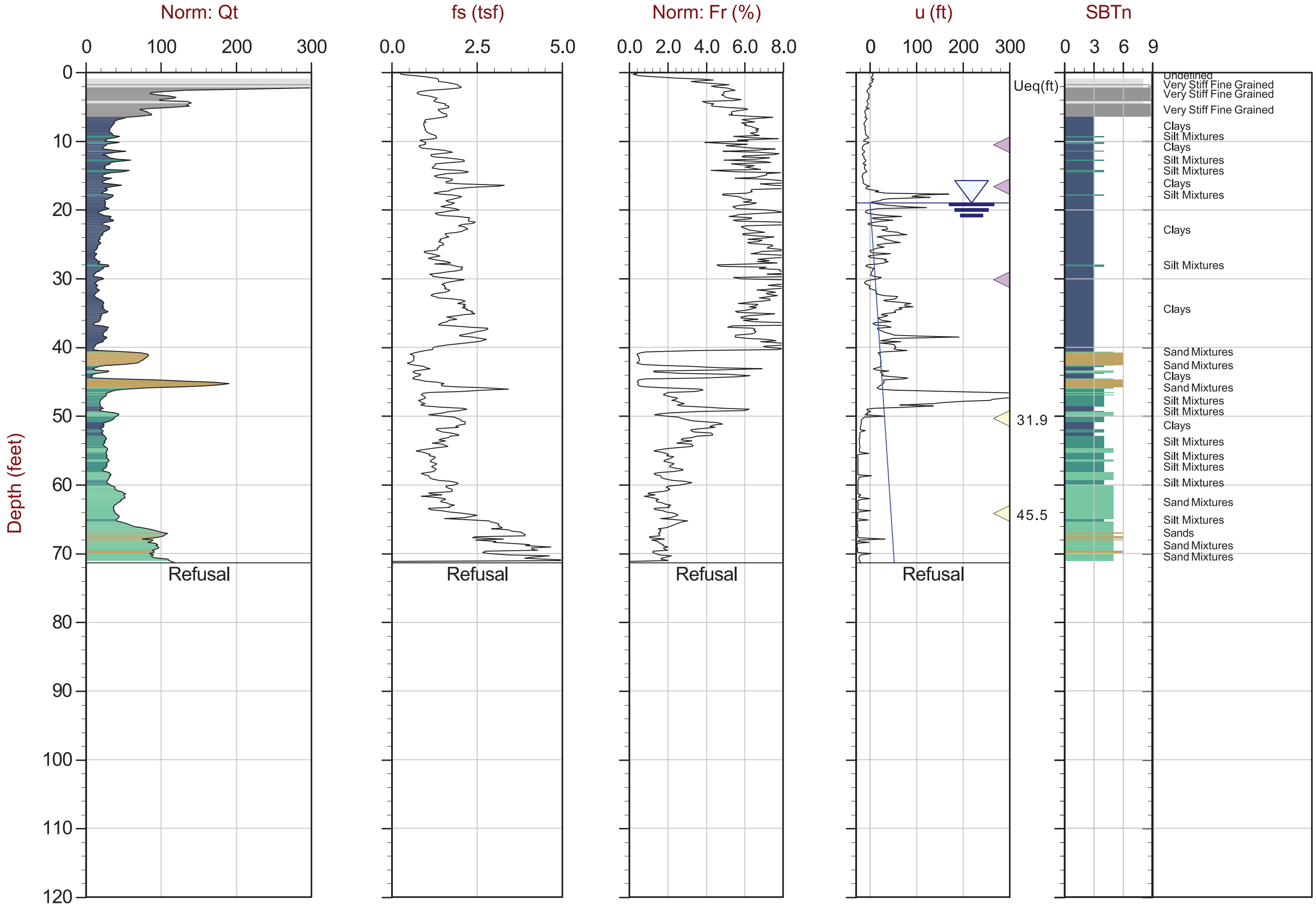
Normalized Cone Penetration Test Plots

CONETEC

AECOM

Job No: 16-54030
Date: 03:21:16 13:47
Site: Plant Scherer

Sounding: C-100
Cone: 304:T1500F15U500



Max Depth: 21.750 m / 71.36 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-100.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.06703 E: -83.81399

△ Dissipation with estimated Ueq value

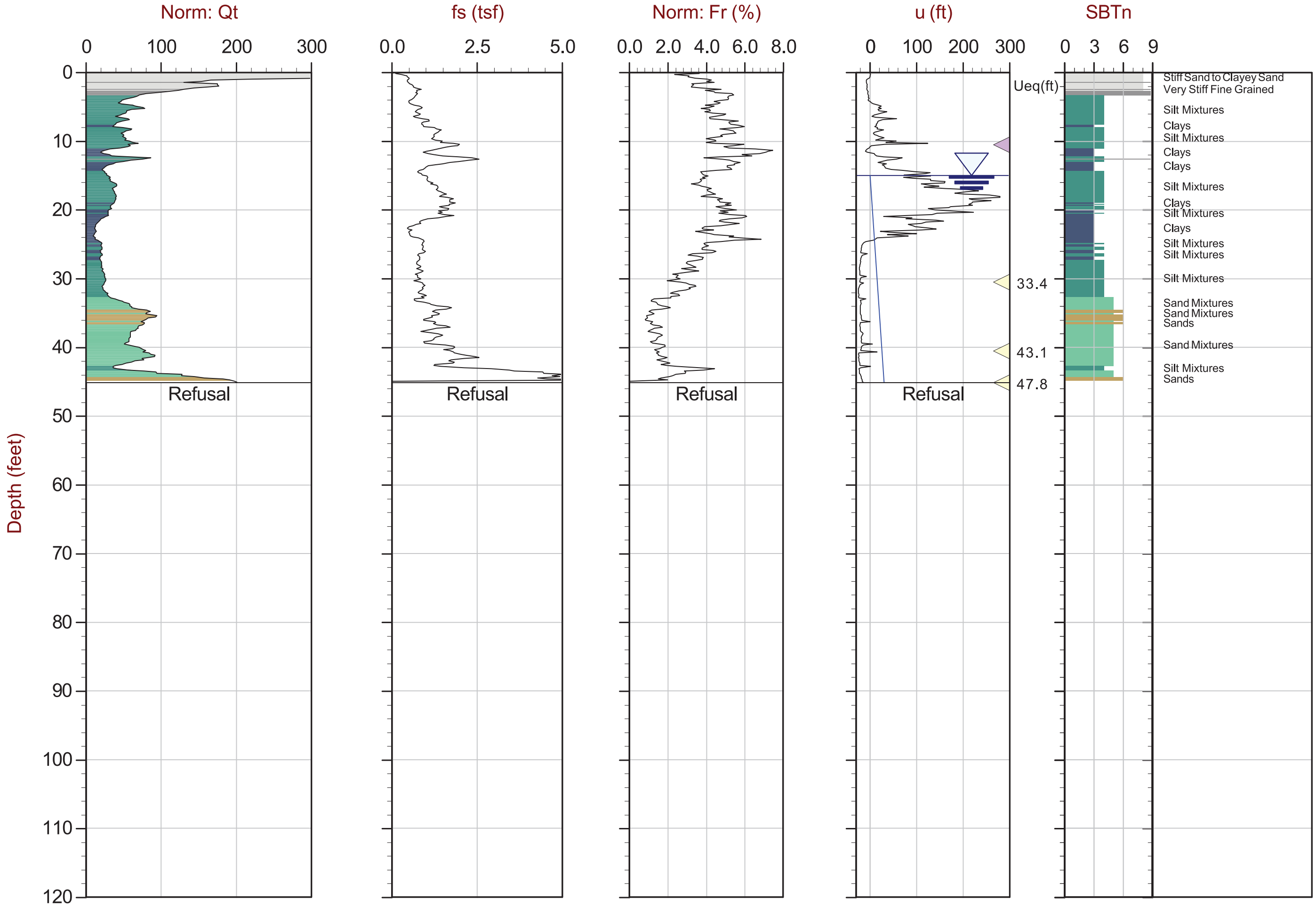
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:18:16 08:48
Site: Plant Scherer

Sounding: C-101
Cone: 304:T1500F15U500



Max Depth: 13.750 m / 45.11 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-101.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.06689 E: -83.81379

△ Dissipation with estimated Ueq value

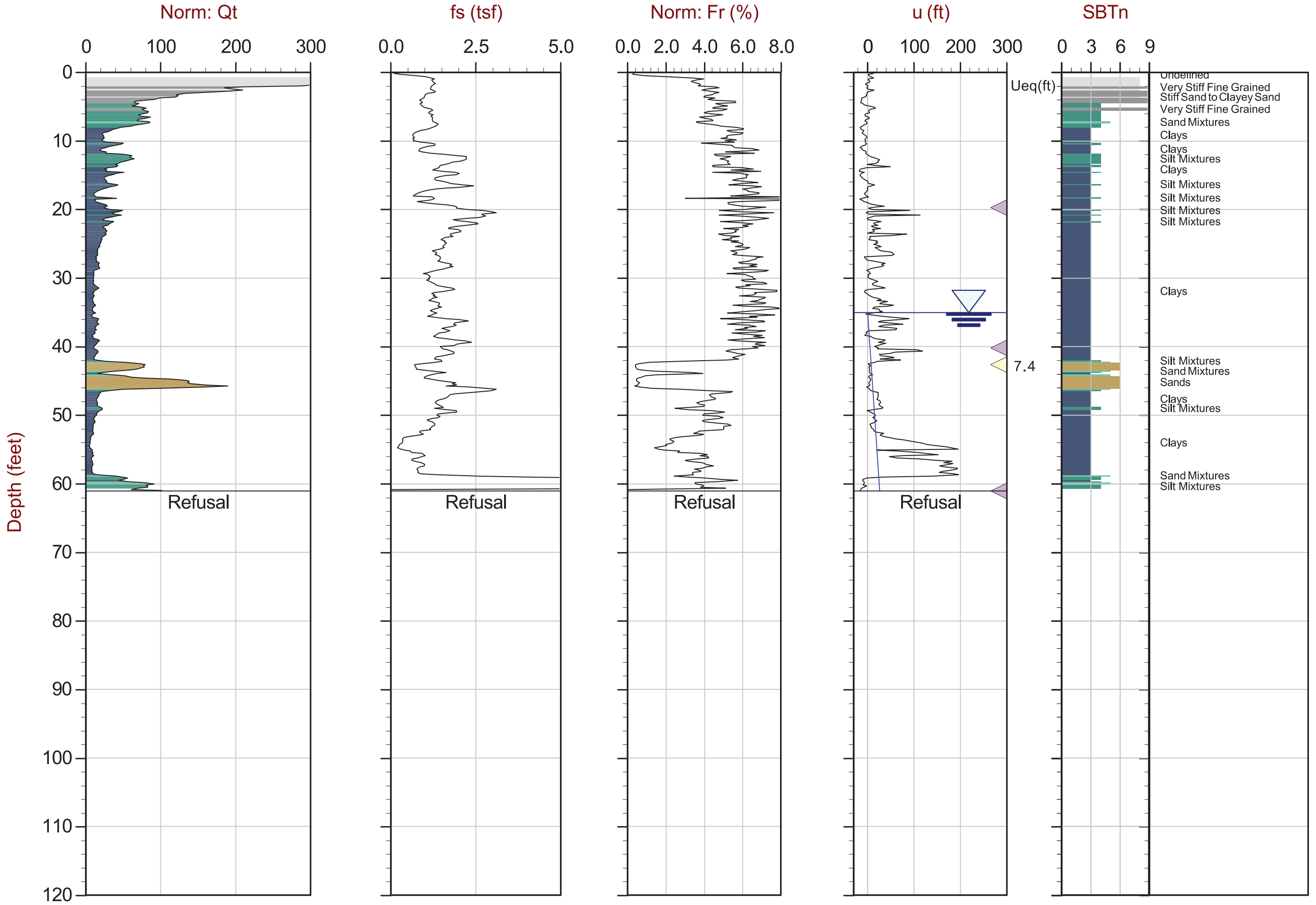
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:22:16 08:51
Site: Plant Scherer

Sounding: C-102
Cone: 304:T1500F15U500



Max Depth: 18.600 m / 61.02 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-102.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.06886 E: -83.80977

△ Dissipation with estimated Ueq value

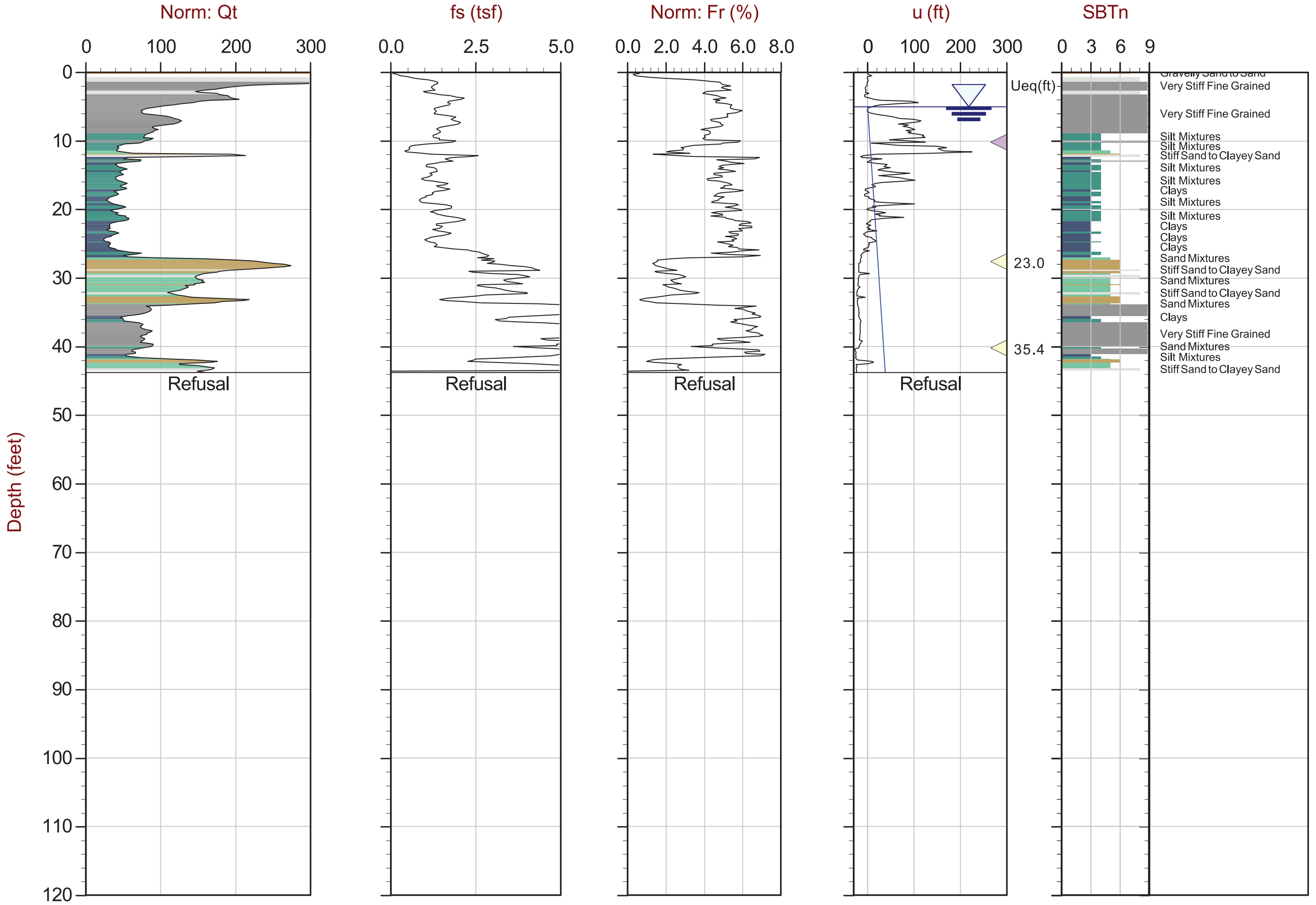
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:22:16 14:13
Site: Plant Scherer

Sounding: C-103
Cone: 304:T1500F15U500



Max Depth: 13.350 m / 43.80 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-103.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.06860 E: -83.80911

△ Dissipation with estimated Ueq value

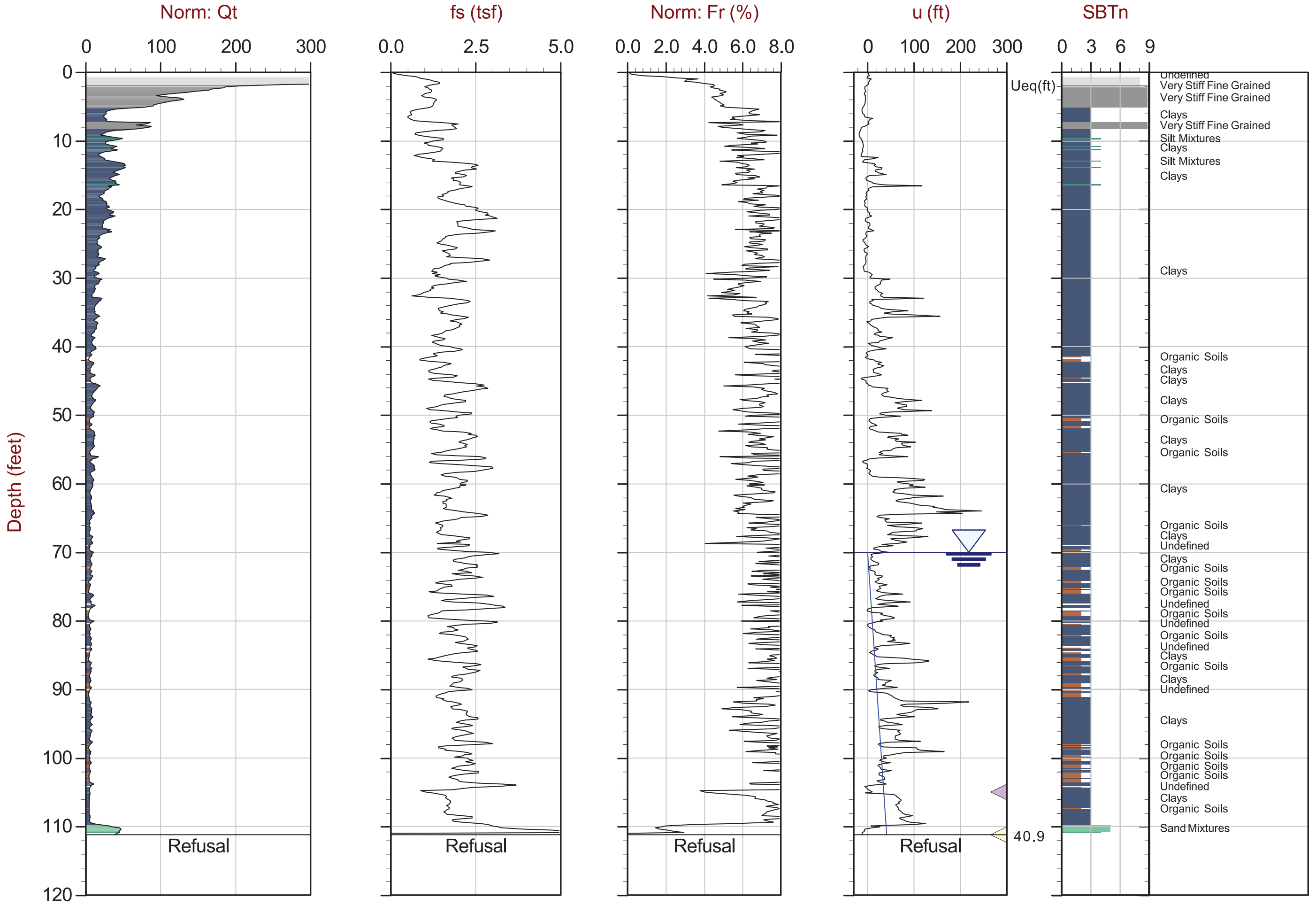
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:24:16 14:16
Site: Plant Scherer

Sounding: C-104
Cone: 304:T1500F15U500



Max Depth: 33.900 m / 111.22 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-104.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.07389 E: -83.80670

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

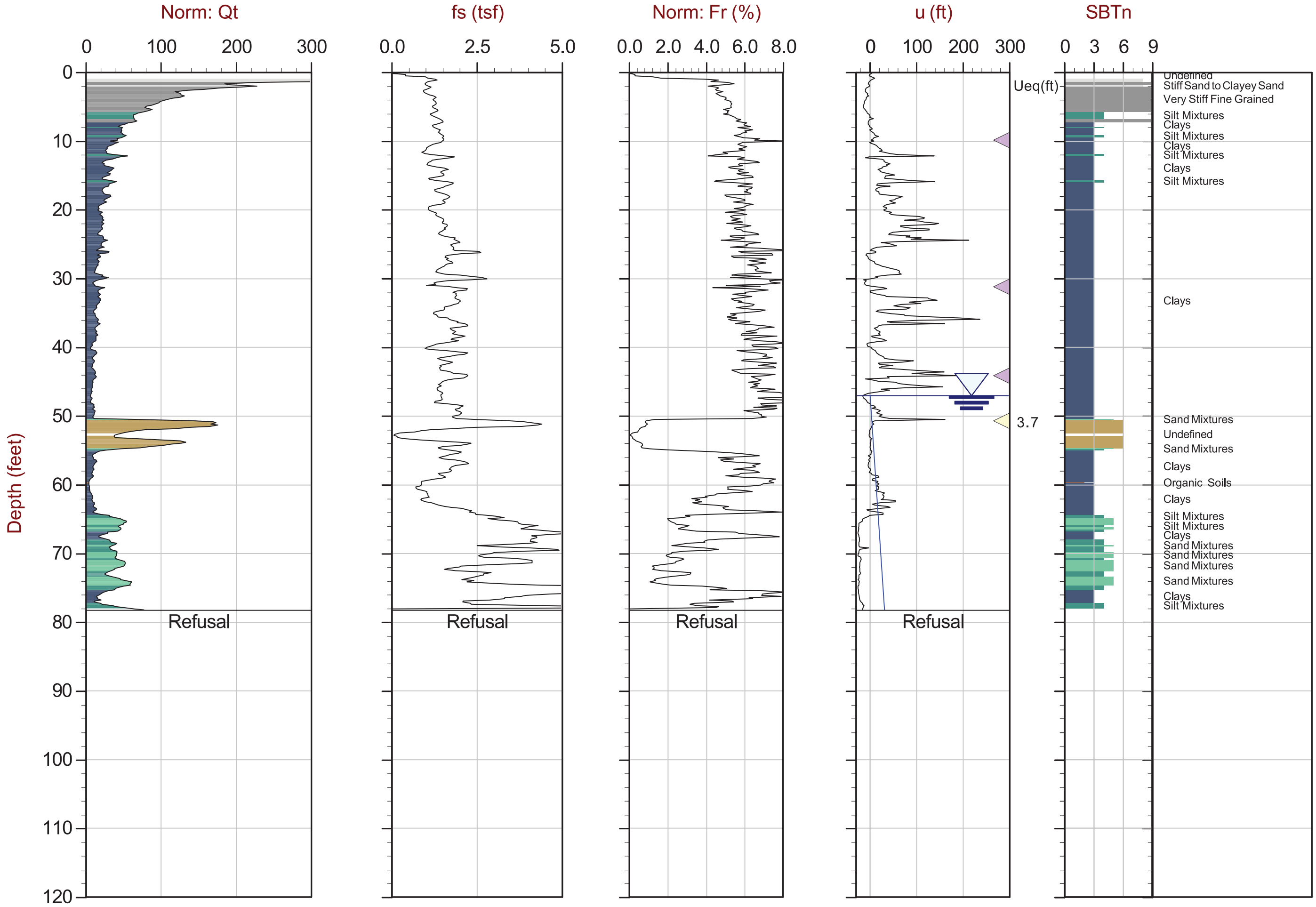
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:23:16 12:45
Site: Plant Scherer

Sounding: C-105
Cone: 304:T1500F15U500



Max Depth: 23.850 m / 78.25 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-105.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.07387 E: -83.80652

△ Dissipation with estimated Ueq value

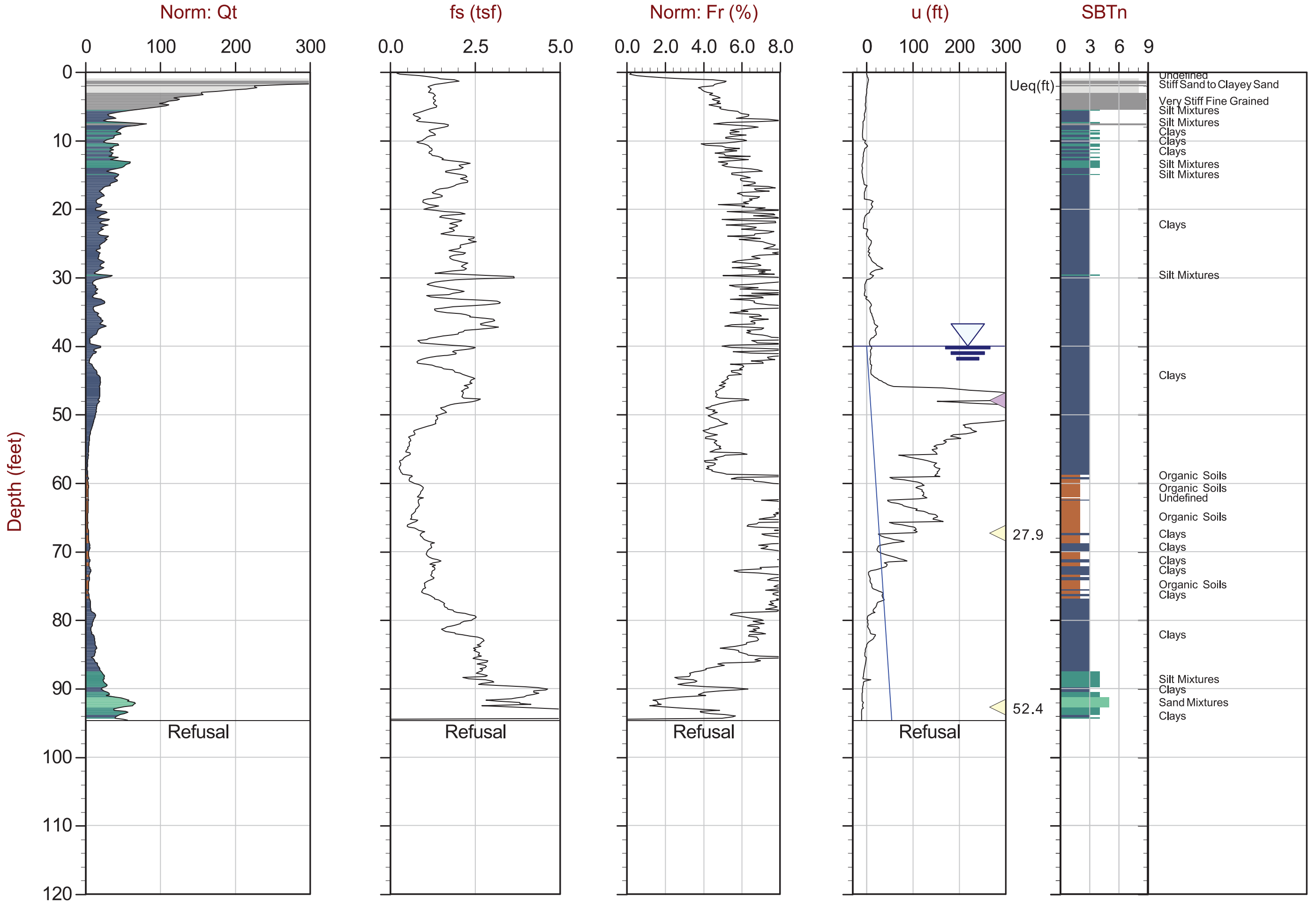
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030	**Sounding:** C-106
Date: 03:24:16 11:06	**Cone:** 304:T1500F15U500
Site: Plant Scherer	



Max Depth: 28.850 m / 94.65 ft	**File:** 16-54030_SPC-106.COR	**SBT:** Robertson, 1990
Depth Inc: 0.050 m / 0.164 ft	**Unit Wt:** SBT Zones	**Coords:** N: 33.07801 E: -83.80669
Avg Int: Every Point		

△ Dissipation with estimated Ueq value

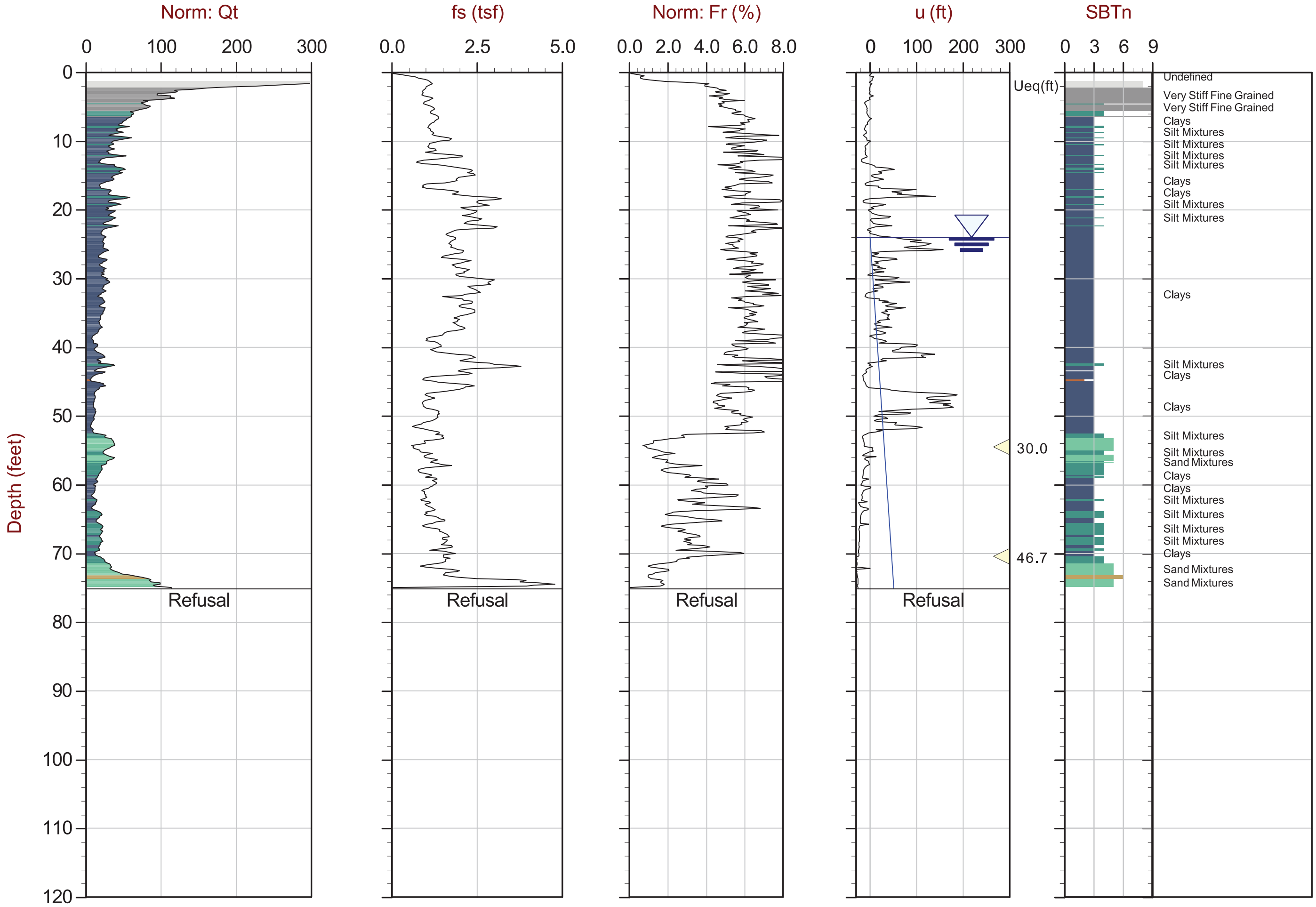
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:24:16 09:14
Site: Plant Scherer

Sounding: C-107
Cone: 304:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-107.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.08140 E: -83.80998

△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

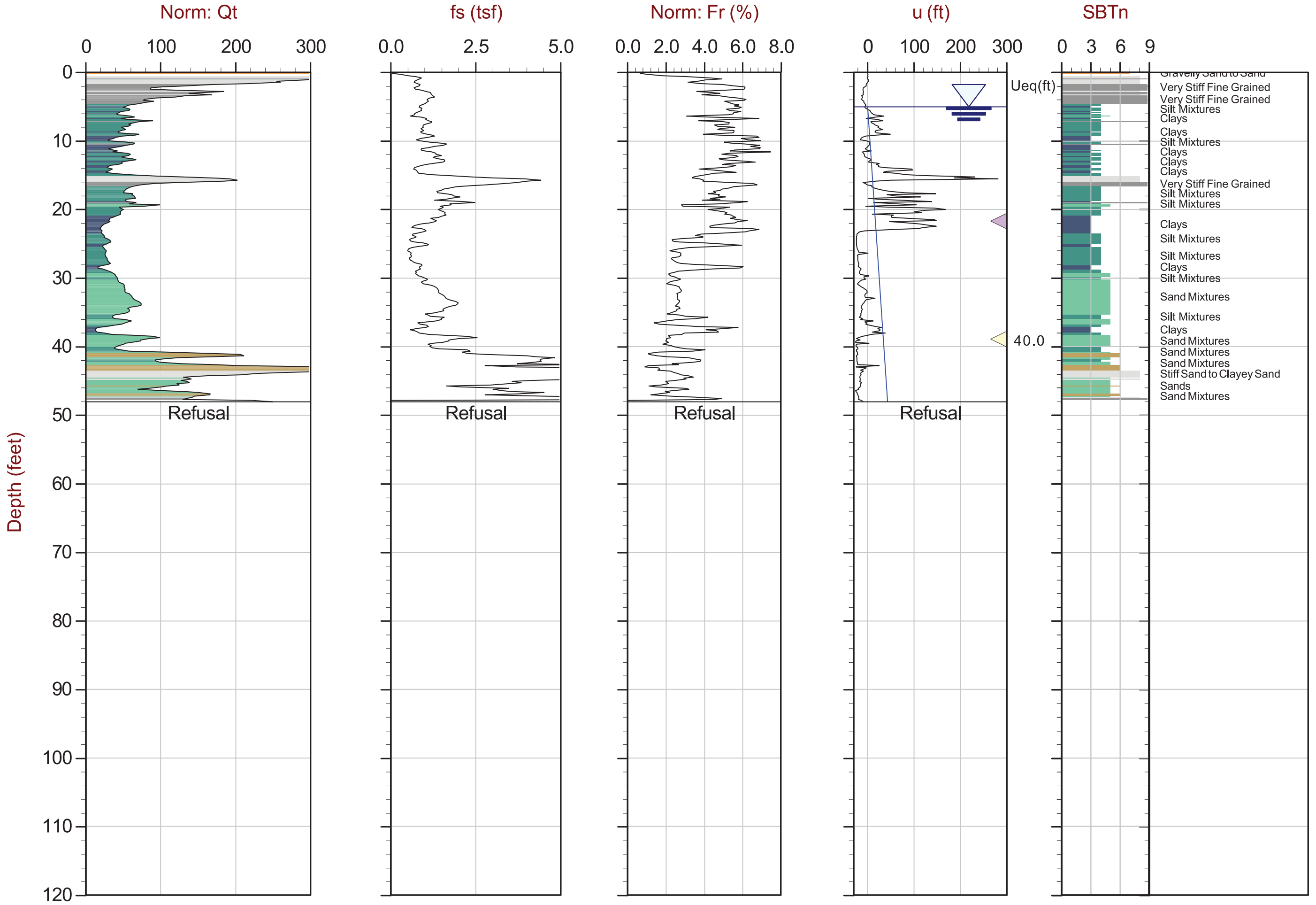
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:23:16 16:29
Site: Plant Scherer

Sounding: C-108
Cone: 304:T1500F15U500



Max Depth: 14.650 m / 48.06 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-108.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.08169 E: -83.80958

△ Dissipation with estimated Ueq value

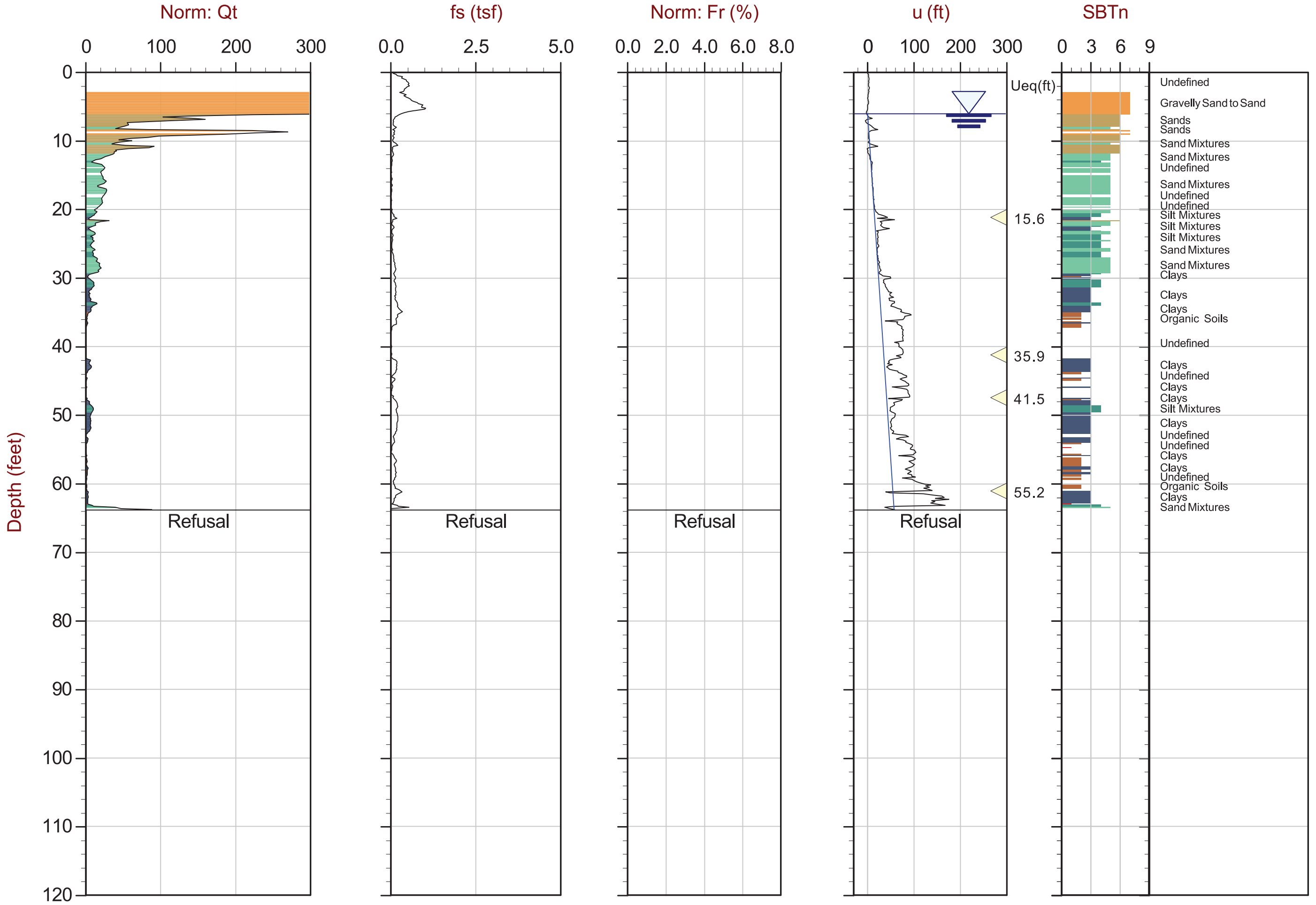
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:16:16 15:33
Site: Plant Scherer

Sounding: C-109
Cone: 437:T1500F15U1K



Max Depth: 19.450 m / 63.81 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-109.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.06985 E: -83.81589

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

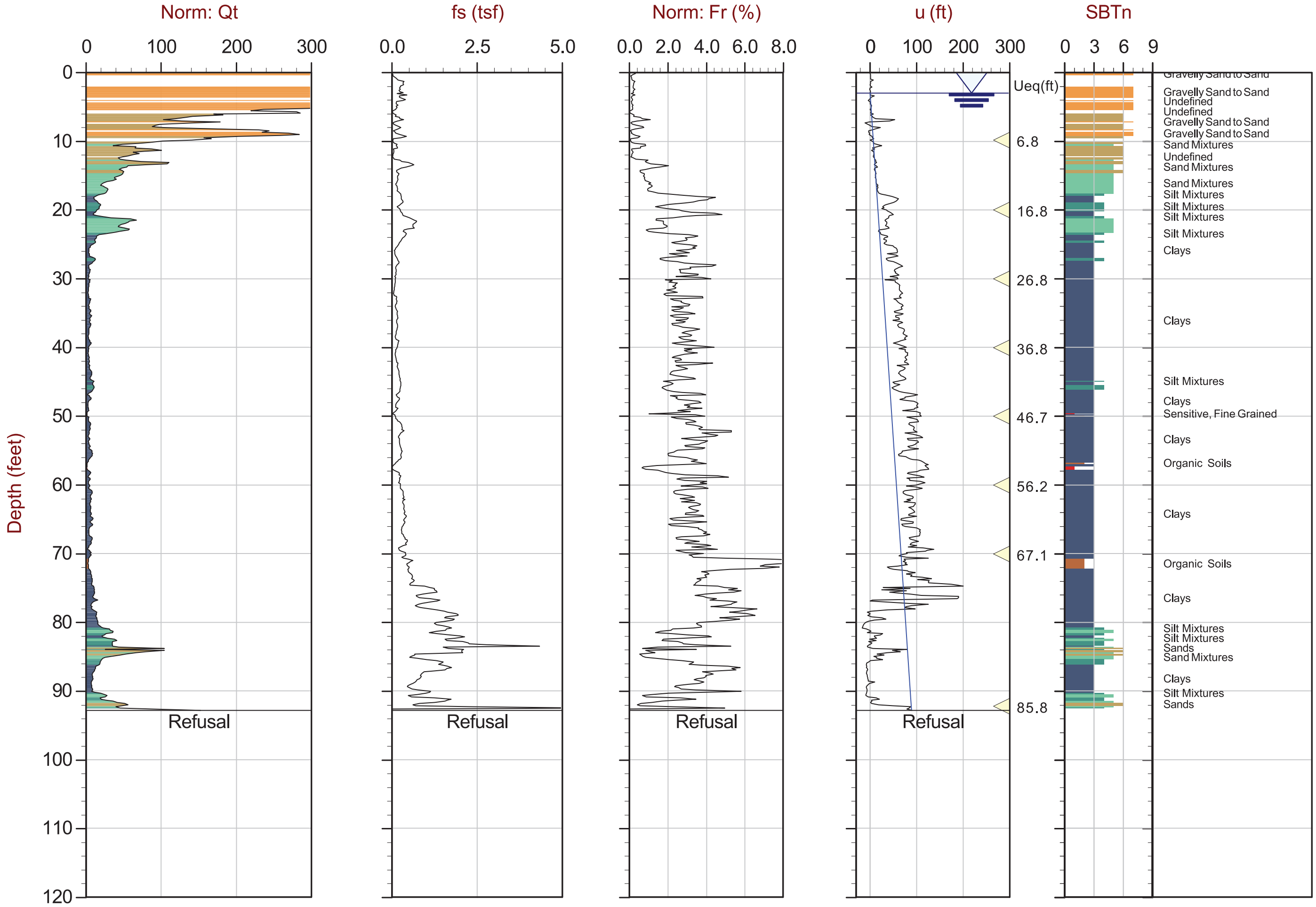
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:17:16 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500



Max Depth: 28.300 m / 92.85 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-110.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.07069 E: -83.81252

△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

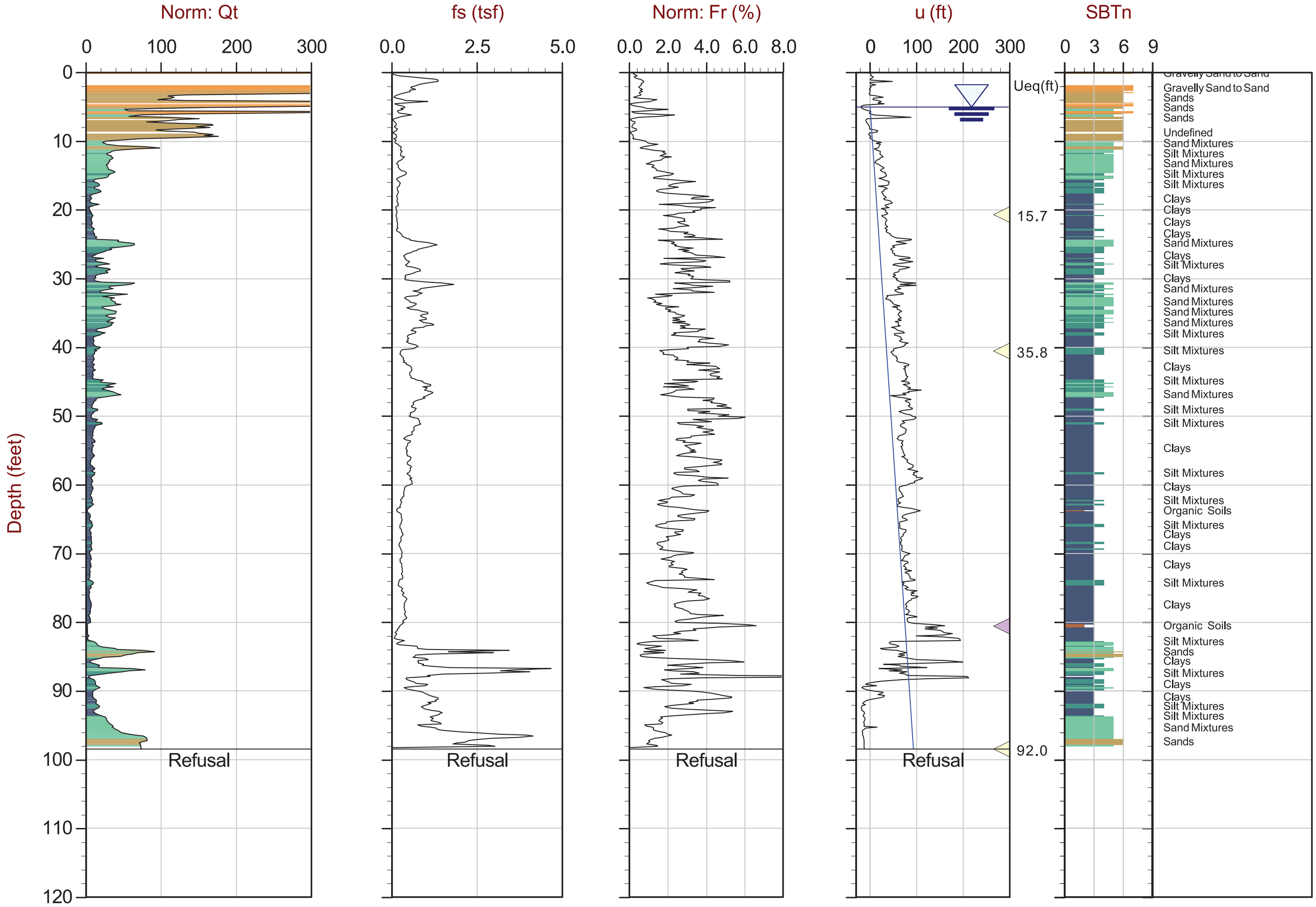
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:16:16 09:01
Site: Plant Scherer

Sounding: C-111
Cone: 304:T1500F15U500



Max Depth: 30.000 m / 98.42 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-111.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.07204 E: -83.81087

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

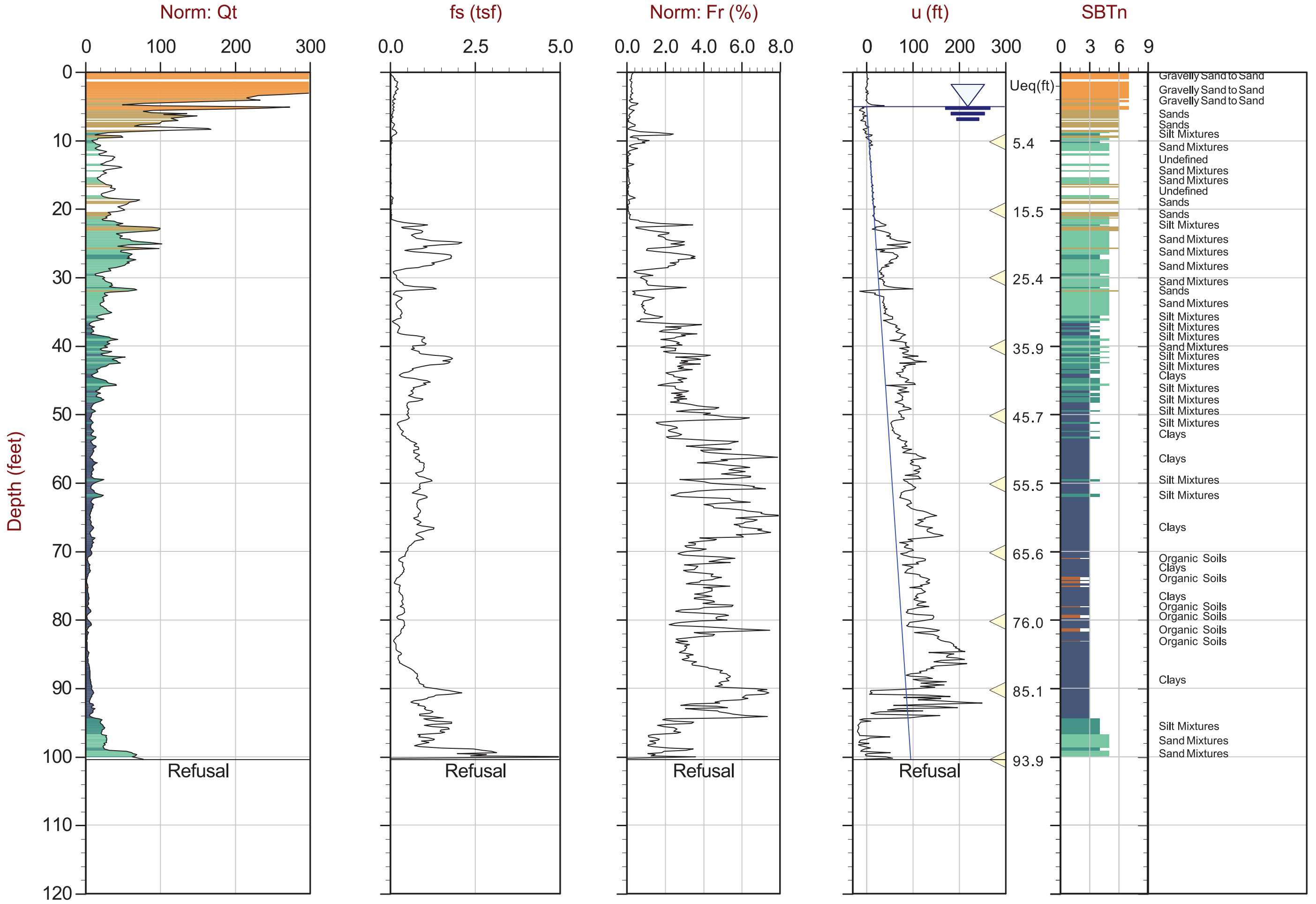
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:23:16 09:06
Site: Plant Scherer

Sounding: C-112
Cone: 304:T1500F15U500



Max Depth: 30.600 m / 100.39 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-112.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.07311 E: -83.81004

△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

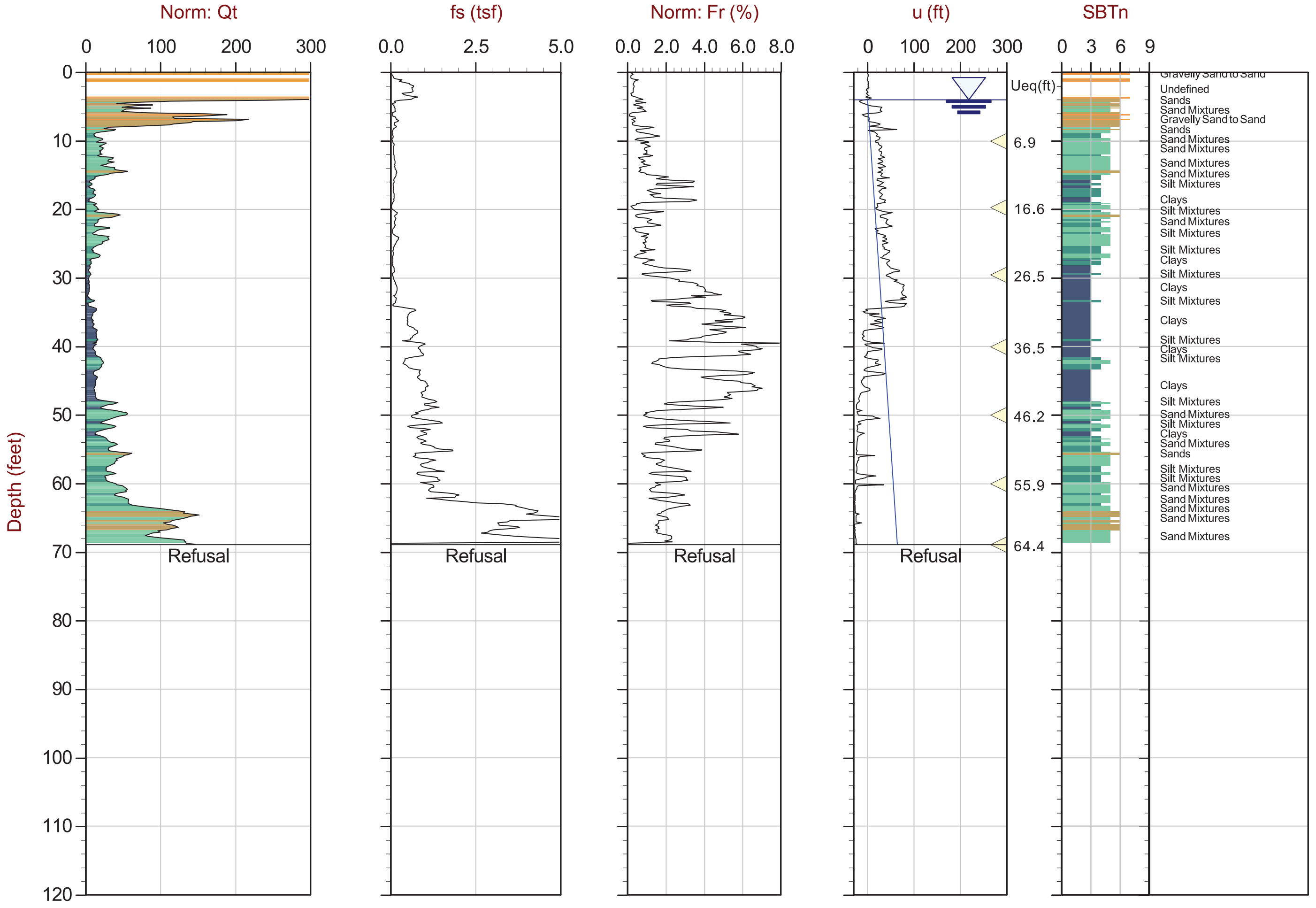
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:17:16 09:32
Site: Plant Scherer

Sounding: C-113
Cone: 304:T1500F15U500



Max Depth: 21.000 m / 68.90 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-113.COR
Unit Wt: SBT Zones

SBT: Robertson, 1990
Coords: N: 33.07312 E: -83.81356

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Seismic Cone Penetration Test Plots

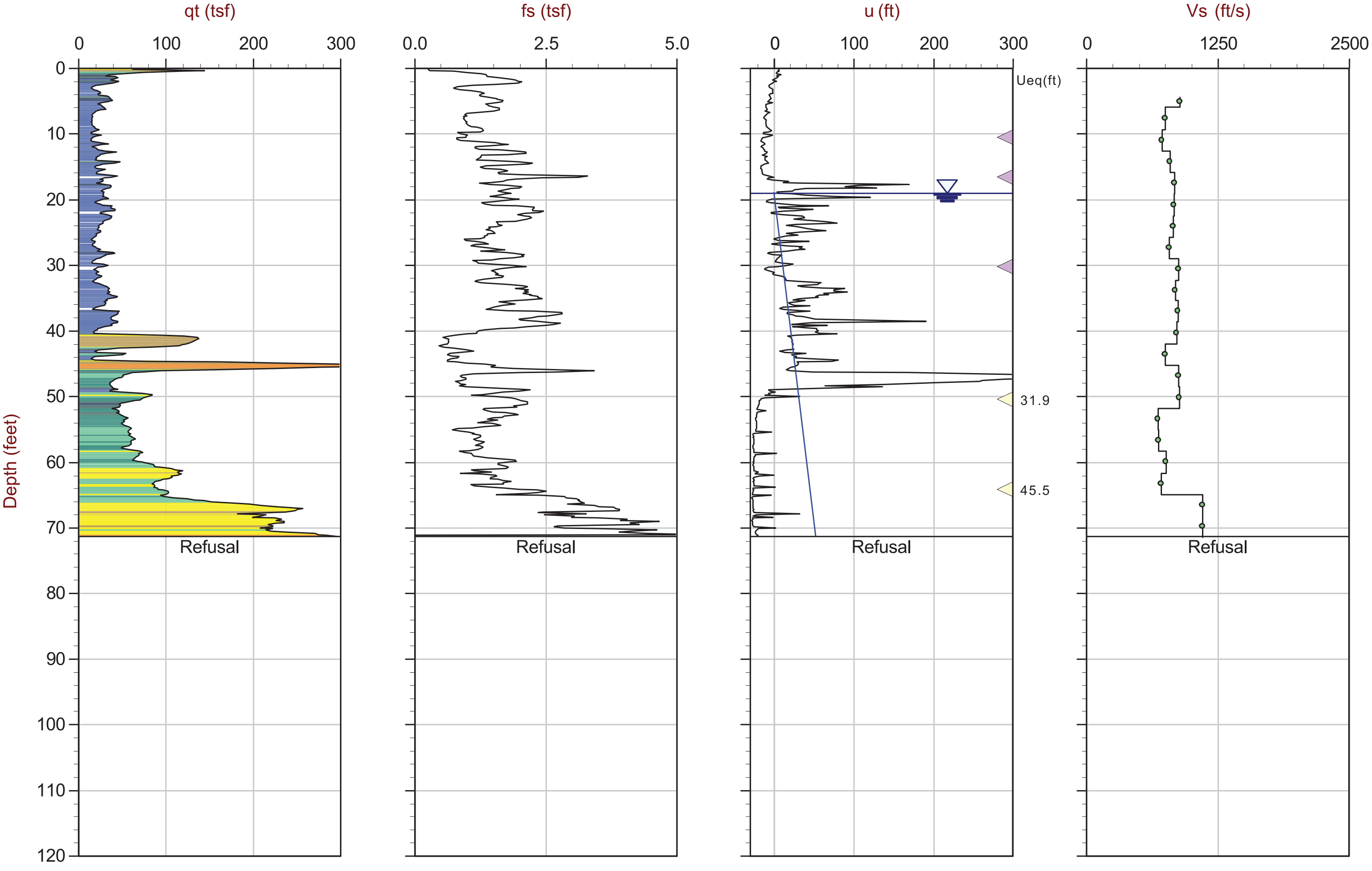
CONETEC

CONETEC

AECOM

Job No: 16-54030
Date: 03:21:16 13:47
Site: Plant Scherer

Sounding: C-100
Cone: 304:T1500F15U500



Max Depth: 21.750 m / 71.36 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-100.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06703 E: -83.81399

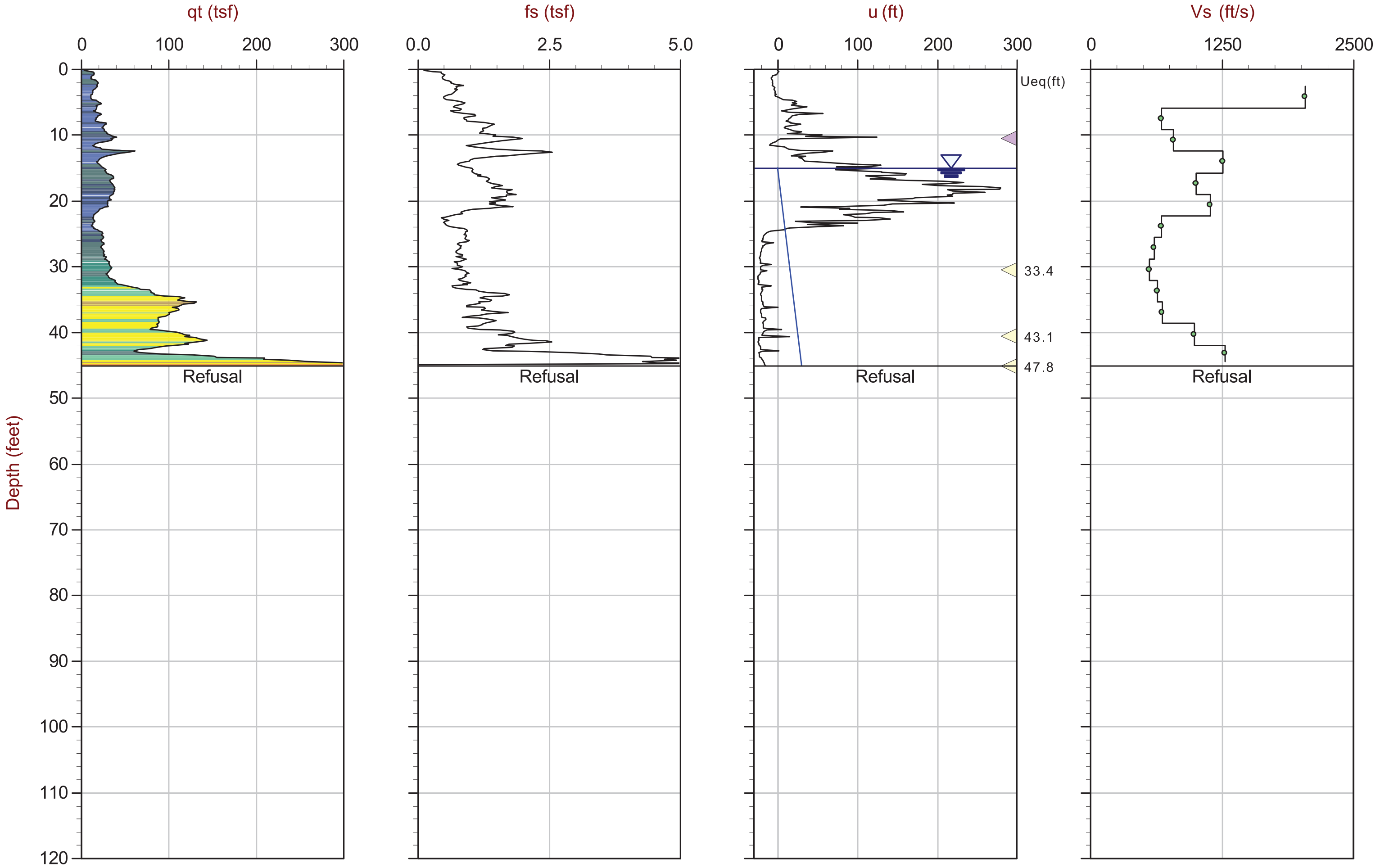
△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC **AECOM**

Job No: 16-54030
Date: 03:18:16 08:48
Site: Plant Scherer
Sounding: C-101
Cone: 304:T1500F15U500



Max Depth: 13.750 m / 45.11 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-101.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06689 E: -83.81379

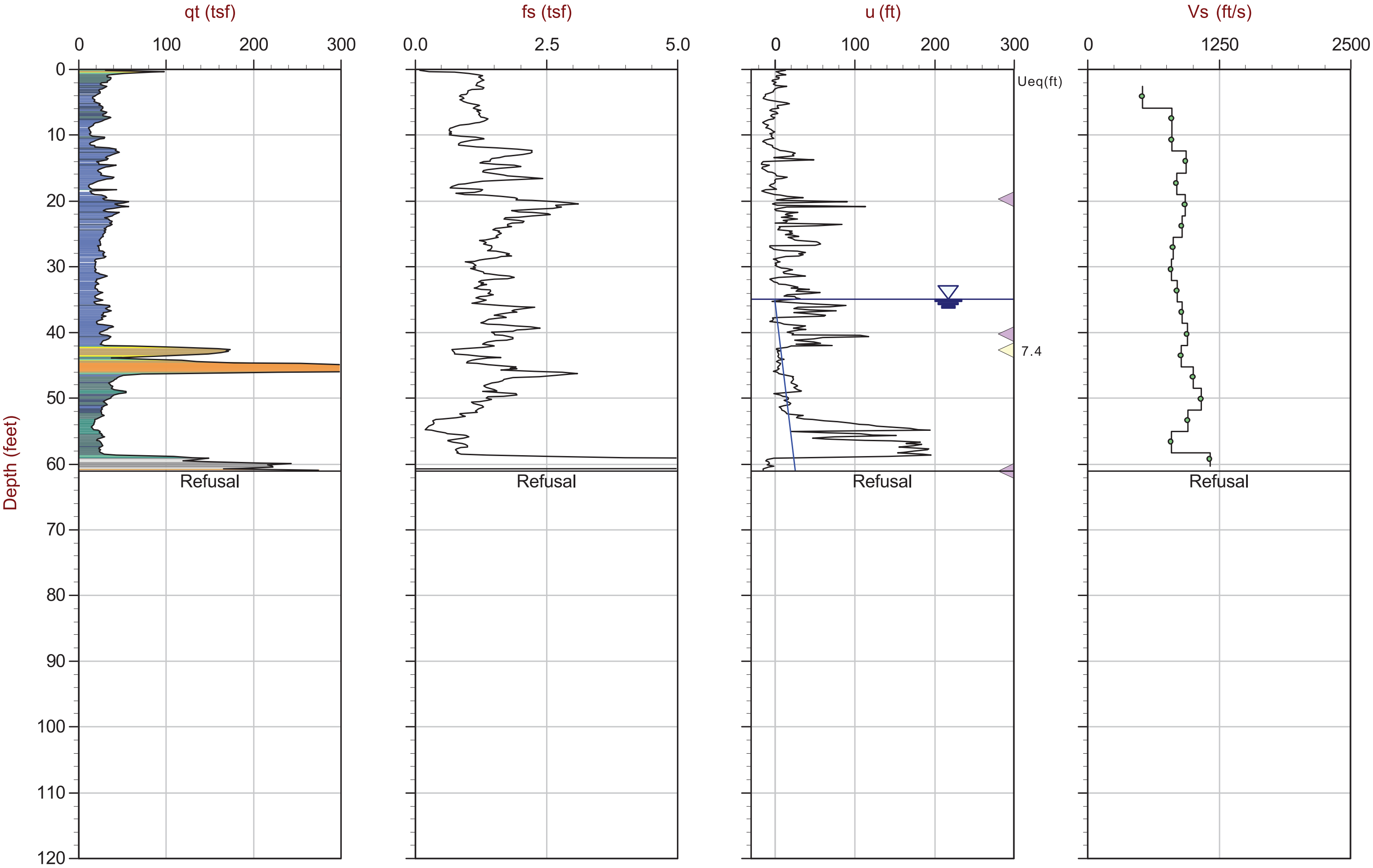
△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:22:16 08:51
Site: Plant Scherer

Sounding: C-102
Cone: 304:T1500F15U500



Max Depth: 18.600 m / 61.02 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-102.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06886 E: -83.80977

△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

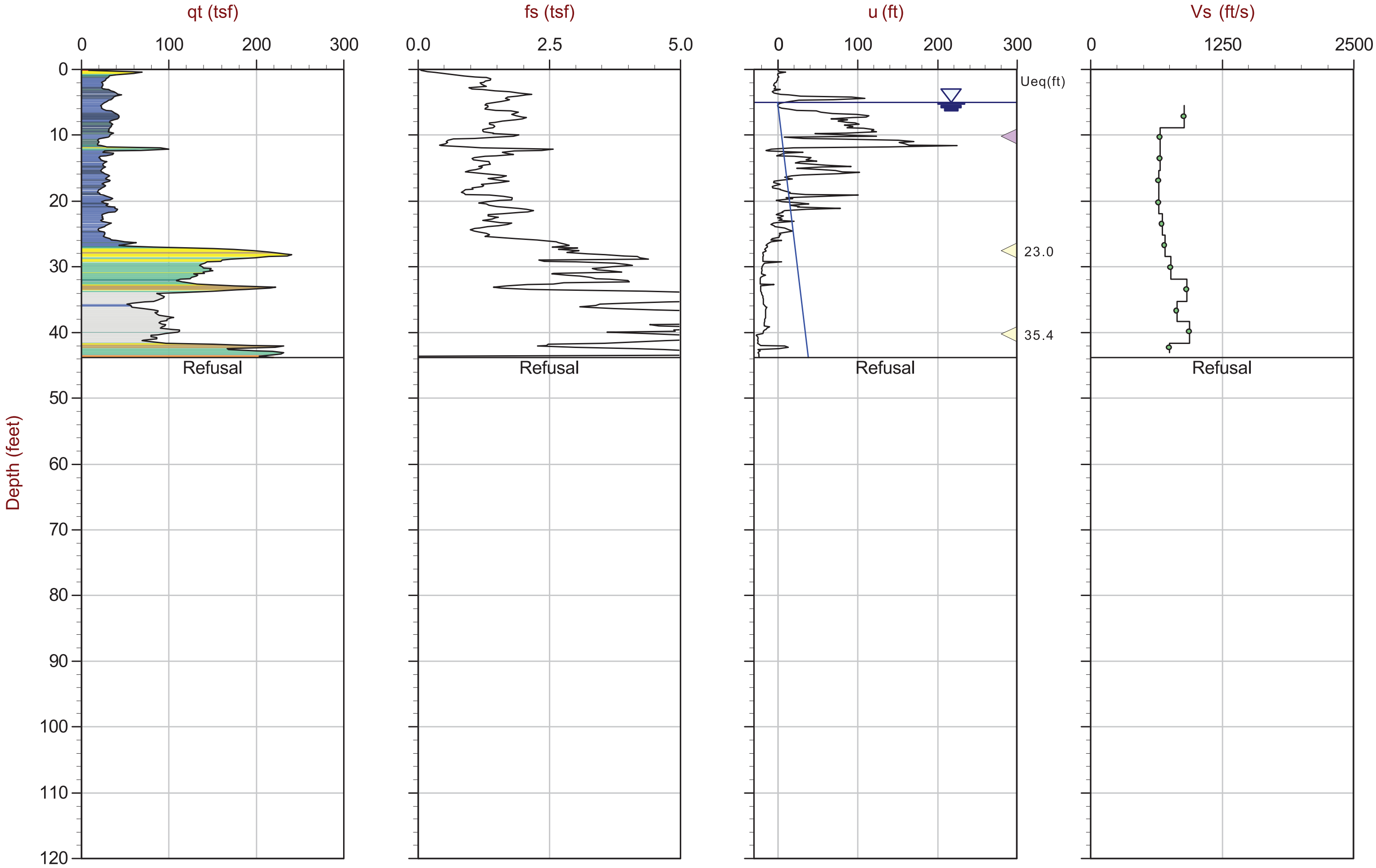
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

AECOM

Job No: 16-54030
Date: 03:22:16 14:13
Site: Plant Scherer

Sounding: C-103
Cone: 304:T1500F15U500



Max Depth: 13.350 m / 43.80 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-103.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06860 E: -83.80911

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

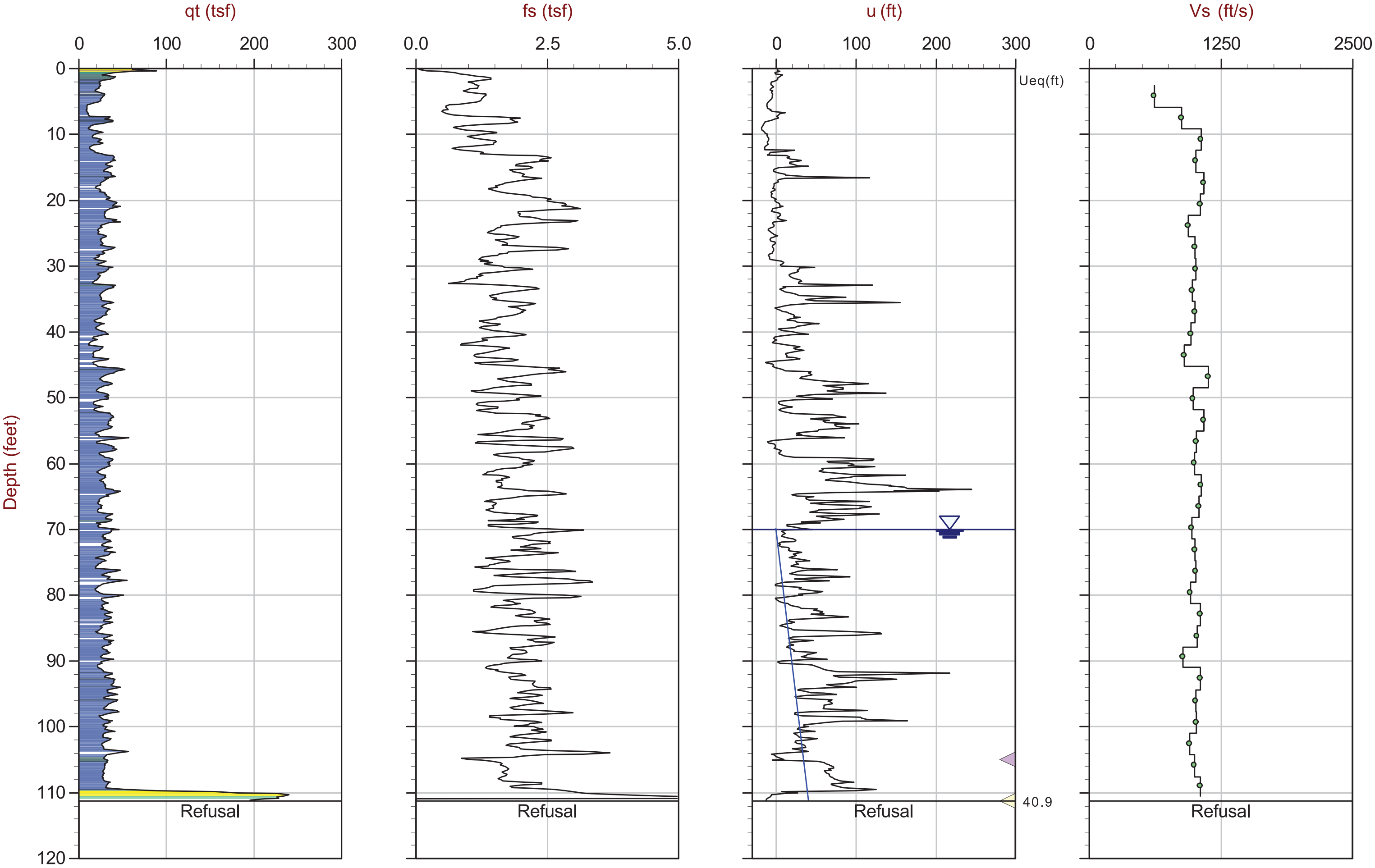
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:24:16 14:16
Site: Plant Scherer

Sounding: C-104
Cone: 304:T1500F15U500



Max Depth: 33.900 m / 111.22 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-104.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07389 E: -83.80670

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

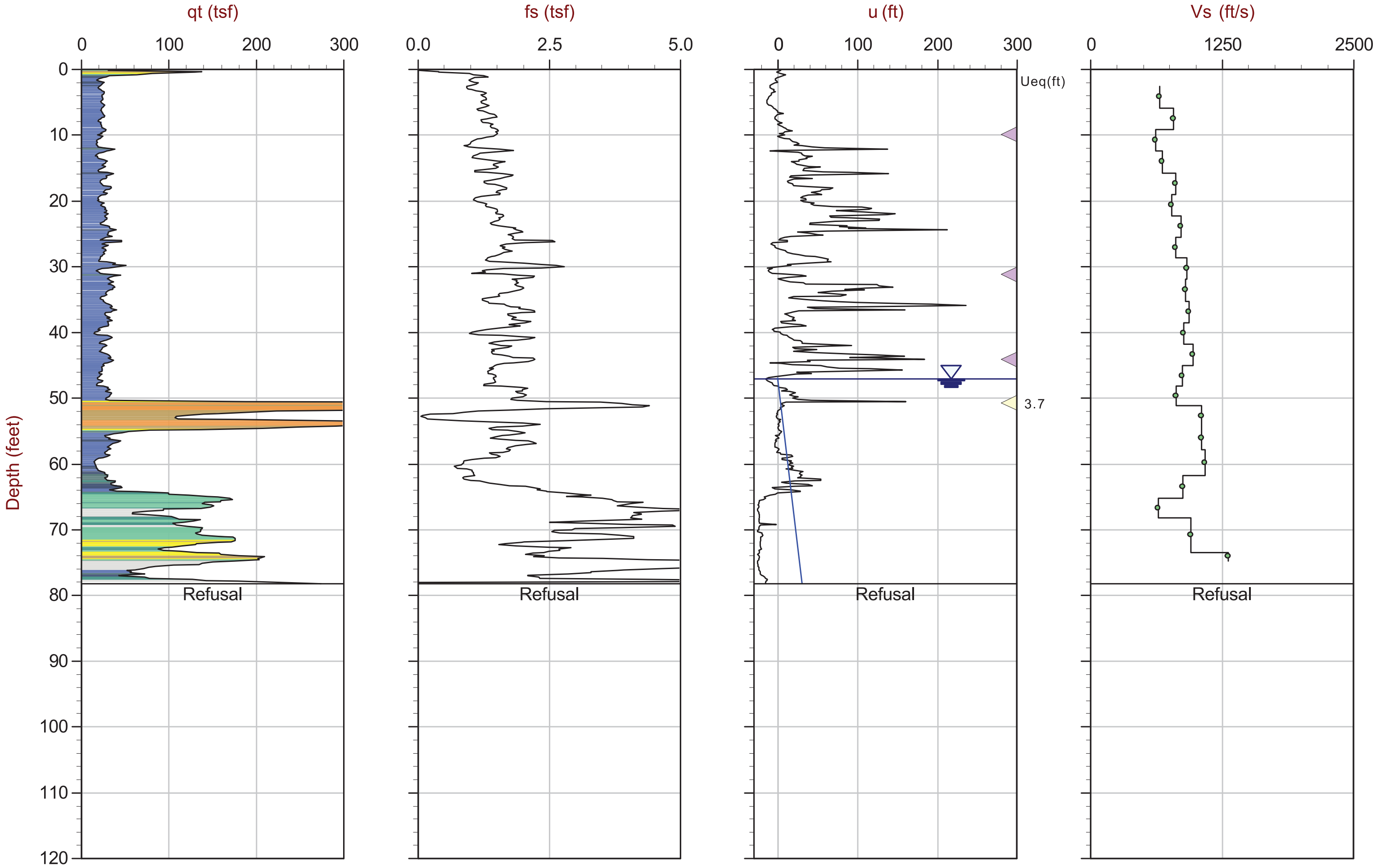
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:23:16 12:45
Site: Plant Scherer

Sounding: C-105
Cone: 304:T1500F15U500



Max Depth: 23.850 m / 78.25 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-105.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07387 E: -83.80652

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

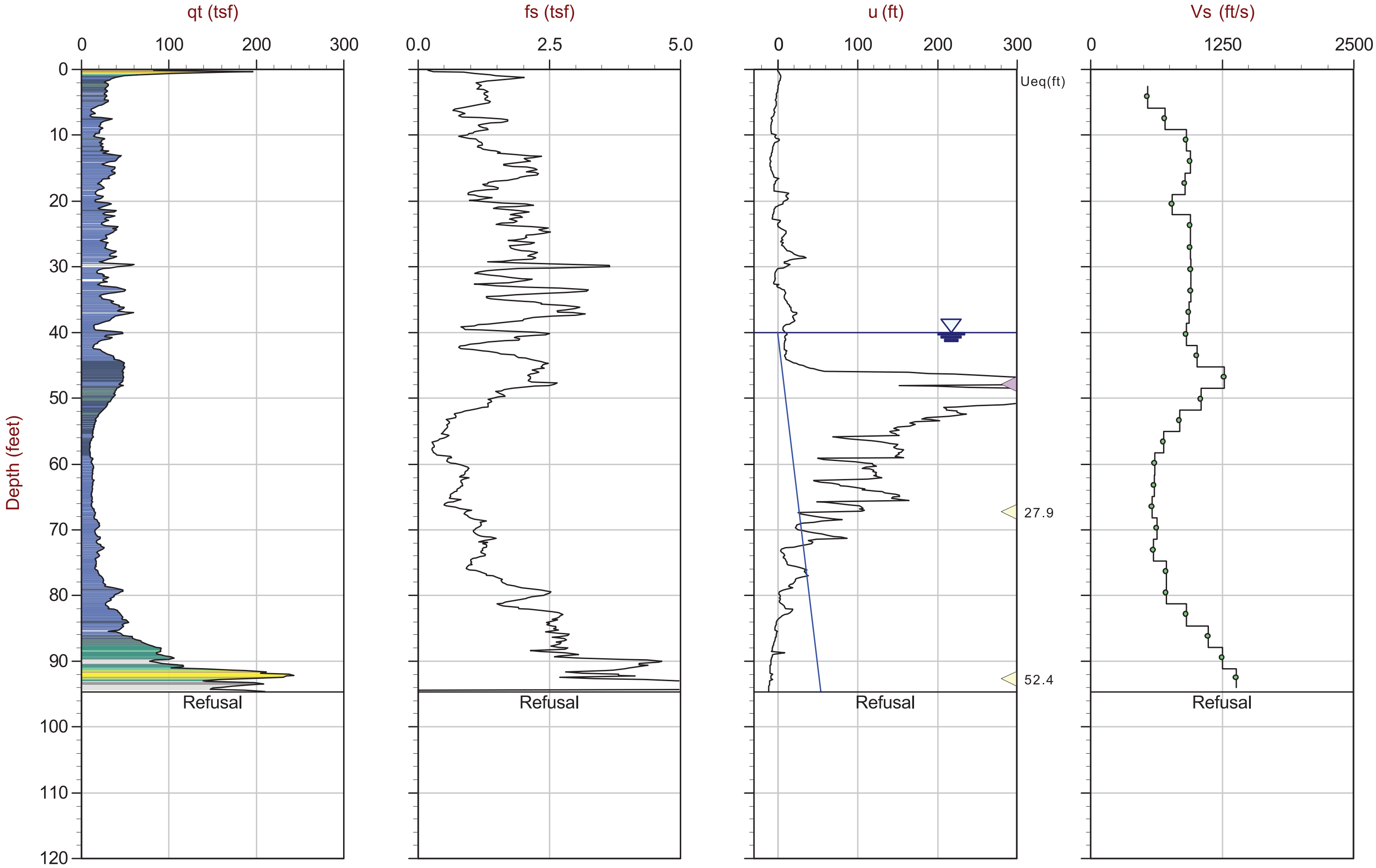
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:24:16 11:06
Site: Plant Scherer

Sounding: C-106
Cone: 304:T1500F15U500



Max Depth: 28.850 m / 94.65 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-106.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07801 E: -83.80669

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

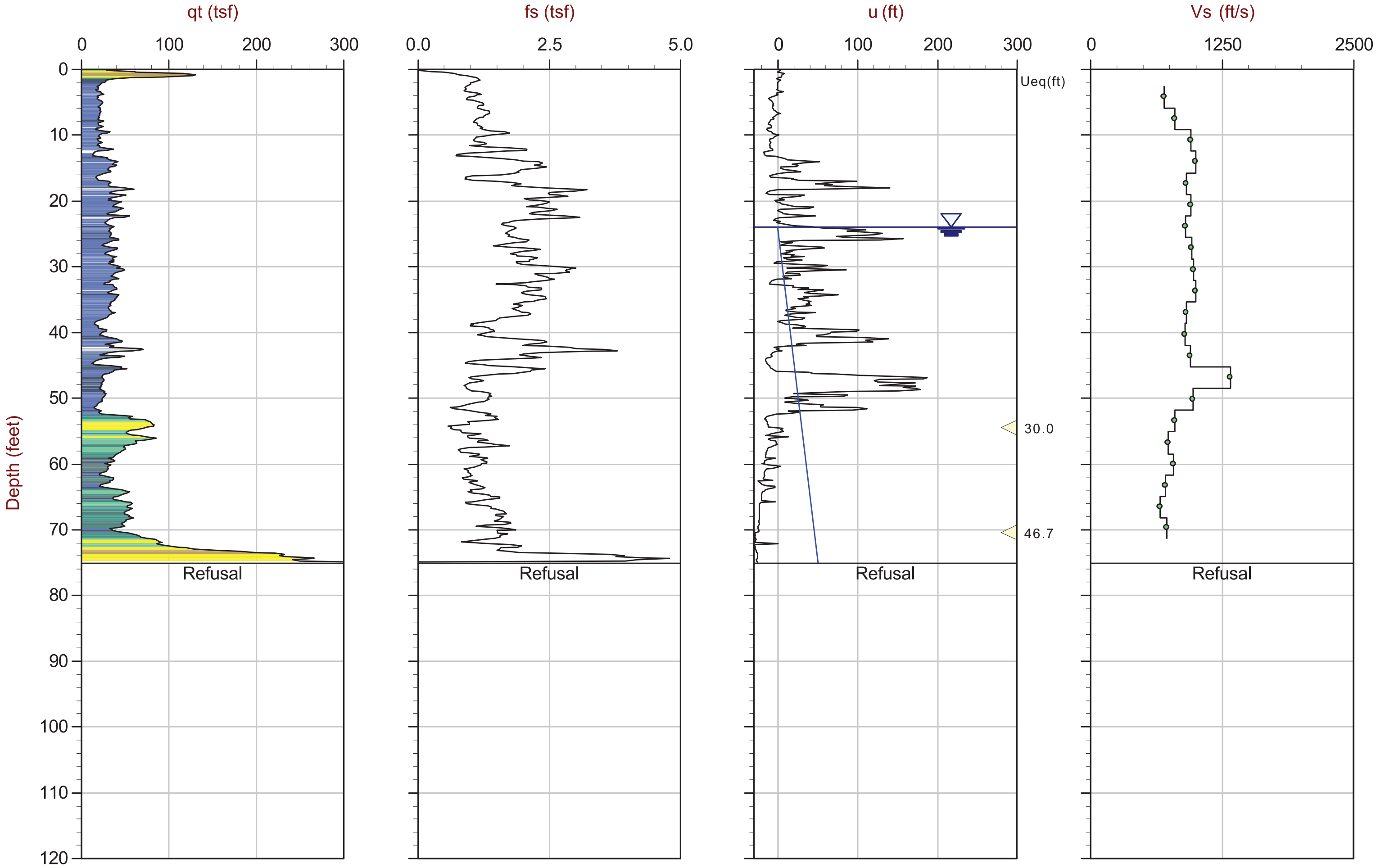
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:24:16 09:14
Site: Plant Scherer

Sounding: C-107
Cone: 304:T1500F15U500



Max Depth: 22.900 m / 75.13 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-107.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.08140 E: -83.80998

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

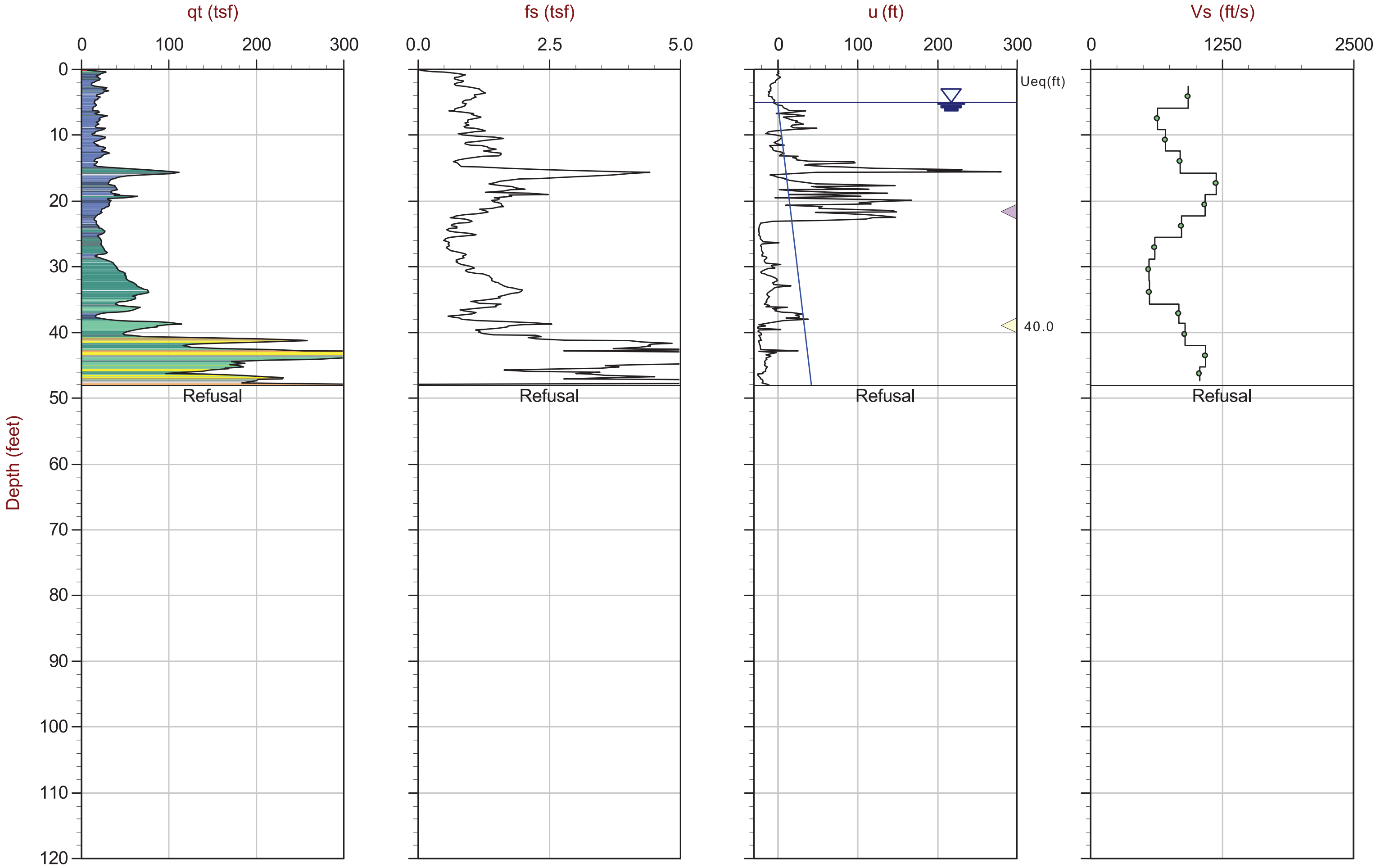
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:23:16 16:29
Site: Plant Scherer

Sounding: C-108
Cone: 304:T1500F15U500



Max Depth: 14.650 m / 48.06 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-108.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.08169 E: -83.80958

△ Dissipation with estimated Ueq value

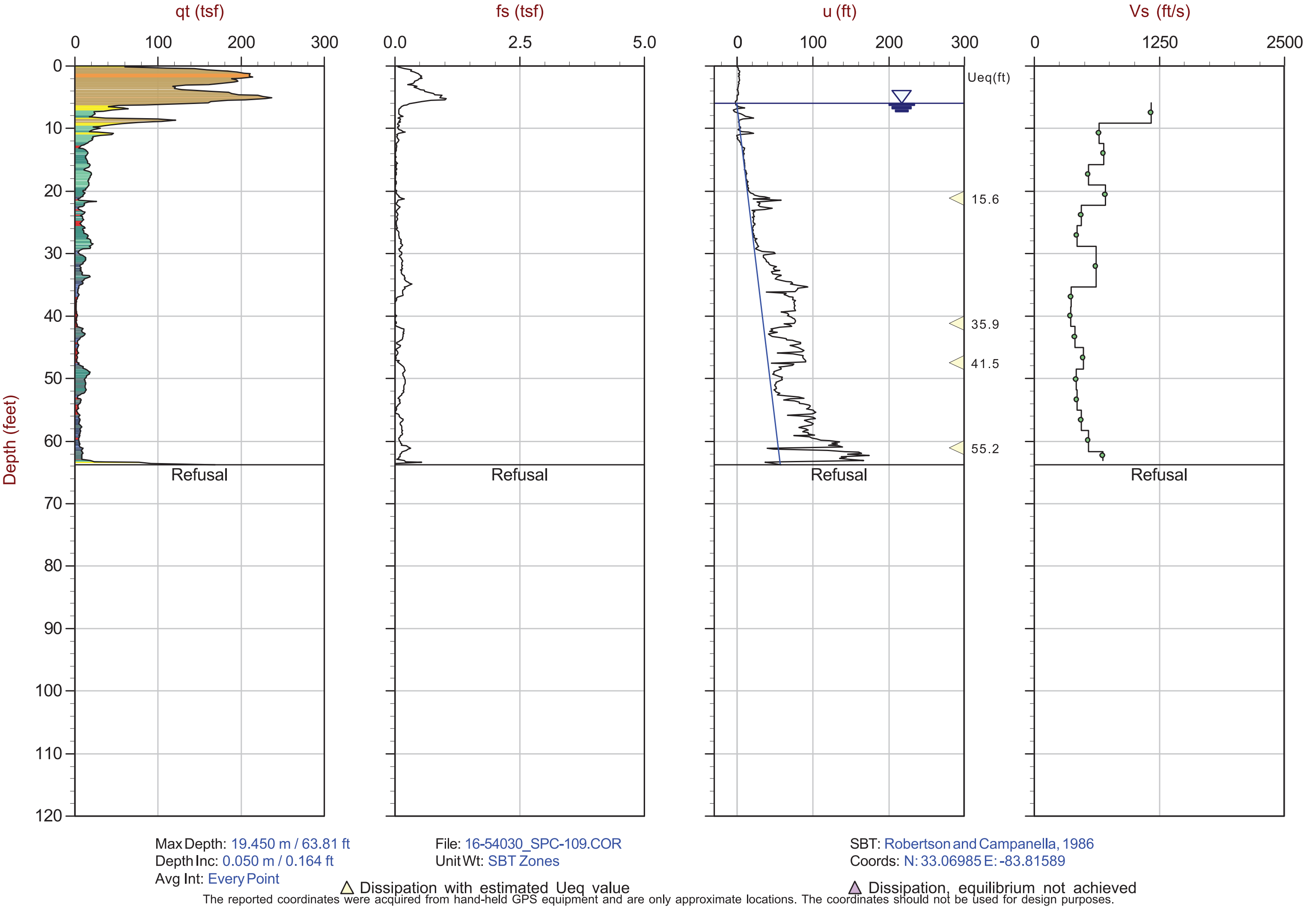
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030
Date: 03:16:16 15:33
Site: Plant Scherer

Sounding: C-109
Cone: 437:T1500F15U1K



Max Depth: 19.450 m / 63.81 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-109.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.06985 E: -83.81589

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

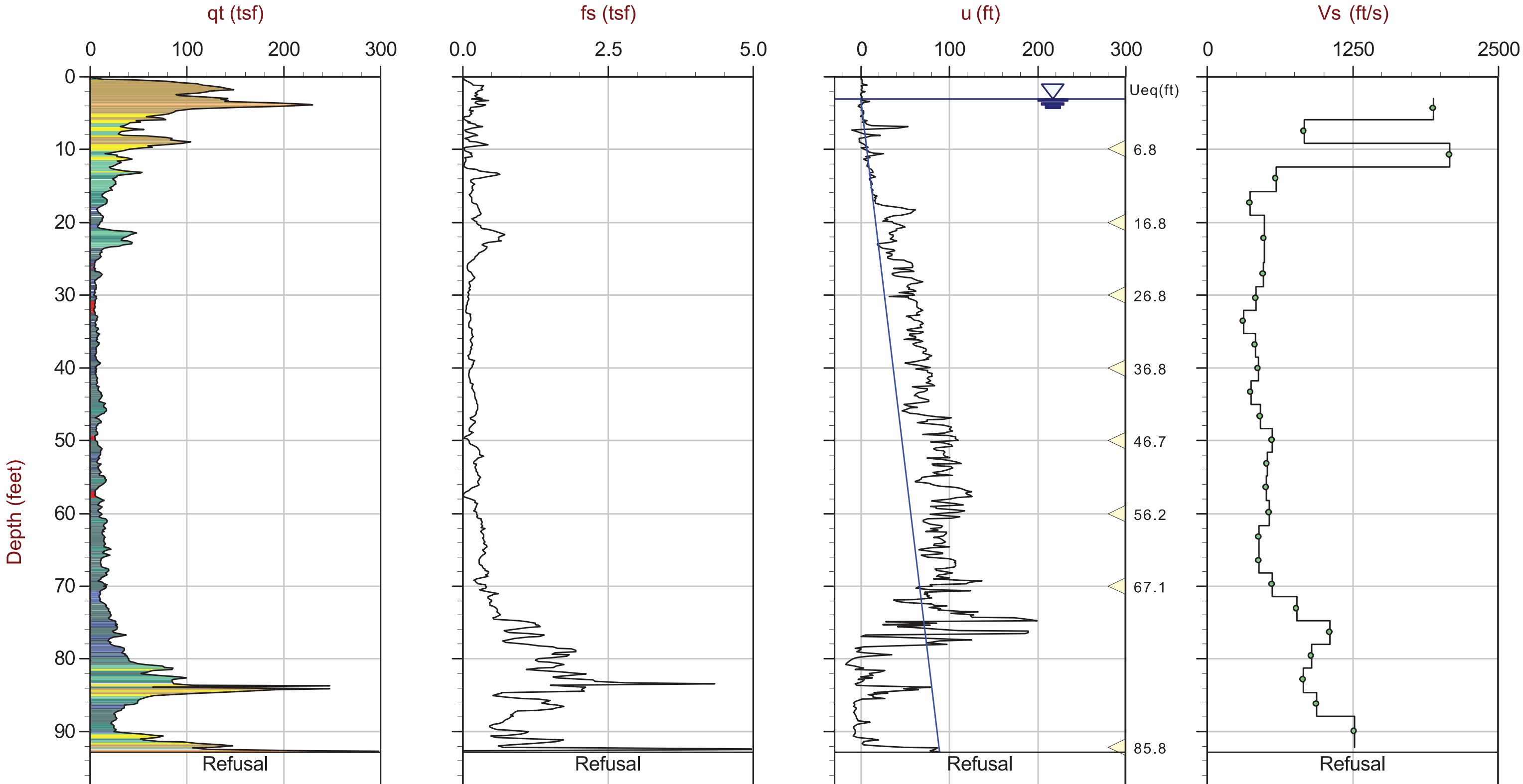
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

AECOM

Job No: 16-54030
Date: 03:17:16 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500



Max Depth: 28.300 m / 92.85 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-110.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07069 E: -83.81252

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

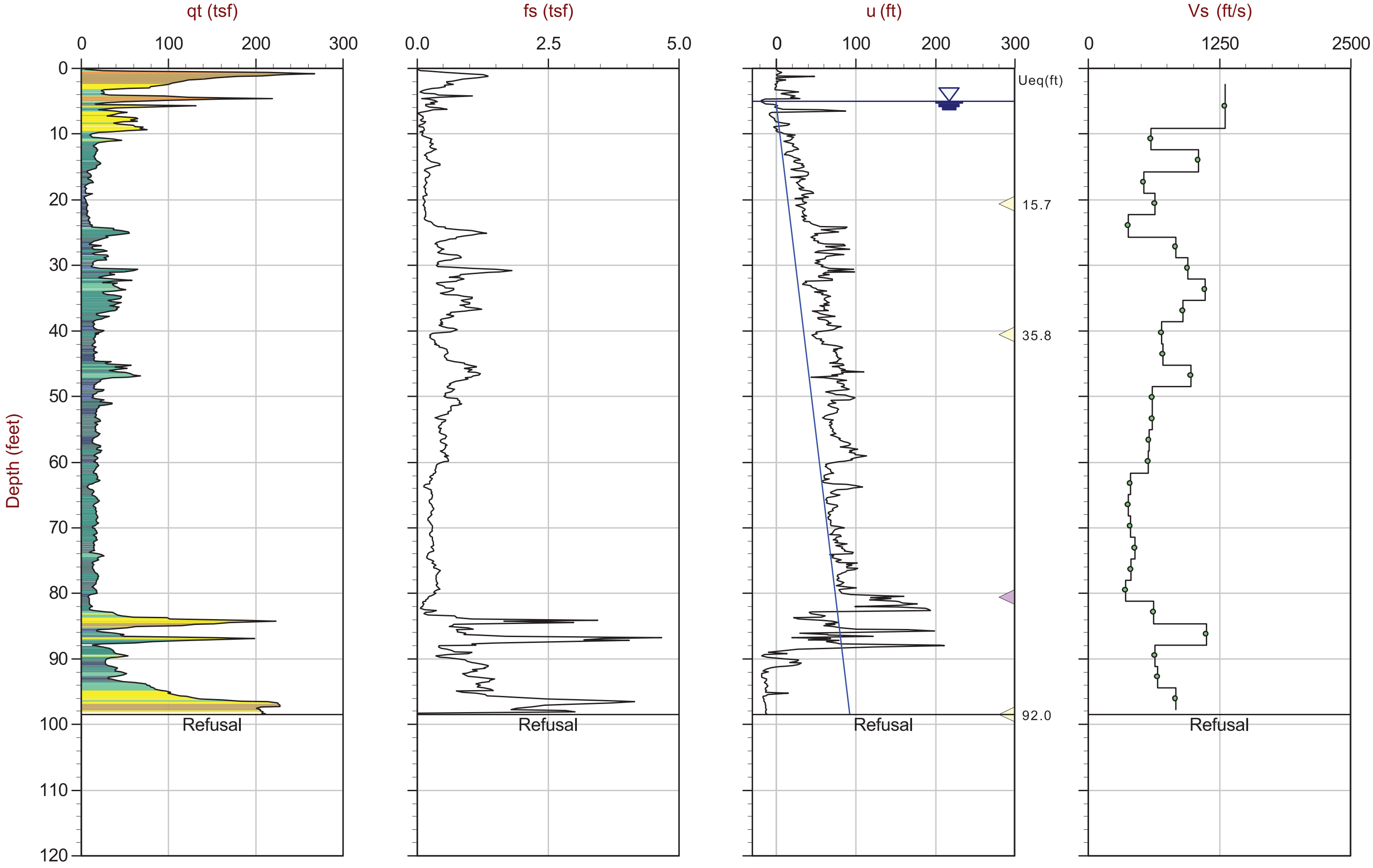
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

AECOM

Job No: 16-54030
Date: 03:16:16 09:01
Site: Plant Scherer

Sounding: C-111
Cone: 304:T1500F15U500



Max Depth: 30.000 m / 98.42 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-111.COR
Unit Wt: SBT Zones

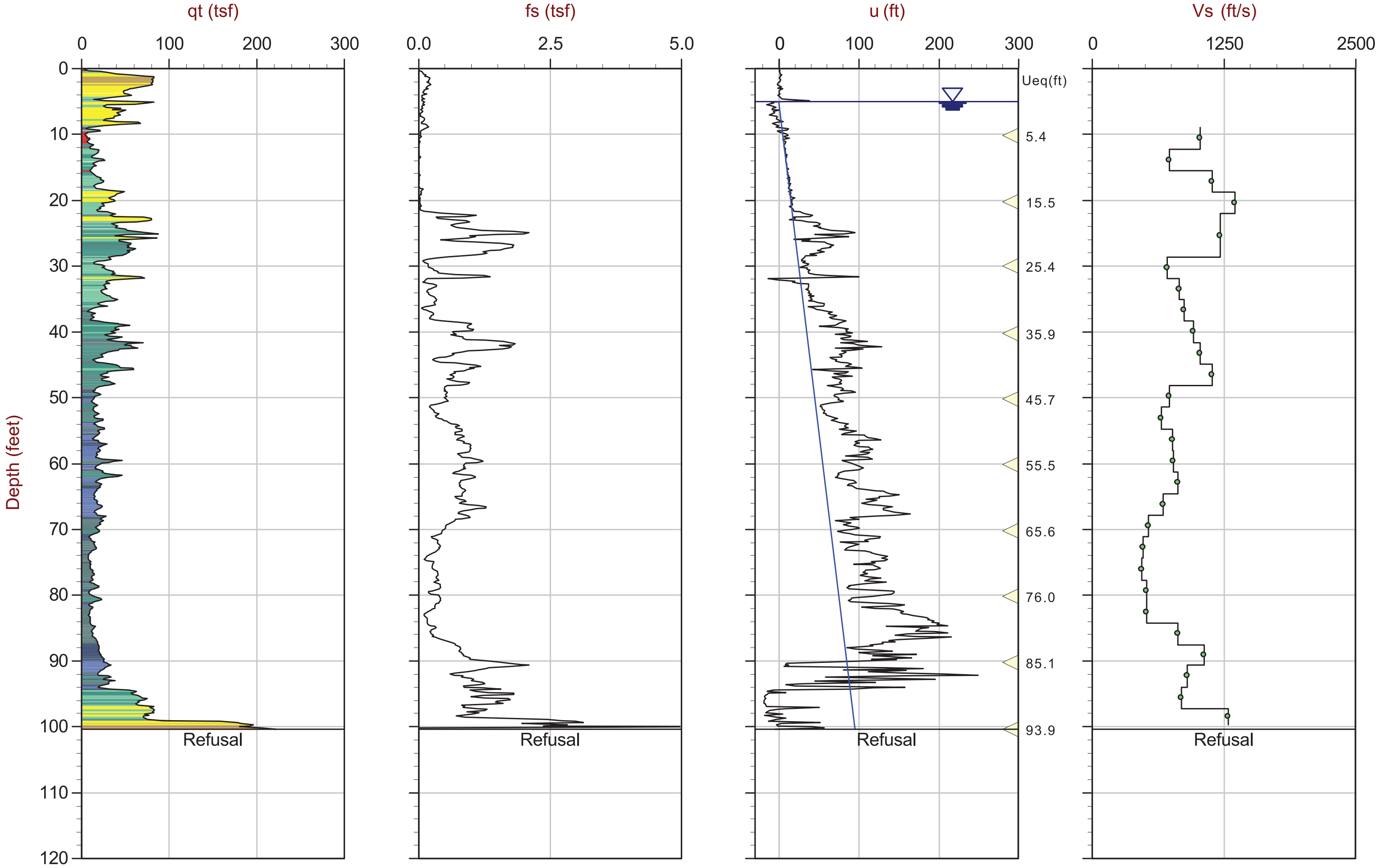
SBT: Robertson and Campanella, 1986
Coords: N: 33.07204 E: -83.81087

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM	Job No: 16-54030	Sounding: C-112
	Date: 03:23:16 09:06	Cone: 304:T1500F15U500
	Site: Plant Scherer	



Max Depth: 30.600 m / 100.39 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-112.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07311 E: -83.81004

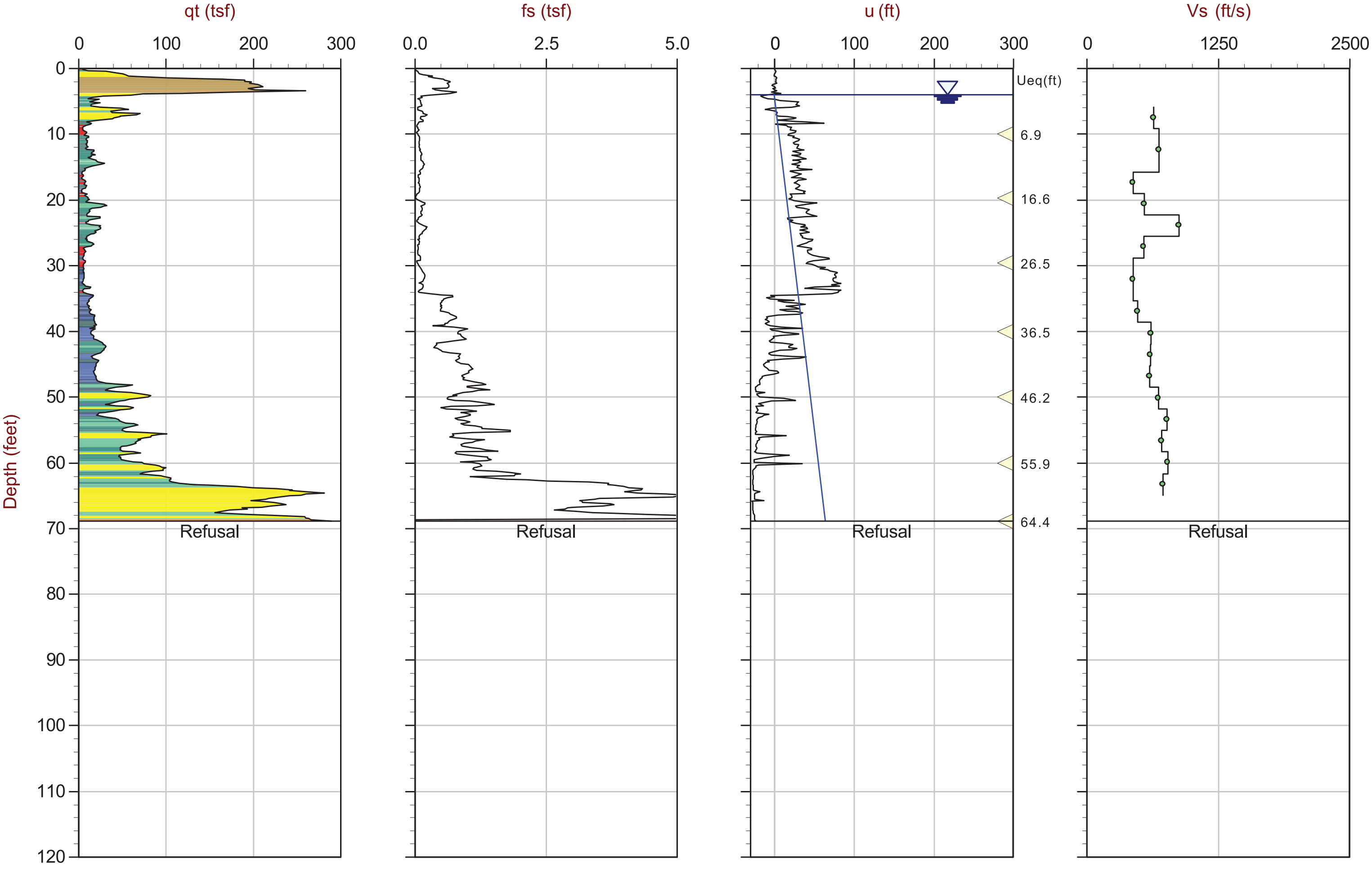
△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

AECOM

Job No: 16-54030	Sounding: C-113
Date: 03:17:16 09:32	Cone: 304:T1500F15U500
Site: Plant Scherer	



Max Depth: 21.000 m / 68.90 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54030_SPC-113.COR
Unit Wt: SBT Zones

SBT: Robertson and Campanella, 1986
Coords: N: 33.07312 E: -83.81356

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Seismic Cone Penetration Test Tabular Results

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-100
Date: 21-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
5.08	4.43	8.33			
6.56	5.91	9.20	0.87	0.97	894
10.01	9.35	11.71	2.51	3.34	752
13.29	12.63	14.47	2.76	3.80	725
16.57	15.91	17.40	2.94	3.67	800
19.85	19.19	20.45	3.04	3.60	845
23.13	22.47	23.55	3.11	3.72	834
26.41	25.75	26.70	3.15	3.80	829
29.69	29.04	29.88	3.18	4.01	792
32.97	32.32	33.08	3.20	3.64	878
36.09	35.43	36.13	3.05	3.58	852
39.37	38.71	39.35	3.22	3.67	877
42.65	41.99	42.58	3.23	3.74	864
45.93	45.28	45.82	3.24	4.29	755
49.21	48.56	49.07	3.24	3.68	881
52.49	51.84	52.31	3.25	3.66	888
55.77	55.12	55.57	3.25	4.74	687
59.06	58.40	58.82	3.26	4.72	690
62.34	61.68	62.08	3.26	4.29	759
65.62	64.96	65.34	3.26	4.56	715
68.90	68.24	68.60	3.26	2.94	1109
72.18	71.52	71.87	3.26	2.94	1109

Job No:	16-54030
Client:	AECOM
Project:	Plant Scherer
Sounding ID:	C-101
Date:	18-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.28	2.62	7.52			
6.56	5.91	9.20	1.67	0.82	2043
9.84	9.19	11.58	2.38	3.52	678
13.12	12.47	14.32	2.74	3.46	794
16.40	15.75	17.25	2.93	2.33	1260
19.69	19.03	20.29	3.04	3.02	1008
22.97	22.31	23.40	3.10	2.72	1140
26.25	25.59	26.54	3.15	4.66	675
29.53	28.87	29.72	3.18	5.21	610
32.81	32.15	32.92	3.20	5.69	562
36.09	35.43	36.13	3.21	5.03	639
39.37	38.71	39.35	3.22	4.70	686
42.65	41.99	42.58	3.23	3.26	991
45.11	44.46	45.01	2.43	1.90	1281

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-102
Date: 22-Mar-2016

Seismic Source: Beam S Wave
Source Offset (ft): 7.05 (ft)
Source Depth (ft): 0.00 (ft)
Geophone Offset (ft): 0.66 (ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.28	2.62	7.52			
6.56	5.91	9.20	1.67	3.19	525
9.84	9.19	11.58	2.38	2.95	807
13.12	12.47	14.32	2.74	3.42	802
16.40	15.75	17.25	2.93	3.12	940
19.69	19.03	20.29	3.04	3.57	852
22.97	22.31	23.40	3.10	3.32	935
26.25	25.59	26.54	3.15	3.49	901
29.53	28.87	29.72	3.18	3.87	820
32.81	32.15	32.92	3.20	4.01	798
36.09	35.43	36.13	3.21	3.76	854
39.37	38.71	39.35	3.22	3.57	902
42.65	41.99	42.58	3.23	3.40	951
45.93	45.28	45.82	3.24	3.62	894
49.21	48.56	49.07	3.24	3.21	1011
52.49	51.84	52.31	3.25	2.99	1086
55.77	55.12	55.57	3.25	3.40	956
59.06	58.40	58.82	3.26	4.09	796
61.02	60.37	60.78	1.95	1.68	1165

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-103
Date: 22-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
6.23	5.58	8.99			
9.51	8.86	11.32	2.33	2.62	891
12.63	11.97	13.90	2.57	3.86	667
16.08	15.42	16.96	3.06	4.60	665
19.36	18.70	19.99	3.03	4.67	649
22.64	21.98	23.08	3.10	4.74	653
25.92	25.26	26.23	3.14	4.58	686
29.20	28.54	29.40	3.17	4.47	710
32.64	31.99	32.76	3.35	4.38	765
35.92	35.27	35.97	3.21	3.50	917
39.04	38.39	39.03	3.06	3.73	821
42.32	41.67	42.26	3.23	3.41	946
43.80	43.14	43.72	1.46	1.93	756

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-104
Date: 24-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.28	2.62	7.52			
6.56	5.91	9.20	1.67	2.71	618
9.84	9.19	11.58	2.38	2.71	880
13.12	12.47	14.32	2.74	2.57	1068
16.40	15.75	17.25	2.93	2.89	1015
19.69	19.03	20.29	3.04	2.78	1094
22.97	22.31	23.40	3.10	2.94	1056
26.25	25.59	26.54	3.15	3.34	943
29.53	28.87	29.72	3.18	3.16	1006
32.81	32.15	32.92	3.20	3.14	1017
36.09	35.43	36.13	3.21	3.26	984
39.37	38.71	39.35	3.22	3.20	1006
42.65	41.99	42.58	3.23	3.32	973
45.93	45.28	45.82	3.24	3.57	908
49.21	48.56	49.07	3.24	2.86	1134
52.49	51.84	52.31	3.25	3.28	991
55.77	55.12	55.57	3.25	2.98	1092
59.06	58.40	58.82	3.26	3.19	1020
62.34	61.68	62.08	3.26	3.25	1004
65.62	64.96	65.34	3.26	3.06	1067
68.90	68.24	68.60	3.26	3.12	1047
72.18	71.52	71.87	3.26	3.33	979
75.46	74.80	75.13	3.27	3.24	1009
78.74	78.08	78.40	3.27	3.21	1016
82.02	81.36	81.67	3.27	3.40	962
85.30	84.65	84.94	3.27	3.09	1058
88.58	87.93	88.21	3.27	3.18	1027
91.70	91.04	91.32	3.11	3.47	896
95.14	94.49	94.75	3.43	3.25	1058

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-104
Date: 24-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
98.43	97.77	98.02	3.27	3.22	1015
101.71	101.05	101.30	3.27	3.21	1019
104.99	104.33	104.57	3.27	3.42	956
108.27	107.61	107.84	3.27	3.26	1005
111.22	110.56	110.79	2.95	2.78	1059

CONETEC

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-105
Date: 23-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.28	2.62	7.52			
6.56	5.91	9.20	1.67	2.53	661
9.84	9.19	11.58	2.38	3.00	795
13.12	12.47	14.32	2.74	4.41	622
16.40	15.75	17.25	2.93	4.29	684
19.69	19.03	20.29	3.04	3.75	811
22.97	22.31	23.40	3.10	4.01	774
26.25	25.59	26.54	3.15	3.64	864
29.36	28.71	29.56	3.02	3.72	811
32.64	31.99	32.76	3.20	3.47	922
35.92	35.27	35.97	3.21	3.54	906
39.21	38.55	39.19	3.22	3.44	936
42.49	41.83	42.42	3.23	3.64	888
45.77	45.11	45.66	3.24	3.32	975
48.88	48.23	48.74	3.08	3.53	872
51.84	51.18	51.66	2.92	3.57	818
54.95	54.30	54.75	3.09	2.92	1059
58.56	57.91	58.33	3.58	3.39	1057
62.50	61.84	62.24	3.91	3.59	1089
65.94	65.29	65.67	3.42	3.90	878
68.90	68.24	68.60	2.94	4.56	644
74.15	73.49	73.83	5.22	5.44	960
75.46	74.80	75.13	1.31	0.99	1316

Job No:	16-54030
Client:	AECOM
Project:	Plant Scherer
Sounding ID:	C-106
Date:	24-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.28	2.62	7.52			
6.56	5.91	9.20	1.67	3.07	546
9.84	9.19	11.58	2.38	3.36	709
13.12	12.47	14.32	2.74	2.99	916
16.40	15.75	17.25	2.93	3.09	950
19.69	19.03	20.29	3.04	3.37	902
22.80	22.15	23.24	2.95	3.77	781
26.25	25.59	26.54	3.30	3.48	949
29.53	28.87	29.72	3.18	3.35	949
32.81	32.15	32.92	3.20	3.34	958
36.09	35.43	36.13	3.21	3.35	958
39.37	38.71	39.35	3.22	3.44	936
42.65	41.99	42.58	3.23	3.53	914
45.93	45.28	45.82	3.24	3.19	1016
49.21	48.56	49.07	3.24	2.54	1276
52.49	51.84	52.31	3.25	3.09	1050
55.77	55.12	55.57	3.25	3.83	848
59.06	58.40	58.82	3.26	4.67	697
62.34	61.68	62.08	3.26	5.32	612
65.62	64.96	65.34	3.26	5.37	607
68.90	68.24	68.60	3.26	5.56	587
72.18	71.52	71.87	3.26	5.13	636
75.46	74.80	75.13	3.27	5.44	600
78.74	78.08	78.40	3.27	4.53	721
82.02	81.36	81.67	3.27	4.53	722
85.30	84.65	84.94	3.27	3.58	913
88.58	87.93	88.21	3.27	2.92	1121
91.86	91.21	91.48	3.27	2.60	1259
94.65	94.00	94.26	2.78	2.00	1387

CONETEC

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-107
Date: 24-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.28	2.62	7.52			
6.56	5.91	9.20	1.67	2.38	702
9.84	9.19	11.58	2.38	2.96	806
13.12	12.47	14.32	2.74	2.87	956
16.40	15.75	17.25	2.93	2.92	1004
19.69	19.03	20.29	3.04	3.34	910
22.97	22.31	23.40	3.10	3.24	957
26.25	25.59	26.54	3.15	3.48	905
29.53	28.87	29.72	3.18	3.30	962
32.81	32.15	32.92	3.20	3.24	986
36.09	35.43	36.13	3.21	3.21	1000
39.37	38.71	39.35	3.22	3.52	915
42.65	41.99	42.58	3.23	3.60	898
45.93	45.28	45.82	3.24	3.41	950
49.21	48.56	49.07	3.24	2.43	1335
52.49	51.84	52.31	3.25	3.33	974
55.77	55.12	55.57	3.25	4.05	803
59.22	58.56	58.99	3.42	4.61	742
62.34	61.68	62.08	3.10	3.90	794
65.62	64.96	65.34	3.26	4.56	715
68.90	68.24	68.60	3.26	4.92	664
72.01	71.36	71.71	3.10	4.27	727

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-108
Date: 23-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.28	2.62	7.52			
6.56	5.91	9.20	1.67	1.80	930
9.84	9.19	11.58	2.38	3.72	641
13.12	12.47	14.32	2.74	3.83	716
16.40	15.75	17.25	2.93	3.44	853
19.69	19.03	20.29	3.04	2.53	1201
22.97	22.31	23.40	3.10	2.85	1089
26.25	25.59	26.54	3.15	3.62	869
29.53	28.87	29.72	3.18	5.19	612
32.81	32.15	32.92	3.20	5.72	559
36.42	35.76	36.45	3.53	6.24	566
39.37	38.71	39.35	2.90	3.45	842
42.65	41.99	42.58	3.23	3.60	898
45.93	45.28	45.82	3.24	2.95	1098
48.06	47.41	47.93	2.11	2.03	1040

CONETEC

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-109
Date: 16-Mar-2016

Seismic Source: Beam S Wave
Source Offset (ft): 7.05 (ft)
Source Depth (ft): 0.00 (ft)
Geophone Offset (ft): 0.66 (ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
6.56	5.91	9.20			
9.84	9.19	11.58	2.38	2.03	1172
13.12	12.47	14.32	2.74	4.21	652
16.40	15.75	17.25	2.93	4.21	697
19.69	19.03	20.29	3.04	5.61	542
22.97	22.31	23.40	3.10	4.34	716
26.25	25.59	26.54	3.15	6.67	472
29.53	28.87	29.72	3.18	7.40	429
36.09	35.43	36.13	6.41	10.29	623
39.21	38.55	39.19	3.06	8.20	373
42.32	41.67	42.26	3.07	8.35	367
45.77	45.11	45.66	3.40	8.24	413
49.21	48.56	49.07	3.41	6.88	495
52.49	51.84	52.31	3.25	7.64	425
55.77	55.12	55.57	3.25	7.52	432
59.06	58.40	58.82	3.26	6.89	472
62.34	61.68	62.08	3.26	5.99	544
63.81	63.16	63.55	1.47	2.13	690

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-110
Date: 17-Mar-2016

Seismic Source: Beam S Wave
Source Offset (ft): 7.05 (ft)
Source Depth (ft): 0.00 (ft)
Geophone Offset (ft): 0.66 (ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.61	2.95	7.64			
6.56	5.91	9.20	1.55	0.80	1949
9.84	9.19	11.58	2.38	2.85	836
13.12	12.47	14.32	2.74	1.31	2089
16.40	15.75	17.25	2.93	4.95	592
19.69	19.03	20.29	3.04	8.16	372
26.25	25.59	26.54	6.25	12.75	490
29.53	28.87	29.72	3.18	6.51	488
32.81	32.15	32.92	3.20	7.61	420
35.92	35.27	35.97	3.05	9.63	317
39.21	38.55	39.19	3.22	7.72	418
42.49	41.83	42.42	3.23	7.27	444
45.77	45.11	45.66	3.24	8.50	381
49.05	48.39	48.90	3.24	7.06	460
52.33	51.67	52.15	3.25	5.78	562
55.61	54.95	55.40	3.25	6.30	517
58.89	58.23	58.66	3.26	6.33	514
62.34	61.68	62.08	3.42	6.33	540
65.62	64.96	65.34	3.26	7.31	446
68.90	68.24	68.60	3.26	7.31	446
72.18	71.52	71.87	3.26	5.77	566
75.46	74.80	75.13	3.27	4.23	772
78.74	78.08	78.40	3.27	3.09	1059
82.02	81.36	81.67	3.27	3.63	901
85.30	84.65	84.94	3.27	3.94	829
88.58	87.93	88.21	3.27	3.47	944
92.85	92.19	92.46	4.25	3.35	1269

CONETEC

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-111
Date: 16-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
3.12	2.46	7.47			
9.84	9.19	11.58	4.11	3.14	1308
13.12	12.47	14.32	2.74	4.59	598
16.40	15.75	17.25	2.93	2.79	1051
19.69	19.03	20.29	3.04	5.74	530
22.97	22.31	23.40	3.10	4.84	641
26.41	25.75	26.70	3.30	8.66	382
29.53	28.87	29.72	3.02	3.61	837
32.81	32.15	32.92	3.20	3.35	953
36.09	35.43	36.13	3.21	2.87	1118
39.37	38.71	39.35	3.22	3.56	906
42.65	41.99	42.58	3.23	4.60	703
45.93	45.28	45.82	3.24	4.54	713
49.21	48.56	49.07	3.24	3.29	986
52.49	51.84	52.31	3.25	5.27	616
55.77	55.12	55.57	3.25	5.27	617
59.06	58.40	58.82	3.26	5.60	581
62.34	61.68	62.08	3.26	5.68	574
65.62	64.96	65.34	3.26	8.00	407
68.90	68.24	68.60	3.26	8.43	387
72.18	71.52	71.87	3.26	8.10	403
75.46	74.80	75.13	3.27	7.25	450
78.74	78.08	78.40	3.27	7.91	413
81.86	81.20	81.51	3.10	8.66	358
85.30	84.65	84.94	3.43	5.50	624
88.58	87.93	88.21	3.27	2.90	1128
91.86	91.21	91.48	3.27	5.13	638
95.14	94.49	94.75	3.27	4.94	662
98.43	97.77	98.02	3.27	3.90	839

Job No:	16-54030
Client:	AECOM
Project:	Plant Scherer
Sounding ID:	C-112
Date:	23-Mar-2016

Seismic Source:	Beam	S Wave
Source Offset (ft):	7.05	(ft)
Source Depth (ft):	0.00	(ft)
Geophone Offset (ft):	0.66	(ft)

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
9.68	9.02	11.45			
12.96	12.30	14.18	2.73	2.65	1029
16.24	15.58	17.10	2.92	3.99	733
19.52	18.86	20.14	3.03	2.65	1144
22.80	22.15	23.24	3.10	2.28	1358
29.36	28.71	29.56	6.32	5.19	1219
32.64	31.99	32.76	3.20	4.45	717
35.76	35.10	35.81	3.05	3.67	831
39.04	38.39	39.03	3.22	3.67	877
42.32	41.67	42.26	3.23	3.35	964
45.60	44.95	45.50	3.24	3.16	1026
48.88	48.23	48.74	3.24	2.85	1139
52.17	51.51	51.99	3.25	4.44	732
55.45	54.79	55.24	3.25	4.94	658
58.73	58.07	58.50	3.26	4.26	764
62.01	61.35	61.76	3.26	4.21	775
65.29	64.63	65.02	3.26	3.99	818
68.57	67.91	68.28	3.26	4.83	675
71.85	71.19	71.54	3.26	6.08	537
75.13	74.47	74.81	3.27	6.75	484
78.41	77.76	78.07	3.27	6.85	477
81.69	81.04	81.34	3.27	6.28	520
84.97	84.32	84.61	3.27	6.33	517
88.25	87.60	87.88	3.27	3.99	820
91.37	90.72	90.99	3.11	2.92	1066
94.65	94.00	94.26	3.27	3.62	905
97.93	97.28	97.53	3.27	3.85	849
100.39	99.74	99.99	2.45	1.90	1294

CONETEC

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Sounding ID: C-113
Date: 17-Mar-2016

Seismic Source: Beam S Wave
Source Offset (ft): 7.05 (ft)
Source Depth (ft): 0.00 (ft)
Geophone Offset (ft): 0.66 (ft)

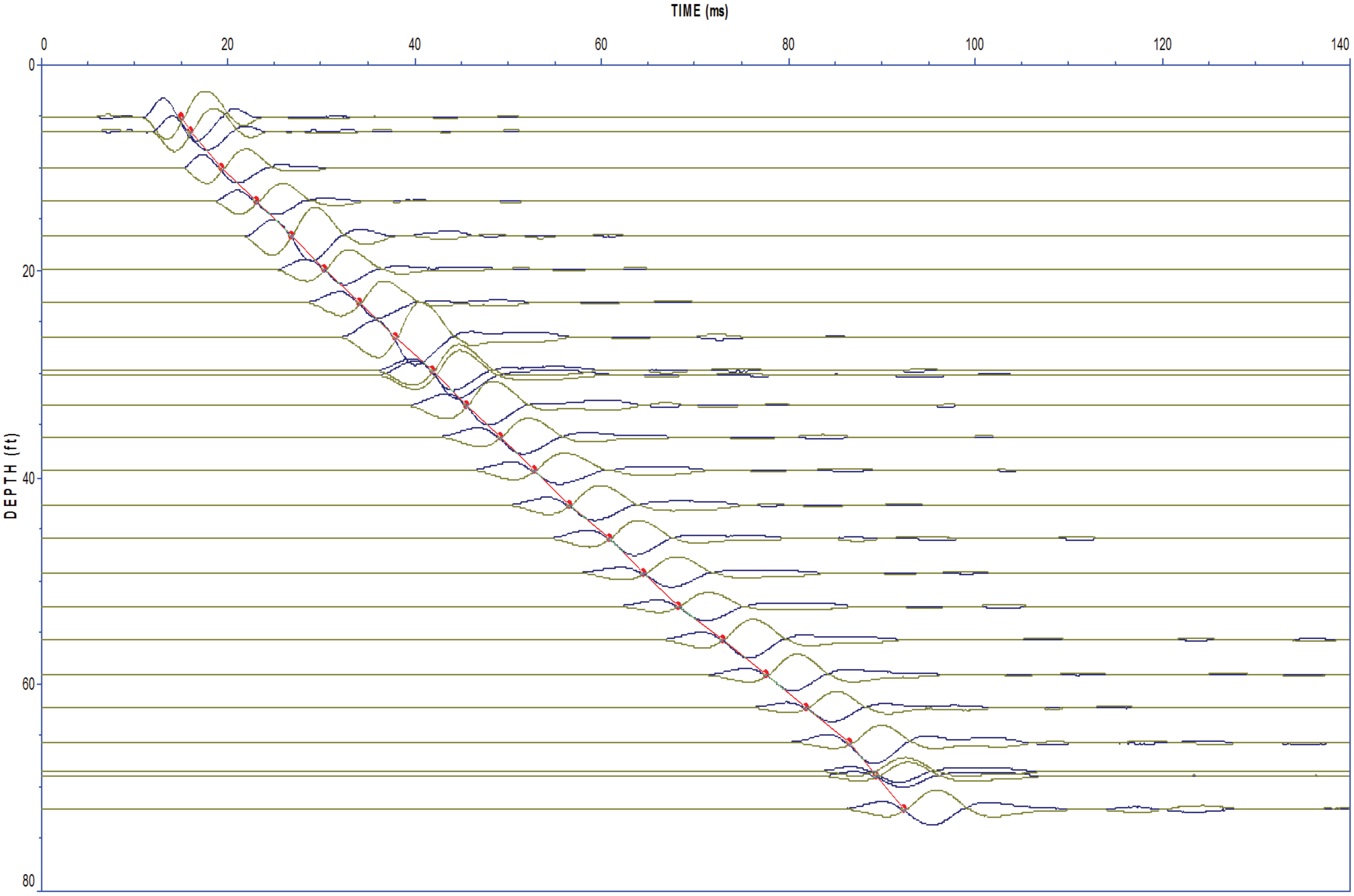
SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
6.56	5.91	9.20			
9.84	9.19	11.58	2.38	3.74	637
16.40	15.75	17.25	5.67	8.25	688
19.69	19.03	20.29	3.04	6.93	439
22.97	22.31	23.40	3.10	5.66	548
26.25	25.59	26.54	3.15	3.58	879
29.53	28.87	29.72	3.18	5.83	545
36.09	35.43	36.13	6.41	14.45	443
39.37	38.71	39.35	3.22	6.65	484
42.65	41.99	42.58	3.23	5.26	615
45.93	45.28	45.82	3.24	5.33	607
49.21	48.56	49.07	3.24	5.41	600
52.49	51.84	52.31	3.25	4.73	686
55.77	55.12	55.57	3.25	4.25	766
59.06	58.40	58.82	3.26	4.56	714
62.34	61.68	62.08	3.26	4.20	776
65.62	64.96	65.34	3.26	4.47	730

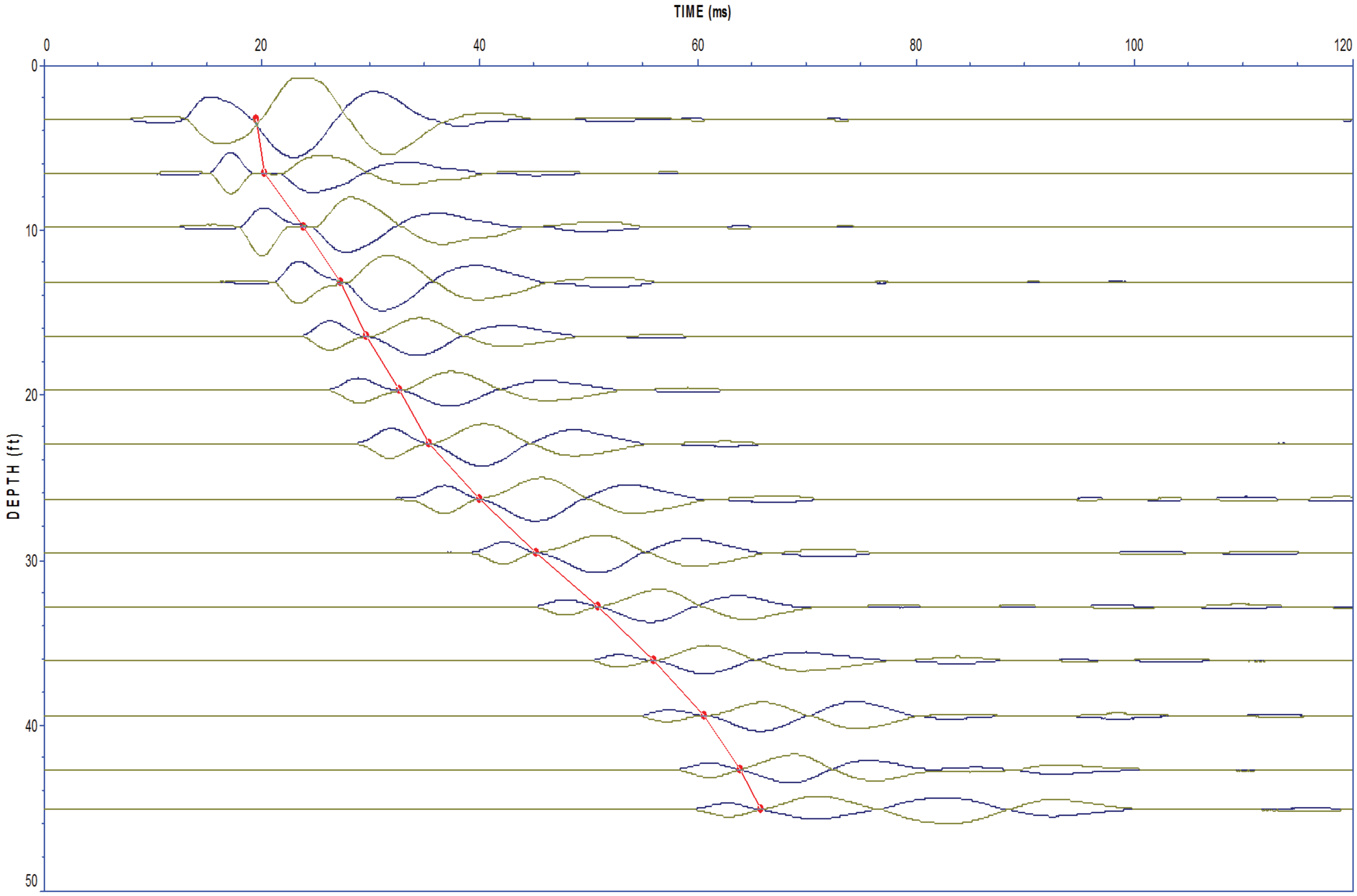
Seismic Cone Penetration Wave Traces

ConeTec

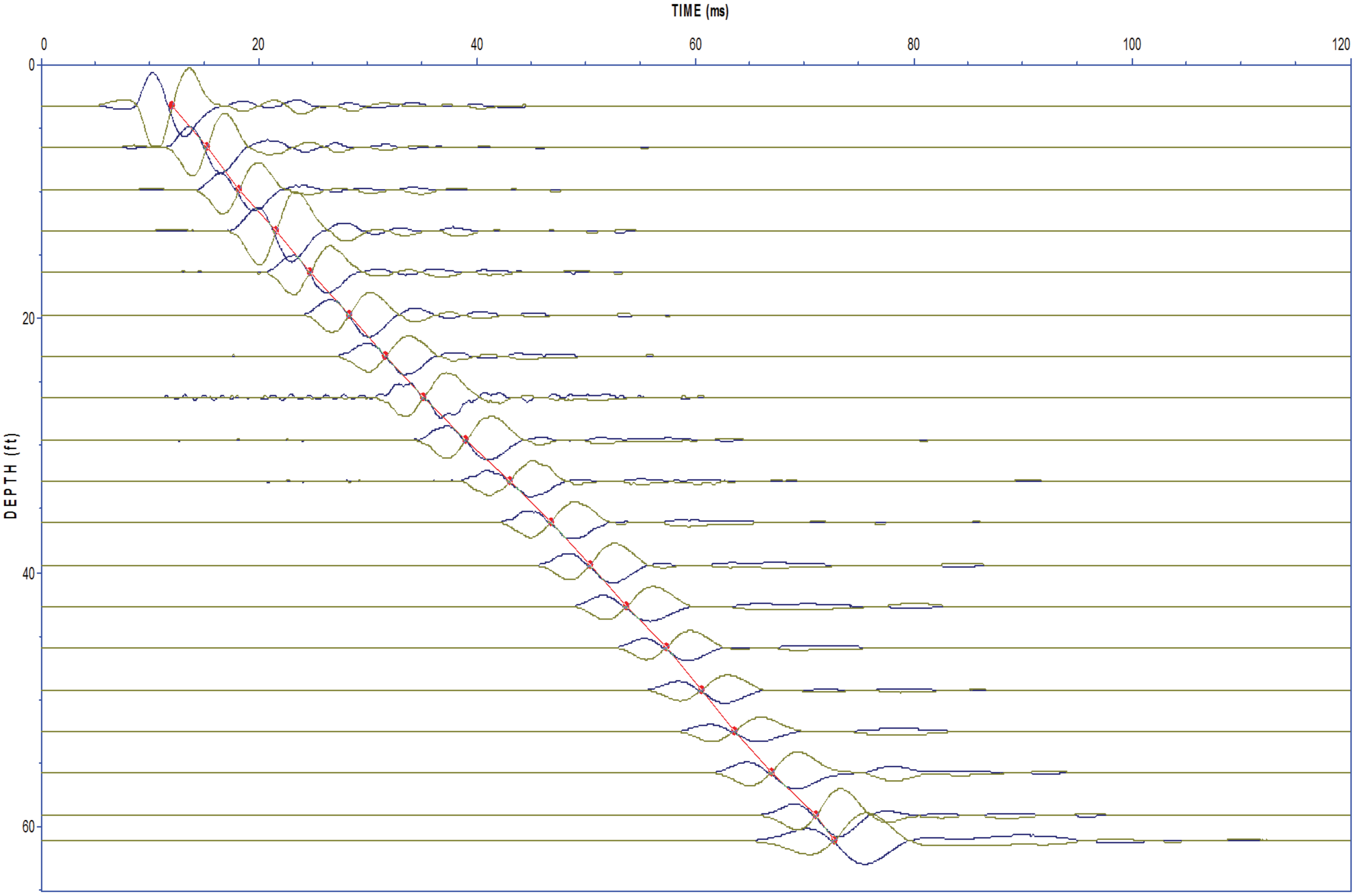
Job No: 16-54030 Client: AECOM Project Title: Plant Scherer Operator: SJ, CM, DW Hole: C-100 Site: Plant Scherer Date: 03:21:16 13:47 Cone: 304:T1500F15U500



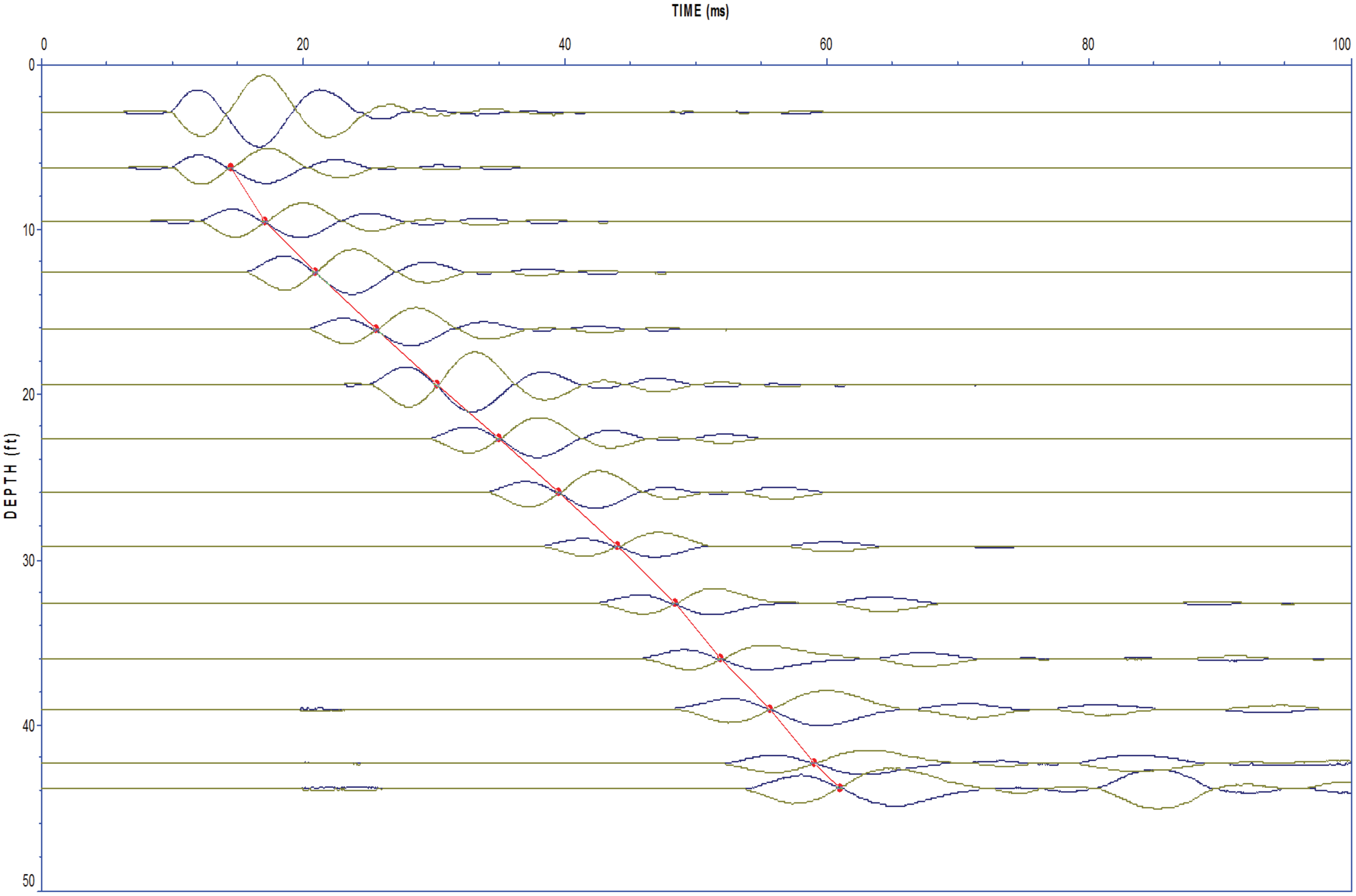
Job No: 16-54030 Client: AECOM Project Title: Plant Scherer Operator: SJ, CM, DW Hole: C-101 Site: Plant Scherer Date: 03:18:16 08:48 Cone: 304:T1500F15U500



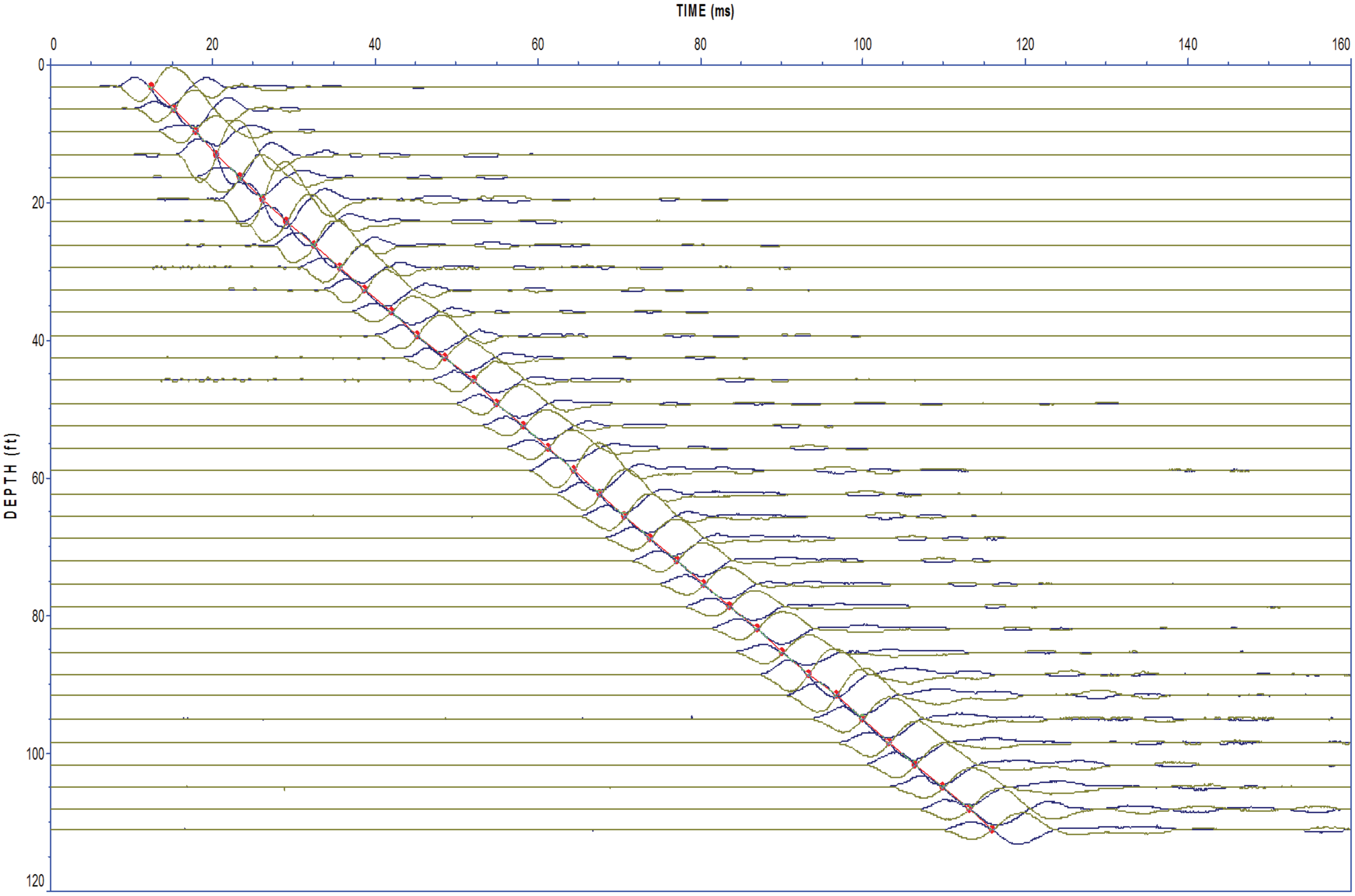
Job No: 16-54030 Client: AECOM Project Title: Plant Scherer Operator: SJ, CM, DW Hole: C-102 Site: Plant Scherer Date: 03:22:16 08:51 Cone: 304:T1500F15U500



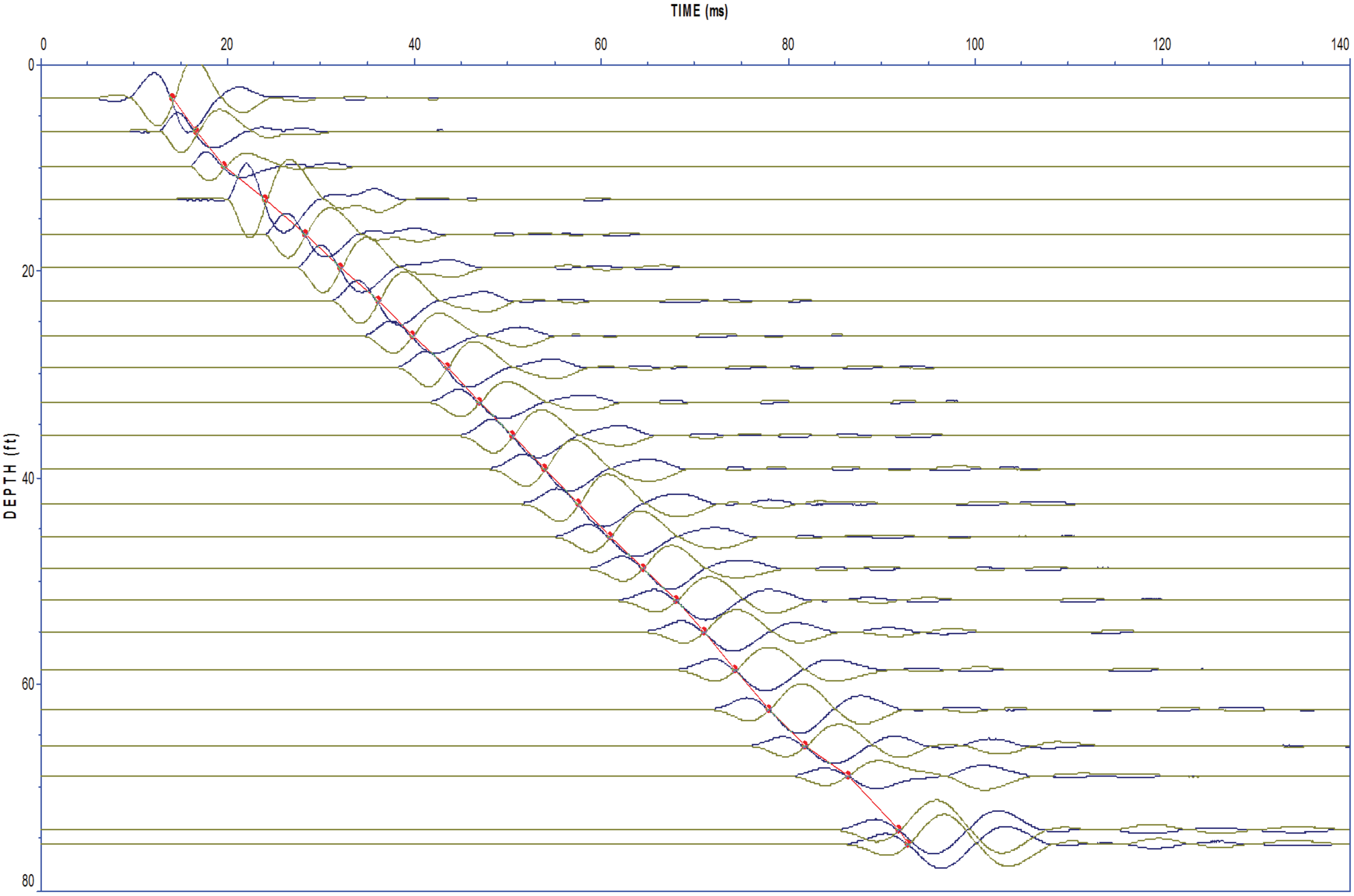
Job No: 16-54030 Client: AECOM Project Title: Plant Scherer Operator: SJ, CM, DW Hole: C-103 Site: Plant Scherer Date: 03:22:16 14:13 Cone: 304:T1500F15U500



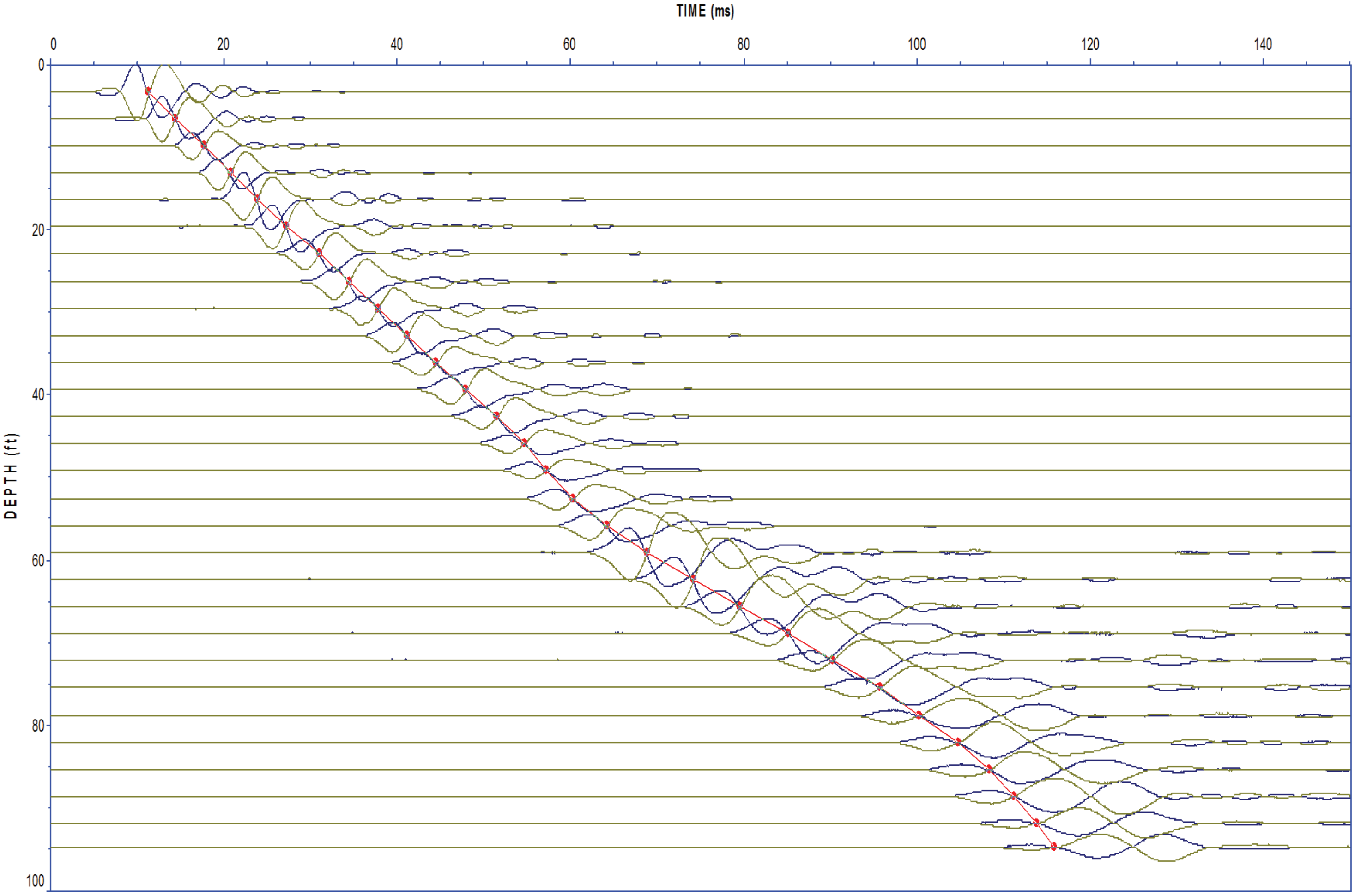
Job No: 16-54030 Client: AECOM Project Title: Plant Scherer Operator: SJ,CM,DW Hole: C-104 Site: Plant Scherer Date: 03:24:16 14:16 Cone: 304:T1500F15U500



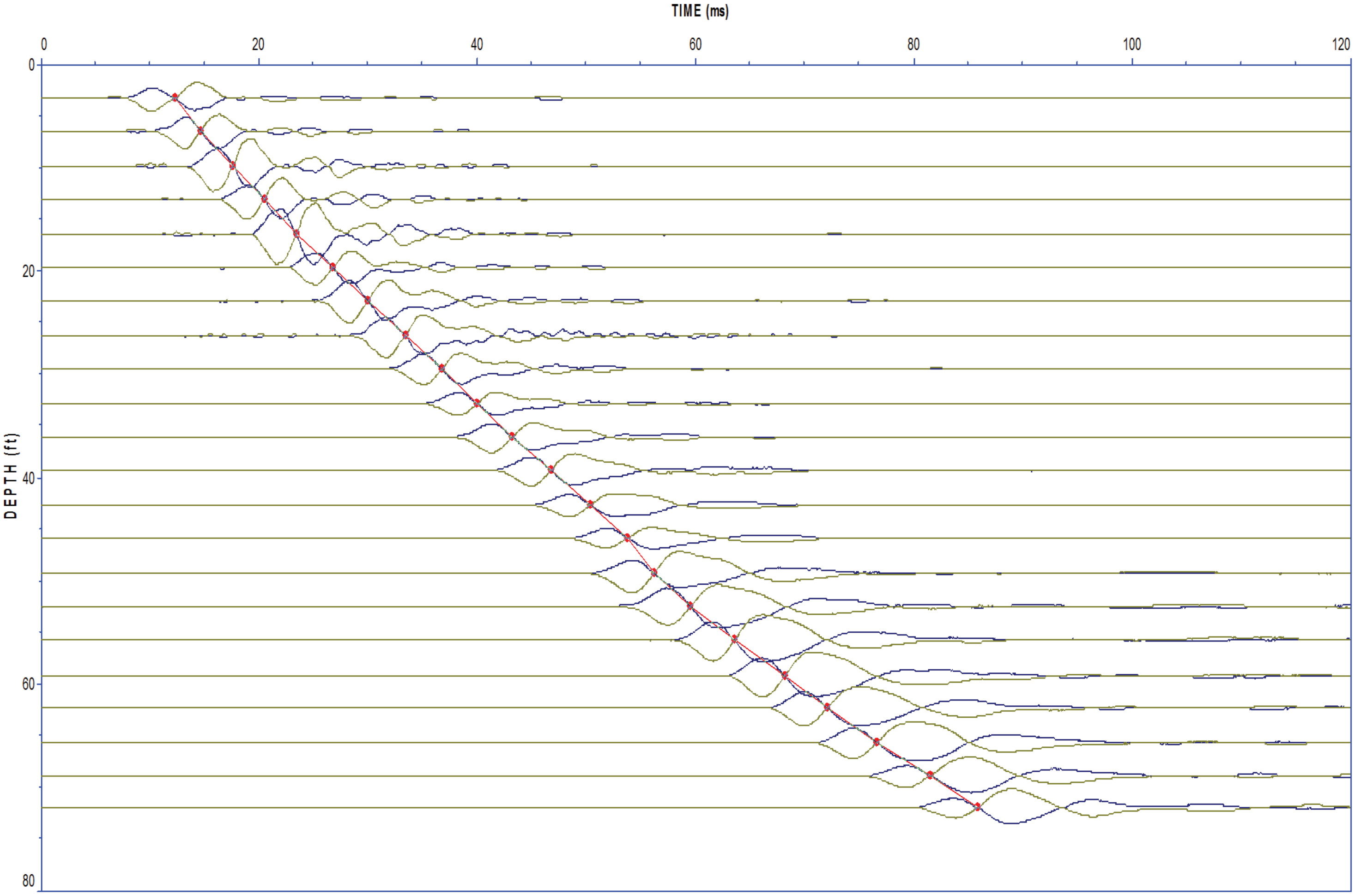
Job No: 16-54030 | Client: AECOM | Project Title: Plant Scherer | Operator: SJ, CM, DW | Hole: C-105 | Site: Plant Scherer | Date: 03:23:16 12:45 | Cone: 304:T1500F15U500



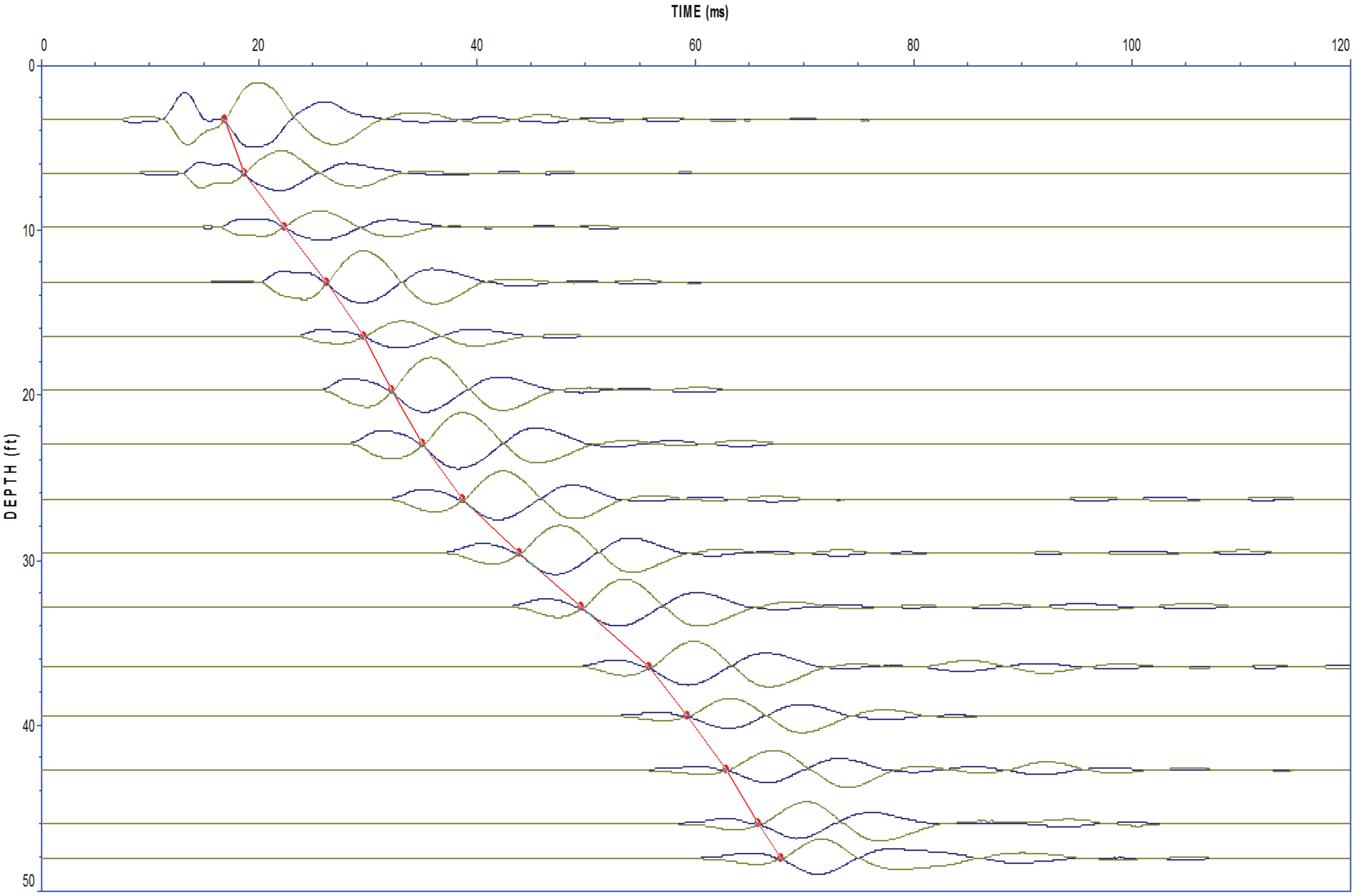
Job No: 16-54030	Client: AECOM	Project Title: Plant Scherer	Operator: SJ,CM,DW	Hole: C-106	Site: Plant Scherer	Date: 03:24:16 11:06	Cone: 304:T1500F15U500



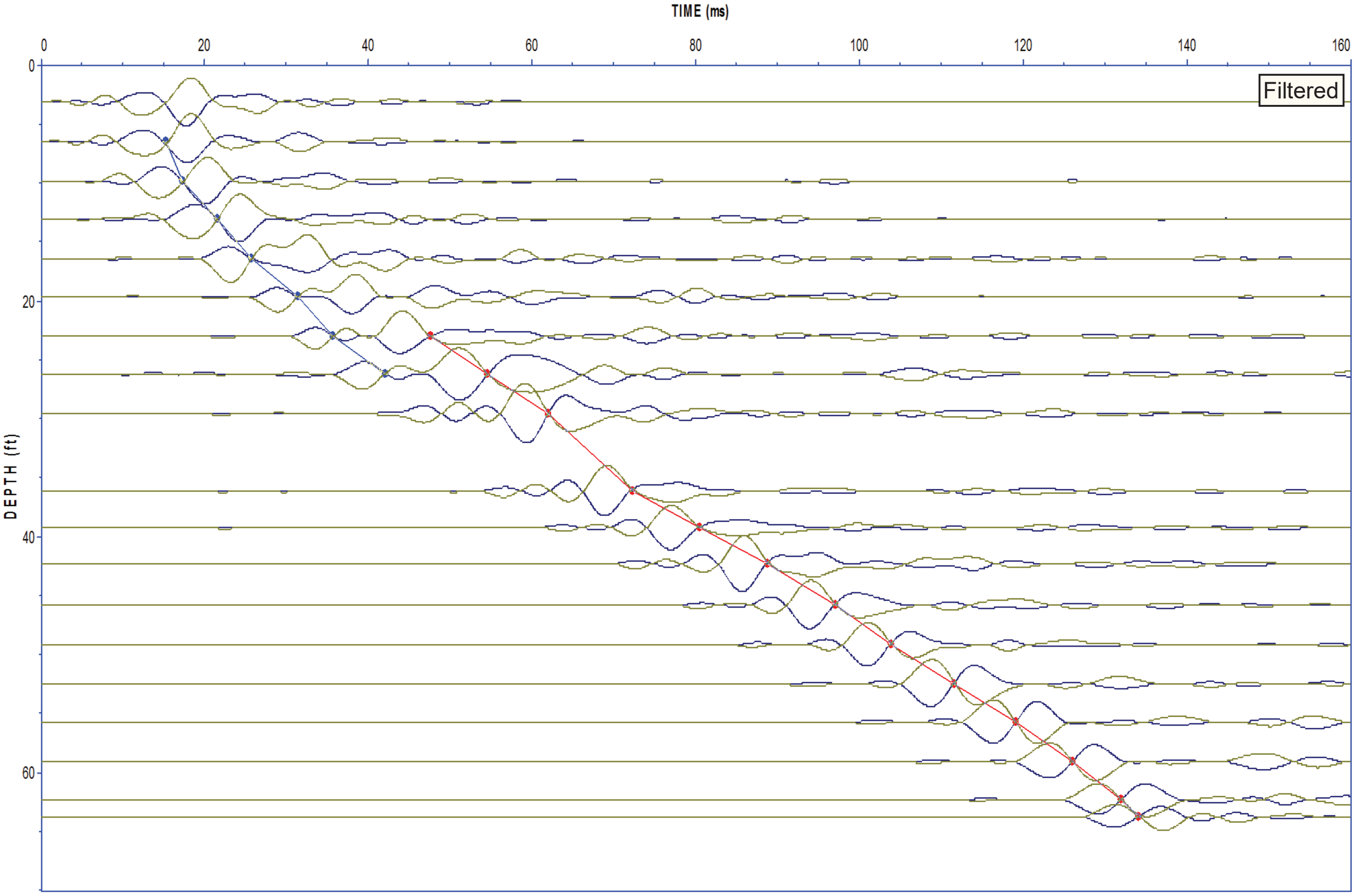
Job No: 16-54030 | Client: AECOM | Project Title: Plant Scherer | Operator: SJ,CM,DW | Hole: C-107 | Site: Plant Scherer | Date: 03:24:16 09:14 | Cone: 304:T1500F15U500



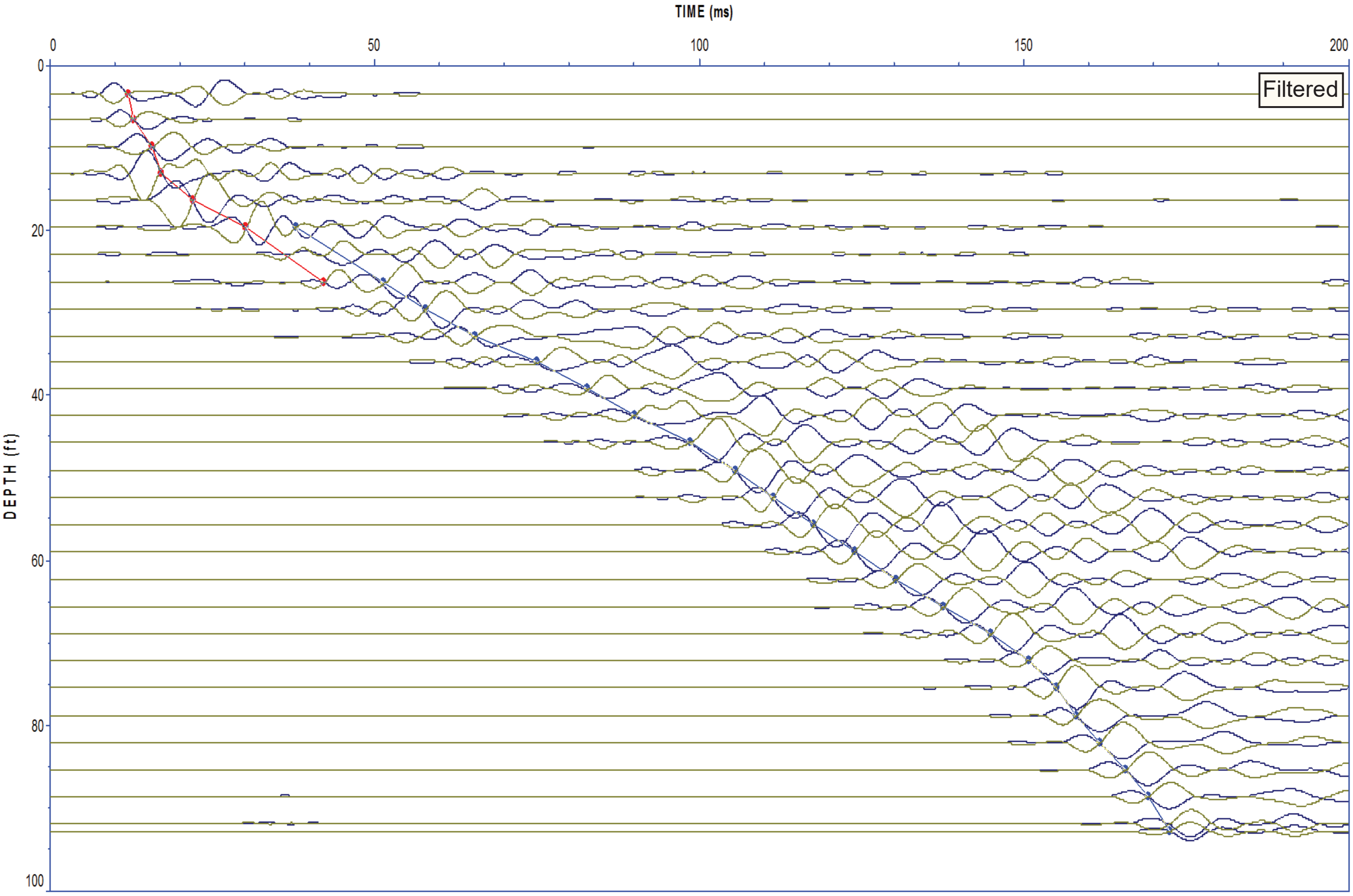
Job No: 16-54030 Client: AECOM Project Title: Plant Scherer Operator: SJ,CM,DW Hole: C-108 Site: Plant Scherer Date: 03:23:16 16:29 Cone: 304:T1500F15U500



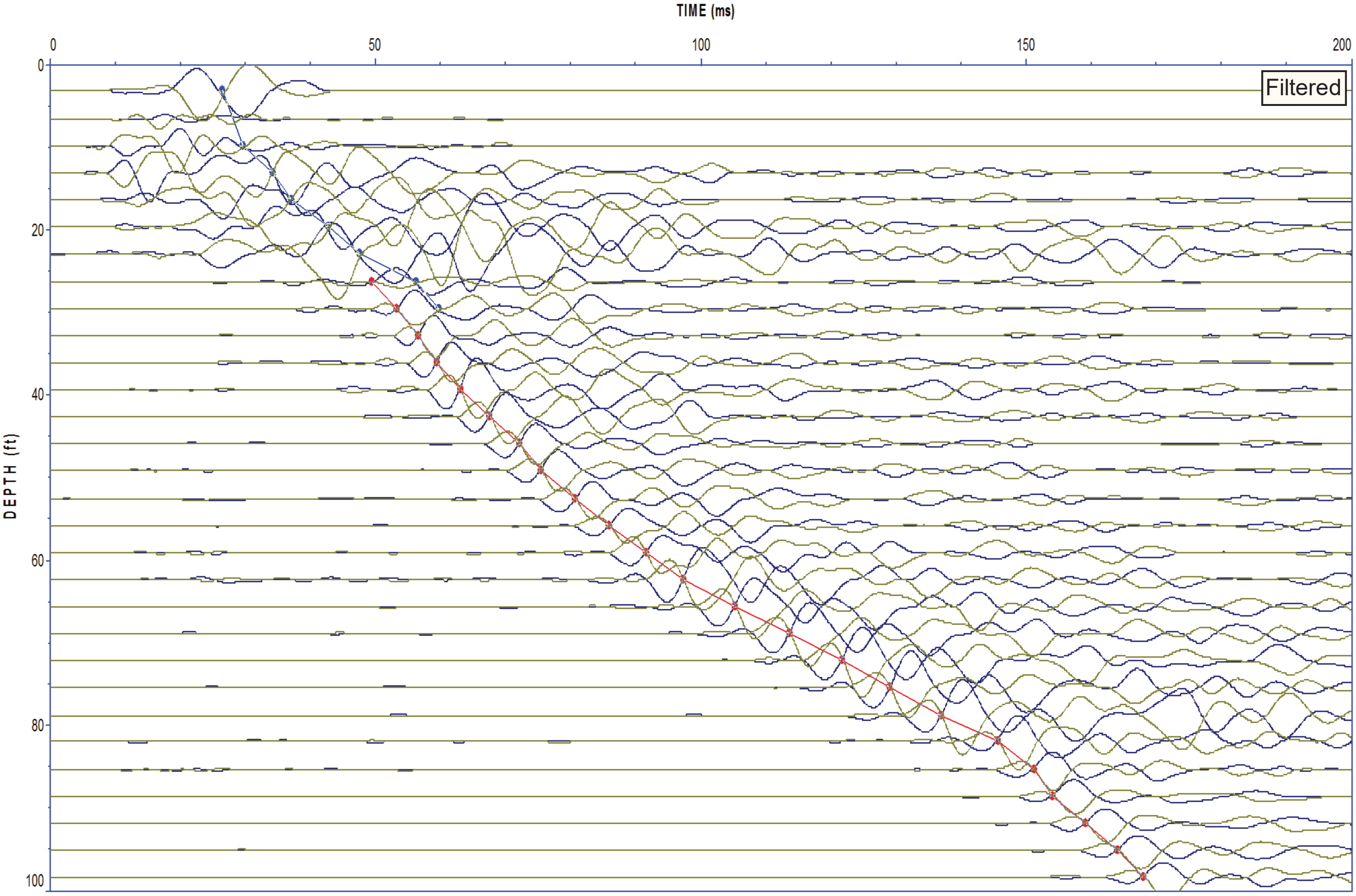
Job No: 16-54030 | Client: AECOM | Project Title: Plant Scherer | Operator: SJ, CM, DW | Hole: C-109 | Site: Plant Scherer | Date: 03:16:16 15:33 | Cone: 437:T1500F15U1K



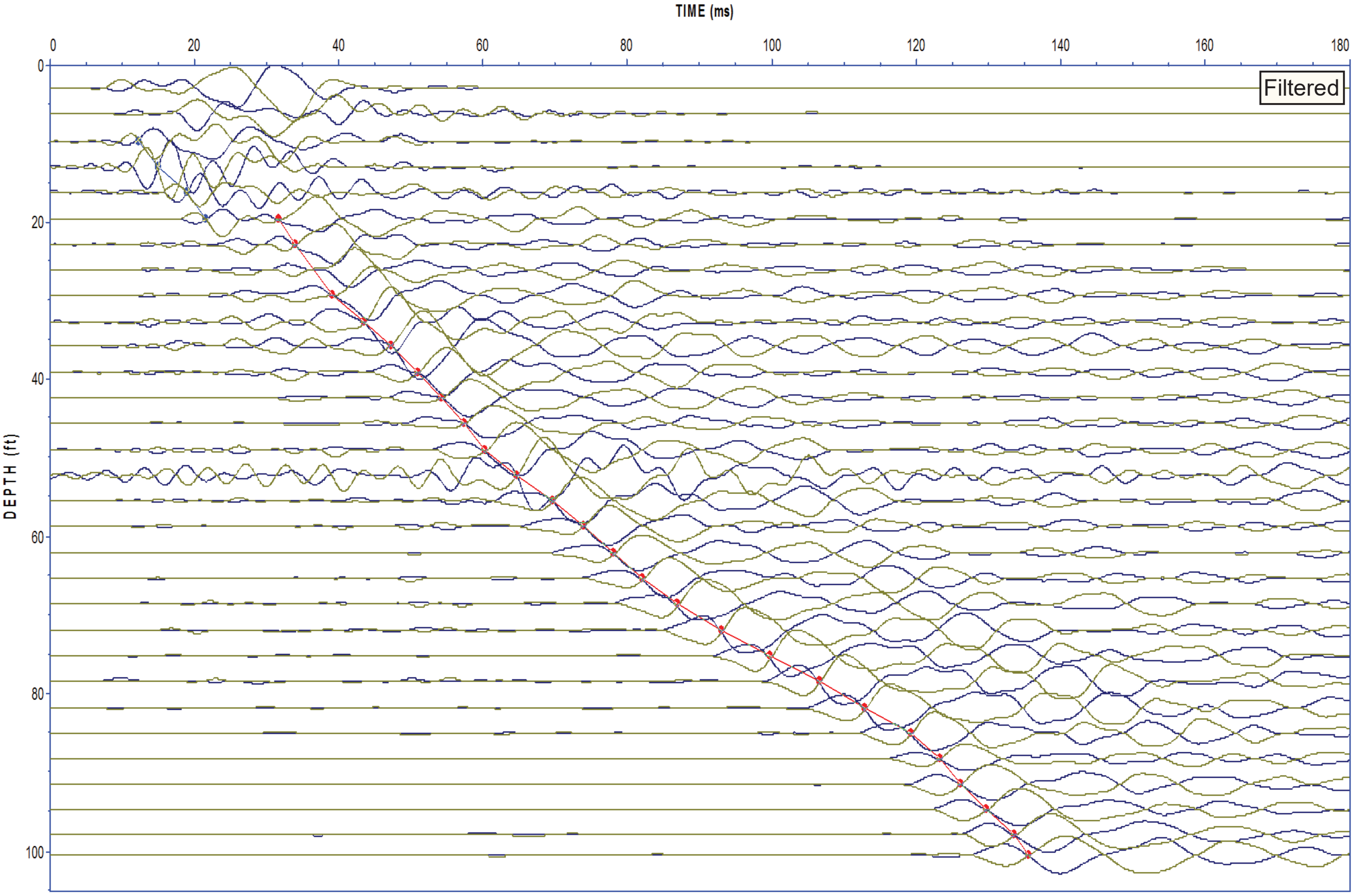
Job No: 16-54030 Client: AECOM Project Title: Plant Scherer Operator: SJ, CM, DW Hole: C-110 Site: Plant Scherer Date: 03:17:16 12:30 Cone: 304:T1500F15U500



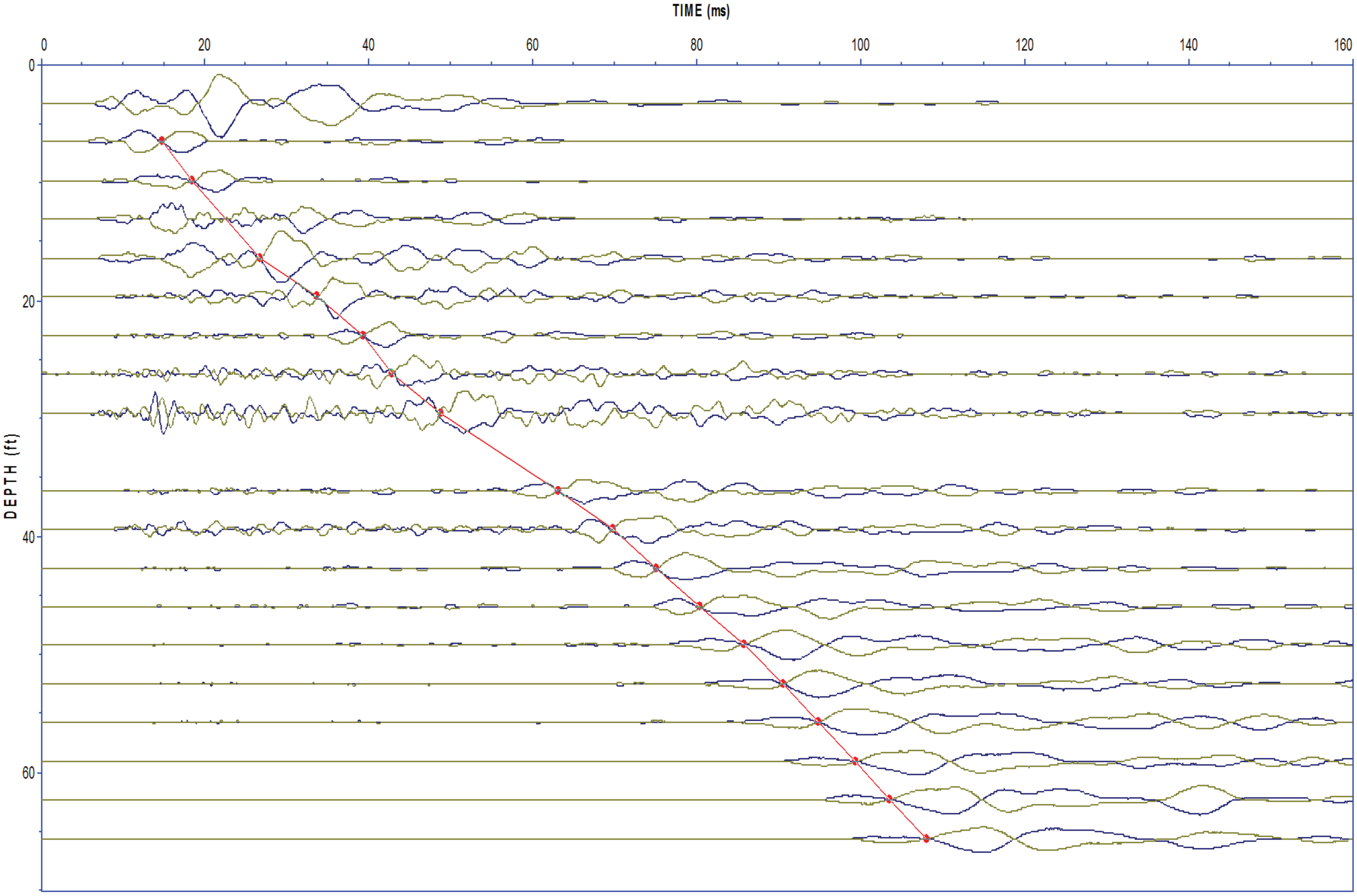
Job No: 16-54030 Client: AECOM Project Title: Plant Scherer Operator: SJ, CM, DW Hole: C-111 Site: Plant Scherer Date: 03:16:16 09:01 Cone: 304:T1500F15U500



Job No: 16-54030
Client: AECOM
Project Title: Plant Scherer
Operator: SJ, CM, DW
Hole: C-112
Site: Plant Scherer
Date: 03:23:16 09:06
Cone: 304:T1500F15U500



Job No: 16-54030 Client: AECOM Project Title: Plant Scherer Operator: SJ, CM, DW Hole: C-113 Site: Plant Scherer Date: 03:17:16 09:32 Cone: 304:T1500F15U500



Pore Pressure Dissipation Summary and

Pore Pressure Dissipation Plots

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Start Date: 16-Mar-2016
End Date: 24-Mar-2016

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
C-100	16-54030_SPC-100	15	305	10.5		
C-100	16-54030_SPC-100	15	1850	16.6		
C-100	16-54030_SPC-100	15	1800	30.2		
C-100	16-54030_SPC-100	15	700	50.4	31.9	18.5
C-100	16-54030_SPC-100	15	700	64.1	45.5	18.6
C-101	16-54030_SPC-101	15	1800	10.5		
C-101	16-54030_SPC-101	15	400	30.5	33.5	-3.0
C-101	16-54030_SPC-101	15	500	40.5	43.1	-2.6
C-101	16-54030_SPC-101	15	1000	45.1	47.8	-2.7
C-102	16-54030_SPC-102	15	1850	19.7		
C-102	16-54030_SPC-102	15	4485	40.2		
C-102	16-54030_SPC-102	15	355	42.7	7.4	35.2
C-102	16-54030_SPC-102	15	4690	61.0		
C-103	16-54030_SPC-103	15	1805	10.2		
C-103	16-54030_SPC-103	15	440	27.6	23.0	4.5
C-103	16-54030_SPC-103	15	705	40.2	35.4	4.8
C-104	16-54030_SPC-104	15	2850	105.0		
C-104	16-54030_SPC-104	15	400	111.2	40.9	70.3
C-105	16-54030_SPC-105	15	1800	9.8		
C-105	16-54030_SPC-105	15	1805	31.2		
C-105	16-54030_SPC-105	15	800	44.1		
C-105	16-54030_SPC-105	15	310	50.7	3.7	46.9
C-106	16-54030_SPC-106	15	850	47.9		
C-106	16-54030_SPC-106	15	1500	67.3	27.9	39.3
C-106	16-54030_SPC-106	15	300	92.7	52.5	40.2
C-107	16-54030_SPC-107	15	400	54.5	30.0	24.4
C-107	16-54030_SPC-107	15	700	70.4	46.7	23.7
C-108	16-54030_SPC-108	15	400	21.7		

Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Start Date: 16-Mar-2016
End Date: 24-Mar-2016

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
C-108	16-54030_SPC-108	15	450	38.9	40.0	-1.1
C-109	16-54030_SPC-109	15	400	21.2	15.6	5.5
C-109	16-54030_SPC-109	15	350	41.2	35.9	5.3
C-109	16-54030_SPC-109	15	440	47.4	41.5	5.9
C-109	16-54030_SPC-109	15	4010	61.0	55.2	5.8
C-110	16-54030_SPC-110	15	305	9.8	6.8	3.1
C-110	16-54030_SPC-110	15	305	20.0	16.8	3.2
C-110	16-54030_SPC-110	15	420	30.0	26.9	3.2
C-110	16-54030_SPC-110	15	455	40.0	36.8	3.2
C-110	16-54030_SPC-110	15	410	50.0	46.7	3.3
C-110	16-54030_SPC-110	15	405	60.0	56.2	3.8
C-110	16-54030_SPC-110	15	1975	70.0	67.1	2.9
C-110	16-54030_SPC-110	15	315	92.2	85.8	6.4
C-111	16-54030_SPC-111	15	300	20.7	15.7	4.9
C-111	16-54030_SPC-111	15	300	40.5	35.8	4.7
C-111	16-54030_SPC-111	15	2050	80.5		
C-111	16-54030_SPC-111	15	475	98.4	92.0	6.4
C-112	16-54030_SPC-112	15	305	10.2	5.4	4.8
C-112	16-54030_SPC-112	15	300	20.2	15.5	4.7
C-112	16-54030_SPC-112	15	305	30.0	25.4	4.6
C-112	16-54030_SPC-112	15	355	40.2	35.9	4.3
C-112	16-54030_SPC-112	15	310	50.2	45.7	4.5
C-112	16-54030_SPC-112	15	310	60.2	55.6	4.6
C-112	16-54030_SPC-112	15	310	70.2	65.6	4.6
C-112	16-54030_SPC-112	15	310	80.2	76.1	4.1
C-112	16-54030_SPC-112	15	1820	90.2	85.2	5.0
C-112	16-54030_SPC-112	15	345	100.4	94.0	6.4
C-113	16-54030_SPC-113	15	200	10.0	6.9	3.1

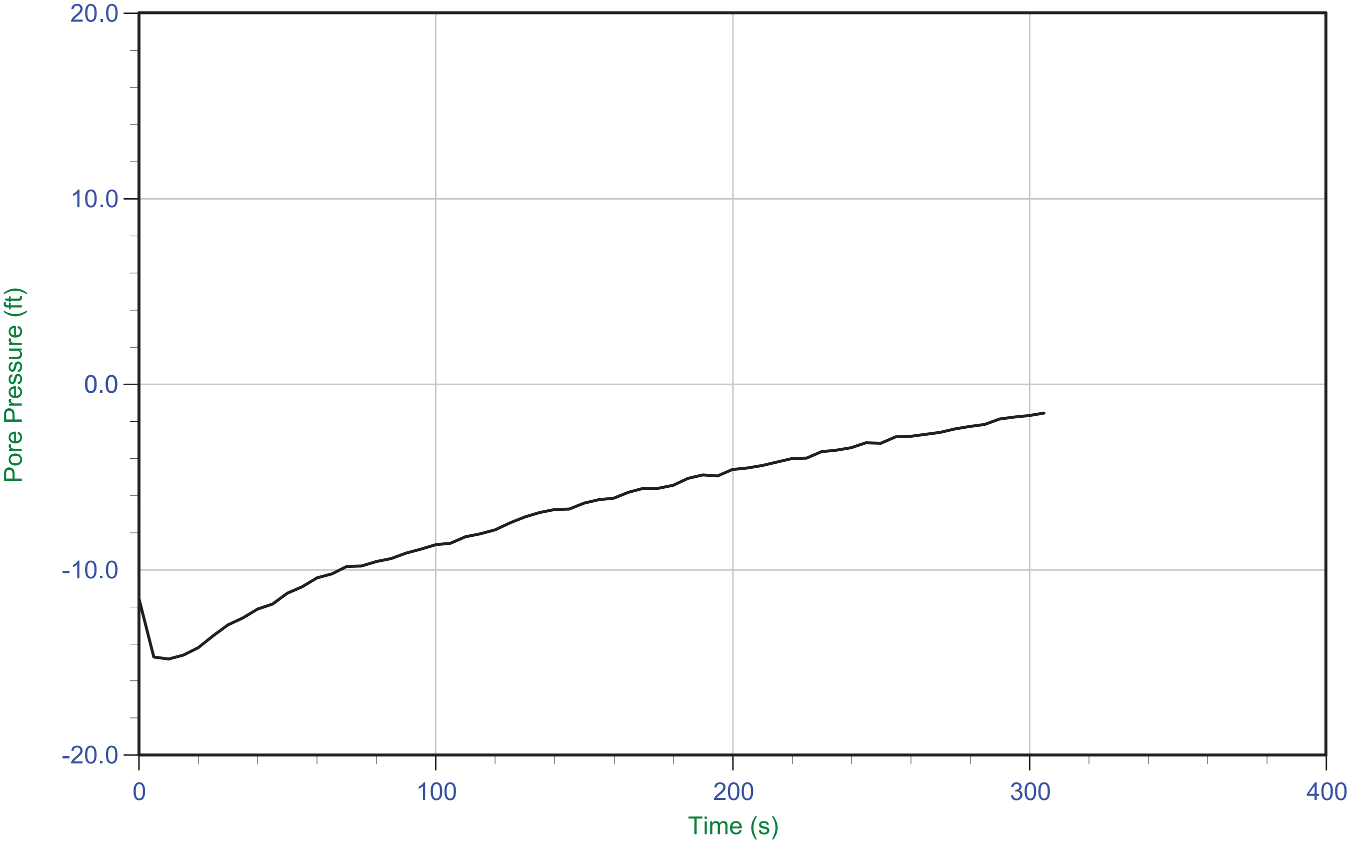
Job No: 16-54030
Client: AECOM
Project: Plant Scherer
Start Date: 16-Mar-2016
End Date: 24-Mar-2016

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
C-113	16-54030_SPC-113	15	305	19.7	16.6	3.1
C-113	16-54030_SPC-113	15	355	29.5	26.5	3.0
C-113	16-54030_SPC-113	15	320	40.0	36.5	3.5
C-113	16-54030_SPC-113	15	300	50.0	46.2	3.8
C-113	16-54030_SPC-113	15	305	60.0	55.9	4.1
C-113	16-54030_SPC-113	15	1860	68.9	64.4	4.5
Totals			15.9 hrs			

CONETEC

AECOM	Job No: 16-54030	Sounding: C-100
	Date: 03/21/2016 13:47	Cone: 304:T1500F15U500
	Site: Plant Scherer	Cone Area: 15 sq cm

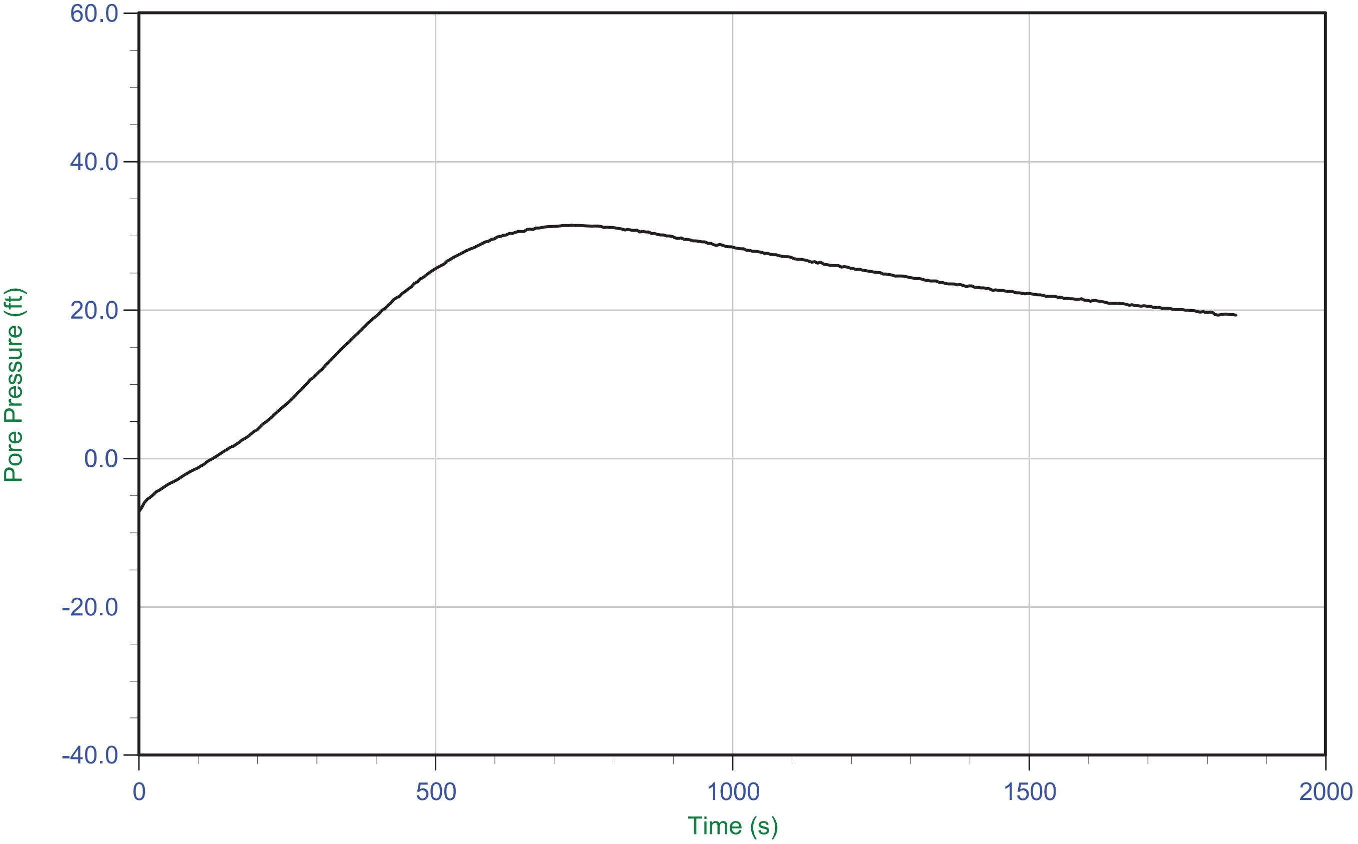


Trace Summary:

Filename: 16-54030_SPC-100.PPD
Depth: 3.200 m / 10.499 ft
Duration: 305.0 s

U Min: -14.8 ft
U Max: -1.6 ft

AECOM	Job No: 16-54030	Sounding: C-100
	Date: 03/21/2016 13:47	Cone: 304:T1500F15U500
	Site: Plant Scherer	Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-100.PPD
Depth: 5.050 m / 16.568 ft
Duration: 1850.0 s

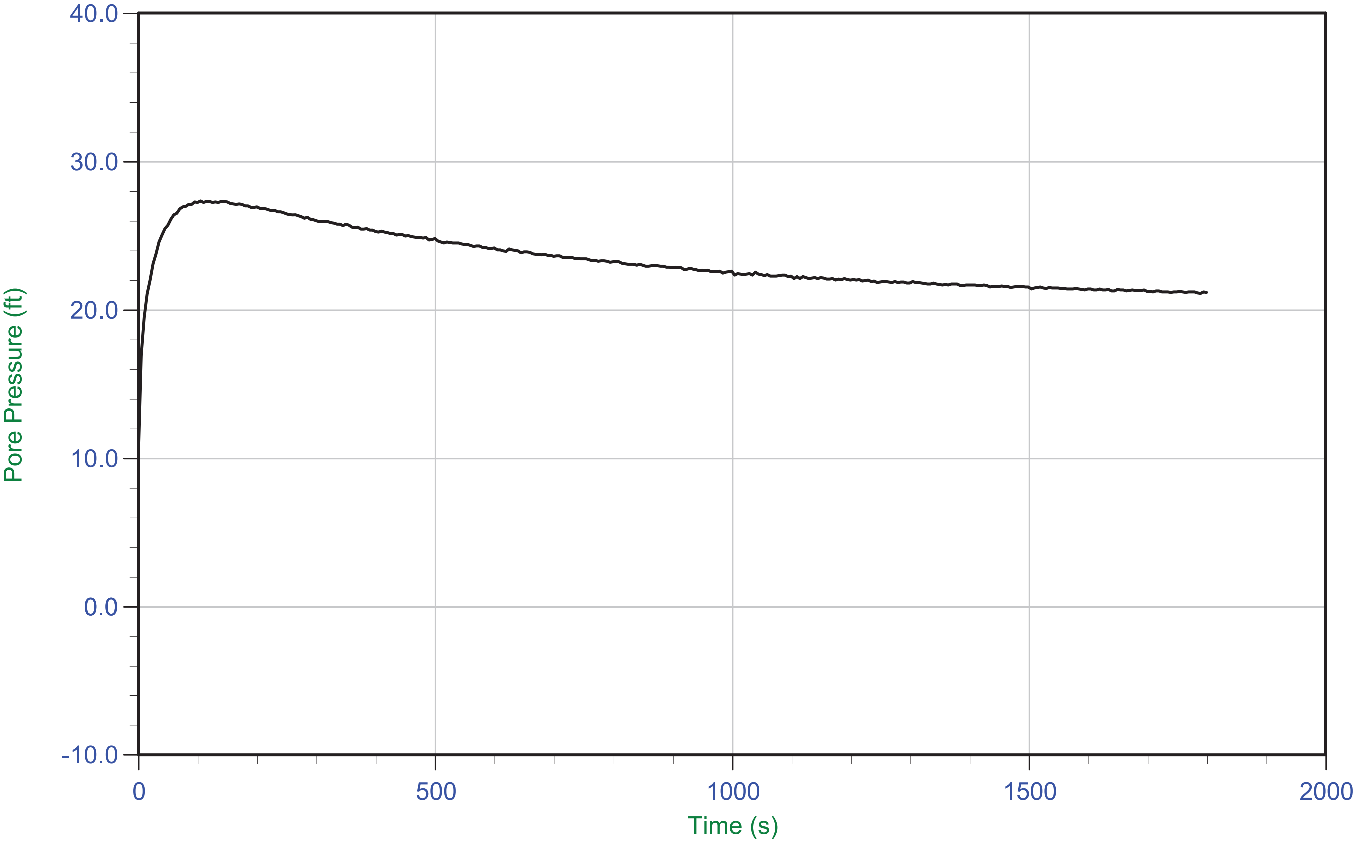
U Min: -7.2 ft
U Max: 31.4 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/21/2016 13:47
Site: Plant Scherer

Sounding: C-100
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-100.PPD
Depth: 9.200 m / 30.183 ft
Duration: 1800.0 s

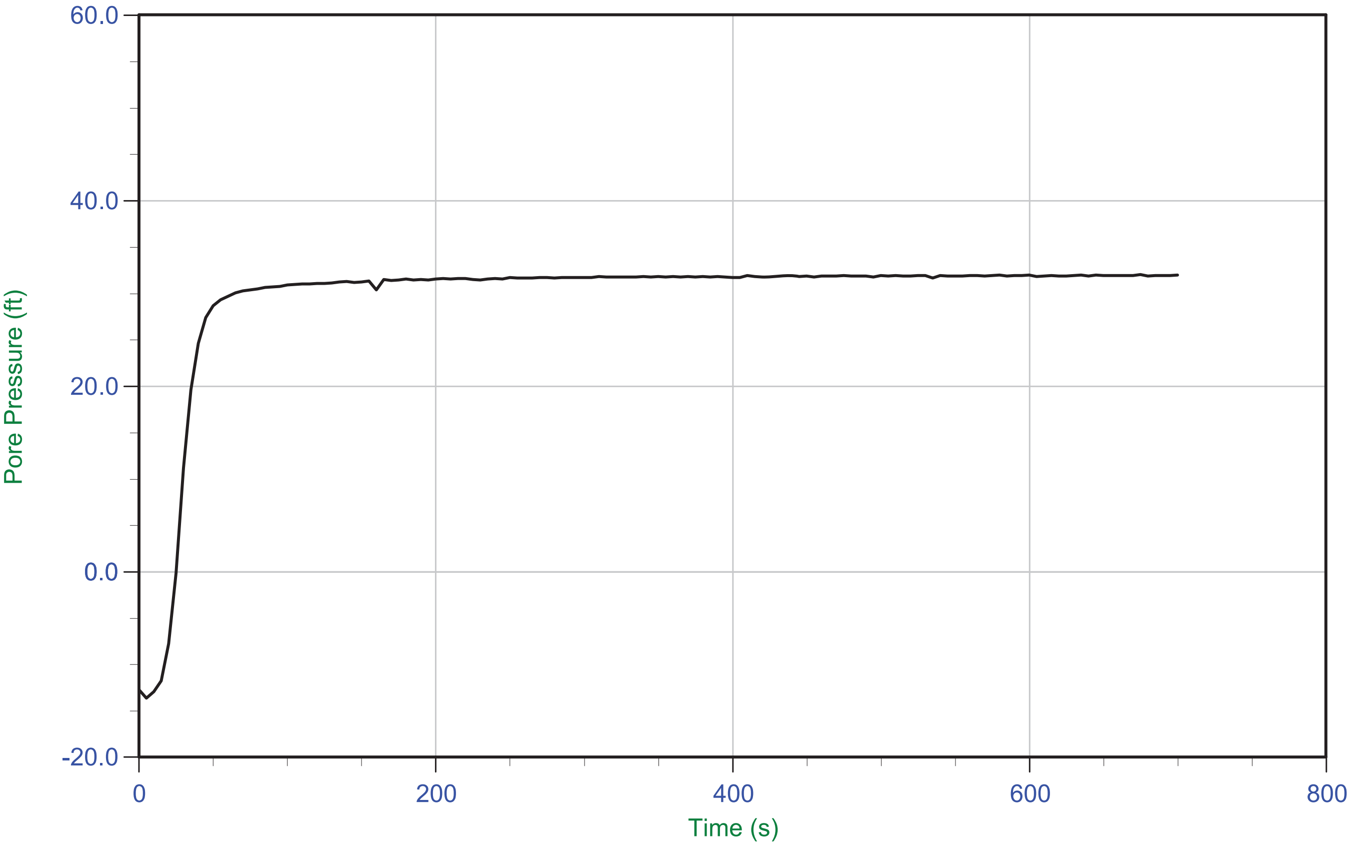
U Min: 11.0 ft
U Max: 27.3 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/21/2016 13:47
Site: Plant Scherer

Sounding: C-100
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-100.PPD
Depth: 15.350 m / 50.360 ft
Duration: 700.0 s

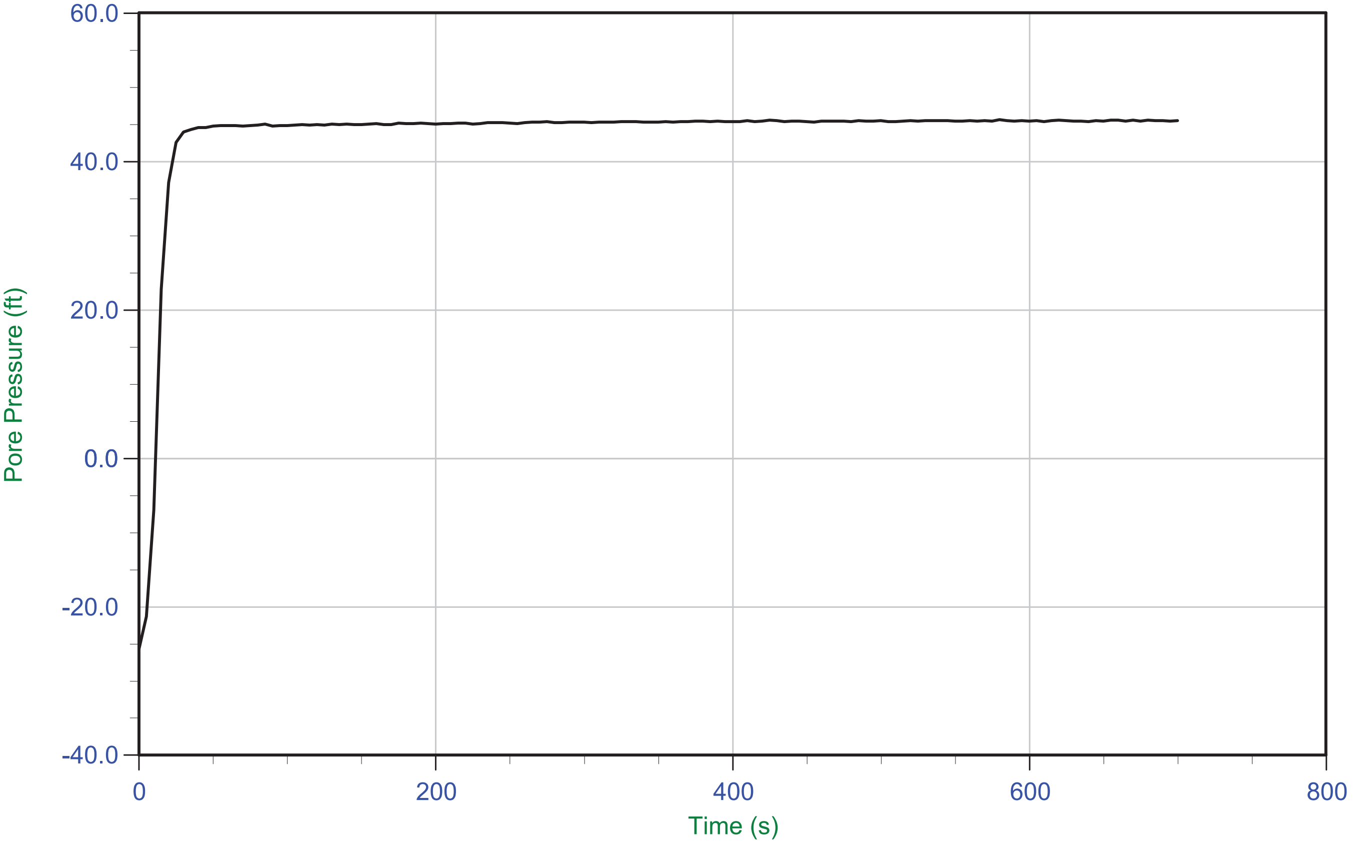
U Min: -13.6 ft
U Max: 32.0 ft

WT: 5.629 m / 18.469 ft
Ueq: 31.9 ft

CONETEC

AECOM

Job No: 16-54030	Sounding: C-100
Date: 03/21/2016 13:47	Cone: 304:T1500F15U500
Site: Plant Scherer	Cone Area: 15 sq cm



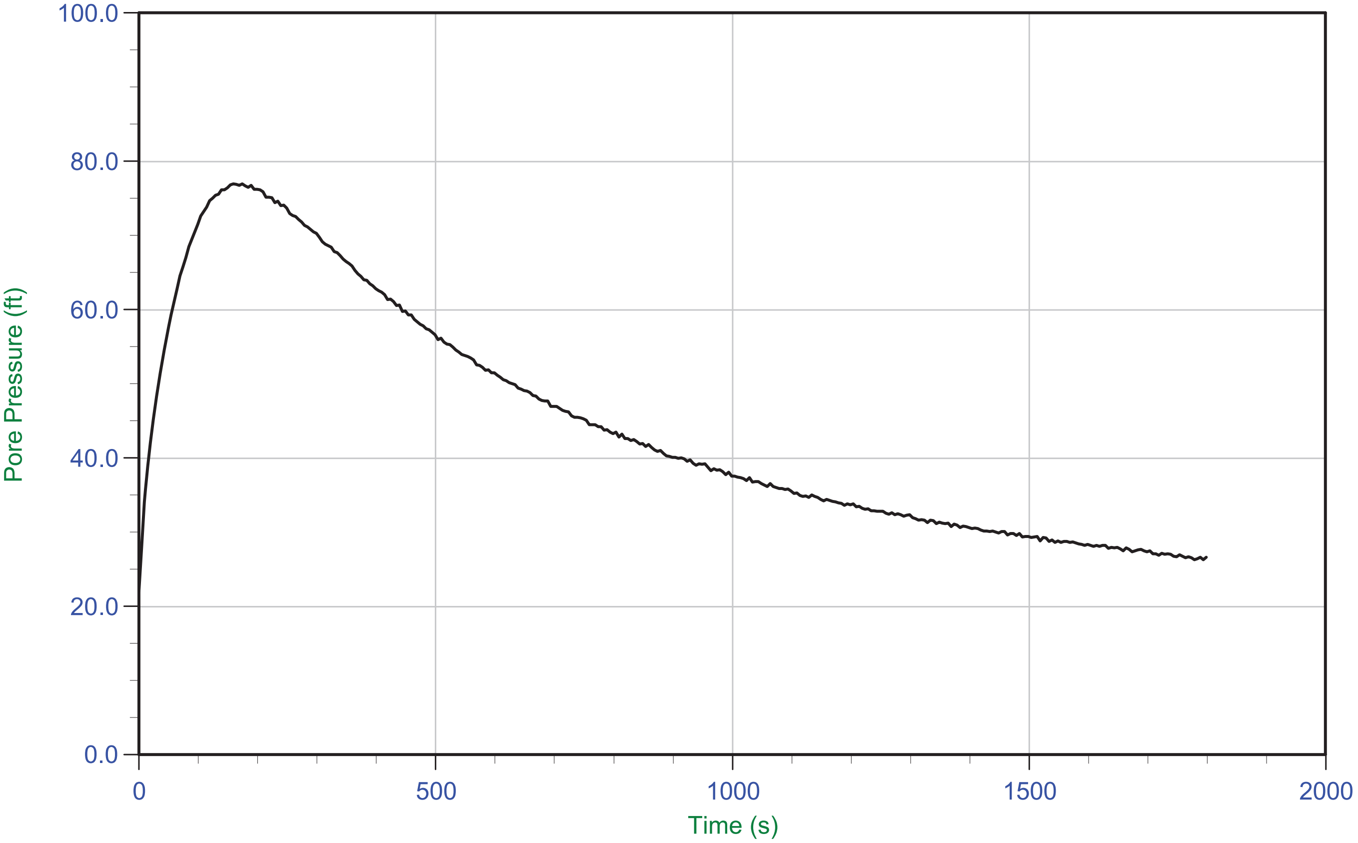
Trace Summary:
Filename: 16-54030_SPC-100.PPD
Depth: 19.550 m / 64.140 ft
Duration: 700.0 s
U Min: -25.7 ft
U Max: 45.6 ft
WT: 5.680 m / 18.637 ft
Ueq: 45.5 ft

CONETEC

AECOM

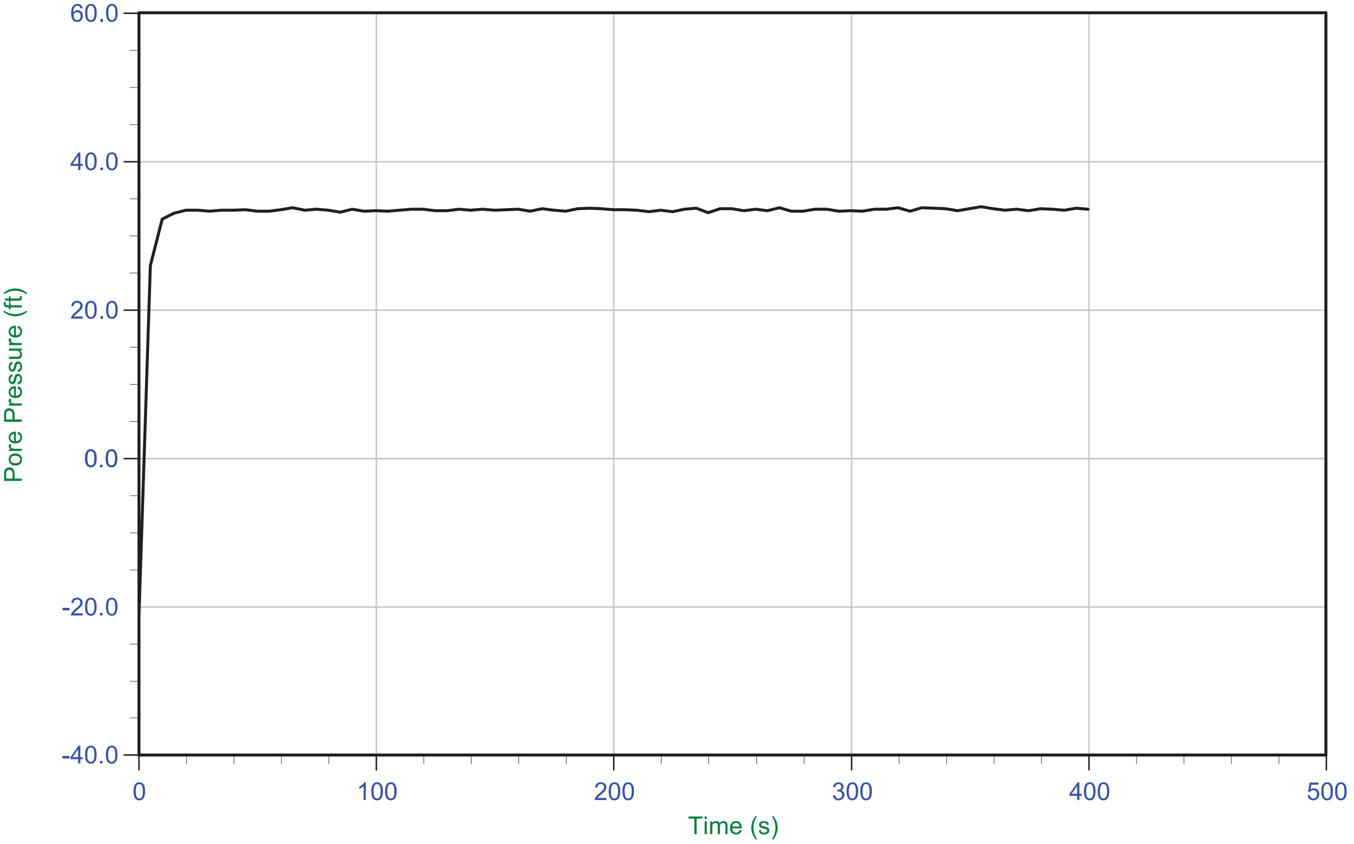
Job No: 16-54030
Date: 03/18/2016 08:48
Site: Plant Scherer

Sounding: C-101
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:
Filename: 16-54030_SPC-101.PPD
Depth: 3.200 m / 10.499 ft
Duration: 1800.0 s

U Min: 22.1 ft
U Max: 77.0 ft



Trace Summary:

Filename: 16-54030_SPC-101.PPD
Depth: 9.300 m / 30.511 ft
Duration: 400.0 s

U Min: -21.2 ft
U Max: 33.9 ft

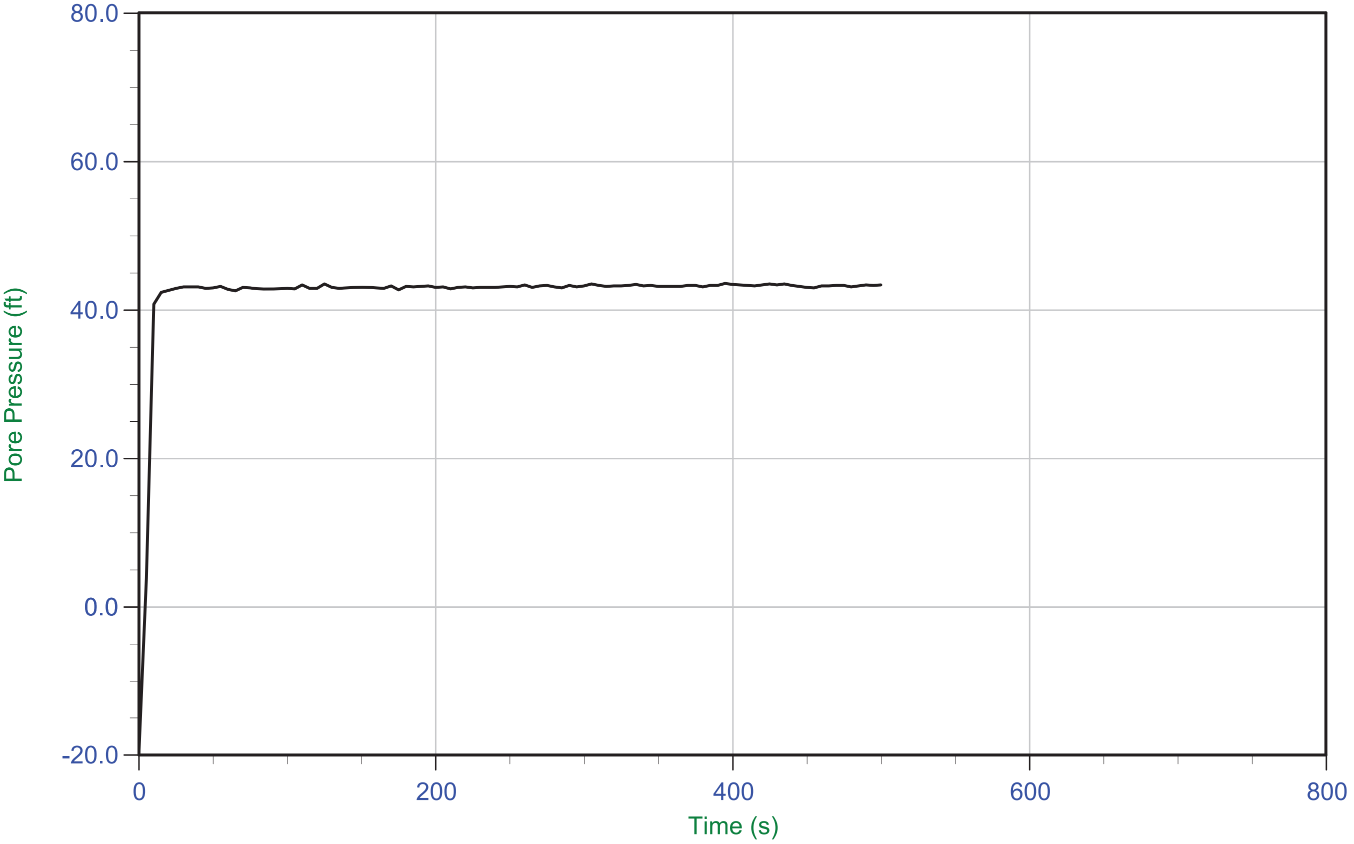
WT: -0.900 m / -2.953 ft
Ueq: 33.5 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/18/2016 08:48
Site: Plant Scherer

Sounding: C-101
Cone: 304:T1500F15U500
Cone Area: 15 sq cm

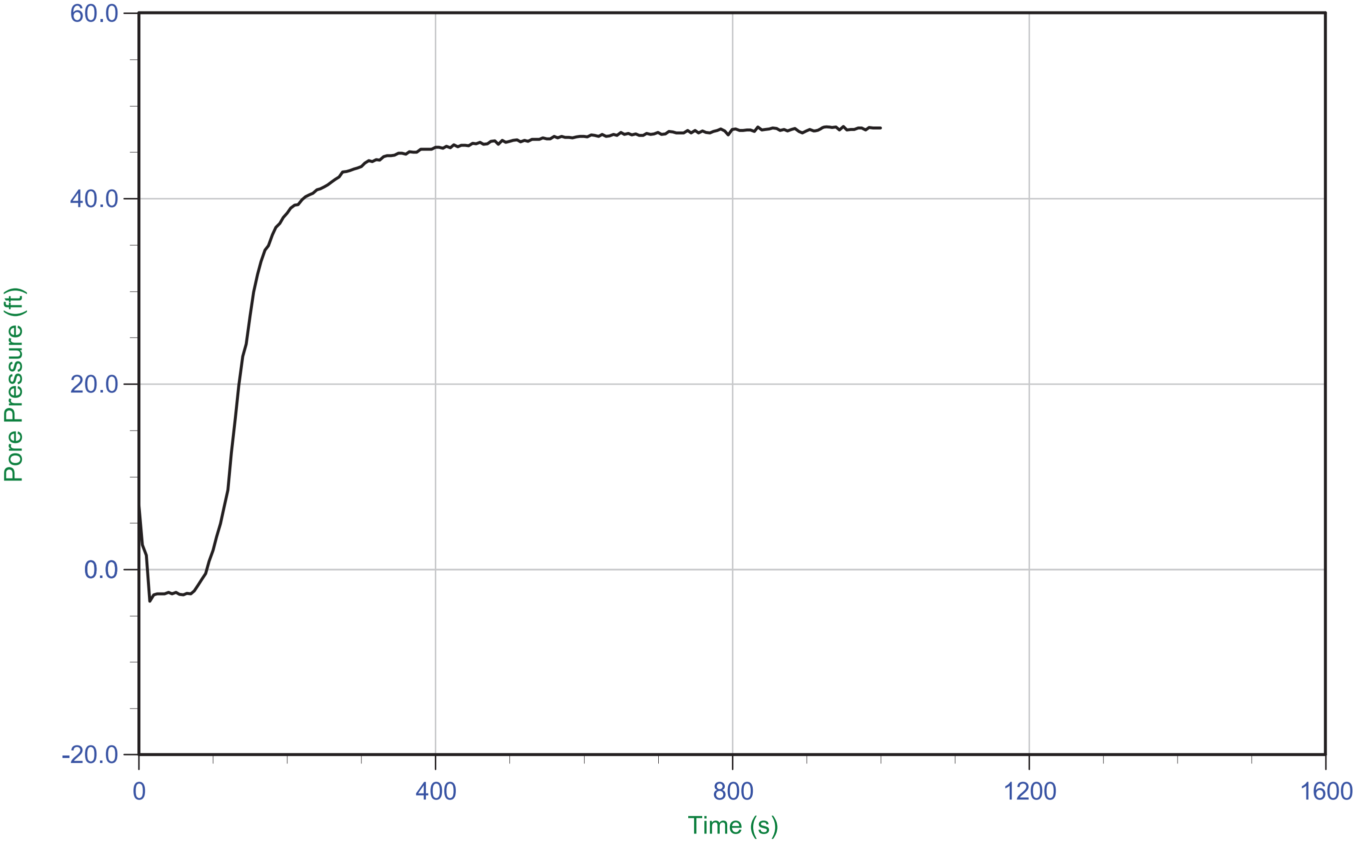


Trace Summary:
Filename: 16-54030_SPC-101.PPD
Depth: 12.350 m / 40.518 ft
Duration: 500.0 s
U Min: -19.5 ft
U Max: 43.6 ft
WT: -0.801 m / -2.627 ft
Ueq: 43.1 ft

AECOM

Job No: 16-54030
Date: 03/18/2016 08:48
Site: Plant Scherer

Sounding: C-101
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-101.PPD
Depth: 13.750 m / 45.111 ft
Duration: 1000.0 s

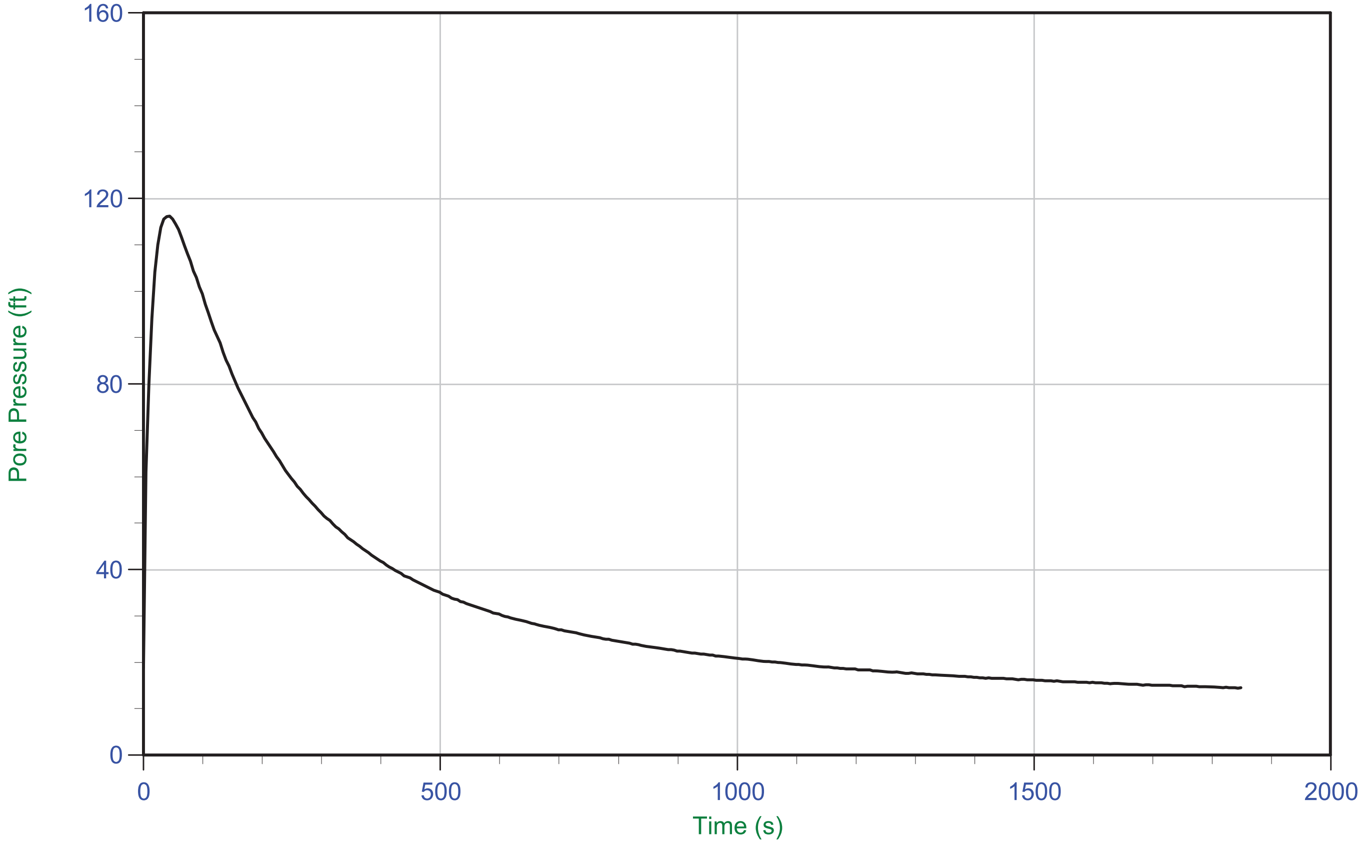
U Min: -3.4 ft
U Max: 47.8 ft

WT: -0.823 m / -2.702 ft
Ueq: 47.8 ft

AECOM

Job No: 16-54030
Date: 03/22/2016 08:51
Site: Plant Scherer

Sounding: C-102
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

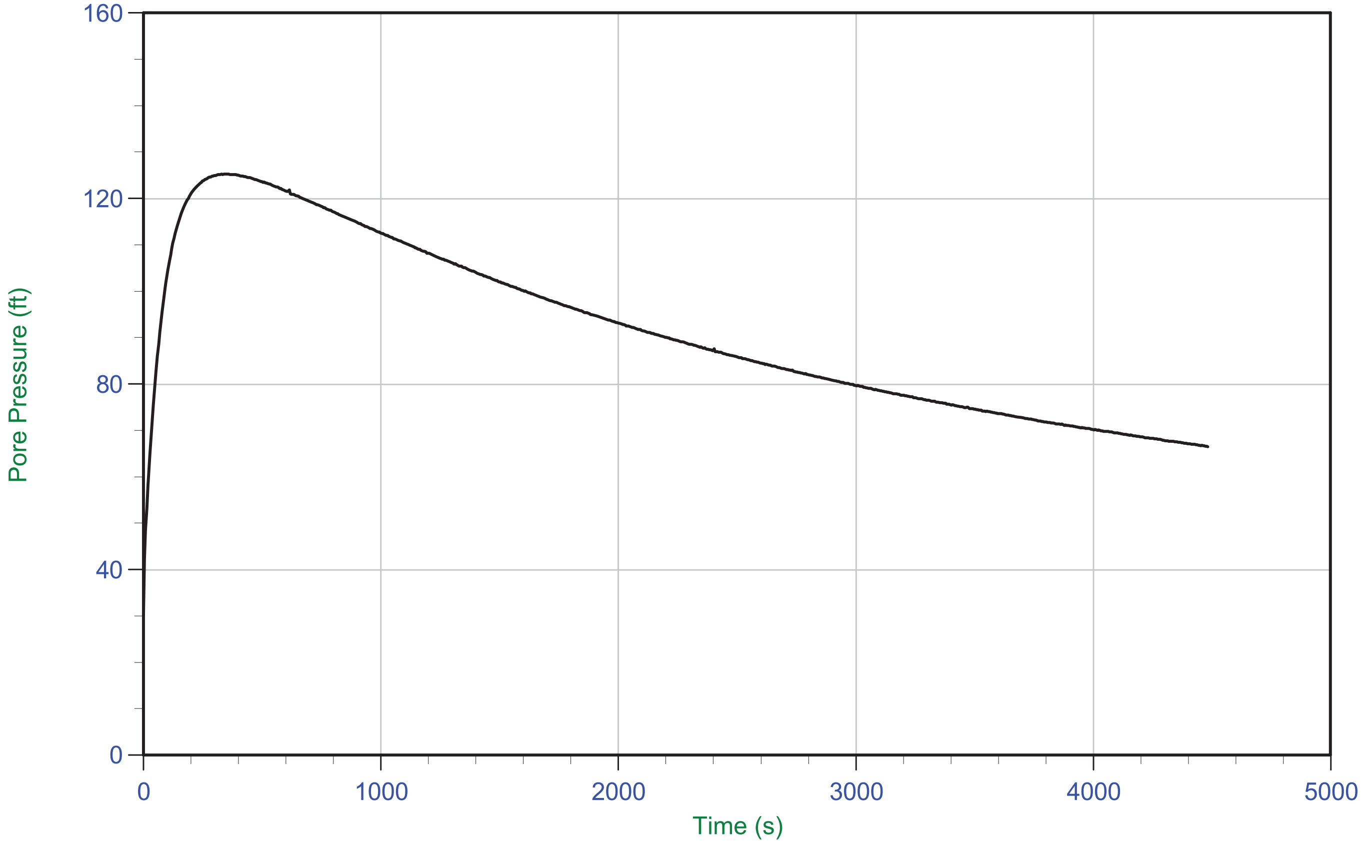
Filename: 16-54030_SPC-102.PPD
Depth: 6.000 m / 19.685 ft
Duration: 1850.0 s

U Min: 14.5 ft
U Max: 116.2 ft

AECOM

Job No: 16-54030
Date: 03/22/2016 08:51
Site: Plant Scherer

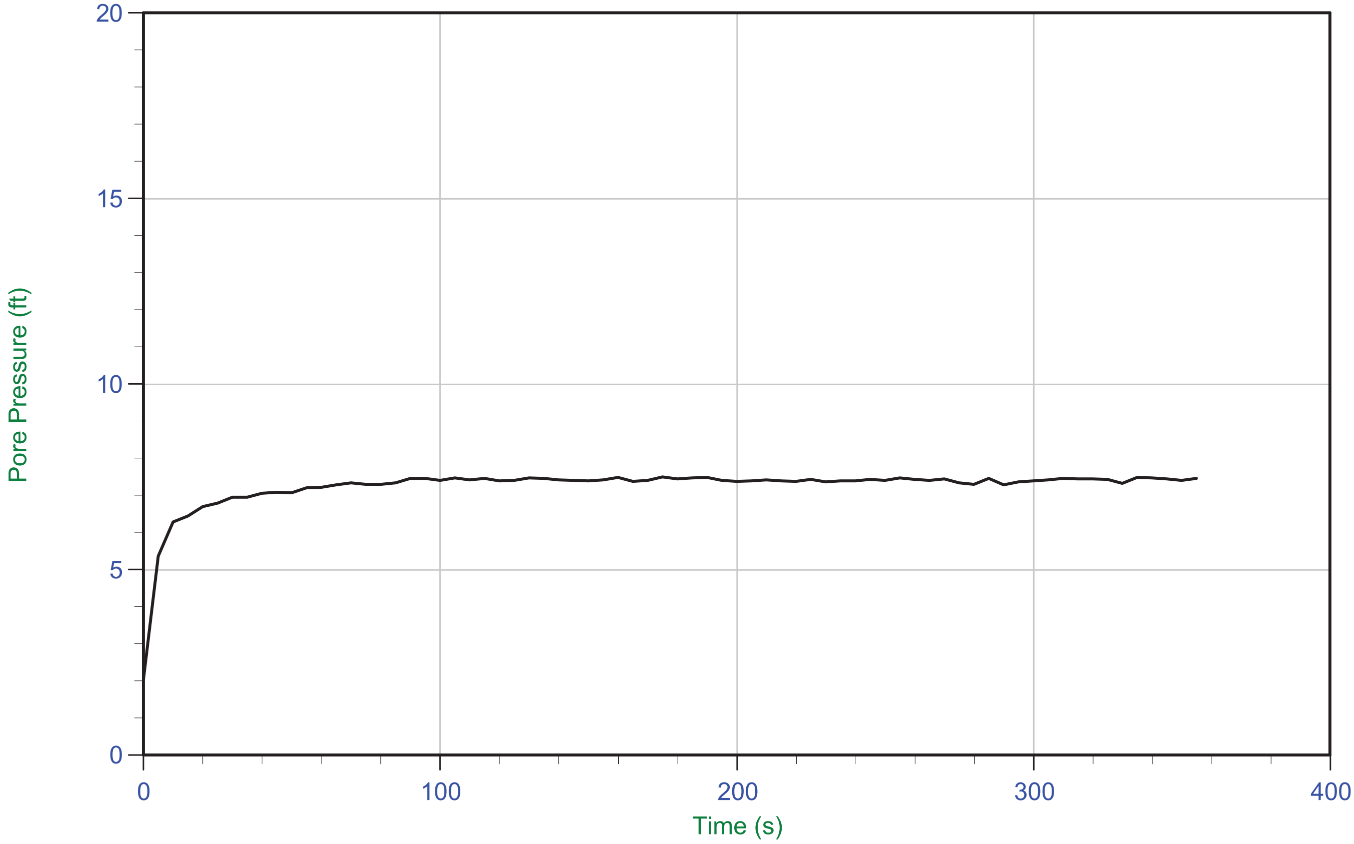
Sounding: C-102
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-102.PPD
Depth: 12.250 m / 40.190 ft
Duration: 4485.0 s

U Min: 30.2 ft
U Max: 125.3 ft



Trace Summary:

Filename: 16-54030_SPC-102.PPD
Depth: 13.000 m / 42.650 ft
Duration: 355.0 s

U Min: 2.0 ft
U Max: 7.5 ft

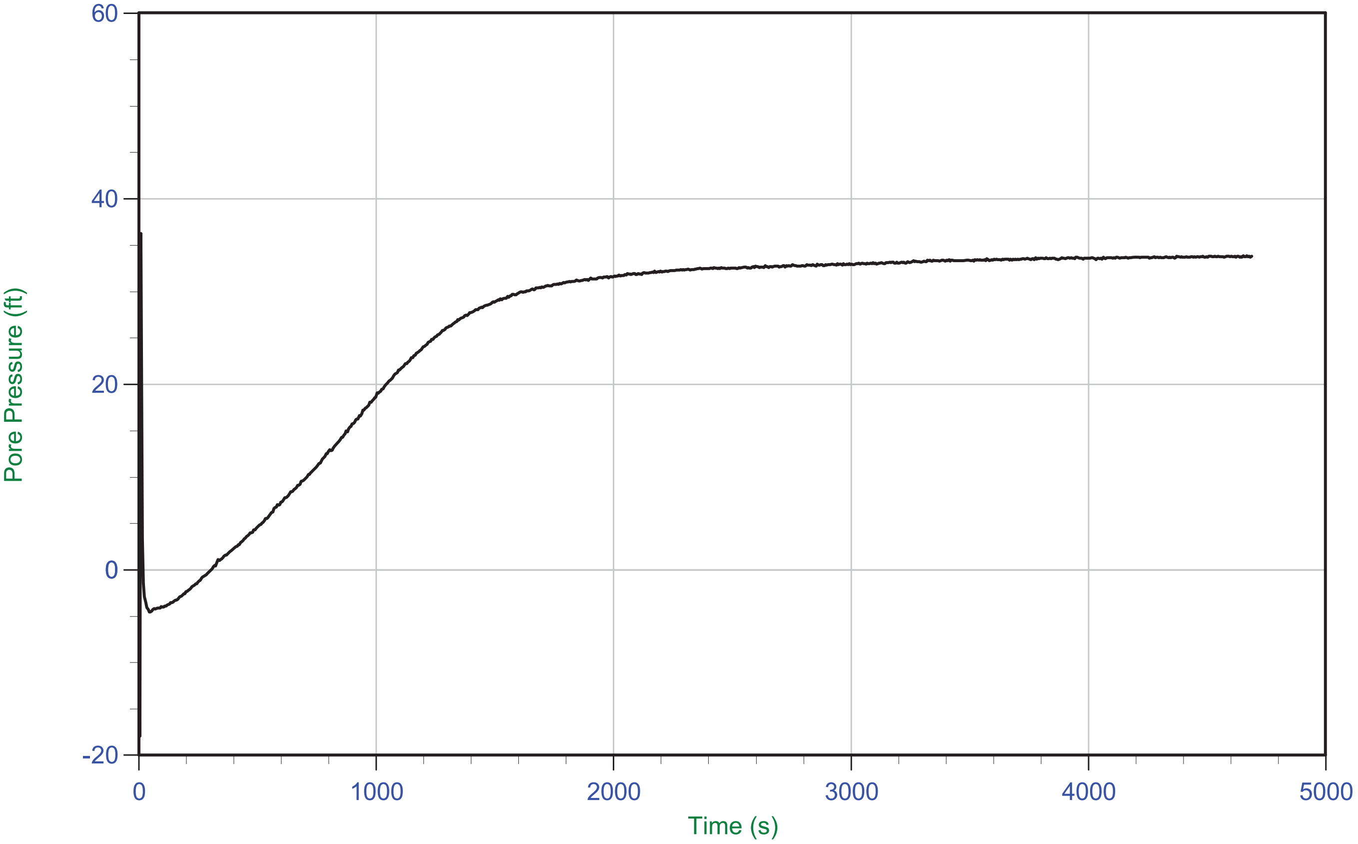
WT: 10.738 m / 35.230 ft
Ueq: 7.4 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/22/2016 08:51
Site: Plant Scherer

Sounding: C-102
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

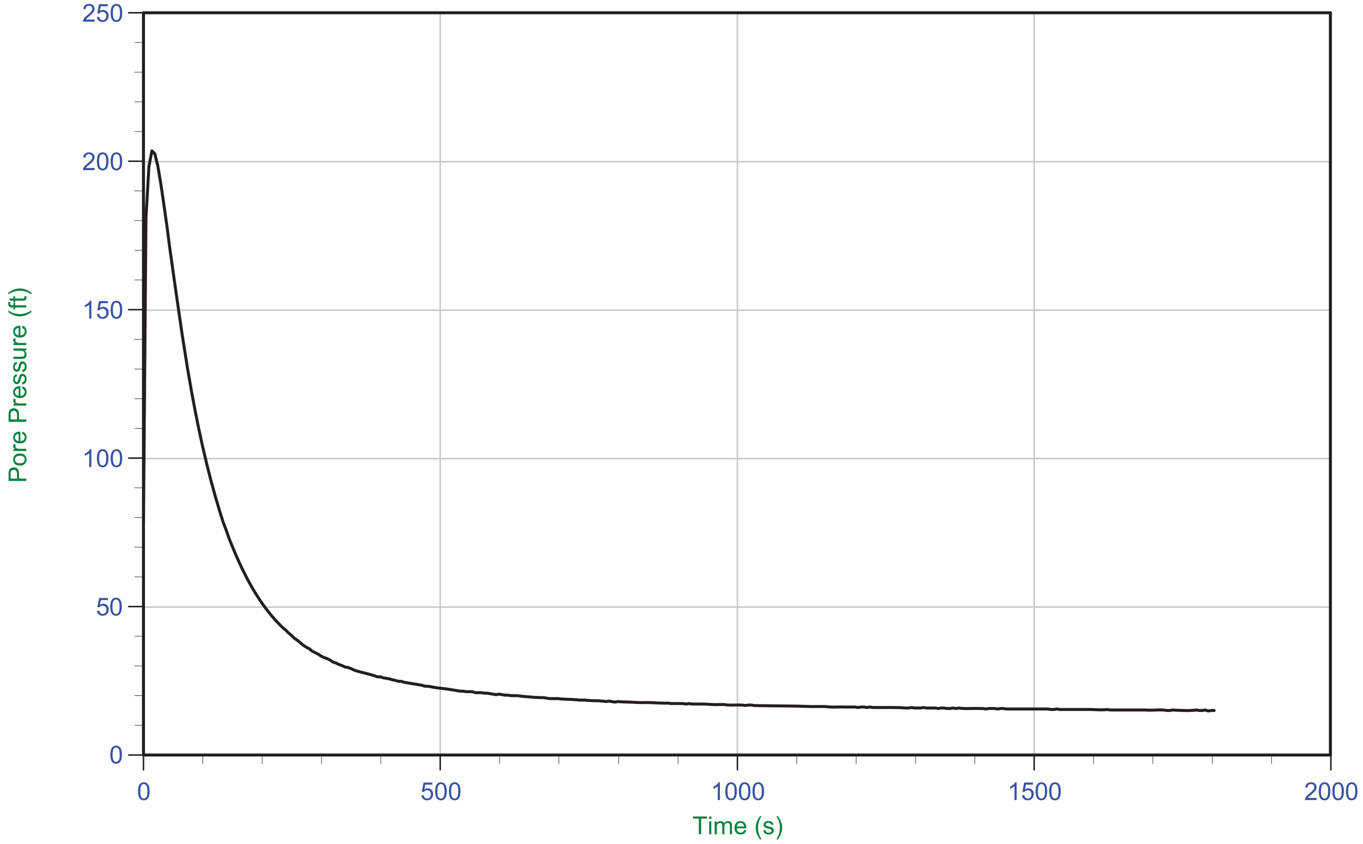
Filename: 16-54030_SPC-102.PPD
Depth: 18.600 m / 61.023 ft
Duration: 4690.0 s

U Min: -17.9 ft
U Max: 36.2 ft

AECOM

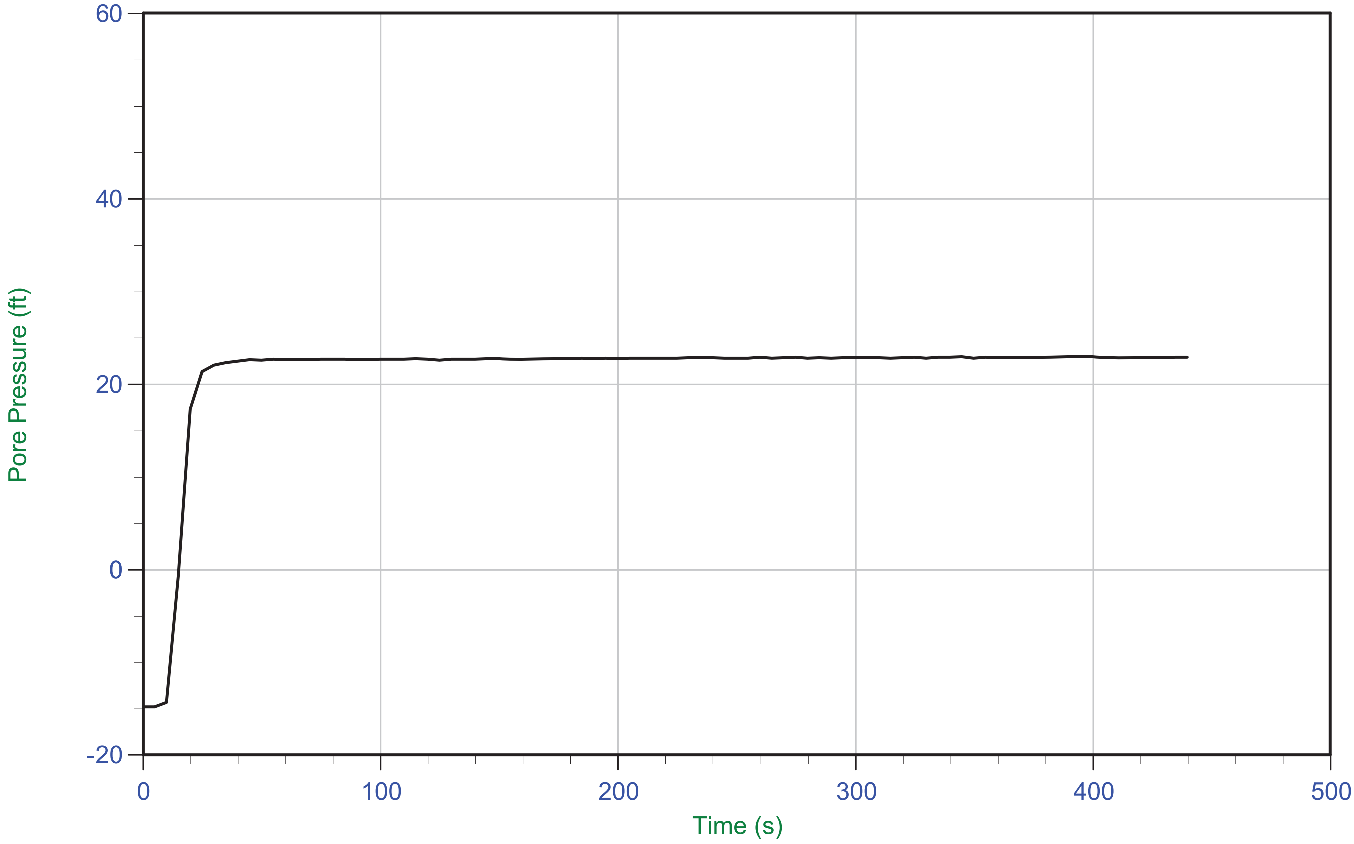
Job No: 16-54030
Date: 03/22/2016 14:13
Site: Plant Scherer

Sounding: C-103
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:
Filename: 16-54030_SPC-103.PPD
Depth: 3.100 m / 10.170 ft
Duration: 1805.0 s
U Min: 15.0 ft
U Max: 203.7 ft

AECOM	Job No: 16-54030	Sounding: C-103
	Date: 03/22/2016 14:13	Cone: 304:T1500F15U500
	Site: Plant Scherer	Cone Area: 15 sq cm



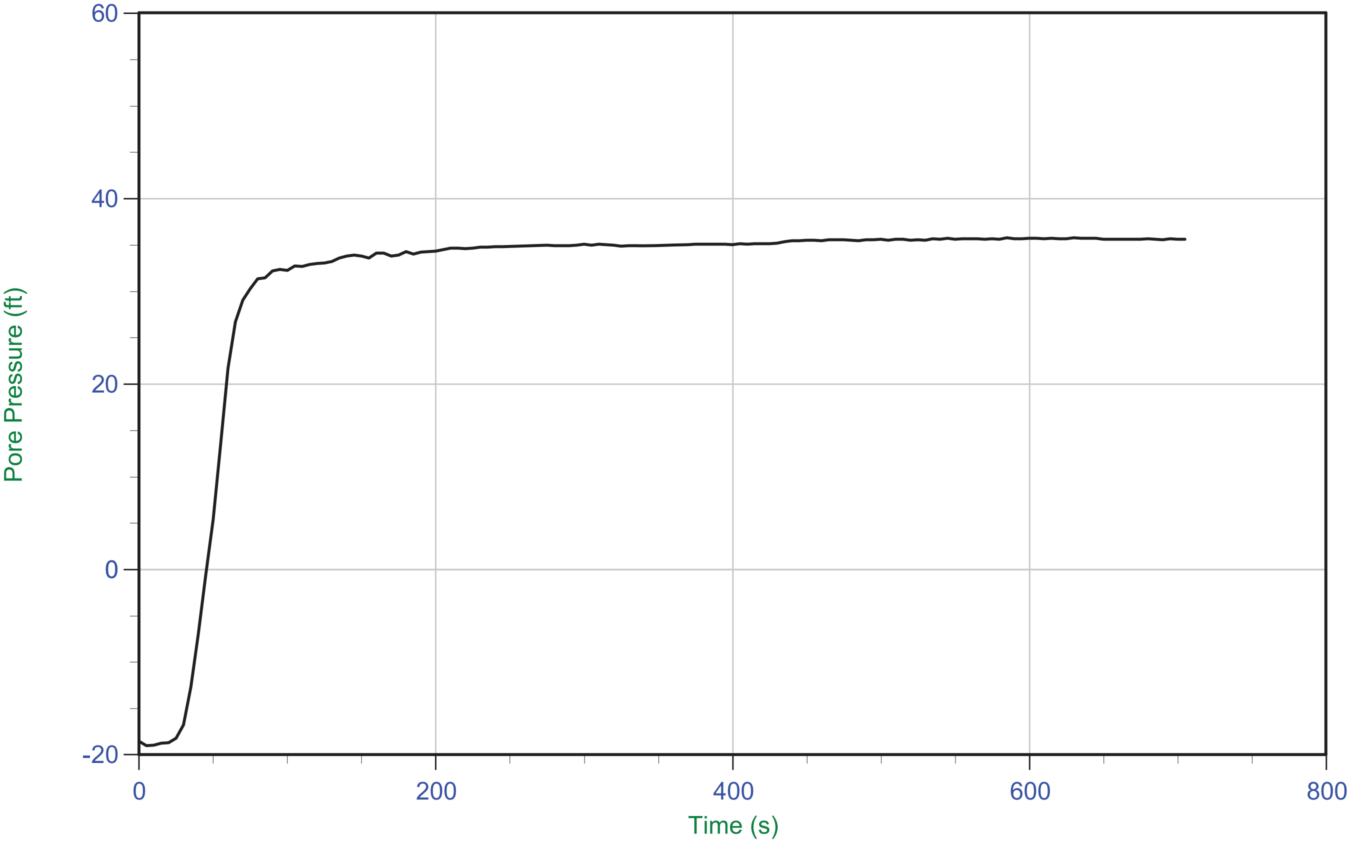
Trace Summary:

Filename: 16-54030_SPC-103.PPD
Depth: 8.400 m / 27.559 ft
Duration: 440.0 s

U Min: -14.8 ft
U Max: 23.0 ft

WT: 1.375 m / 4.512 ft
Ueq: 23.0 ft

CONETEC	AECOM	Job No: 16-54030	Sounding: C-103
		Date: 03/22/2016 14:13	Cone: 304:T1500F15U500
		Site: Plant Scherer	Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-103.PPD
Depth: 12.250 m / 40.190 ft
Duration: 705.0 s

U Min: -19.0 ft
U Max: 35.8 ft

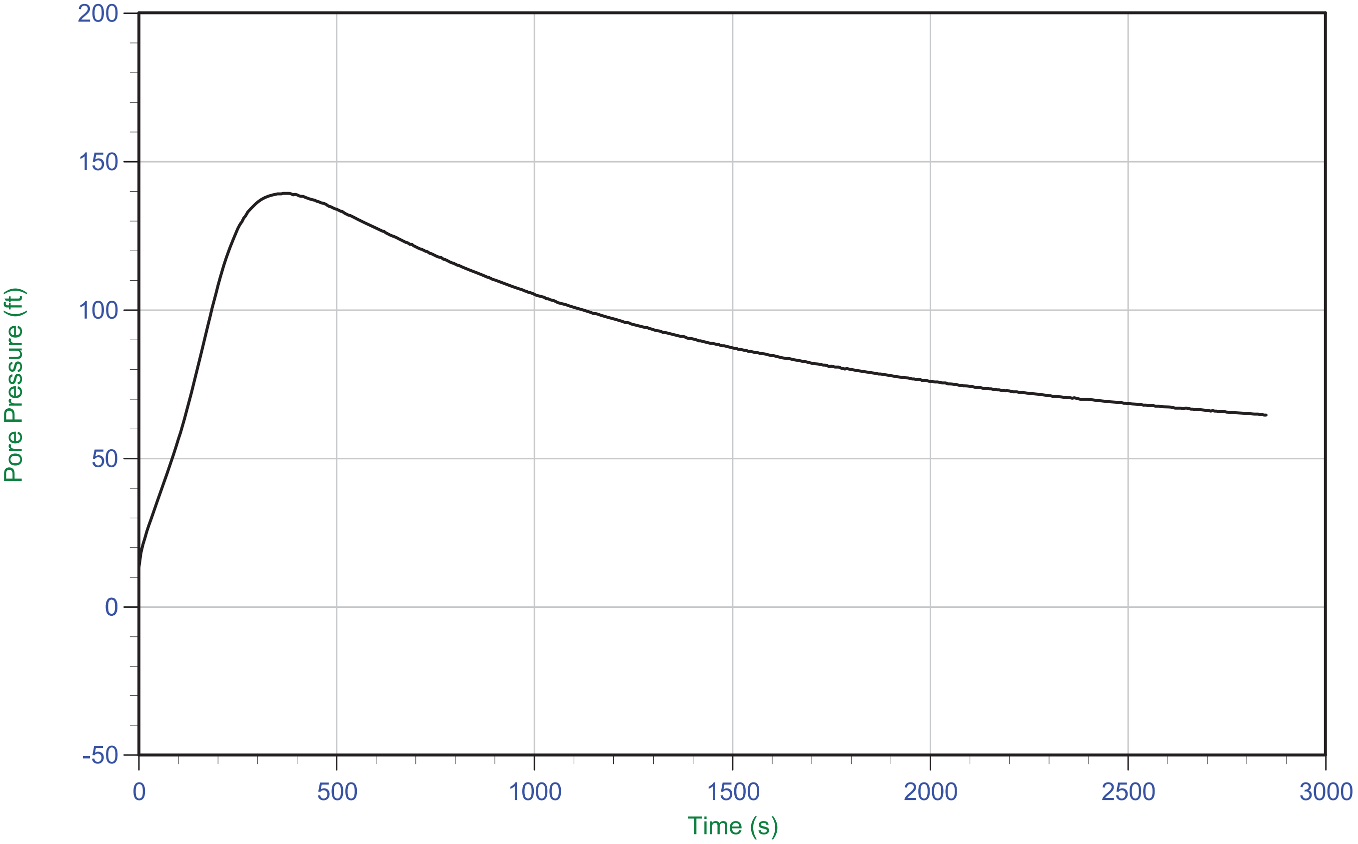
WT: 1.451 m / 4.760 ft
Ueq: 35.4 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/24/2016 14:16
Site: Plant Scherer

Sounding: C-104
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



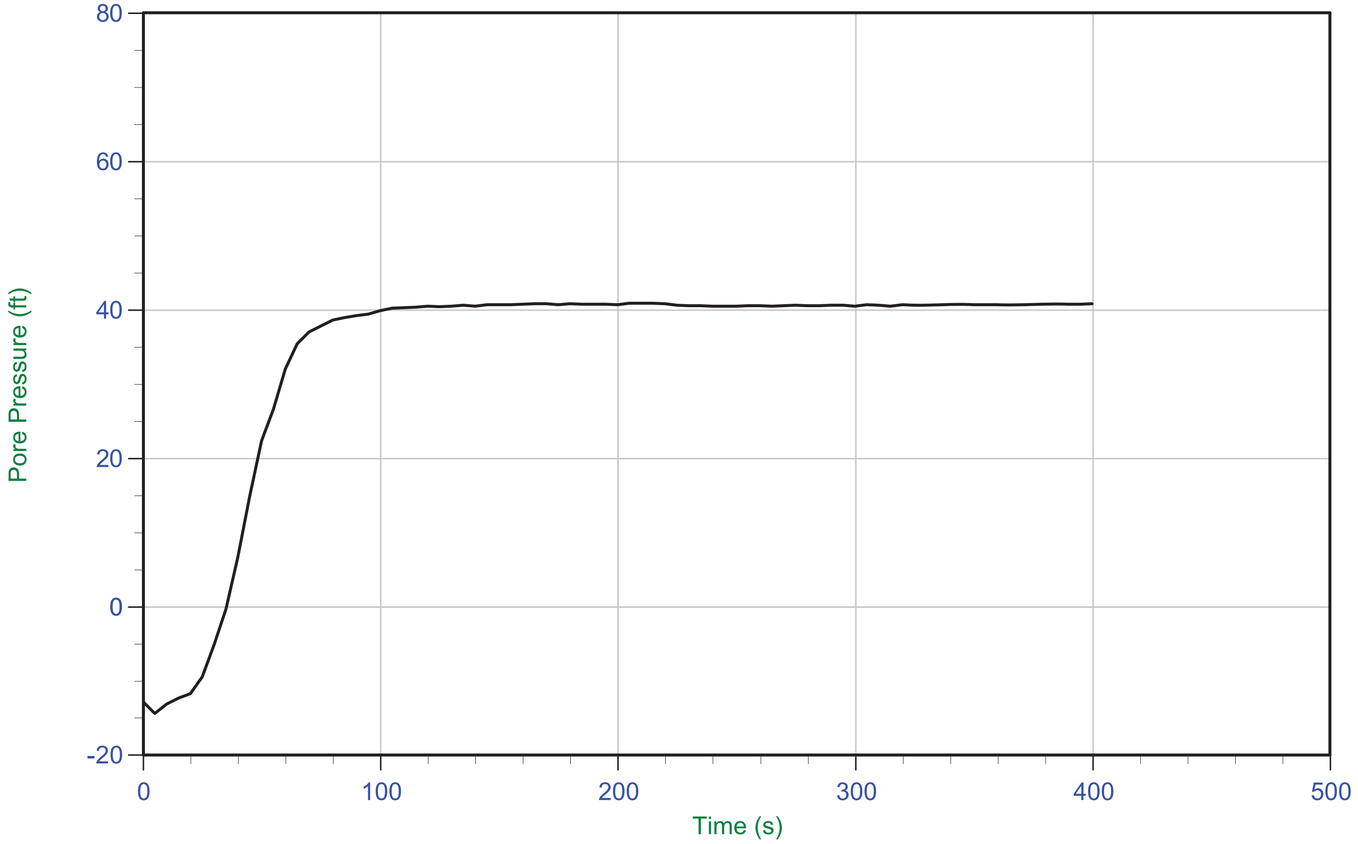
Trace Summary:

Filename: 16-54030_SPC-104.PPD
Depth: 32.000 m / 104.986 ft
Duration: 2850.0 s

U Min: 13.3 ft
U Max: 139.3 ft

Job No: 16-54030
Date: 03/24/2016 14:16
Site: Plant Scherer

Sounding: C-104
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-104.PPD
Depth: 33.900 m / 111.219 ft
Duration: 400.0 s

U Min: -14.3 ft
U Max: 40.9 ft

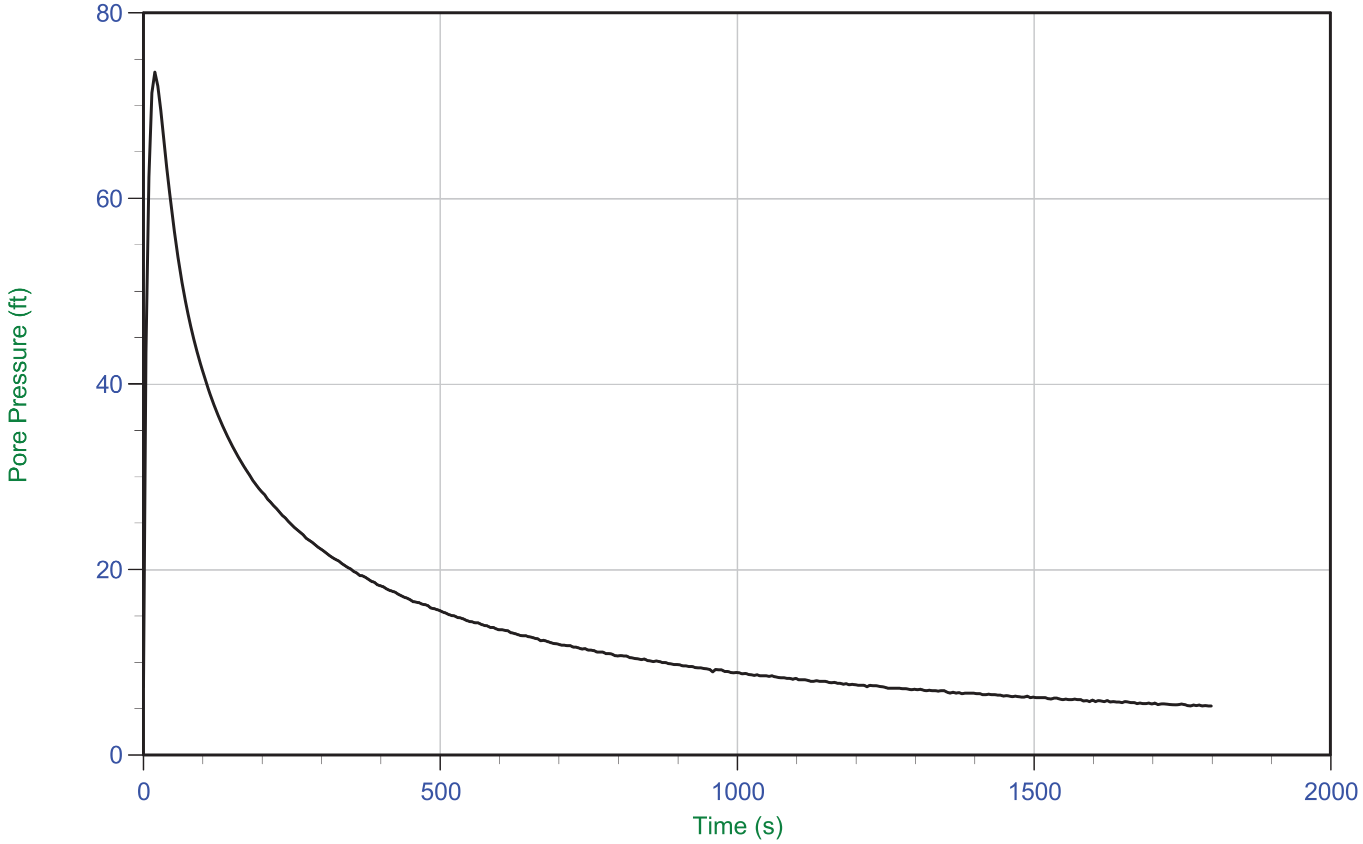
WT: 21.423 m / 70.286 ft
Ueq: 40.9 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/23/2016 12:45
Site: Plant Scherer

Sounding: C-105
Cone: 304:T1500F15U500
Cone Area: 15 sq cm

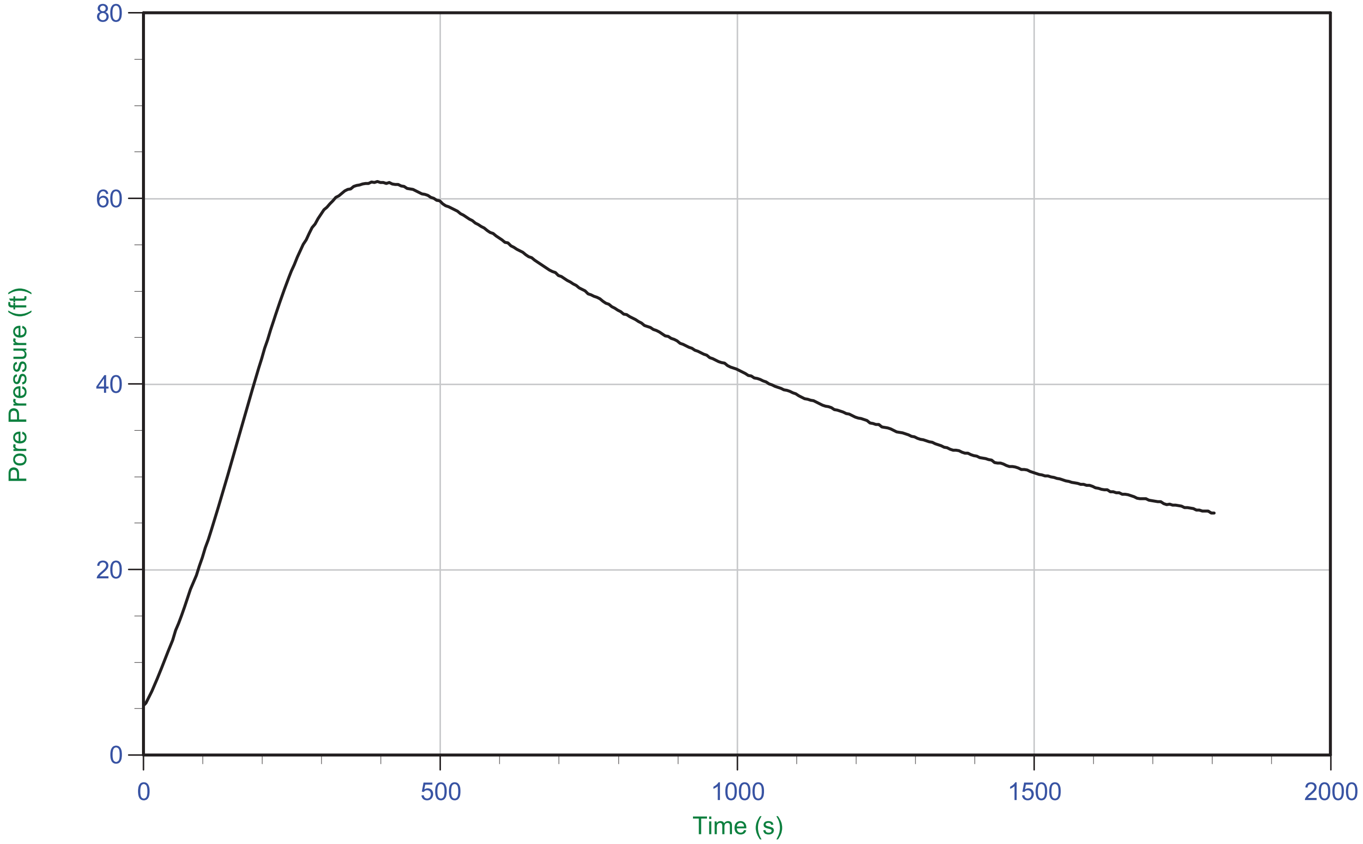


Trace Summary:

Filename: 16-54030_SPC-105.PPD
Depth: 3.000 m / 9.842 ft
Duration: 1800.0 s

U Min: 5.3 ft
U Max: 73.6 ft

AECOM	Job No: 16-54030	Sounding: C-105
	Date: 03/23/2016 12:45	Cone: 304:T1500F15U500
	Site: Plant Scherer	Cone Area: 15 sq cm



Trace Summary:

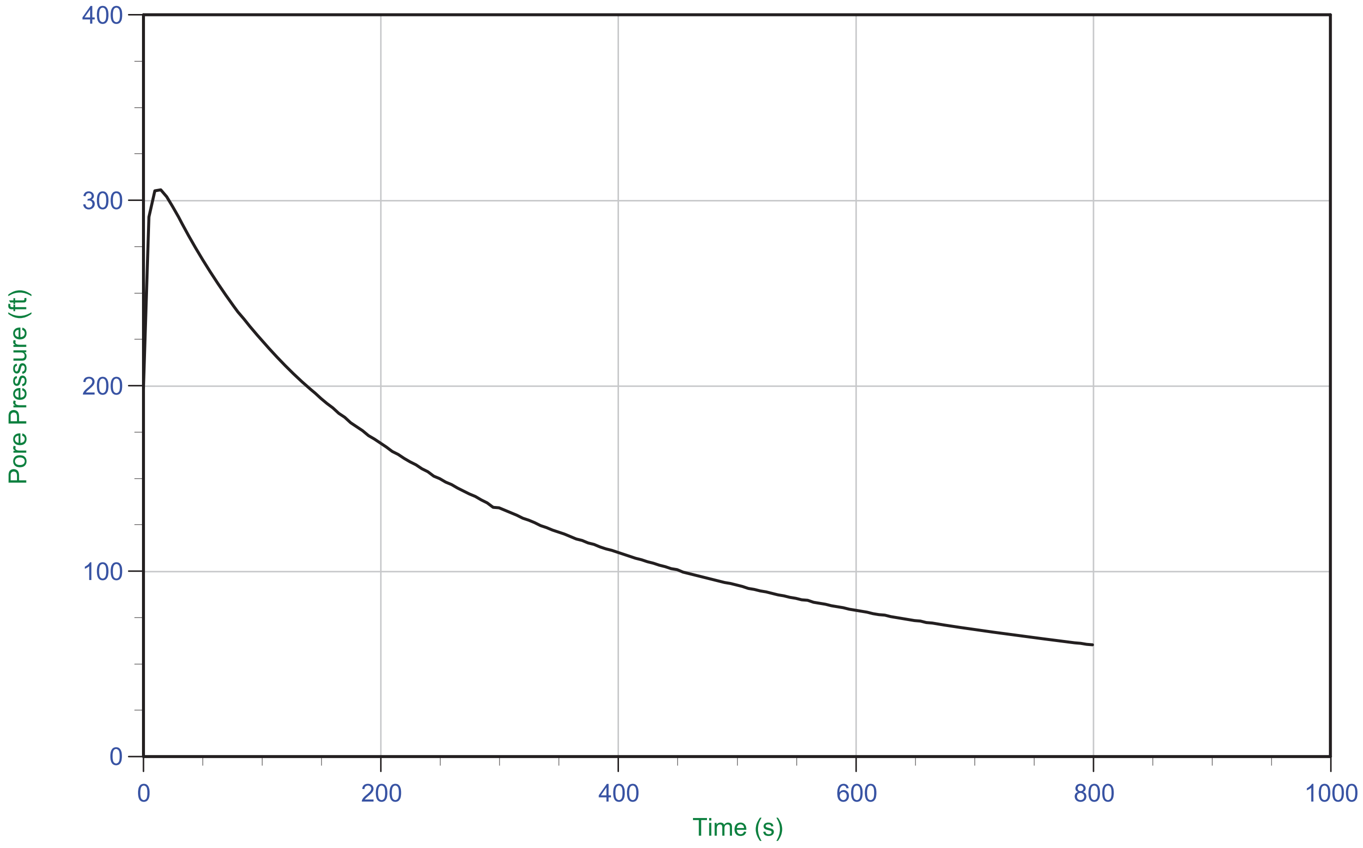
Filename: 16-54030_SPC-105.PPD
Depth: 9.500 m / 31.168 ft
Duration: 1805.0 s

U Min: 5.3 ft
U Max: 61.9 ft

AECOM

Job No: 16-54030
Date: 03/23/2016 12:45
Site: Plant Scherer

Sounding: C-105
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

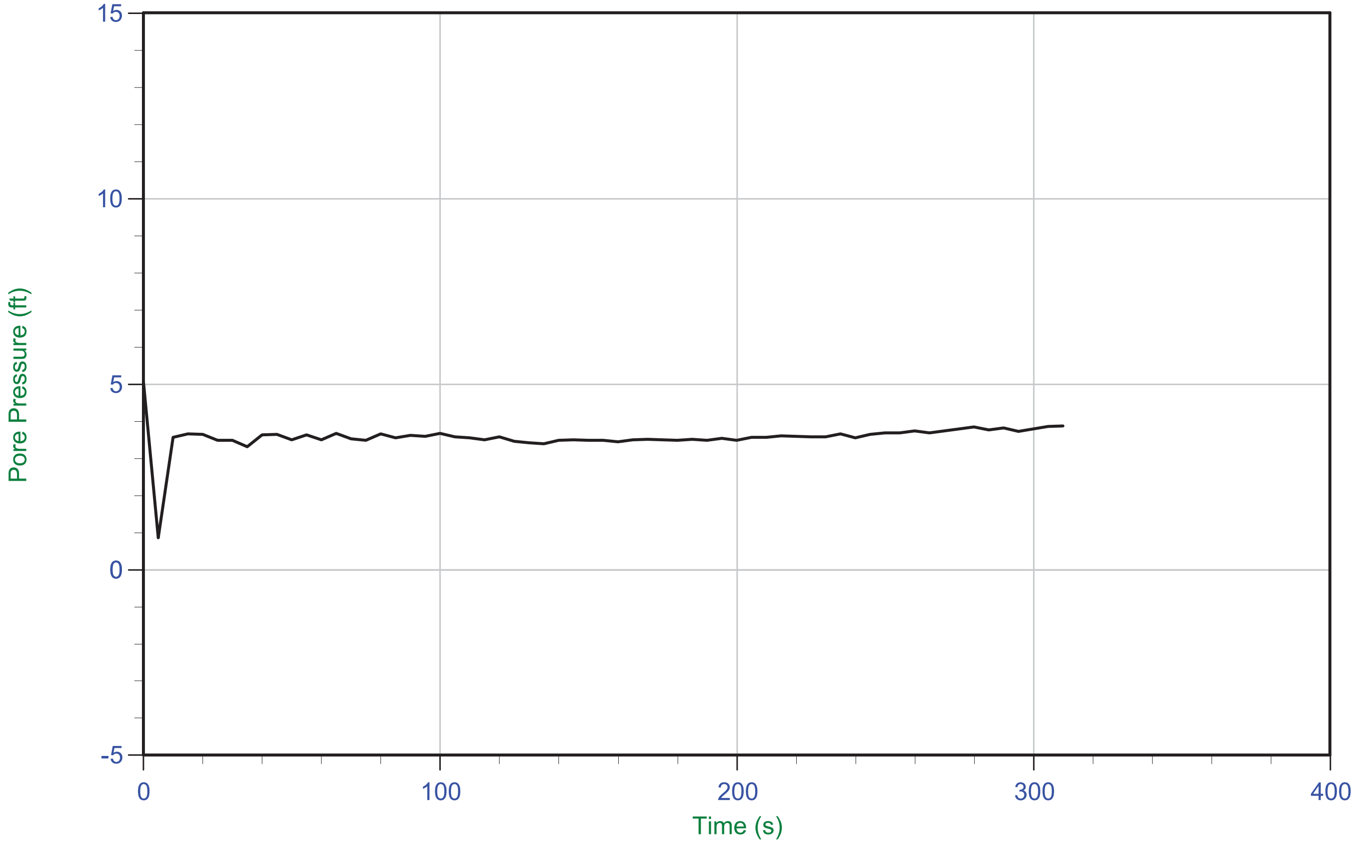
Filename: 16-54030_SPC-105.PPD
Depth: 13.450 m / 44.127 ft
Duration: 800.0 s

U Min: 60.4 ft
U Max: 305.6 ft

AECOM

Job No: 16-54030
Date: 03/23/2016 12:45
Site: Plant Scherer

Sounding: C-105
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-105.PPD
Depth: 15.450 m / 50.688 ft
Duration: 310.0 s

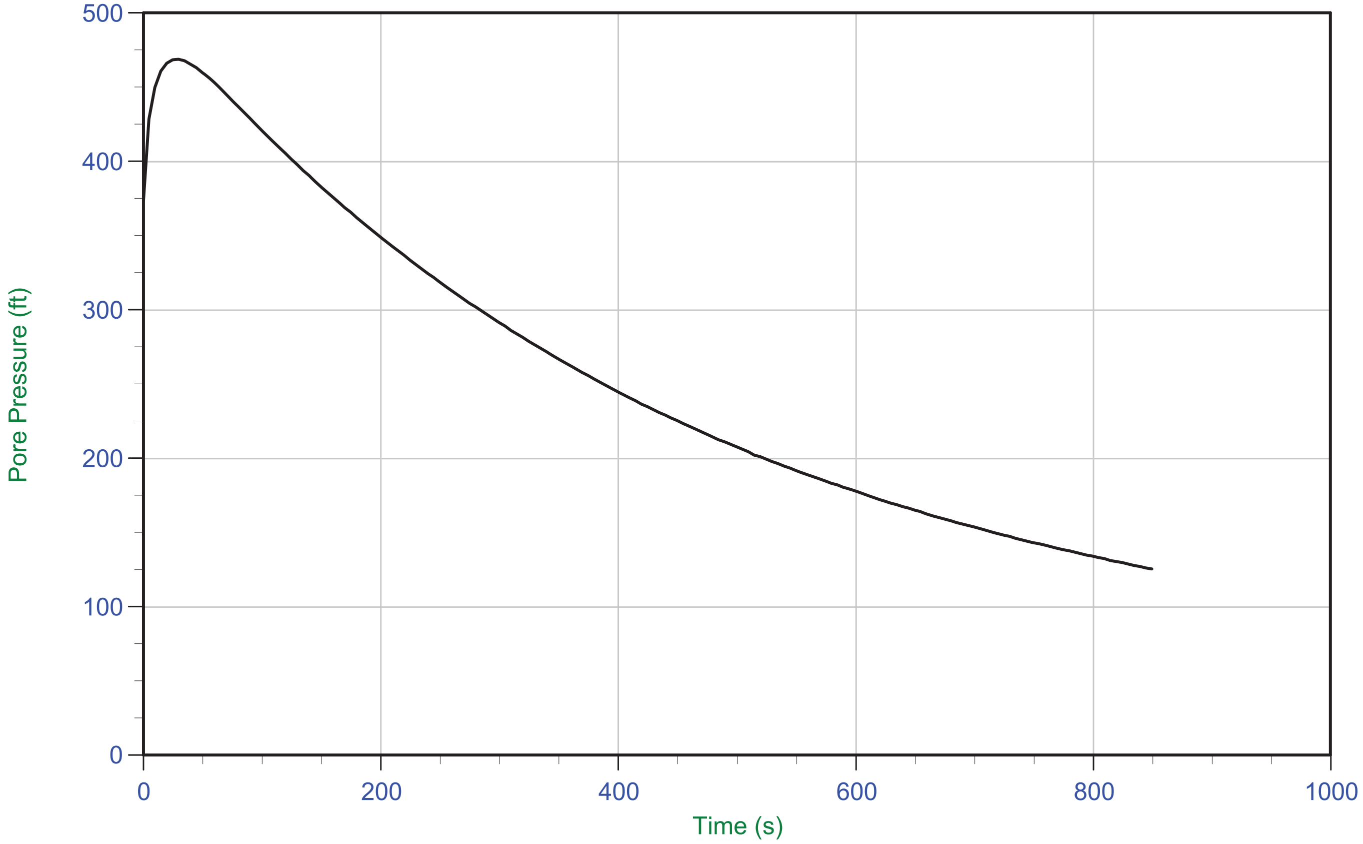
U Min: 0.9 ft
U Max: 5.1 ft

WT: 14.308 m / 46.941 ft
Ueq: 3.7 ft

AECOM

Job No: 16-54030
Date: 03/24/2016 11:06
Site: Plant Scherer

Sounding: C-106
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-106.PPD
Depth: 14.600 m / 47.900 ft
Duration: 850.0 s

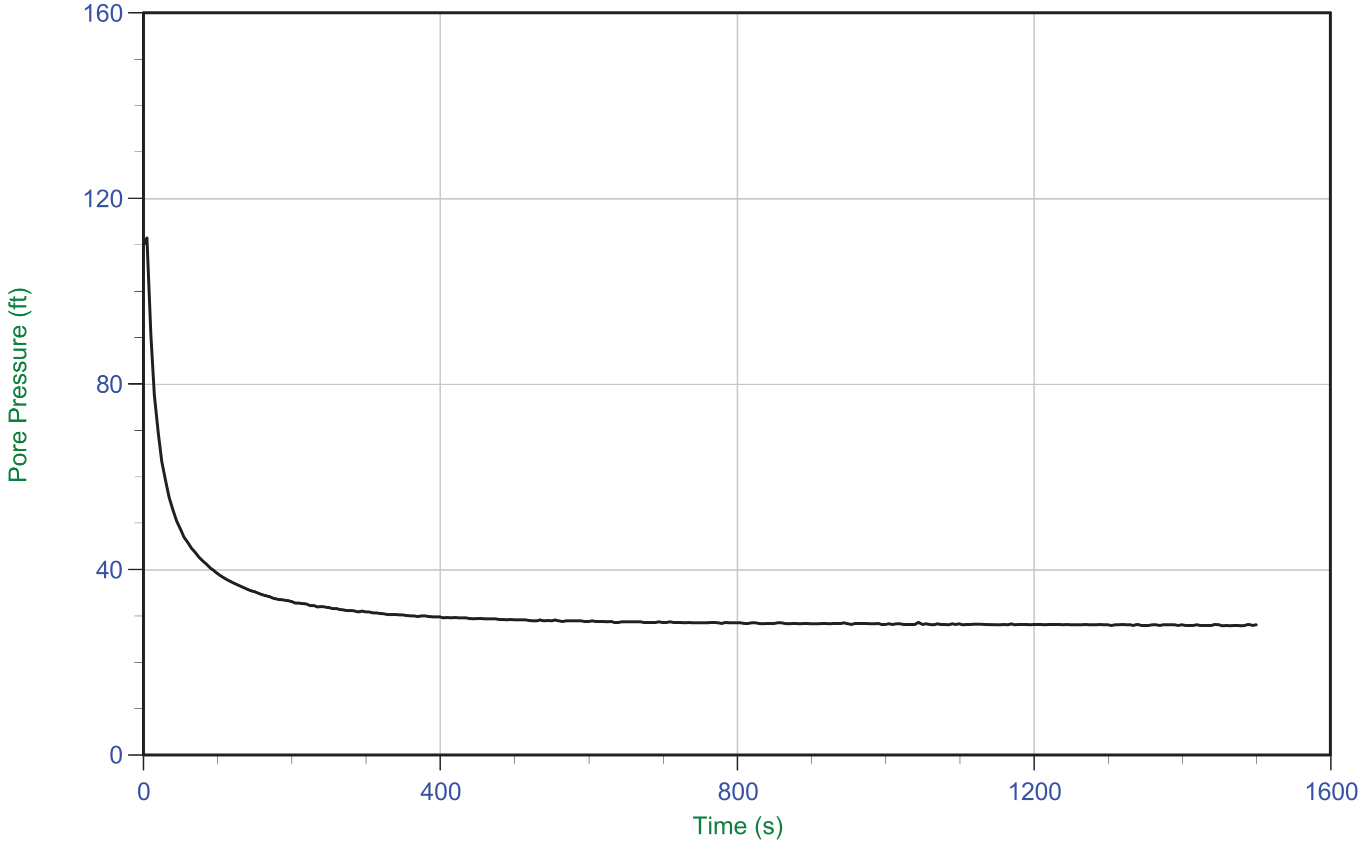
U Min: 125.5 ft
U Max: 468.8 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/24/2016 11:06
Site: Plant Scherer

Sounding: C-106
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



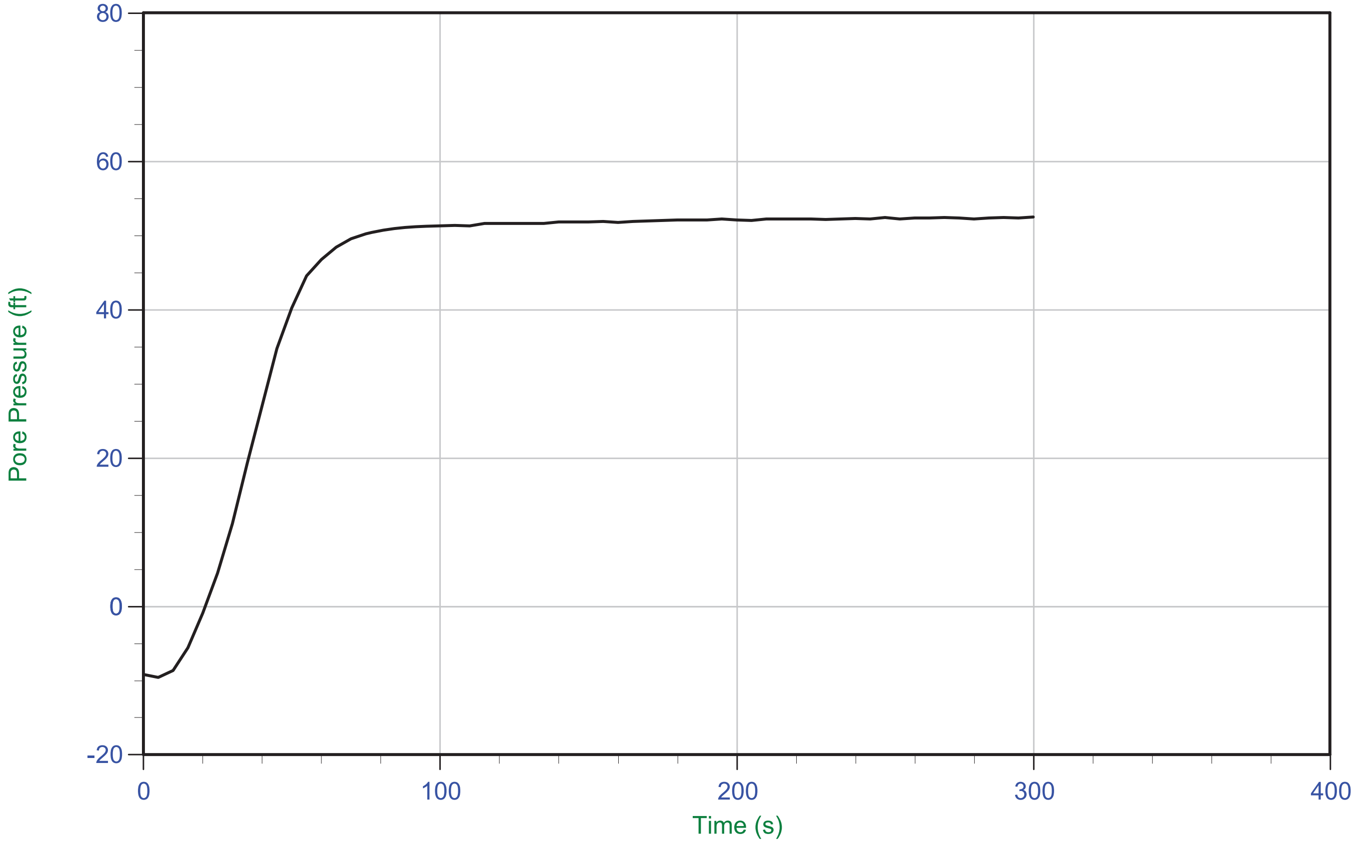
Trace Summary:

Filename: 16-54030_SPC-106.PPD
Depth: 20.500 m / 67.256 ft
Duration: 1500.0 s

U Min: 27.9 ft
U Max: 111.6 ft

WT: 11.993 m / 39.345 ft
Ueq: 27.9 ft

AECOM	Job No: 16-54030 Date: 03/24/2016 11:06 Site: Plant Scherer	Sounding: C-106 Cone: 304:T1500F15U500 Cone Area: 15 sq cm



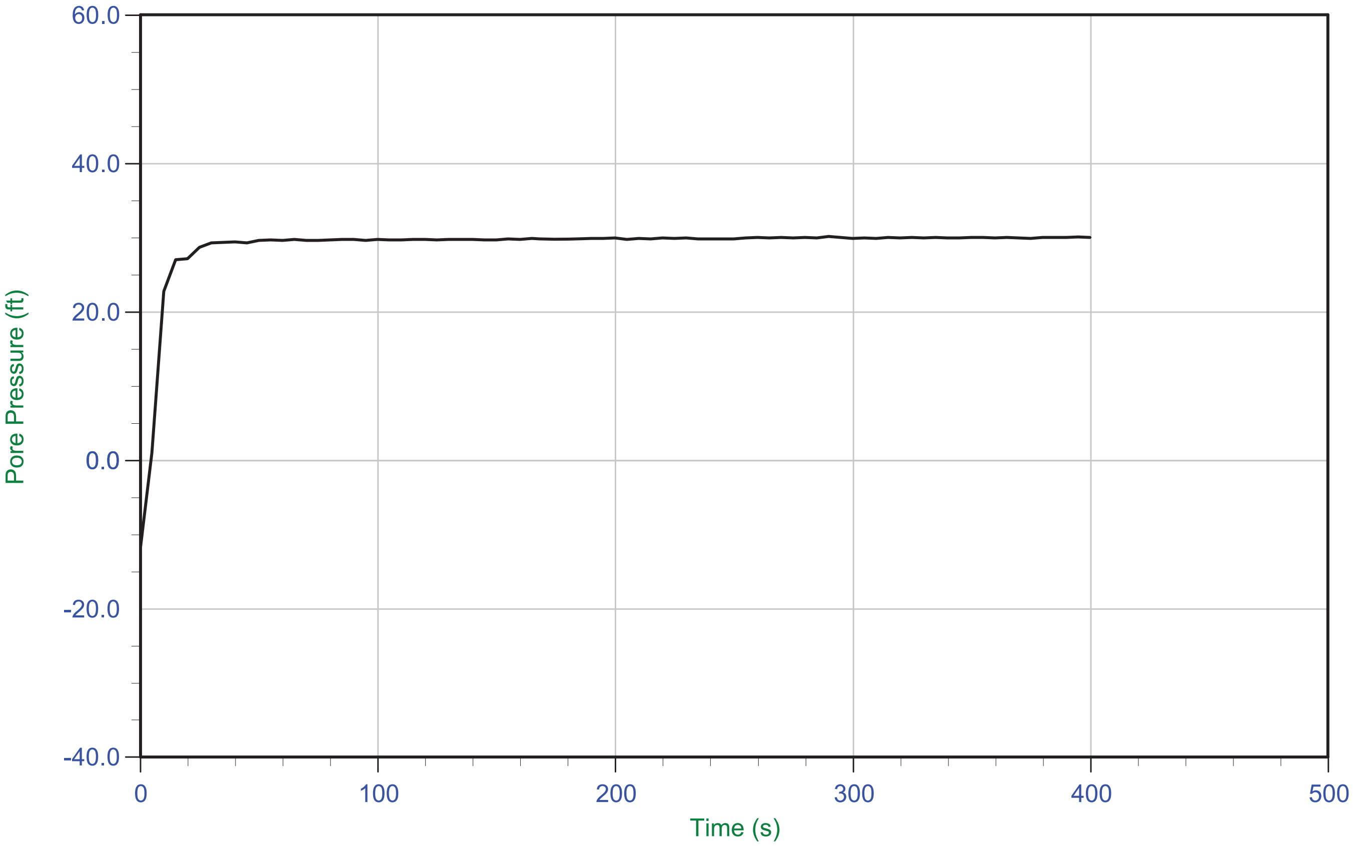
Trace Summary:	Filename: 16-54030_SPC-106.PPD	U Min: -9.5 ft	WT: 12.254 m / 40.202 ft
	Depth: 28.250 m / 92.683 ft	U Max: 52.5 ft	Ueq: 52.5 ft
	Duration: 300.0 s		

CONETEC

AECOM

Job No: 16-54030
Date: 03/24/2016 09:14
Site: Plant Scherer

Sounding: C-107
Cone: 304:T1500F15U500
Cone Area: 15 sq cm

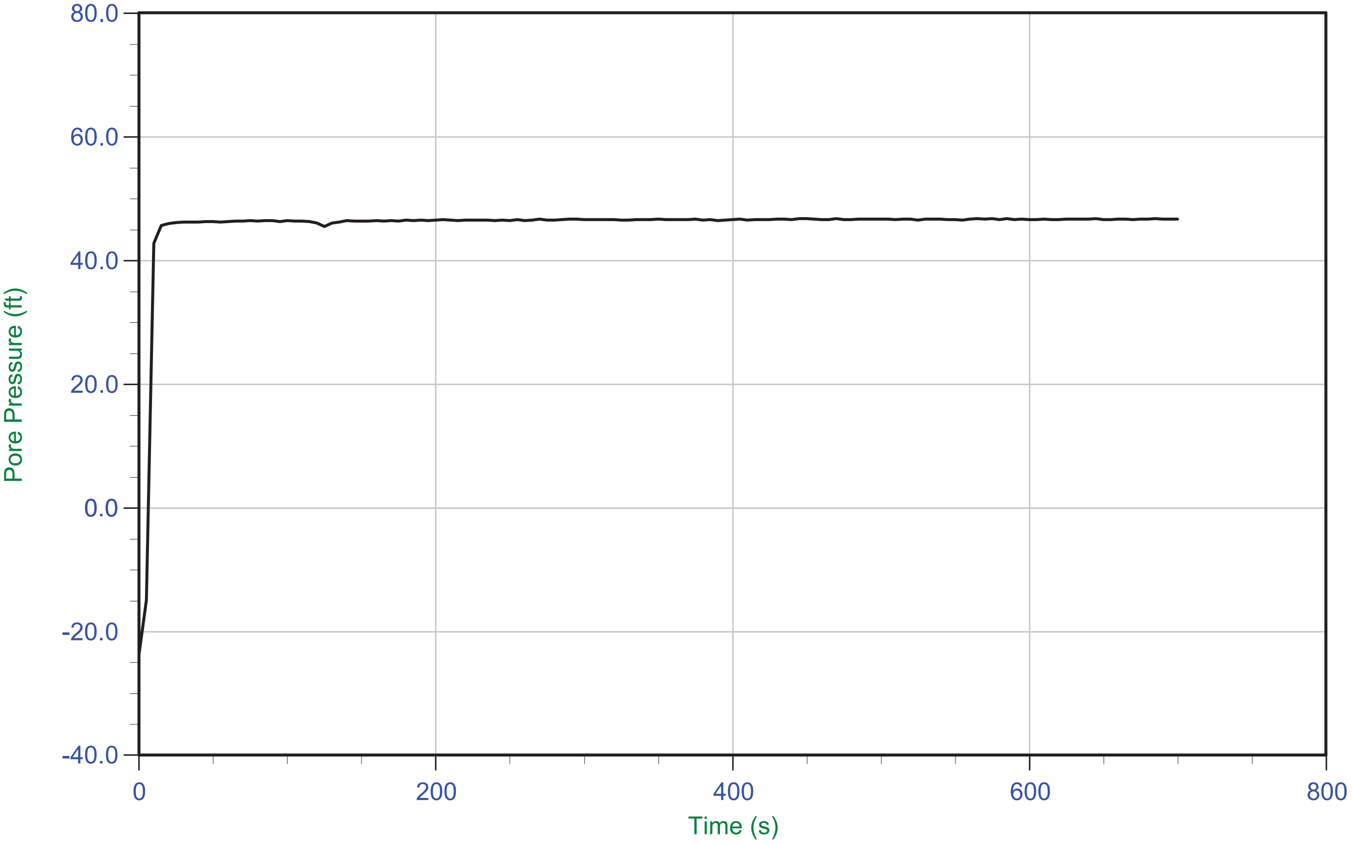


Trace Summary:

Filename: 16-54030_SPC-107.PPD
Depth: 16.600 m / 54.461 ft
Duration: 400.0 s

U Min: -11.7 ft
U Max: 30.1 ft

WT: 7.449 m / 24.437 ft
Ueq: 30.0 ft



Trace Summary:

Filename: 16-54030_SPC-107.PPD
Depth: 21.450 m / 70.373 ft
Duration: 700.0 s

U Min: -23.7 ft
U Max: 46.8 ft

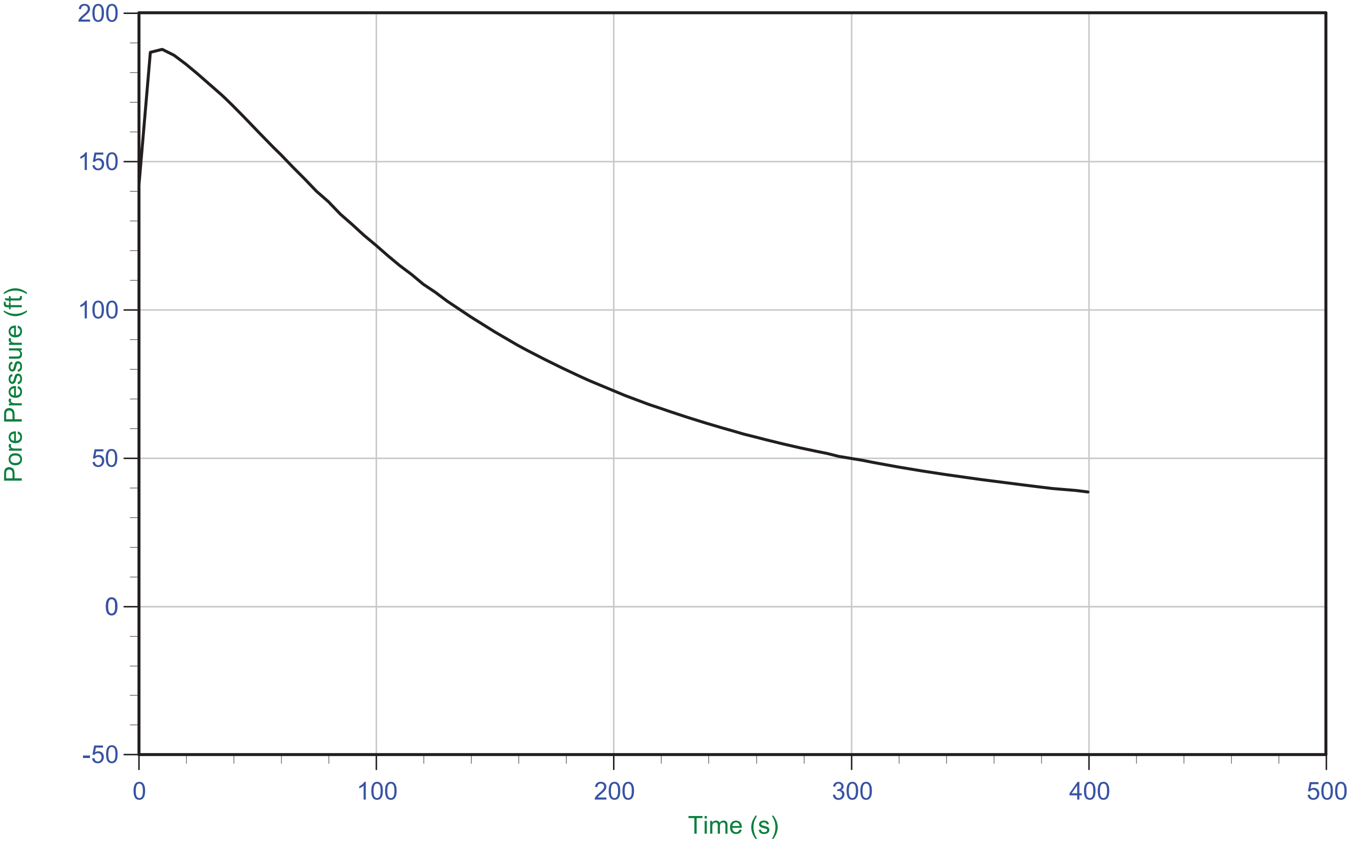
WT: 7.221 m / 23.691 ft
Ueq: 46.7 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/23/2016 16:29
Site: Plant Scherer

Sounding: C-108
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

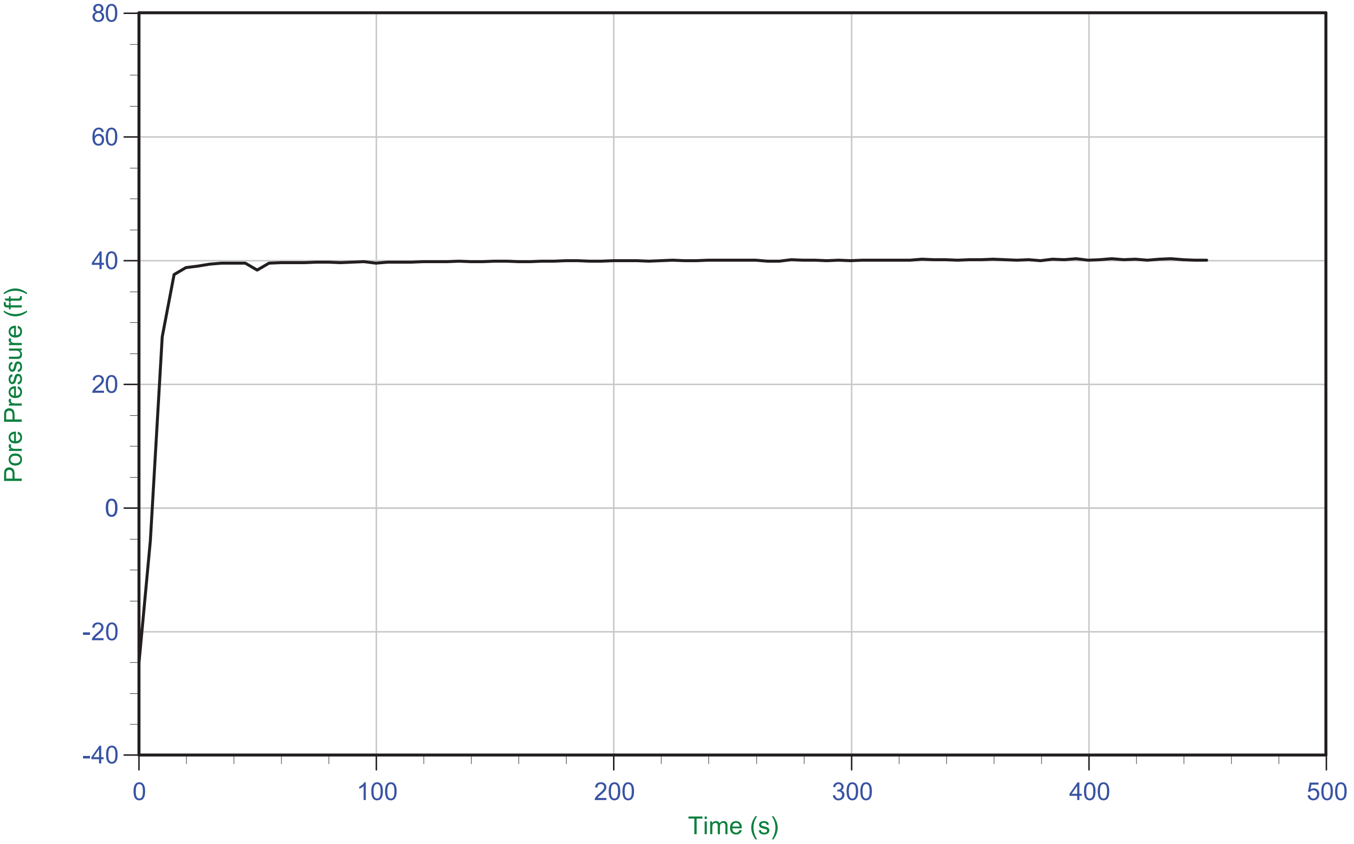
Filename: 16-54030_SPC-108.PPD
Depth: 6.600 m / 21.653 ft
Duration: 400.0 s

U Min: 38.6 ft
U Max: 187.8 ft

AECOM

Job No: 16-54030
Date: 03/23/2016 16:29
Site: Plant Scherer

Sounding: C-108
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-108.PPD
Depth: 11.850 m / 38.877 ft
Duration: 450.0 s

U Min: -25.1 ft
U Max: 40.3 ft

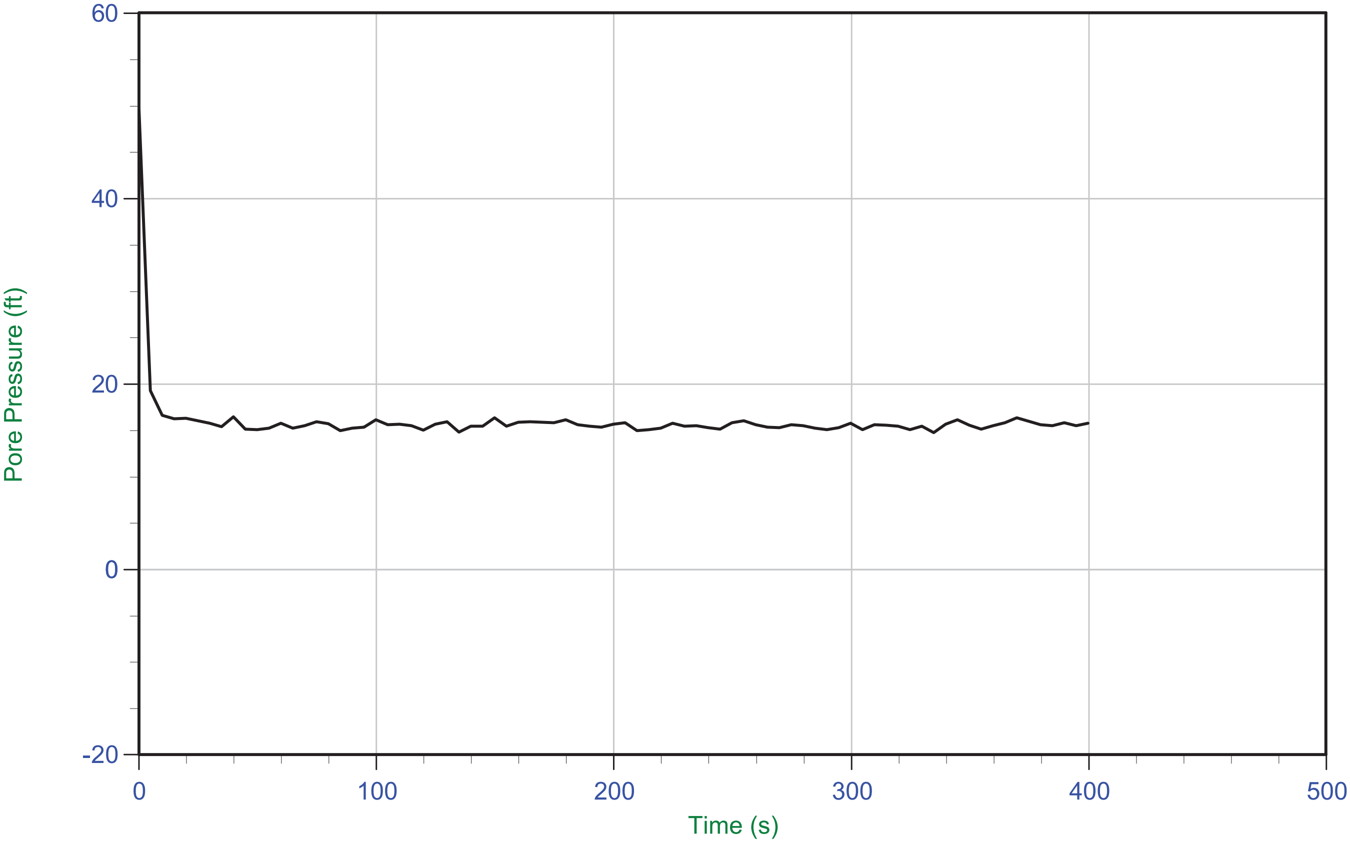
WT: -0.342 m / -1.122 ft
Ueq: 40.0 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/16/2016 15:33
Site: Plant Scherer

Sounding: C-109
Cone: 437:T1500F15U1K
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-109.PPD
Depth: 6.450 m / 21.161 ft
Duration: 400.0 s

U Min: 14.8 ft
U Max: 49.7 ft

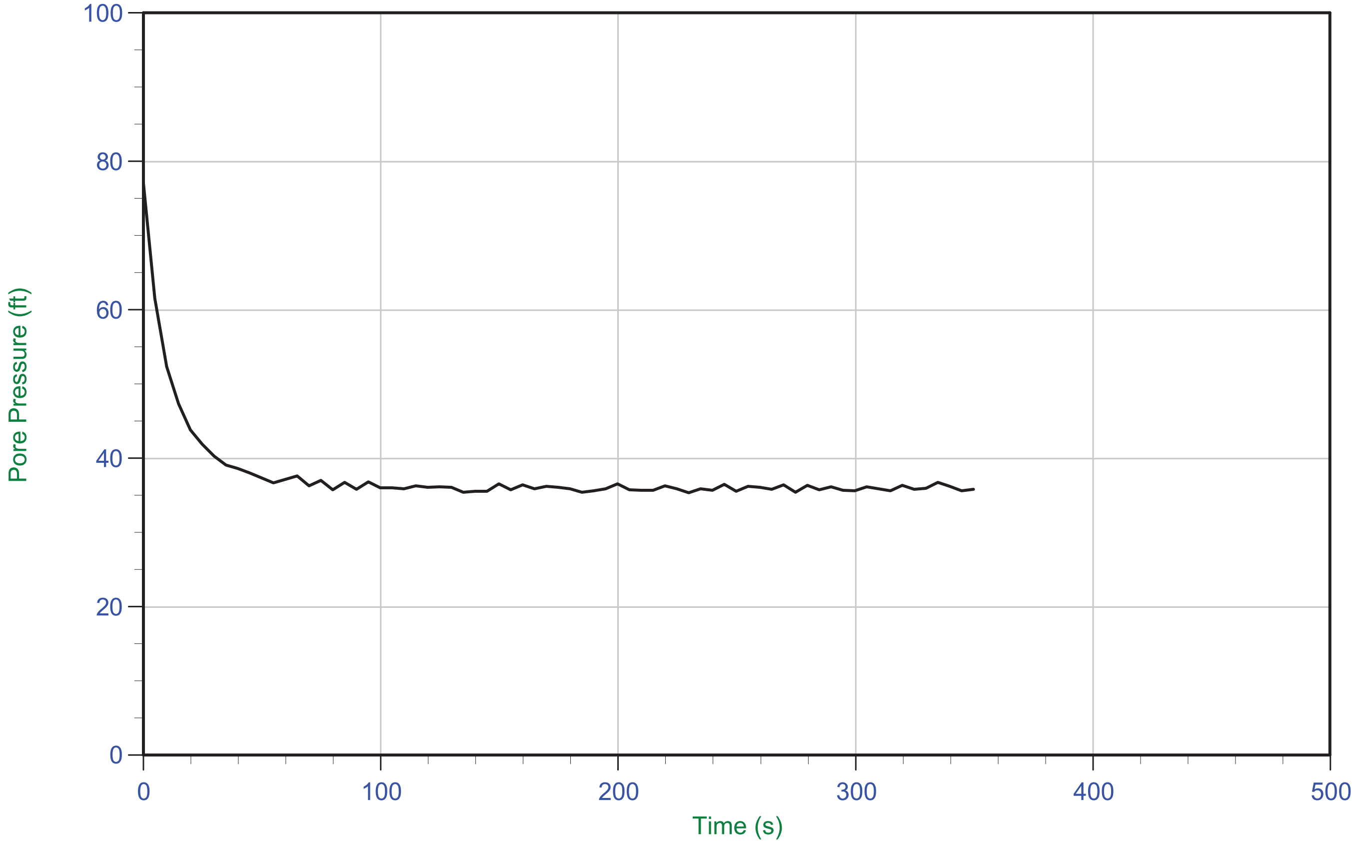
WT: 1.690 m / 5.544 ft
Ueq: 15.6 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/16/2016 15:33
Site: Plant Scherer

Sounding: C-109
Cone: 437:T1500F15U1K
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-109.PPD
Depth: 12.550 m / 41.174 ft
Duration: 350.0 s

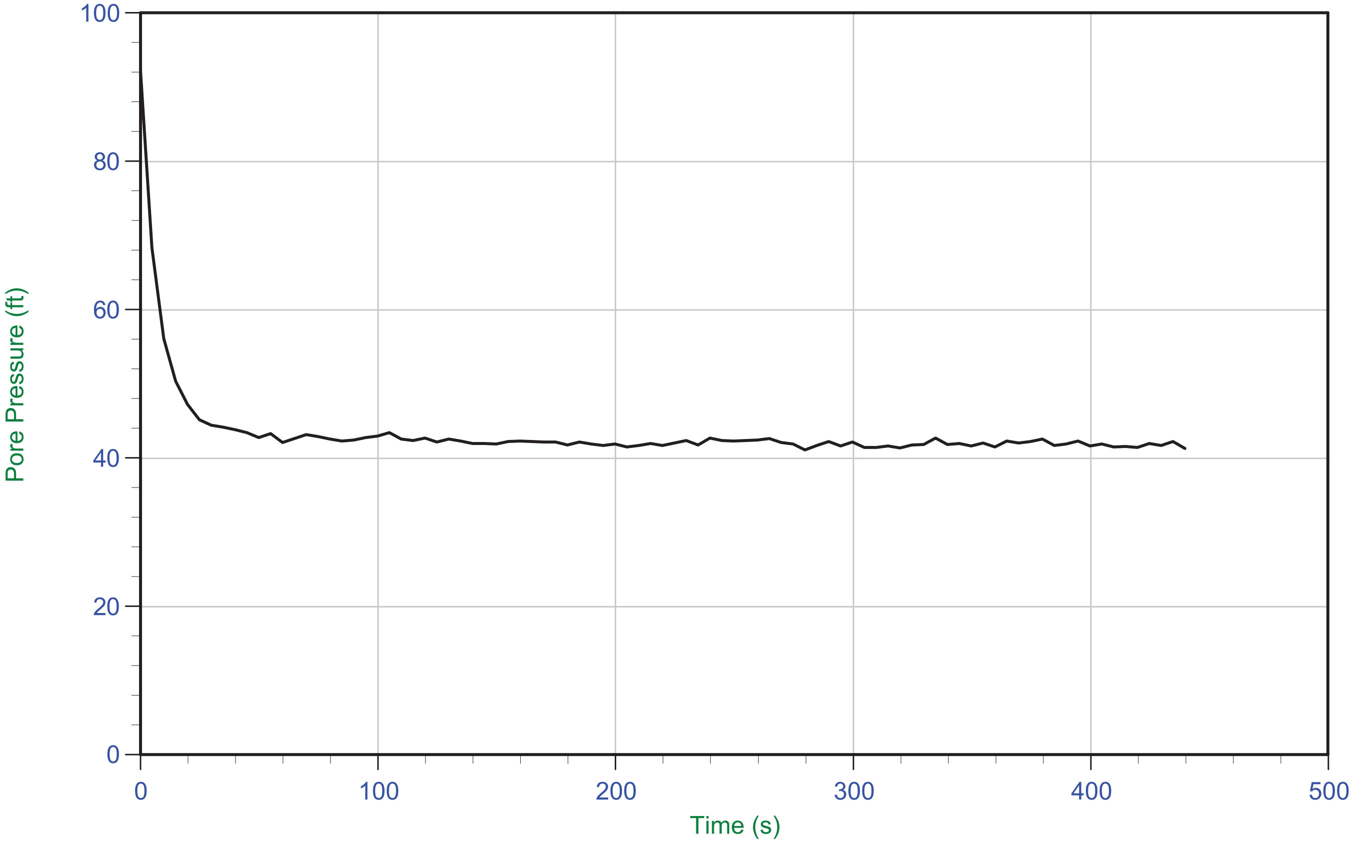
U Min: 35.4 ft
U Max: 77.1 ft

WT: 1.608 m / 5.277 ft
Ueq: 35.9 ft

AECOM

Job No: 16-54030
Date: 03/16/2016 15:33
Site: Plant Scherer

Sounding: C-109
Cone: 437:T1500F15U1K
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-109.PPD
Depth: 14.450 m / 47.408 ft
Duration: 440.0 s

U Min: 41.1 ft
U Max: 92.2 ft

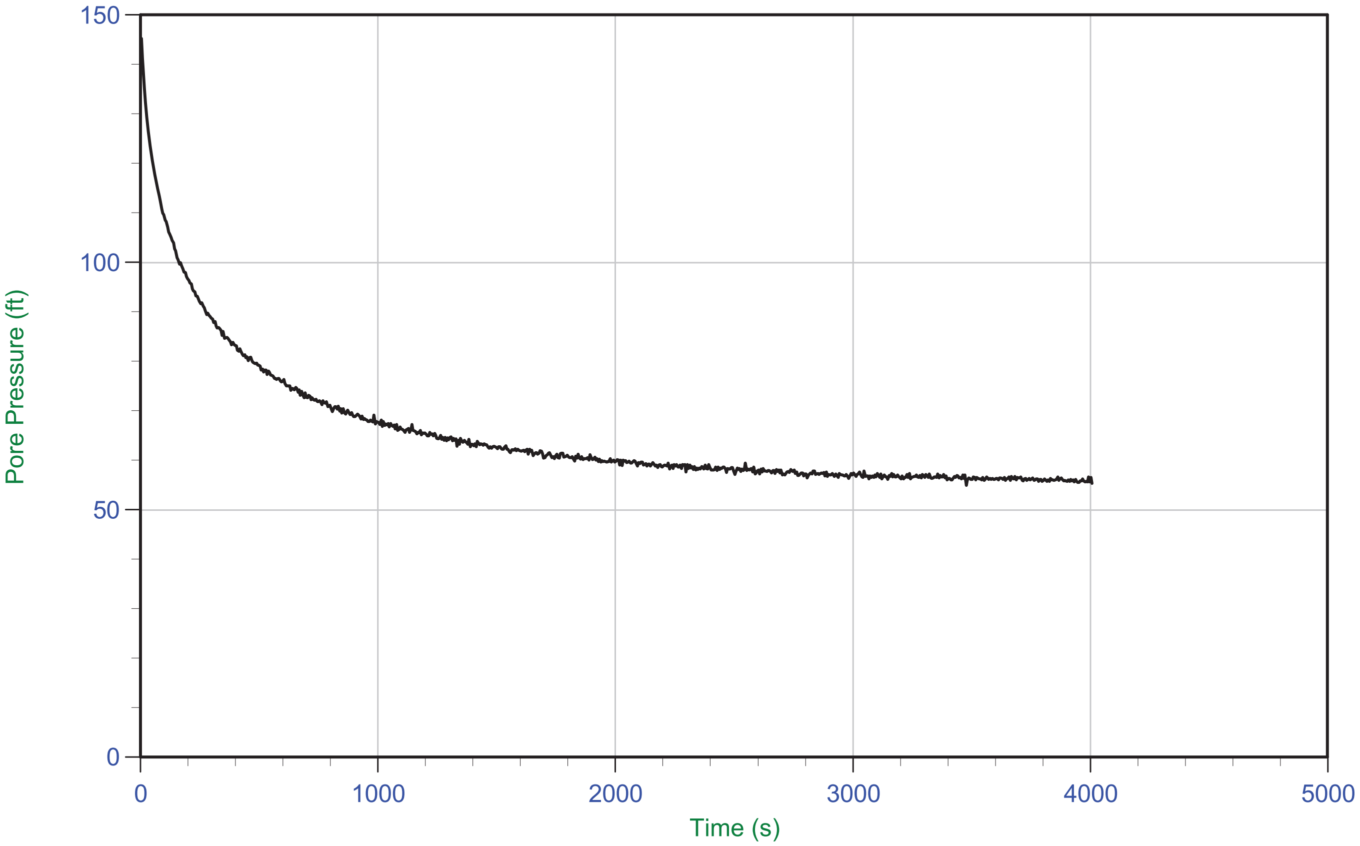
WT: 1.803 m / 5.916 ft
Ueq: 41.5 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/16/2016 15:33
Site: Plant Scherer

Sounding: C-109
Cone: 437:T1500F15U1K
Cone Area: 15 sq cm



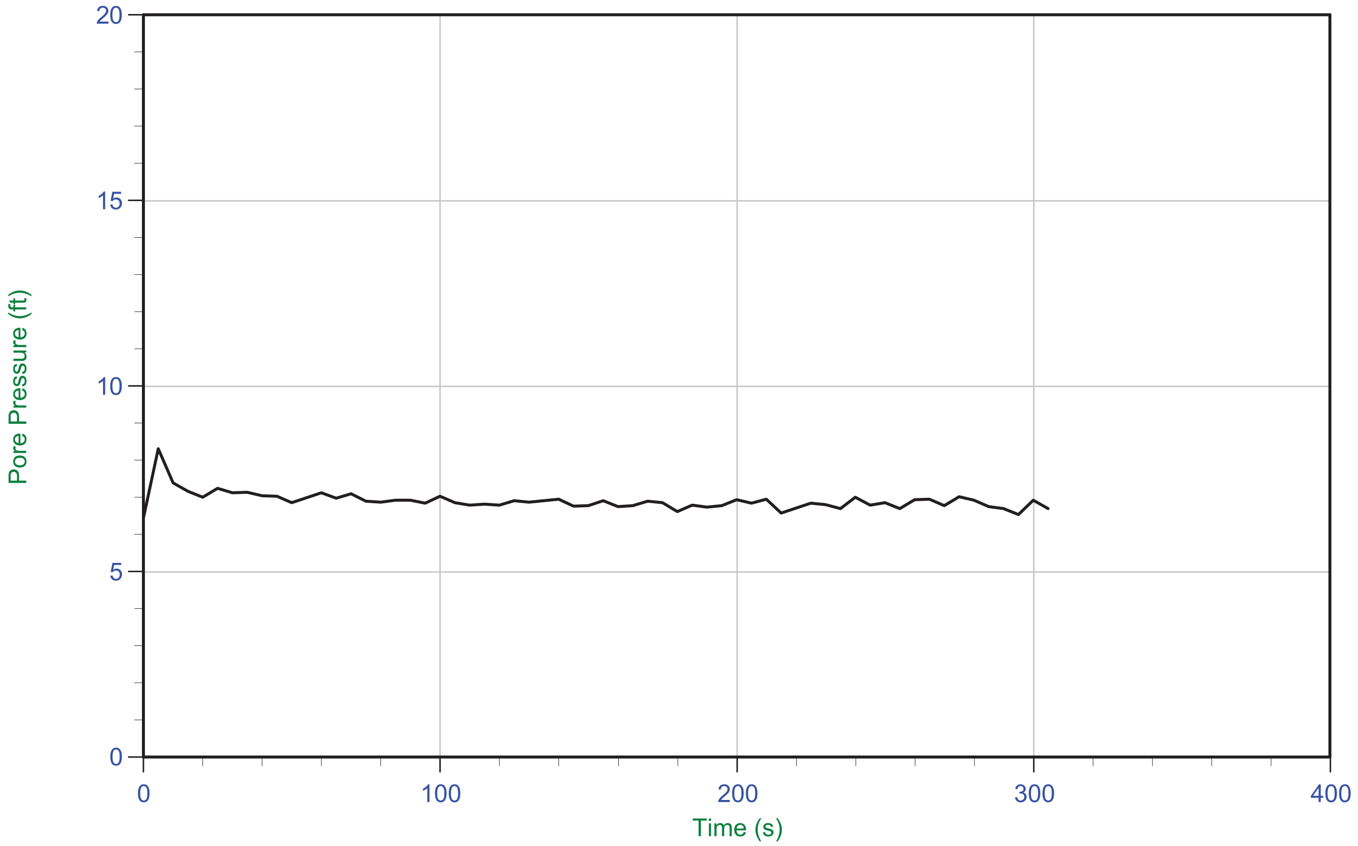
Trace Summary:

Filename: 16-54030_SPC-109.PPD
Depth: 18.600 m / 61.023 ft
Duration: 4010.0 s

U Min: 54.9 ft
U Max: 145.3 ft

WT: 1.761 m / 5.779 ft
Ueq: 55.2 ft

CONETEC	AECOM	Job No: 16-54030 Date: 03/17/2016 12:30 Site: Plant Scherer	Sounding: C-110 Cone: 304:T1500F15U500 Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-110.PPD
Depth: 3.000 m / 9.842 ft
Duration: 305.0 s

U Min: 6.4 ft
U Max: 8.3 ft

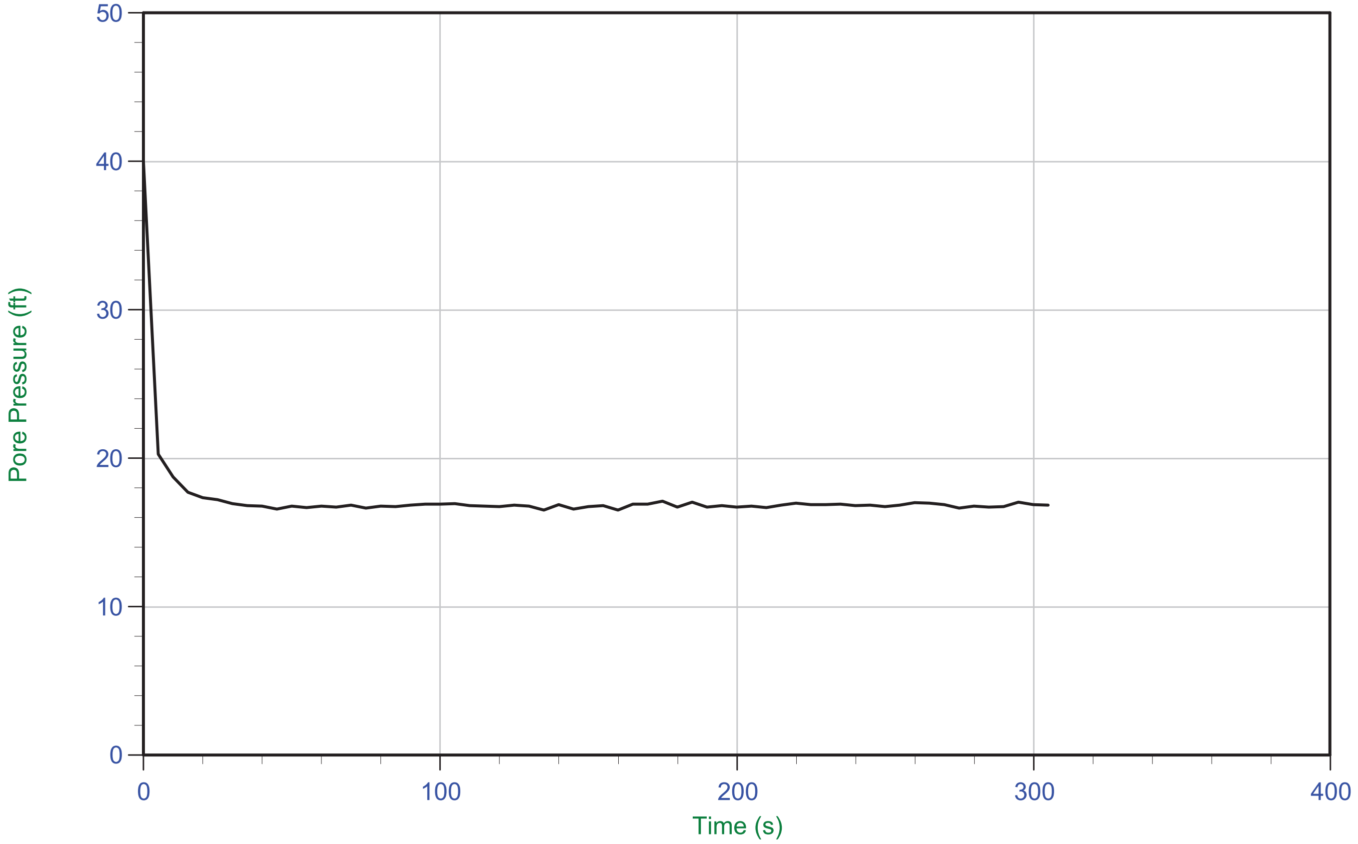
WT: 0.940 m / 3.083 ft
Ueq: 6.8 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/17/2016 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-110.PPD
Depth: 6.100 m / 20.013 ft
Duration: 305.0 s

U Min: 16.5 ft
U Max: 40.0 ft

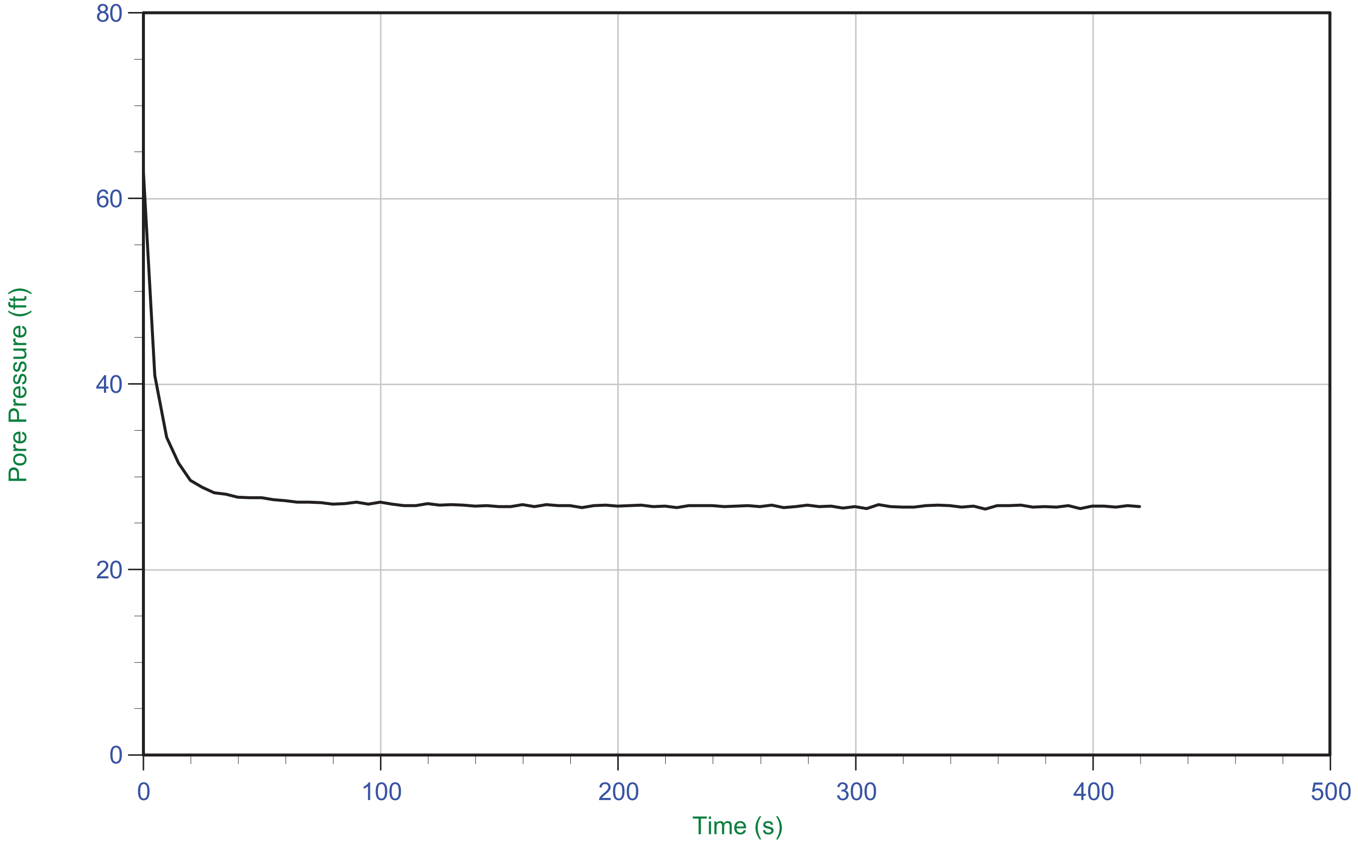
WT: 0.984 m / 3.230 ft
Ueq: 16.8 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/17/2016 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-110.PPD
Depth: 9.150 m / 30.019 ft
Duration: 420.0 s

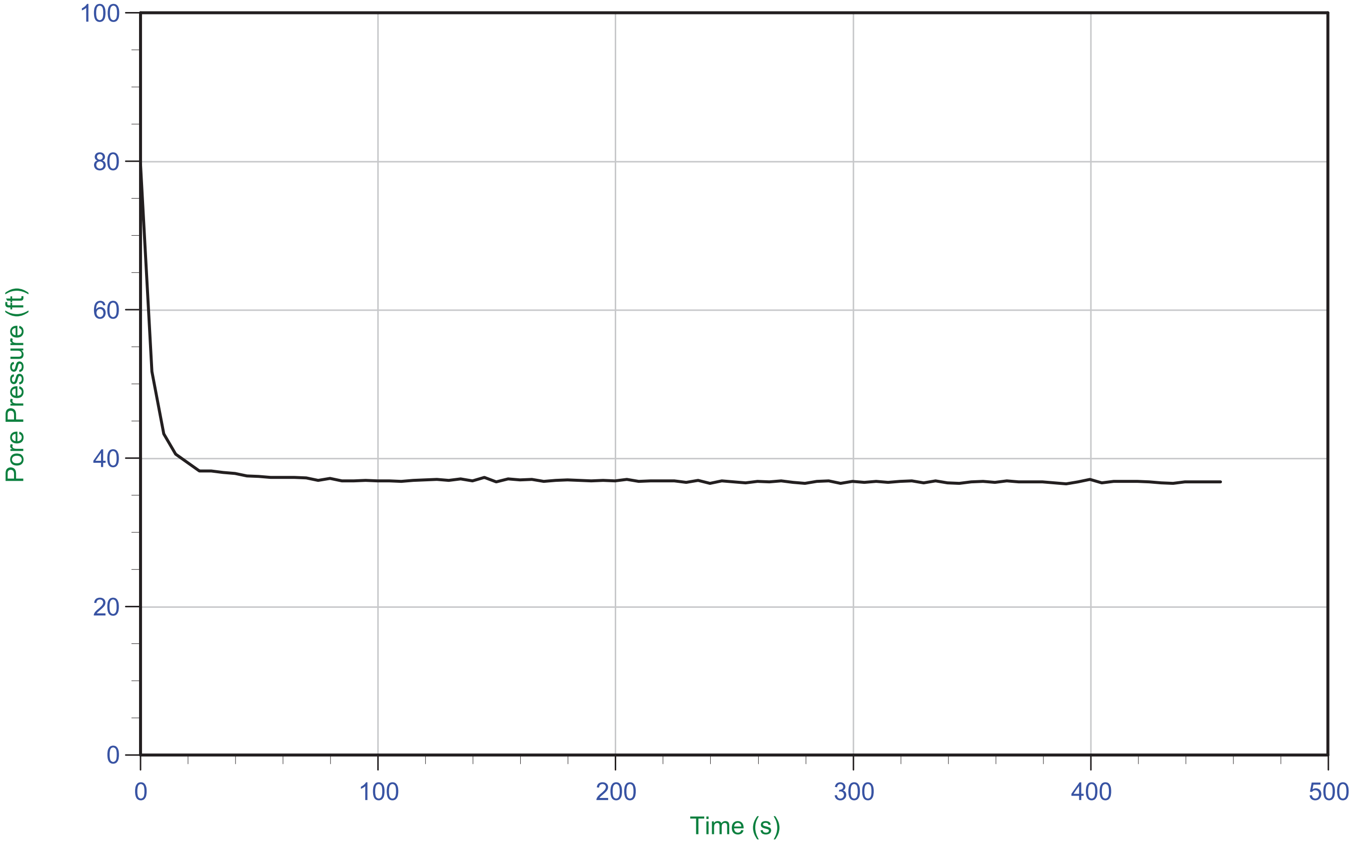
U Min: 26.5 ft
U Max: 62.8 ft

WT: 0.965 m / 3.166 ft
Ueq: 26.9 ft

AECOM

Job No: 16-54030
Date: 03/17/2016 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-110.PPD
Depth: 12.200 m / 40.026 ft
Duration: 455.0 s

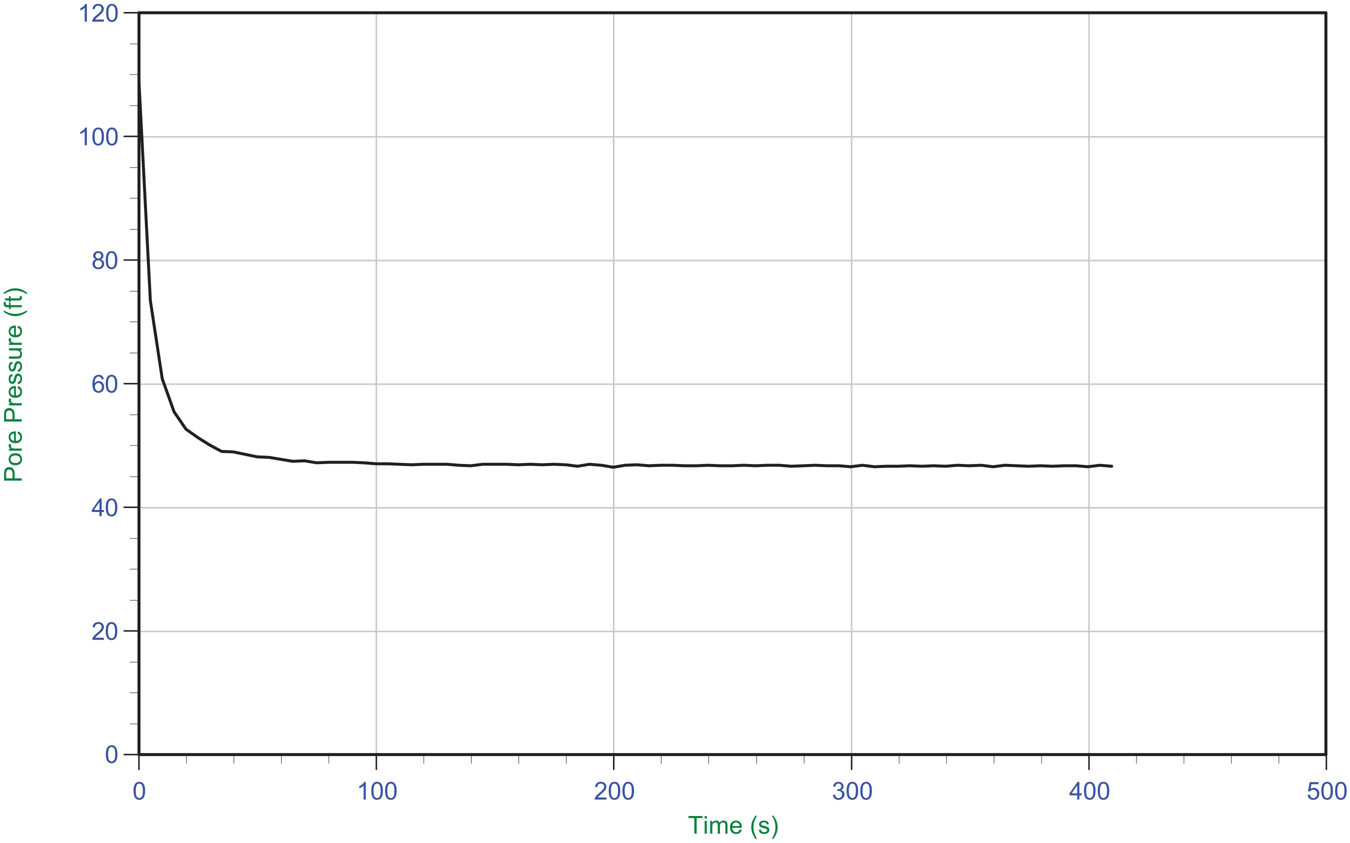
U Min: 36.6 ft
U Max: 79.6 ft

WT: 0.974 m / 3.196 ft
Ueq: 36.8 ft

AECOM

Job No: 16-54030
Date: 03/17/2016 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-110.PPD
Depth: 15.250 m / 50.032 ft
Duration: 410.0 s

U Min: 46.5 ft
U Max: 108.8 ft

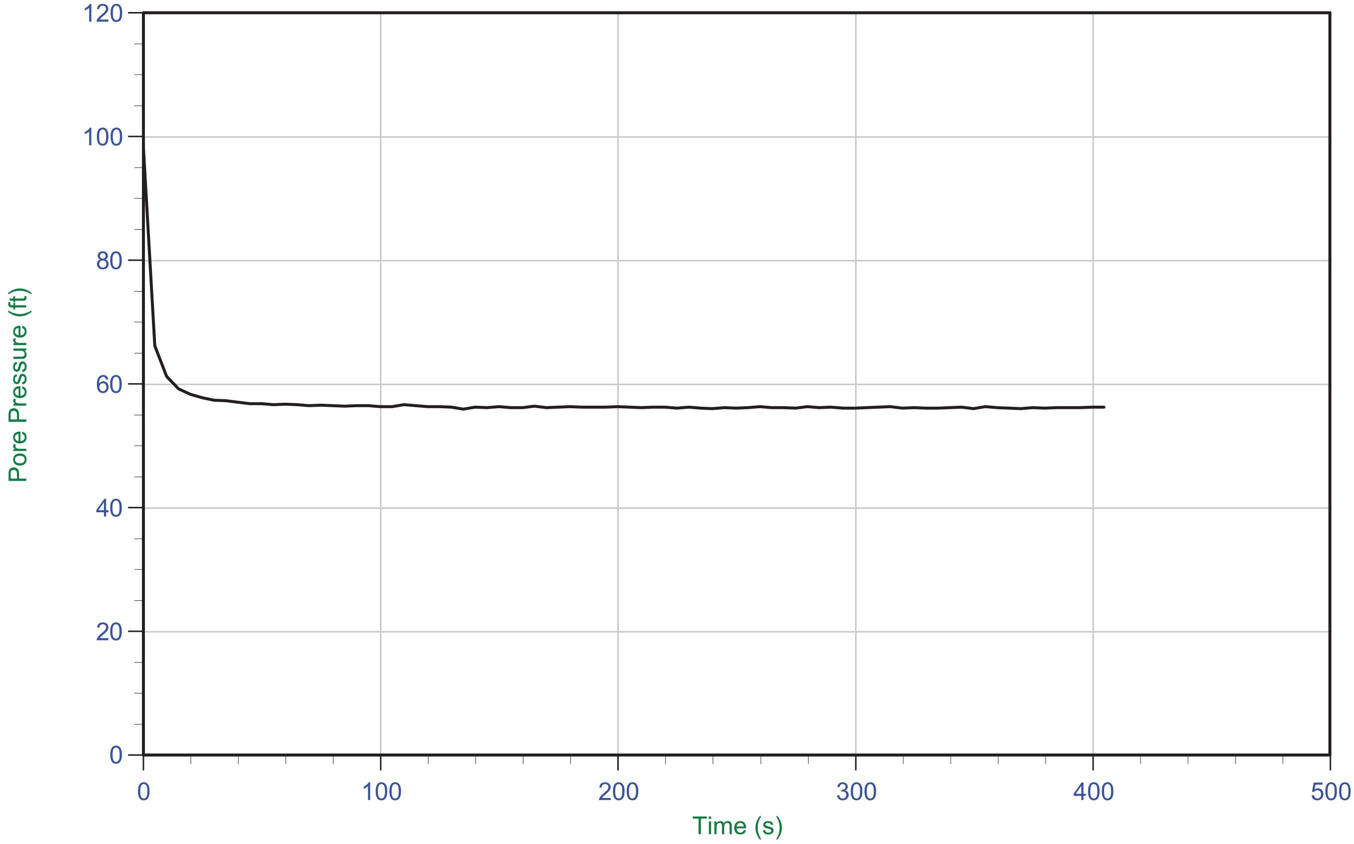
WT: 1.012 m / 3.319 ft
Ueq: 46.7 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/17/2016 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-110.PPD
Depth: 18.300 m / 60.039 ft
Duration: 405.0 s

U Min: 56.0 ft
U Max: 98.3 ft

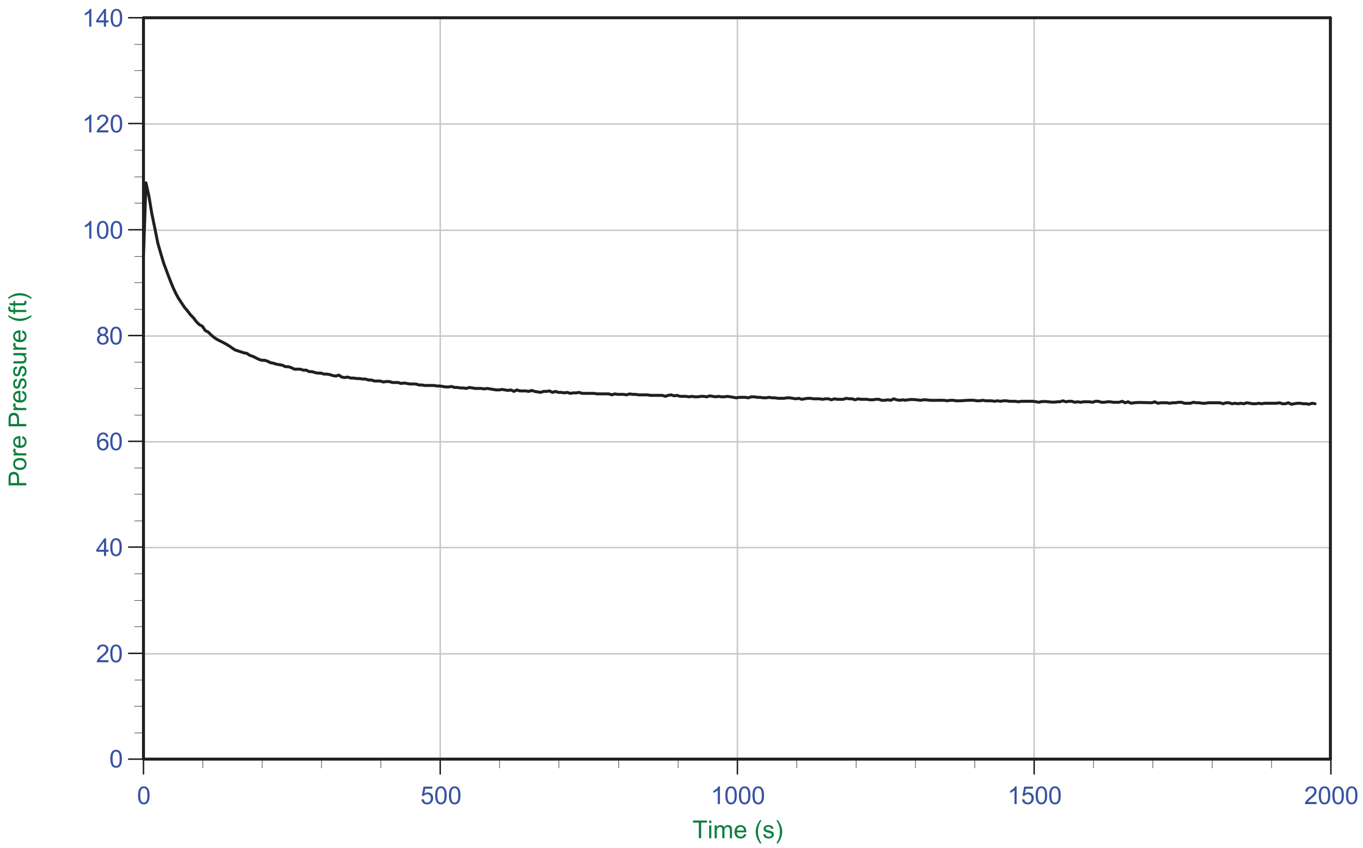
WT: 1.163 m / 3.816 ft
Ueq: 56.2 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/17/2016 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-110.PPD
Depth: 21.350 m / 70.045 ft
Duration: 1975.0 s

U Min: 67.1 ft
U Max: 108.9 ft

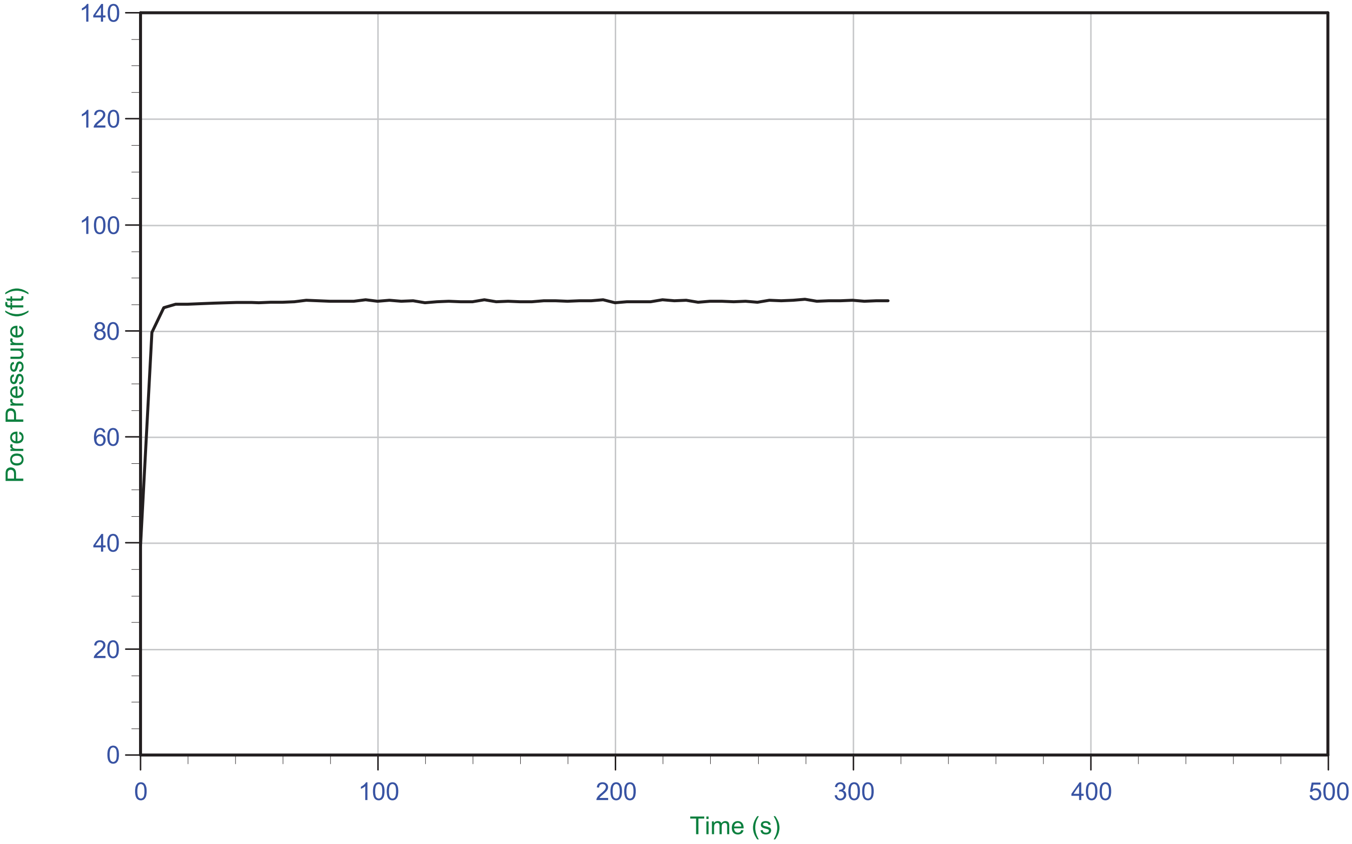
WT: 0.888 m / 2.913 ft
Ueq: 67.1 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/17/2016 12:30
Site: Plant Scherer

Sounding: C-110
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



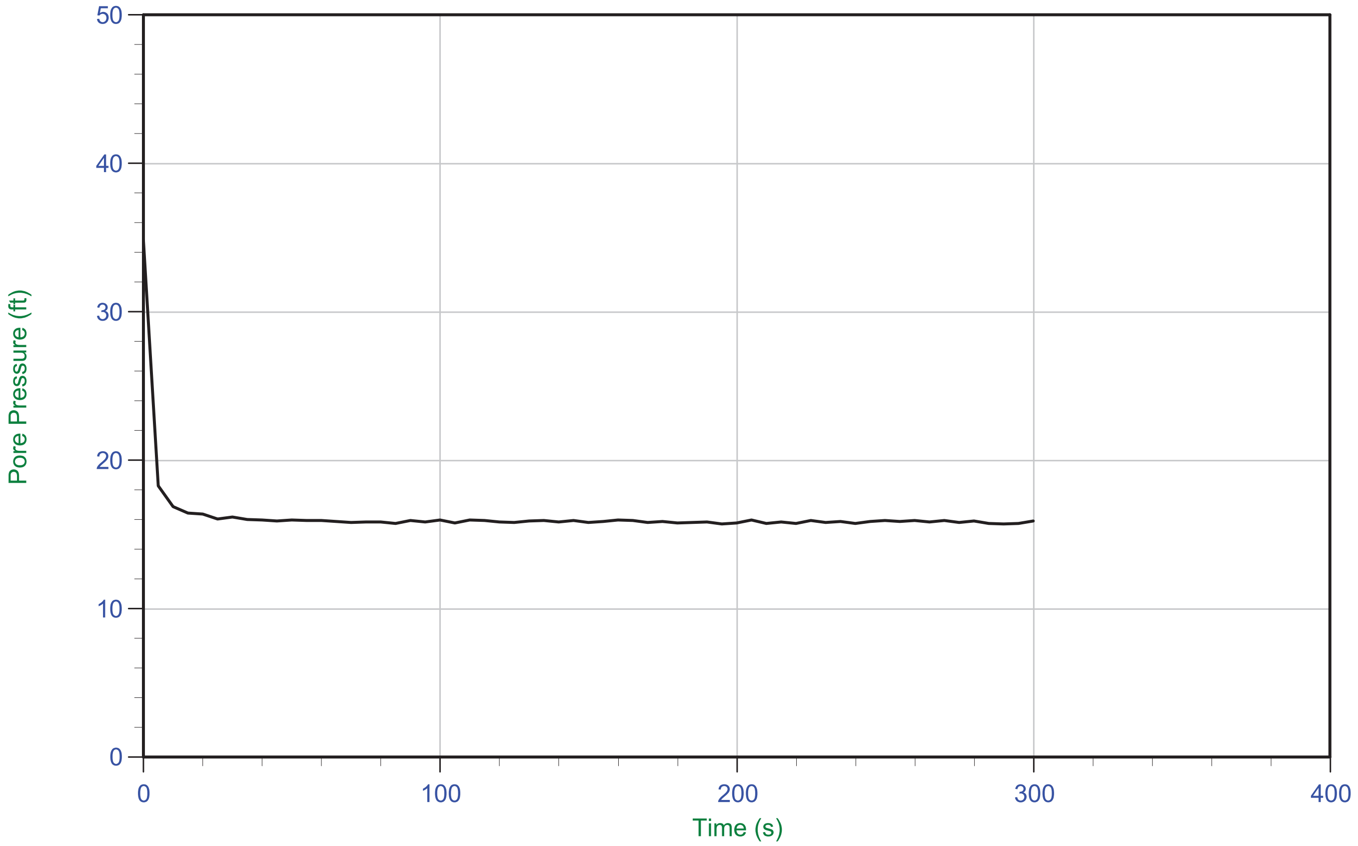
Trace Summary:
Filename: 16-54030_SPC-110.PPD
Depth: 28.100 m / 92.190 ft
Duration: 315.0 s
U Min: 39.5 ft
U Max: 86.0 ft
WT: 1.940 m / 6.364 ft
Ueq: 85.8 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/16/2016 09:01
Site: Plant Scherer

Sounding: C-111
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



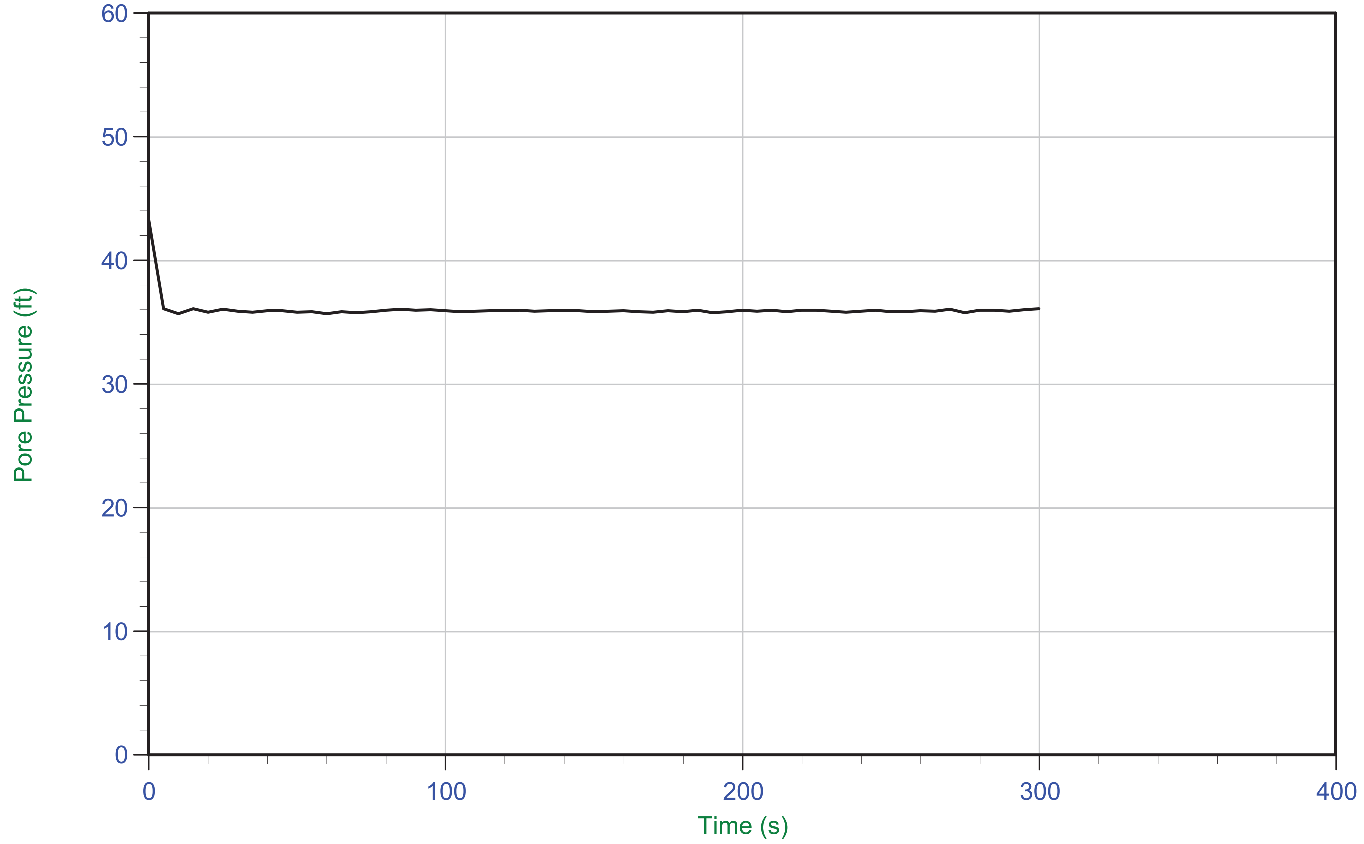
Trace Summary:

Filename: 16-54030_SPC-111.PPD
Depth: 6.300 m / 20.669 ft
Duration: 300.0 s

U Min: 15.7 ft
U Max: 34.8 ft

WT: 1.504 m / 4.935 ft
Ueq: 15.7 ft

CONETEC	AECOM	Job No: 16-54030 Date: 03/16/2016 09:01 Site: Plant Scherer	Sounding: C-111 Cone: 304:T1500F15U500 Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-111.PPD
Depth: 12.350 m / 40.518 ft
Duration: 300.0 s

U Min: 35.7 ft
U Max: 43.3 ft

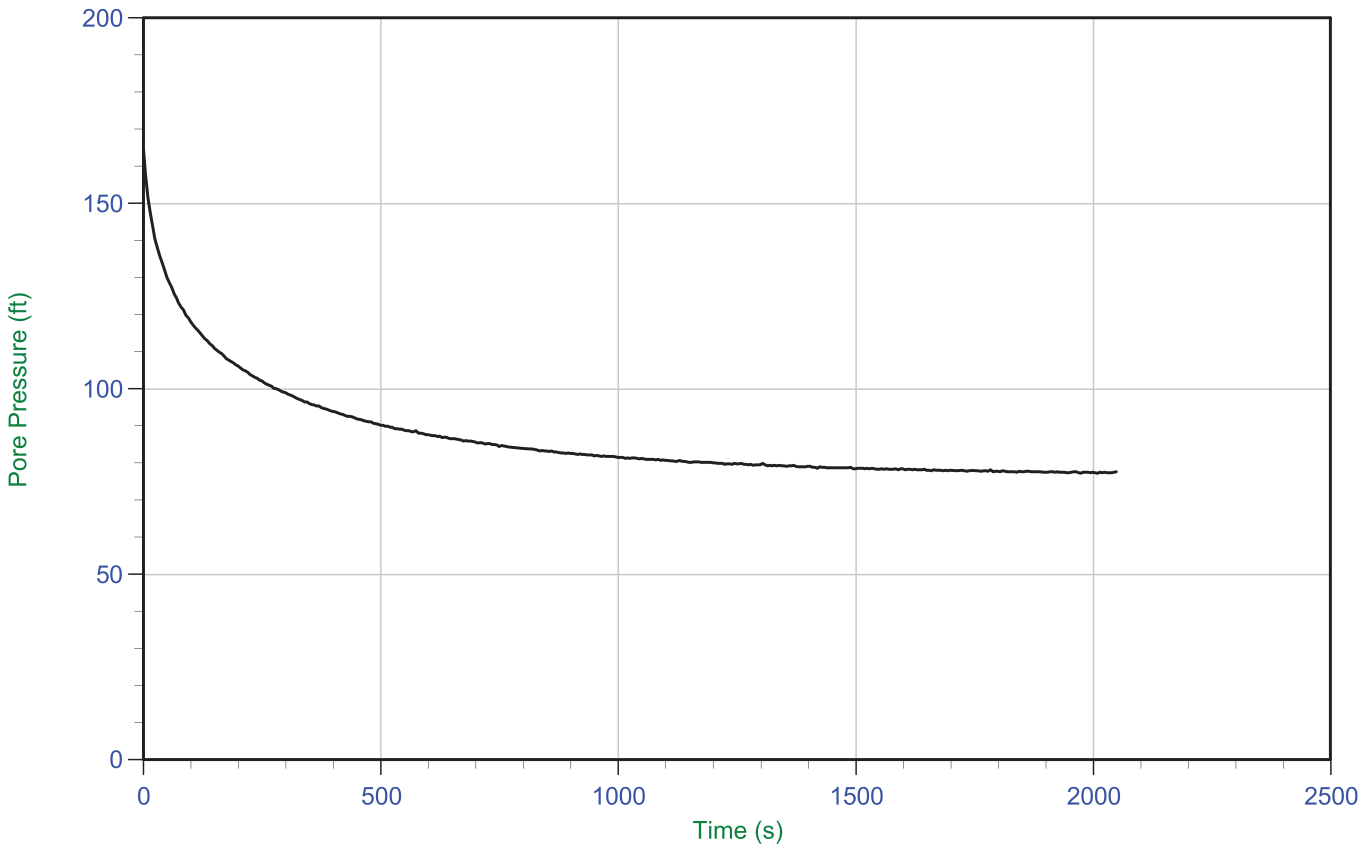
WT: 1.437 m / 4.714 ft
Ueq: 35.8 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/16/2016 09:01
Site: Plant Scherer

Sounding: C-111
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-111.PPD
Depth: 24.550 m / 80.544 ft
Duration: 2050.0 s

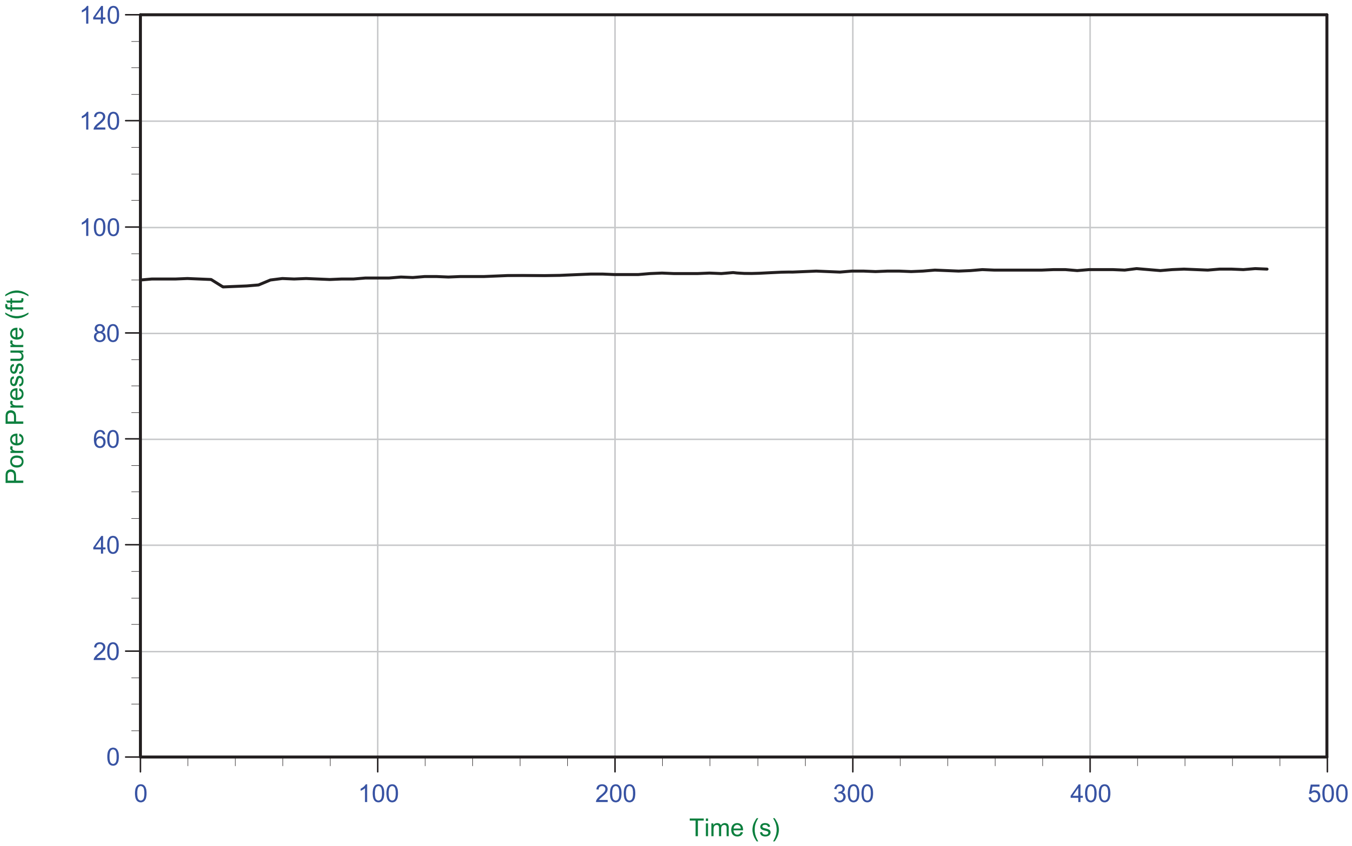
U Min: 77.3 ft
U Max: 164.7 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/16/2016 09:01
Site: Plant Scherer

Sounding: C-111
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-111.PPD
Depth: 30.000 m / 98.424 ft
Duration: 475.0 s

U Min: 88.8 ft
U Max: 92.2 ft

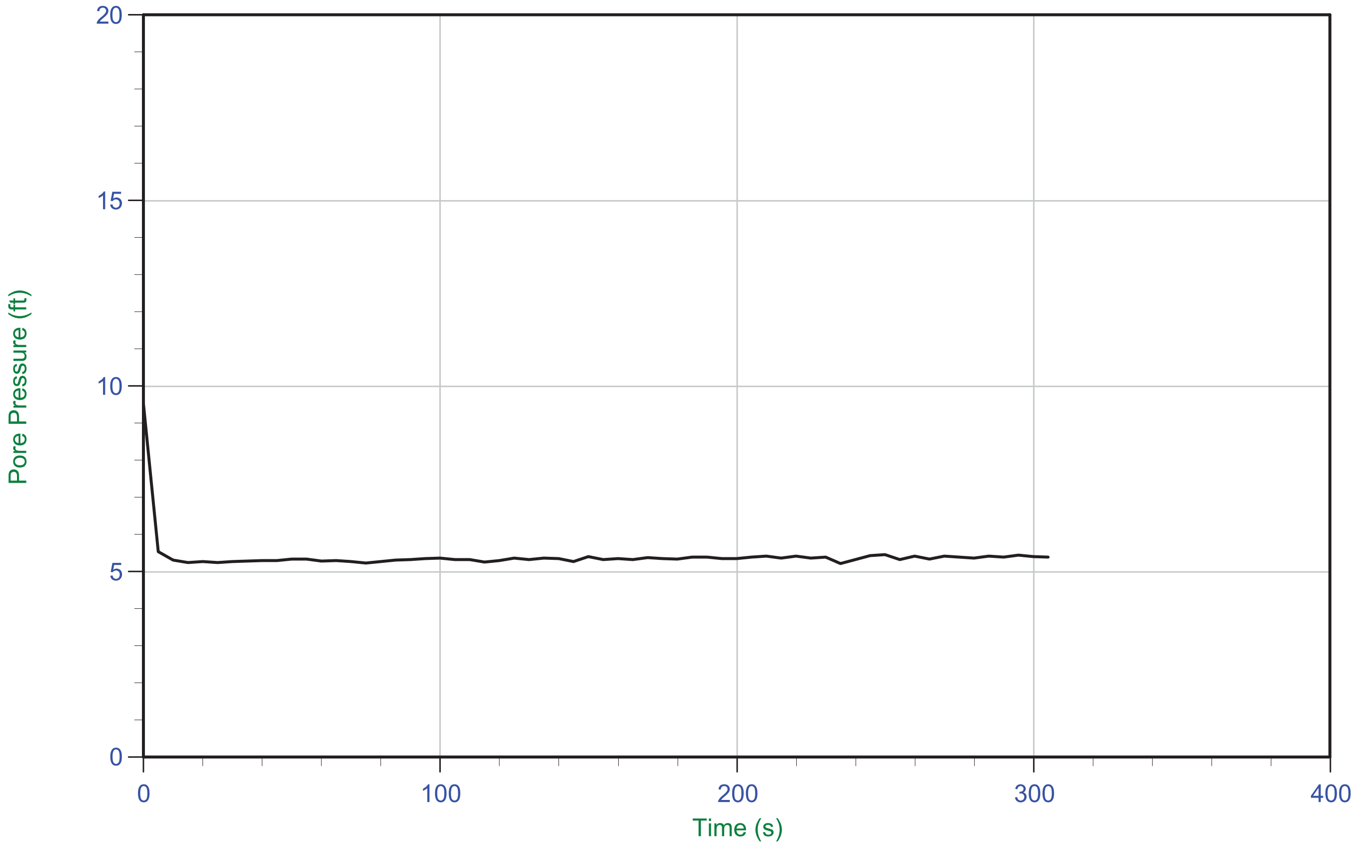
WT: 1.950 m / 6.397 ft
Ueq: 92.0 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/23/2016 09:06
Site: Plant Scherer

Sounding: C-112
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

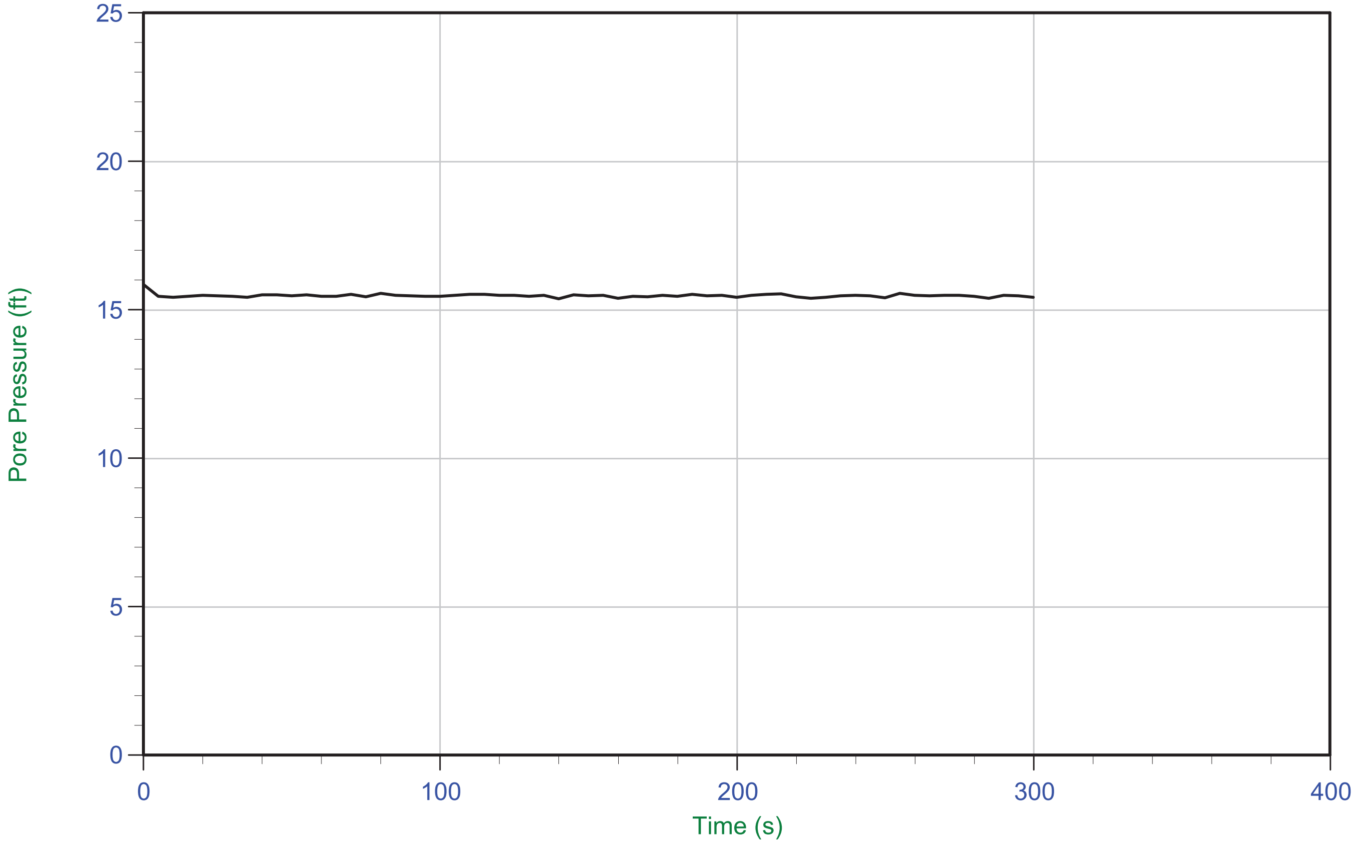
Filename: 16-54030_SPC-112.PPD
Depth: 3.100 m / 10.170 ft
Duration: 305.0 s

U Min: 5.2 ft
U Max: 9.5 ft

WT: 1.452 m / 4.763 ft
Ueq: 5.4 ft

CONETEC

AECOM	Job No: 16-54030 Date: 03/23/2016 09:06 Site: Plant Scherer	Sounding: C-112 Cone: 304:T1500F15U500 Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-112.PPD
Depth: 6.150 m / 20.177 ft
Duration: 300.0 s

U Min: 15.4 ft
U Max: 15.9 ft

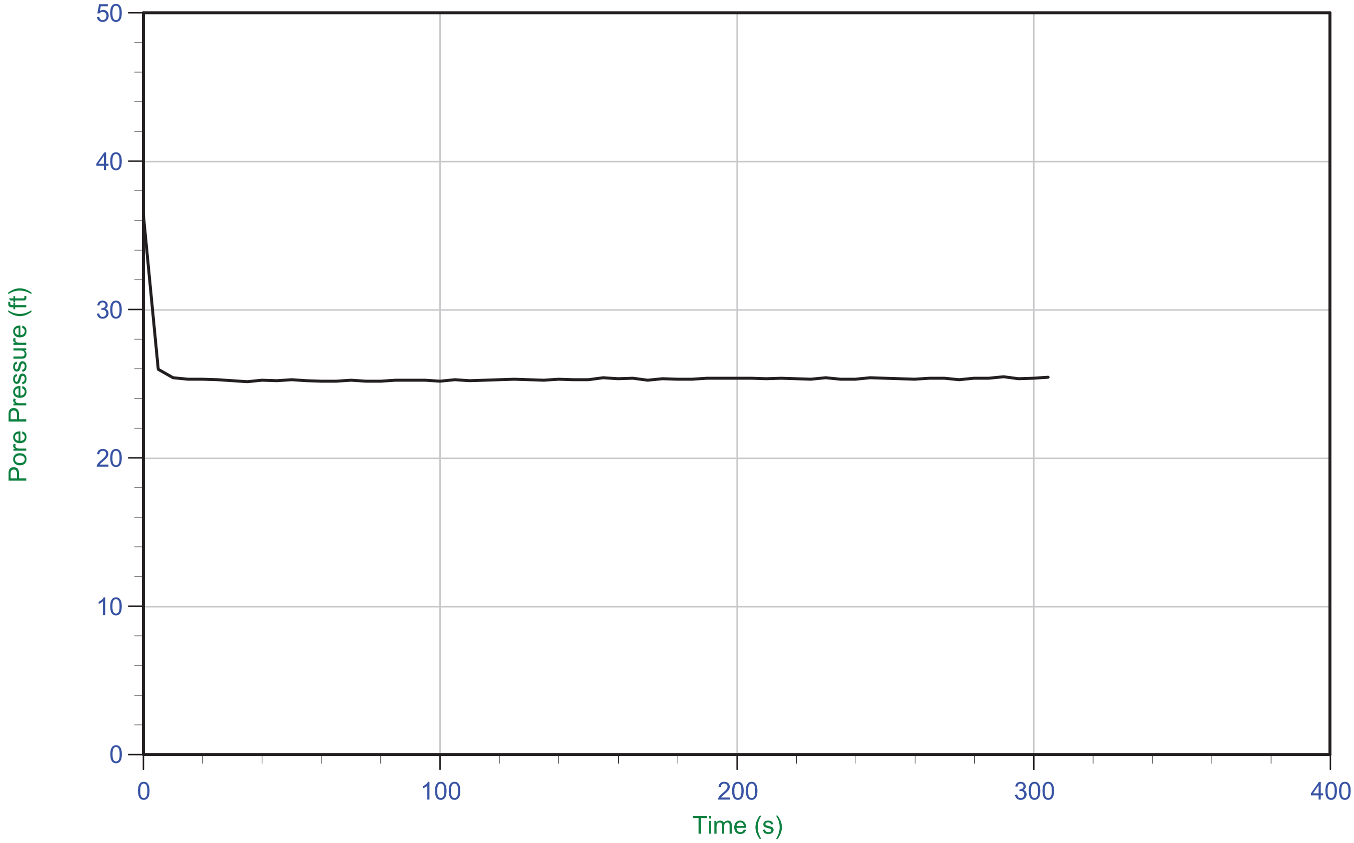
WT: 1.425 m / 4.676 ft
Ueq: 15.5 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/23/2016 09:06
Site: Plant Scherer

Sounding: C-112
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-112.PPD
Depth: 9.150 m / 30.019 ft
Duration: 305.0 s

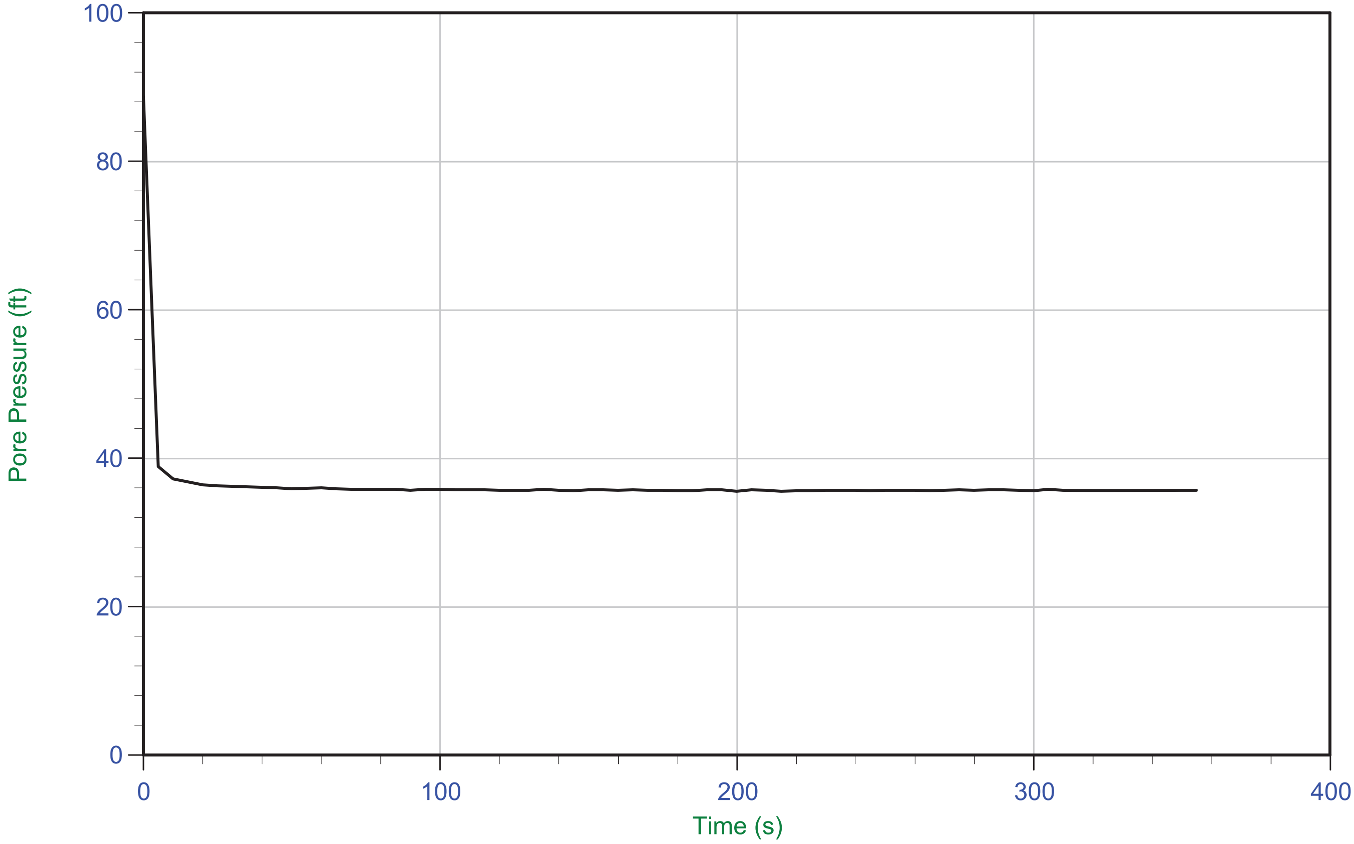
U Min: 25.2 ft
U Max: 36.4 ft

WT: 1.406 m / 4.612 ft
Ueq: 25.4 ft

AECOM

Job No: 16-54030
Date: 03/23/2016 09:06
Site: Plant Scherer

Sounding: C-112
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-112.PPD
Depth: 12.250 m / 40.190 ft
Duration: 355.0 s

U Min: 35.6 ft
U Max: 88.7 ft

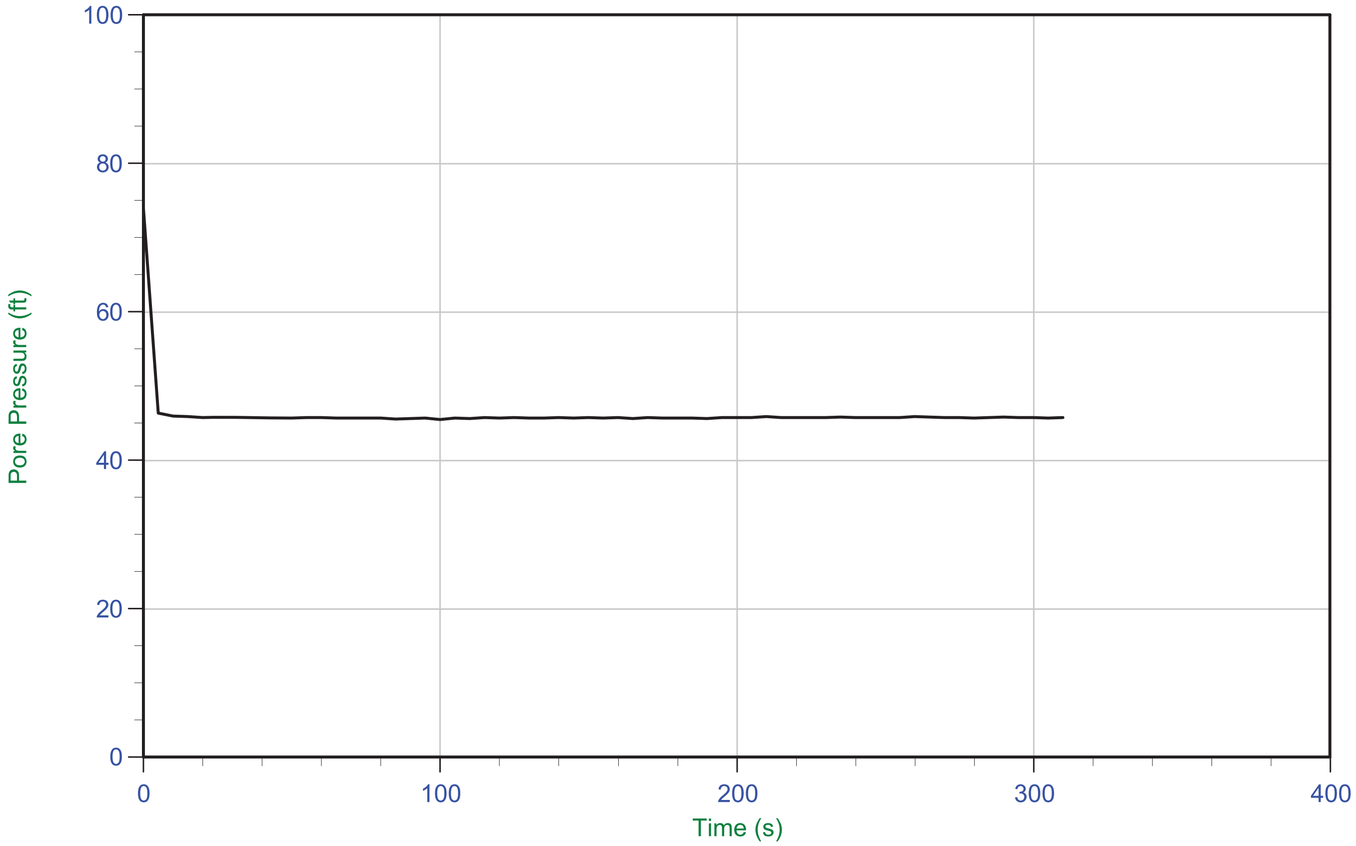
WT: 1.308 m / 4.293 ft
Ueq: 35.9 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/23/2016 09:06
Site: Plant Scherer

Sounding: C-112
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-112.PPD
Depth: 15.300 m / 50.196 ft
Duration: 310.0 s

U Min: 45.5 ft
U Max: 73.9 ft

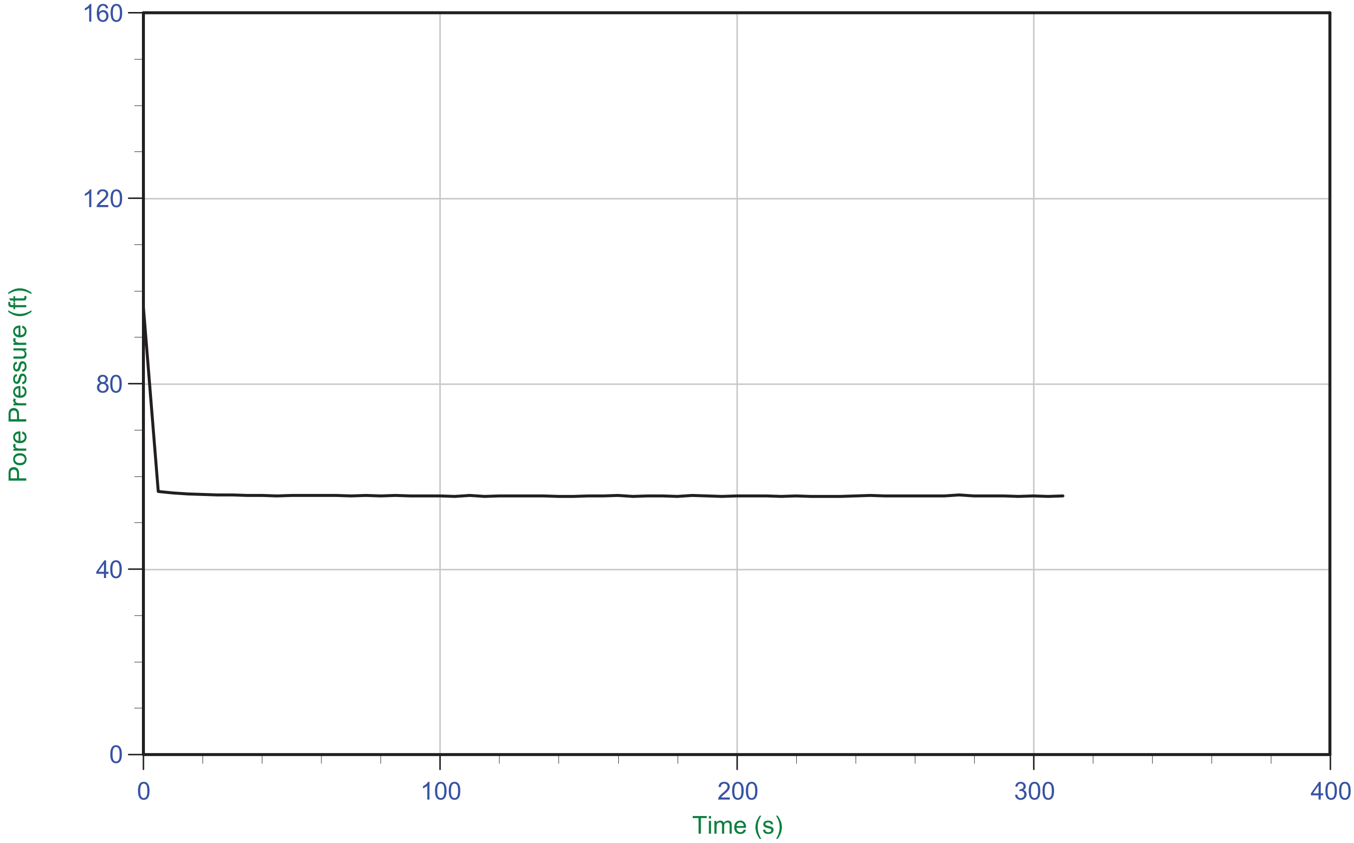
WT: 1.374 m / 4.509 ft
Ueq: 45.7 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/23/2016 09:06
Site: Plant Scherer

Sounding: C-112
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



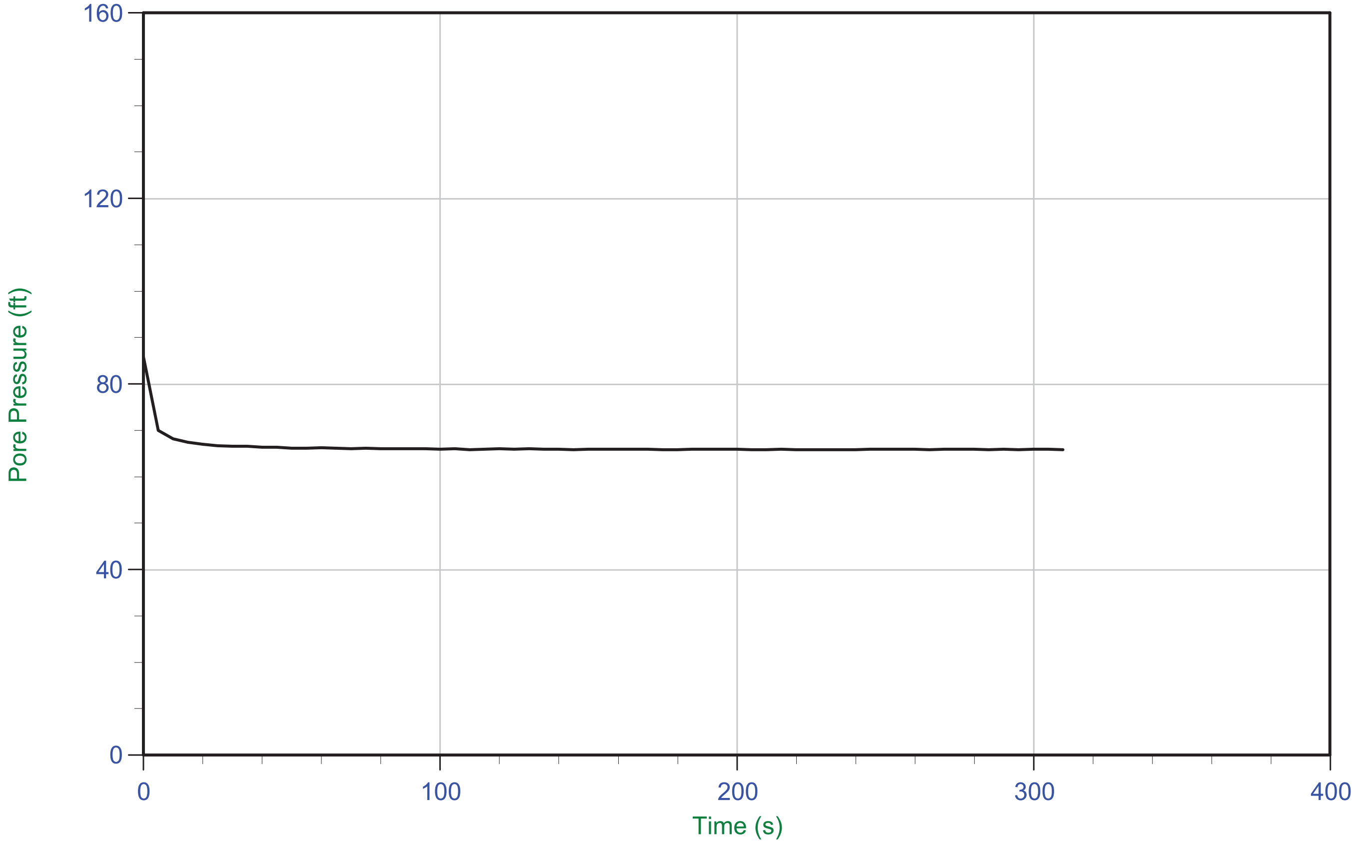
Trace Summary:

Filename: 16-54030_SPC-112.PPD
Depth: 18.350 m / 60.203 ft
Duration: 310.0 s

U Min: 55.7 ft
U Max: 96.5 ft

WT: 1.412 m / 4.632 ft
Ueq: 55.6 ft

AECOM	Job No: 16-54030	Sounding: C-112
	Date: 03/23/2016 09:06	Cone: 304:T1500F15U500
	Site: Plant Scherer	Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-112.PPD
Depth: 21.400 m / 70.209 ft
Duration: 310.0 s

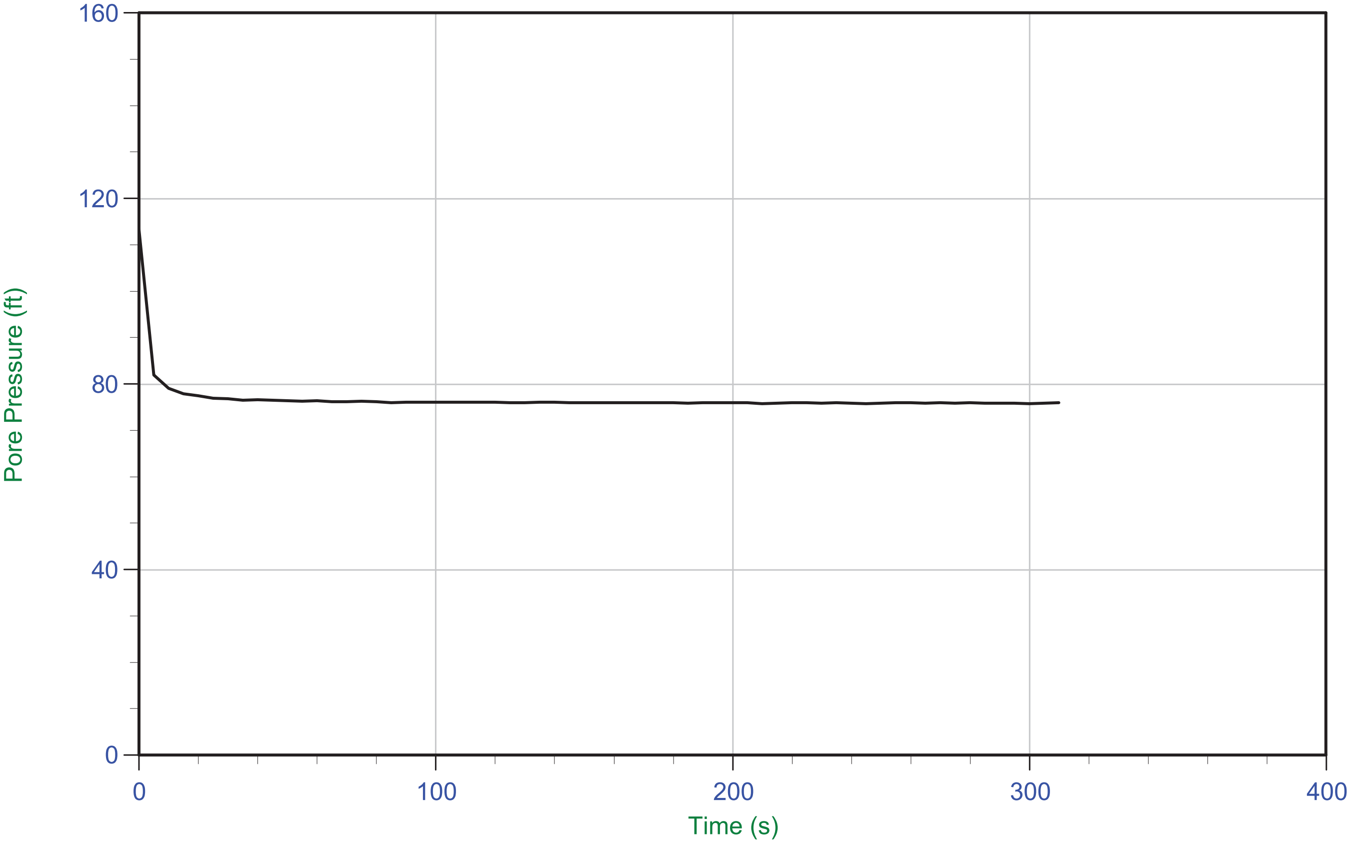
U Min: 65.8 ft
U Max: 86.0 ft

WT: 1.393 m / 4.569 ft
Ueq: 65.6 ft

AECOM

Job No: 16-54030
Date: 03/23/2016 09:06
Site: Plant Scherer

Sounding: C-112
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



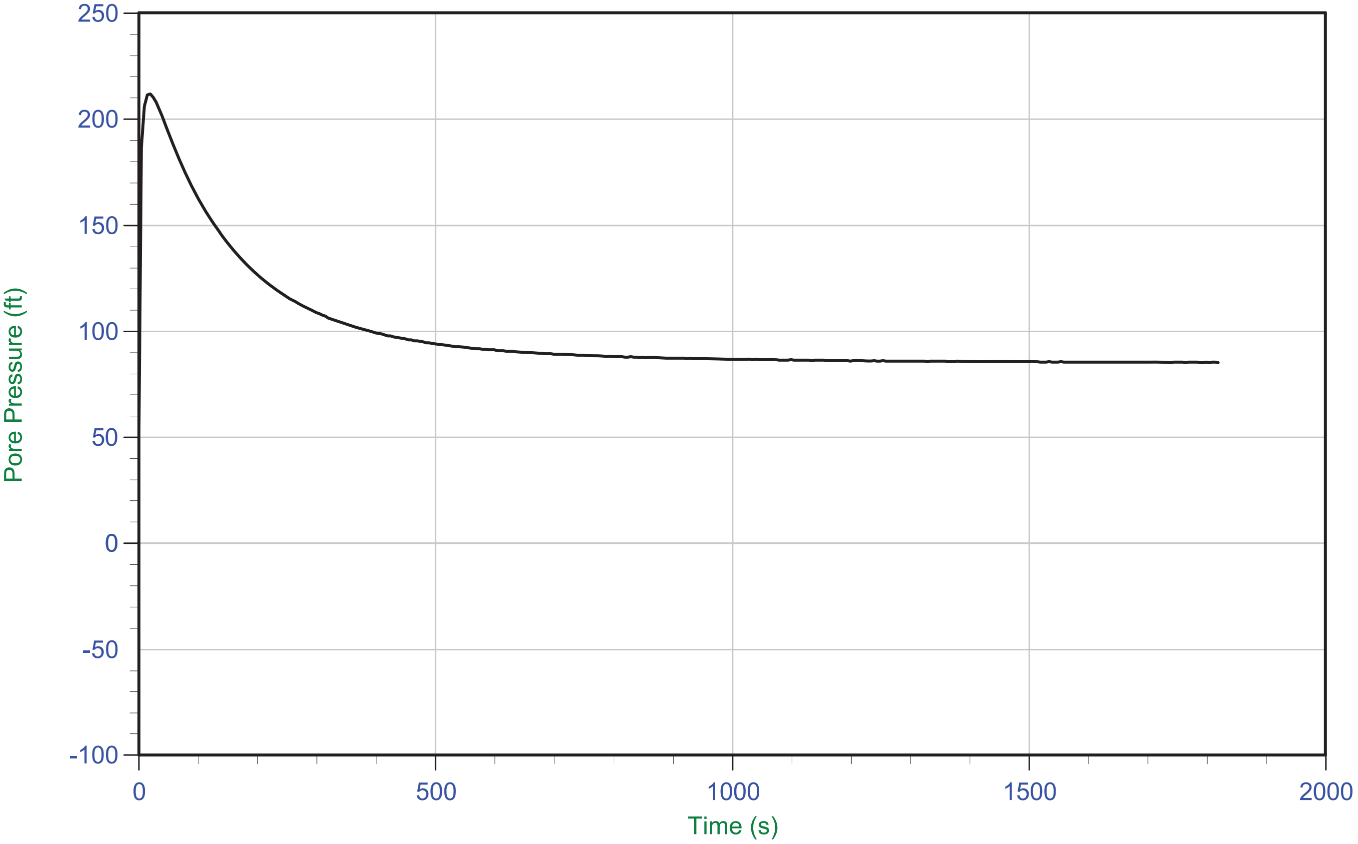
Trace Summary:

Filename: 16-54030_SPC-112.PPD
Depth: 24.450 m / 80.216 ft
Duration: 310.0 s

U Min: 75.8 ft
U Max: 113.3 ft

WT: 1.260 m / 4.133 ft
Ueq: 76.1 ft

CONETEC	AECOM	Job No: 16-54030 Date: 03/23/2016 09:06 Site: Plant Scherer	Sounding: C-112 Cone: 304:T1500F15U500 Cone Area: 15 sq cm



Trace Summary:

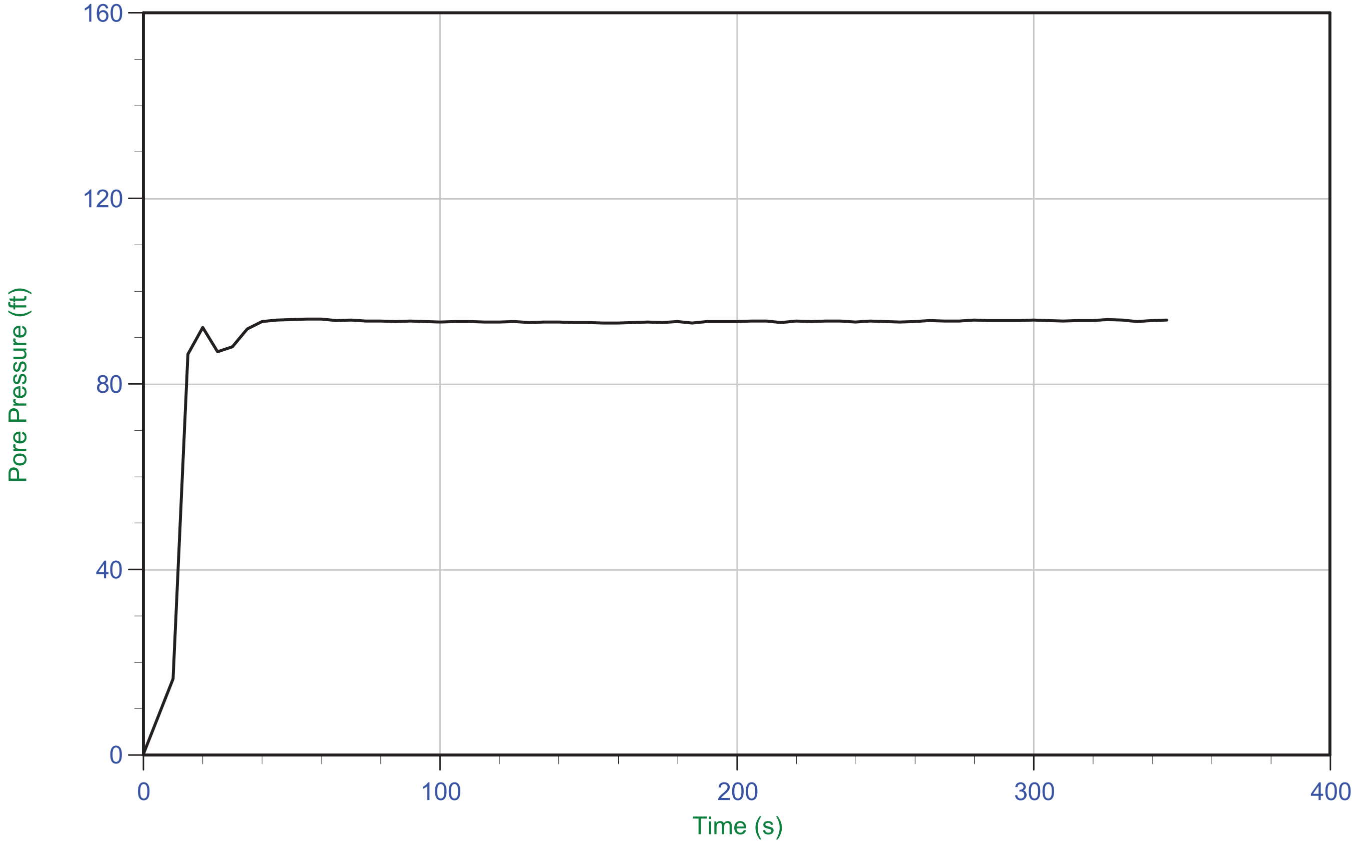
Filename: 16-54030_SPC-112.PPD
Depth: 27.500 m / 90.222 ft
Duration: 1820.0 s

U Min: 52.2 ft
U Max: 211.8 ft

WT: 1.532 m / 5.025 ft
Ueq: 85.2 ft

CONETEC

AECOM		
	Job No: 16-54030	Sounding: C-112
	Date: 03/23/2016 09:06	Cone: 304:T1500F15U500
	Site: Plant Scherer	Cone Area: 15 sq cm

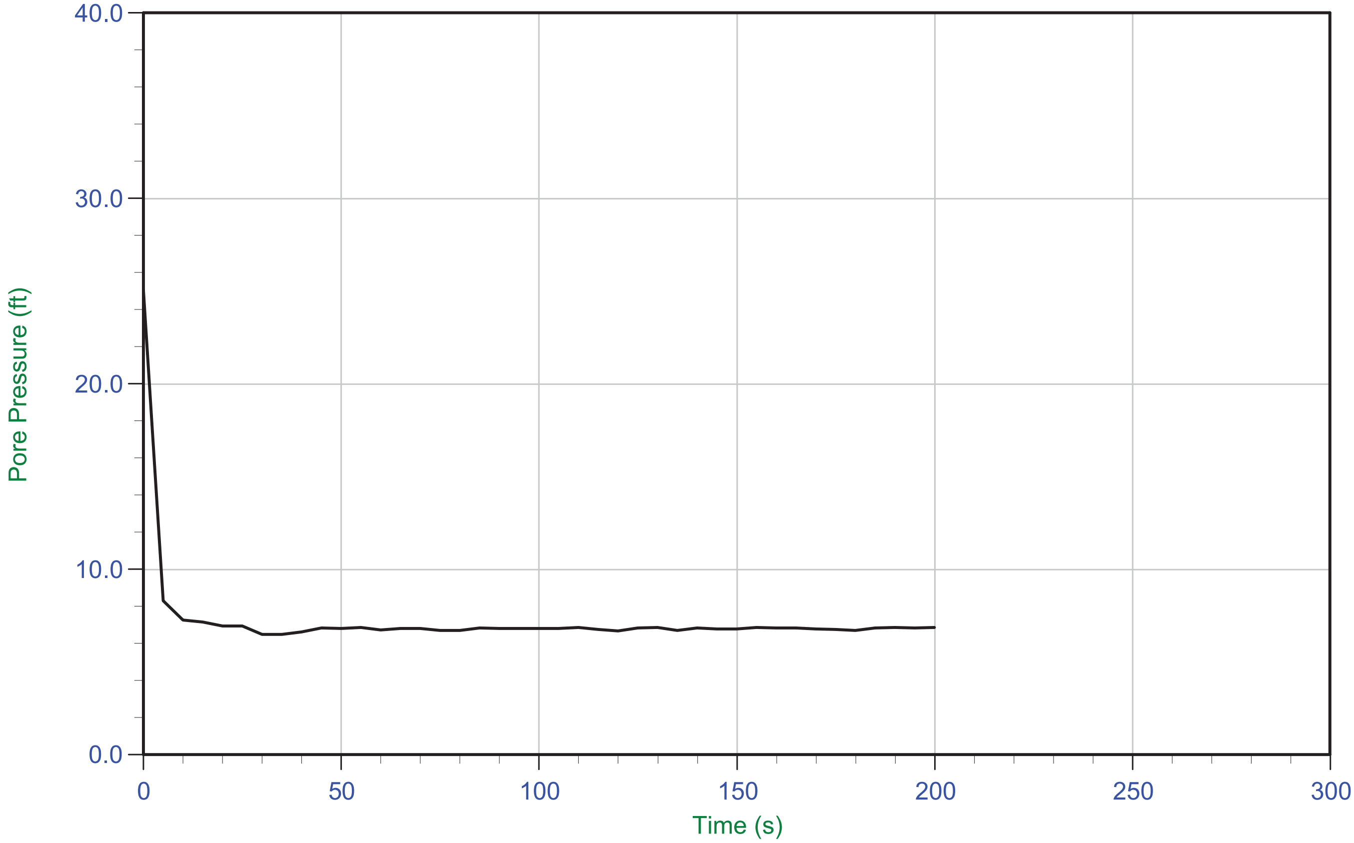


Trace Summary:
Filename: 16-54030_SPC-112.PPD
Depth: 30.600 m / 100.392 ft
Duration: 345.0 s
U Min: 0.2 ft
U Max: 94.0 ft
WT: 1.953 m / 6.408 ft
Ueq: 94.0 ft

AECOM

Job No: 16-54030
Date: 03/17/2016 09:32
Site: Plant Scherer

Sounding: C-113
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



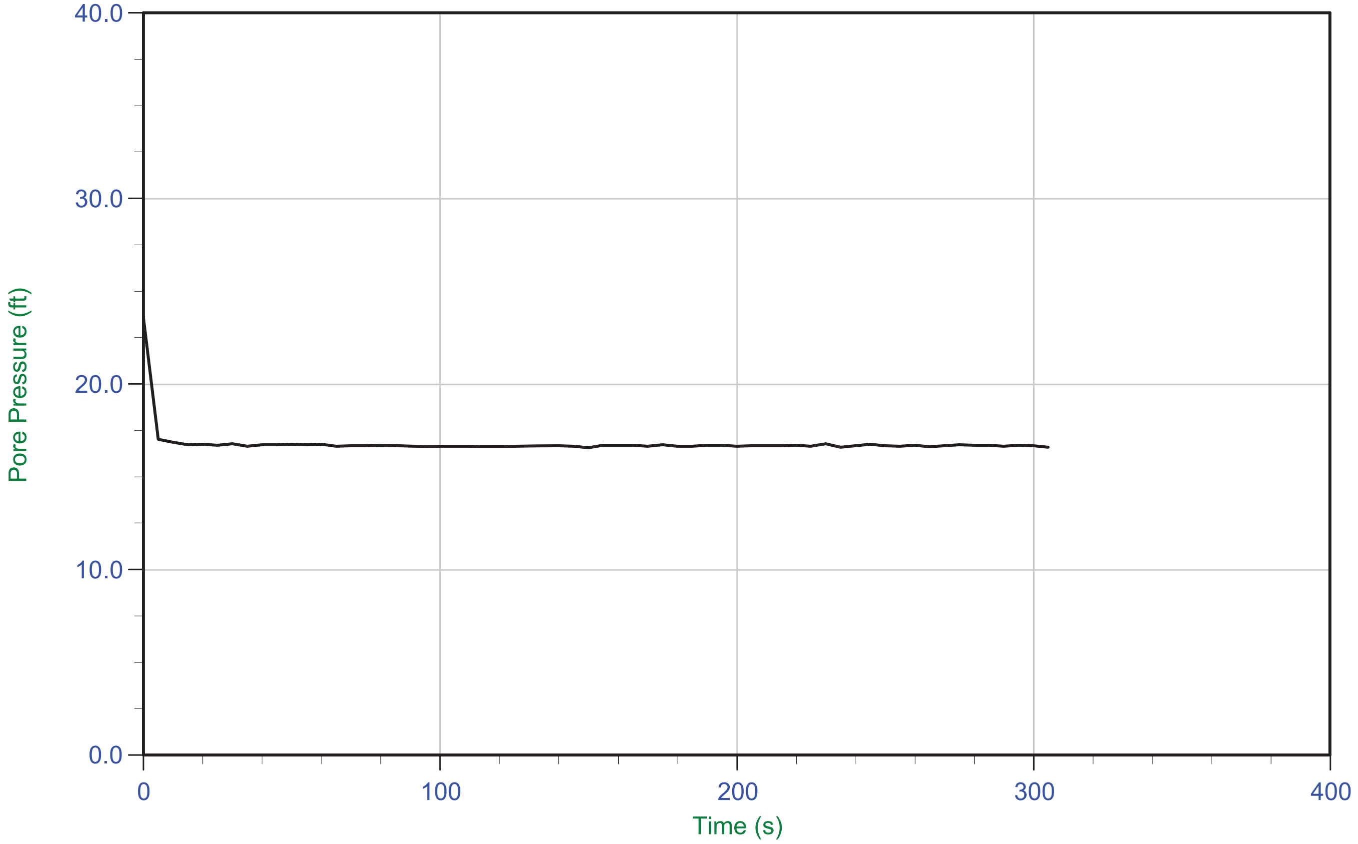
Trace Summary:

Filename: 16-54030_SPC-113.PPD
Depth: 3.050 m / 10.006 ft
Duration: 200.0 s

U Min: 6.5 ft
U Max: 25.1 ft

WT: 0.954 m / 3.130 ft
Ueq: 6.9 ft

AECOM	Job No: 16-54030	Sounding: C-113
	Date: 03/17/2016 09:32	Cone: 304:T1500F15U500
	Site: Plant Scherer	Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-113.PPD
Depth: 6.000 m / 19.685 ft
Duration: 305.0 s

U Min: 16.6 ft
U Max: 23.6 ft

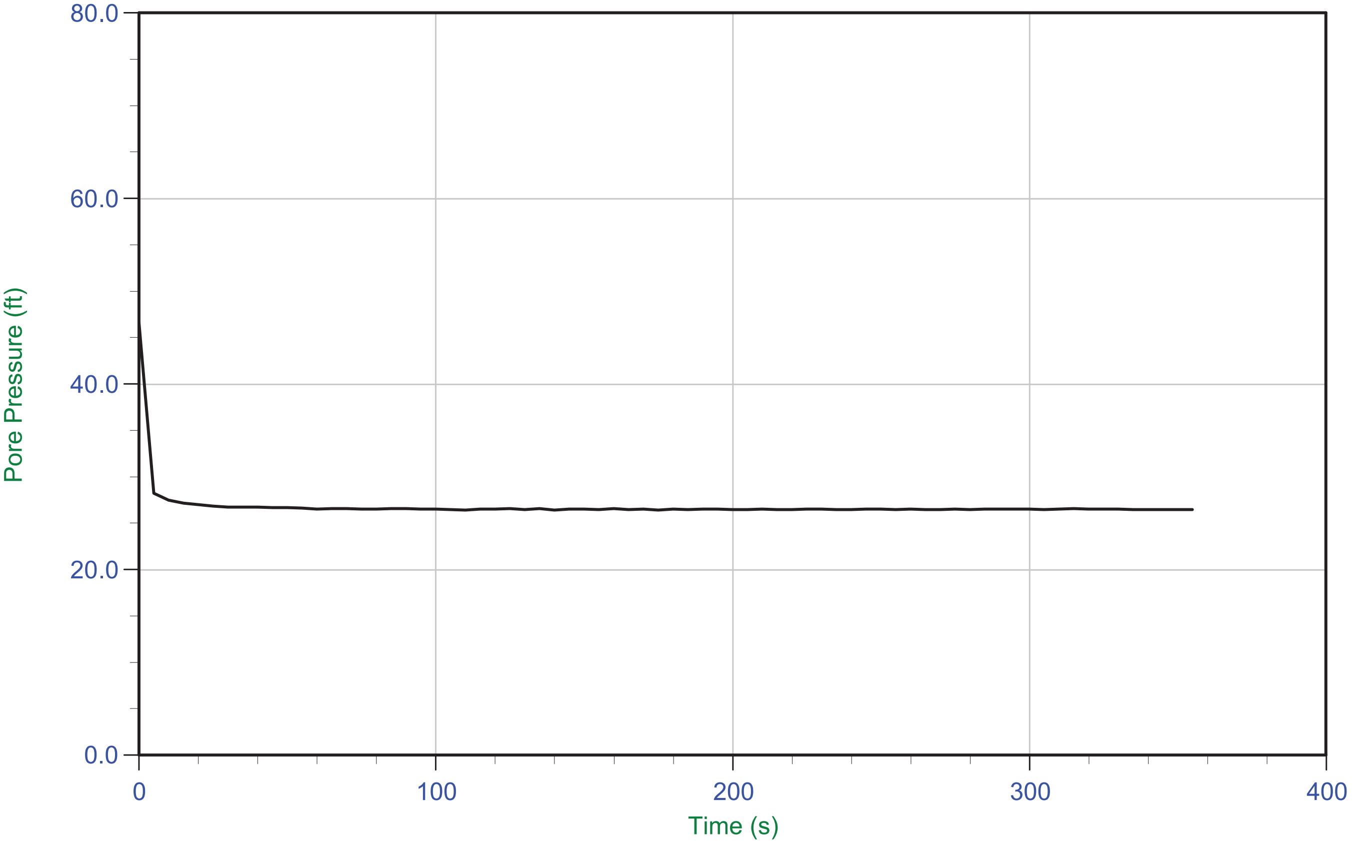
WT: 0.941 m / 3.088 ft
Ueq: 16.6 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/17/2016 09:32
Site: Plant Scherer

Sounding: C-113
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-113.PPD
Depth: 9.000 m / 29.527 ft
Duration: 355.0 s

U Min: 26.4 ft
U Max: 46.6 ft

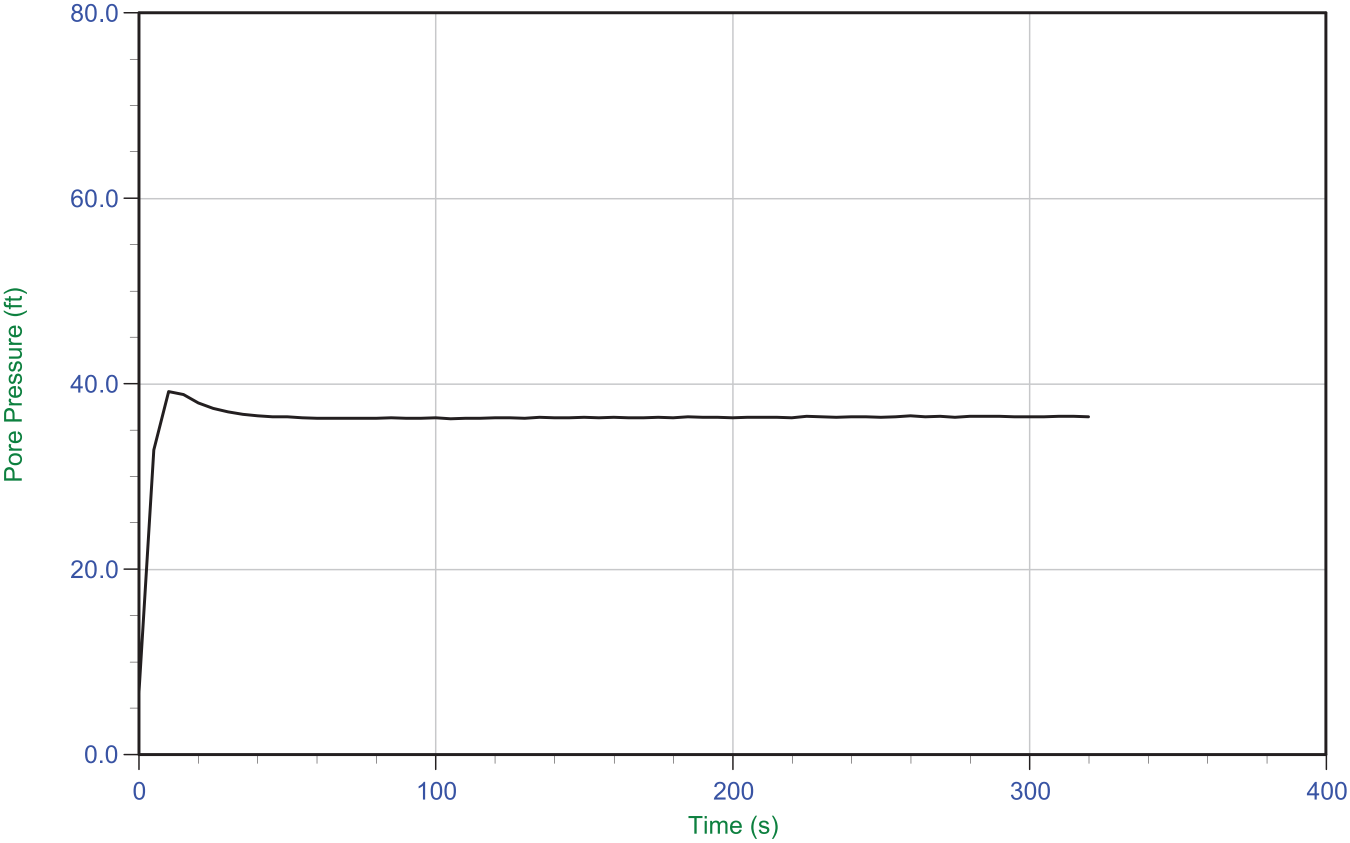
WT: 0.929 m / 3.047 ft
Ueq: 26.5 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/17/2016 09:32
Site: Plant Scherer

Sounding: C-113
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



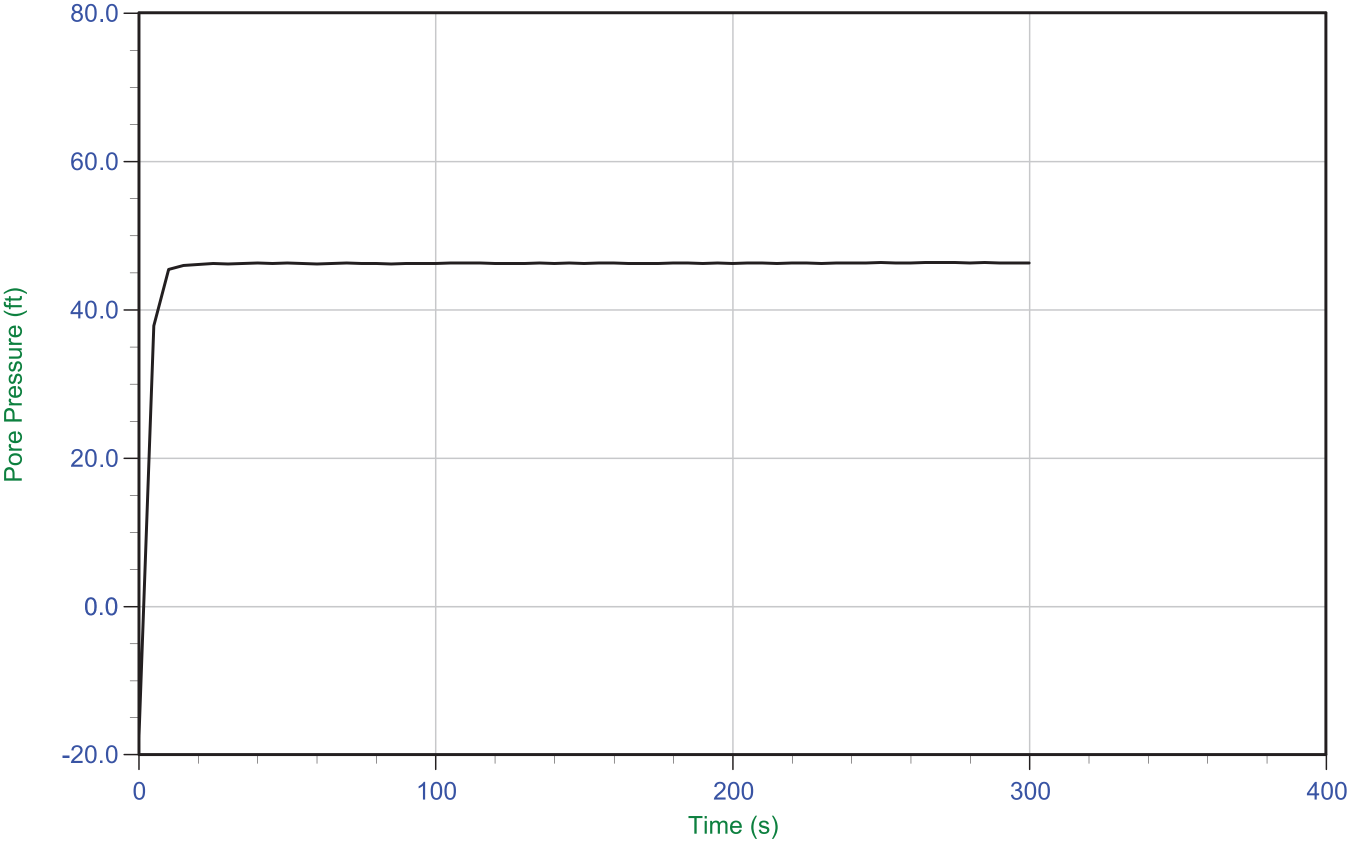
Trace Summary:

Filename: 16-54030_SPC-113.PPD
Depth: 12.200 m / 40.026 ft
Duration: 320.0 s

U Min: 6.7 ft
U Max: 39.1 ft

WT: 1.060 m / 3.476 ft
Ueq: 36.6 ft

CONETEC	AECOM	Job No: 16-54030 Date: 03/17/2016 09:32 Site: Plant Scherer	Sounding: C-113 Cone: 304:T1500F15U500 Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-113.PPD
Depth: 15.250 m / 50.032 ft
Duration: 300.0 s

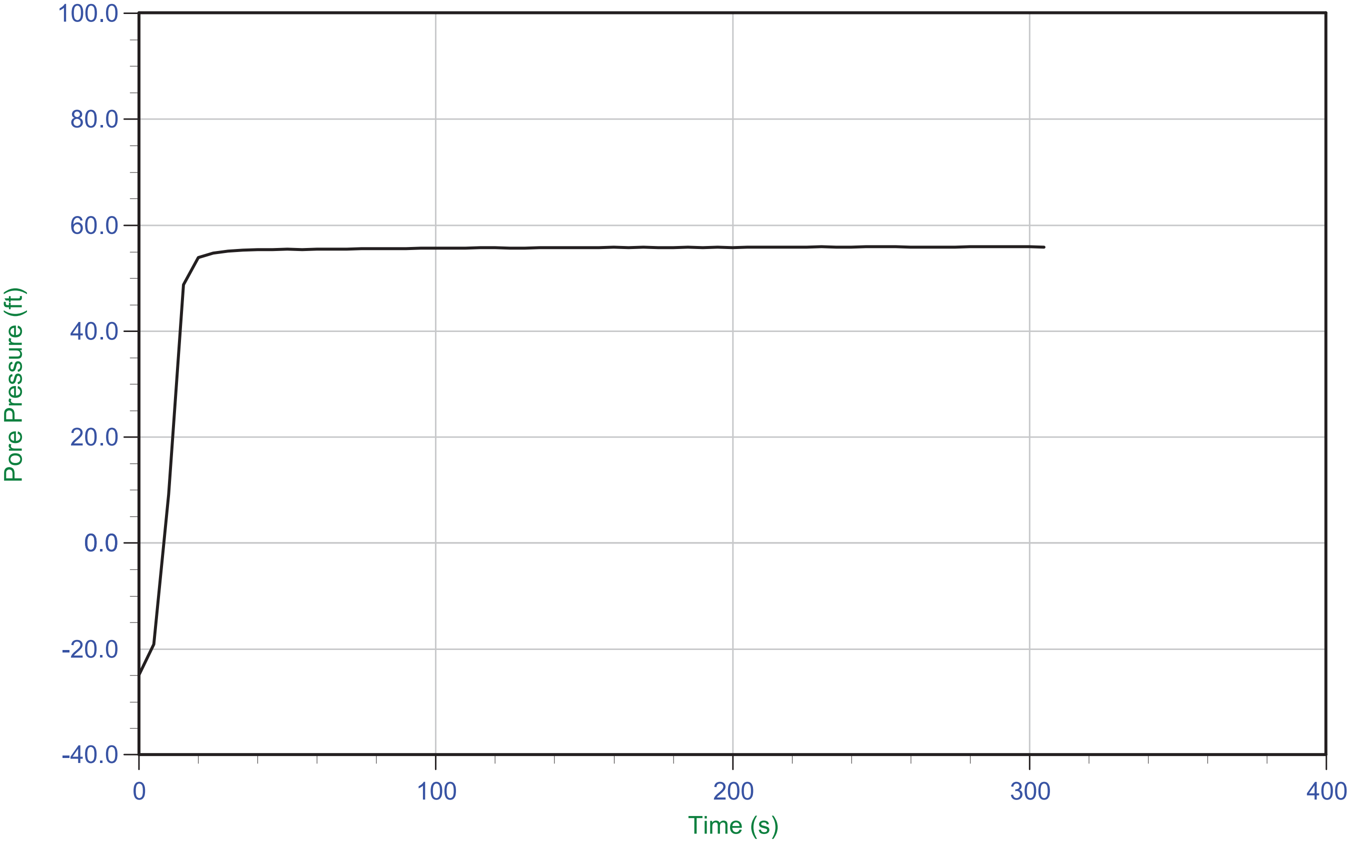
U Min: -17.5 ft
U Max: 46.4 ft

WT: 1.168 m / 3.832 ft
Ueq: 46.2 ft

AECOM

Job No: 16-54030
Date: 03/17/2016 09:32
Site: Plant Scherer

Sounding: C-113
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-113.PPD
Depth: 18.300 m / 60.039 ft
Duration: 305.0 s

U Min: -24.9 ft
U Max: 55.9 ft

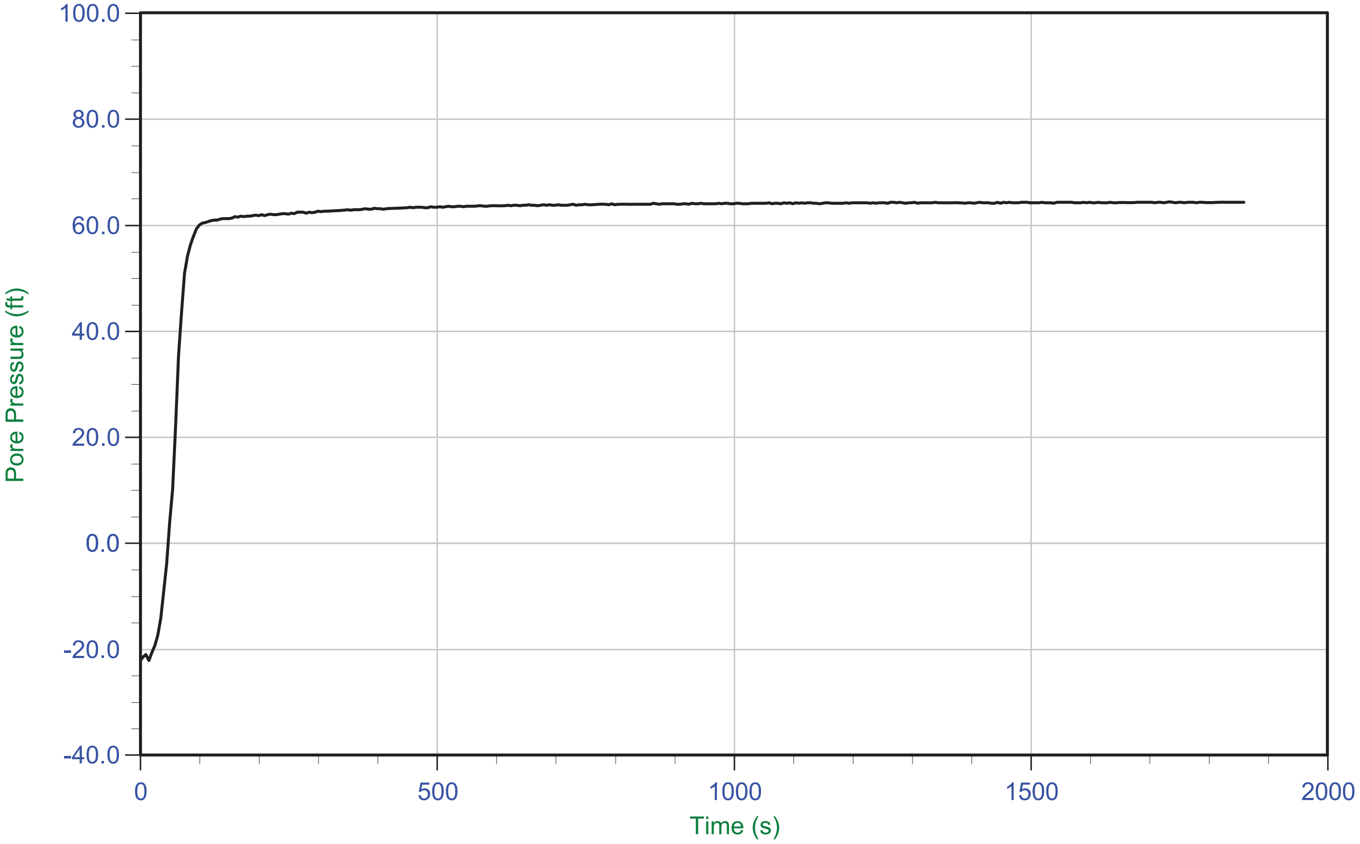
WT: 1.248 m / 4.095 ft
Ueq: 55.9 ft

CONETEC

AECOM

Job No: 16-54030
Date: 03/17/2016 09:32
Site: Plant Scherer

Sounding: C-113
Cone: 304:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54030_SPC-113.PPD
Depth: 21.000 m / 68.897 ft
Duration: 1860.0 s

U Min: -22.1 ft
U Max: 64.4 ft

WT: 1.362 m / 4.469 ft
Ueq: 64.4 ft

2016 AECOM Subsurface Investigation Laboratory Data

6/23

Table D.1: Laboratory Test Data Summary - Ash Pond Dike

BORING	SAMPLE DEPTH (ft)	SAMPLE NUMBER	GEOLOGIC DESCRIPTION[2]	INDEX TESTS										HYDRAULIC CONDUCTIVITY	DISPERSION TESTING		CONSOLIDATION TESTS Initial Conditions				STRENGTH TESTS[1] Triaxial Test						
				WATER CONTENT w (%)	LIQUID LIMIT LL (%)	PLASTIC LIMIT PL (%)	PLASTICITY INDEX PI (%)	USCS CLASSIFICATION[3]	SIEVE % Minus No. 200	HYDROMETER % Minus 5 µm	SPECIFIC GRAVITY	TOTAL[4] UNIT WEIGHT γ_t (pcf)	DRY[4] UNIT WEIGHT γ_d (pcf)	PERMEABILITY k (cm/sec)	DOUBLE HYDROMETER DISPERSION TEST (%)	Dispersive Classification[5]	Void Ratio	Saturation (%)	Swell Pressure (ksf)	Cv[6] (ft^2/sec)	Test Type	σ'_1 at Failure (ksf)	σ'_3 at Failure (ksf)	Effective Confining Pressure (ksf)	Total Confining Pressure (ksf)	Strain at Failure (%)	Undrained Strength (ksf)
B-100	3.5-5.0	SPT-2	EMBANKMENT FILL	16.9																							
	8.0-10.0	T-4		27.2	69	38	31	MH				115.7	91.0														
	13.5-15.0	SPT-5		28.3												Grade 4											
	18.0-20.0	T-6		28.3	64	42	22	MH	62.7	29.2		116.2	91.3	3.2E-07													
	23.5-25.0	SPT-7		26.9					59.0	24.9																	
	25.0-27.0	T-8		28.3	66	42	24	MH	67.0	38.6		114.3	90.1								CU	7.27	1.85	4.75		4.40	
																						8.43	2.46	6.33		6.13	
	30.0-32.0	T-10		20.5	52	20	32	CH	67.2	47.4		127.0	103.5	8.9E-07													
	33.5-35.0	SPT-11		28.0												Grade 4											
	35.0-37.0	T-12		30.2	71	39	32	MH	78.5	47.9		114.6	85.6								CU	7.01	1.88	4.32		5.79	
																						8.78	2.45	6.48		5.47	
																						11.80	3.10	8.64		5.47	
	38.5-40.0	SPT-13		27.8					65.4	35.1																	
	40.0-42.0	T-14		27.7	68	37	31	MH	69.5	45.5		119.2	99.0								CU	6.64	1.76	4.90		7.00	
																						10.26	2.90	7.34		8.97	
	48.5-50.0	SPT-16		29.5																							
	53.5-55.0	SPT-17	RESIDUUM	10.6					5.4																		
	58.5-60.0	SPT-18		28.0												Grade 4											
	68.5-70.0	SPT-20	SAPROLITE	27.5					41.4	9.3																	
	88.5-90.0	SPT-24	PWR	20.8					42.0	8.9																	
	98.5-100.0	SPT-26		25.5																							
B-101	1.0-2.5	S-1	GENERAL FILL	22.5	33	23	10	CL																			
	5.0-7.0	S-3	ALLUVIUM																								
	8.5-10.0	S-4		31.8	39	21	18	CL																			
	12.0-13.5	S-6		24.2	51	19	32	CH																			
	13.5-15.5	S-7		26.2	26	21	5	CL-ML	50.2	10.0		122.8	95.0								CU	2.72	0.68	1.30		4.81	
																						3.50	0.87	2.02		6.93	
																						3.78	0.93	2.59		9.66	
	18.5-20.0	S-8	SAPROLITE	27.5					38.7	9.0																	
	33.5-35.0	S-11		13.2																							
	41.0-42.0	S-13		16.9																							

NOTES:

[1] SHEAR STRENGTH PARAMATERS BASED ON PEAK EFFECTIVE PRINCIPAL STRESS RATIO

[2] BASED ON VISUAL OBSERVATIONS

[3] USCS CLASSIFICATION OF FINE GRAINED SOIL COMPONENT ASSUMED WHEN ATTERBERG LIMITS ARE NOT COMPLETED

[4] SPECIFIC GRAVITY WAS ASSUMED WHEN SPECIFIC GRAVITY TESTS WERE NOT PERFOMED.

[5] DISPERSIVE CLASSIFICATION REPORTED AT 1 HOUR. FOR MORE DETAILED CLASSIFICATION REFER TO APPENDIX.

[6] C_v VALUES ARE ONLY FOR RECOMPRESSION.

Table D.2: Laboratory Test Data Summary - Ash Delta

				INDEX TESTS											HYDRAULIC CONDUCTIVITY	DISPERSION TESTING		CONSOLIDATION TESTS Initial Conditions				STRENGTH TESTS[1] Triaxial Test						
BORING	SAMPLE DEPTH (ft)	SAMPLE NUMBER	GEOLOGIC DESCRIPTION[2]	WATER CONTENT w (%)	LIQUID LIMIT LL (%)	PLASTIC LIMIT PL (%)	PLASTICITY INDEX PI (%)	USCS CLASSIFICATION[3]	SIEVE % Minus No. 200	HYDROMETER % Minus 5 µm	SPECIFIC GRAVITY	DOUBLE HYDROMETER DISPERSION (%)	TOTAL[4] UNIT WEIGHT γ_t (pcf)	DRY[4] UNIT WEIGHT γ_d (pcf)	PERMEABILITY k (cm/sec)	DOUBLE HYDROMETER DISPERSION TEST (%)	Dispersive Classification[5]	Void Ratio	Saturation (%)	Swell Pressure (ksf)	Cv[6] (ft^2/sec)	Test Type	σ'_1 at Failure (ksf)	σ'_3 at Failure (ksf)	Effective Confining Pressure (ksf)	Total Confining Pressure (ksf)	Strain at Failure (%)	Undrained Strength (ksf)
B-102	3.5-5.0	S-2	CCR	24.6				SM	21.4	3.0																		
	6.0-8.0	S-3		50.3				ML	53.0	6.3	2.39		98.8	65.8	1.50E-04			1.07	98.07	1.34	1.37E-05							
	8.5-10.0	S-4		78.0	NP	NP	NP																					
	13.0-15.0	S-5		40.8				ML	97.2	14.4			98.8	70.8								CU	4.10 5.92 5.68	0.98 1.65 1.22	0.72 1.08 1.44		2.20 4.88 2.23	
	23.0-25.0	S-8		62.6				ML	85.3	13.8	2.34		92.3	56.8	1.50E-04													
	33.0-35.0	S-10		40.2				ML	93.2	9.1			93.0	67.9								CU	8.10 5.56 7.67	1.81 1.40 2.03	1.29 1.94 2.59		1.53 3.05 3.33	
	38.0-40.0	S-11		41.9				ML	90.0	13.0			93.9	66.2	2.10E-05													
	43.0-45.0	S-12		49.0				ML	84.5	11.8			87.5	58.6								CU	4.40 6.79 9.38	1.09 1.85 2.63	1.58 2.38 3.17		3.83 3.50 2.75	
	48.5-50.0	S-13		47.4				ML	82.7																			
	58.5-60.0	S-15		51.3				ML	87.7		2.35																	
	63.0-65.0	S-16		59.0				ML	91.9	17.3			90.0	56.6	3.40E-05			1.35	97.90	0.14	1.08E-05							
	68.5-70.0	S-17	SAPROLITE	22.9	41	15	26	CL	55.7																			
	78.5-80.0	S-19		43.1	NP	NP	NP	SM	21.6																			
B-103	3.5-5.0	S-2	CCR	66.5				ML	65.3	17.9																		
	8.0-10.0	S-4		31.8				ML	54.6	6.3	2.37		109.5	79.3								CU	3.94 6.78 6.95	0.70 1.36 1.31	0.72 1.08 1.44		2.58 2.68 2.33	
	22.0-24.0	S-8		82.7				ML	81.7	15.5																		
	26-28	S-10		76.0	NP	NP	NP																					
	38.0-40.0	S-11		77.3				ML	77.7	13.0			90.7	51.2	1.1E-04			1.57	94.94	0.16	1.22E-05							
	43.0-45.0	S-12		61.8				ML	93.6	18.9			89.2	47.6								CU	2.90 2.04 4.86	0.49 0.29 1.10	1.73 2.59 3.45		1.51 5.89 4.67	
	48.5-50.5	S-13		69.1				ML	84.9	13.8	2.34		92.8	54.9	6.3E-05			1.84	96.14	0.16	9.95E-06							
	53.0-55.0	S-14		54.5				ML	95.1	16.4			90.1	52.9								CU	3.34 3.58 4.02	0.79 0.70 0.92	2.02 3.02 4.03		2.98 2.40 5.53	
	58.0-60.0	S-15		40.2				ML	87.9	13.8			99.5	71.0	1.5E-04													
	68.5-70.0	S-17		53.3				ML	66.6		2.33																	
	78.5-80.0	S-19		64.4				ML	75.0	14.6																		
	83.5-85.0	S-20	ALLUVIUM	26.6				SP-SC	11.7																			
	93.5-95.0	S-22	SAPROLITE	13.3				SC	34.2																			
B-104	3.5-5.0	S-2	CCR	19.1				SP	9.8	3.0	2.66																	
	13.0-15.0	S-6		41.5				SM	35.9	4.0			94.8	68.6	3.8E-04													
	28.0-30.0	S-9		60.0				ML	88.4	15.2			97.2	63.7								CU	2.72 4.23 5.30	0.16 0.29 0.20	1.15 1.73 2.30		1.24 1.40 1.55	
	33.0-35.0	S-10		67.5				ML	65.7	7.3			59.9	35.7	7.4E-05			1.60	99.76	0.15	1.58E-05							
	43.5-45.0	S-12		79.0				ML	81.6	15.4	2.33																	
	48.0-50.0	S-13		30.3				ML	69.7	7.9			90.7	43.4								CU	3.14 3.07 3.67	0.63 0.24 0.56	1.73 2.59 3.45		2.50 3.98 3.07	
	58.0-60.0	S-15		83.5				ML	83.7	17.7			84.1	45.9	9.4E-05													
	68.5-70.0	S-17		48.3				ML	84.3	9.1																		
	73.5-75.0	S-18		46.0	NP	NP	NP																					
	78.5-80.0	S-19		45.4				ML	79.2	11.3																		
	83.5-83.8	S-20	ALLUVIUM	52.5																								
	83.8-84.7	S-21		72.7	NP	NP	NP																					
	84.7-85.0	S-22		24.9																								
	88.5-90.0	S-23		24.3	35	19	16	SC	46.1																			
	93.5-94.0	S-24	PARTIALLY WEATHERED ROCK	17.2				SM	20.8																			

NOTES:

[1] SHEAR STRENGTH PARAMATERS BASED ON PEAK EFFECTIVE PRINCIPAL STRESS RATIO

[2] BASED ON VISUAL OBSERVATIONS

[3] USCS CLASSIFICATION OF FINE GRAINED SOIL COMPONENT ASSUMED WHEN ATTERBERG LIMITS ARE NOT COMPLETED

[4] SPECIFIC GRAVITY WAS ASSUMED WHEN SPECIFIC GRAVITY TESTS WERE NOT PERFOMED.

[5] DISPERSIVE CLASSIFICATION REPORTED AT 1 HOUR. FOR MORE DETAILED CLASSIFICATION REFER TO APPENDIX.

[6] C_v VALUES ARE ONLY FOR RECOMPRESSION.

Table D.3: Laboratory Test Data Summary - Ash Pond Free Water

BORING	SAMPLE DEPTH (ft)	SAMPLE NUMBER	GEOLOGIC DESCRIPTION^{2}	INDEX TESTS											HYDRAULIC CONDUCTIVITY	DISPERSION TESTING		CONSOLIDATION TESTS Initial Conditions				STRENGTH TESTS^{1} Triaxial Test						
				WATER CONTENT w (%)	LIQUID LIMIT LL (%)	PLASTIC LIMIT PL (%)	PLASTICITY INDEX PI (%)	USCS CLASSIFICATION^{3}	SIEVE % Minus No. 200	HYDROMETER % Minus 5 µm	SPECIFIC GRAVITY	DOUBLE HYDROMETER DISPERSION (%)	TOTAL^{4} UNIT WEIGHT γ_t (pcf)	DRY^{4} UNIT WEIGHT γ_d (pcf)	PERMEABILITY k (cm/sec)	DOUBLE HYDROMETER DISPERSION TEST (%)	Dispersive Classification^{5}	Void Ratio	Saturation (%)	Swell Pressure (ksf)	Cv^{6} (ft^{2}/sec)	Test Type	σ'_1 at Failure (ksf)	σ'_3 at Failure (ksf)	Effective Confining Pressure (ksf)	Total Confining Pressure (ksf)	Strain at Failure (%)	Undrained Strength (ksf)
B-105	49.5-51.5	SS-1	CCR	38.9																								
	53.0-54.0	T-1	RESIDUUM	40.2	94	41	53	MH	80.0				102.6	70.2	4.10E-07													
	54.0-55.5	SS-3		39.2	85	45	40	MH																				
	57.0-58.5	SS-5		47.1																								
	58.5-60.0	SS-6		43.7																								
	61.5-63.0	SS-8		59.9	78	58	20	MH	75.8																			
	64.5-66.0	SS-10		54.1																								
	67.5-69.0	SS-12	SAPROLITE	53.8					42.2																			
	73.5-75.0	SS-13		68.5				ML	54.9																			
	78.5-80.0	SS-14		63.8	NP	NP	NP	ML																				
	83.5-85.0	SS-15		42.8																								
B-105A	57.0-59.0	T-1	RESIDUUM	30.9	62	24	38	CH					112.1	85.7								CU	1.24 2.44 6.12	0.29 0.58 1.10	1.15 2.30 3.46		6.18 5.43 2.68	
	63.0-65.0	T-3		61.6	57	39	18	MH					99.4	61.5														
	73.0-75.0	T-4	SAPROLITE	62.1	NP	NP	NP	SM	29.5				102.6	63.3														
	83.0-85.0	SPT-1		53.7				ML	59.2																			
B-106	29.5-31.0	SS-1	CCR	34.5																								
	33.5-35.5	T-1	RESIDUUM	32.8	49	40	9	SM	41.2				112.7	85.7								UU				3.60	12.70	1.40
	37.0-38.5	SS-4	SAPROLITE	42.0					26.3																			
B-107	20.5-21.5	SS-1	CCR	66.6																								
	21.5-23.5	SS-2A	TOPSOIL	36.7																								
	25.0-27.0	T-1	RESIDUUM	37.8					53.0				112.9	81.9								CU	3.34 9.95	0.80 2.85	2.16 6.48		5.50 3.58	
	28.5-30.0	SS-4		20.4																								
B-108	46.75-47.5	SS-1A	CCR	61.7				CL	73.1	51.8																		
	47.5-48.5	SS-1B	TOPSOIL	33.8	44	21	23	CL																				
	48.5-50.0	SS-2	ALLUVIUM	30.3	36	18	18	CL																				
	55.5-57.0	SS-4	RESIDUUM	24.5	40	17	23	CL																				
	61.0-62.5	SS-6	SAPROLITE	48.5	NP	NP	NP	SM	29.9																			
	70.5-72.0	SS-8		41.8				SM	25.5																			
B-109	31.0-31.8	SS-1	CCR	90.8																								
	37.0-38.5	SS-2	RESIDUUM	24.6																								
	40.0-41.5	SS-3	PARTIALLY WEATHERED ROCK	17.3																								
B-110	47.75-48.25	SPT-1A	CCR	86.6				CL	73.9	49.4																		
	52.0-54.0	T-1	RESIDUUM	20.1	73	35	38	MH					122.7	102.2								UU				3.74	15.10	2.42
	63.5-65.0	SPT-7		40.3	70	35	35	MH	76.8																			
	73.5-75.0	SPT-9	SAPROLITE	25.7				SM	21.5																			
B-111	59.0-60.5	SS-1	CCR	25.6					44.3	13.1																		
	62.0-62.5	SS-2A	RESIDUUM	36.4	65	28	37	CH																				
	65.0-66.5	SS-3	SAPROLITE	22.1					38.7																			
	73.0-74.5	SS-6	PARTIALLY WEATHERED	13.7					18.5																			
	88.0-89.4	SS-9		15.9																								
B-112	42.5-42.8	SS-1A	CCR	53.3					71.7																			
	42.8-44.0	SS-1B	RESIDUUM	40.7	60	26	34	CH									Grade 1											
	44.5-46.0	SS-2		26.4	49	22	27	CL	40.0	14.0						35												
	47.5-49.0	SS-4		25.0																								
	54.0-56.0	T-2	SAPROLITE	56.2	NP	NP	NP	SM	25.2																			
	61.0-62.5	SS-8		35.9					20.1																			
	71.0-72.5	SS-10		19.9																								
B-113	12.5-12.9	SS-1	CCR	31.5					46.9	28.4																		
	15.0-17.0	T-1	RESIDUUM	34.2	66	37	29	MH	52.5													CU	2.10 2.42 5.50	0.41 0.55 1.57	0.72 1.44 2.88		1.40 3.32 3.00	
	18.5-20.0	SS-3		43.4																								
	20.0-21.5	SS-4		48.1					52.2																			
	27.0-28.5	SS-7	SAPROLITE	18.5																								
B-114	28.5-28.9	SS-1A	CCR AND LAKE BED	70.2					32.7	16.4																		
	28.9-30.0	SS-1B	RESIDUUM	30.5																								
	30.0-31.5	SS-2		24.7																								
	35.0-36.5	SS-4		32.4																								
	37.0-39.0	T-1		29.9	NP	NP	NP	SM	23.0																			
	47.0-48.5	SS-6	PARTIALLY WEATHERED ROCK	18.1					23.1																			

NOTES:

[1] SHEAR STRENGTH PARAMATERS BASED ON PEAK EFFECTIVE PRINCIPAL STRESS RATIO

[2] BASED ON VISUAL OBSERVATIONS

[3] USCS CLASSIFICATION OF FINE GRAINED SOIL COMPONENT ASSUMED WHEN ATTERBERG LIMITS ARE NOT COMPLETED

[4] SPECIFIC GRAVITY WAS ASSUMED WHEN SPECIFIC GRAVITY TESTS WERE NOT PERFOMED.

[5] DISPERSIVE CLASSIFICATION REPORTED AT 1 HOUR. FOR MORE DETAILED CLASSIFICATION REFER TO APPENDIX.

[6] C_v VALUES ARE ONLY FOR RECOMPRESSION.

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/14/16	Checked By:	mcm
Depth :	---	Test Id:	370727		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-100	SPT- 2	3.5-5 ft	Moist, red clay	16.9
B-100	T- 4	8-10 ft	Moist, red silt	27.2
B-100	SPT- 5	13.5-15 ft	Moist, reddish brown silt with sand	28.3
B-100	T- 6	18-20 ft	Moist, red sandy silt	28.3
B-100	SPT- 7	23.5-25 ft	Moist, reddish brown sandy silt	26.9
B-100	T- 8	25-27 ft	Moist, red sandy silt	28.3
B-100	T- 10	30-32 ft	Moist, dark reddish brown sandy clay	20.5
B-100	SPT- 11	33.5-35 ft	Moist, reddish brown silt with sand	28.0
B-100	T- 12	35-37 ft	Moist, red silt with sand	30.2
B-100	SPT13	38.5-40 ft	Moist, reddish brown sandy silt	27.8

Notes: Temperature of Drying : 110º Celsius

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/05/16	Checked By:	mcm
Depth :	---	Test Id:	370734		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-100	T- 14	40-42 ft	Moist, red sandy silt	27.7
B-100	SPT- 16	48.5-50 ft	Moist, red clay	29.5
B-100	SPT- 17	53.5-55 ft	Moist, very dark gray sand with silt and gravel	10.6
B-100	SPT- 18	58.5-60 ft	Moist, red silt with sand	28.0
B-100	SPT- 20	68.5-70 ft	Moist, olive brown sandy silt	27.5
B-100	SPT- 24	88.5-90 ft	Moist, dark olive gray silty sand	20.8
B-100	SPT- 26	98.5-100 ft	Moist, olive brown sandy clay	25.5

Notes: Temperature of Drying : 110º Celsius

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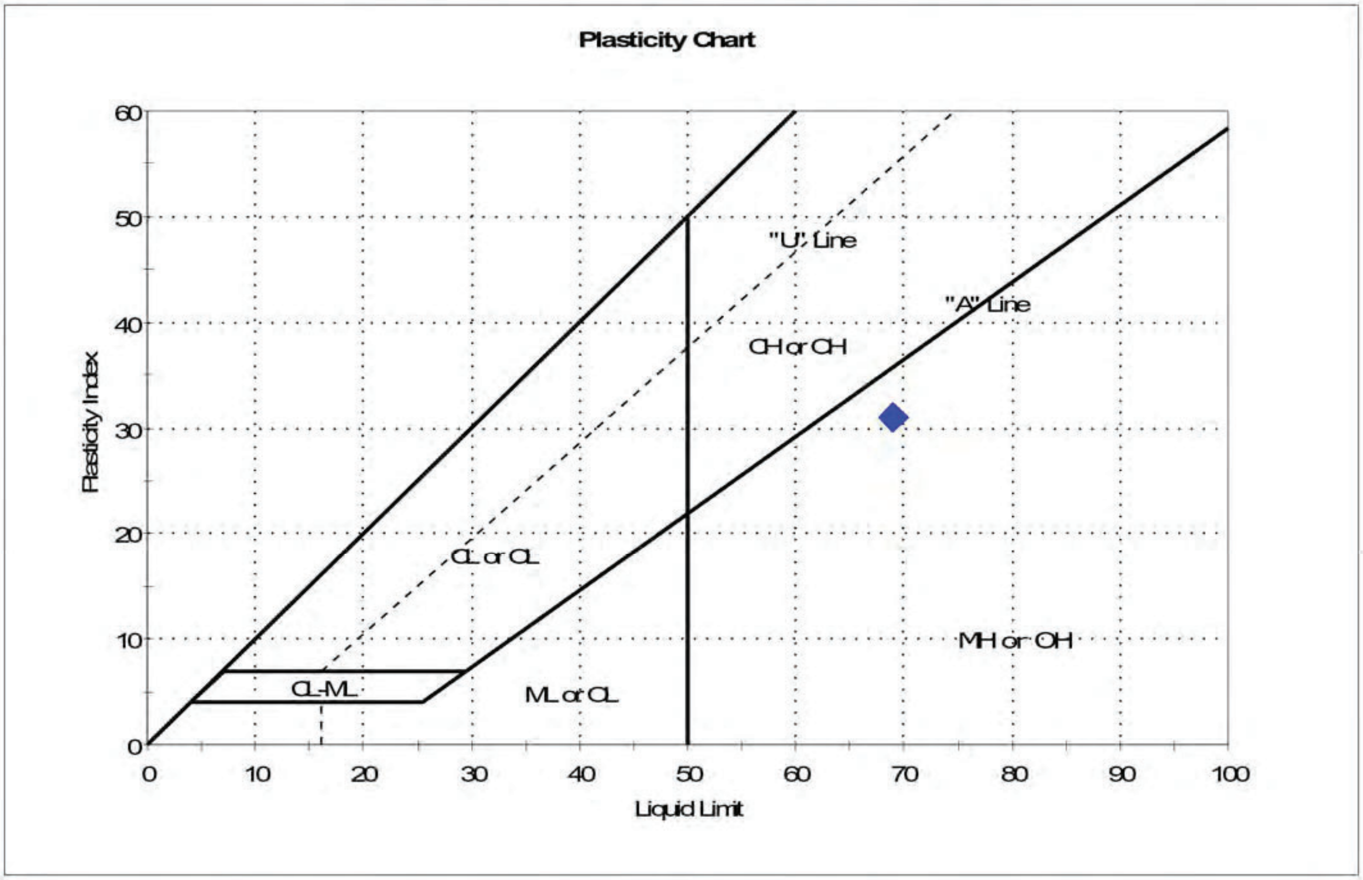
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-4	Test Date:	04/13/16	Checked By:	mcm
Depth :	8-10 ft	Test Id:	370737		

Test Comment: ---
Visual Description: Moist, red silt
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-4	B-100	8-10 ft	27	69	38	31	-0.3	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

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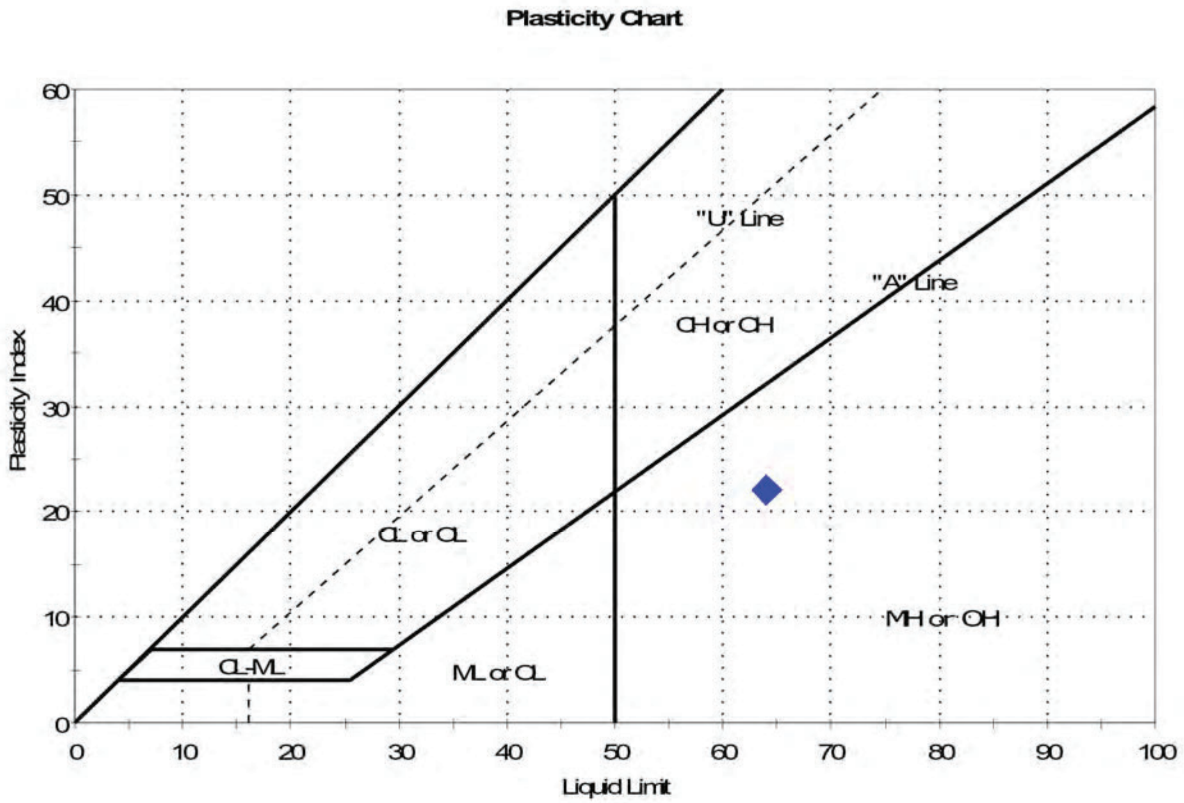
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-6	Test Date:	04/08/16	Checked By:	mcm
Depth :	18-20 ft	Test Id:	370738		

Test Comment: ---
Visual Description: Moist, red sandy silt
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-6	B-100	18-20 ft	28	64	42	22	-0.6	Sandy Elastic silt (MH)

Sample Prepared using the WET method
10% Retained on #40 Sieve
Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

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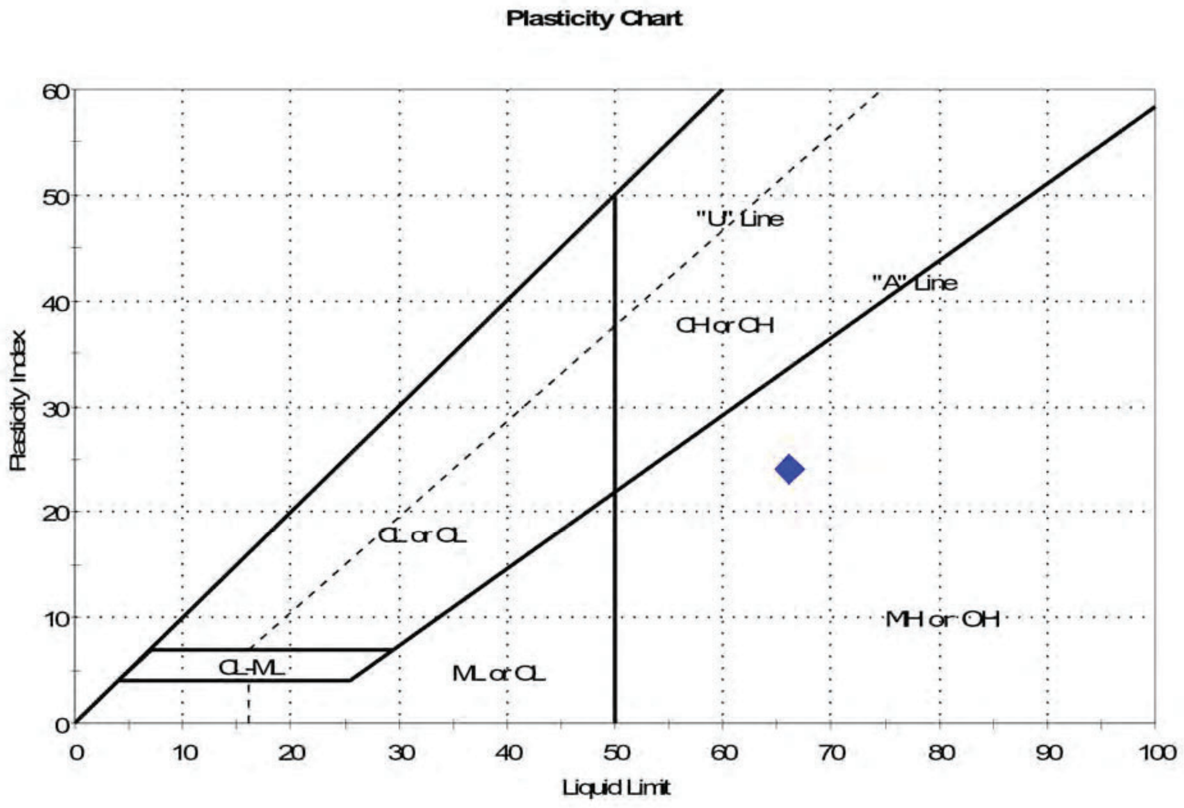
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-8	Test Date:	04/08/16	Checked By:	mcm
Depth :	25-27 ft	Test Id:	370739		

Test Comment: ---
Visual Description: Moist, red sandy silt
Sample Comment: ---

Atterberg Limits - ASTM D4318



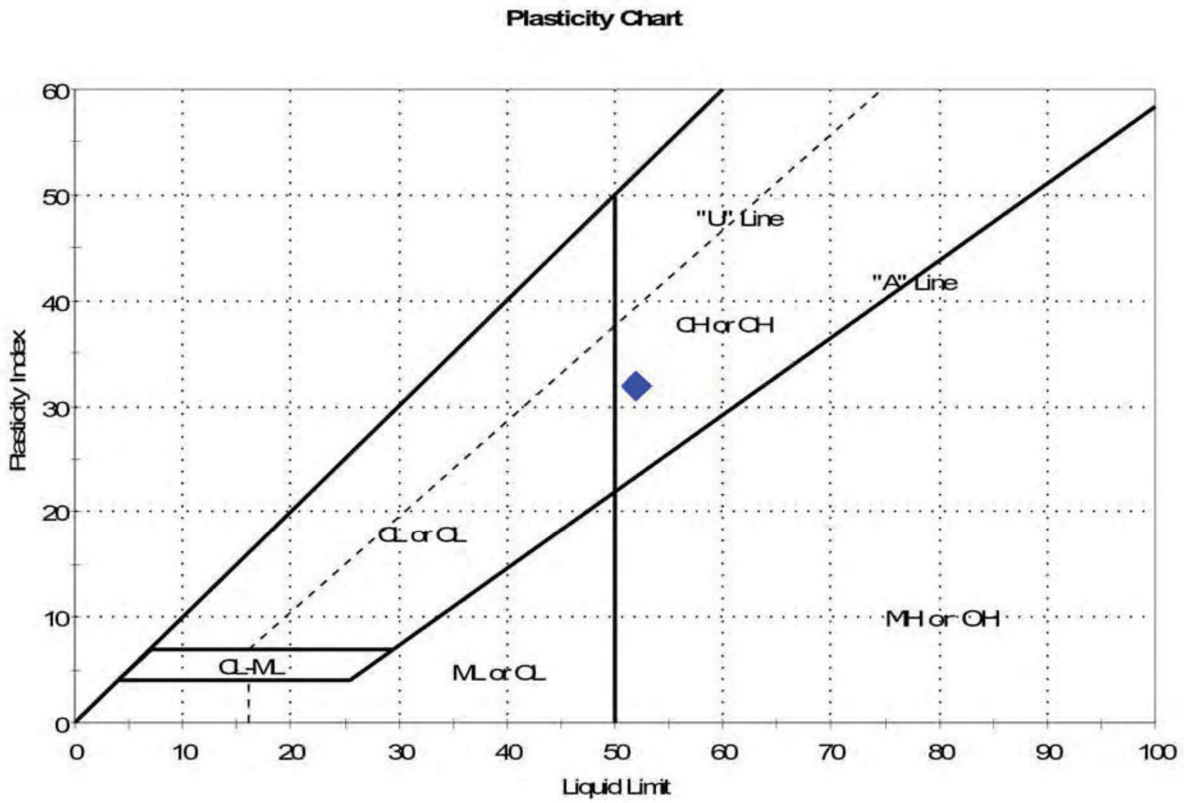
Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-8	B-100	25-27 ft	28	66	42	24	-0.6	Sandy Elastic silt (MH)

Sample Prepared using the WET method
10% Retained on #40 Sieve
Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-10	Test Date:	04/08/16	Checked By:	mcm
Depth :	30-32 ft	Test Id:	370740		

Test Comment: ---
Visual Description: Moist, dark reddish brown sandy clay
Sample Comment: ---

Atterberg Limits - ASTM D4318



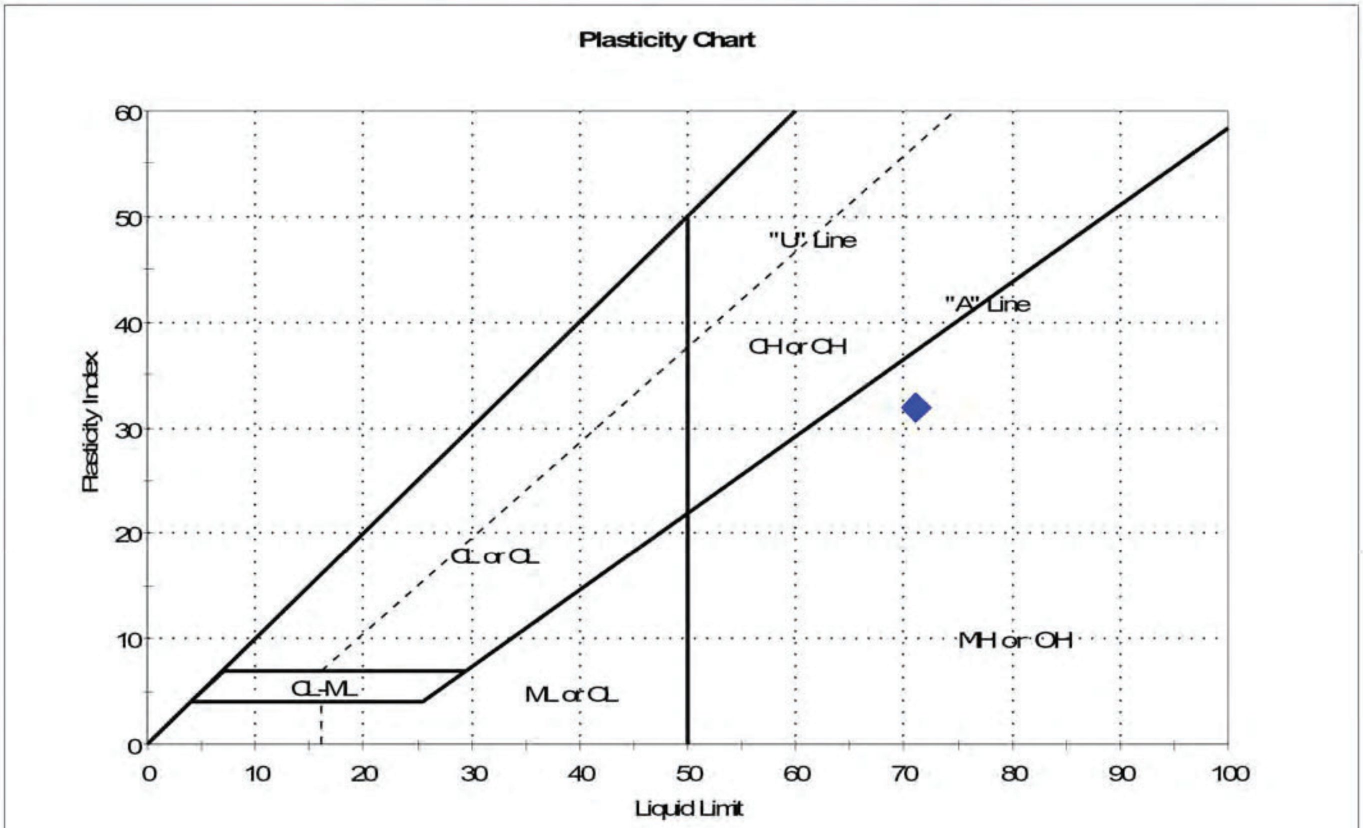
Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-10	B-100	30-32 ft	21	52	20	32	0	Sandy Fat clay (CH)

Sample Prepared using the WET method
9% Retained on #40 Sieve
Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-12	Test Date:	04/08/16	Checked By:	mcm
Depth :	35-37 ft	Test Id:	370741		

Test Comment: ---
Visual Description: Moist, red silt with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-12	B-100	35-37 ft	30	71	39	32	-0.3	Elastic silt with sand (MH)

Sample Prepared using the WET method
7% Retained on #40 Sieve
Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

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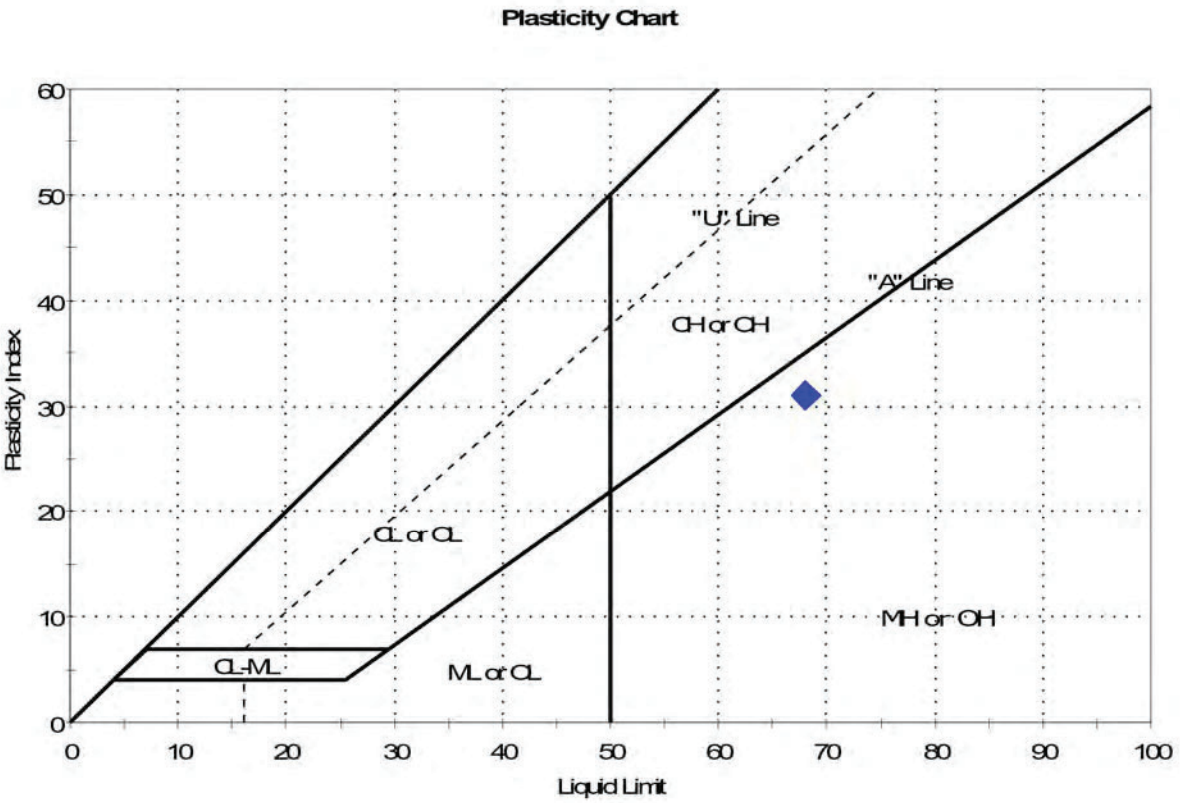
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-14	Test Date:	04/08/16	Checked By:	mcm
Depth :	40-42 ft	Test Id:	370742		

Test Comment: ---
Visual Description: Moist, red sandy silt
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-14	B-100	40-42 ft	28	68	37	31	-0.3	Sandy Elastic silt (MH)

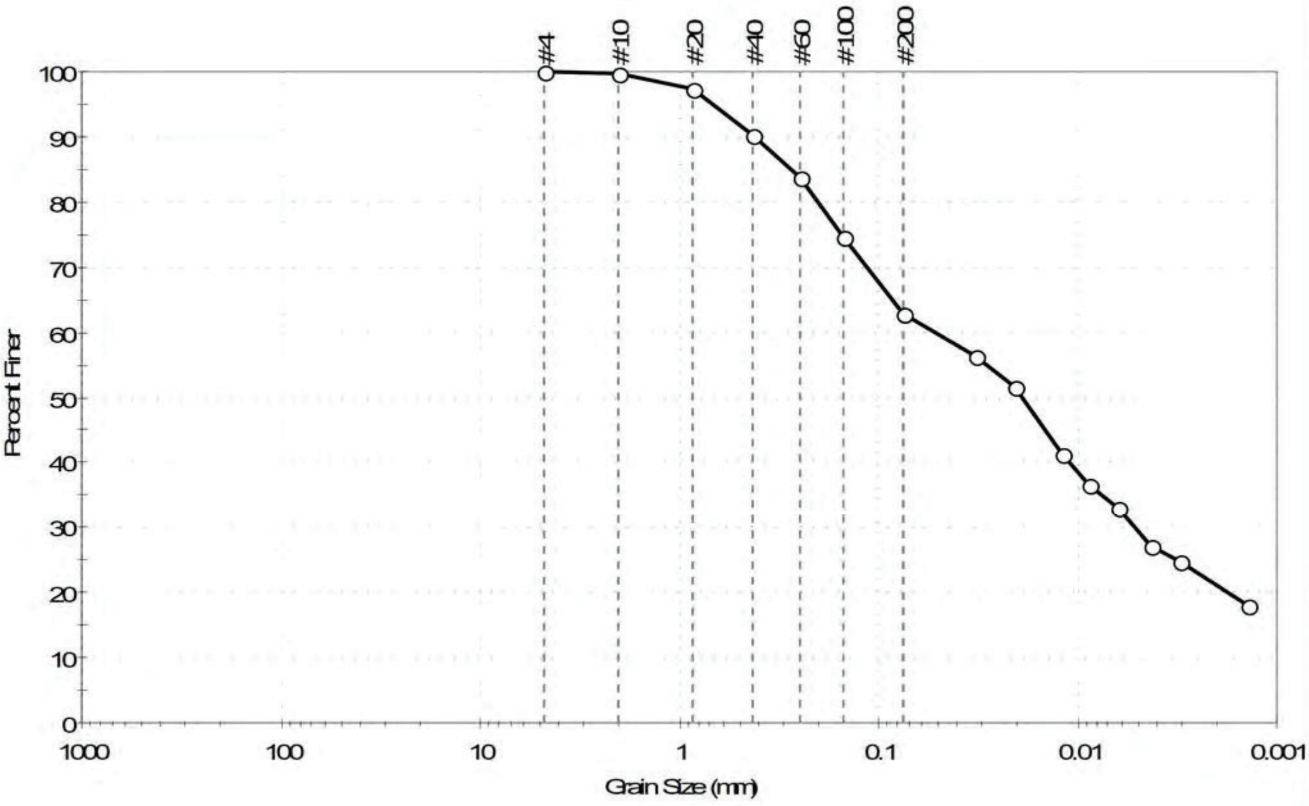
Sample Prepared using the WET method
8% Retained on #40 Sieve
Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-100
Sample ID: T-6
Depth : 18-20 ft
Sample Type: tube
Test Date: 04/12/16
Test Id: 370743
Tested By: GA
Checked By: mcm

Test Comment: ---
Visual Description: Moist, red sandy silt
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	37.3	62.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	97		
#40	0.42	90		
#60	0.25	84		
#100	0.15	75		
#200	0.075	63		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0325	56		
---	0.0207	52		
---	0.0120	41		
---	0.0087	36		
---	0.0062	33		
---	0.0043	27		
---	0.0031	25		
---	0.0014	18		

Coefficients

D_{85} = 0.2760 mm	D_{30} = 0.0052 mm
D_{60} = 0.0527 mm	D_{15} = N/A
D_{50} = 0.0190 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM	Sandy Elastic silt (MH)
AASHTO	Clayey Soils (A-7-5 (15))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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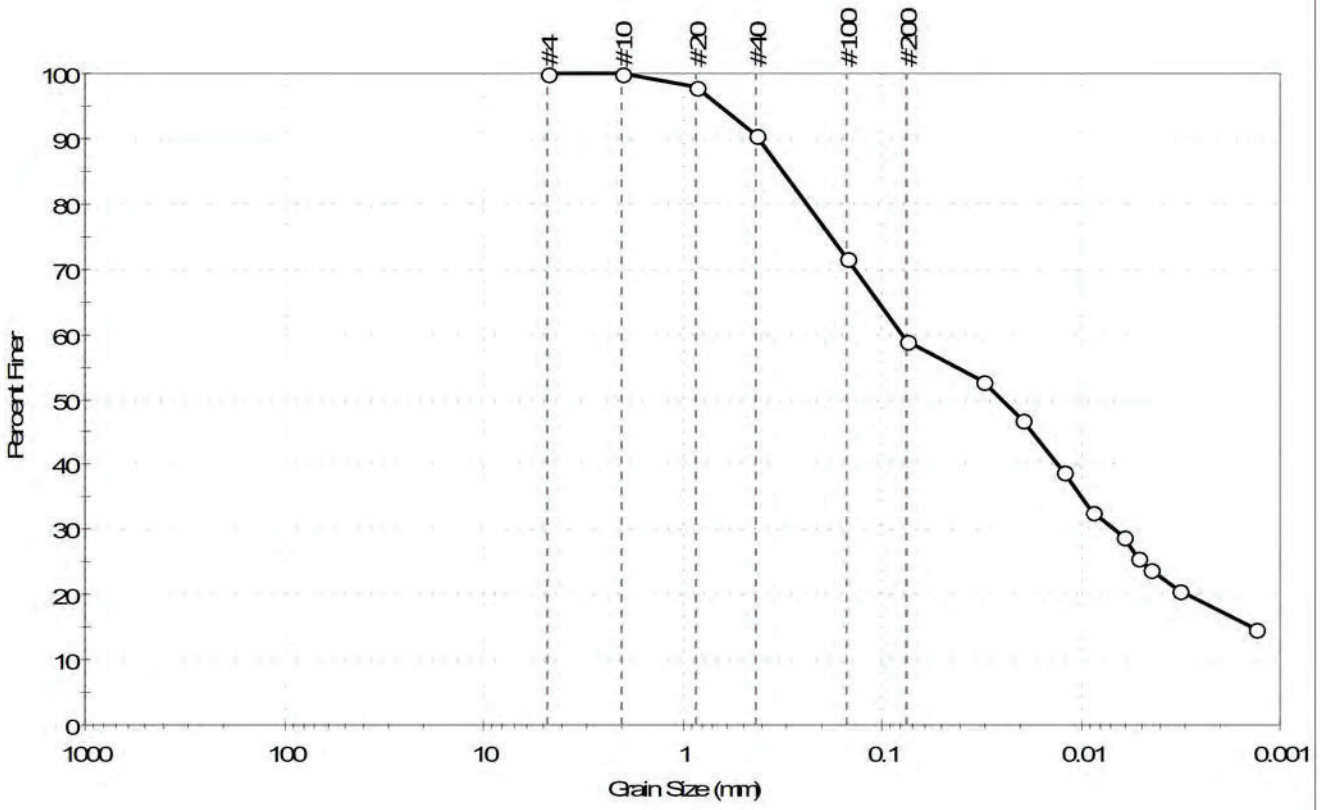
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-100
Sample Type: bag
Tested By: GA
Sample ID: SPT-7
Test Date: 04/18/16
Checked By: n/a
Depth : 23.5-25 ft
Test Id: 370714

Test Comment: ---
Visual Description: Moist, reddish brown sandy silt
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	41.0	59.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	91		
#100	0.15	72		
#200	0.075	59		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0311	53		
---	0.0196	47		
---	0.0122	39		
---	0.0088	33		
---	0.0062	29		
---	0.0052	26		
---	0.0045	24		
---	0.0032	21		
---	0.0013	15		

Coefficients

D_{85} = 0.3126 mm
D_{30} = 0.0069 mm
D_{60} = 0.0793 mm
D_{15} = 0.0014 mm
D_{50} = 0.0250 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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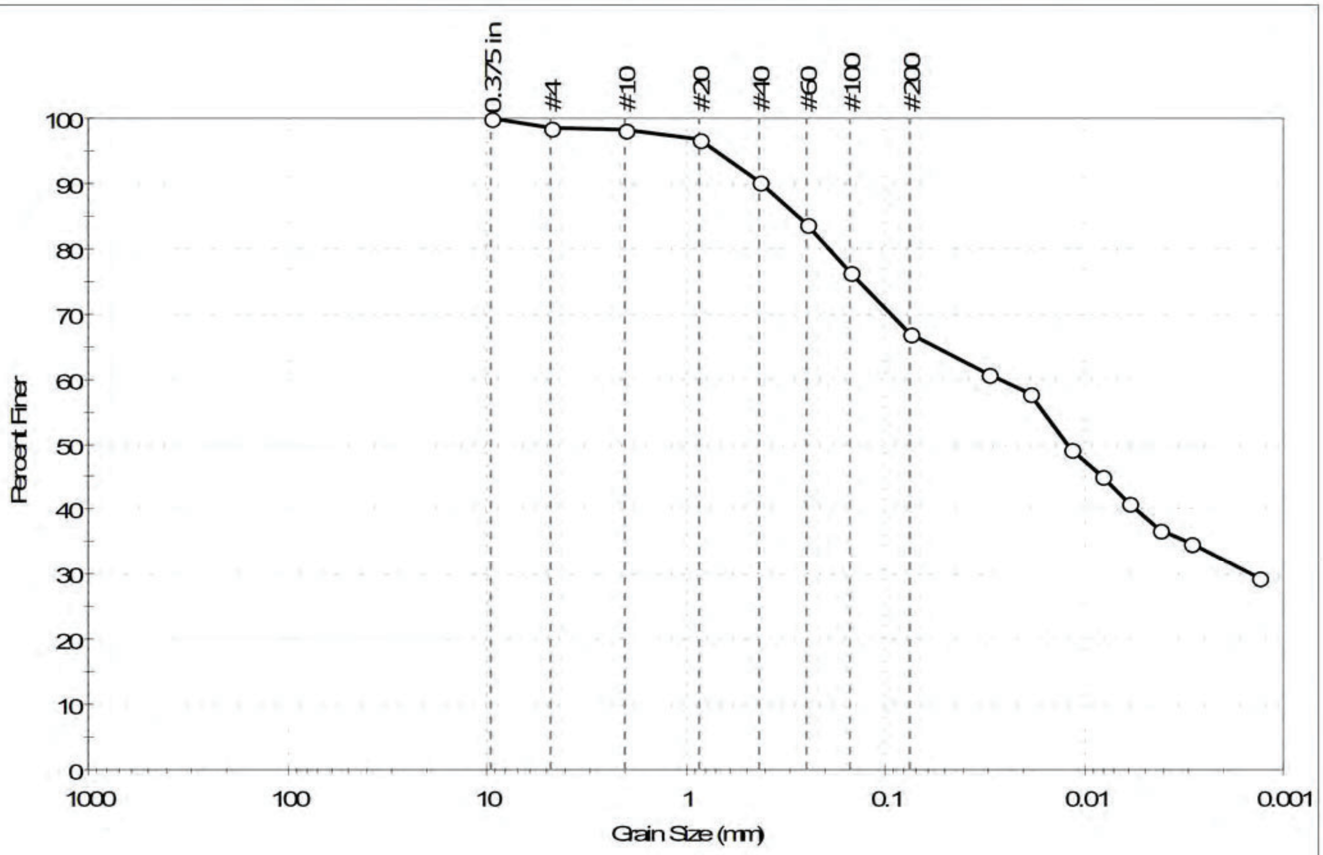
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-8	Test Date:	04/18/16	Checked By:	n/a
Depth :	25-27 ft	Test Id:	370744		

Test Comment: ---
Visual Description: Moist, red sandy silt
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	1.5	31.5	67.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	98		
#20	0.85	97		
#40	0.42	90		
#60	0.25	84		
#100	0.15	77		
#200	0.075	67		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0306	61		
---	0.0188	58		
---	0.0116	49		
---	0.0082	45		
---	0.0060	41		
---	0.0042	37		
---	0.0029	35		
---	0.0013	30		

Coefficients

D_{85} =0.2766 mm	D_{30} =0.0014 mm
D_{60} =0.0267 mm	D_{15} =N/A
D_{50} =0.0120 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	Sandy Elastic silt (MH)
AASHTO	Clayey Soils (A-7-5 (18))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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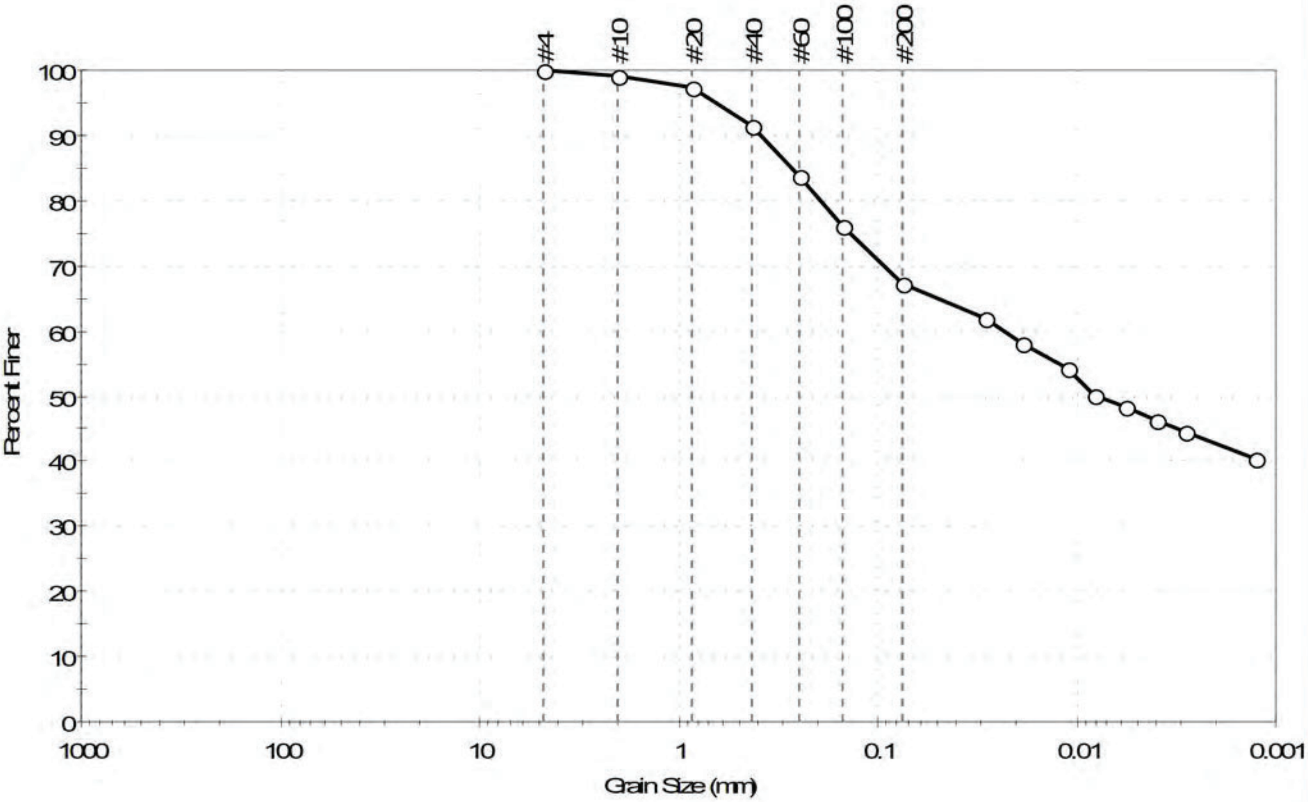
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-10	Test Date:	04/12/16	Checked By:	mcm
Depth :	30-32 ft	Test Id:	370745		

Test Comment: ---

Visual Description: Moist, dark reddish brown sandy clay

Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	32.8	67.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	97		
#40	0.42	91		
#60	0.25	84		
#100	0.15	76		
#200	0.075	67		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0289	62		
---	0.0187	58		
---	0.0111	54		
---	0.0081	50		
---	0.0058	48		
---	0.0040	46		
---	0.0028	44		
---	0.0013	40		

Coefficients

D_{85} = 0.2699 mm	D_{30} = N/A
D_{60} = 0.0230 mm	D_{15} = N/A
D_{50} = 0.0077 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM	Sandy Fat clay (CH)
AASHTO	Clayey Soils (A-7-6 (20))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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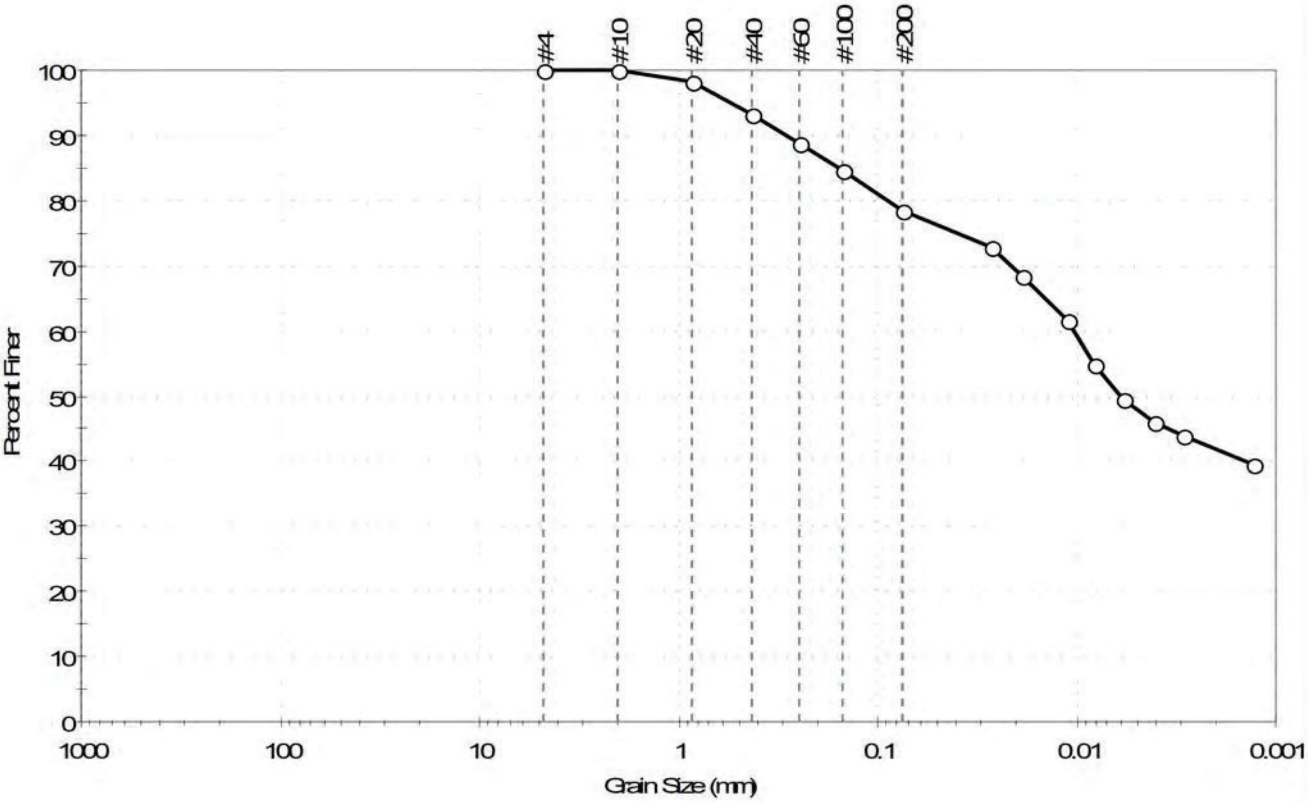
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-12	Test Date:	04/12/16	Checked By:	mcm
Depth :	35-37 ft	Test Id:	370746		

Test Comment: ---
Visual Description: Moist, red silt with sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	21.5	78.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	93		
#60	0.25	89		
#100	0.15	85		
#200	0.075	78		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0266	73		
---	0.0189	68		
---	0.0112	62		
---	0.0081	55		
---	0.0059	49		
---	0.0041	46		
---	0.0029	44		
---	0.0013	39		

Coefficients

D_{85} =0.1553 mm	D_{30} =N/A
D_{60} =0.0103 mm	D_{15} =N/A
D_{50} =0.0060 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	Elastic silt with sand (MH)
AASHTO	Clayey Soils (A-7-5 (29))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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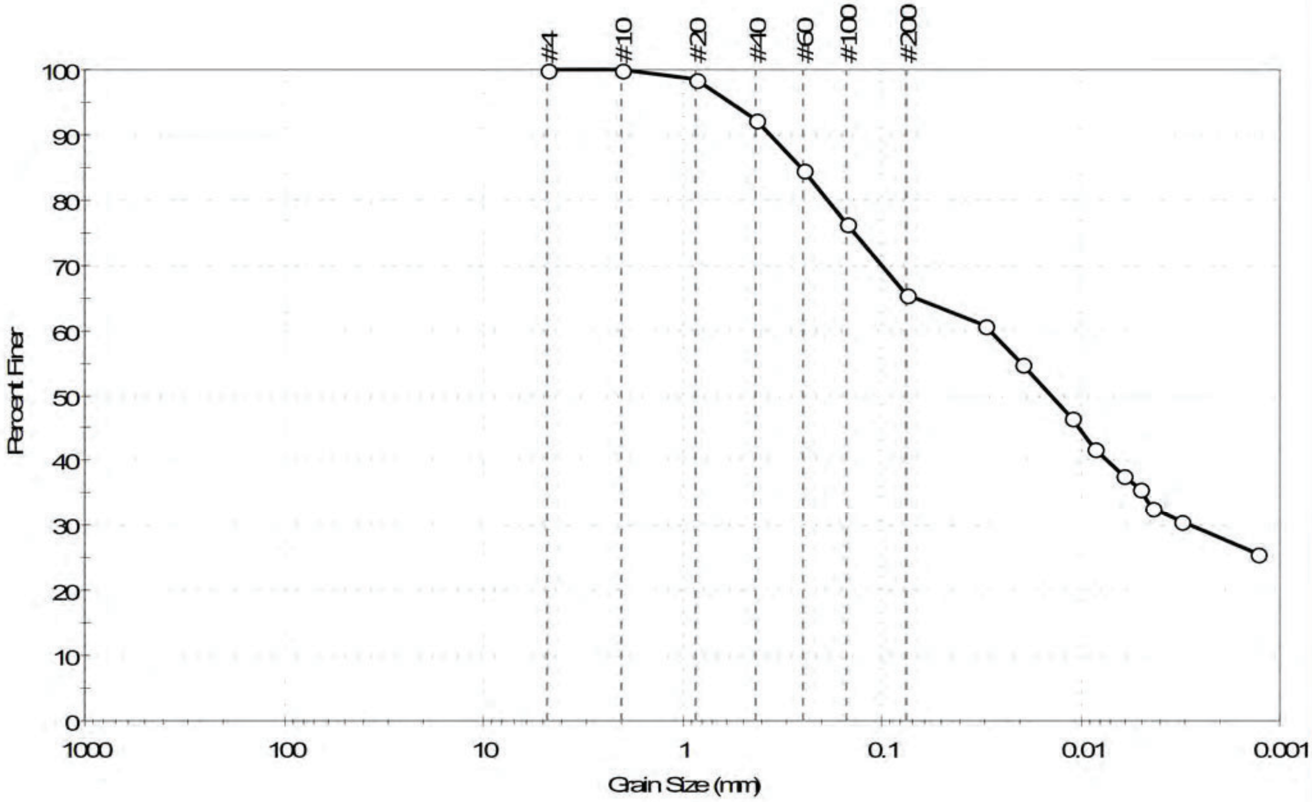
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-100
Sample ID: SPT13
Depth : 38.5-40 ft
Sample Type: bag
Test Date: 04/18/16
Test Id: 370715
Tested By: GA
Checked By: mcm

Test Comment: ---
Visual Description: Moist, reddish brown sandy silt
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	34.6	65.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	92		
#60	0.25	85		
#100	0.15	76		
#200	0.075	65		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0306	61		
---	0.0197	55		
---	0.0112	47		
---	0.0085	42		
---	0.0061	38		
---	0.0050	36		
---	0.0044	33		
---	0.0031	31		
---	0.0013	26		

Coefficients

D_{85} = 0.2542 mm
D_{30} = 0.0027 mm
D_{60} = 0.0290 mm
D_{15} = N/A
D_{50} = 0.0141 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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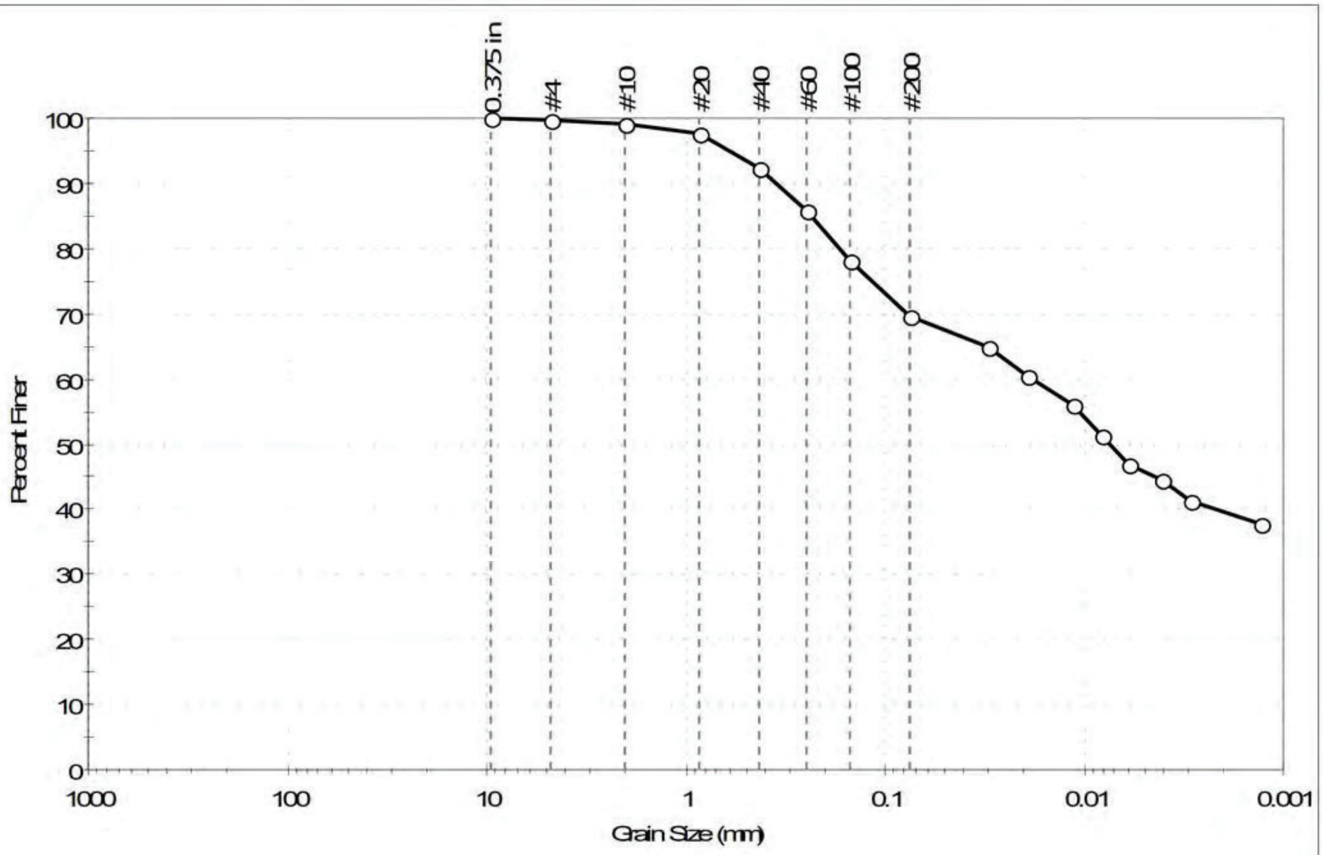
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID:	B-100	Sample Type:	tube	Tested By:	GA
Sample ID:	T-14	Test Date:	04/12/16	Checked By:	mcm
Depth :	40-42 ft	Test Id:	370747		

Test Comment: ---
Visual Description: Moist, red sandy silt
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.4	30.1	69.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	98		
#40	0.42	92		
#60	0.25	86		
#100	0.15	78		
#200	0.075	70		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0305	65		
---	0.0193	60		
---	0.0115	56		
---	0.0082	51		
---	0.0060	47		
---	0.0041	45		
---	0.0029	41		
---	0.0013	38		

Coefficients

D_{85} = 0.2356 mm	D_{30} = N/A
D_{60} = 0.0183 mm	D_{15} = N/A
D_{50} = 0.0074 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM	Sandy Elastic silt (MH)
AASHTO	Clayey Soils (A-7-5 (23))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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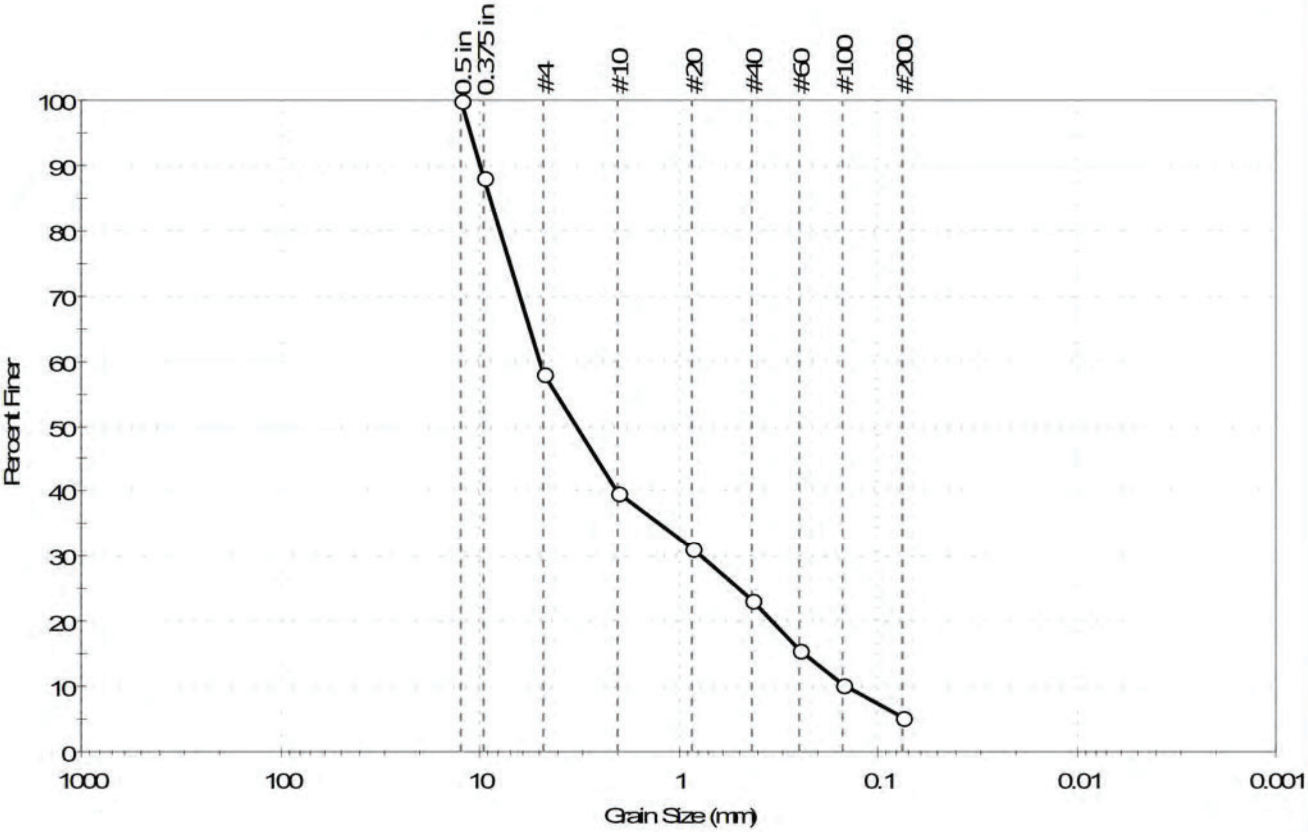
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-17	Test Date:	04/05/16	Checked By:	mcm
Depth :	53.5-55 ft	Test Id:	370765		

Test Comment: ---
Visual Description: Moist, very dark gray sand with silt and gravel
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	42.0	52.6	5.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	88		
#4	4.75	58		
#10	2.00	40		
#20	0.85	31		
#40	0.42	23		
#60	0.25	16		
#100	0.15	10		
#200	0.075	5.4		

Coefficients

D_{85} = 8.8238 mm
D_{30} = 0.7623 mm
D_{60} = 4.9729 mm
D_{15} = 0.2343 mm
D_{50} = 3.2404 mm
D_{10} = 0.1419 mm
C_u = 35.045
C_c = 0.823

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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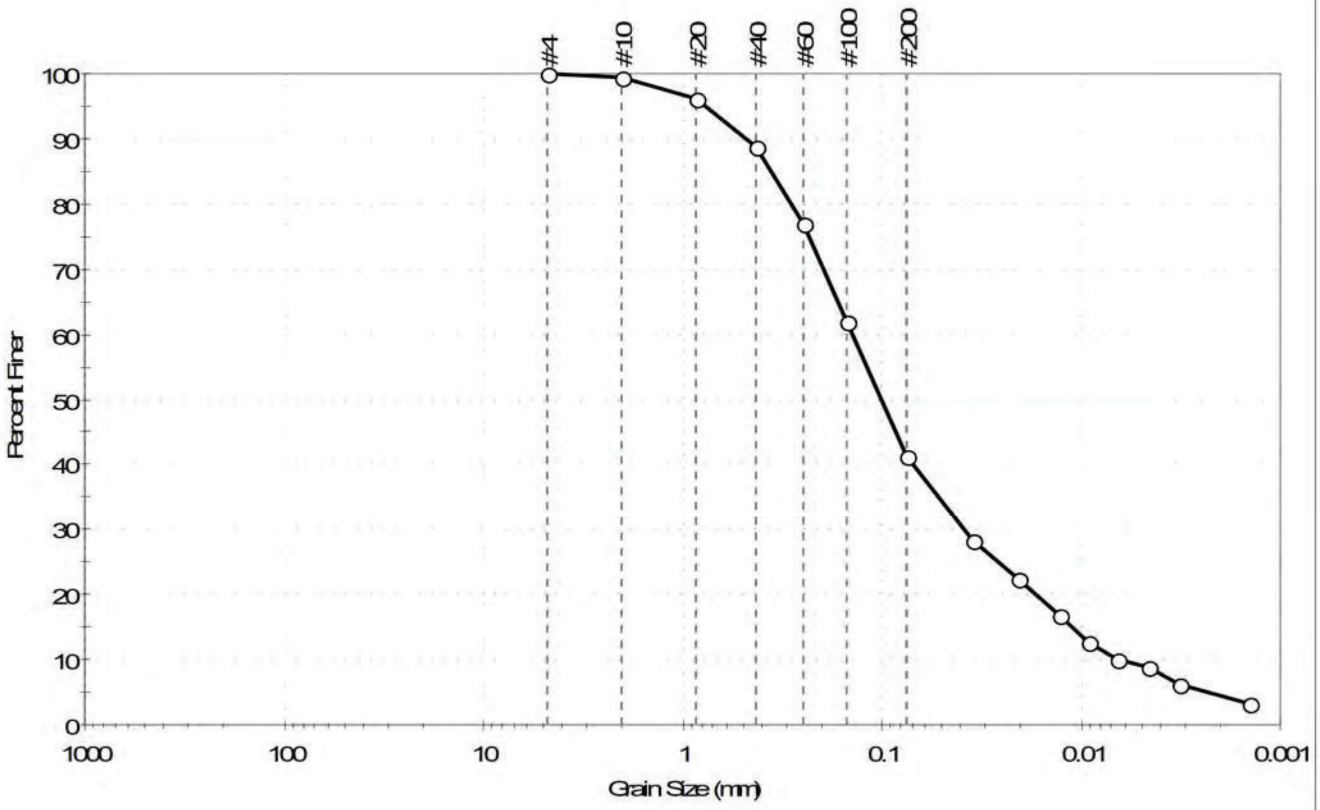
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-20	Test Date:	04/12/16	Checked By:	mcm
Depth :	68.5-70 ft	Test Id:	370748		

Test Comment: ---
Visual Description: Moist, olive brown sandy silt
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	58.6	41.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	96		
#40	0.42	89		
#60	0.25	77		
#100	0.15	62		
#200	0.075	41		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0349	28		
---	0.0209	22		
---	0.0129	17		
---	0.0092	13		
---	0.0065	10		
---	0.0046	9		
---	0.0032	6		
---	0.0014	3		

Coefficients

D_{85} =0.3582 mm	D_{30} =0.0386 mm
D_{60} =0.1400 mm	D_{15} =0.0111 mm
D_{50} =0.1001 mm	D_{10} =0.0066 mm
C_u =21.212	C_c =1.613

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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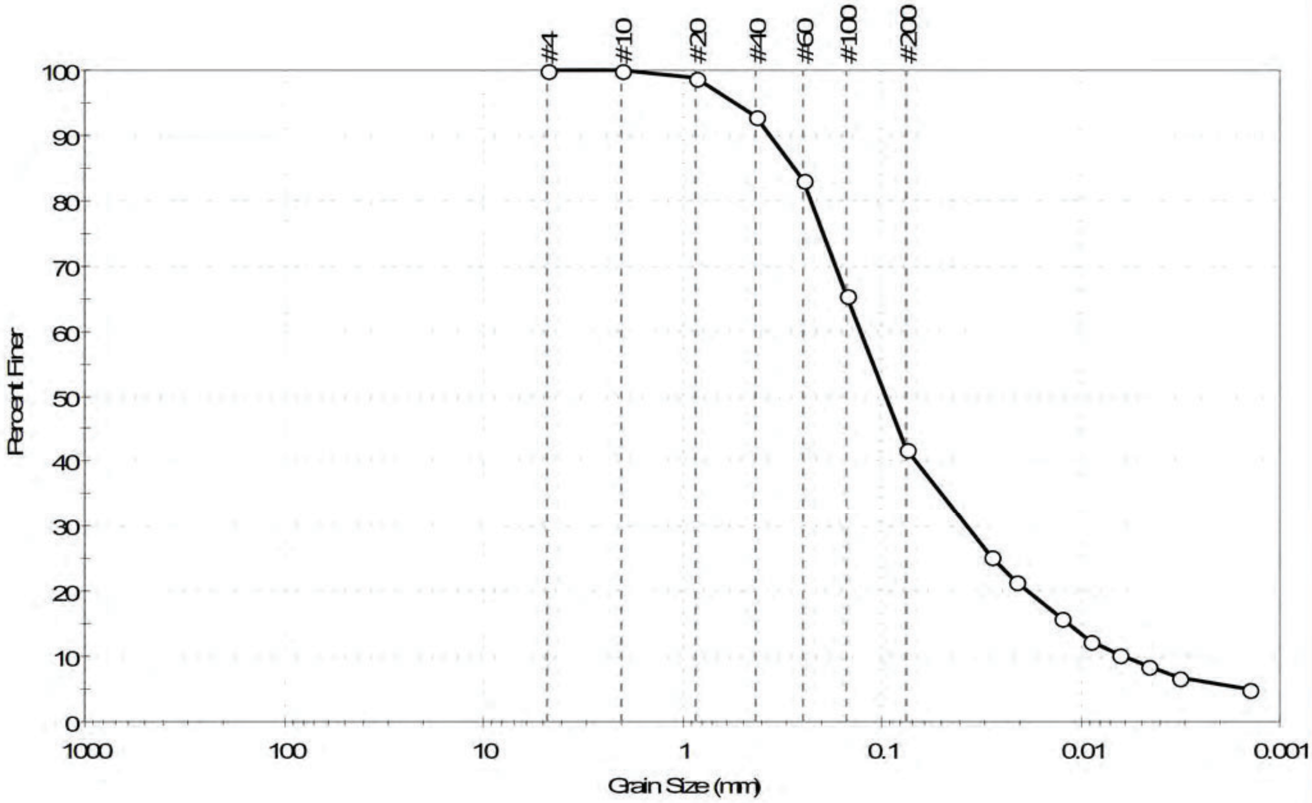
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-24	Test Date:	04/12/16	Checked By:	mcm
Depth :	88.5-90 ft	Test Id:	370749		

Test Comment: ---
Visual Description: Moist, dark olive gray silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	58.0	42.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	93		
#60	0.25	83		
#100	0.15	65		
#200	0.075	42		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0284	25		
---	0.0210	22		
---	0.0125	16		
---	0.0091	12		
---	0.0065	10		
---	0.0046	9		
---	0.0032	7		
---	0.0014	5		

Coefficients

D_{85} = 0.2771 mm
D_{30} = 0.0374 mm
D_{60} = 0.1279 mm
D_{15} = 0.0114 mm
D_{50} = 0.0951 mm
D_{10} = 0.0059 mm
C_u = 21.678
C_c = 1.854

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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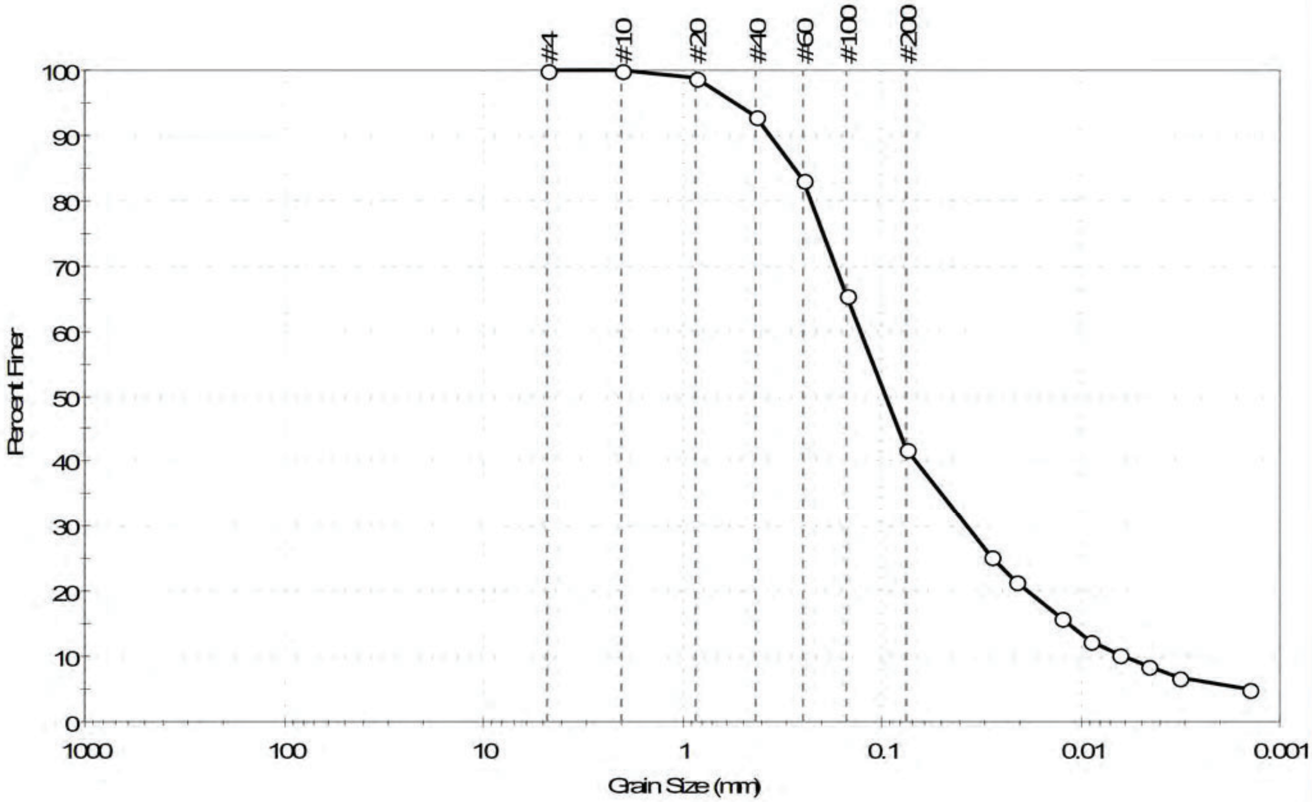
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-100	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-24	Test Date:	04/12/16	Checked By:	mcm
Depth :	88.5-90 ft	Test Id:	370749		

Test Comment: ---
Visual Description: Moist, dark olive gray silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	58.0	42.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	93		
#60	0.25	83		
#100	0.15	65		
#200	0.075	42		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0284	25		
---	0.0210	22		
---	0.0125	16		
---	0.0091	12		
---	0.0065	10		
---	0.0046	9		
---	0.0032	7		
---	0.0014	5		

Coefficients

D_{85} = 0.2771 mm	D_{30} = 0.0374 mm
D_{60} = 0.1279 mm	D_{15} = 0.0114 mm
D_{50} = 0.0951 mm	D_{10} = 0.0059 mm
C_u = 21.678	C_c = 1.854

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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Client:	AECOM
Project Name:	SCS Plant Scherer Ph.2
Project Location:	Monroe County, GA
GTX #:	304548
Test Date:	04/14/16
Tested By:	jm
Checked By:	mcm

Determining Dispersive Characteristics of Clayey Soils by the Crumb Test ASTM D6572

Type of Test:	Method B - Remolded Crumb Cube
Natural Moisture Content. %:	28.3
Curing Time, min:	---
Time Test Started:	10:47 AM
Initial Water Temperature, °C:	20.7

Boring ID	Sample ID	Depth, ft	Visual Description	2 Minutes		1 Hour		6 hours	
				Grade	°C	Grade	°C	Grade	°C
B-100	SPT-5	13.5-15	Moist, reddish brown silt with sand	2	20.7	4	20.6	4	20.7

Notes: Moisture content determined by ASTM D2216 at 110° C
Photo provided was taken after 6 hour reading

Client:	AECOM
Project Name:	SCS Plant Scherer Ph.2
Project Location:	Monroe County, GA
GTX #:	304548
Test Date:	04/14/16
Tested By:	jm
Checked By:	mcm

Determining Dispersive Characteristics of Clayey Soils by the Crumb Test ASTM D6572

Type of Test: Method B - Remolded Crumb Cube
Natural Moisture Content. %: 28.0
Curing Time, min: ---
Time Test Started: 10:50 AM
Initial Water Temperature, °C: 20.7

Boring ID	Sample ID	Depth, ft	Visual Description	2 Minutes		1 Hour		6 hours	
				Grade	°C	Grade	°C	Grade	°C
B-100	SPT-11	33.5-35	Moist, reddish brown silt with sand	2	20.7	4	20.6	4	20.7

Notes: Moisture content determined by ASTM D2216 at 110° C
Photo provided was taken after 6 hour reading

Client:	AECOM
Project Name:	SCS Plant Scherer Ph.2
Project Location:	Monroe County, GA
GTX #:	304548
Test Date:	04/14/16
Tested By:	jm
Checked By:	mcm

Determining Dispersive Characteristics of Clayey Soils by the Crumb Test ASTM D6572

Type of Test:	Method B - Remolded Crumb Cube
Natural Moisture Content. %:	28.0
Curing Time, min:	---
Time Test Started:	10:54 AM
Initial Water Temperature, °C:	20.7

Boring ID	Sample ID	Depth, ft	Visual Description	2 Minutes		1 Hour		6 hours	
				Grade	°C	Grade	°C	Grade	°C
B-100	SPT-18	58.5-60	Moist, dark red silt with sand	1	20.7	4	20.6	4	20.7

Notes: Moisture content determined by ASTM D2216 at 110° C
Photo provided was taken after 6 hour reading

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/18/16	Checked By:	mcm
Depth :	---	Test Id:	370761		

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	Sample ID	Depth	Visual Description	Bulk Density pcf	Moisture Content %	Dry Density pcf	*
B-100	T- 4	8-10 ft	Moist, red silt	115.7	27.19	90.98	(1)
B-100	T- 6	18-20 ft	Moist, red sandy silt	116.2	27.25	91.29	(2)
B-100	T- 8	25-27 ft	Moist, red sandy silt	114.3	26.86	90.07	(3)
B-100	T- 10	30-32 ft	Moist, dark reddish brown sandy clay	127.0	22.78	103.5	(4)
B-100	T- 12	35-37 ft	Moist, red silt with sand	114.6	33.90	85.61	(5)
B-100	T- 14	40-42 ft	Moist, red sandy silt	119.2	20.47	98.96	(6)

* Sample Comments

(1): Method B-Cylinder, Intact
(2): Method B-Cylinder, Intact
(3): Method B-Cylinder, Intact
(4): Method B-Cylinder, Intact
(5): Method B-Cylinder, Intact
(6): Method B-Cylinder, Intact

Notes: Moisture Content determined by ASTM D2216.

GeoTesting EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe County, GA		
GTX #:	304548		
Start Date:	4/7/2016	Tested By:	jcw
End Date:	4/12/2016	Checked By:	mcm
Boring #:	B-100		
Sample #:	T-6		
Depth:	18-20 ft		
Visual Description:	Moist, red sandy silt		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Volume

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	6/7

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Trimmings moisture content = 27.0%.

Assumed Specific Gravity: 2.65

Parameter	Initial	Final
Height, in	2.52	2.50
Diameter, in	2.86	2.86
Area, in^2	6.42	6.42
Volume, in^3	16.2	16.1
Mass, g	494	507
Bulk Density, pcf	116	120
Moisture Content, %	25.2	28.5
Dry Density, pcf	92.6	93.3
Degree of Saturation, %	85	98

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	92.04	Increased Cell Pressure, psi:	96.96	Cell Pressure Increment, psi:	4.92
Sample Pressure, psi:	75.97	Corresponding Sample Pressure, psi:	80.56	Sample Pressure Increment, psi:	4.59
				B Coefficient:	0.93

*B value did not increase with increase in pressure. Final degree of saturation >95%.

FLOW DATA

Date	Trial #	Pressure, psi		Manometer Readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	Z_1	Z_2	Z_1-Z_2						
4/11	1	92.0	76.0	10.0	9.7	0.3	34	19.8	3.4E-07	20.3	0.993	3.4E-07
4/11	2	92.0	76.0	10.0	9.7	0.3	36	19.8	3.2E-07	20.3	0.993	3.2E-07
4/11	3	92.0	76.0	10.0	9.7	0.3	37	19.8	3.1E-07	20.3	0.993	3.1E-07
4/11	4	92.0	76.0	10.0	9.7	0.3	37	19.8	3.1E-07	20.3	0.993	3.1E-07

PERMEABILITY AT 20° C: 3.2×10^{-7} cm/sec (@ 16 psi effective stress)

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe County, GA		
GTX #:	304548		
Start Date:	4/8/2016	Tested By:	jcw
End Date:	4/12/2016	Checked By:	mcm
Boring #:	B-100		
Sample #:	T-10		
Depth:	30-32 ft		
Visual Description:	Moist, dark reddish brown sandy clay		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Volume

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	9/23

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Trimmings moisture content = 22.5%.

Assumed Specific Gravity: 2.65

Parameter	Initial	Final
Height, in	2.68	2.61
Diameter, in	2.86	2.84
Area, in^2	6.42	6.33
Volume, in^3	17.2	16.5
Mass, g	537	543
Bulk Density, pcf	119	125
Moisture Content, %	20.9	22.3
Dry Density, pcf	98.1	102.2
Degree of Saturation, %	81	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	92.01	Increased Cell Pressure, psi:	96.98	Cell Pressure Increment, psi:	4.97
Sample Pressure, psi:	65.97	Corresponding Sample Pressure, psi:	70.18	Sample Pressure Increment, psi:	4.21
				B Coefficient:	0.85

*B value did not increase with increase in pressure. Final degree of saturation >95%.

FLOW DATA

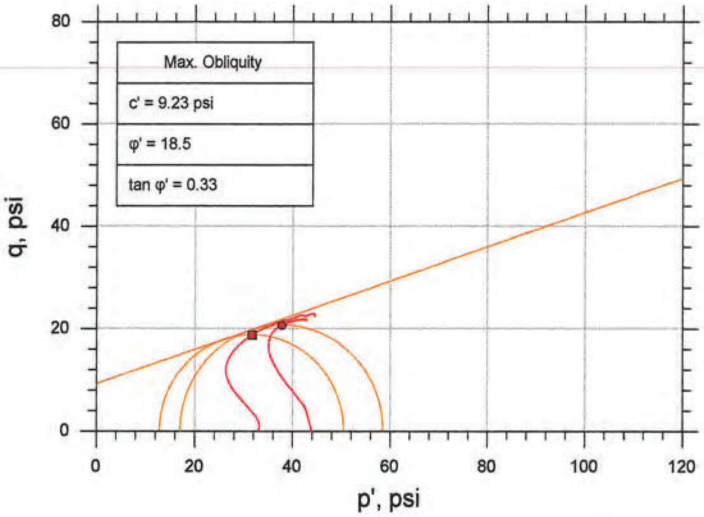
Date	Trial #	Pressure, psi		Manometer Readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	Z_1	Z_2	Z_1-Z_2						
4/11	1	92.0	66.0	10.5	9.7	0.8	35	20.0	9.2E-07	20.3	0.993	9.1E-07
4/11	2	92.0	66.0	10.5	9.7	0.8	36	20.0	8.9E-07	20.3	0.993	8.9E-07
4/11	3	92.0	66.0	10.5	9.7	0.8	36	20.0	8.9E-07	20.3	0.993	8.9E-07
4/11	4	92.0	66.0	10.5	9.7	0.8	36	20.0	8.9E-07	20.3	0.993	8.9E-07

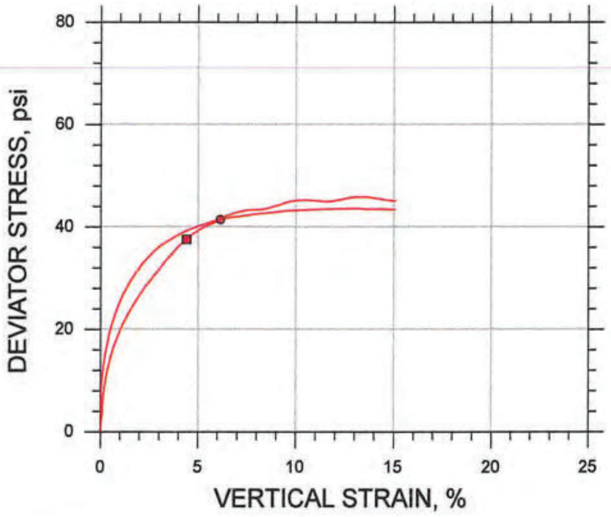
PERMEABILITY AT 20° C: 8.9 x 10^{-7} cm/sec (@ 26 psi effective stress)

GeoTesting
EXPRESS

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: md	Checked By: mcm
Boring ID: B-100	
Preparation: intact	
Description: Moist, red sandy silt	
Classification: Sandy Elastic silt	
Group Symbol: MH	
Liquid Limit: 66	Plastic Limit: 42
Plasticity Index: 24	Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

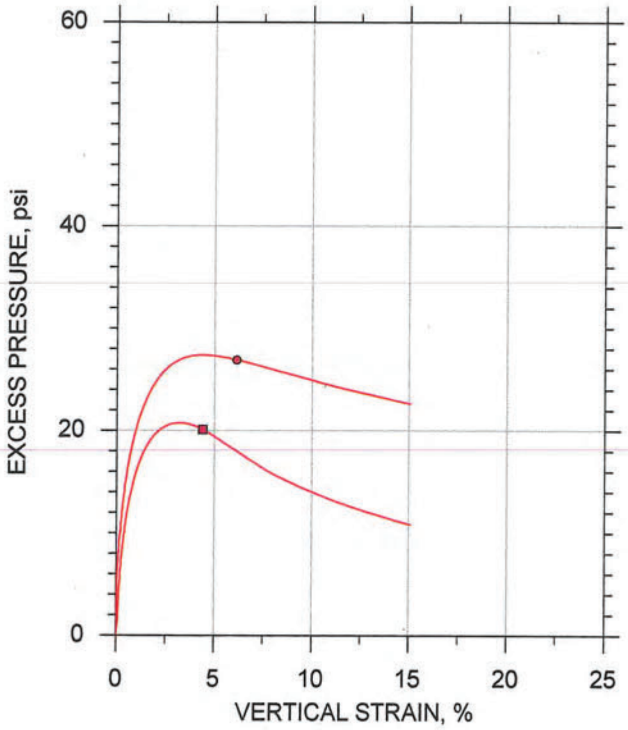


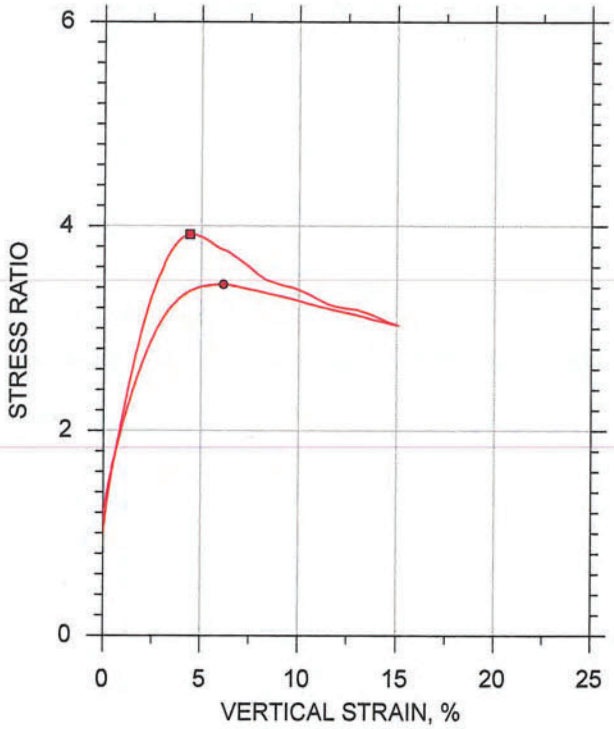


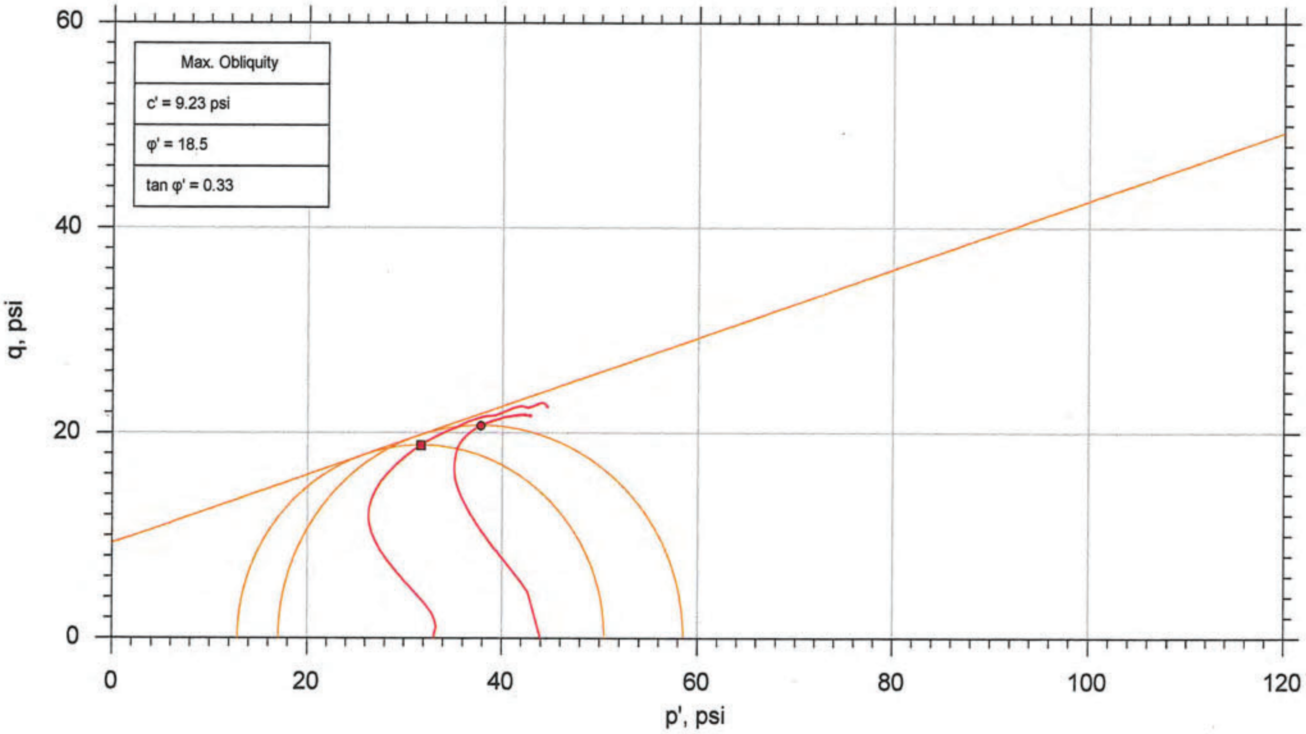
Symbol		🟥	●		
Sample ID		T-8	T-8		
Depth, ft		25-27 ft	25-27 ft		
Test Number		CU-4-2	CU-4-3		
Initial	Height, in	6.180	6.130		
	Diameter, in	2.870	2.870		
	Moisture Content (from Cuttings), %	29.5	32.3		
	Dry Density, pcf	90.6	88.3		
	Saturation (Wet Method), %	92.5	96.0		
	Void Ratio	0.860	0.909		
Before Shear	Moisture Content, %	29.4	29.9		
	Dry Density, pcf	93.9	93.3		
	Cross-sectional Area (Method A), in²	6.357	6.273		
	Saturation, %	100.0	100.0		
	Void Ratio	0.795	0.807		
	Back Pressure, psi	130.9	132.8		
Vertical Effective Consolidation Stress, psi		32.89	43.84		
Horizontal Effective Consolidation Stress, psi		33.00	43.98		
Vertical Strain after Consolidation, %		1.883	2.486		
Volumetric Strain after Consolidation, %		3.670	5.554		
Time to 50% Consolidation, min		4.410	0.4900		
Shear Strength, psi		18.80	20.73		
Strain at Failure, %		4.40	6.13		
Strain Rate, %/min		0.01600	0.01600		
Deviator Stress at Failure, psi		37.59	41.47		
Effective Minor Principal Stress at Failure, psi		12.88	17.05		
Effective Major Principal Stress at Failure, psi		50.47	58.52		
B-Value		0.95	0.95		
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Atterberg Limits determined by ASTM D4318. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:					

System X

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767







	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	T-8	CU-4-2	25-27 ft	md	4/5/16	mcm	4/12/16	304548-CU-4-2m.dat
●	T-8	CU-4-3	25-27 ft	md	4/5/16	mcm	4/12/16	304548-CU-4-3m.dat

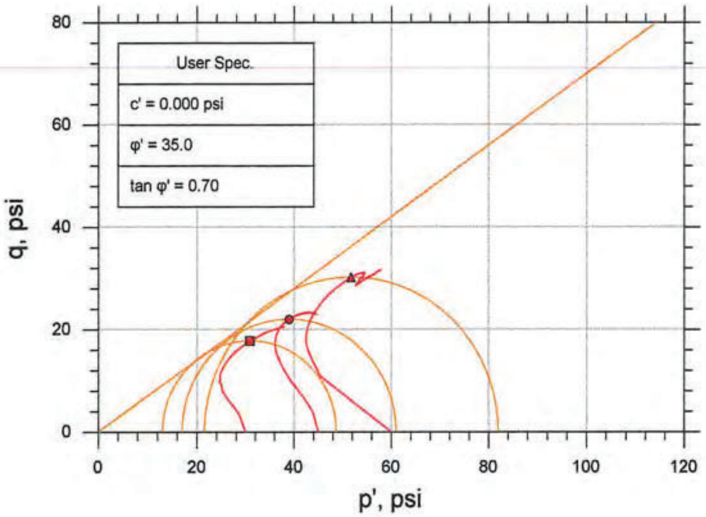
GeoTesting
EXPRESS

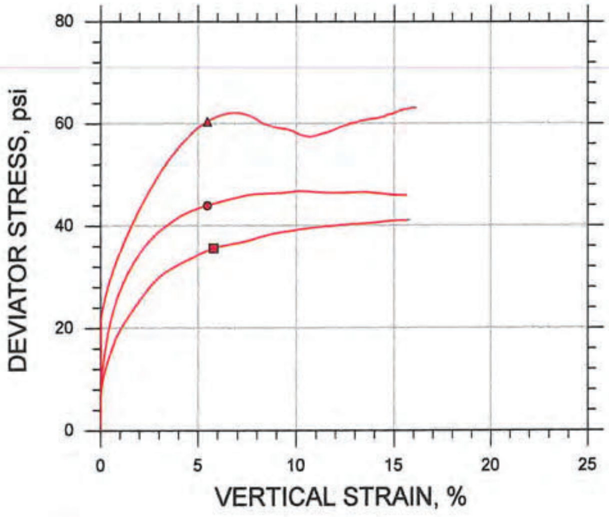
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-100	Sample Type: intact	
Description: Moist, red sandy silt		
Remarks: System X		

GeoTesting EXPRESS

Client: AECOM
Project Name: SCS Plant Scherer Ph.2
Project Location: Monroe County, GA
Project Number: GTX-304548
Tested By: md | Checked By: mcm
Boring ID: B-100
Preparation: intact
Description: Moist, red silt with sand
Classification: Elastic silt with sand
Group Symbol: MH
Liquid Limit: 71 | Plastic Limit: 39
Plasticity Index: 32 | Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

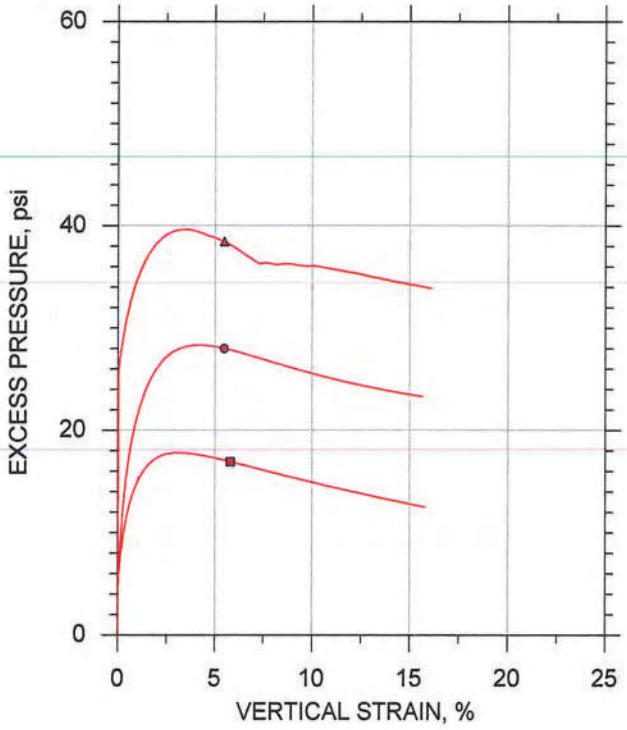


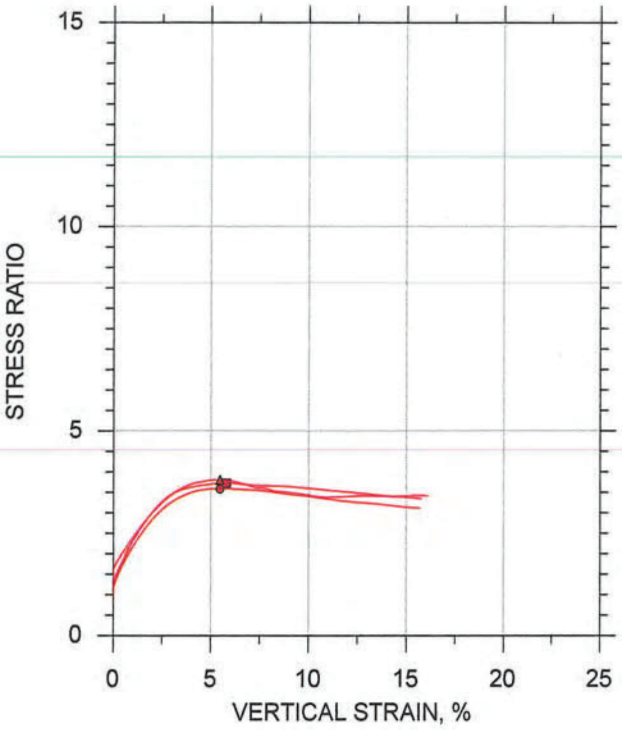


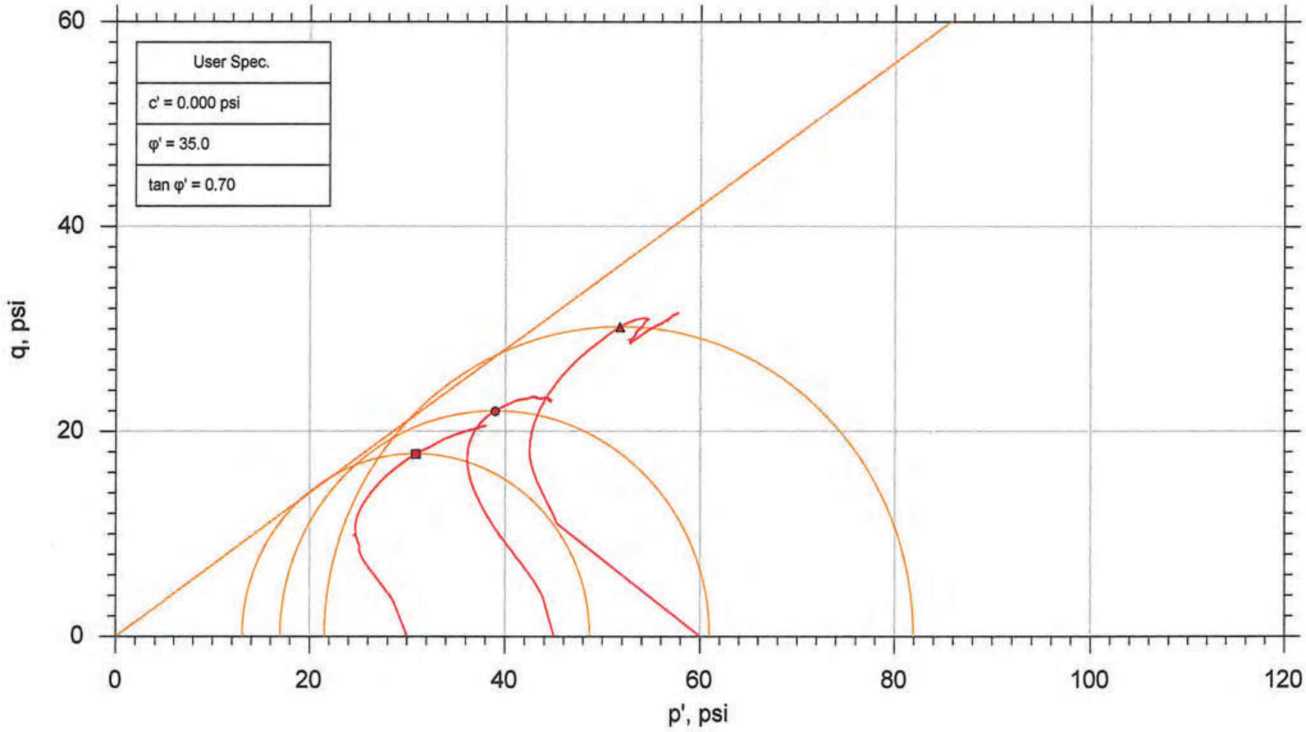
Symbol		■	●	▲	
Sample ID		T-12	T-12	T-12	
Depth, ft		35-37 ft	35-37 ft	35-37 ft	
Test Number		CU-5-1	CU-5-2	CU-5-3	
Initial	Height, in	6.190	6.100	6.020	
	Diameter, in	2.870	2.870	2.870	
	Moisture Content (from Cuttings), %	33.9	29.3	34.1	
	Dry Density, pcf	85.6	87.1	85.9	
	Saturation (Wet Method), %	94.5	84.6	95.6	
	Void Ratio	0.969	0.934	0.963	
Before Shear	Moisture Content, %	33.1	31.1	31.3	
	Dry Density, pcf	89.0	91.7	91.4	
	Cross-sectional Area (Method A), in²	6.348	6.291	6.326	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	0.893	0.839	0.844	
	Back Pressure, psi	131.0	150.9	160.8	
Vertical Effective Consolidation Stress, psi		29.88	44.88	59.76	
Horizontal Effective Consolidation Stress, psi		30.00	44.99	59.99	
Vertical Strain after Consolidation, %		1.975	2.164	4.031	
Volumetric Strain after Consolidation, %		3.722	4.708	6.318	
Time to 50% Consolidation, min		0.8100	0.3600	0.4900	
Shear Strength, psi		17.81	21.99	30.21	
Strain at Failure, %		5.79	5.47	5.47	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		35.62	43.98	60.41	
Effective Minor Principal Stress at Failure, psi		13.06	16.99	21.52	
Effective Major Principal Stress at Failure, psi		48.68	60.96	81.94	
B-Value		0.95	0.96	0.95	
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Atterberg Limits determined by ASTM D4318. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.					
Remarks:					

System Y

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767







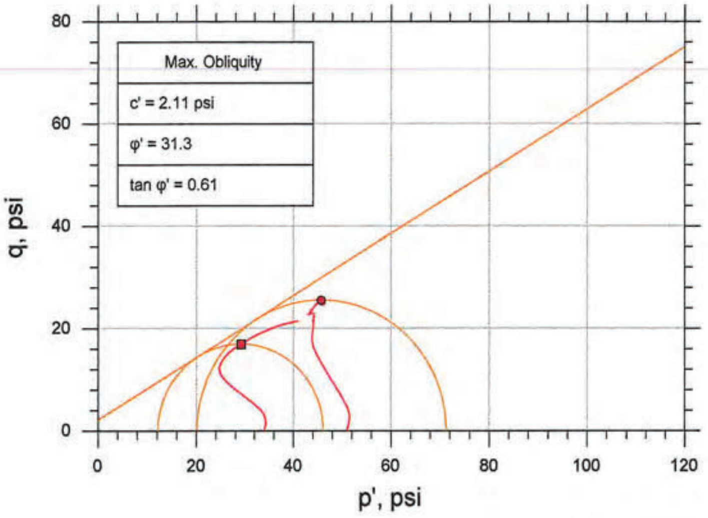
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	T-12	CU-5-1	35-37 ft	md	4/5/16	mcm	4/12/16	304548-CU-5-1d.dat
●	T-12	CU-5-2	35-37 ft	md	4/5/16	mcm	4/12//16	304548-CU-5-2d.dat
▲	T-12	CU-5-3	35-37 ft	md	4/5/16	mcm	4/12/16	304548-CU-5-3d.dat

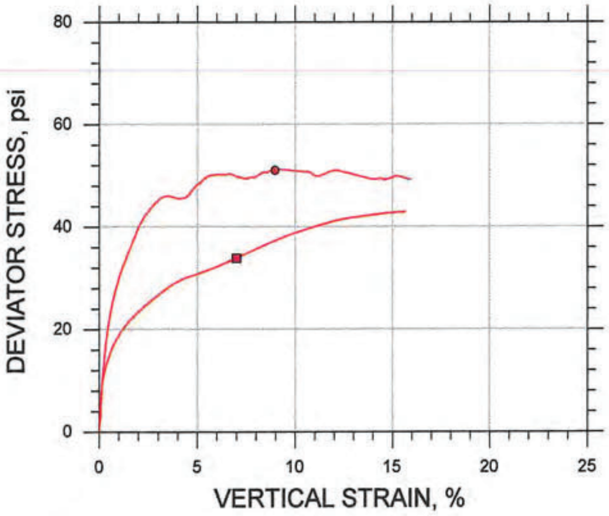
GeoTesting
EXPRESS

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-100	Sample Type: intact	
Description: Moist, red silt with sand		
Remarks: System Y		

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: md	Checked By: mcm
Boring ID: B-100	
Preparation: intact	
Description: Moist, red sandy silt	
Classification: Sandy Elastic silt	
Group Symbol: MH	
Liquid Limit: 68	Plastic Limit: 37
Plasticity Index: 31	Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

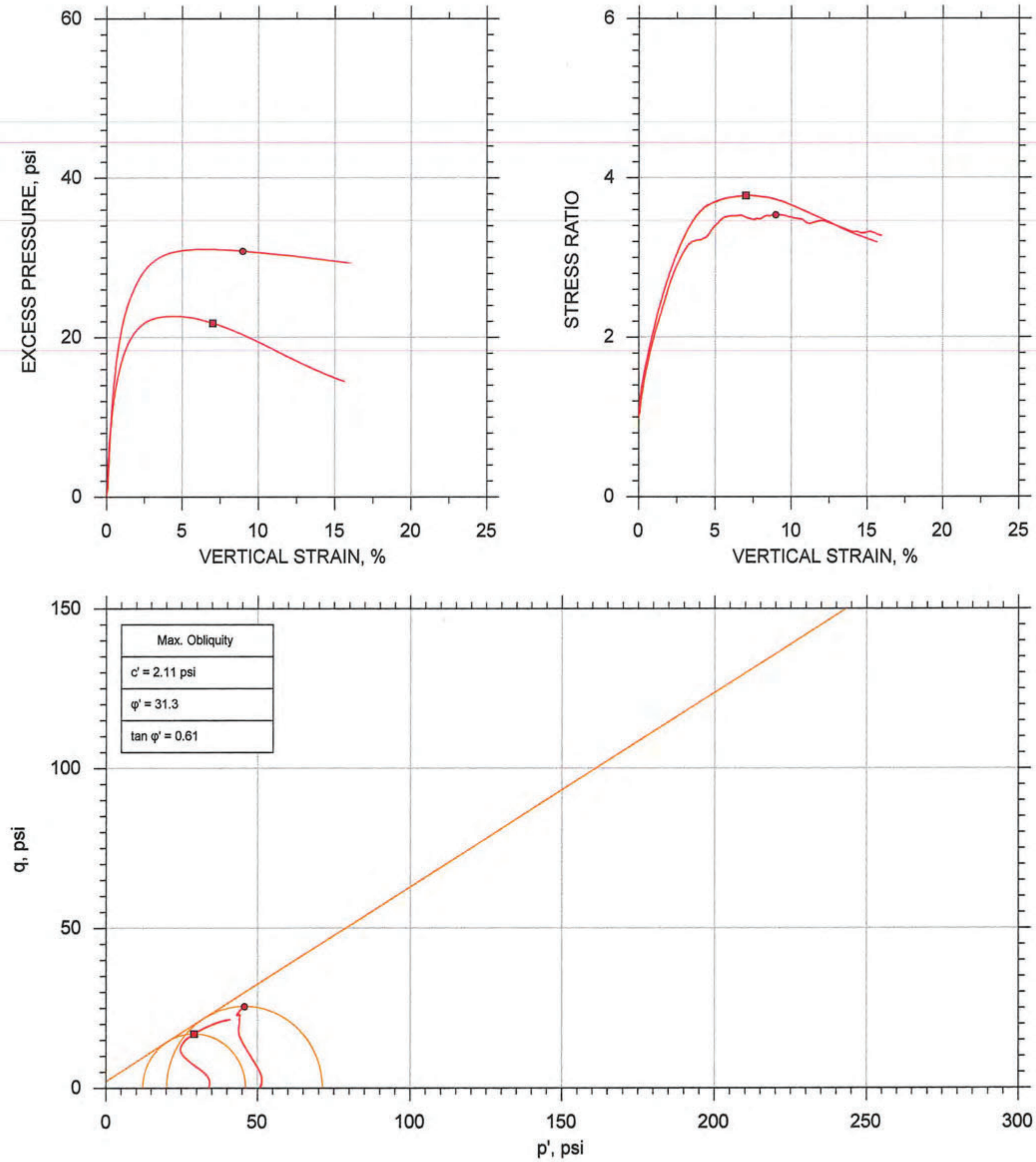




	Symbol	■	●		
	Sample ID	T-14	T-14		
	Depth, ft	40-42 ft	40-42 ft		
	Test Number	CU-6-1	CU-6-2		
Initial	Height, in	6.110	6.150		
	Diameter, in	2.870	2.870		
	Moisture Content (from Cuttings), %	20.5	27.7		
	Dry Density, pcf	99.0	87.6		
	Saturation (Wet Method), %	78.6	80.9		
	Void Ratio	0.703	0.925		
Before Shear	Moisture Content, %	23.0	30.2		
	Dry Density, pcf	104.	92.8		
	Cross-sectional Area (Method A), in²	6.294	6.267		
	Saturation, %	100.0	100.0		
	Void Ratio	0.622	0.817		
	Back Pressure, psi	141.0	150.9		
	Vertical Effective Consolidation Stress, psi	33.92	50.80		
	Horizontal Effective Consolidation Stress, psi	34.02	50.95		
	Vertical Strain after Consolidation, %	1.720	2.670		
	Volumetric Strain after Consolidation, %	3.555	5.887		
	Time to 50% Consolidation, min	4.410	1.210		
	Shear Strength, psi	16.95	25.54		
	Strain at Failure, %	7.00	8.97		
	Strain Rate, %/min	0.01600	0.01600		
	Deviator Stress at Failure, psi	33.90	51.07		
	Effective Minor Principal Stress at Failure, psi	12.21	20.15		
	Effective Major Principal Stress at Failure, psi	46.12	71.22		
	B-Value	0.95	0.95		
	Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Atterberg Limits determined by ASTM D4318. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:				

System S

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	T-14	CU-6-1	40-42 ft	md	4/6/16	mcm	4/15/16	304548-CU-6-1m.dat
●	T-14	CU-6-2	40-42 ft	md	4/6/16	mcm	4/15/16	304548-CU-6-2m.dat

GeoTesting EXPRESS

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-100	Sample Type: intact	
Description: Moist, red sandy silt		
Remarks: System S		

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/05/16	Checked By:	mcm
Depth :	---	Test Id:	370773		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-101	S- 1 (BAG)	1-2.5 ft	Moist, reddish brown clay with sand	22.5
B-101	S- 4 (BAG)	8.5-10 ft	Moist, dark brown clay	31.8
B-101	S- 6 (BAG)	12-13.5 ft	Moist, olive clay with sand	24.2
B-101	S- 7 (TUBE)	13.5-15.5 ft	Moist, mottled dark gray and white sandy silty clay	26.2
B-101	S- 8 (BAG)	18.5-20 ft	Moist, very dark gray silty sand	27.5
B-101	S- 11 (BAG)	33.5-35 ft	Moist, very dark gray sandy clay	13.2
B-101	S- 13 (BAG)	41-42 ft	Moist, very dark gray sandy clay	16.9

Notes: Temperature of Drying : 110º Celsius

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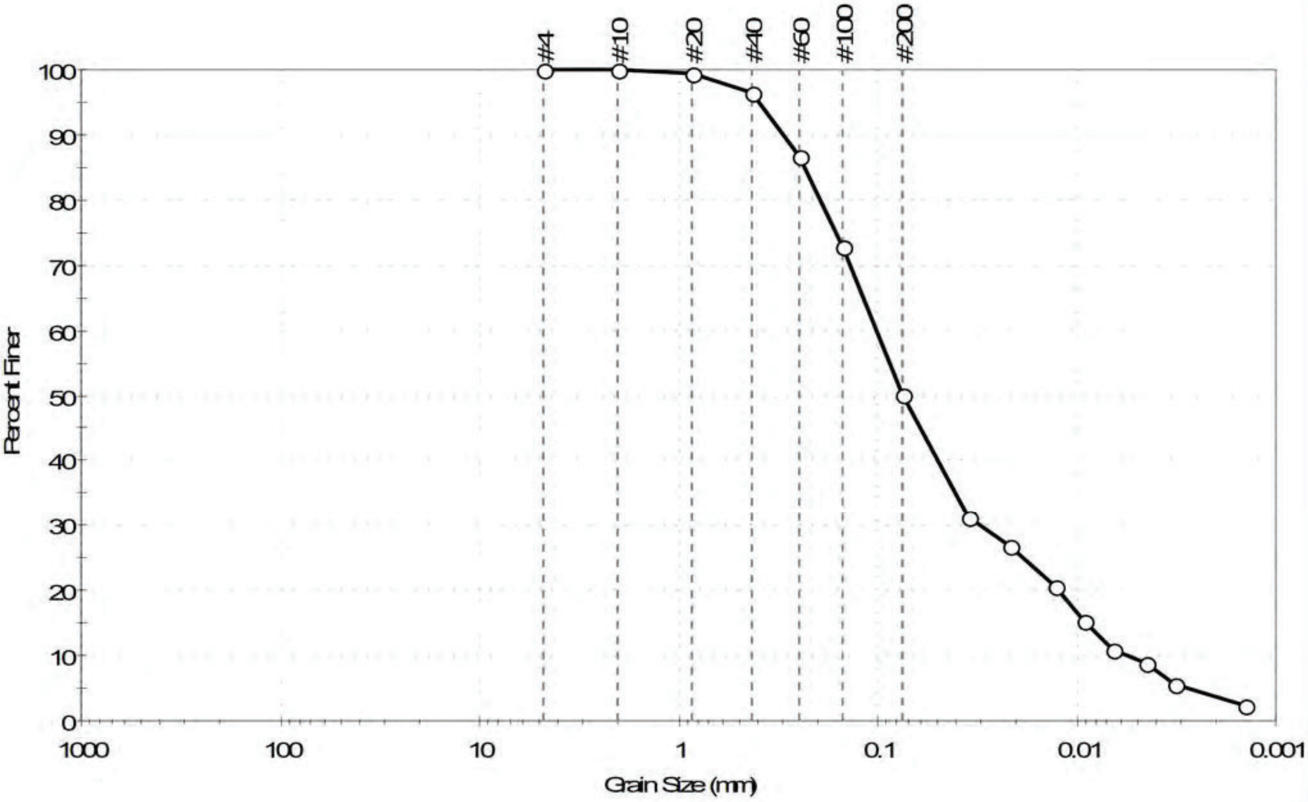
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-101	Sample Type:	tube	Tested By:	GA
Sample ID:	S-7 (TUBE)	Test Date:	04/12/16	Checked By:	mcm
Depth :	13.5-15.5 ft	Test Id:	370780		

Test Comment: ---
Visual Description: Moist, mottled dark gray and white sandy silty clay
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	49.8	50.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	96		
#60	0.25	87		
#100	0.15	73		
#200	0.075	50		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0347	31		
---	0.0217	27		
---	0.0128	21		
---	0.0092	15		
---	0.0066	11		
---	0.0045	9		
---	0.0032	6		
---	0.0014	2		

Coefficients

D_{85} =0.2356 mm	D_{30} =0.0303 mm
D_{60} =0.1011 mm	D_{15} =0.0090 mm
D_{50} =0.0744 mm	D_{10} =0.0055 mm
C_u =18.382	C_c =1.651

Classification

<u>ASTM</u> Sandy Silty clay (CL-ML)

<u>AASHTO</u> Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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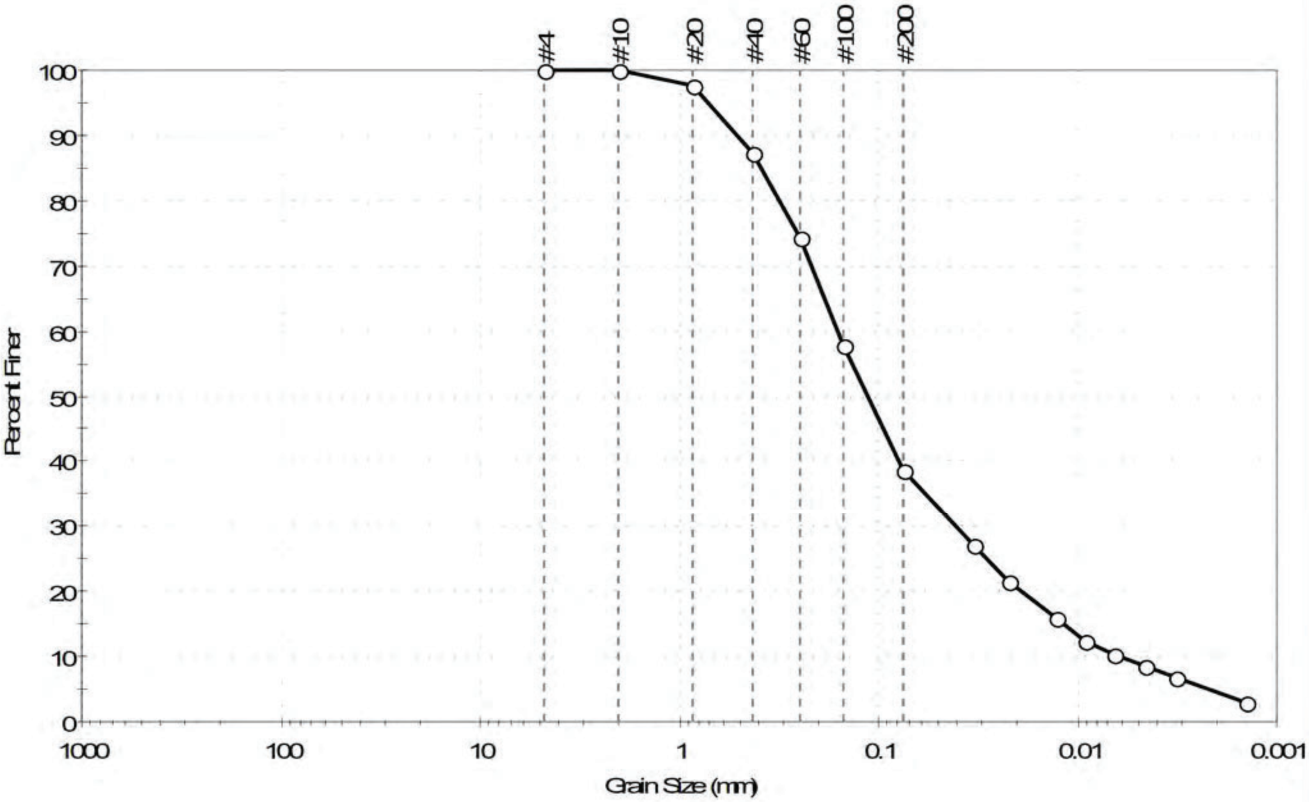
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-101	Sample Type:	bag	Tested By:	GA
Sample ID:	S-8 (BAG)	Test Date:	04/12/16	Checked By:	mcm
Depth :	18.5-20 ft	Test Id:	370781		

Test Comment: ---

Visual Description: Moist, very dark gray silty sand

Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	61.3	38.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	87		
#60	0.25	74		
#100	0.15	58		
#200	0.075	39		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0333	27		
---	0.0220	21		
---	0.0128	16		
---	0.0092	12		
---	0.0065	10		
---	0.0046	9		
---	0.0032	7		
---	0.0014	3		

Coefficients

D_{85} =0.3876 mm

D_{30} =0.0410 mm

D_{60} =0.1603 mm

D_{15} =0.0118 mm

D_{50} =0.1128 mm

D_{10} =0.0060 mm

C_u =26.717

C_c =1.748

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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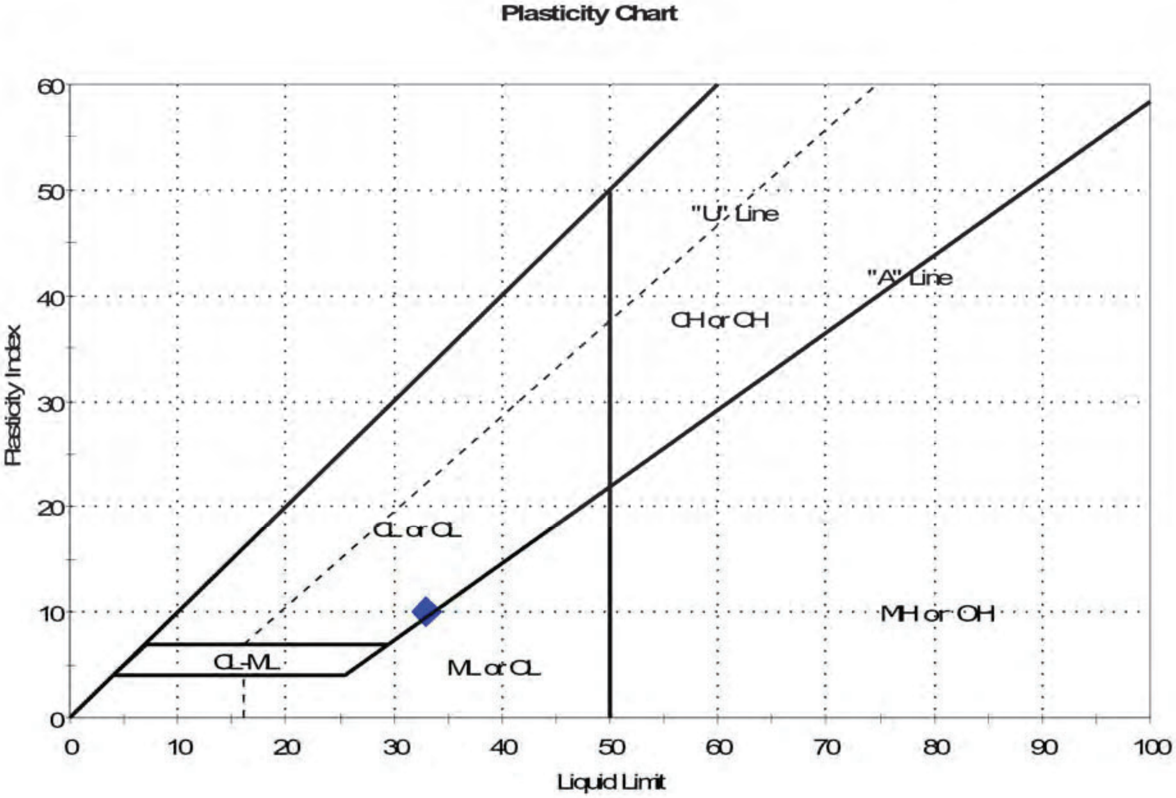
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-101
Sample Type: bag
Tested By: GA
Sample ID: S-1 (BAG)
Test Date: 04/07/16
Checked By: mcm
Depth : 1-2.5 ft
Test Id: 370774
Test Comment: ---
Visual Description: Moist, reddish brown clay with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-1 (BAG)	B-101	1-2.5 ft	22	33	23	10	-0.1	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

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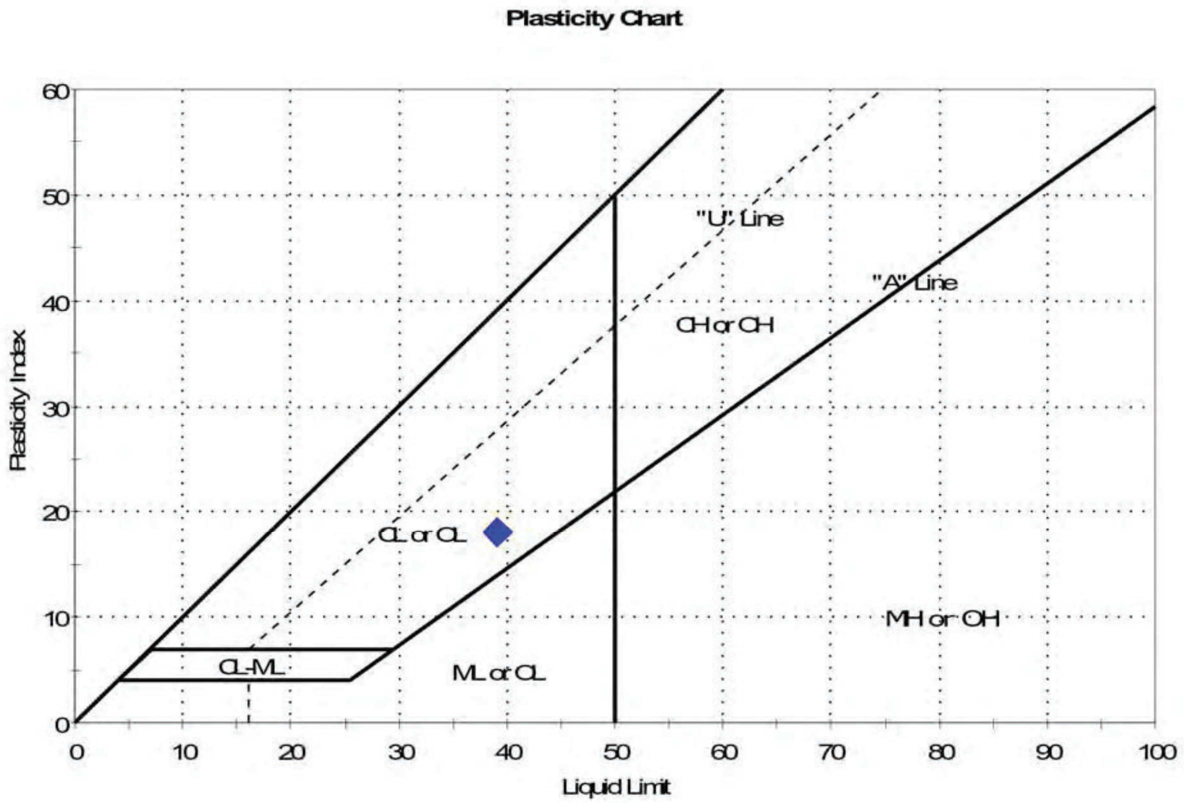
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-101
Sample Type: bag
Tested By: GA
Sample ID: S-4 (BAG)
Test Date: 04/06/16
Checked By: mcm
Depth : 8.5-10 ft
Test Id: 370776

Test Comment: ---
Visual Description: Moist, dark brown clay
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-4 (BAG)	B-101	8.5-10 ft	32	39	21	18	0.6	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

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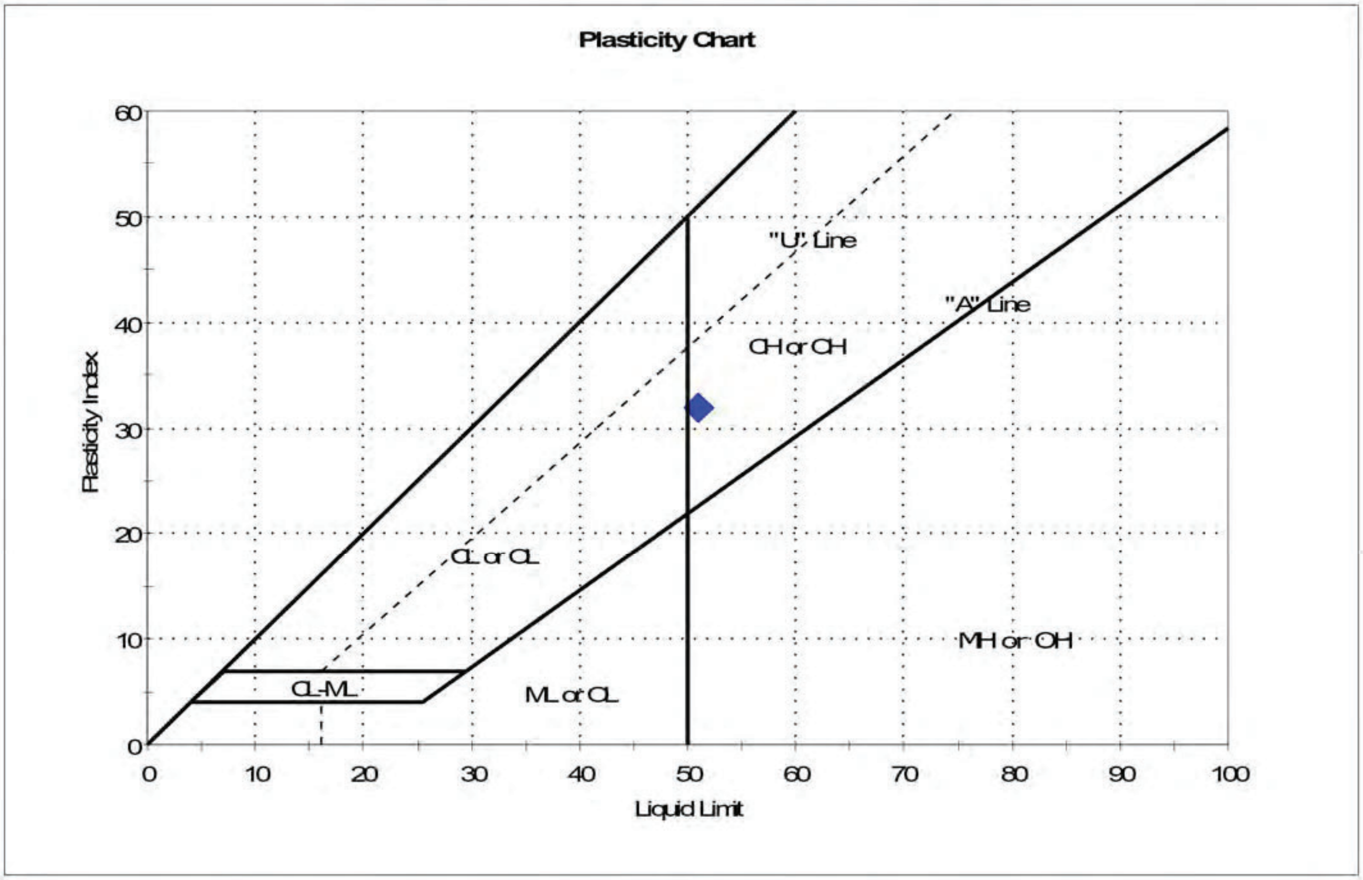
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-101	Sample Type:	bag	Tested By:	GA
Sample ID:	S-6 (BAG)	Test Date:	04/07/16	Checked By:	mcm
Depth :	12-13.5 ft	Test Id:	370777		

Test Comment: ---
Visual Description: Moist, olive clay with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-6 (BAG)	B-101	12-13.5 ft	24	51	19	32	0.2	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

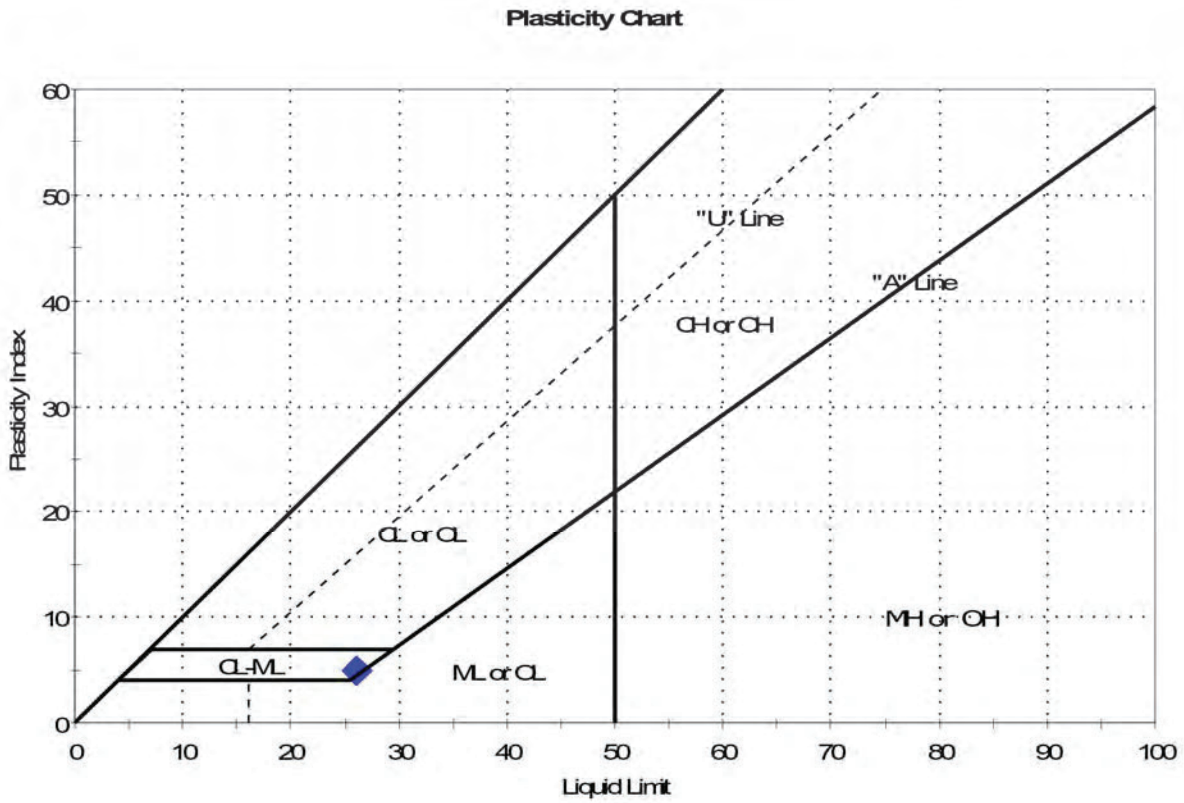
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-101	Sample Type:	tube	Tested By:	GA
Sample ID:	S-7 (TUBE)	Test Date:	04/08/16	Checked By:	mcm
Depth :	13.5-15.5 ft	Test Id:	370778		

Test Comment: ---

Visual Description: Moist, mottled dark gray and white sandy silty clay

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-7 (TUBE)	B-101	13.5-15.5 ft	26	26	21	5	1	Sandy Silty clay (CL-ML)

Sample Prepared using the WET method

4% Retained on #40 Sieve

Dry Strength: HIGH

Dilatancy: NONE

Toughness: LOW

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-101	Sample Type:	tube	Tested By:	GA
Sample ID:	S-7 (TUBE)	Test Date:	04/18/16	Checked By:	mcm
Depth :	13.5-15.5 ft	Test Id:	370785		

Test Comment: ---
Visual Description: Moist, mottled dark gray and white sandy silty clay
Sample Comment: ---

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	Sample ID	Depth	Visual Description	Bulk Density pcf	Moisture Content %	Dry Density pcf
B-101	S- 7 (TUBE)	13.5-15.5 ft	Moist, mottled dark gray and white sandy silty clay	122.8	29.37	94.95

* Sample Comments

(1): Method B-Cylinder, Intact

Notes: Moisture Content determined by ASTM D2216.

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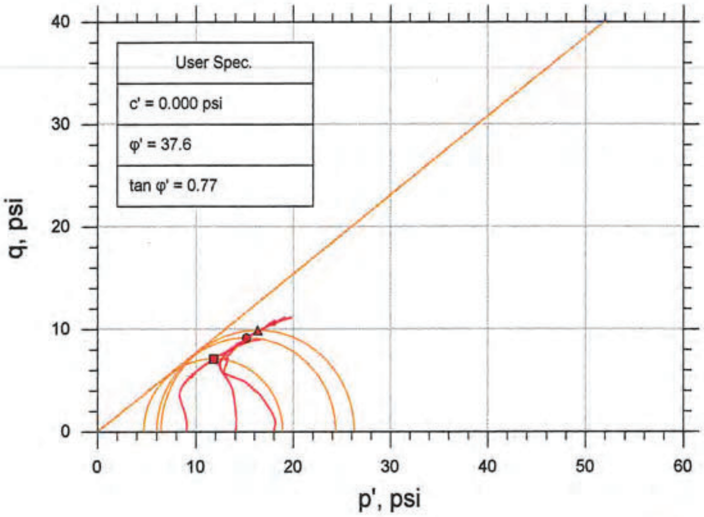
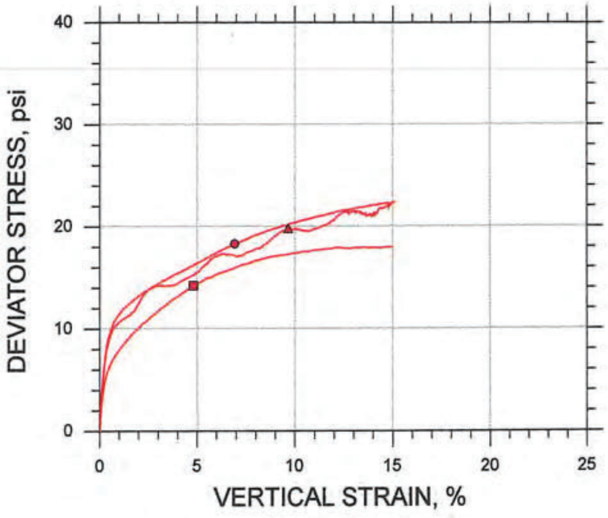
GeoTesting EXPRESS

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: jm	Checked By: mcm
Boring ID: B-101	
Preparation: intact	
Description: Moist, mottled dark gray and white sandy silty clay	
Classification: Sandy Silty clay	
Group Symbol: CL-ML	
Liquid Limit: 26	Plastic Limit: 21
Plasticity Index: 5	Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

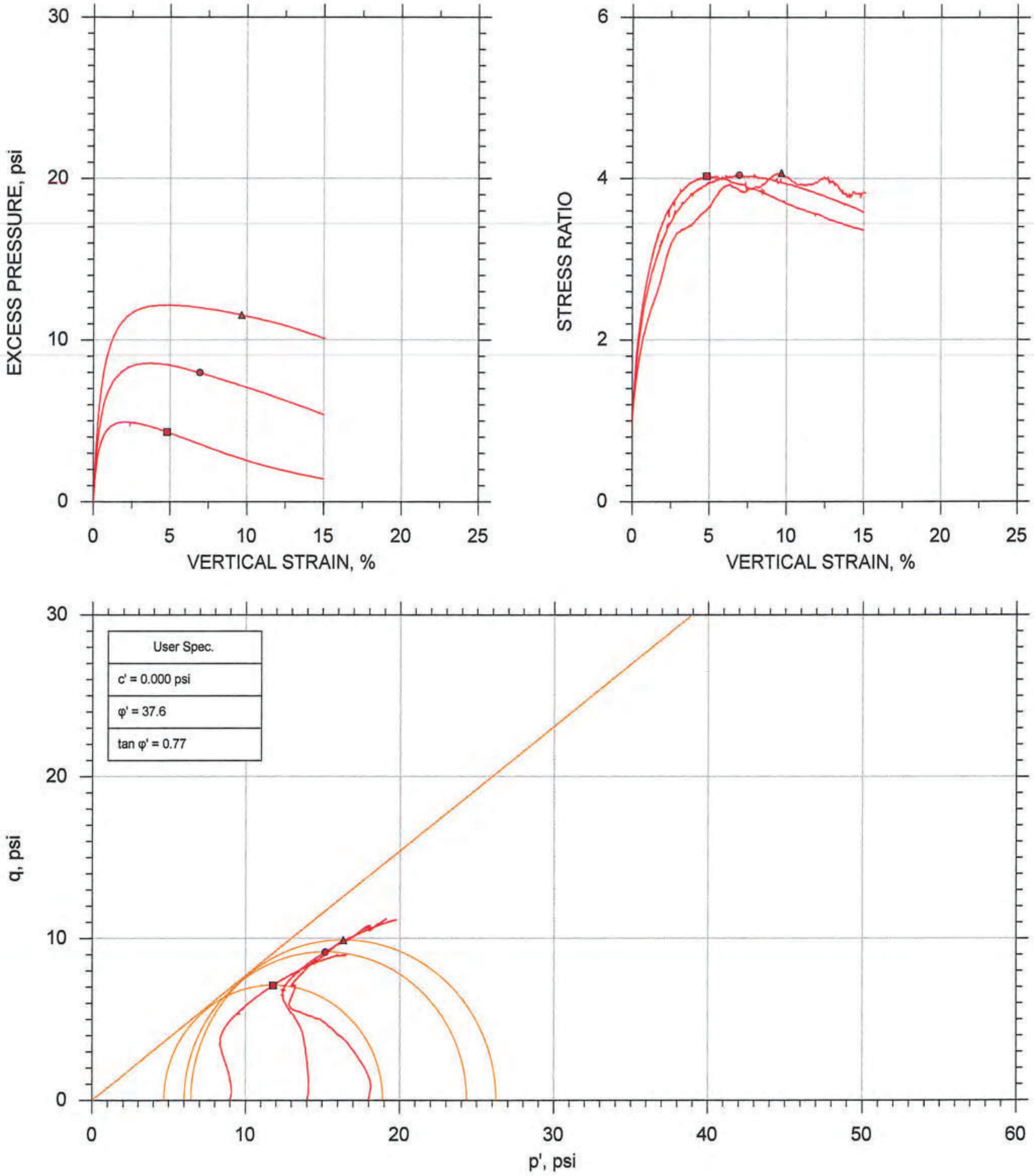




	Symbol	■	●	▲	
	Sample ID	S-7	S-7	S-7	
	Depth, ft	13.5-15.5 ft	13.5-15.5 ft	13.5-15.5 ft	
	Test Number	CU-11-1	CU-11-2	CU-11-3	
Initial	Height, in	6.053	6.201	6.054	
	Diameter, in	2.870	2.870	2.870	
	Moisture Content (from Cuttings), %	29.4	30.4	28.0	
	Dry Density, pcf	94.0	92.5	94.0	
	Saturation (Wet Method), %	99.9	99.8	95.2	
	Void Ratio	0.794	0.822	0.793	
Before Shear	Moisture Content, %	28.6	30.0	26.5	
	Dry Density, pcf	95.1	93.1	98.3	
	Cross-sectional Area (Method A), in²	6.414	6.439	6.285	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	0.772	0.811	0.715	
	Back Pressure, psi	61.00	29.00	65.00	
Vertical Effective Consolidation Stress, psi		8.993	13.99	17.96	
Horizontal Effective Consolidation Stress, psi		9.000	14.00	17.99	
Vertical Strain after Consolidation, %		0.2953	0.4110	1.358	
Volumetric Strain after Consolidation, %		0.9772	1.360	3.746	
Time to 50% Consolidation, min		8.410	0.4900	1.210	
Shear Strength, psi		7.106	9.159	9.897	
Strain at Failure, %		4.81	6.93	9.66	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		14.21	18.32	19.79	
Effective Minor Principal Stress at Failure, psi		4.689	6.017	6.449	
Effective Major Principal Stress at Failure, psi		18.90	24.34	26.24	
B-Value		0.96	0.97	0.95	
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Atterberg Limits determined by ASTM D4318. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.					
Remarks:					

System A

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	S-7	CU-11-1	13.5-15.5 ft	jm	4/2/16	mcm	4/17/16	304548-CU-11-1m.dat
●	S-7	CU-11-2	13.5-15.5 ft	jm	4/2/16	mcm	4/17/16	304548-CU-11-2m.dat
▲	S-7	CU-11-3	13.5-15.5 ft	jm	4/2/16	mcm	4/17/16	304548-CU-11-3m.dat

GeoTesting EXPRESS

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-101	Sample Type: intact	
Description: Moist, mottled dark gray and white sandy silty clay		
Remarks: System A		

Client:	AECOM
Project Name:	SCS Plant Scherer Ph.2
Project Location:	Monroe County, GA
GTX #:	304548
Boring ID:	B-101
Sample ID:	S-3
Depth, ft:	5-7

Top Section of Tube

Top of tube

Bottom of tube

Middle Section of Tube

Top of tube

Bottom of tube

Bottom Section of Tube

Top of tube

Bottom of tube

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/11/16	Checked By:	mcm
Depth :	---	Test Id:	371547		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-102	S- 2	3.5-5 ft	Moist, olive brown silty sand	24.6
B-102	S- 17	68.5-70 ft	Moist, olive sandy clay	22.9
B-102	S- 19	78.5-80 ft	Moist, dark yellowish brown silty sand	43.1

Notes: Temperature of Drying : 110º Celsius

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/19/16	Checked By:	mcm
Depth :	---	Test Id:	371545		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-102	S- 3 (TUBE)	6-8 ft	Moist, dark gray sandy silt (ASH)	50.3
B-102	S- 5 (TUBE)	13-15 ft	Moist, light gray silt (ASH)	40.8
B-102	S- 8 (TUBE)	23-25 ft	Moist, dark gray silt (ASH)	62.6
B-102	S- 10 (TUBE)	33-35 ft	Moist, light gray silt (ASH)	40.2
B-102	S- 11 (TUBE)	38-40 ft	Moist, dark gray silt (ASH)	41.9
B-102	S- 12 (TUBE)	43-45 ft	Moist, gray silt with sand (ASH)	49.0
B-102	S- 13	48.5-50 ft	Moist, gray silt with sand (ASH)	47.4
B-102	S- 15	58.5-60 ft	Moist, gray silt (ASH)	51.3
B-102	S- 16 (TUBE)	63-65 ft	Moist, dark gray silt (ASH)	59.0

Notes: Temperature of Drying : 60º Celsius

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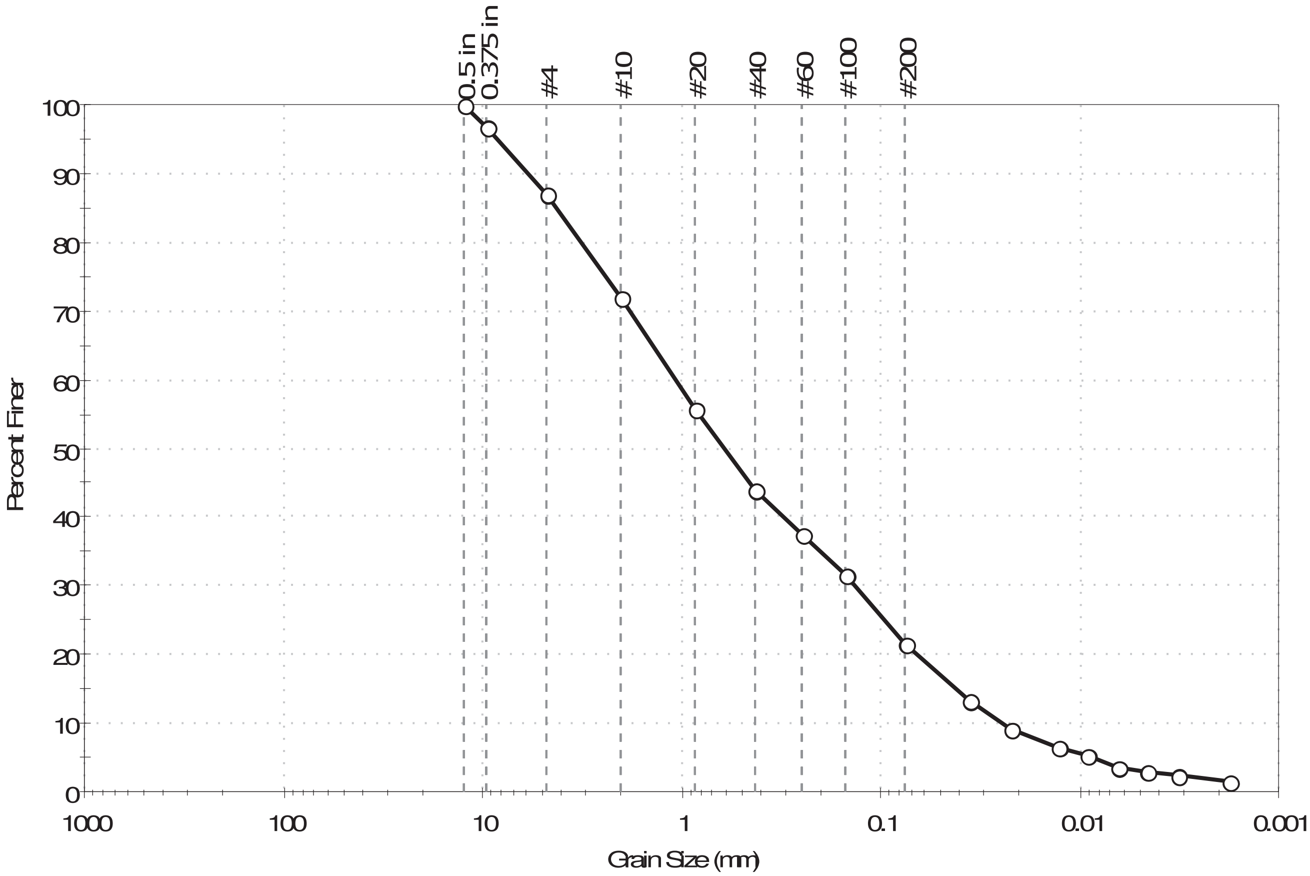
GeoTesting
EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-102
Sample ID: S-2
Depth : 3.5-5 ft
Sample Type: bag
Test Date: 04/26/16
Test Id: 371548
Tested By: GA
Checked By: mcm
Test Comment: ---
Visual Description: Moist, olive brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	13.1	65.5	21.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	97		
#4	4.75	87		
#10	2.00	72		
#20	0.85	56		
#40	0.42	44		
#60	0.25	38		
#100	0.15	31		
#200	0.075	21		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0355	13		
---	0.0223	9		
---	0.0130	6		
---	0.0092	5		
---	0.0065	4		
---	0.0047	3		
---	0.0032	2		
---	0.0018	1		

Coefficients

D_{85} =4.2430 mm
D_{30} =0.1359 mm
D_{60} =1.0569 mm
D_{15} =0.0419 mm
D_{50} =0.6014 mm
D_{10} =0.0244 mm
C_u =43.316
C_c =0.716

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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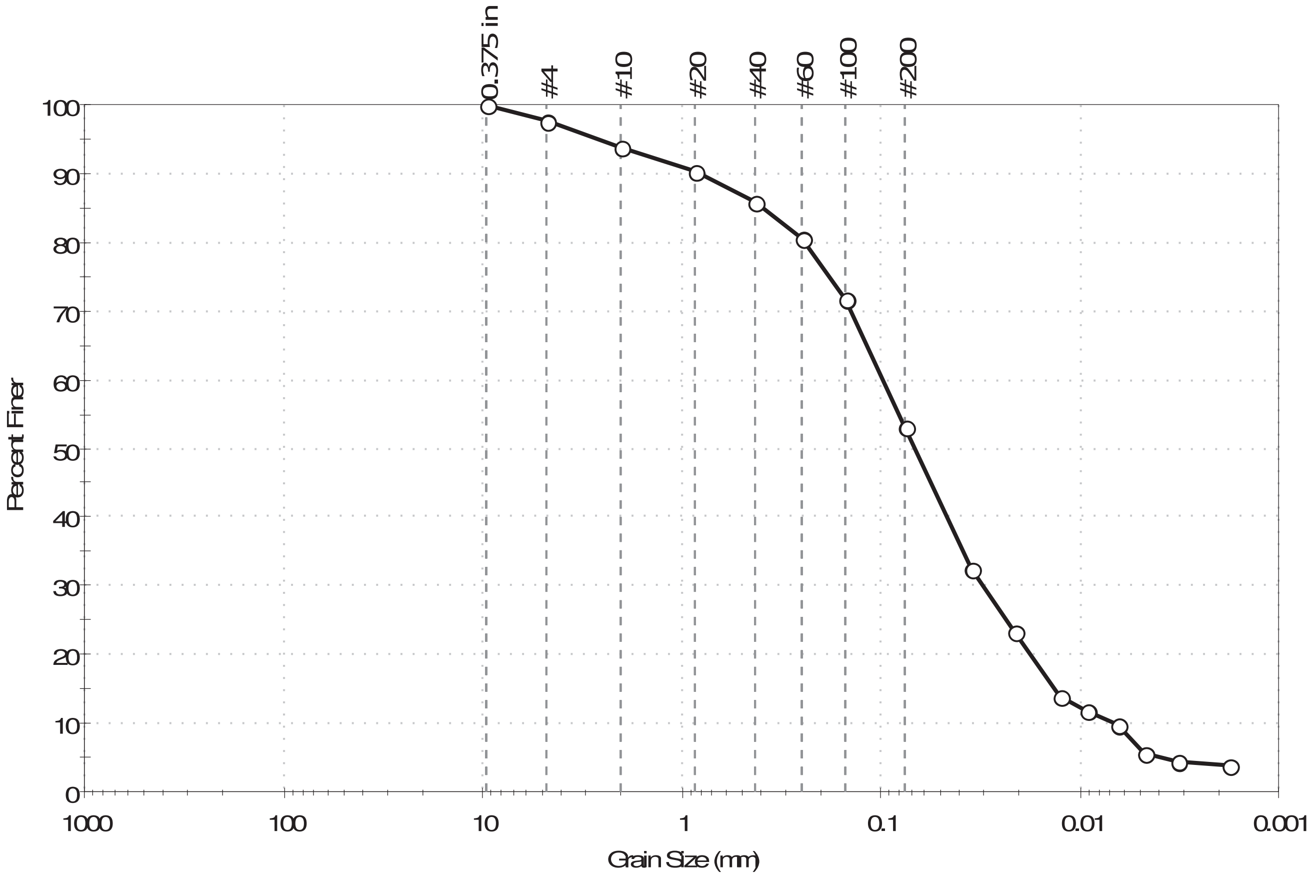
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-102	Sample Type:	tube	Tested By:	GA
Sample ID:	S-3 (TUBE)	Test Date:	04/26/16	Checked By:	mcm
Depth :	6-8 ft	Test Id:	371549		

Test Comment: ---
Visual Description: Moist, dark gray sandy silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	2.3	44.7	53.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	94		
#20	0.85	90		
#40	0.42	86		
#60	0.25	81		
#100	0.15	72		
#200	0.075	53		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0346	33		
---	0.0214	23		
---	0.0126	14		
---	0.0092	12		
---	0.0064	10		
---	0.0047	5		
---	0.0032	4		
---	0.0018	4		

Coefficients

D_{85} =0.3915 mm
D_{30} =0.0303 mm
D_{60} =0.0972 mm
D_{15} =0.0133 mm
D_{50} =0.0669 mm
D_{10} =0.0066 mm
C_u =14.727
C_c =1.431

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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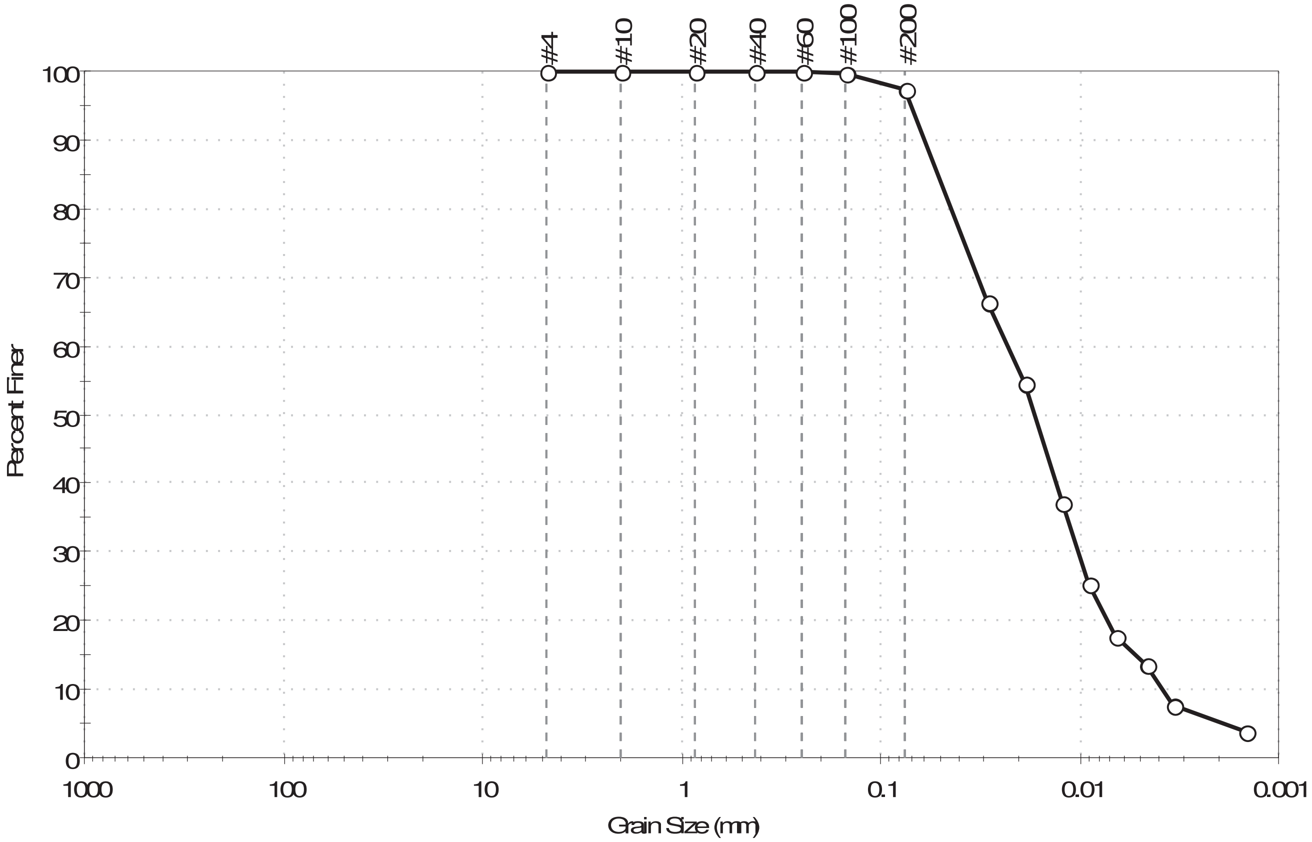
GeoTesting
EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-102
Sample ID: S-5 (TUBE)
Depth : 13-15 ft
Sample Type: tube
Test Date: 04/20/16
Test Id: 371550
Tested By: jbr
Checked By: mcm

Test Comment: ---
Visual Description: Moist, light gray silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	2.8	97.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	97		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0287	66		
---	0.0187	55		
---	0.0121	37		
---	0.0089	25		
---	0.0065	18		
---	0.0046	14		
---	0.0034	8		
---	0.0015	4		

Coefficients

D_{85} =0.0512 mm
D_{30} =0.0101 mm
D_{60} =0.0227 mm
D_{15} =0.0052 mm
D_{50} =0.0166 mm
D_{10} =0.0038 mm
C_u =5.974
C_c =1.183

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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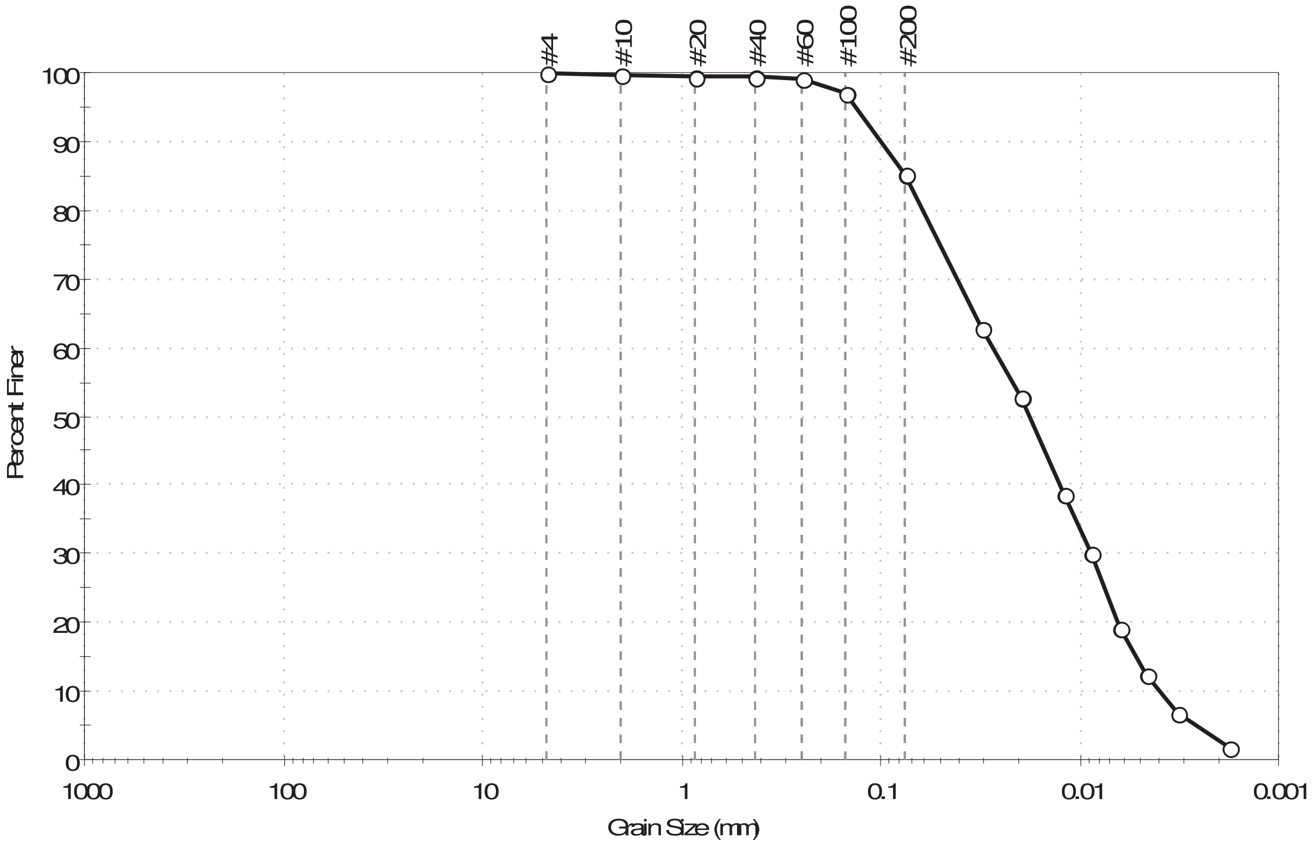
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-102	Sample Type:	tube	Tested By:	GA
Sample ID:	S-8 (TUBE)	Test Date:	04/26/16	Checked By:	mcm
Depth :	23-25 ft	Test Id:	371551		

Test Comment: ---

Visual Description: Moist, dark gray silt (ASH)

Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	14.7	85.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	99		
#100	0.15	97		
#200	0.075	85		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0308	63		
---	0.0196	53		
---	0.0118	39		
---	0.0088	30		
---	0.0063	19		
---	0.0046	12		
---	0.0032	7		
---	0.0018	2		

Coefficients

D_{85} =0.0741 mm	D_{30} =0.0088 mm
D_{60} =0.0272 mm	D_{15} =0.0052 mm
D_{50} =0.0177 mm	D_{10} =0.0039 mm
C_u =6.974	C_c =0.730

Classification

ASTM	N/A
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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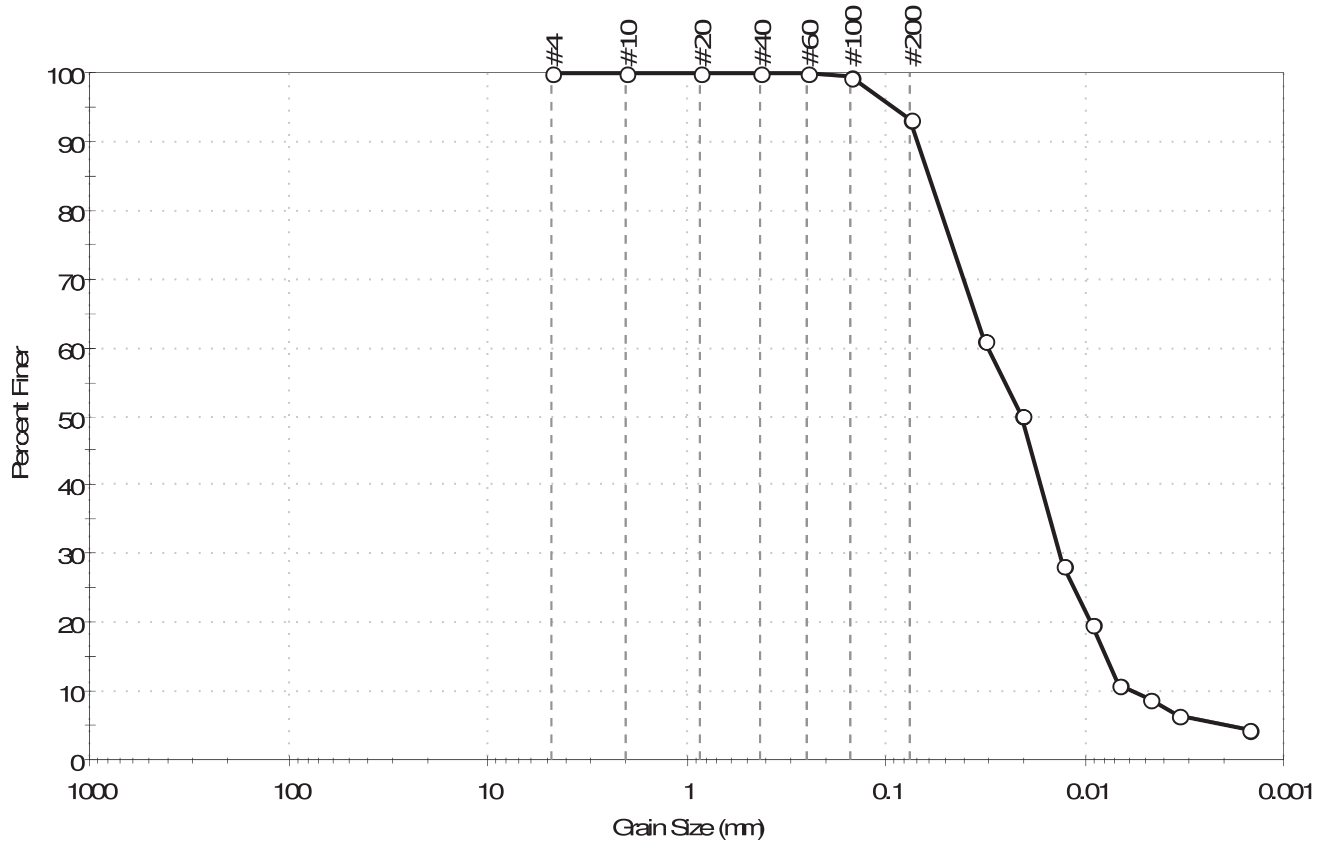
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-102
Sample ID: S-10 (TUBE)
Depth : 33-35 ft
Sample Type: tube
Test Date: 04/20/16
Test Id: 371552
Tested By: jbr
Checked By: mcm

Test Comment: ---
Visual Description: Moist, light gray silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	6.8	93.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	99		
#200	0.075	93		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0317	61		
---	0.0208	50		
---	0.0128	28		
---	0.0093	20		
---	0.0067	11		
---	0.0048	9		
---	0.0034	7		
---	0.0015	4		

Coefficients

D_{85} =0.0602 mm
D_{30} =0.0133 mm
D_{60} =0.0305 mm
D_{15} =0.0078 mm
D_{50} =0.0207 mm
D_{10} =0.0058 mm
C_u =5.259
C_c =1.000

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

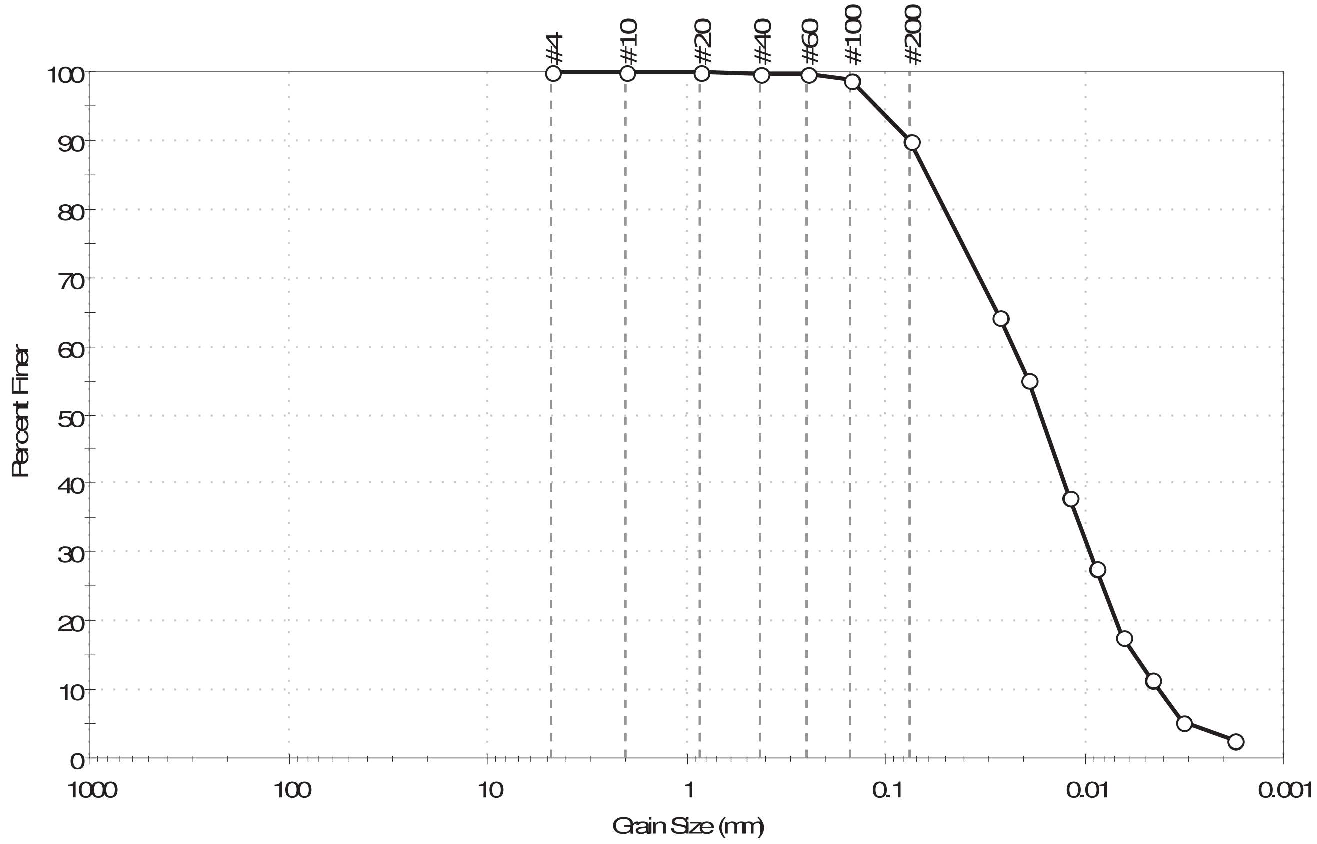
Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID:	B-102	Sample Type:	tube	Tested By:	GA
Sample ID:	S-11 (TUBE)	Test Date:	04/26/16	Checked By:	mcm
Depth :	38-40 ft	Test Id:	371553		

Test Comment: ---
Visual Description: Moist, dark gray silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	10.0	90.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	99		
#200	0.075	90		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0272	64		
---	0.0194	55		
---	0.0119	38		
---	0.0088	28		
---	0.0064	18		
---	0.0046	11		
---	0.0032	5		
---	0.0018	3		

Coefficients

D_{85} =0.0616 mm
D_{30} =0.0094 mm
D_{60} =0.0233 mm
D_{15} =0.0055 mm
D_{50} =0.0168 mm
D_{10} =0.0042 mm
C_u =5.548
C_c =0.903

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

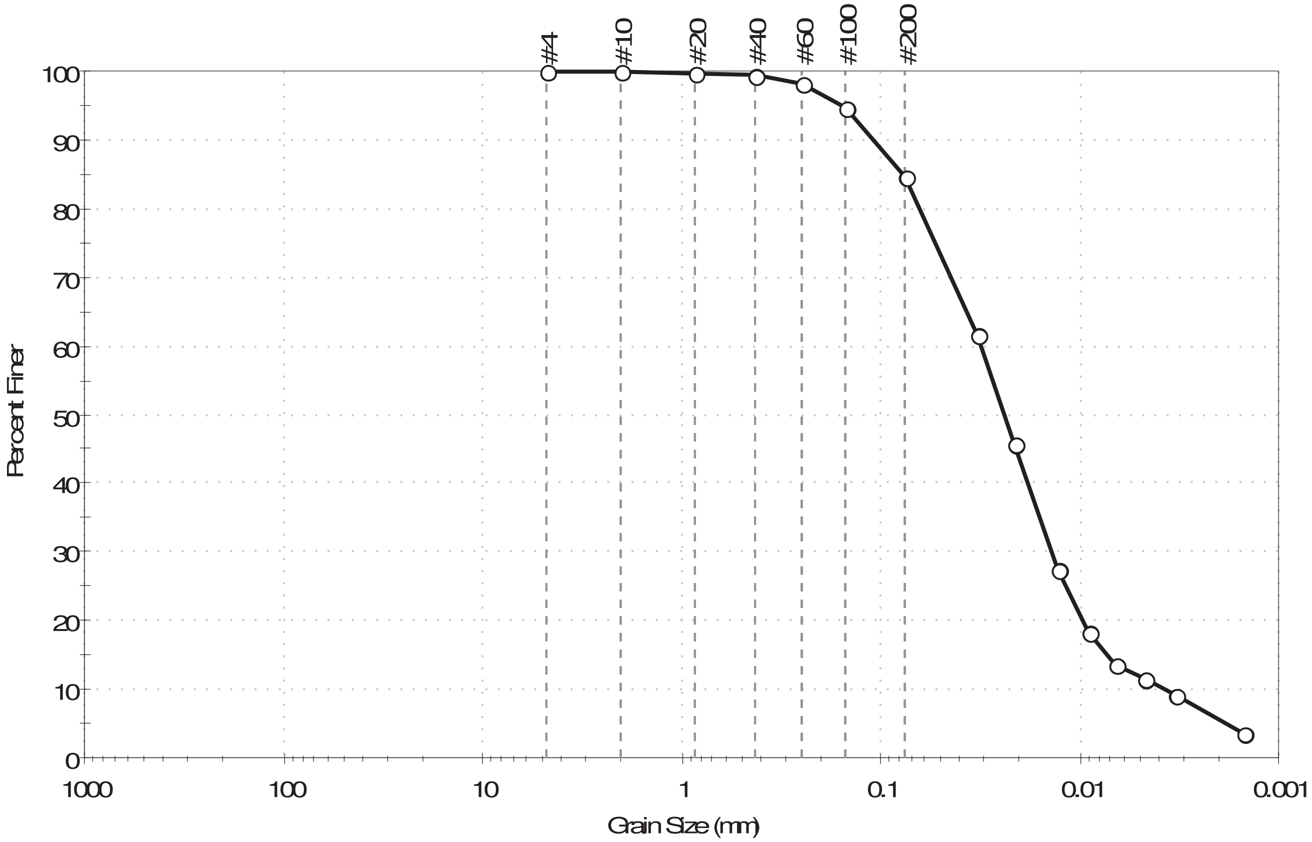
Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-102	Sample Type:	tube	Tested By:	jbr
Sample ID:	S-12 (TUBE)	Test Date:	04/20/16	Checked By:	mcm
Depth :	43-45 ft	Test Id:	371554		

Test Comment: ---
Visual Description: Moist, gray silt with sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	15.5	84.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	98		
#100	0.15	95		
#200	0.075	85		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0325	62		
---	0.0211	46		
---	0.0128	27		
---	0.0091	18		
---	0.0066	14		
---	0.0047	11		
---	0.0033	9		
---	0.0015	3		

Coefficients

D_{85} =0.0774 mm	D_{30} =0.0138 mm
D_{60} =0.0311 mm	D_{15} =0.0072 mm
D_{50} =0.0237 mm	D_{10} =0.0038 mm
C_u =8.184	C_c =1.611

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

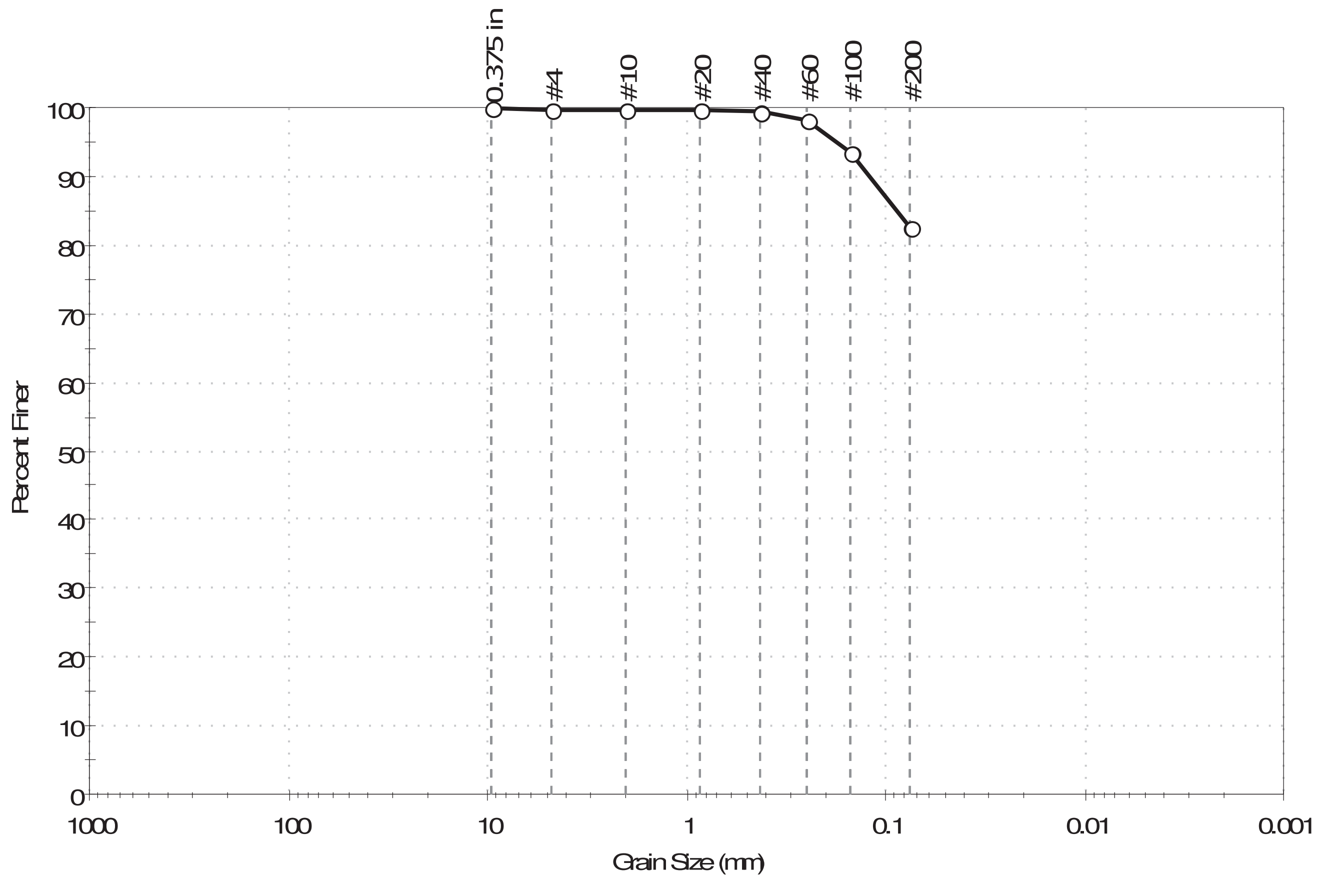
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-102	Sample Type:	bag	Tested By:	GA
Sample ID:	S-13	Test Date:	04/12/16	Checked By:	mcm
Depth :	48.5-50 ft	Test Id:	371556		

Test Comment: ---

Visual Description: Moist, gray silt with sand (ASH)

Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.2	17.1	82.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	98		
#100	0.15	94		
#200	0.075	83		

Coefficients

D_{85} =0.0868 mm	D_{30} =N/A
D_{60} =N/A	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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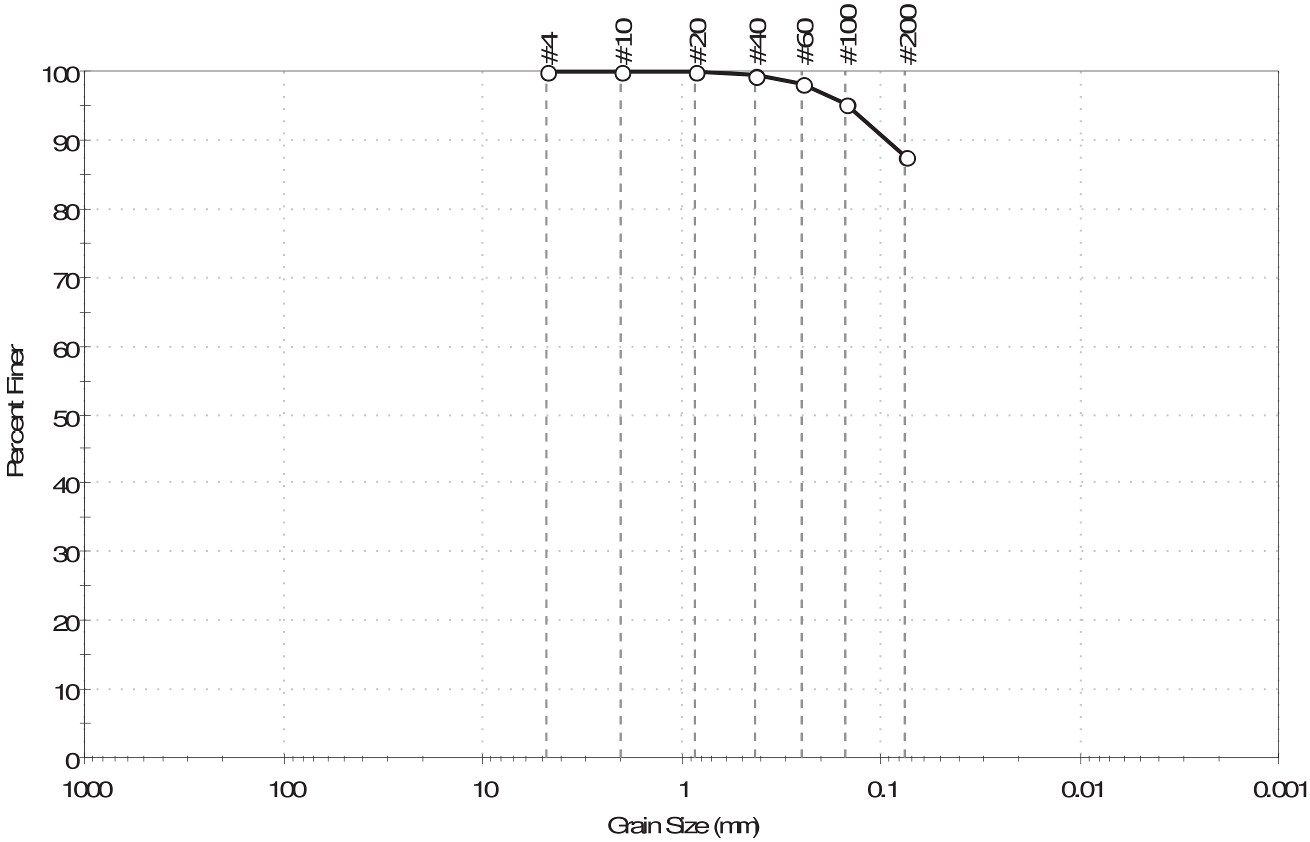
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-102	Sample Type:	bag	Tested By:	GA
Sample ID:	S-15	Test Date:	04/12/16	Checked By:	mcm
Depth :	58.5-60 ft	Test Id:	371557		

Test Comment: ---
Visual Description: Moist, gray silt (ASH)
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	12.3	87.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	98		
#100	0.15	95		
#200	0.075	88		

Coefficients

D_{85} =N/A	D_{30} =N/A
D_{60} =N/A	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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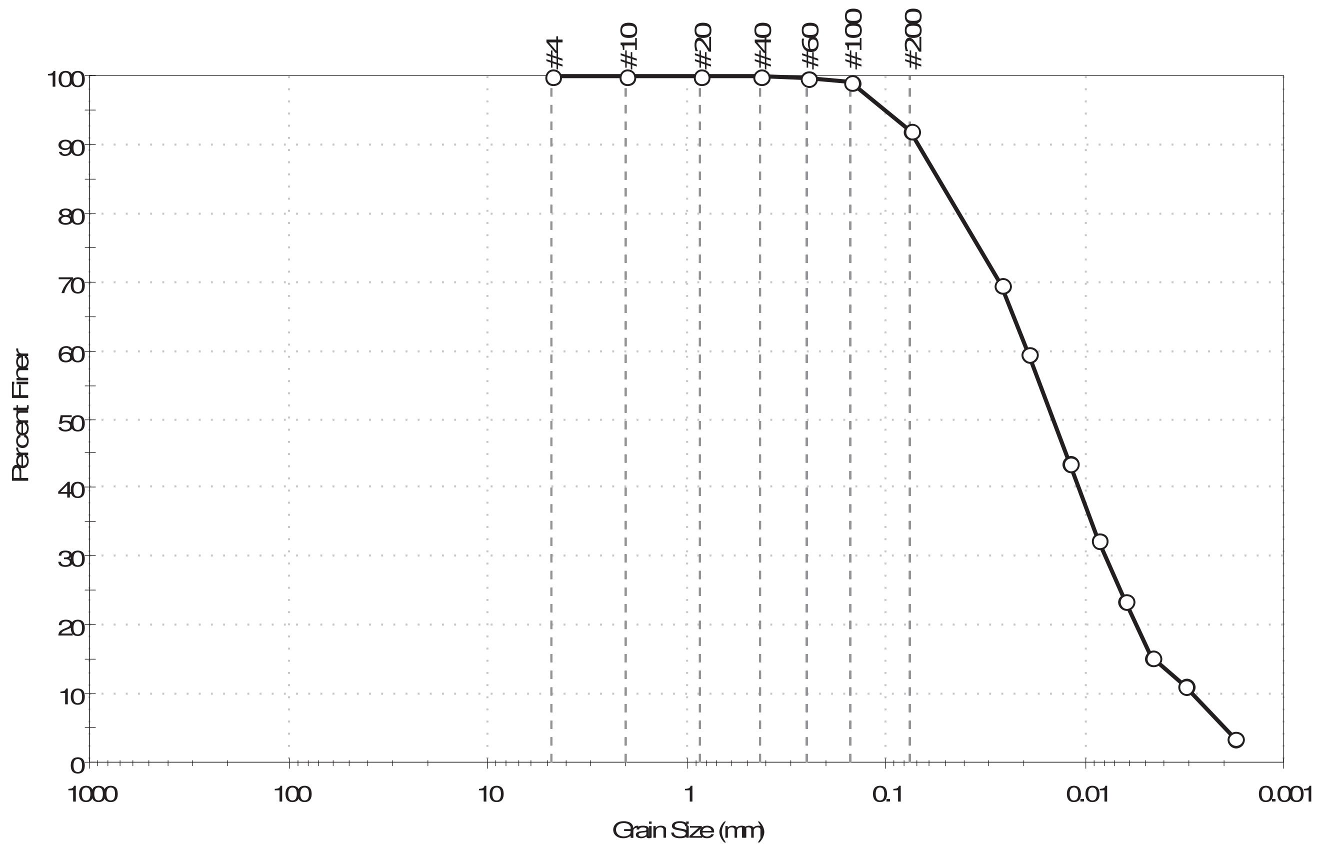
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-102	Sample Type:	tube	Tested By:	GA
Sample ID:	S-16 (TUBE)	Test Date:	04/26/16	Checked By:	mcm
Depth :	63-65 ft	Test Id:	371555		

Test Comment: ---
Visual Description: Moist, dark gray silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	8.1	91.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	99		
#200	0.075	92		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0263	70		
---	0.0192	60		
---	0.0118	44		
---	0.0086	33		
---	0.0063	24		
---	0.0046	15		
---	0.0032	11		
---	0.0018	4		

Coefficients

D_{85} =0.0542 mm D_{30} =0.0079 mm
D_{60} =0.0194 mm D_{15} =0.0044 mm
D_{50} =0.0144 mm D_{10} =0.0029 mm
C_u =6.690 C_c =1.109

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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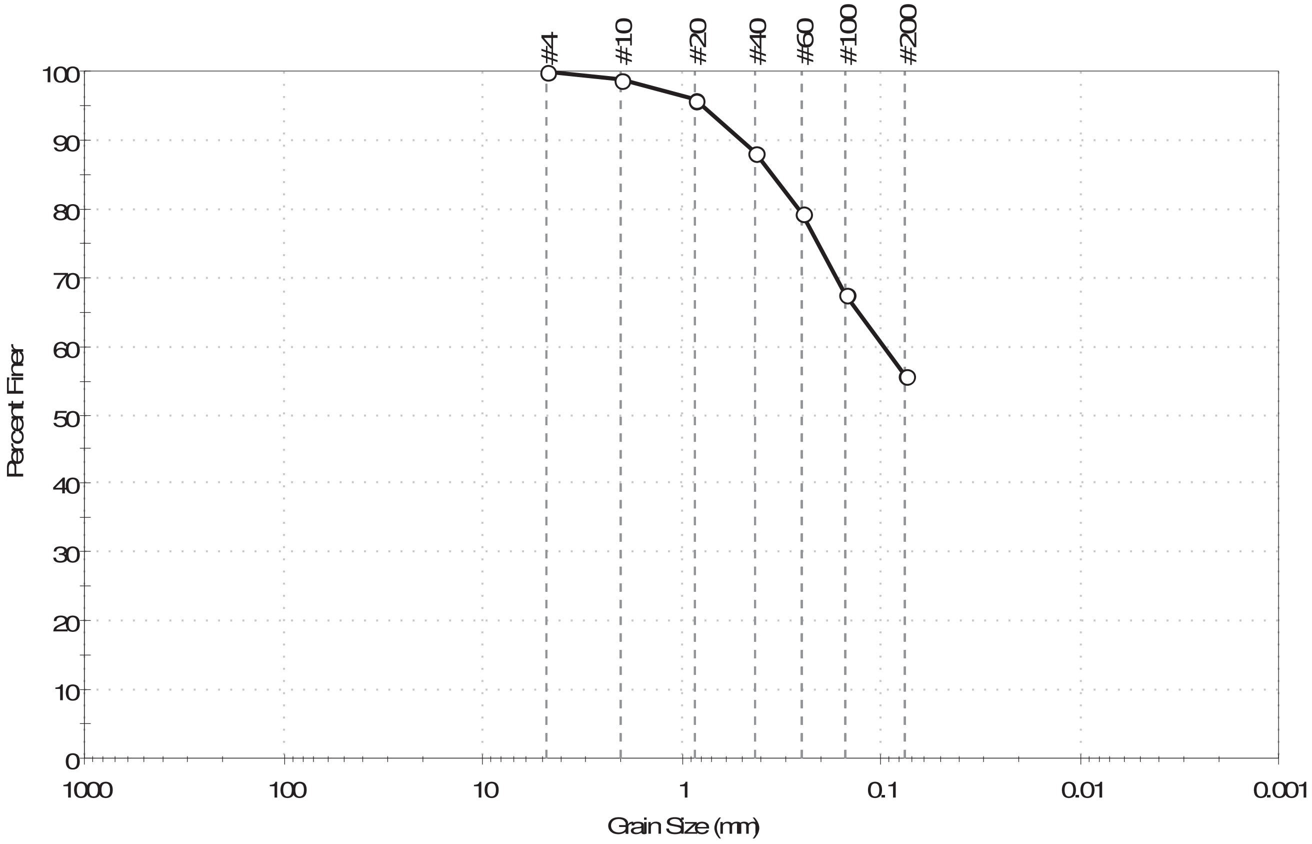
GeoTesting EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-102
Sample Type: bag
Tested By: GA
Sample ID: S-17
Test Date: 04/11/16
Checked By: mcm
Depth : 68.5-70 ft
Test Id: 371558
Test Comment: ---
Visual Description: Moist, olive sandy clay
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	44.3	55.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	96		
#40	0.42	88		
#60	0.25	79		
#100	0.15	67		
#200	0.075	56		

Coefficients

D_{85} =0.3489 mm
D_{30} =N/A
D_{60} =0.0969 mm
D_{15} =N/A
D_{50} =N/A
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM Sandy Lean clay (CL)

AASHTO Clayey Soils (A-7-6 (11))

Sample/Test Description

Sand/Gravel Particle Shape : ---

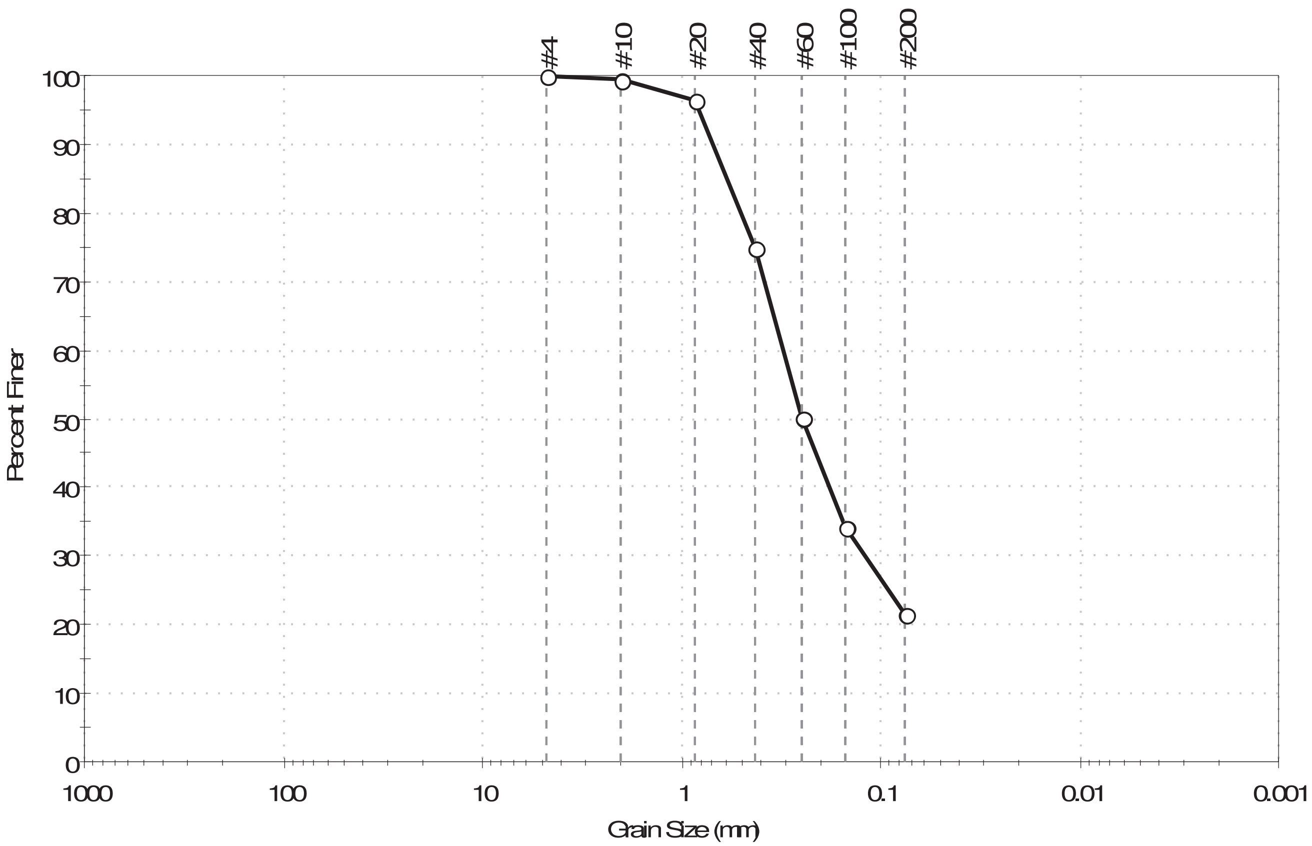
Sand/Gravel Hardness : ---

GeoTesting
EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-102	Sample Type:	bag	Tested By:	GA
Sample ID:	S-19	Test Date:	04/11/16	Checked By:	mcm
Depth :	78.5-80 ft	Test Id:	371559		

Test Comment: ---
Visual Description: Moist, dark yellowish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	78.4	21.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	96		
#40	0.42	75		
#60	0.25	50		
#100	0.15	34		
#200	0.075	22		

Coefficients

D_{85} =0.5876 mm	D_{30} =0.1187 mm
D_{60} =0.3090 mm	D_{15} =N/A
D_{50} =0.2493 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	Silty sand (SM)
AASHTO	Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

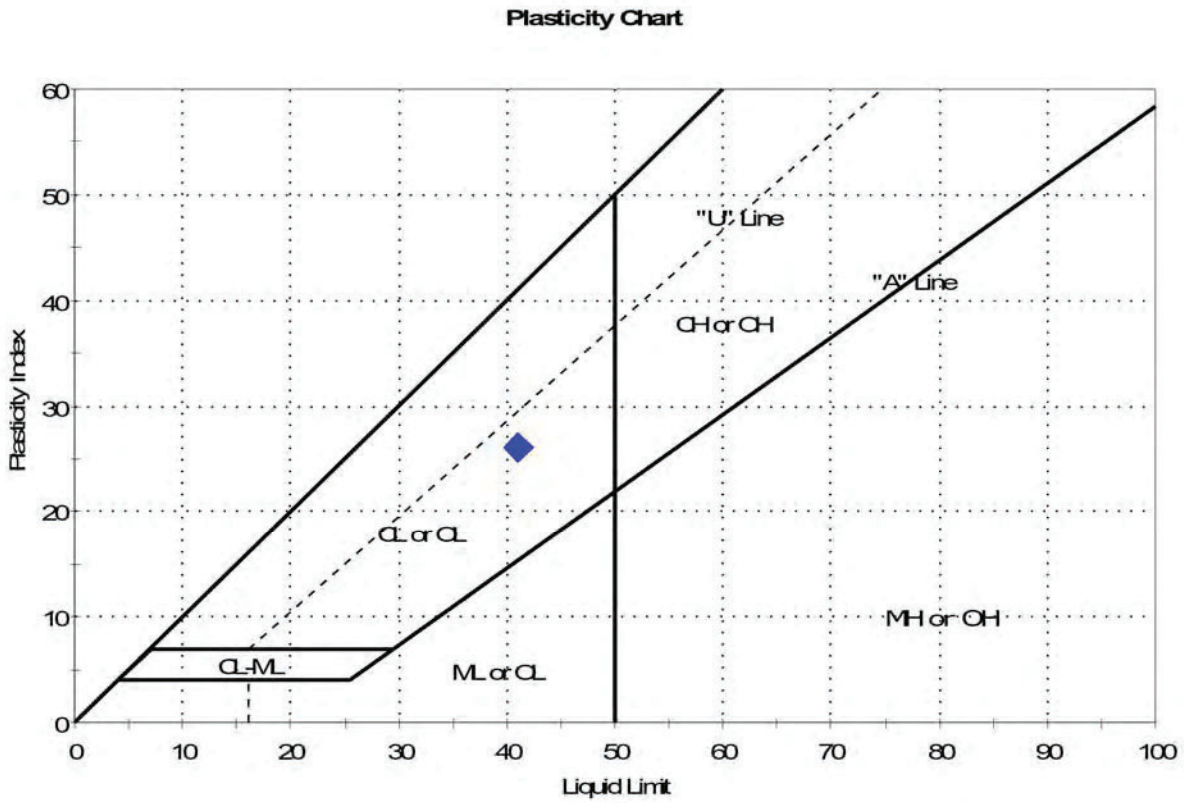
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting
EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-102
Sample Type: bag
Tested By: GA
Sample ID: S-17
Test Date: 04/08/16
Checked By: mcm
Depth : 68.5-70 ft
Test Id: 371579
Test Comment: ---
Visual Description: Moist, olive sandy clay
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-17	B-102	68.5-70 ft	23	41	15	26	0.3	Sandy Lean clay (CL)

Sample Prepared using the WET method

12% Retained on #40 Sieve

Dry Strength: VERY HIGH

Dilatancy: NONE

Toughness: MEDIUM

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GeoTesting EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-102
Sample Type: bag
Tested By: GA
Sample ID: S-4
Test Date: 06/03/16
Checked By: n/a
Depth : 8.5-10 ft
Test Id: 380258
Test Comment: ---
Visual Description: Moist, olive gray silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-4	B-102	8.5-10 ft	78	n/a	n/a	n/a	n/a	

Dry Strength: NONE
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-102	Sample Type:	bag	Tested By:	GA
Sample ID:	S-19	Test Date:	04/08/16	Checked By:	mcm
Depth :	78.5-80 ft	Test Id:	371580		

Test Comment: ---
Visual Description: Moist, dark yellowish brown silty sand
Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-19	B-102	78.5-80 ft	43	n/a	n/a	n/a	n/a	Silty sand (SM)

25% Retained on #40 Sieve

Dry Strength: NONE

Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	05/03/16	Checked By:	mcm
Depth :	---	Test Id:	371562		

Specific Gravity of Soils by ASTM D854

Boring ID	Sample ID	Depth	Visual Description	Specific Gravity	Comment
B-102	S-3 (TUBE)	6-8 ft	Moist, dark gray sandy silt (ASH)	2.39	
B-102	S-8 (TUBE)	23-25 ft	Moist, dark gray silt (ASH)	2.34	
B-102	S-15	58.5-60 ft	Moist, gray silt (ASH)	2.35	

Notes: Specific Gravity performed by using method B (oven dried specimens) of ASTM D854
Moisture Content determined by ASTM D2216.

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/19/16	Checked By:	mcm
Depth :	---	Test Id:	371578		

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	Sample ID	Depth	Visual Description	Bulk Density pcf	Moisture Content %	Dry Density pcf	*
B-102	S- 3 (TUBE)	6-8 ft	Moist, dark gray sandy silt (ASH)	98.79	50.25	65.75	(1)
B-102	S- 5 (TUBE)	13-15 ft	Moist, light gray silt (ASH)	98.83	39.62	70.79	(2)
B-102	S- 8 (TUBE)	23-25 ft	Moist, dark gray silt (ASH)	92.34	62.59	56.79	(3)
B-102	S- 10 (TUBE)	33-35 ft	Moist, light gray silt (ASH)	93.03	36.93	67.94	(4)
B-102	S- 11 (TUBE)	38-40 ft	Moist, dark gray silt (ASH)	93.89	41.93	66.16	(5)
B-102	S- 12 (TUBE)	43-45 ft	Moist, gray silt with sand (ASH)	87.54	49.38	58.60	(6)
B-102	S- 16 (TUBE)	63-65 ft	Moist, dark gray silt (ASH)	89.95	58.96	56.58	(7)

* Sample Comments

(1): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

(2): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

(3): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

(4): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

(5): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

(6): Moisture Content determined at 60° C for ash.

Method B-Volumetric,

(7): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

Notes: Moisture Content determined by ASTM D2216.

GeoTesting EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe Couny, GA		
GTX #:	304548		
Start Date:	4/21/2016	Tested By:	jcw
End Date:	4/27/2016	Checked By:	mcm
Boring #:	B-102		
Sample #:	S-3 (TUBE)		
Depth:	6-8 ft		
Visual Description:	Moist, dark gray sandy silt (ASH)		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Gradient

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	4/5

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Moisture Content determined at 60° C for ash.

Measured Specific Gravity: 2.39

Parameter	Initial	Final
Height, in	2.90	2.84
Diameter, in	2.86	2.85
Area, in^2	6.42	6.38
Volume, in^3	18.6	18.1
Mass, g	473	465
Bulk Density, pcf	97	98
Moisture Content, %	56.5	53.6
Dry Density, pcf	61.7	63.5
Degree of Saturation, %	95	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90.03	Increased Cell Pressure, psi:	94.91	Cell Pressure Increment, psi:	4.88
Sample Pressure, psi:	84.95	Corresponding Sample Pressure, psi:	89.73	Sample Pressure Increment, p	4.78
				B Coefficient:	0.98

FLOW DATA

Date	Time, sec	Pressure, psi			Gradient	Flow Volume, cc				Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Inlet	Outlet		In	Out	Δ In	Δ Out			
4/25	---	90.0	85.1	84.9	1.8	10.90	13.50	---	---	---	---	---
4/25	38	90.0	85.1	84.9	1.8	11.30	13.10	0.40	0.40	20.1	0.998	1.5E-04
4/25	----	90.0	85.1	84.9	1.8	12.10	12.80	---	---	---	---	---
4/25	37	90.0	85.1	84.9	1.8	12.50	12.40	0.40	0.40	20.1	0.998	1.5E-04
4/25	----	90.0	85.1	84.9	1.8	12.20	12.60	---	---	---	---	---
4/25	39	90.0	85.1	84.9	1.8	12.60	12.20	0.40	0.40	20.1	0.998	1.4E-04
4/25	----	90.0	85.1	84.9	1.8	11.90	12.40	---	---	---	---	---
4/25	37	90.0	85.1	84.9	1.8	12.30	12.00	0.40	0.40	20.1	0.998	1.5E-04

PERMEABILITY AT 20° C: 1.5 x 10^{-4} cm/sec (@ 5 psi effective stress)

GeoTesting EXPRESS

Client: AECOM
Project Name: SCS Plant Scherer Ph. 2
Project Location: Monroe Couny, GA
GTX #: 304548
Start Date: 4/22/2016 Tested By: jcw
End Date: 4/27/2016 Checked By: mcm
Boring #: B-102
Sample #: S-8 (TUBE)
Depth: 23-25 ft
Visual Description: Moist, dark gray silt (ASH)

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Gradient

Sample Type: Intact
Orientation: Vertical
Permeant Fluid: De-aired Distilled water
Cell #: 12/2

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Moisture Content determined at 60° C for ash.

Measured Specific Gravity: 2.34

Parameter	Initial	Final
Height, in	2.99	2.93
Diameter, in	2.86	2.85
Area, in^2	6.42	6.38
Volume, in^3	19.2	18.7
Mass, g	465	459
Bulk Density, pcf	92	93
Moisture Content, %	64.5	62.6
Dry Density, pcf	55.9	57.4
Degree of Saturation, %	94	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 90.02
Sample Pressure, psi: 83.47
Increased Cell Pressure, psi: 94.83
Corresponding Sample Pressure, psi: 88.19
Cell Pressure Increment, psi: 4.81
Sample Pressure Increment, p 4.72
B Coefficient: 0.98

FLOW DATA

Date	Time,	Pressure, psi			Gradient					Temp,		Permeability K @ 20 °C,
	sec	Cell	Inlet	Outlet		In	Out	Δ In	Δ Out	°C	R_t	cm/sec
4/25	---	90.0	83.6	83.4	1.9	11.70	13.60	---	---	---	---	---
4/25	46	90.0	83.6	83.4	1.9	12.30	13.00	0.60	0.60	20.1	0.998	1.7E-04
4/25	----	90.0	83.6	83.4	1.9	12.60	13.30	---	---	---	---	---
4/25	42	90.0	83.6	83.4	1.9	13.10	12.80	0.50	0.50	20.1	0.998	1.5E-04
4/25	----	90.0	83.6	83.4	1.9	13.20	13.60	---	---	---	---	---
4/25	36	90.0	83.6	83.4	1.9	13.60	13.20	0.40	0.40	20.1	0.998	1.4E-04
4/25	----	90.0	83.6	83.4	1.9	12.40	13.00	---	---	---	---	---
4/25	35	90.0	83.6	83.4	1.9	12.80	12.60	0.40	0.40	20.1	0.998	1.5E-04

PERMEABILITY AT 20° C: 1.5 x 10^{-4} cm/sec (@ 6.5 psi effective stress)

GeoTesting
EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe Couny, GA		
GTX #:	304548		
Start Date:	4/21/2016	Tested By:	jcw
End Date:	4/27/2016	Checked By:	mcm
Boring #:	B-102		
Sample #:	S-11 (TUBE)		
Depth:	38-40 ft		
Visual Description:	Moist, dark gray silt (ASH)		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Gradient

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	8/13

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Moisture Content determined at 60° C for ash.

Assumed Specific Gravity: 2.35

Parameter	Initial	Final
Height, in	2.86	2.75
Diameter, in	2.86	2.81
Area, in^2	6.42	6.20
Volume, in^3	18.4	17.1
Mass, g	469	458
Bulk Density, pcf	97	102
Moisture Content, %	45.2	41.8
Dry Density, pcf	66.8	72.0
Degree of Saturation, %	89	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	89.98	Increased Cell Pressure, psi:	94.99	Cell Pressure Increment, psi:	5.01
Sample Pressure, psi:	79.72	Corresponding Sample Pressure, psi:	84.54	Sample Pressure Increment, p	4.82
				B Coefficient:	0.96

FLOW DATA

Date	Time, sec	Pressure, psi			Gradient	Flow Volume, cc				Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Inlet	Outlet		In	Out	Δ In	Δ Out			
4/25	---	90.0	80.2	79.8	4.0	11.30	13.60	---	---	---	---	---
4/25	117	90.0	80.2	79.8	4.0	11.70	13.20	0.40	0.40	20.1	0.998	2.1E-05
4/25	----	90.0	80.2	79.8	4.0	11.80	13.40	---	---	---	---	---
4/25	86	90.0	80.2	79.8	4.0	12.10	13.10	0.30	0.30	20.1	0.998	2.2E-05
4/25	----	90.0	80.2	79.8	4.0	12.30	13.20	---	---	---	---	---
4/25	88	90.0	80.2	79.8	4.0	12.60	12.90	0.30	0.30	20.1	0.998	2.1E-05
4/25	----	90.0	80.2	79.8	4.0	12.80	13.00	---	---	---	---	---
4/25	60	90.0	80.2	79.8	4.0	13.00	12.80	0.20	0.20	20.1	0.998	2.1E-05

PERMEABILITY AT 20^o C: 2.1 x 10^{-5} cm/sec (@ 10 psi effective stress)

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph.2		
Project Location:	Monroe County, GA		
GTX #:	304548		
Start Date:	4/21/2016	Tested By:	jcw
End Date:	4/27/2016	Checked By:	mcm
Boring #:	B-102		
Sample #:	S-16 (TUBE)		
Depth:	63-65 ft		
Visual Description:	Moist, dark gray silt with sand (ASH)		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Gradient

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	9/23

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Trimmings moisture content = 57.1%.

Assumed Specific Gravity: 2.35

Parameter	Initial	Final
Height, in	2.94	2.78
Diameter, in	2.86	2.84
Area, in^2	6.42	6.33
Volume, in^3	18.9	17.6
Mass, g	458	444
Bulk Density, pcf	92	96
Moisture Content, %	61.5	56.6
Dry Density, pcf	57.1	61.2
Degree of Saturation, %	92	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90.03	Increased Cell Pressure, psi:	95.40	Cell Pressure Increment, psi:	5.37
Sample Pressure, psi:	73.98	Corresponding Sample Pressure, psi:	79.21	Sample Pressure Increment, p	5.23
				B Coefficient:	0.97

FLOW DATA

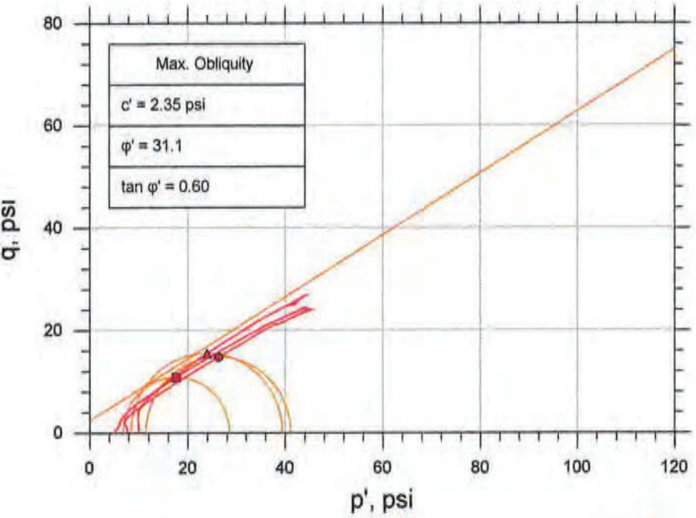
Date	Time, sec	Pressure, psi			Gradient	Flow Volume, cc				Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Inlet	Outlet		In	Out	Δ In	Δ Out			
4/25	---	90.0	74.2	73.8	4.0	11.70	14.30	---	---	---	---	---
4/25	52	90.0	74.2	73.8	4.0	12.00	14.00	0.30	0.30	20.1	0.998	3.5E-05
4/25	----	90.0	74.2	73.8	4.0	12.20	13.90	---	---	---	---	---
4/25	55	90.0	74.2	73.8	4.0	12.50	13.60	0.30	0.30	20.1	0.998	3.3E-05
4/25	----	90.0	74.2	73.8	4.0	12.70	14.20	---	---	---	---	---
4/25	55	90.0	74.2	73.8	4.0	13.00	13.90	0.30	0.30	20.1	0.998	3.3E-05
4/25	----	90.0	74.2	73.8	4.0	12.20	13.00	---	---	---	---	---
4/25	55	90.0	74.2	73.8	4.0	12.50	12.70	0.30	0.30	20.1	0.998	3.3E-05

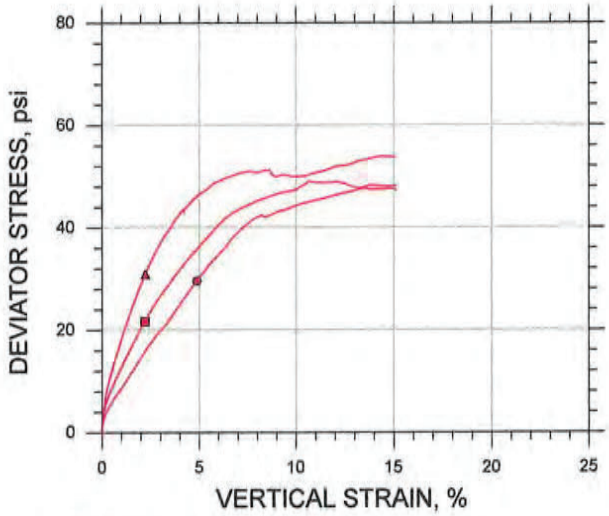
PERMEABILITY AT 20° C: 3.4 x 10^{-5} cm/sec (@ 16 psi effective stress)

GeoTesting EXPRESS

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: md	Checked By: mcm
Boring ID: B-102	
Preparation: intact	
Description: Moist, light grey silt (ASH)	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Estimated Specific Gravity: 2.35

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



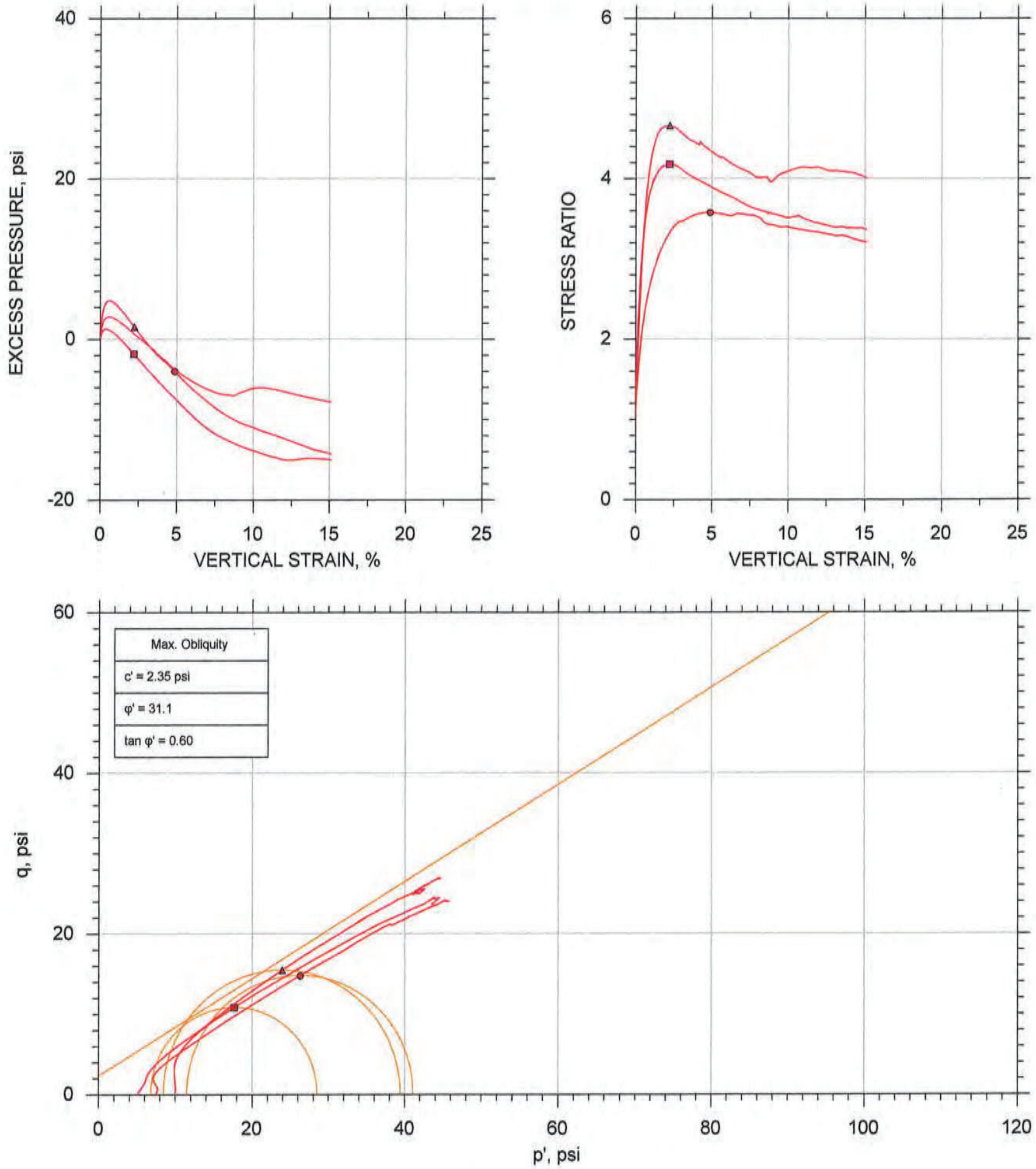


Symbol		■	●	▲	
Sample ID		S-5 (TUBE)	S-5 (TUBE)	S-5 (TUBE)	
Depth, ft		13-15 ft	13-15 ft	13-15 ft	
Test Number		CU-7-1	CU-7-2	CU-7-3	
Initial	Height, in	5.800	5.820	5.770	
	Diameter, in	2.860	2.860	2.860	
	Moisture Content (from Cuttings), %	40.8	39.6	37.2	
	Dry Density, pcf	70.5	70.8	70.0	
	Saturation (Wet Method), %	88.7	86.8	79.9	
	Void Ratio	1.08	1.07	1.09	
Before Shear	Moisture Content, %	45.7	45.0	46.0	
	Dry Density, pcf	70.7	71.3	70.5	
	Cross-sectional Area (Method A), in²	6.404	6.385	6.389	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	1.07	1.06	1.08	
	Back Pressure, psi	140.9	141.0	140.9	
Vertical Effective Consolidation Stress, psi		5.018	7.497	9.990	
Horizontal Effective Consolidation Stress, psi		5.002	7.500	9.999	
Vertical Strain after Consolidation, %		-0.006440	0.1031	0.1598	
Volumetric Strain after Consolidation, %		0.3073	0.6910	0.7127	
Time to 50% Consolidation, min		0.6400	1.440	0.3600	
Shear Strength, psi		10.84	14.80	15.48	
Strain at Failure, %		2.20	4.88	2.23	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		21.68	29.60	30.95	
Effective Minor Principal Stress at Failure, psi		6.814	11.48	8.452	
Effective Major Principal Stress at Failure, psi		28.49	41.08	39.41	
B-Value		0.95	0.95	0.95	
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.					

Remarks:

Moisture Content determine at 60° C for ash.

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



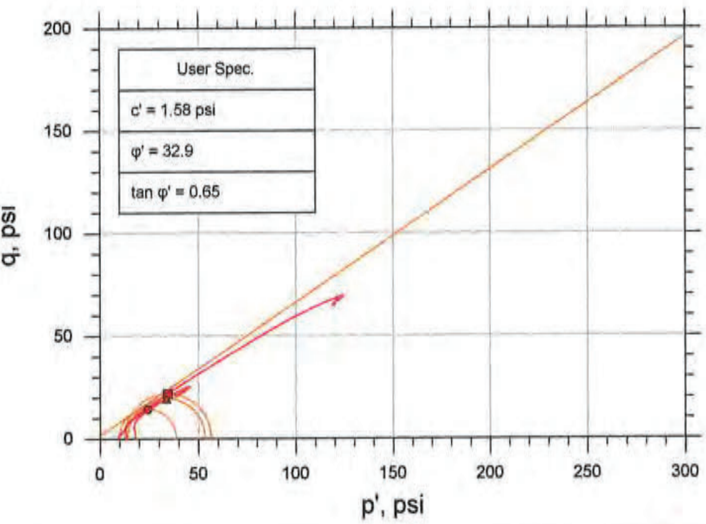
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	S-5 (TUBE)	CU-7-1	13-15 ft	md	4/9/16	mcm	4/26/16	304548-CU-7-1m.dat
●	S-5 (TUBE)	CU-7-2	13-15 ft	md	4/9/16	mcm	4/26/16	304548-CU-7-2m.dat
▲	S-5 (TUBE)	CU-7-3	13-15 ft	md	4/9/16	mcm	4/26/16	304548-CU-7-3m.dat

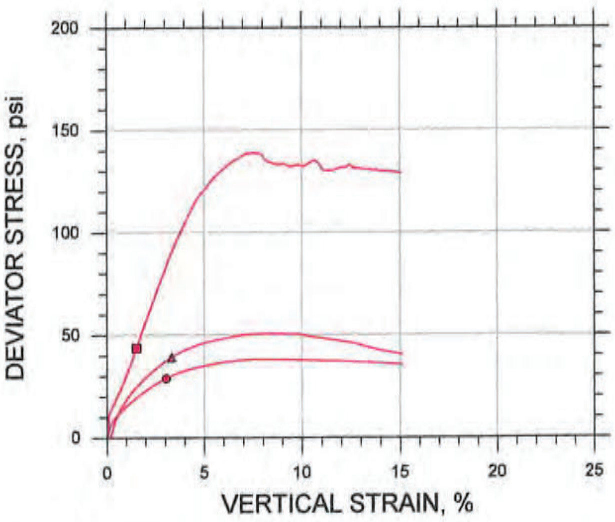
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-102	Sample Type: intact	
	Description: Moist, light grey silt (ASH)		
	Remarks: Moisture Content determine at 60° C for ash.		

GeoTesting EXPRESS

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: md	Checked By: mcm
Boring ID: B-102	
Preparation: intact	
Description: Moist, light gray ash silt (ASH)	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Estimated Specific Gravity: 2.35

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

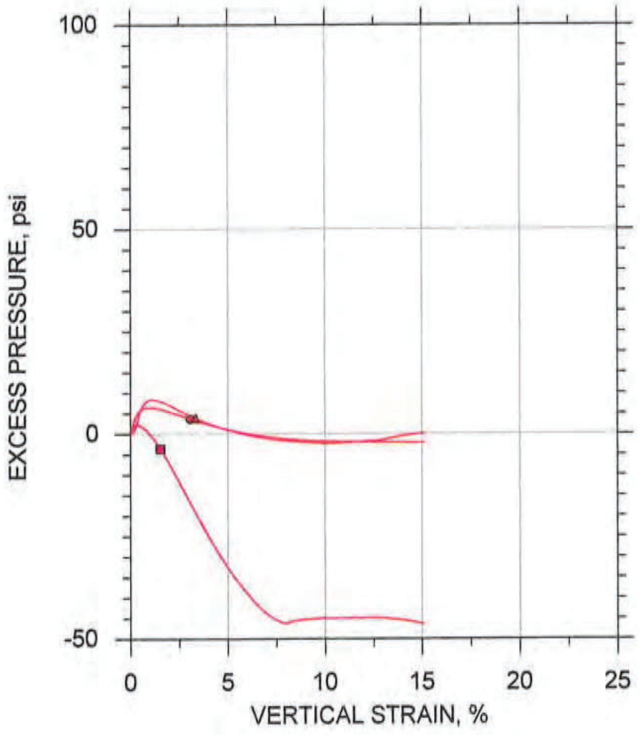


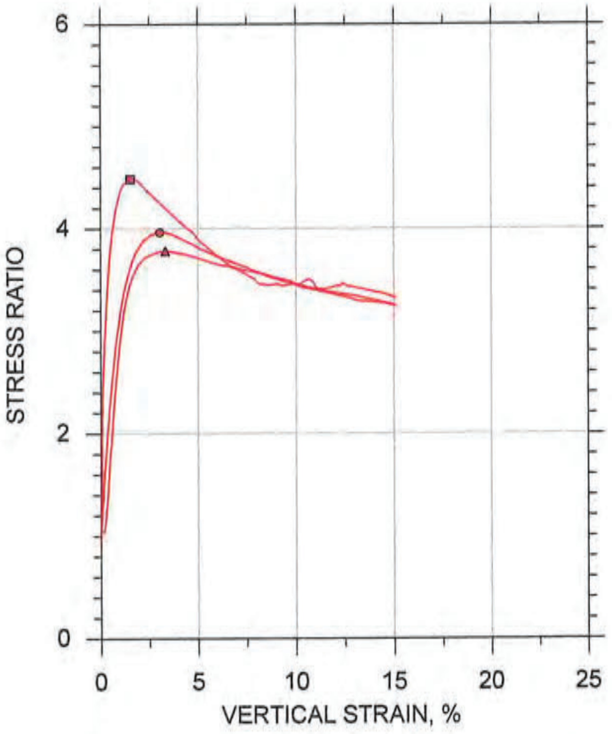


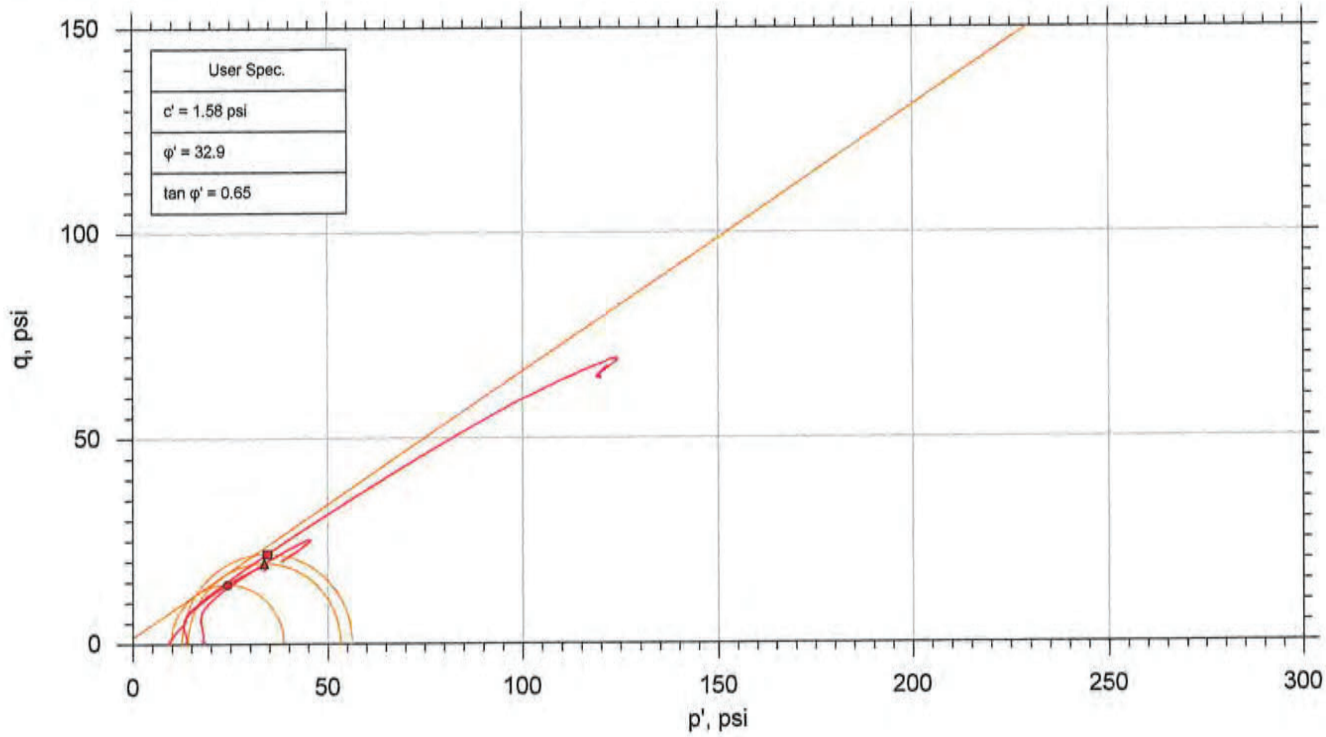
Symbol		■	●	▲	
Sample ID		S-10 (TUBE)	S-10 ((TUBE)	S-10 (TUBE)	
Depth, ft		33-35 ft	33-35 ft	33-35 ft	
Test Number		CU-8-1	CU-8-2	CU-8-3	
Initial	Height, in	5.730	5.700	5.750	
	Diameter, in	2.860	2.850	2.860	
	Moisture Content (from Cuttings), %	43.3	47.4	45.2	
	Dry Density, pcf	68.2	63.1	66.3	
	Saturation (Wet Method), %	88.4	84.1	87.5	
	Void Ratio	1.15	1.33	1.21	
Before Shear	Moisture Content, %	47.8	54.7	49.7	
	Dry Density, pcf	69.1	64.2	67.7	
	Cross-sectional Area (Method A), in²	6.354	6.278	6.290	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	1.12	1.29	1.17	
	Back Pressure, psi	93.01	103.0	101.0	
Vertical Effective Consolidation Stress, psi		8.998	13.50	18.00	
Horizontal Effective Consolidation Stress, psi		8.979	13.50	17.98	
Vertical Strain after Consolidation, %		-0.005566	0.08860	-0.01650	
Volumetric Strain after Consolidation, %		0.6758	1.696	2.120	
Time to 50% Consolidation, min		0.3600	0.1600	0.2500	
Shear Strength, psi		21.87	14.45	19.59	
Strain at Failure, %		1.53	3.05	3.33	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		43.73	28.89	39.18	
Effective Minor Principal Stress at Failure, psi		12.54	9.742	14.08	
Effective Major Principal Stress at Failure, psi		56.27	38.63	53.25	
B-Value		0.95	0.95	0.96	
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:					

Moisture Content determined at 60° C for ash. Test specimen 8-1 not used in determining cohesion or friction angle values.

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





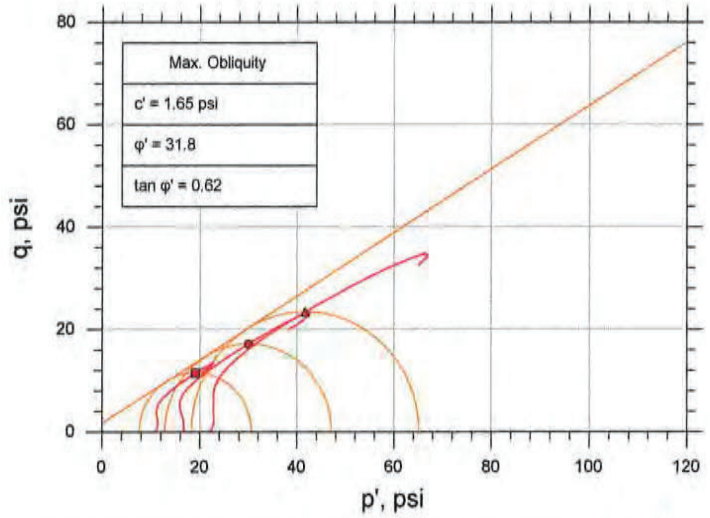


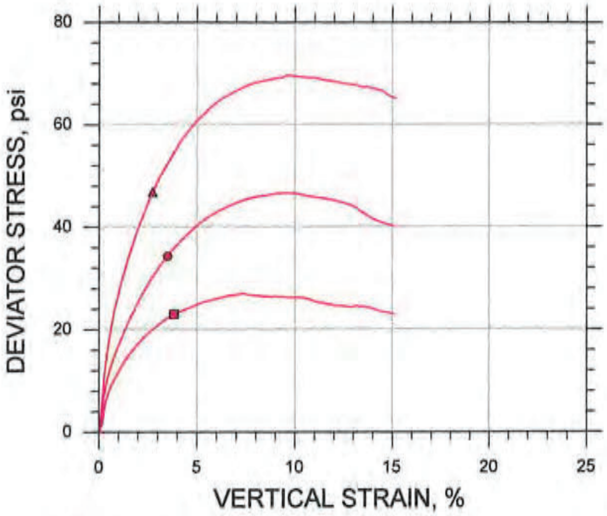
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	S-10 (TUBE)	CU-8-1	33-35 ft	md	4/9/16	mcm	4/26/15	304548-CU-8-1m.dat
●	S-10 ((TUBE)	CU-8-2	33-35 ft	md	4/9/16	mcm	4/26/16	304548-CU-8-2m.dat
▲	S-10 (TUBE)	CU-8-3	33-35 ft	md	4/9/16	mcm	4/26/16	304548-CU-8-3m.dat

GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-102	Sample Type: intact	
	Description: Moist, light gray ash silt (ASH)		
	Remarks: Moisture Content determined at 60° C for ash. Test specimen 8-1 not used in determining cohesion or friction angle values.		

Client: AECOM	
Project Name: SCS Plant Scherer Ph2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: md	Checked By: mcm
Boring ID: B-102	
Preparation: intact	
Description: Moist, gray silt with sand (ASH)	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Estimated Specific Gravity: 2.35

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





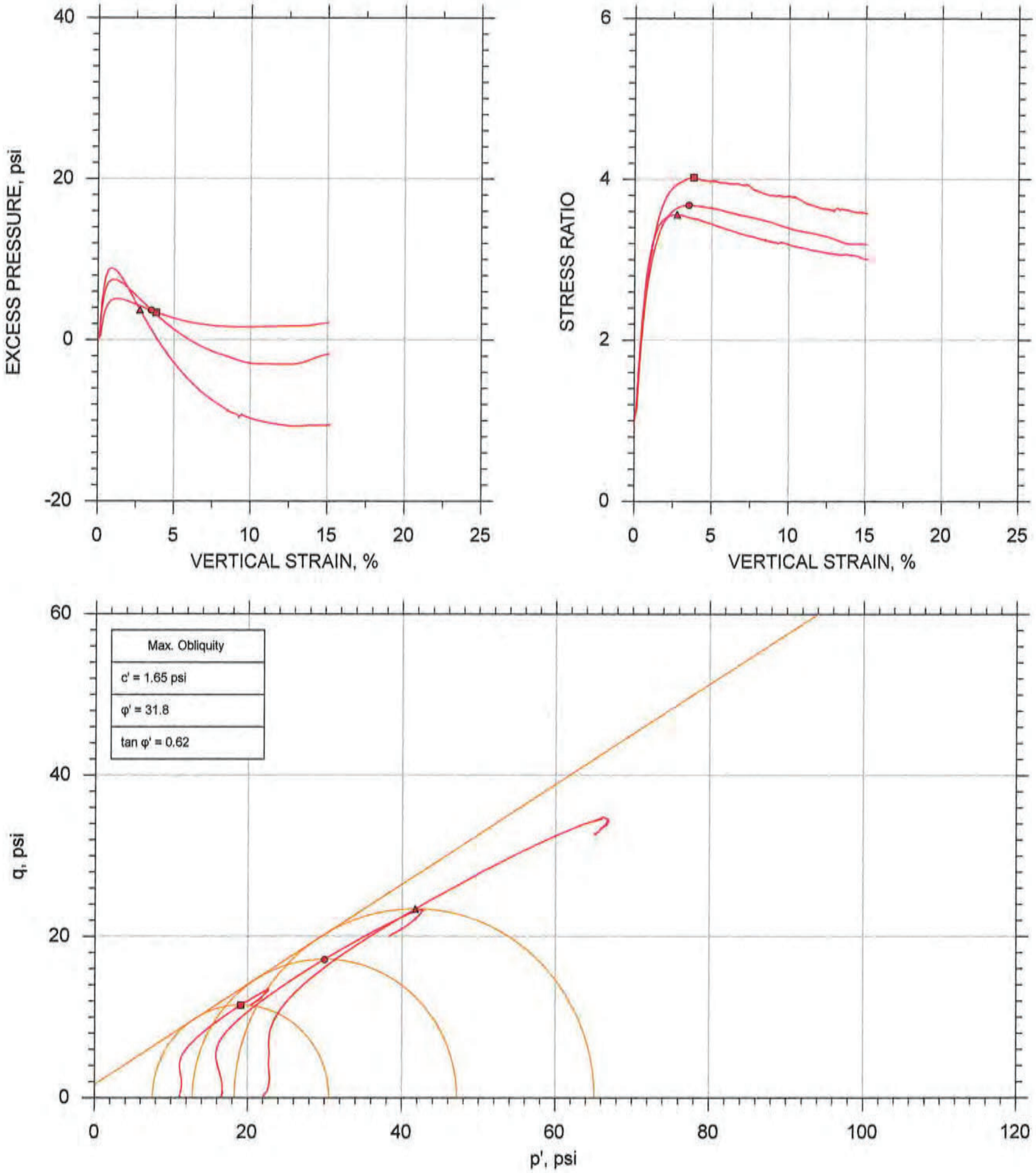
Symbol		■	●	▲	
Sample ID		S-12 (TUBE)	S-12 (TUBE)	S-12 (TUBE)	
Depth, ft		43-45 ft	43-45 ft	43-45 ft	
Test Number		CU-9-1	CU-9-2	CU-9-3	
Initial	Height, in	5.900	5.720	5.700	
	Diameter, in	2.860	2.860	2.860	
	Moisture Content (from Cuttings), %	53.1	50.7	47.4	
	Dry Density, pcf	61.0	61.1	63.3	
	Saturation (Wet Method), %	89.0	77.8	84.6	
	Void Ratio	1.40	1.76	1.32	
Before Shear	Moisture Content, %	55.1	64.1	55.0	
	Dry Density, pcf	63.9	61.7	64.0	
	Cross-sectional Area (Method A), in²	6.132	6.354	6.348	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	1.29	1.73	1.29	
	Back Pressure, psi	32.99	119.0	119.0	
Vertical Effective Consolidation Stress, psi		11.00	16.50	22.02	
Horizontal Effective Consolidation Stress, psi		11.00	16.50	22.01	
Vertical Strain after Consolidation, %		-0.01700	0.006265	0.01138	
Volumetric Strain after Consolidation, %		4.546	1.329	1.378	
Time to 50% Consolidation, min		0.1600	0.3000	0.6400	
Shear Strength, psi		11.49	17.16	23.41	
Strain at Failure, %		3.83	3.50	2.75	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		22.99	34.32	46.82	
Effective Minor Principal Stress at Failure, psi		7.601	12.82	18.29	
Effective Major Principal Stress at Failure, psi		30.59	47.14	65.11	
B-Value		0.97	0.95	0.96	
					

Notes:
- Before Shear Saturation set to 100% for phase calculation.
- Moisture Content determined by ASTM D2216.
- Deviator Stress includes membrane correction.
- Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.

Remarks:

Moisture Content determined at 60° C for ash.

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



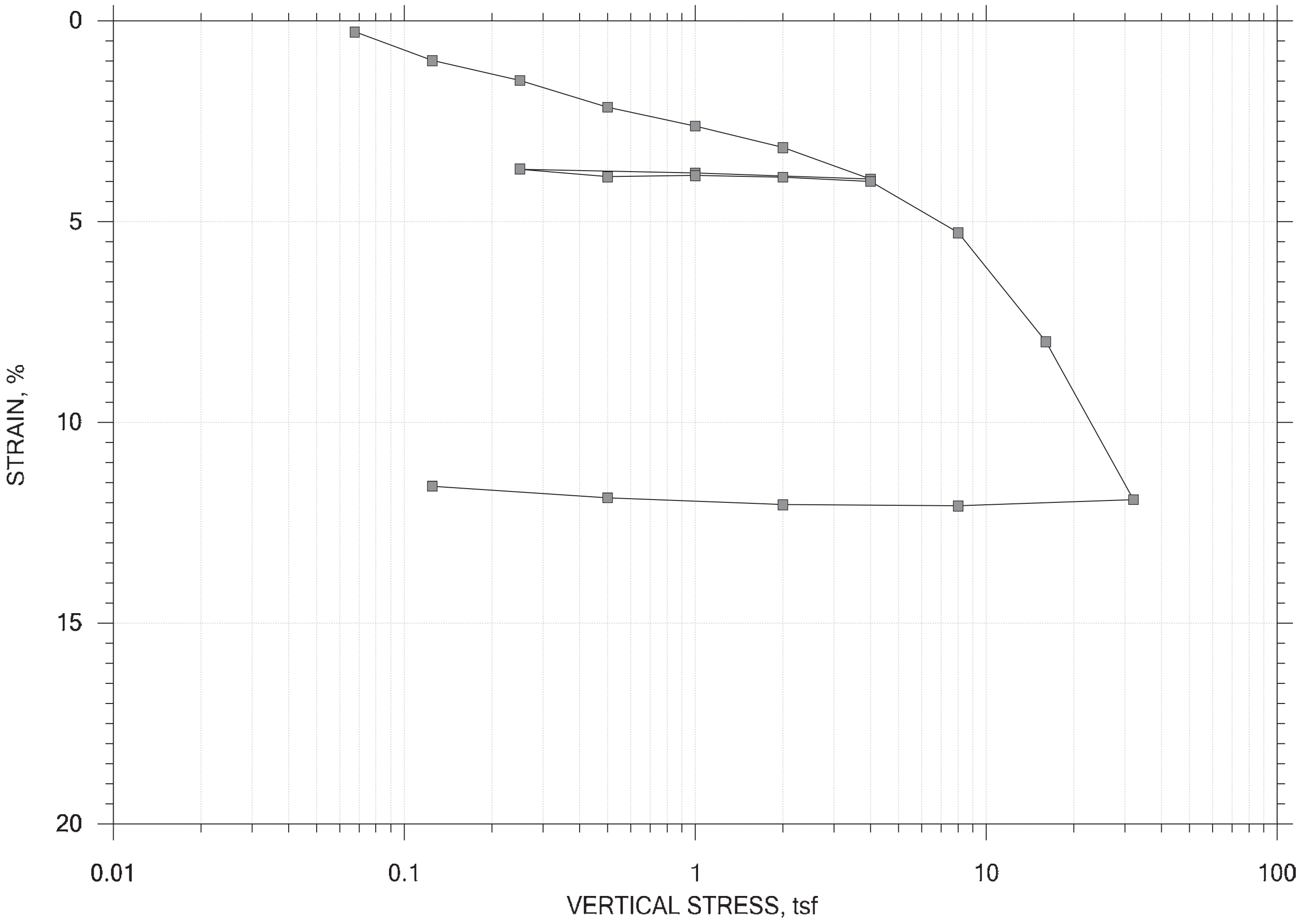
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	S-12 (TUBE)	CU-9-1	43-45 ft	md	4/12/16	mcm	4/26/16	304548-CU-9-1m.dat
●	S-12 (TUBE)	CU-9-2	43-45 ft	md	4/12/16	mcm	4/26/16	304548-CU-9-2m.dat
▲	S-12 (TUBE)	CU-9-3	43-45 ft	md	4/12/16	mcm	4/26/16	304548-CU-9-3m.dat

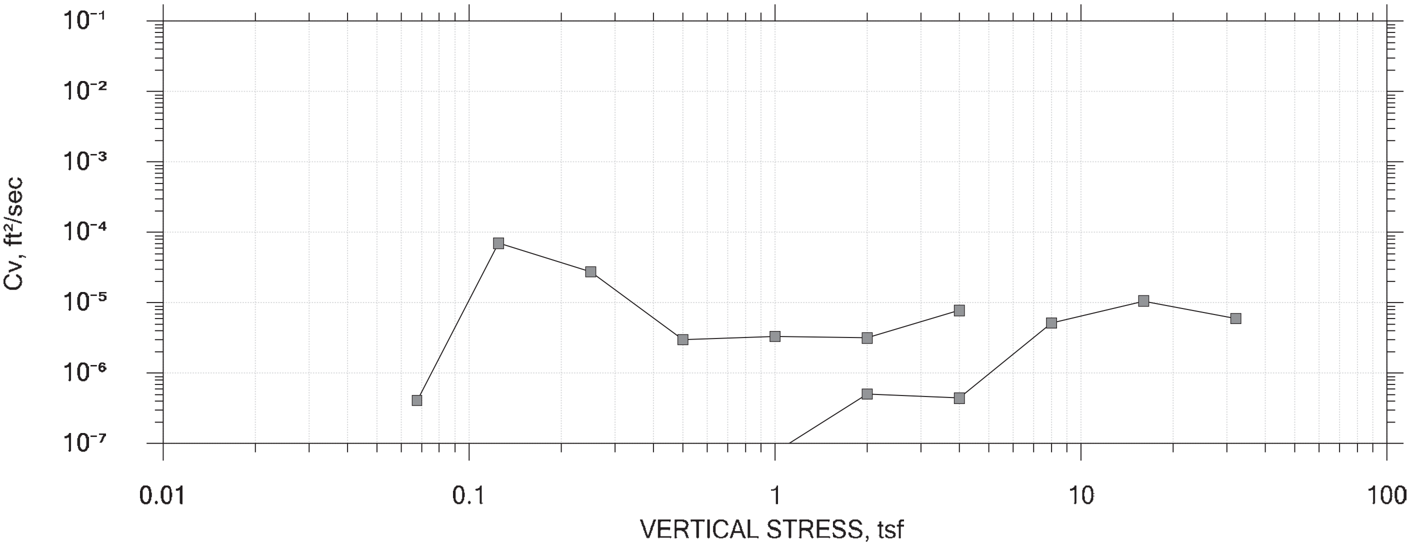
GeoTesting EXPRESS

Project: SCS Plant Scherer Ph2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Sample Type: intact	
Description: Moist, gray silt with sand (ASH)		
Remarks: Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

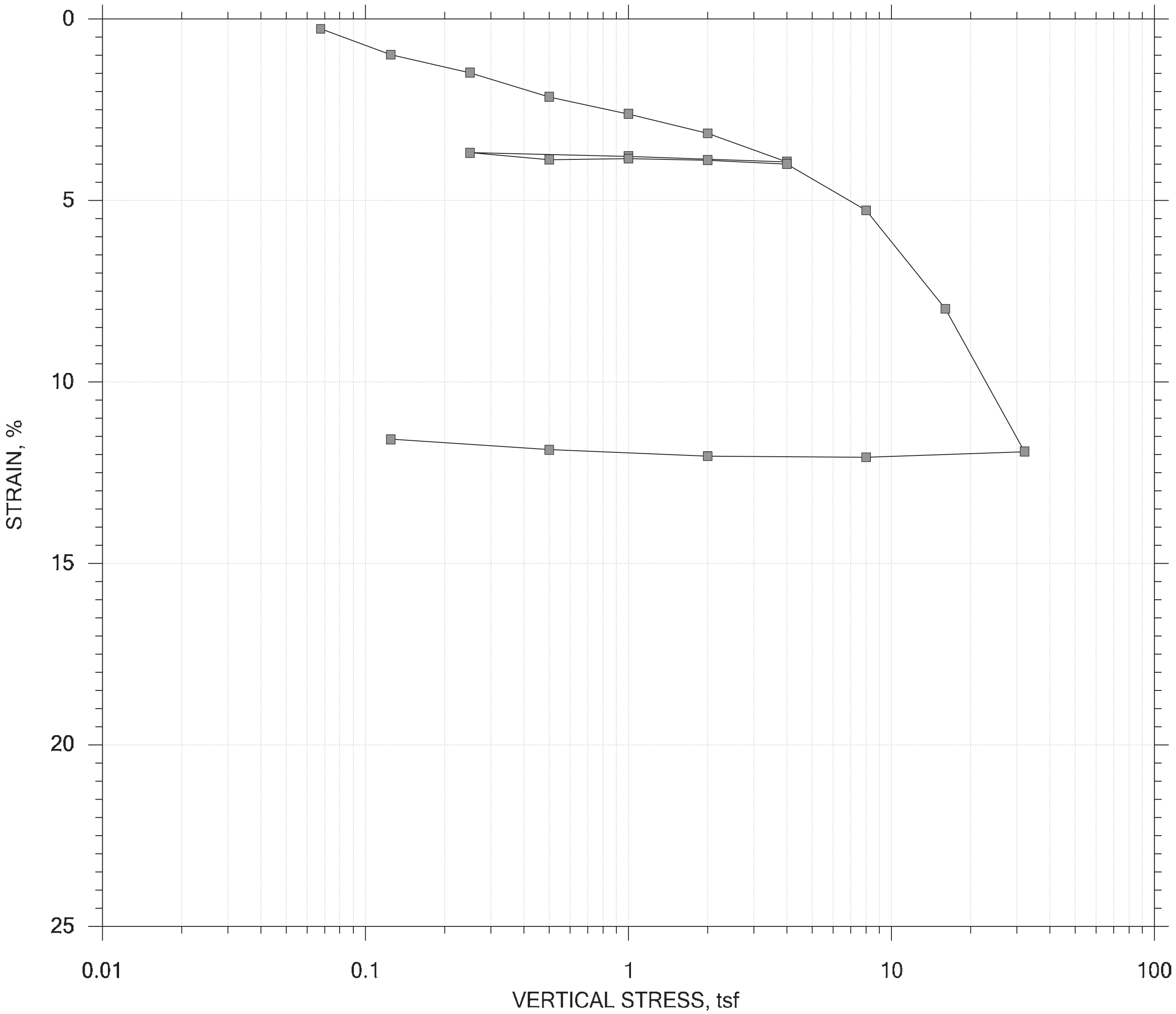




Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: ---				Water Content, %	45.27	37.59
Preconsolidation Stress: ---				Dry Unit Weight, pcf	69.976	77.408
Compression Ratio: ---				Saturation, %	98.07	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.07	0.87
LL: ---	PL: ---	PI: ---	GS: 2.32			

GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-102	Tested By: jm	Checked By: mcm
	Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silty sand (ASH)		
	Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Depth: 6-8 ft
Test No.: IP-2	Sample Type: intact	Elevation: ---

Soil Description: Moist, dark gray silty sand (ASH)
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.

Estimated Specific Gravity: 2.32	Liquid Limit: ---	Specimen Diameter: 2.50 in
Initial Void Ratio: 1.07	Plastic Limit: ---	Initial Height: 1.00 in
Final Void Ratio: 0.873	Plasticity Index: ---	Final Height: 0.90 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	a39	RING	A	a2
Wt. Container + Wet Soil, gm	90.140	239.82	232.90	138.82
Wt. Container + Dry Soil, gm	59.550	199.01	199.01	105.56
Wt. Container, gm	17.290	108.84	108.84	17.080
Wt. Dry Soil, gm	42.260	90.166	90.166	88.480
Water Content, %	72.39	45.27	37.59	37.59
Void Ratio	---	1.07	0.873	---
Degree of Saturation, %	---	98.07	100.00	---
Dry Unit Weight, pcf	---	69.976	77.408	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Depth: 6-8 ft
Test No.: IP-2	Sample Type: intact	Elevation: ---

Soil Description: Moist, dark gray silty sand (ASH)
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k cm/sec
1	0.0676	0.002750	1.07	0.275	64.797	3.78e-007	4.07e-002	1.46e-008
2	0.125	0.009857	1.05	0.986	0.418	5.80e-005	1.24e-001	6.83e-006
3	0.250	0.01478	1.04	1.48	1.117	2.14e-005	3.94e-002	8.04e-007
4	0.500	0.02147	1.03	2.15	8.528	2.77e-006	2.68e-002	7.06e-008
5	1.00	0.02614	1.02	2.61	7.206	3.24e-006	9.33e-003	2.88e-008
6	2.00	0.03155	1.01	3.15	8.291	2.79e-006	5.41e-003	1.44e-008
7	4.00	0.03934	0.990	3.93	3.012	7.58e-006	3.89e-003	2.81e-008
8	1.00	0.03785	0.993	3.79	2.900	7.82e-006	4.94e-004	3.68e-009
9	0.250	0.03687	0.996	3.69	15.899	1.43e-006	1.31e-003	1.79e-009
10	0.500	0.03879	0.992	3.88	0.000	0.00e+000	7.67e-003	0.00e+000
11	1.00	0.03849	0.992	3.85	69.902	3.24e-007	-5.92e-004	-1.83e-010
12	2.00	0.03889	0.991	3.89	78.934	2.87e-007	4.02e-004	1.10e-010
13	4.00	0.03993	0.989	3.99	48.903	4.63e-007	5.19e-004	2.29e-010
14	8.00	0.05273	0.963	5.27	4.726	4.72e-006	3.20e-003	1.44e-008
15	16.0	0.07986	0.906	7.99	3.115	6.87e-006	3.39e-003	2.22e-008
16	32.0	0.1192	0.825	11.9	4.606	4.32e-006	2.46e-003	1.01e-008
17	8.00	0.1207	0.822	12.1	11.890	1.60e-006	-6.41e-005	-9.75e-011
18	2.00	0.1204	0.822	12.0	17.864	1.06e-006	4.92e-005	4.98e-011
19	0.500	0.1187	0.826	11.9	14.588	1.30e-006	1.15e-003	1.43e-009
20	0.125	0.1158	0.832	11.6	21.105	9.06e-007	7.69e-003	6.63e-009

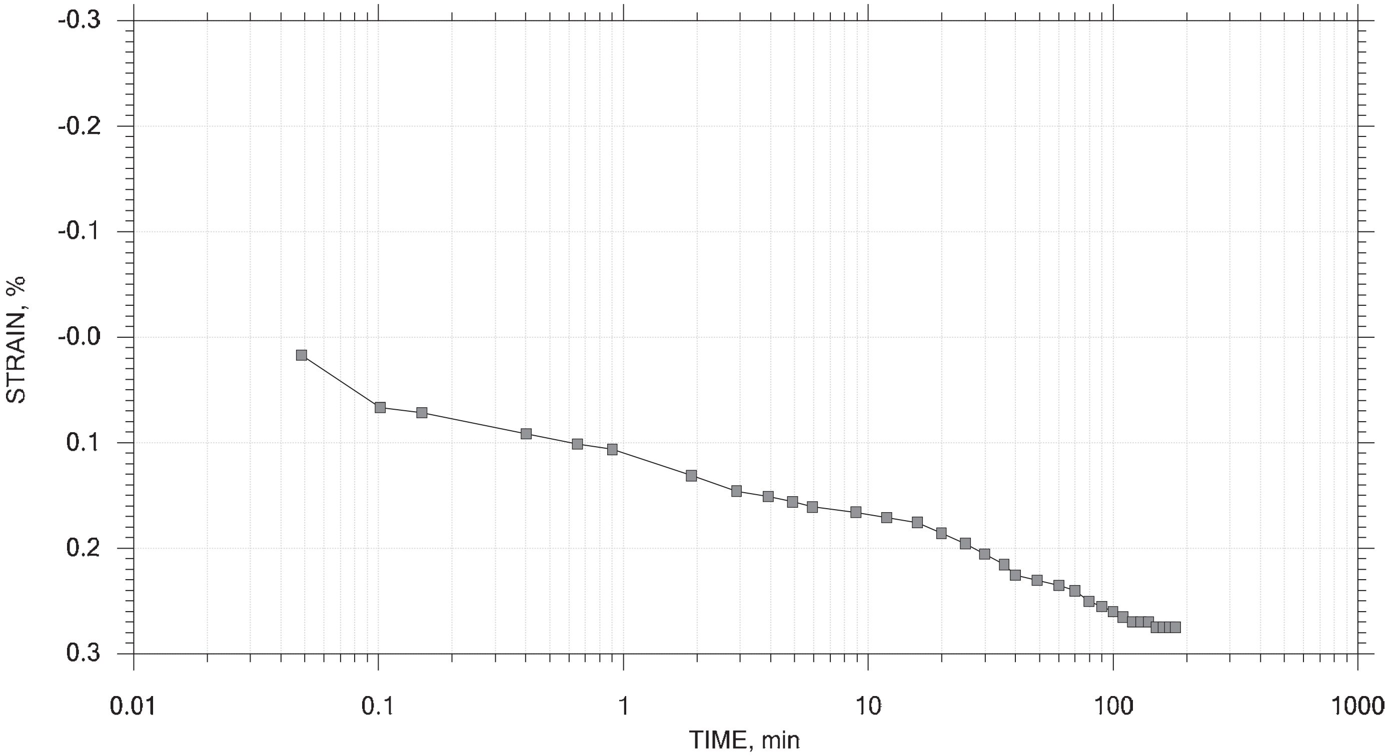
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k cm/sec	Ca %
1	0.0676	0.002750	1.07	0.275	0.000	0.00e+000	4.07e-002	0.00e+000	0.00e+000
2	0.125	0.009857	1.05	0.986	0.000	0.00e+000	1.24e-001	0.00e+000	0.00e+000
3	0.250	0.01478	1.04	1.48	0.000	0.00e+000	3.94e-002	0.00e+000	0.00e+000
4	0.500	0.02147	1.03	2.15	0.000	0.00e+000	2.68e-002	0.00e+000	0.00e+000
5	1.00	0.02614	1.02	2.61	0.000	0.00e+000	9.33e-003	0.00e+000	0.00e+000
6	2.00	0.03155	1.01	3.15	0.000	0.00e+000	5.41e-003	0.00e+000	0.00e+000
7	4.00	0.03934	0.990	3.93	0.000	0.00e+000	3.89e-003	0.00e+000	0.00e+000
8	1.00	0.03785	0.993	3.79	0.000	0.00e+000	4.94e-004	0.00e+000	0.00e+000
9	0.250	0.03687	0.996	3.69	0.000	0.00e+000	1.31e-003	0.00e+000	0.00e+000
10	0.500	0.03879	0.992	3.88	0.000	0.00e+000	7.67e-003	0.00e+000	0.00e+000
11	1.00	0.03849	0.992	3.85	0.000	0.00e+000	-5.92e-004	-0.00e+000	0.00e+000
12	2.00	0.03889	0.991	3.89	0.000	0.00e+000	4.02e-004	0.00e+000	0.00e+000
13	4.00	0.03993	0.989	3.99	0.000	0.00e+000	5.19e-004	0.00e+000	0.00e+000
14	8.00	0.05273	0.963	5.27	0.000	0.00e+000	3.20e-003	0.00e+000	0.00e+000
15	16.0	0.07986	0.906	7.99	0.267	1.86e-005	3.39e-003	6.01e-008	0.00e+000
16	32.0	0.1192	0.825	11.9	0.583	7.93e-006	2.46e-003	1.86e-008	0.00e+000
17	8.00	0.1207	0.822	12.1	0.000	0.00e+000	-6.41e-005	-0.00e+000	0.00e+000
18	2.00	0.1204	0.822	12.0	0.000	0.00e+000	4.92e-005	0.00e+000	0.00e+000
19	0.500	0.1187	0.826	11.9	0.000	0.00e+000	1.15e-003	0.00e+000	0.00e+000
20	0.125	0.1158	0.832	11.6	0.000	0.00e+000	7.69e-003	0.00e+000	0.00e+000

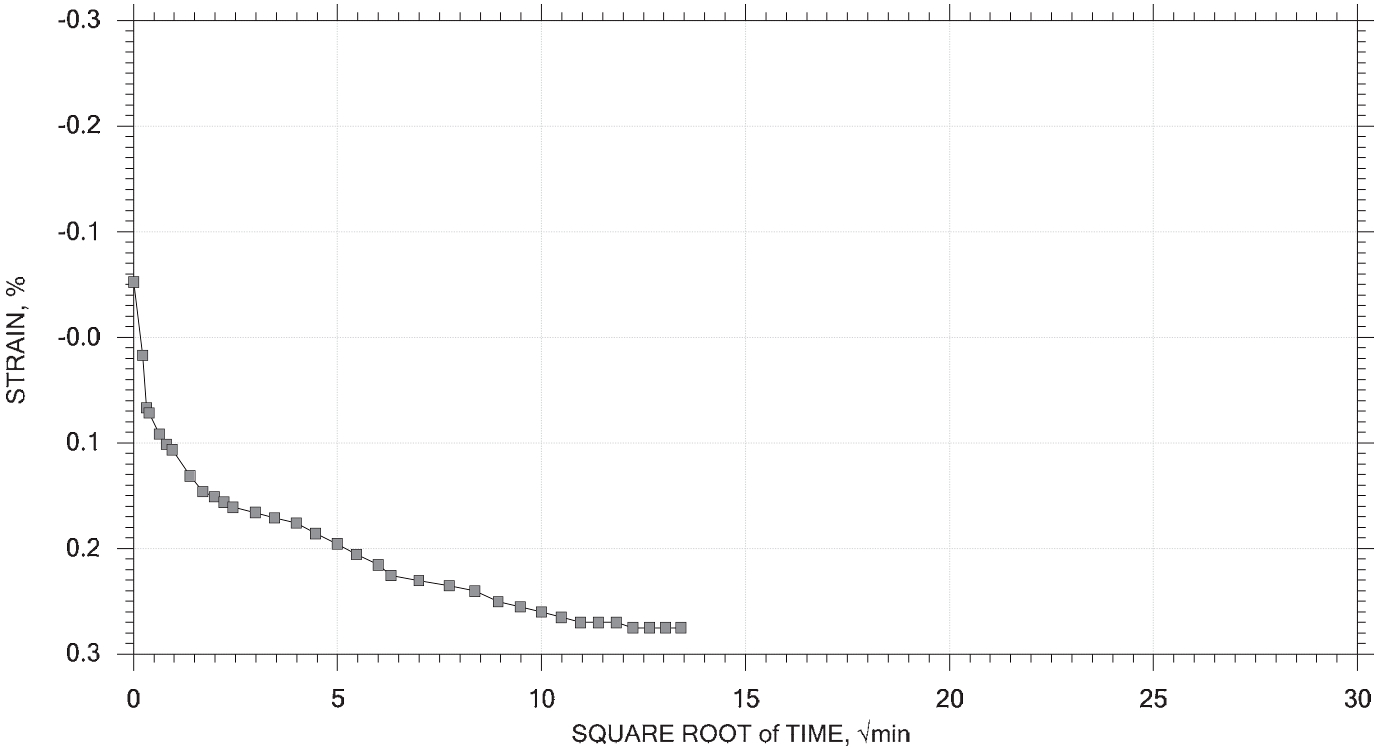
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 20

Stress: 0.067601 tsf





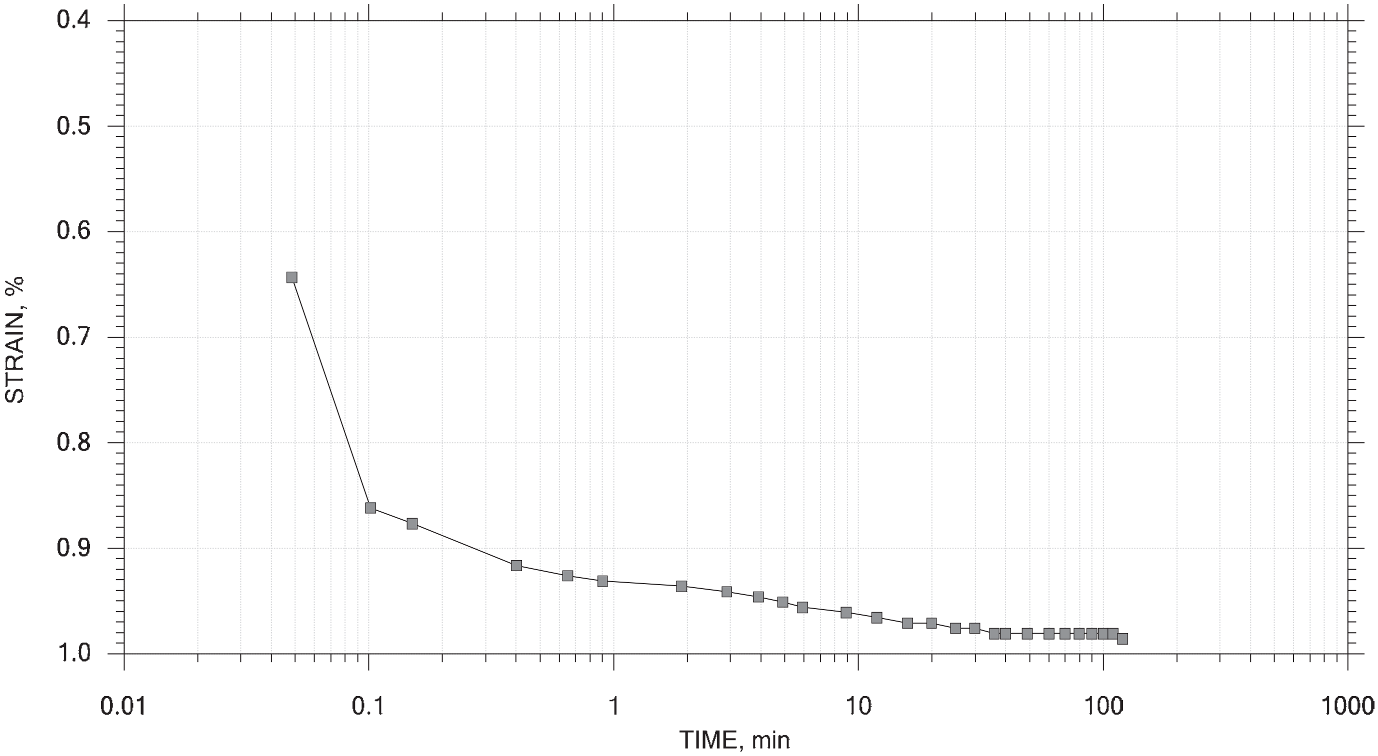
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

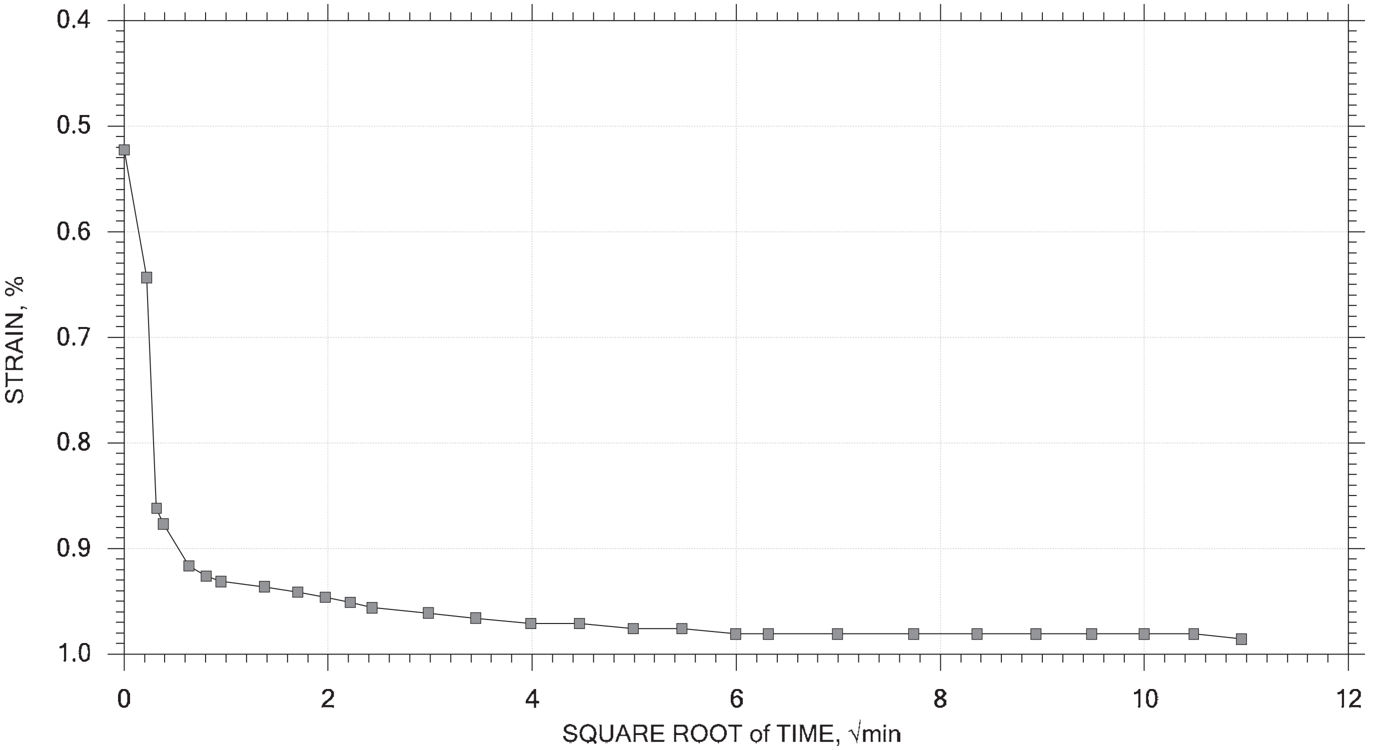
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 20

Stress: 0.125 tsf





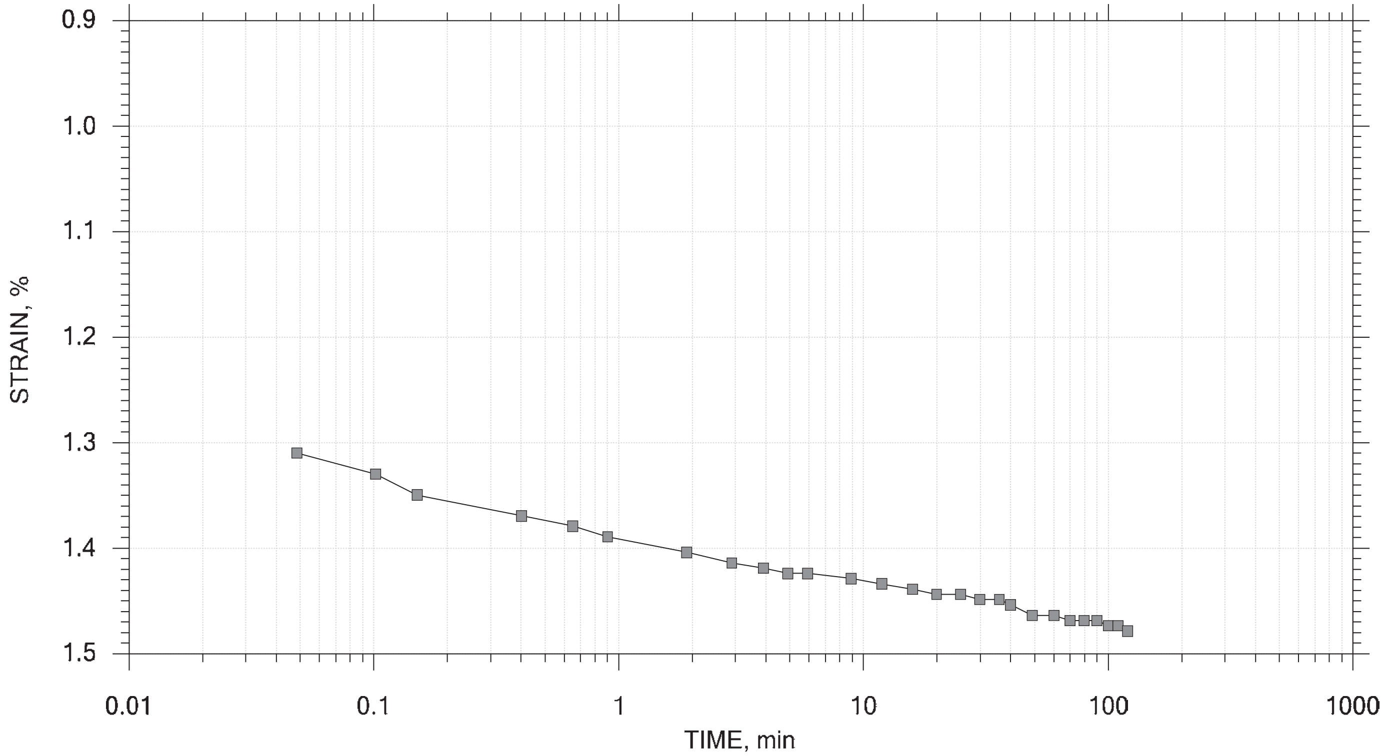
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

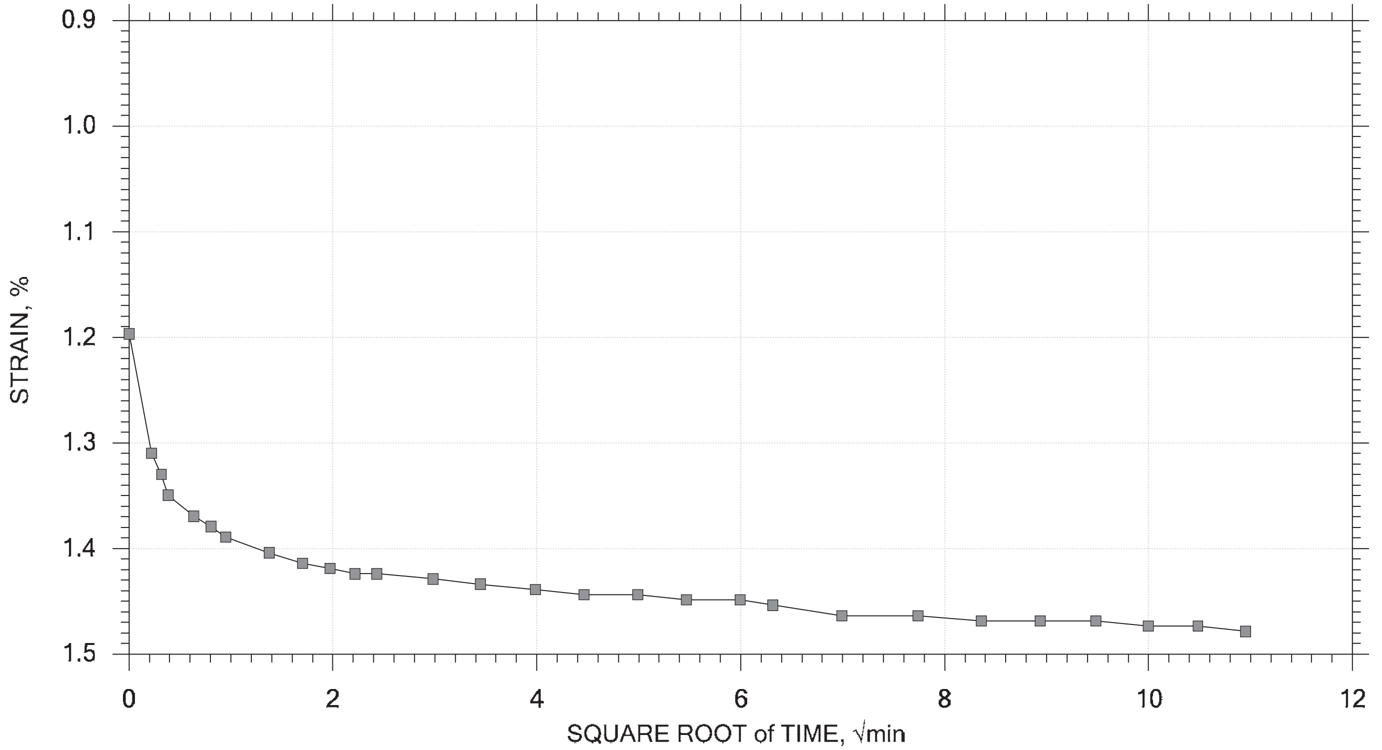
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 20

Stress: 0.25 tsf





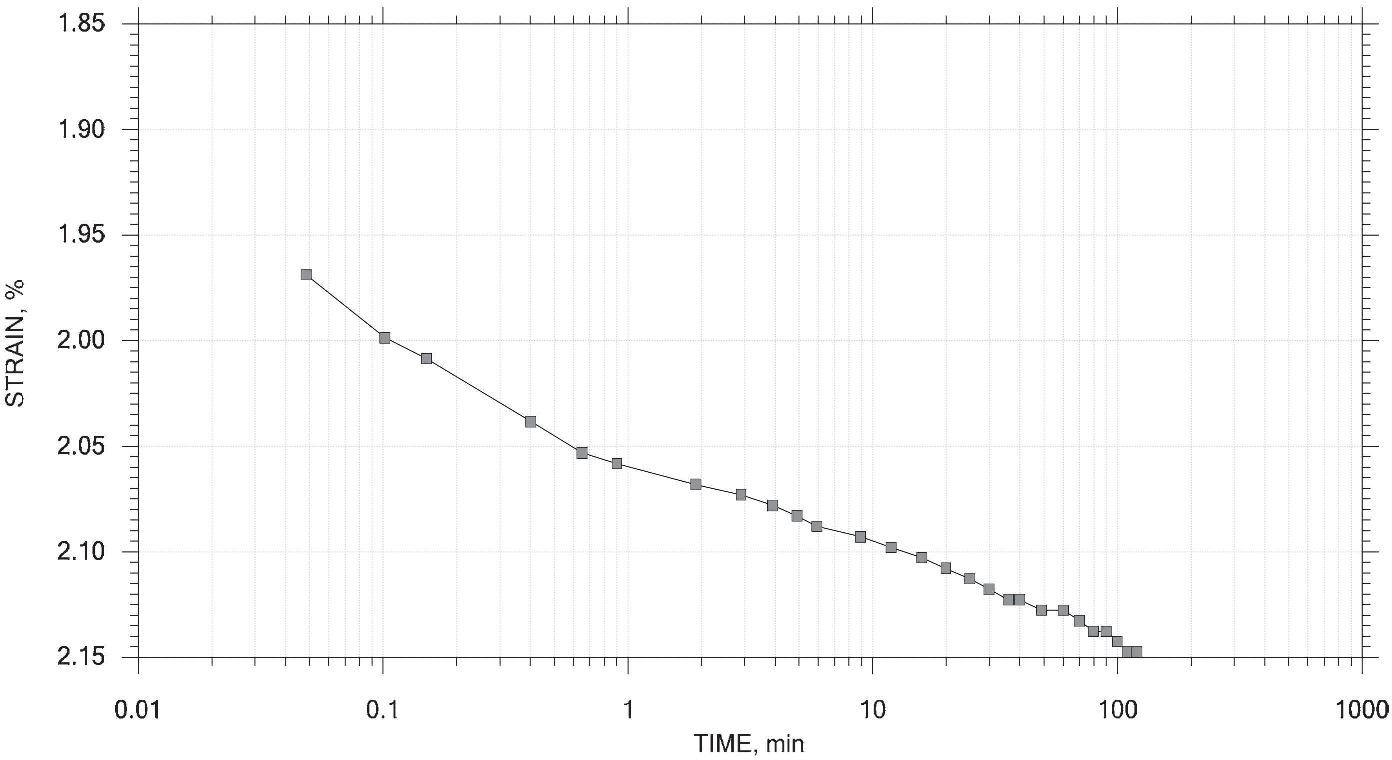
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

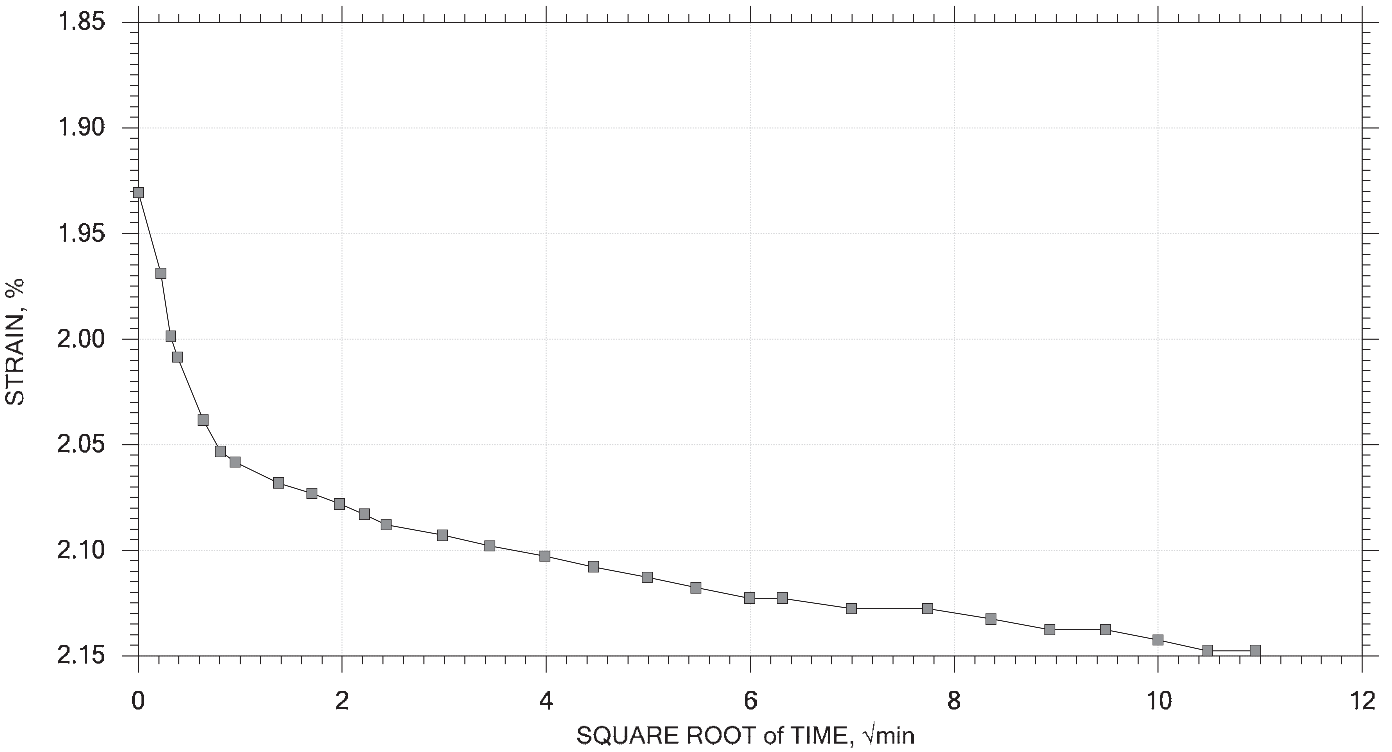
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 20

Stress: 0.5 tsf





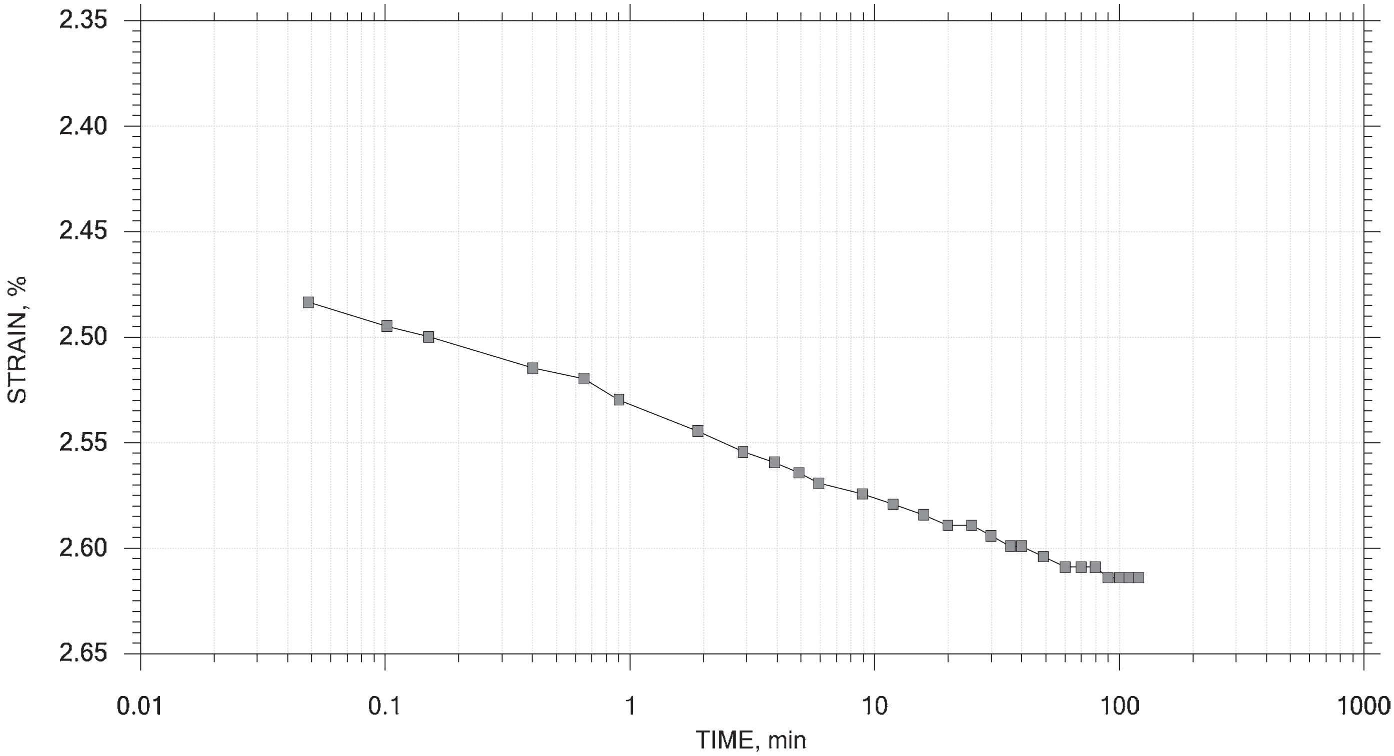
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

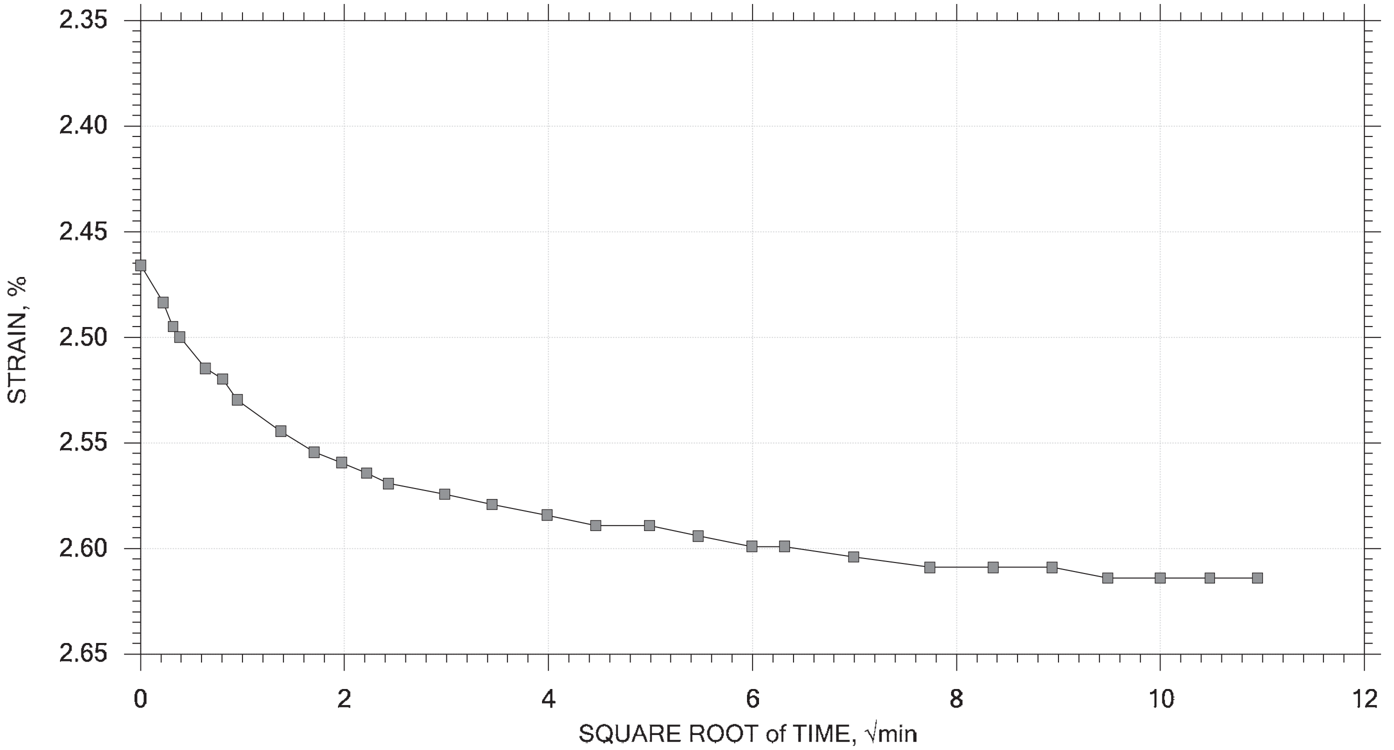
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 20

Stress: 1 tsf





Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---

Description: Moist, dark gray silty sand (ASH)

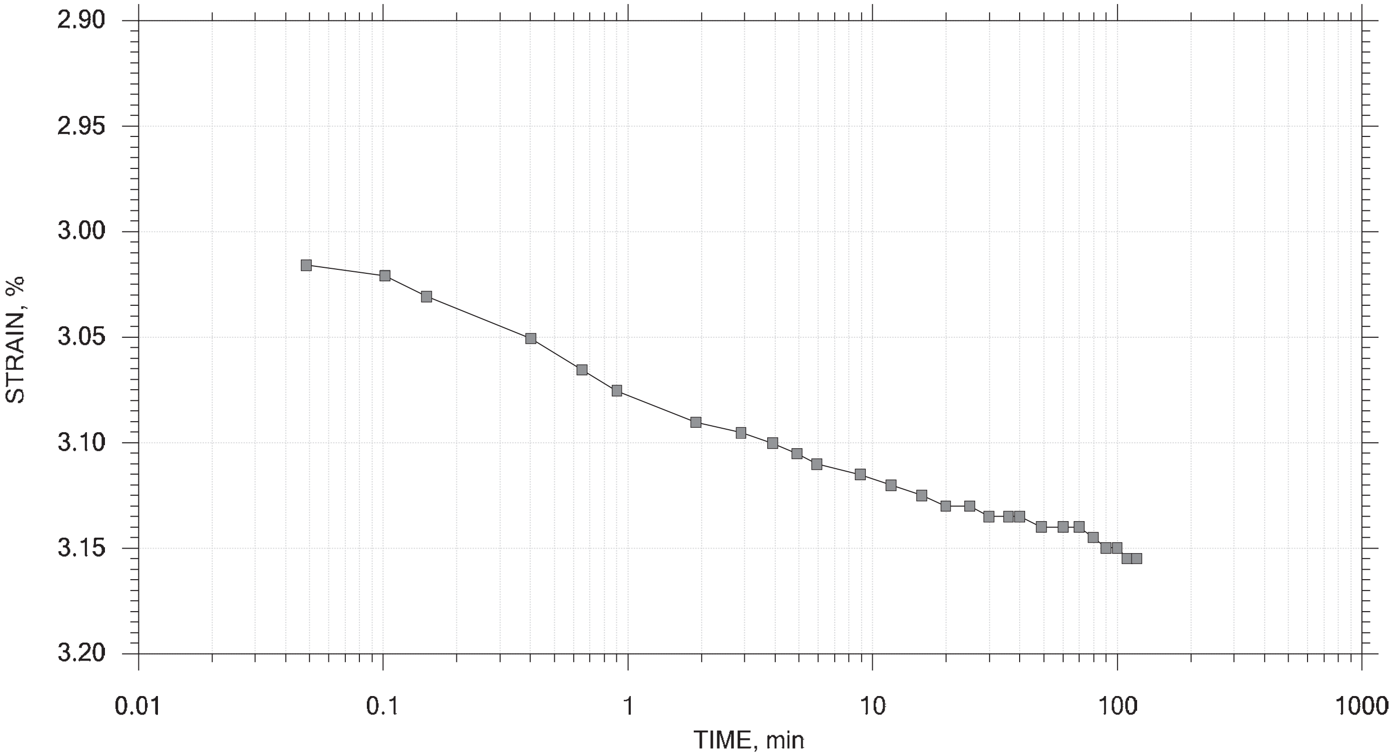
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.

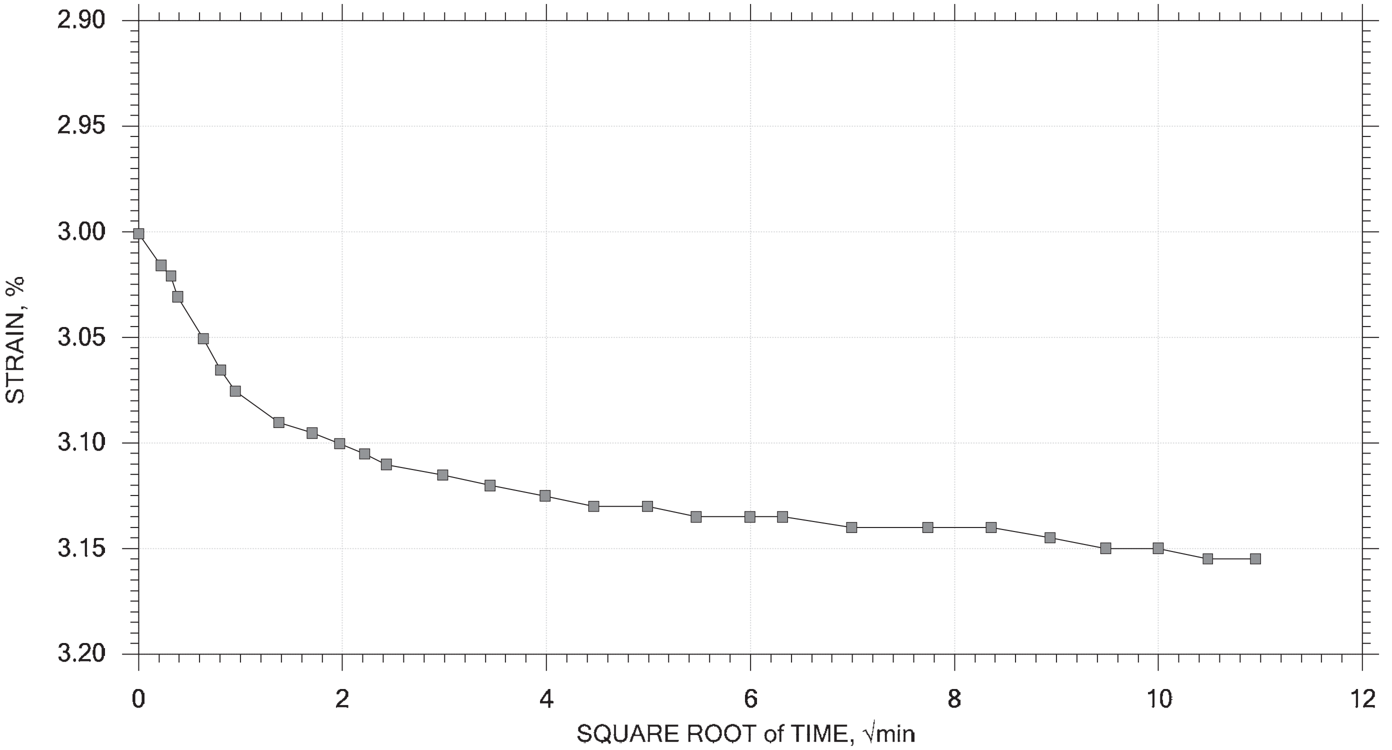
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 20

Stress: 2 tsf





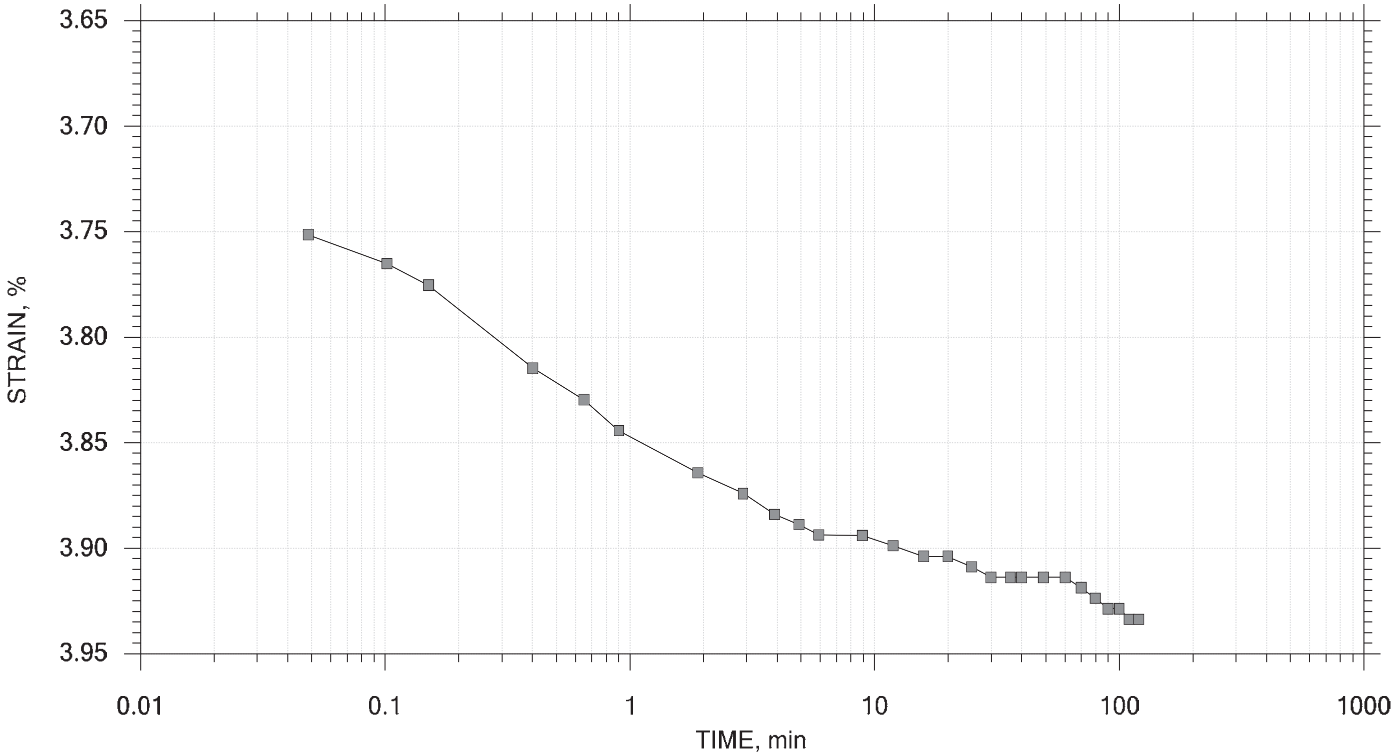
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

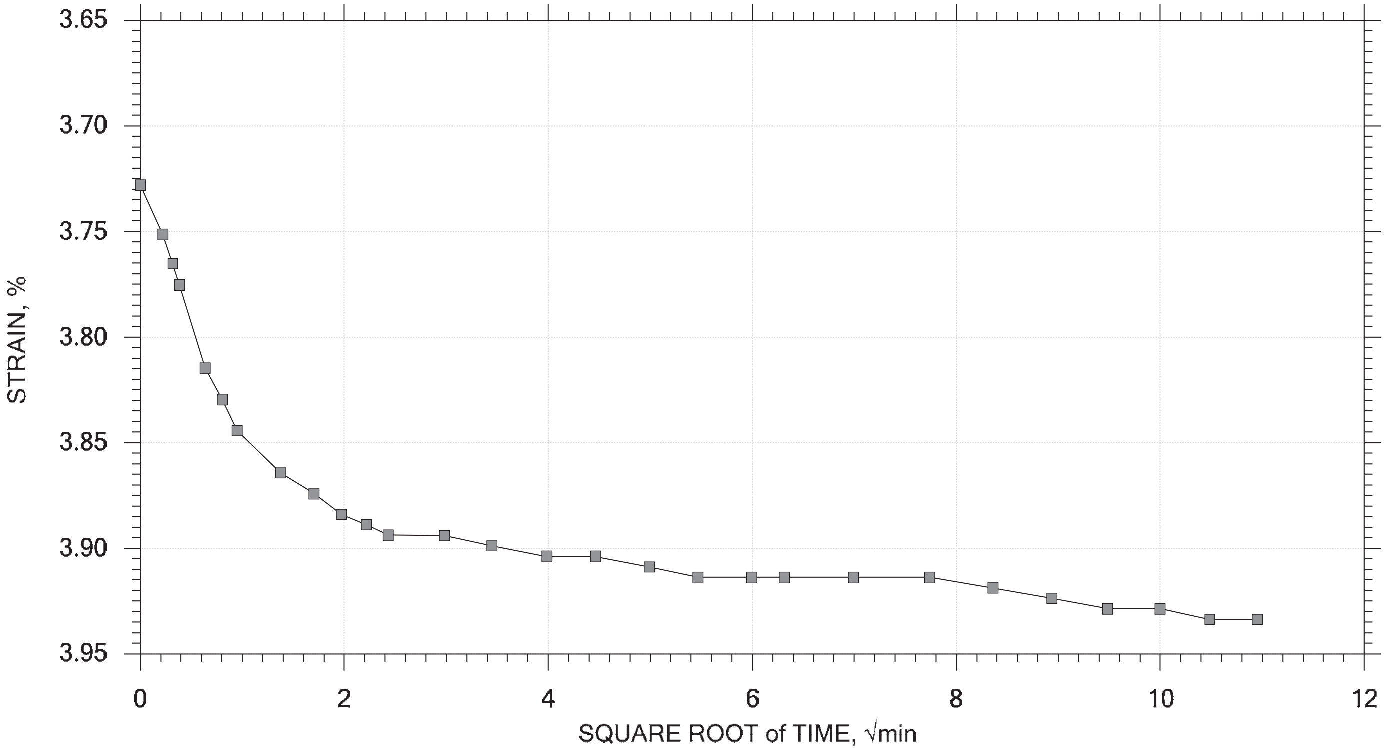
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 20

Stress: 4 tsf





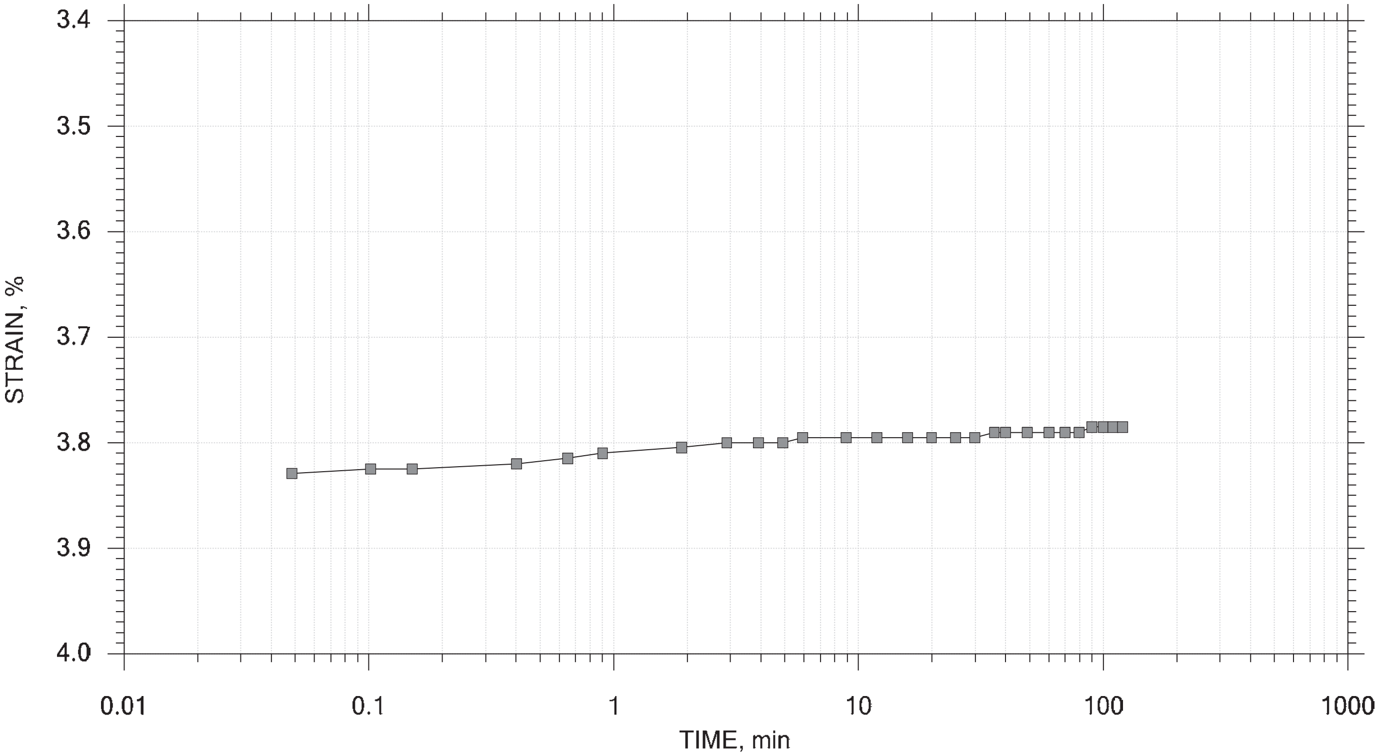
GeoTesting EXPRESS			
	Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-102	Tested By: jm	Checked By: mcm
	Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
	Depth: 6-8 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silty sand (ASH)		
	Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

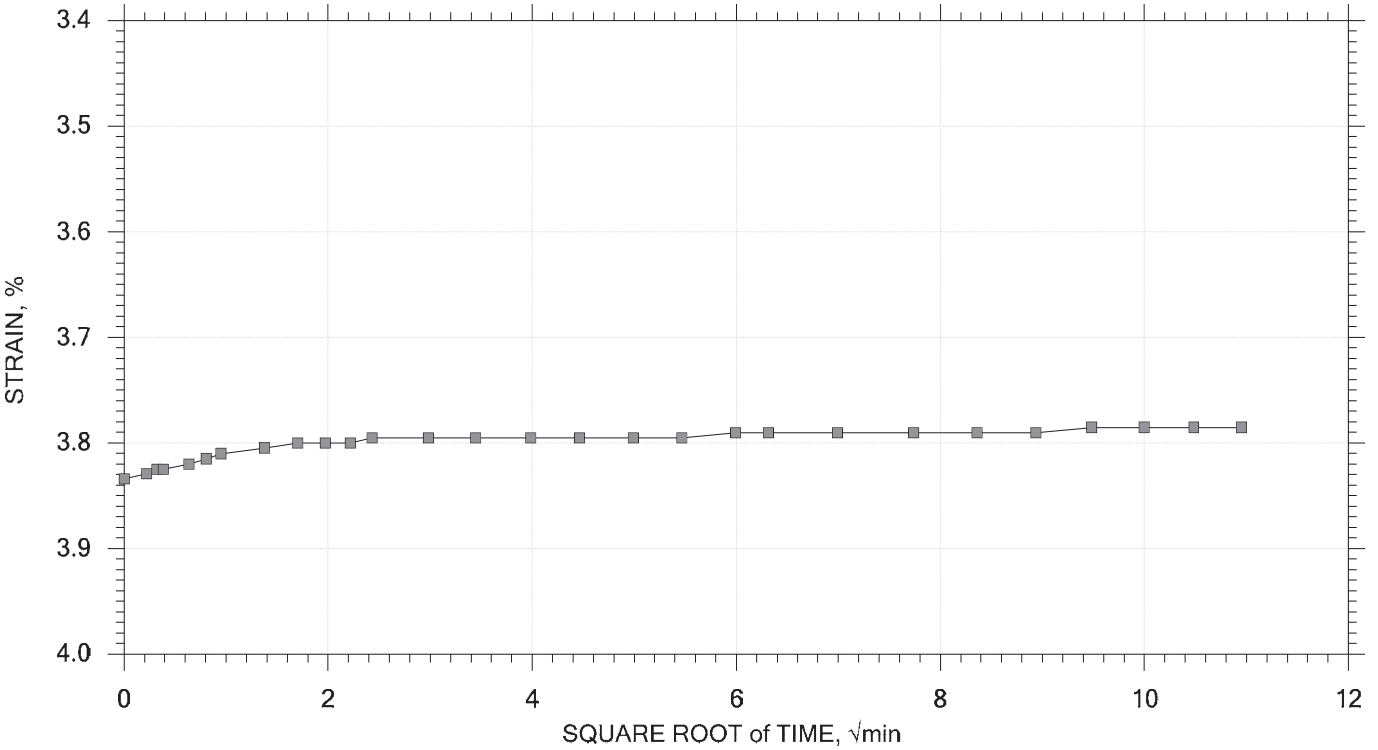
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 20

Stress: 1 tsf





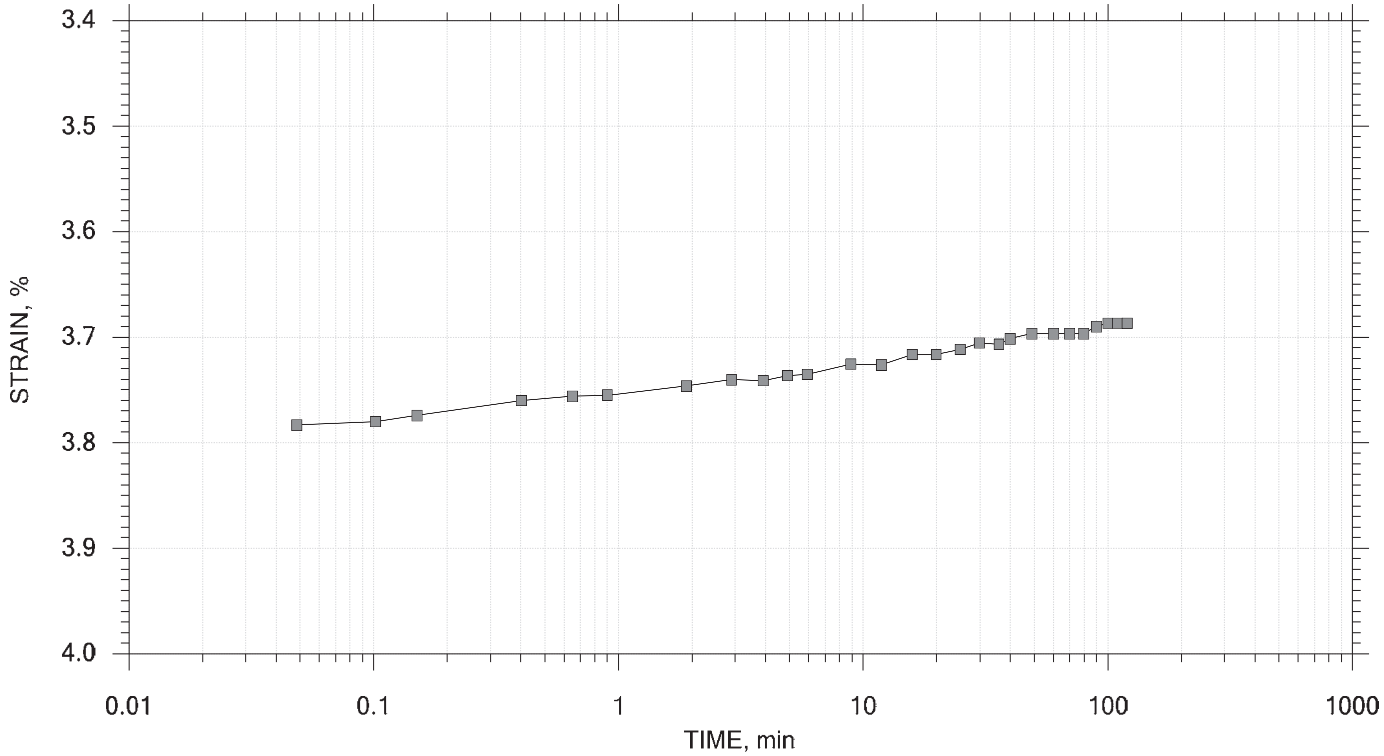
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

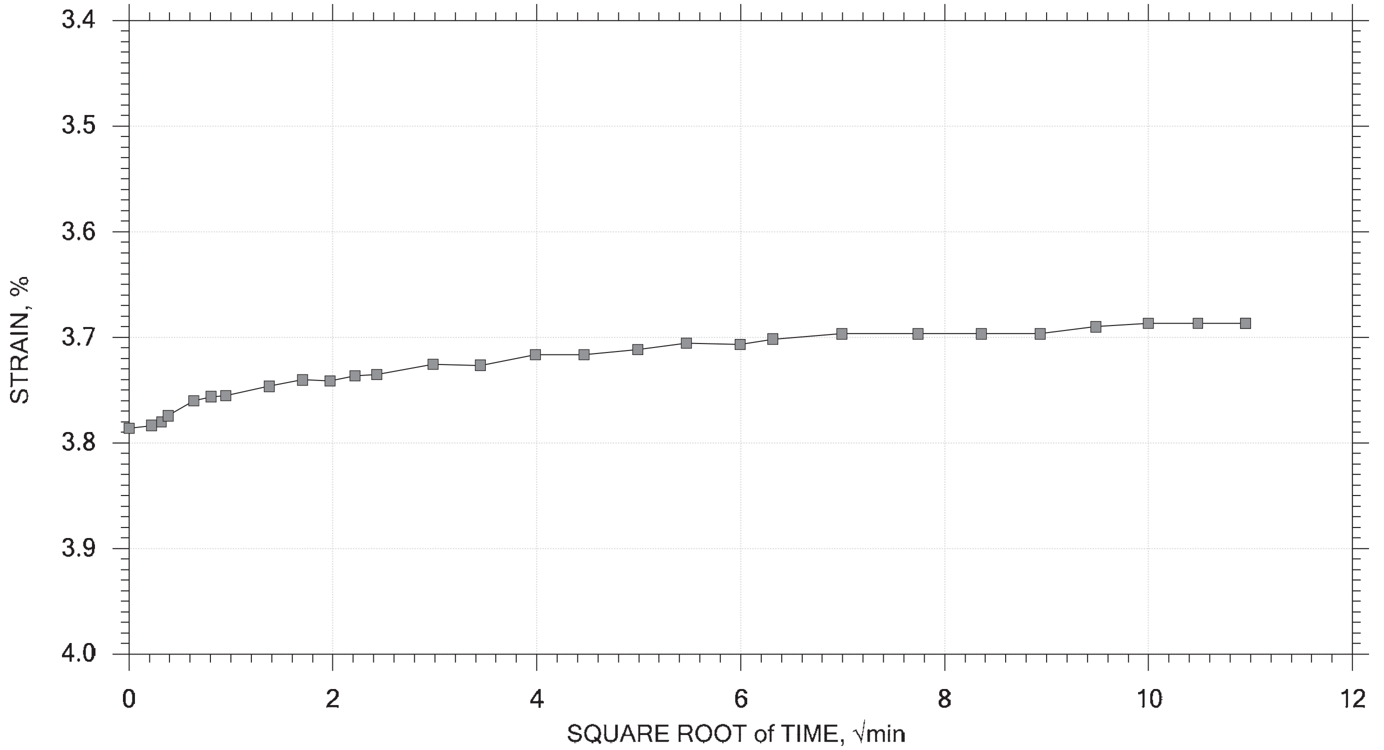
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 20

Stress: 0.25 tsf





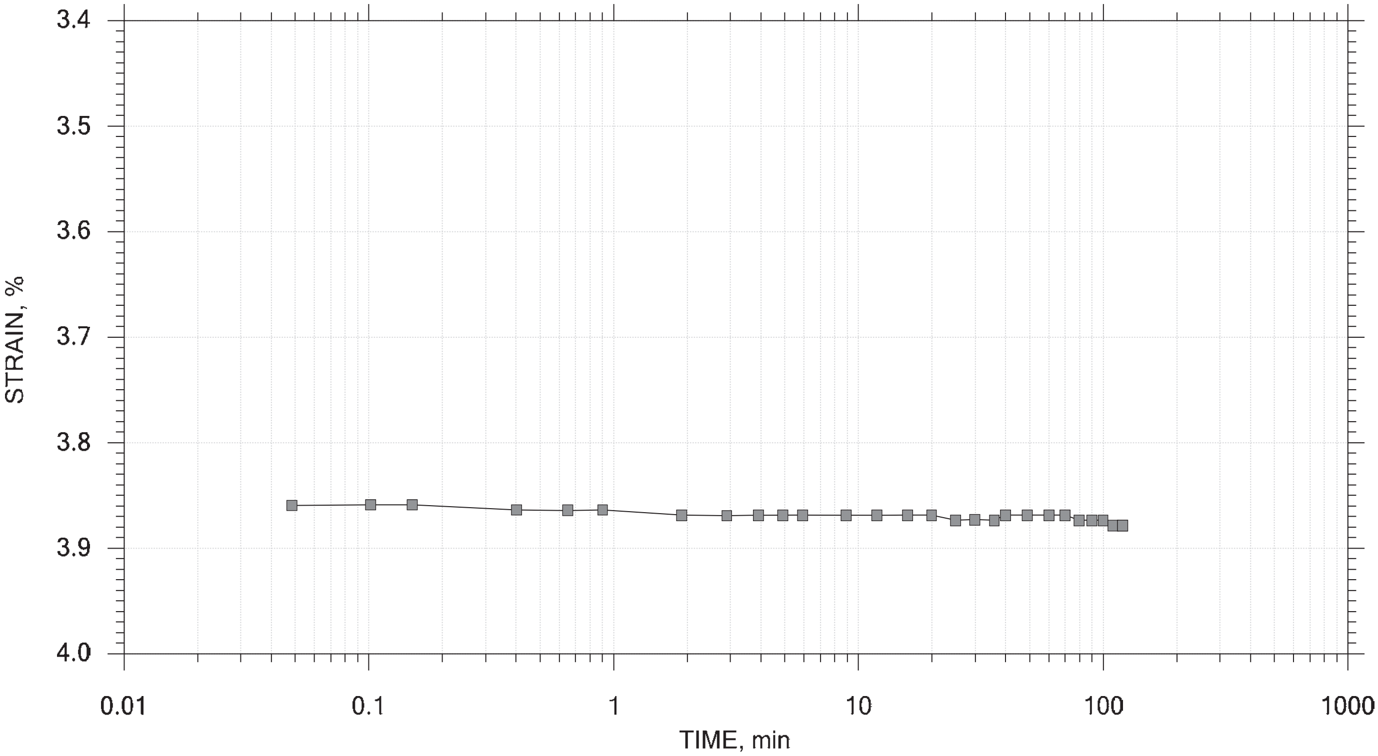
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

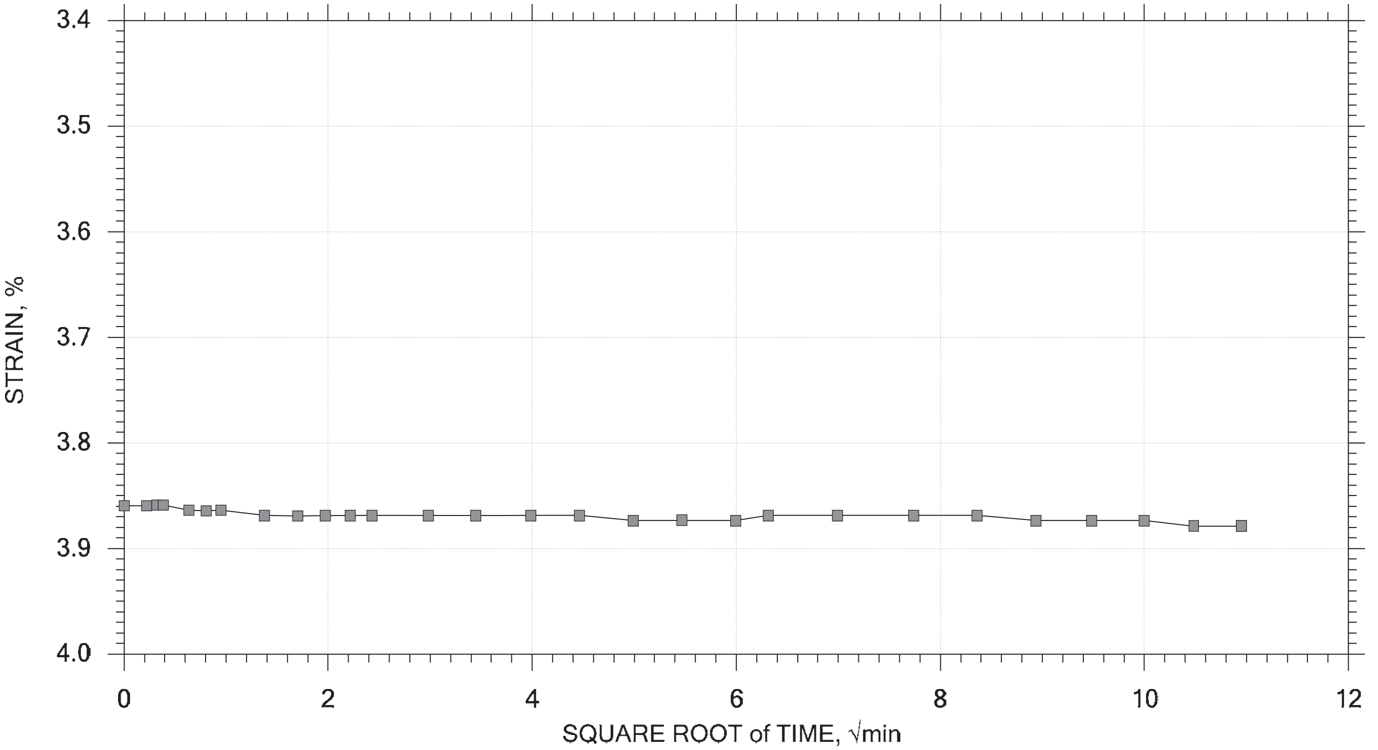
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 20

Stress: 0.5 tsf





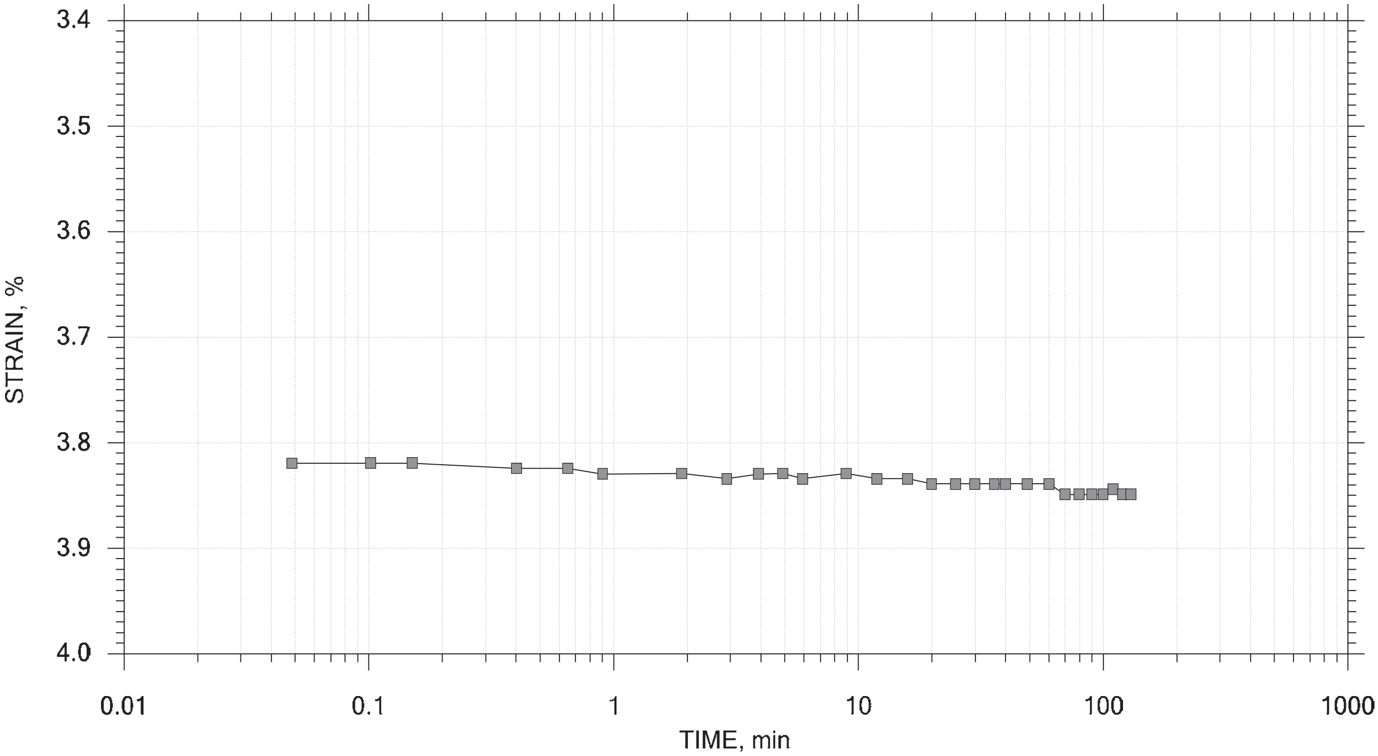
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

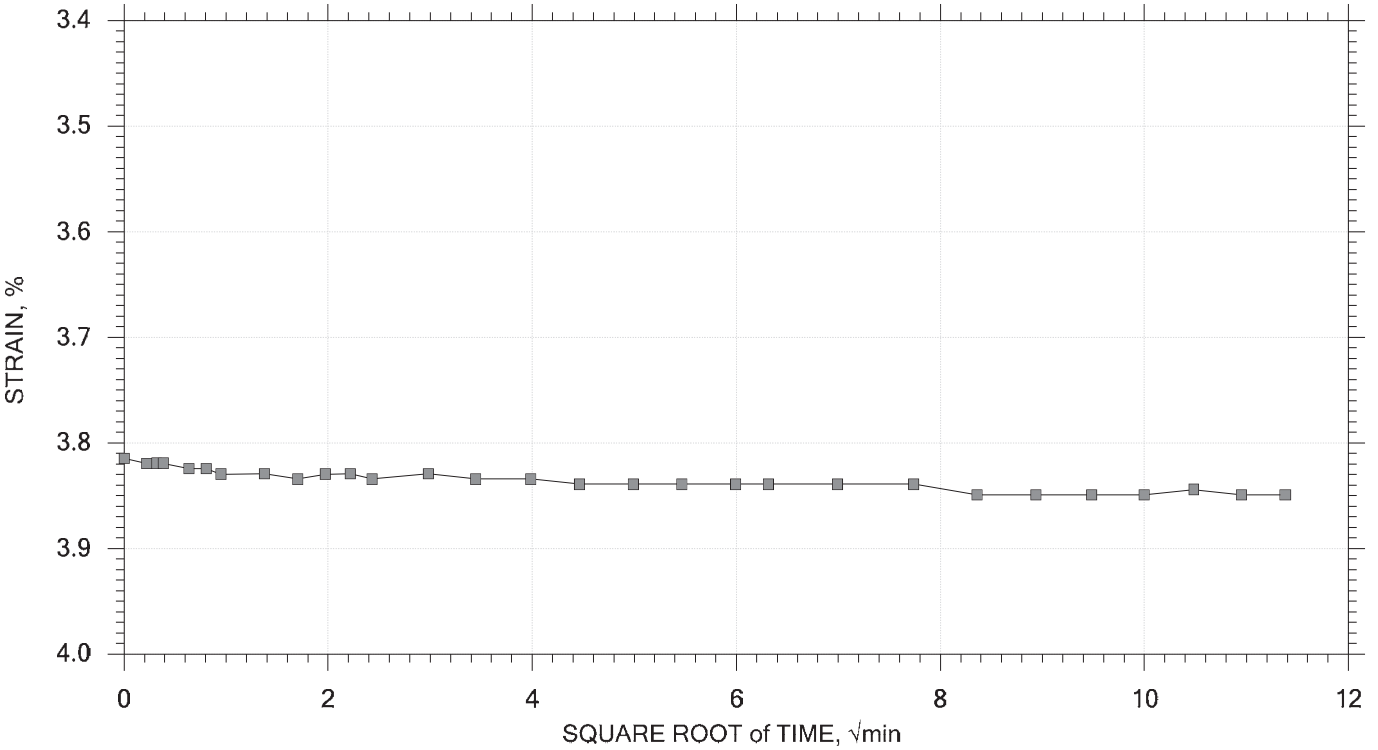
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 20

Stress: 1 tsf





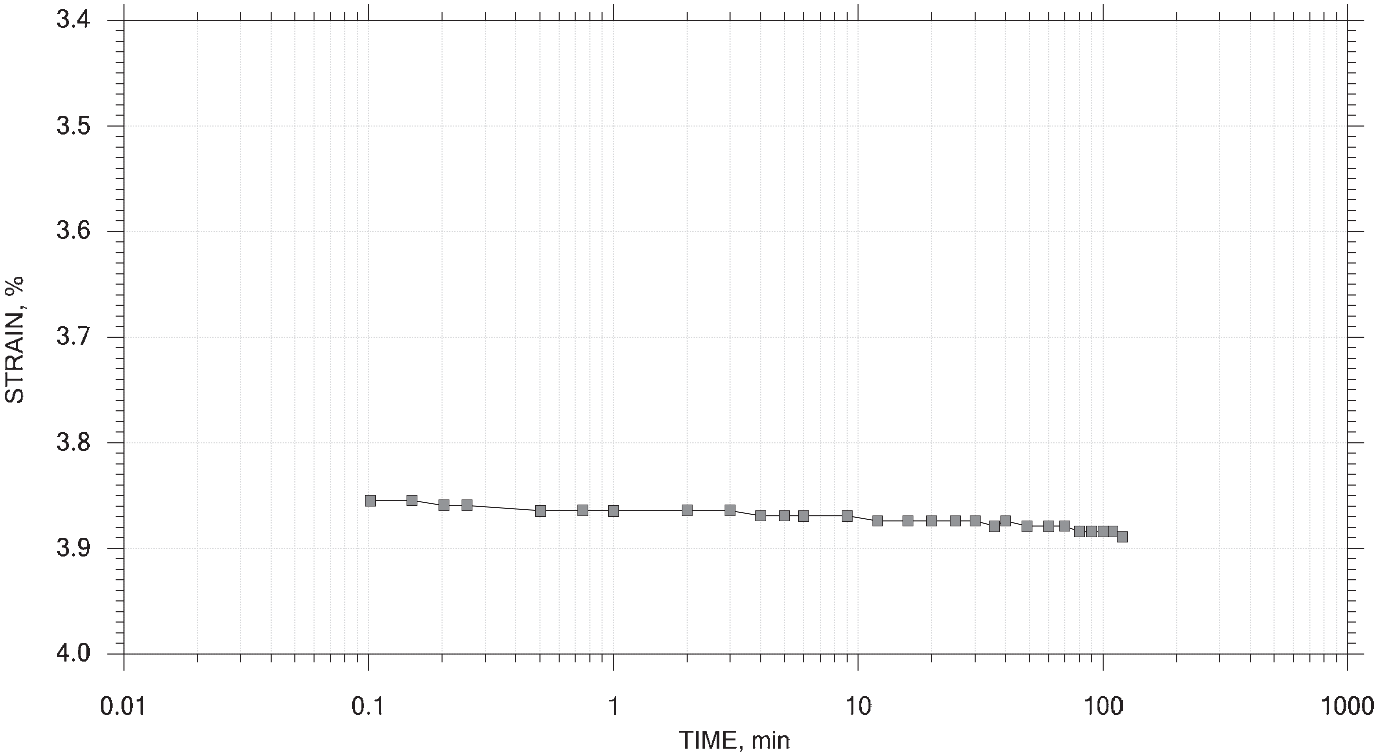
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

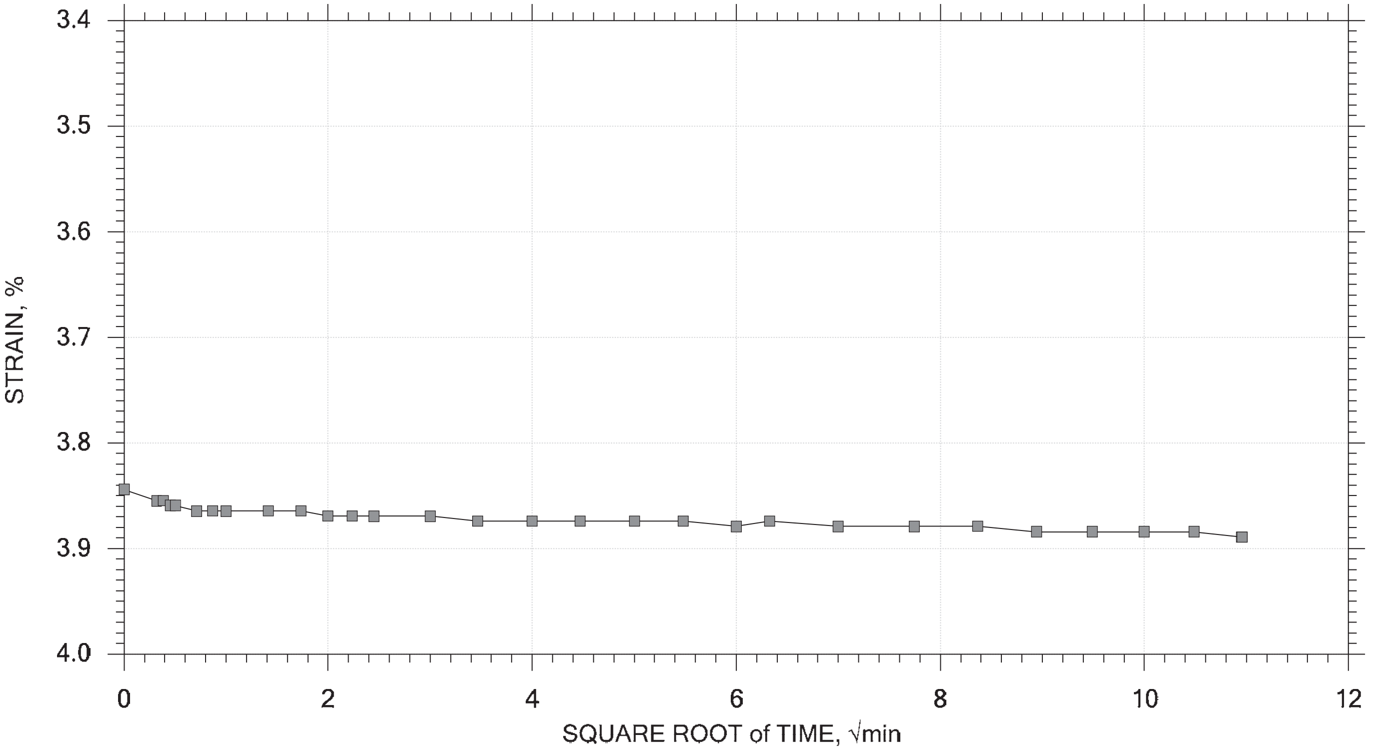
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 20

Stress: 2 tsf





Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---

Description: Moist, dark gray silty sand (ASH)

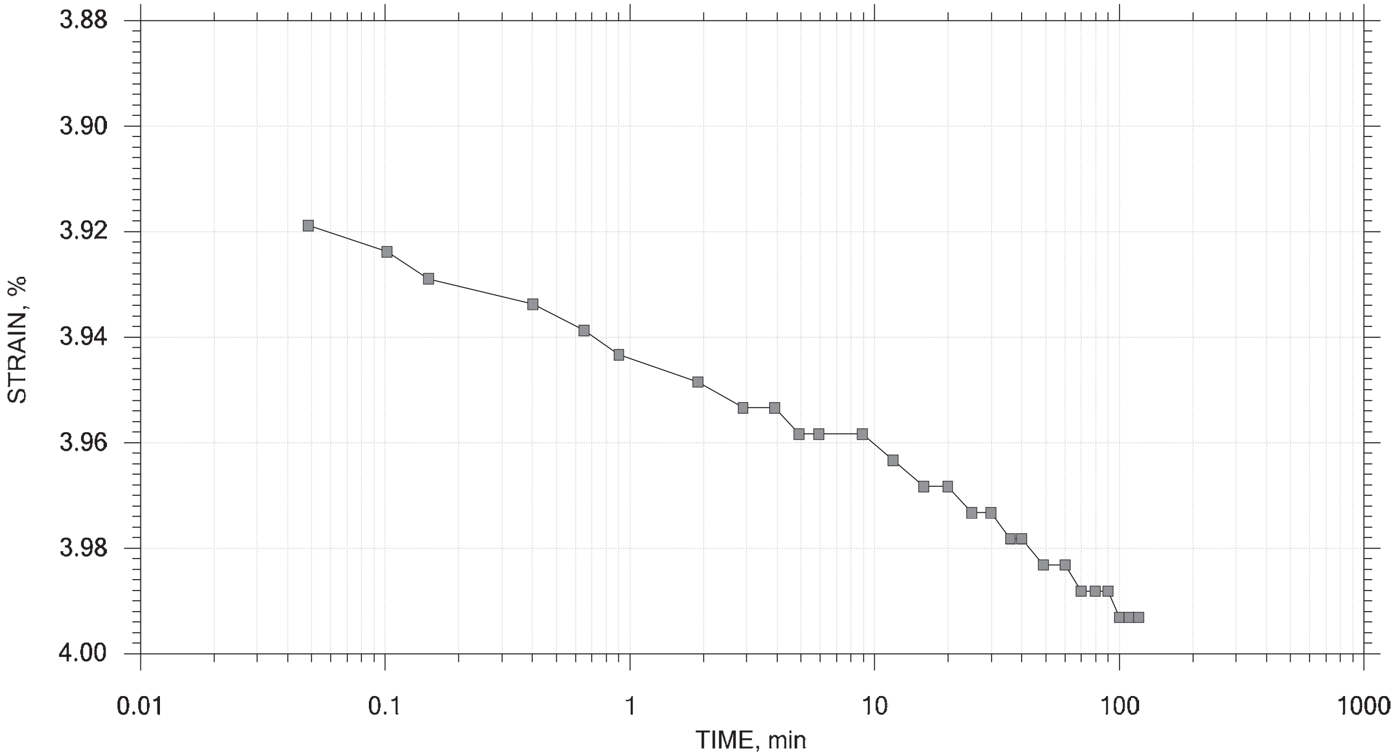
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.

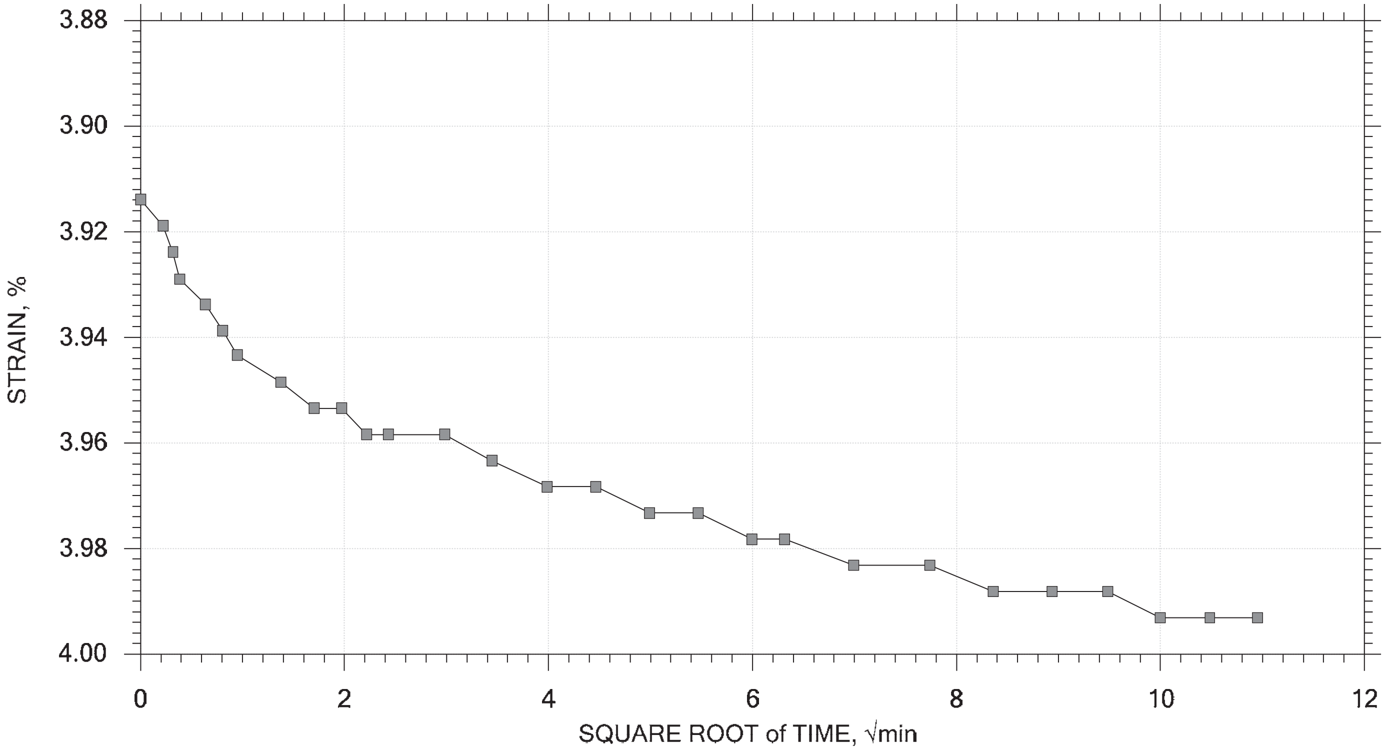
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 20

Stress: 4 tsf





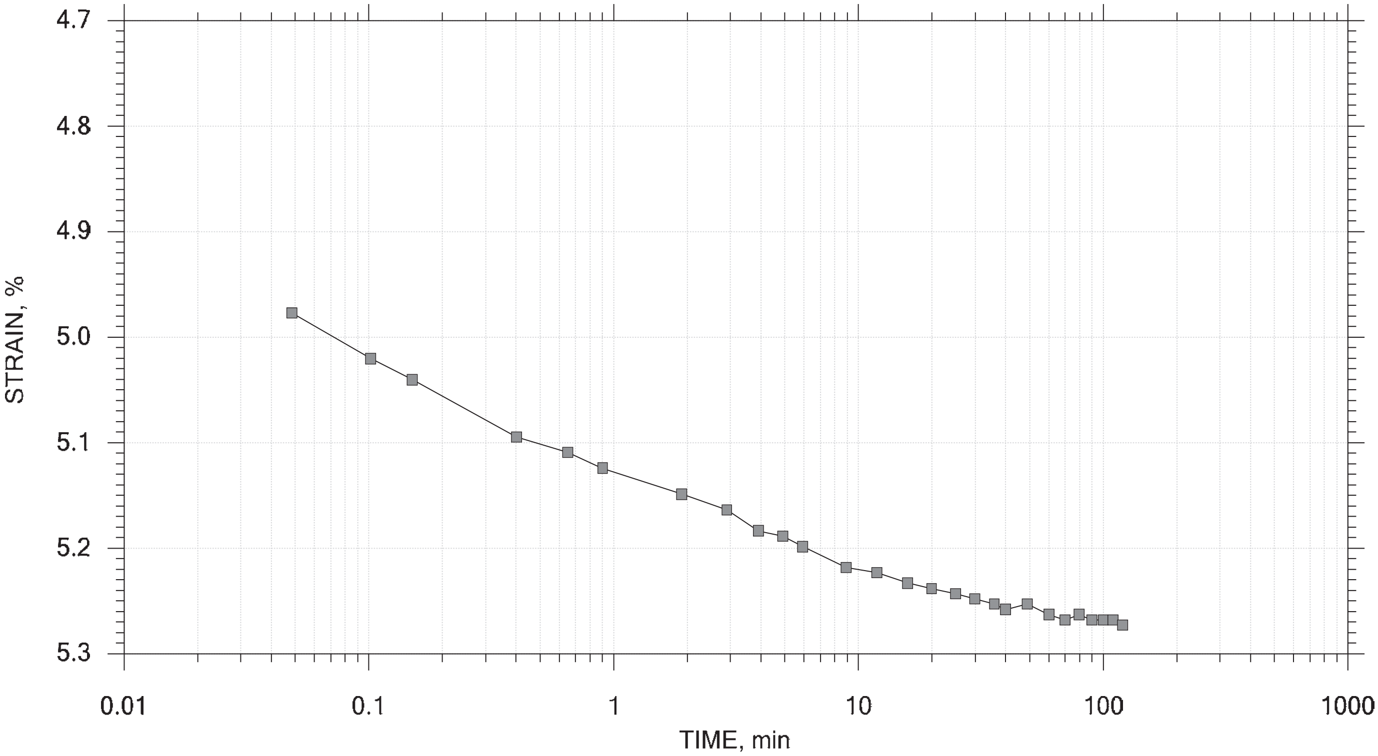
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

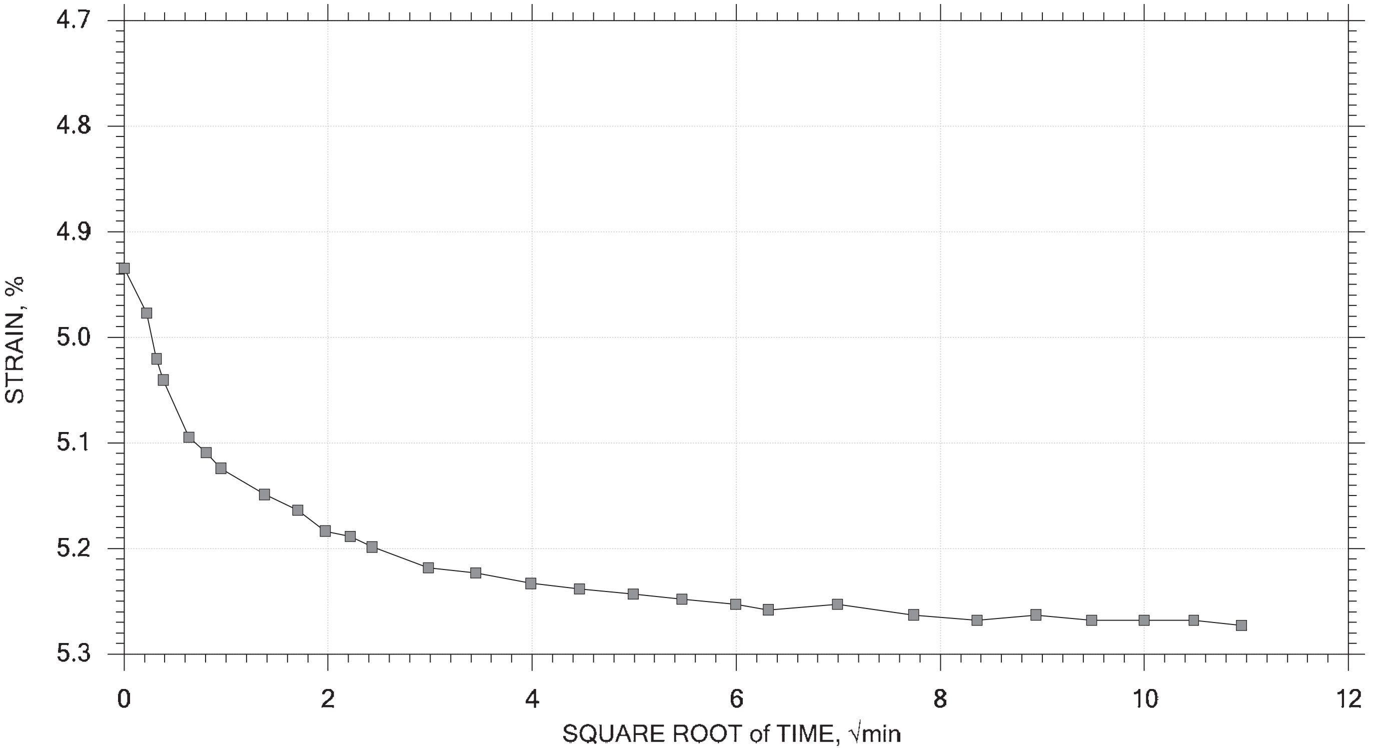
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 20

Stress: 8 tsf





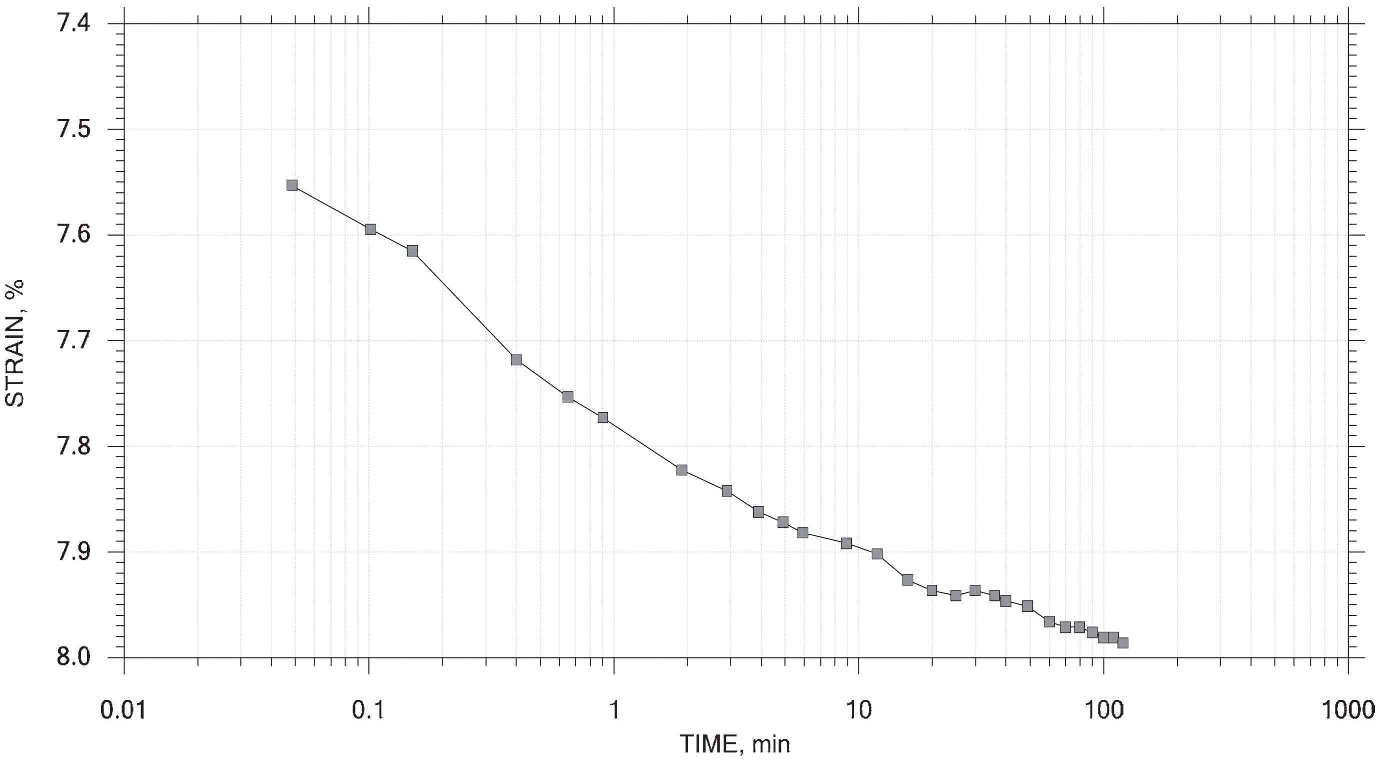
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

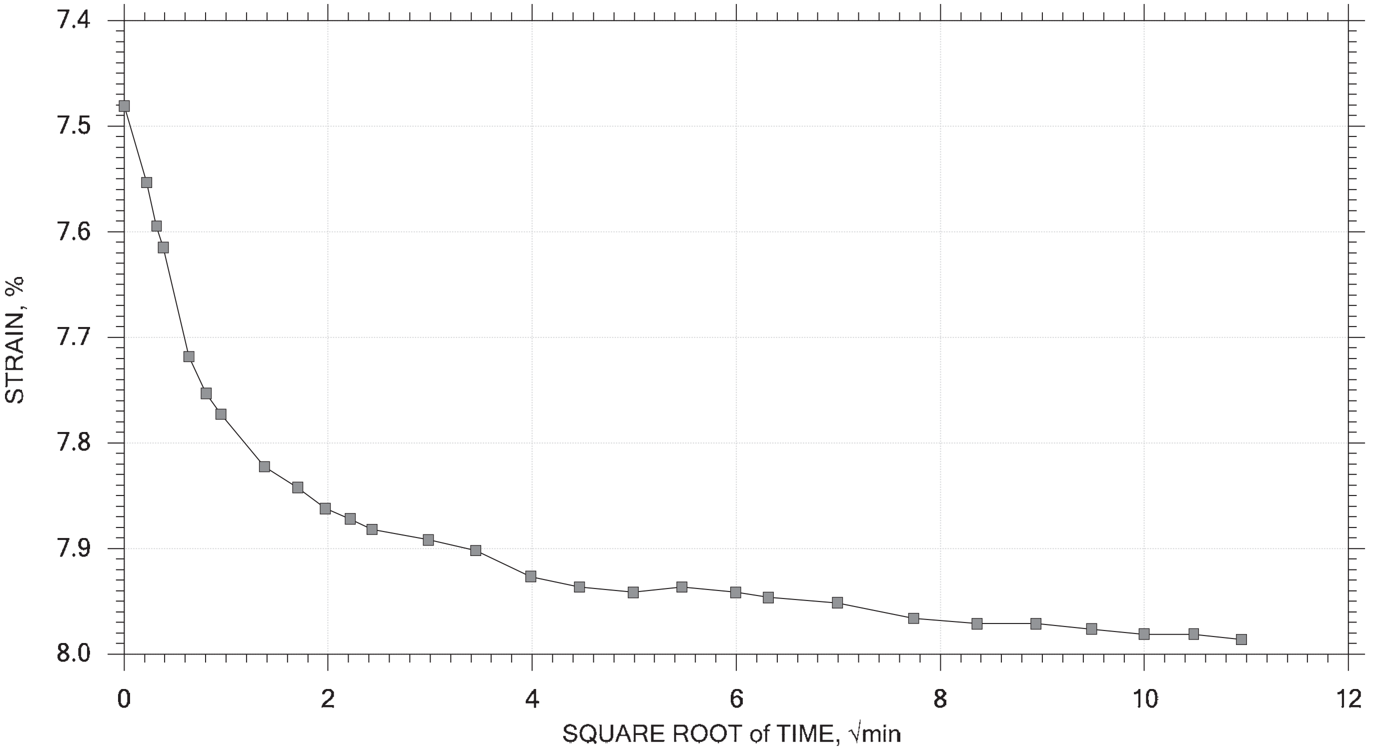
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 20

Stress: 16 tsf





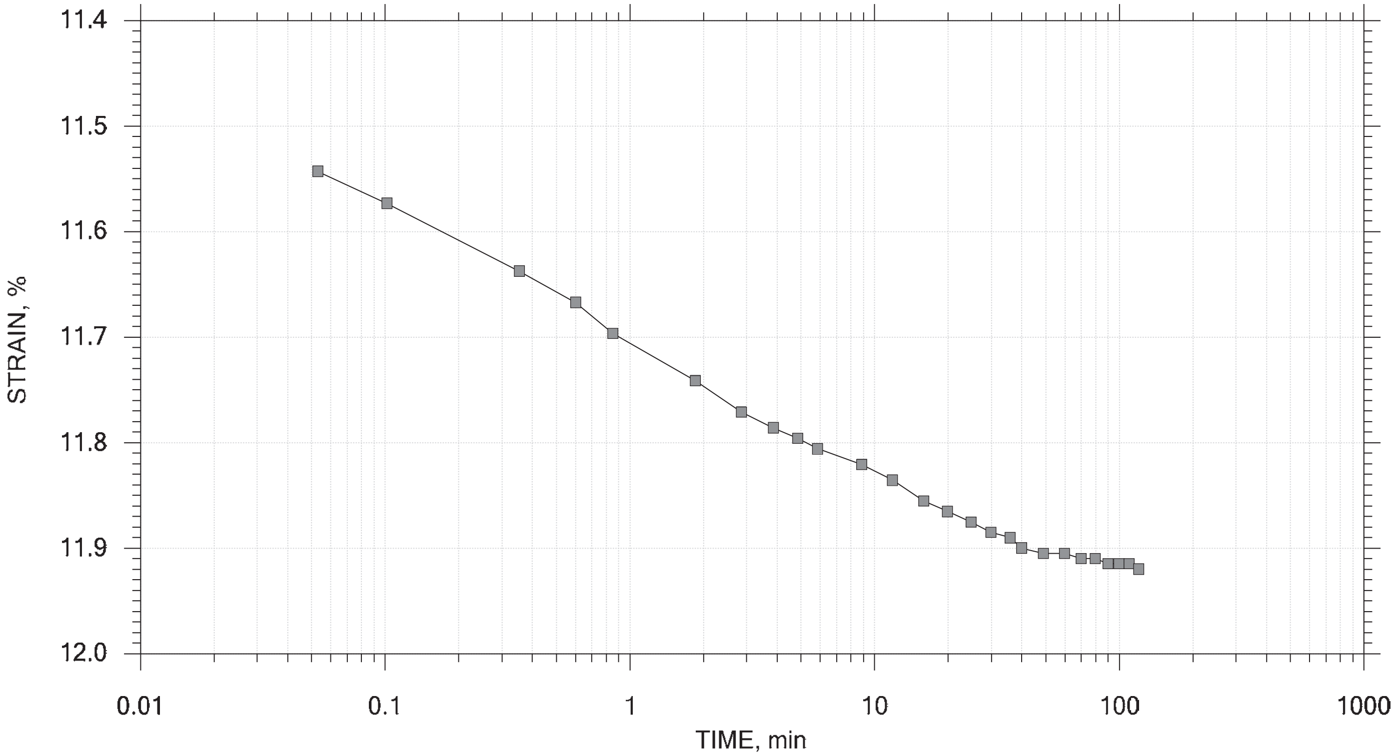
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

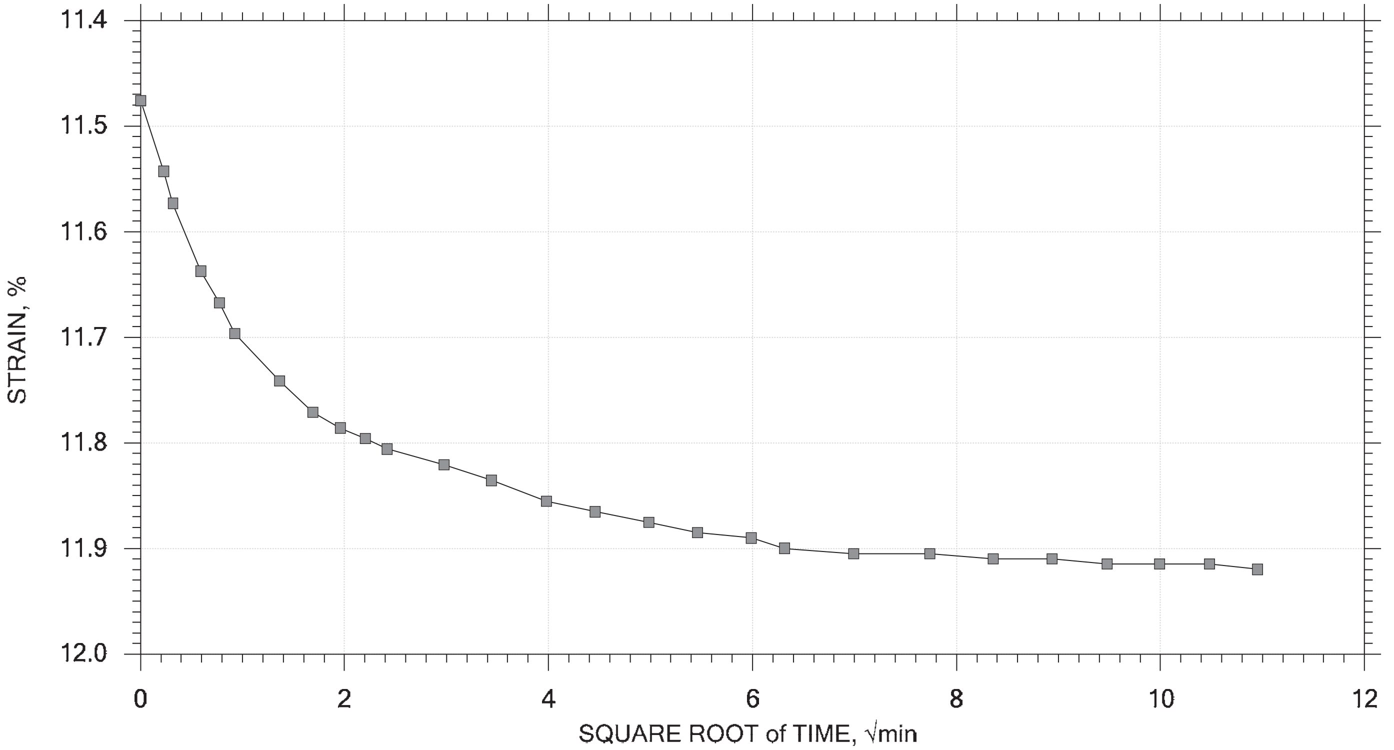
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 20

Stress: 32 tsf





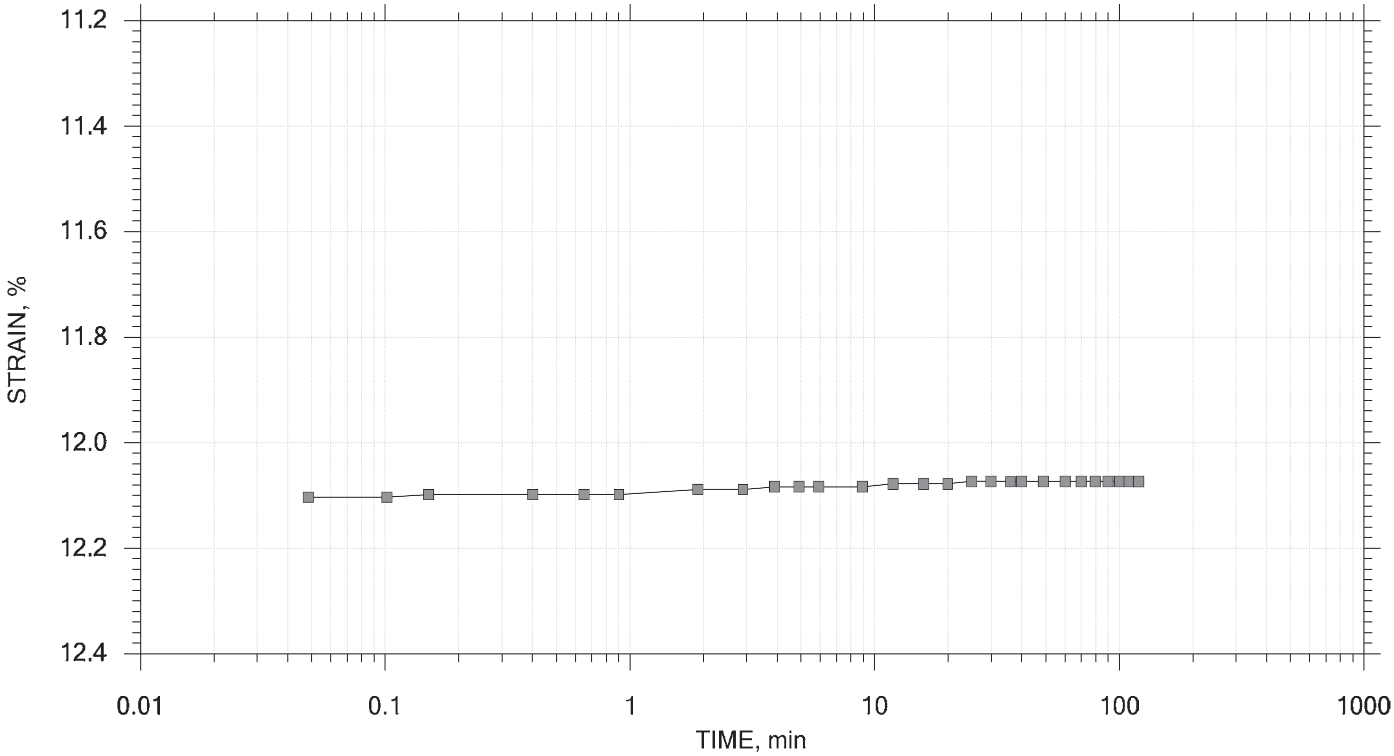
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

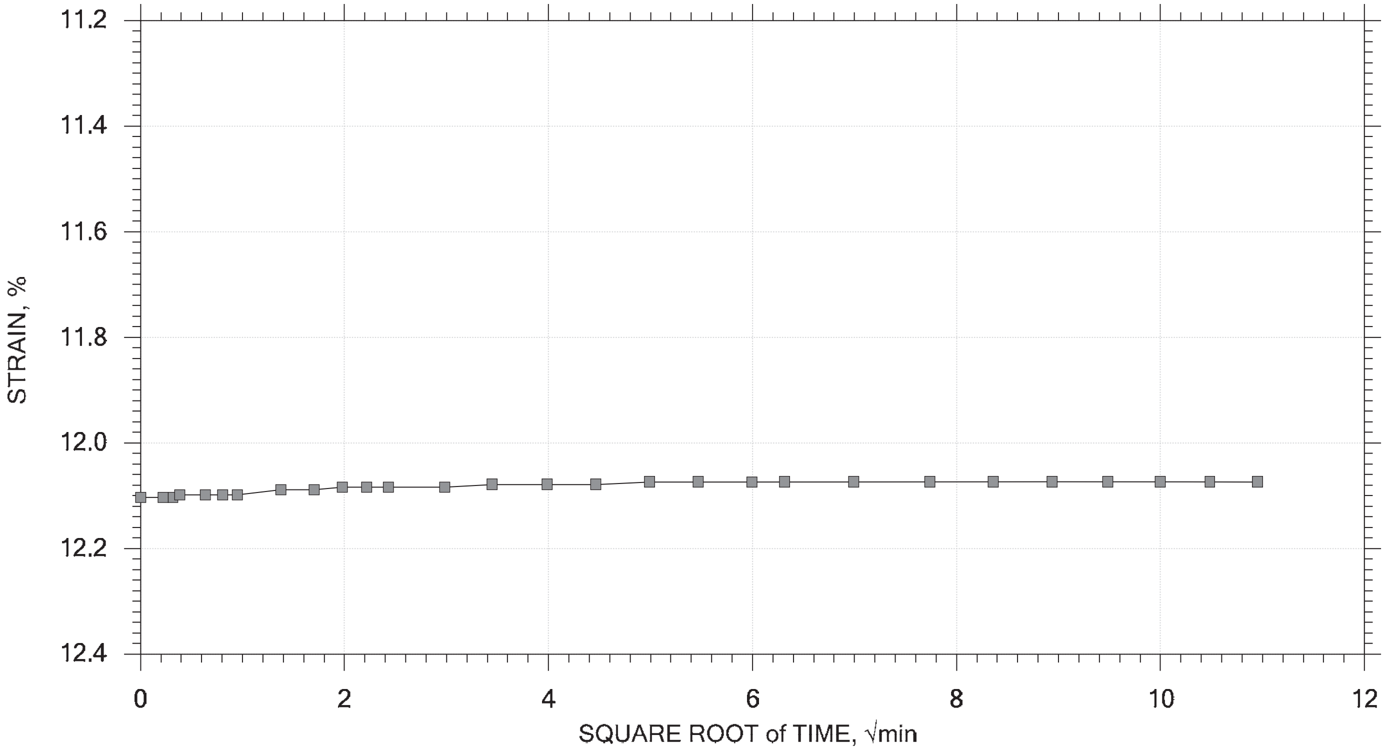
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 20

Stress: 8 tsf





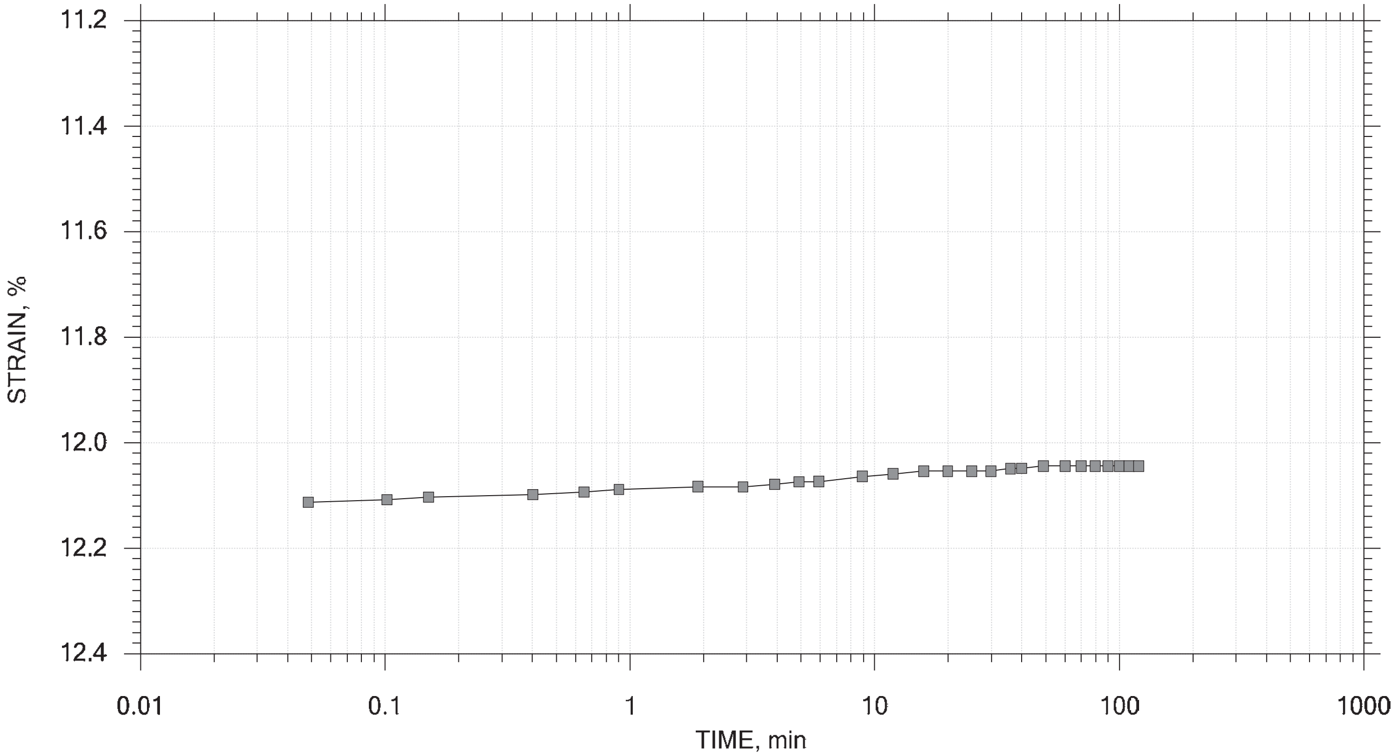
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

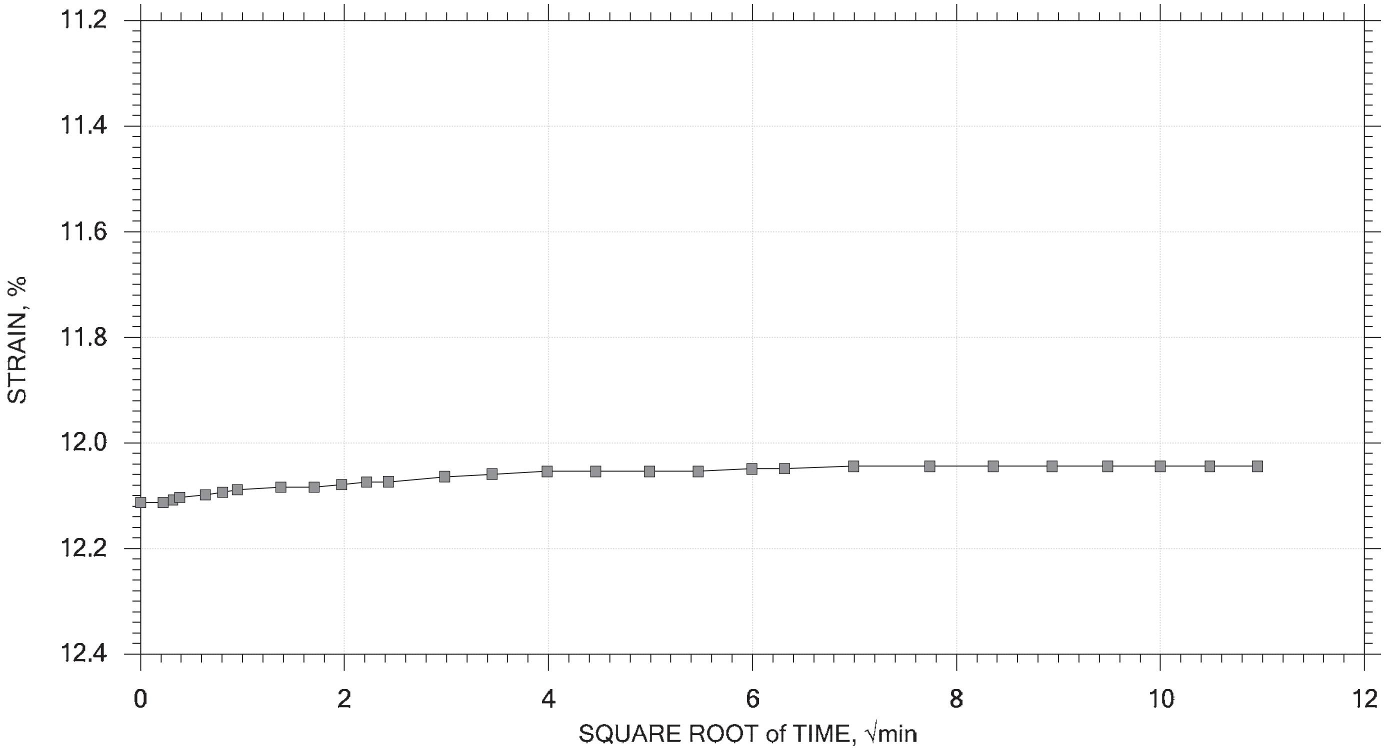
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 18 of 20

Stress: 2 tsf





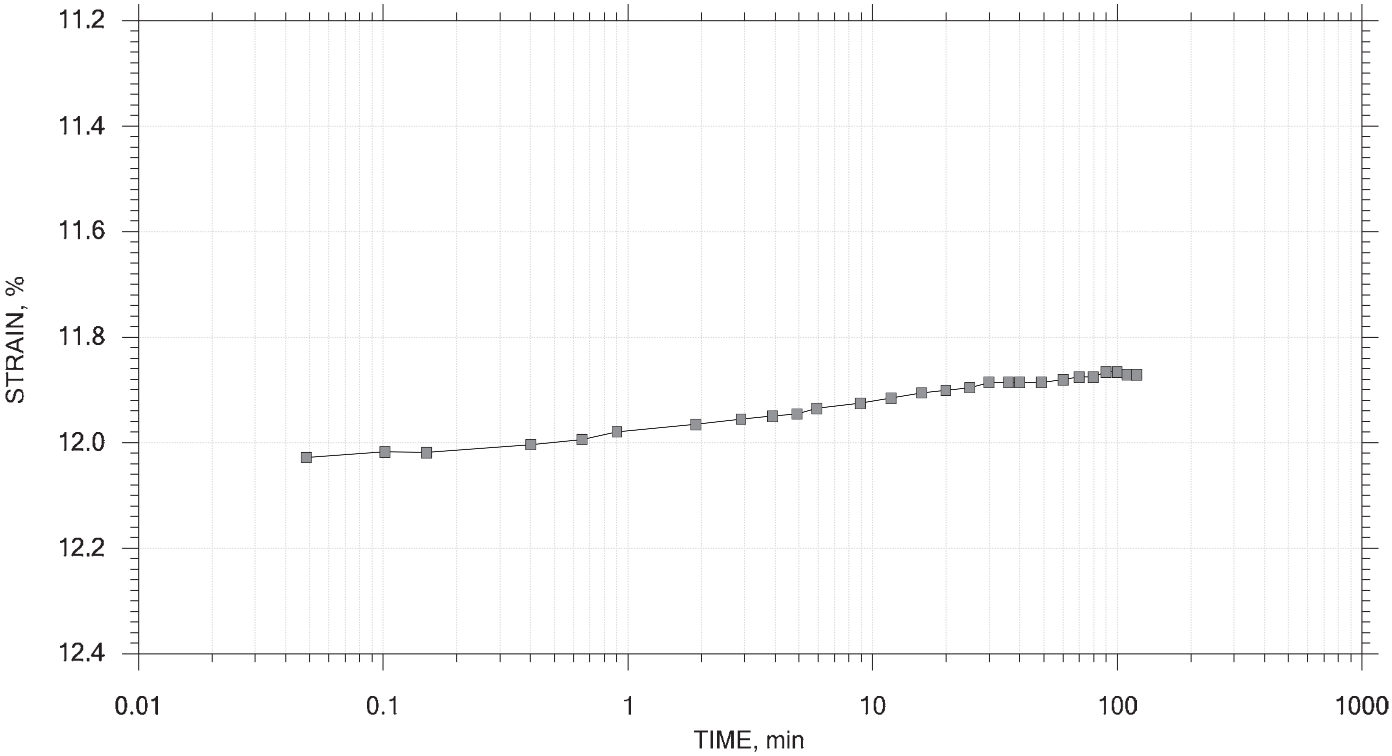
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

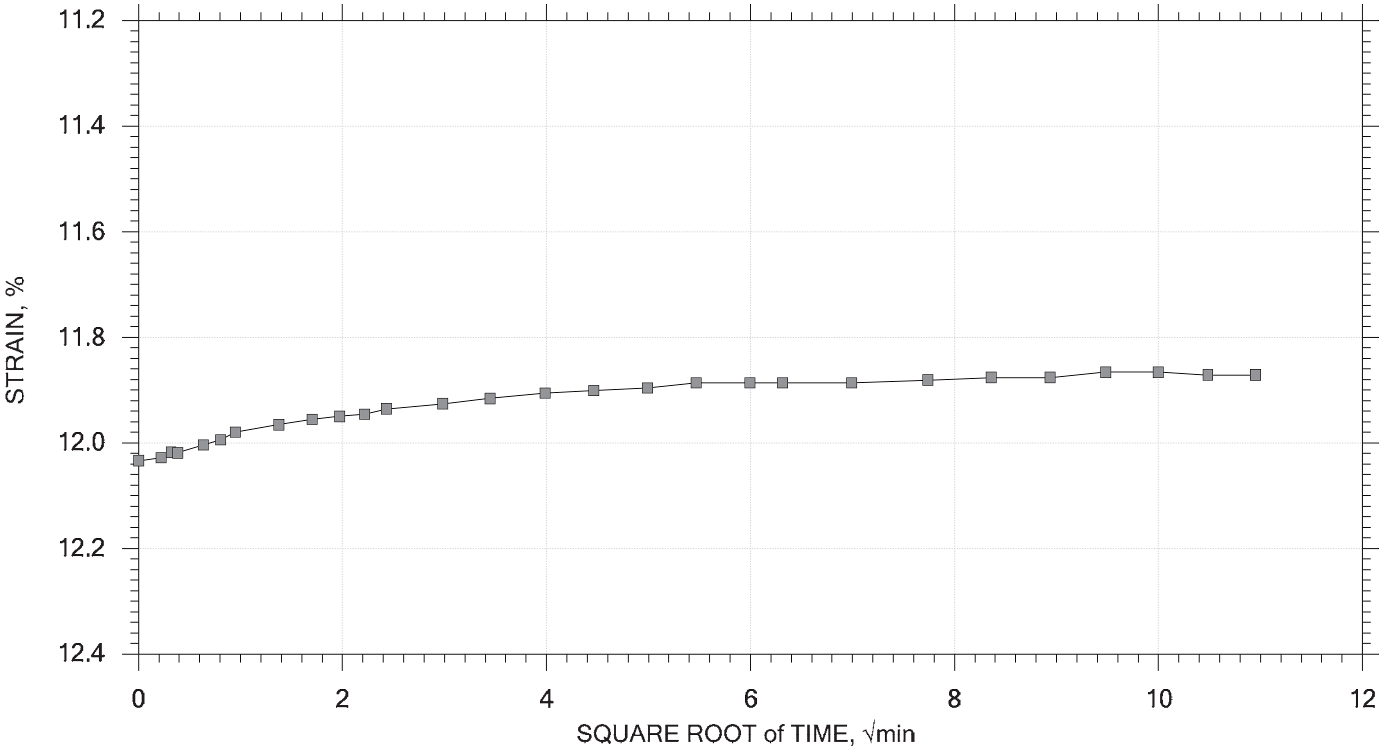
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 19 of 20

Stress: 0.5 tsf





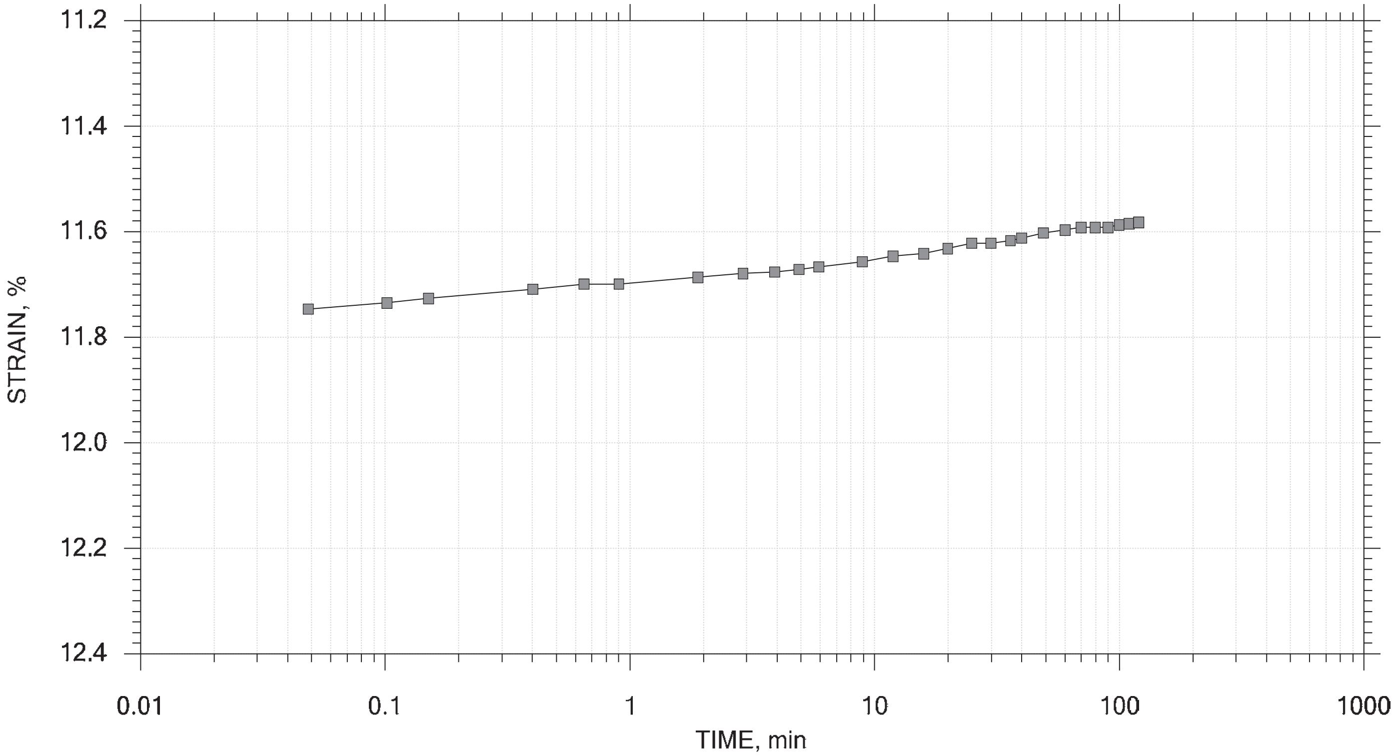
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

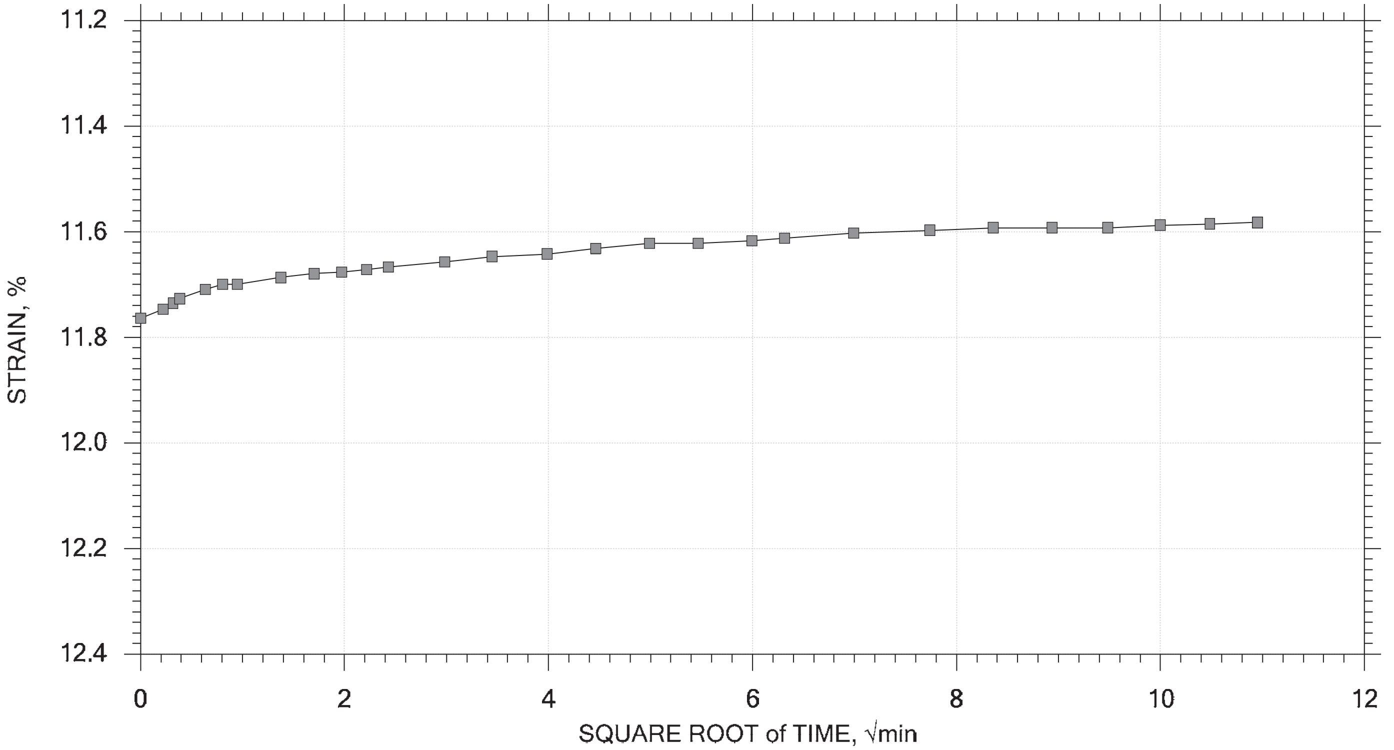
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 20 of 20

Stress: 0.125 tsf

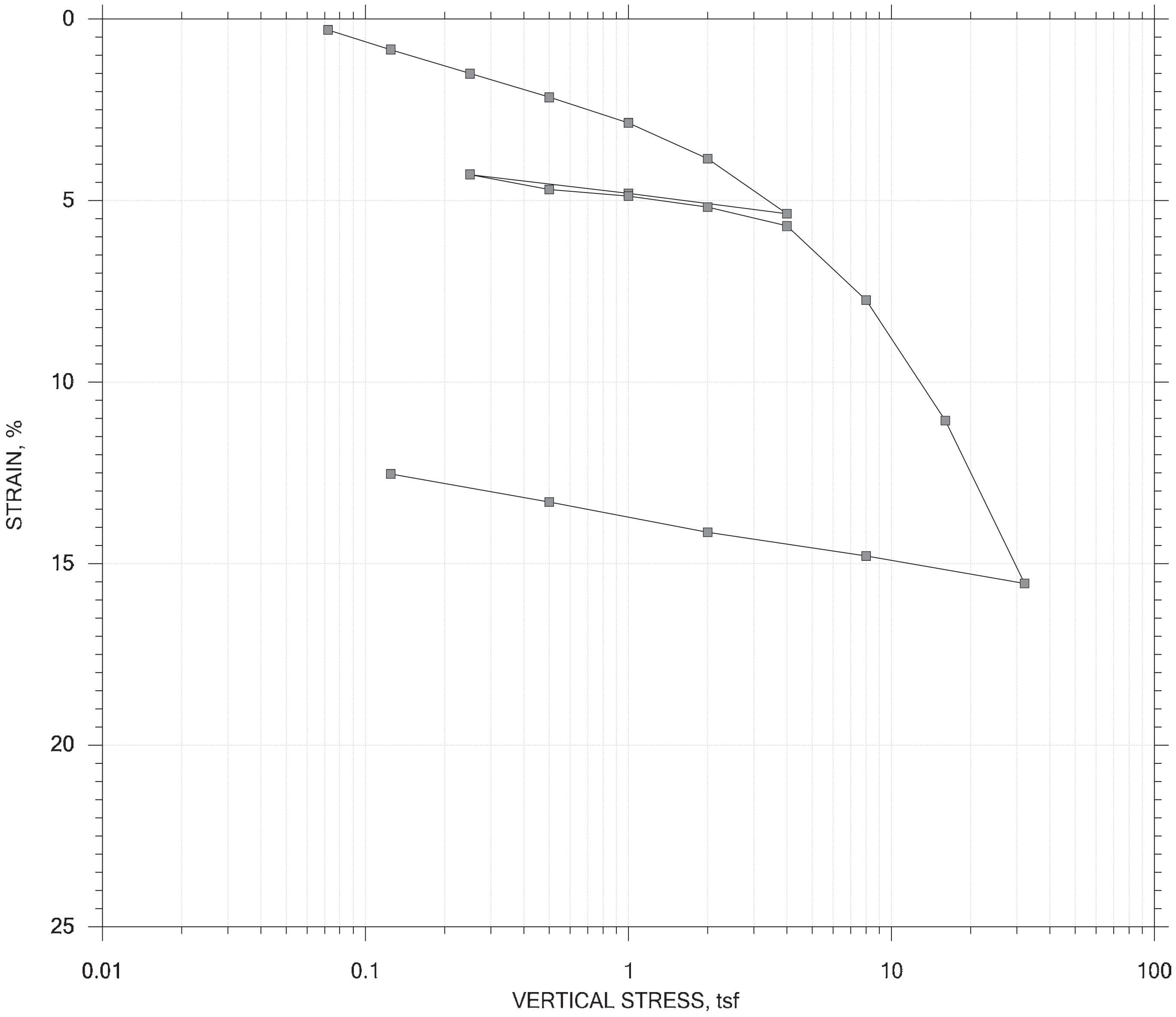




Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-3	Test Date: 4/9/16	Test No.: IP-2
Depth: 6-8 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell pressure = 0.672 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: ---				Water Content, %	58.61	48.75
Preconsolidation Stress: ---				Dry Unit Weight, pcf	59.818	66.948
Compression Ratio: ---				Saturation, %	97.90	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.35	1.10
LL: ---	PL: ---	PI: ---	GS: 2.25			

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph.2
Boring No.: B-102
Sample No.: S-16
Test No.: IP-3

Location: Monroe County, GA
Tested By: jm
Test Date: 4/9/16
Sample Type: intact

Project No.: GTX-304548
Checked By: mcm
Depth: 63-65 ft
Elevation: ---

Soil Description: Moist, dark gray silty sand (ASH)
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.

Estimated Specific Gravity: 2.25
Initial Void Ratio: 1.35
Final Void Ratio: 1.10

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.89 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	a46	RING	1057	a47
Wt. Container + Wet Soil, gm	121.77	230.28	222.68	133.12
Wt. Container + Dry Soil, gm	78.140	185.11	185.11	95.590
Wt. Container, gm	16.700	108.03	108.03	18.600
Wt. Dry Soil, gm	61.440	77.077	77.077	76.990
Water Content, %	71.01	58.61	48.75	48.75
Void Ratio	---	1.35	1.10	---
Degree of Saturation, %	---	97.90	100.00	---
Dry Unit Weight, pcf	---	59.818	66.948	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No.: GTX-304548
Boring No.: B-102
Tested By: jm
Checked By: mcm
Sample No.: S-16
Test Date: 4/9/16
Depth: 63-65 ft
Test No.: IP-3
Sample Type: intact
Elevation: ---

Soil Description: Moist, dark gray silty sand (ASH)
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k cm/sec
1	0.0721	0.003001	1.34	0.300	61.867	3.95e-007	4.16e-002	1.57e-008
2	0.125	0.008472	1.33	0.847	0.453	5.36e-005	1.03e-001	5.27e-006
3	0.250	0.01506	1.31	1.51	0.752	3.19e-005	5.27e-002	1.60e-006
4	0.500	0.02156	1.29	2.16	8.835	2.68e-006	2.60e-002	6.62e-008
5	1.00	0.02863	1.28	2.86	7.292	3.20e-006	1.41e-002	4.30e-008
6	2.00	0.03848	1.25	3.85	7.727	2.97e-006	9.84e-003	2.78e-008
7	4.00	0.05366	1.22	5.37	11.523	1.94e-006	7.59e-003	1.40e-008
8	1.00	0.04806	1.23	4.81	0.000	0.00e+000	1.87e-003	0.00e+000
9	0.250	0.04282	1.24	4.28	93.467	2.39e-007	6.98e-003	1.59e-009
10	0.500	0.04700	1.23	4.70	0.000	0.00e+000	1.67e-002	0.00e+000
11	1.00	0.04879	1.23	4.88	0.000	0.00e+000	3.57e-003	0.00e+000
12	2.00	0.05183	1.22	5.18	0.000	0.00e+000	3.04e-003	0.00e+000
13	4.00	0.05701	1.21	5.70	23.905	9.18e-007	2.59e-003	2.26e-009
14	8.00	0.07743	1.16	7.74	14.718	1.45e-006	5.10e-003	7.04e-009
15	16.0	0.1106	1.09	11.1	14.730	1.37e-006	4.15e-003	5.40e-009
16	32.0	0.1555	0.981	15.5	13.117	1.41e-006	2.80e-003	3.75e-009
17	8.00	0.1480	0.998	14.8	0.000	0.00e+000	3.14e-004	0.00e+000
18	2.00	0.1414	1.01	14.1	79.900	2.25e-007	1.10e-003	2.35e-010
19	0.500	0.1330	1.03	13.3	7.459	2.45e-006	5.54e-003	1.29e-008
20	0.125	0.1253	1.05	12.5	0.401	4.63e-005	2.07e-002	9.14e-007

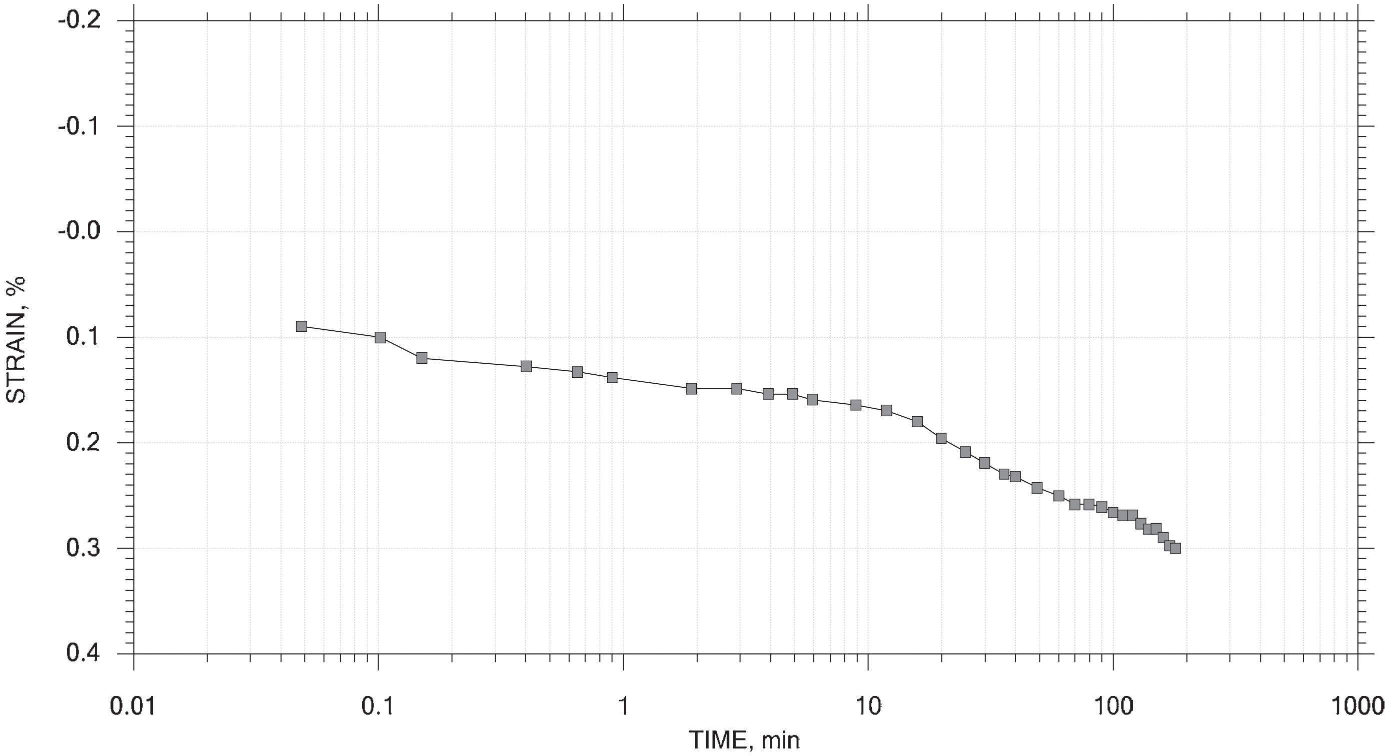
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k cm/sec	Ca %
1	0.0721	0.003001	1.34	0.300	0.000	0.00e+000	4.16e-002	0.00e+000	0.00e+000
2	0.125	0.008472	1.33	0.847	0.052	1.09e-004	1.03e-001	1.07e-005	0.00e+000
3	0.250	0.01506	1.31	1.51	0.000	0.00e+000	5.27e-002	0.00e+000	0.00e+000
4	0.500	0.02156	1.29	2.16	0.000	0.00e+000	2.60e-002	0.00e+000	0.00e+000
5	1.00	0.02863	1.28	2.86	0.000	0.00e+000	1.41e-002	0.00e+000	0.00e+000
6	2.00	0.03848	1.25	3.85	0.000	0.00e+000	9.84e-003	0.00e+000	0.00e+000
7	4.00	0.05366	1.22	5.37	0.000	0.00e+000	7.59e-003	0.00e+000	0.00e+000
8	1.00	0.04806	1.23	4.81	0.000	0.00e+000	1.87e-003	0.00e+000	0.00e+000
9	0.250	0.04282	1.24	4.28	0.000	0.00e+000	6.98e-003	0.00e+000	0.00e+000
10	0.500	0.04700	1.23	4.70	7.609	6.83e-007	1.67e-002	1.09e-008	0.00e+000
11	1.00	0.04879	1.23	4.88	0.000	0.00e+000	3.57e-003	0.00e+000	0.00e+000
12	2.00	0.05183	1.22	5.18	0.000	0.00e+000	3.04e-003	0.00e+000	0.00e+000
13	4.00	0.05701	1.21	5.70	0.000	0.00e+000	2.59e-003	0.00e+000	0.00e+000
14	8.00	0.07743	1.16	7.74	0.000	0.00e+000	5.10e-003	0.00e+000	0.00e+000
15	16.0	0.1106	1.09	11.1	0.000	0.00e+000	4.15e-003	0.00e+000	0.00e+000
16	32.0	0.1555	0.981	15.5	0.000	0.00e+000	2.80e-003	0.00e+000	0.00e+000
17	8.00	0.1480	0.998	14.8	0.000	0.00e+000	3.14e-004	0.00e+000	0.00e+000
18	2.00	0.1414	1.01	14.1	0.000	0.00e+000	1.10e-003	0.00e+000	0.00e+000
19	0.500	0.1330	1.03	13.3	0.000	0.00e+000	5.54e-003	0.00e+000	0.00e+000
20	0.125	0.1253	1.05	12.5	0.000	0.00e+000	2.07e-002	0.00e+000	0.00e+000

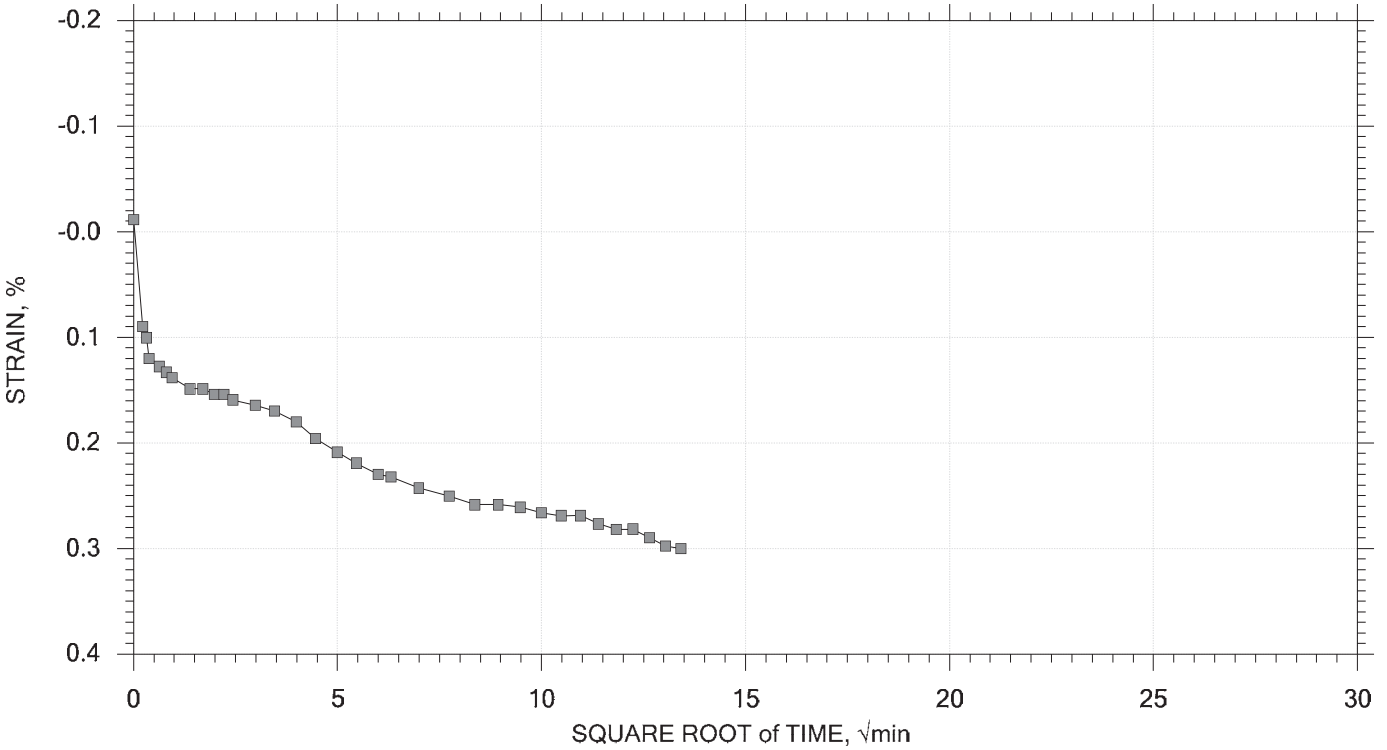
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 20

Stress: 0.072093 tsf





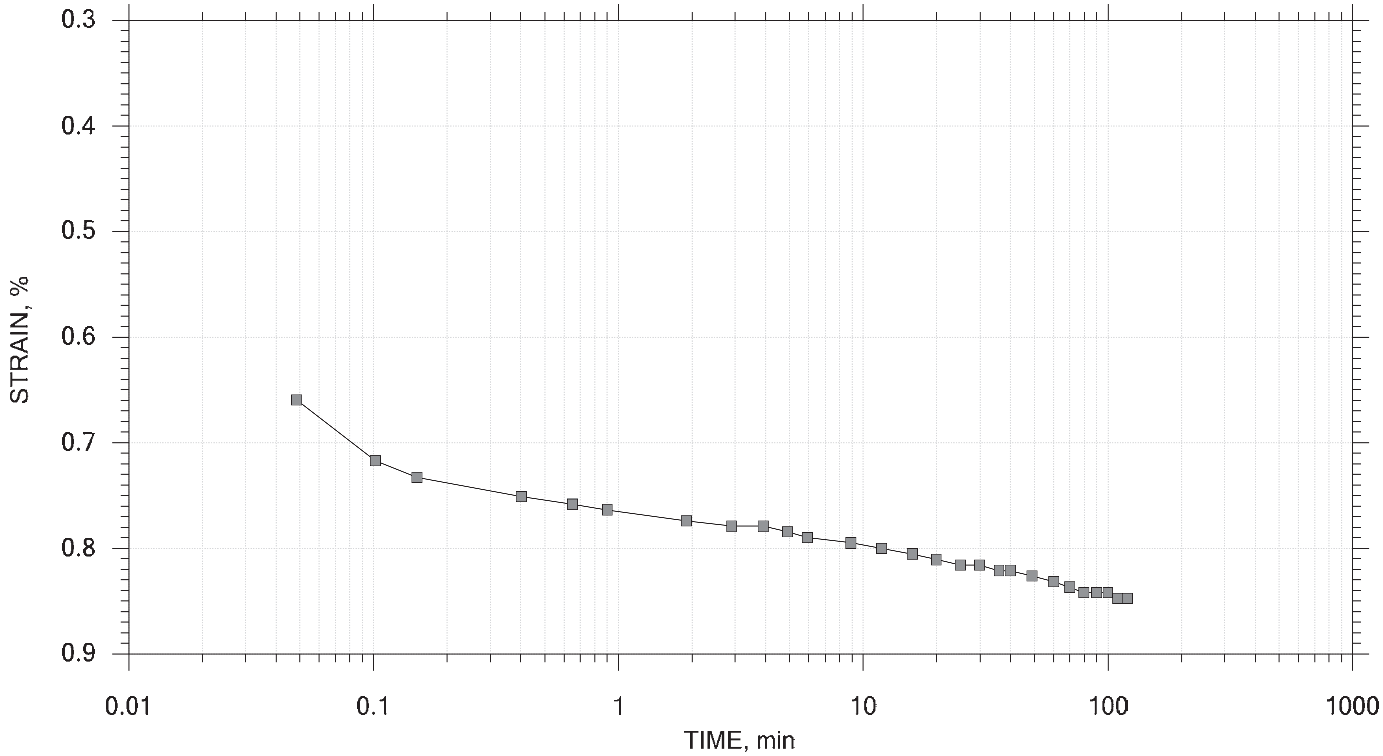
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

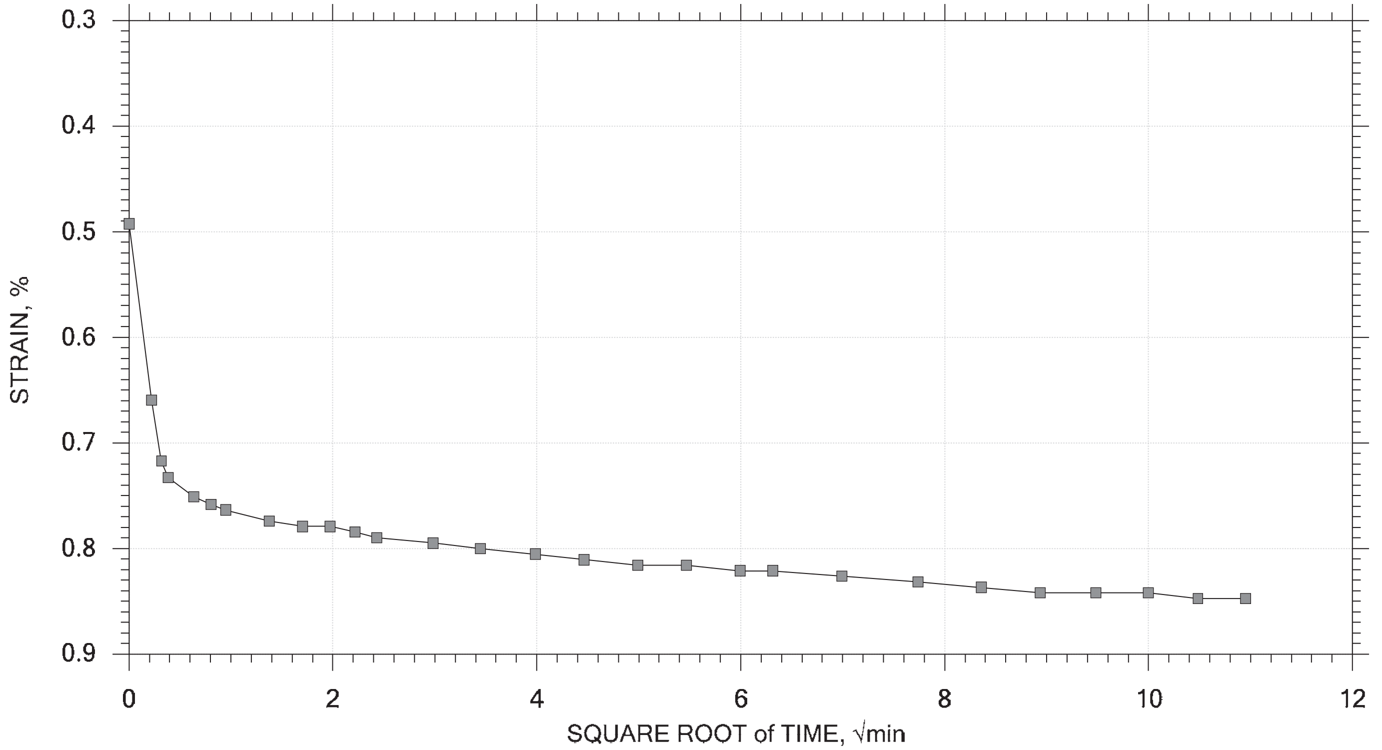
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 20

Stress: 0.125 tsf





GeoTesting EXPRESS

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---

Description: Moist, dark gray silty sand (ASH)

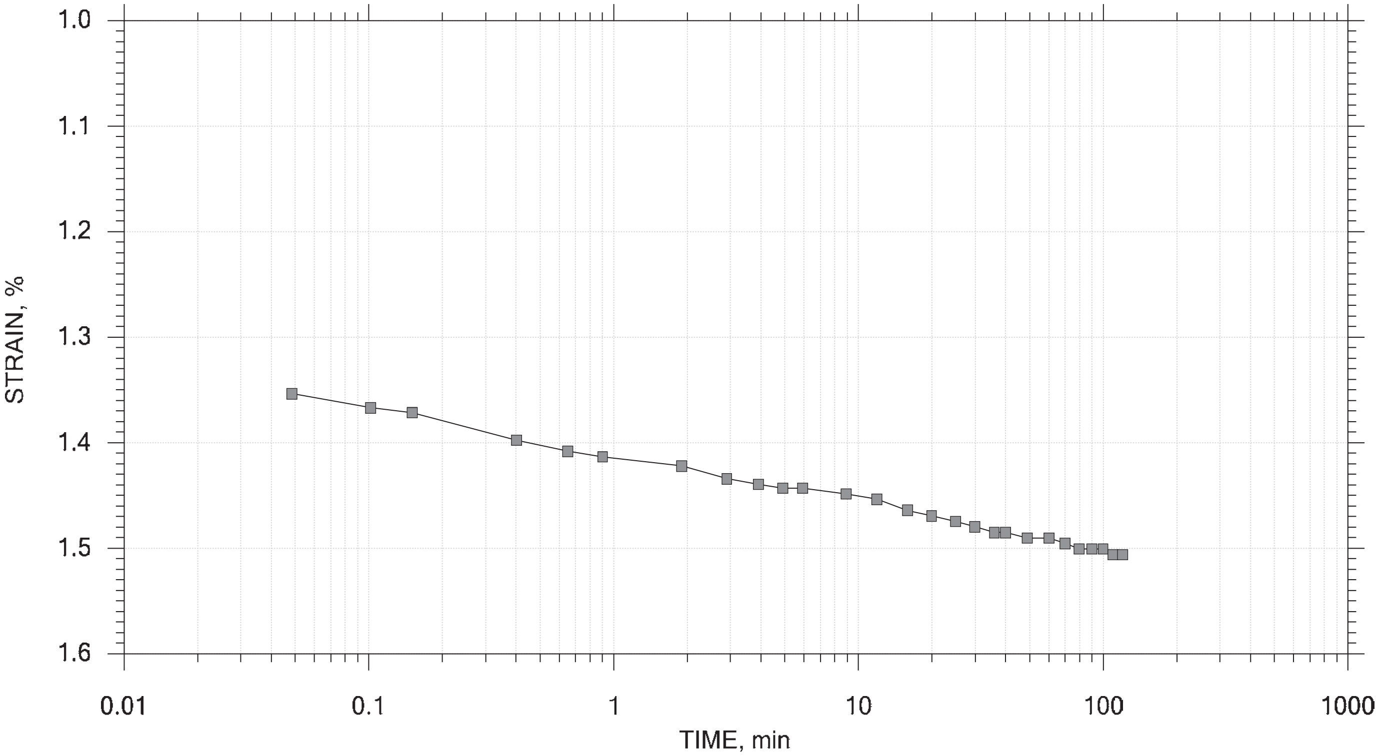
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.

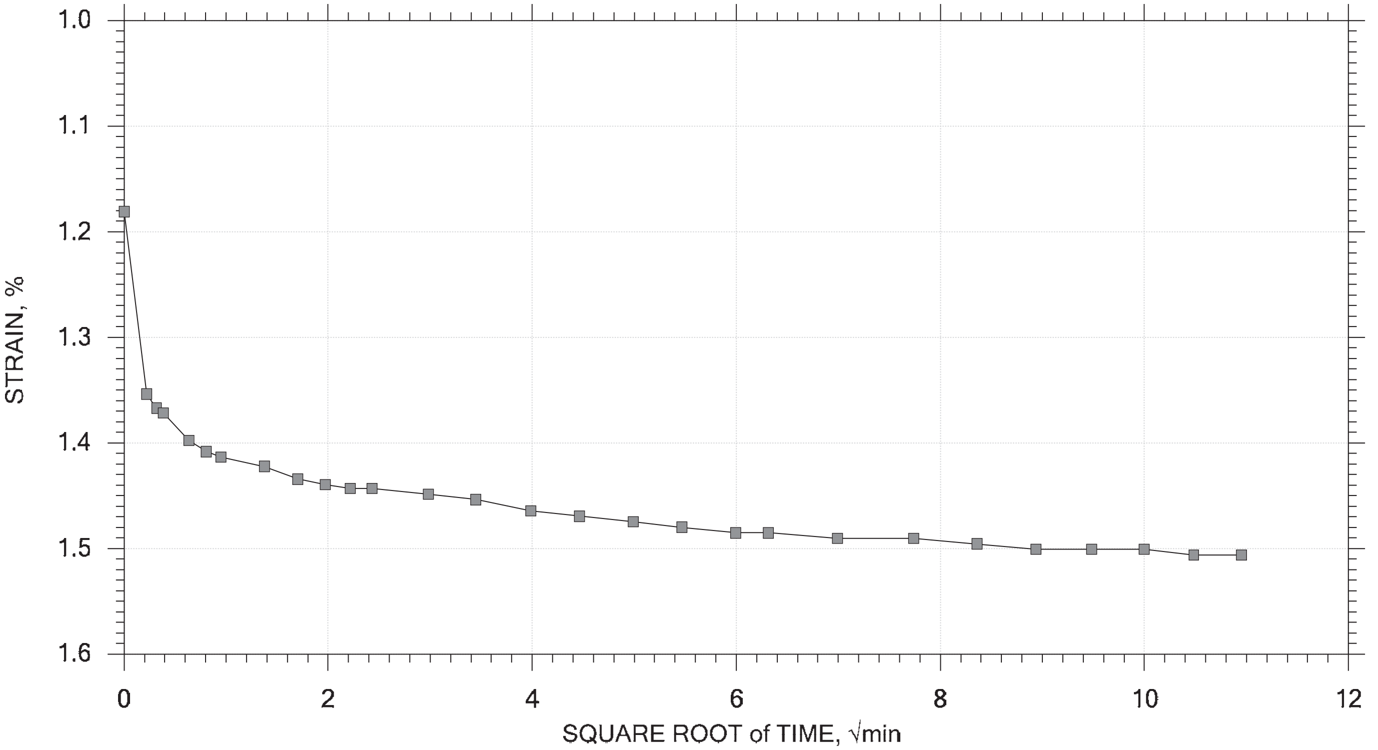
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 20

Stress: 0.25 tsf





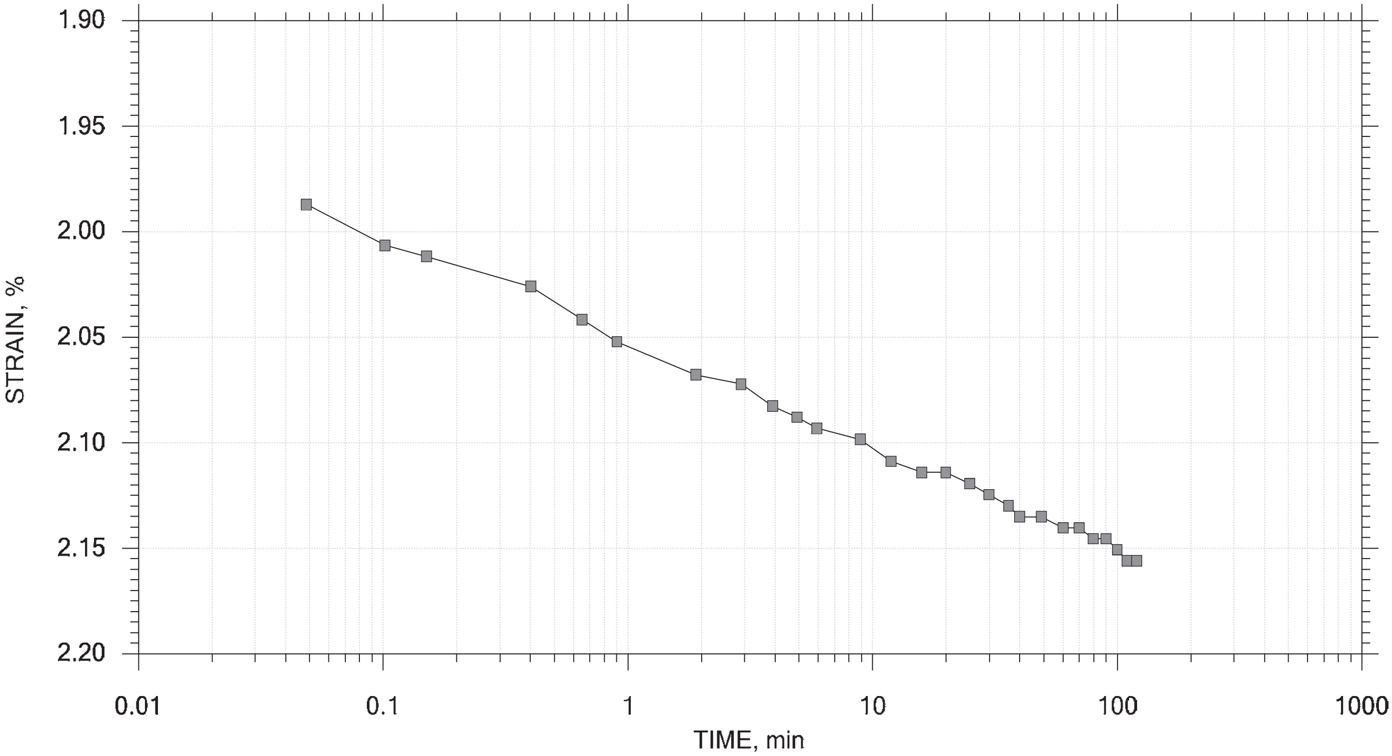
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-102	Tested By: jm	Checked By: mcm
	Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
	Depth: 63-65 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silty sand (ASH)		
	Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

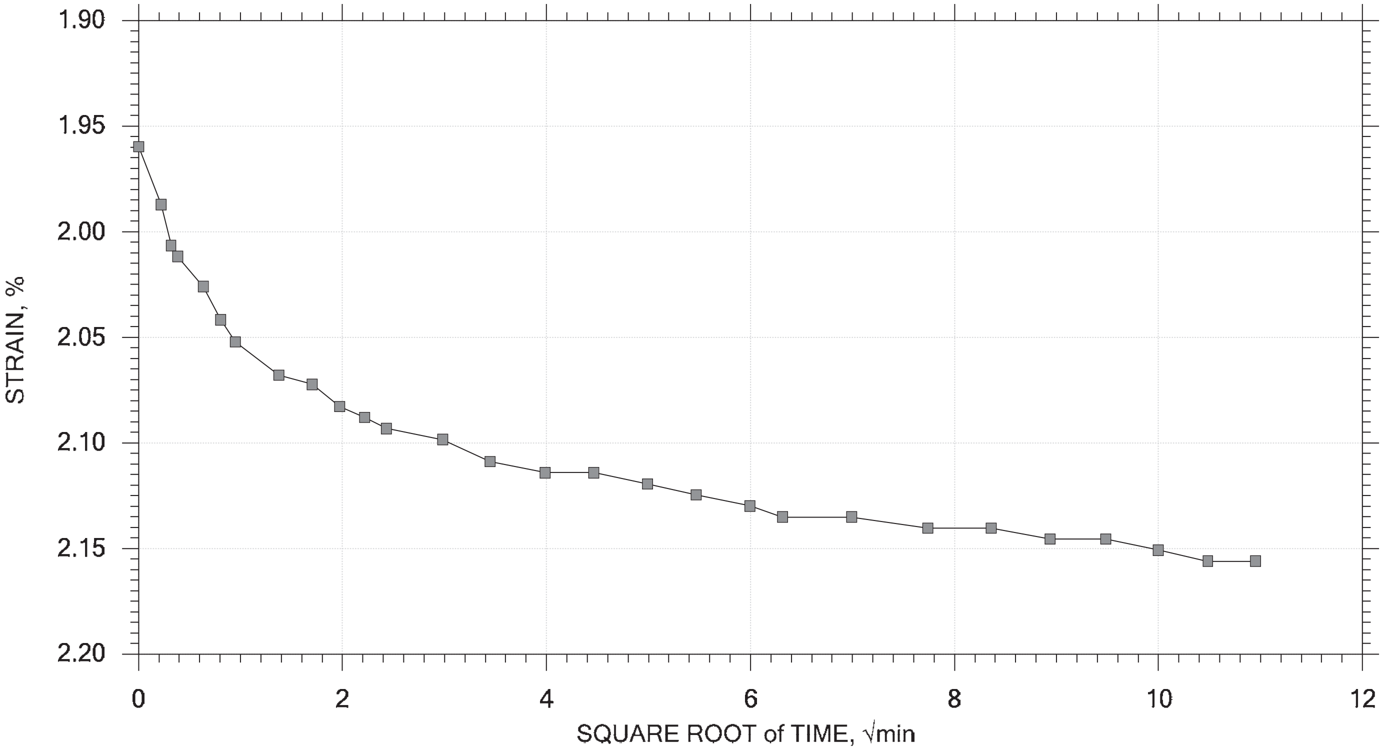
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 20

Stress: 0.5 tsf





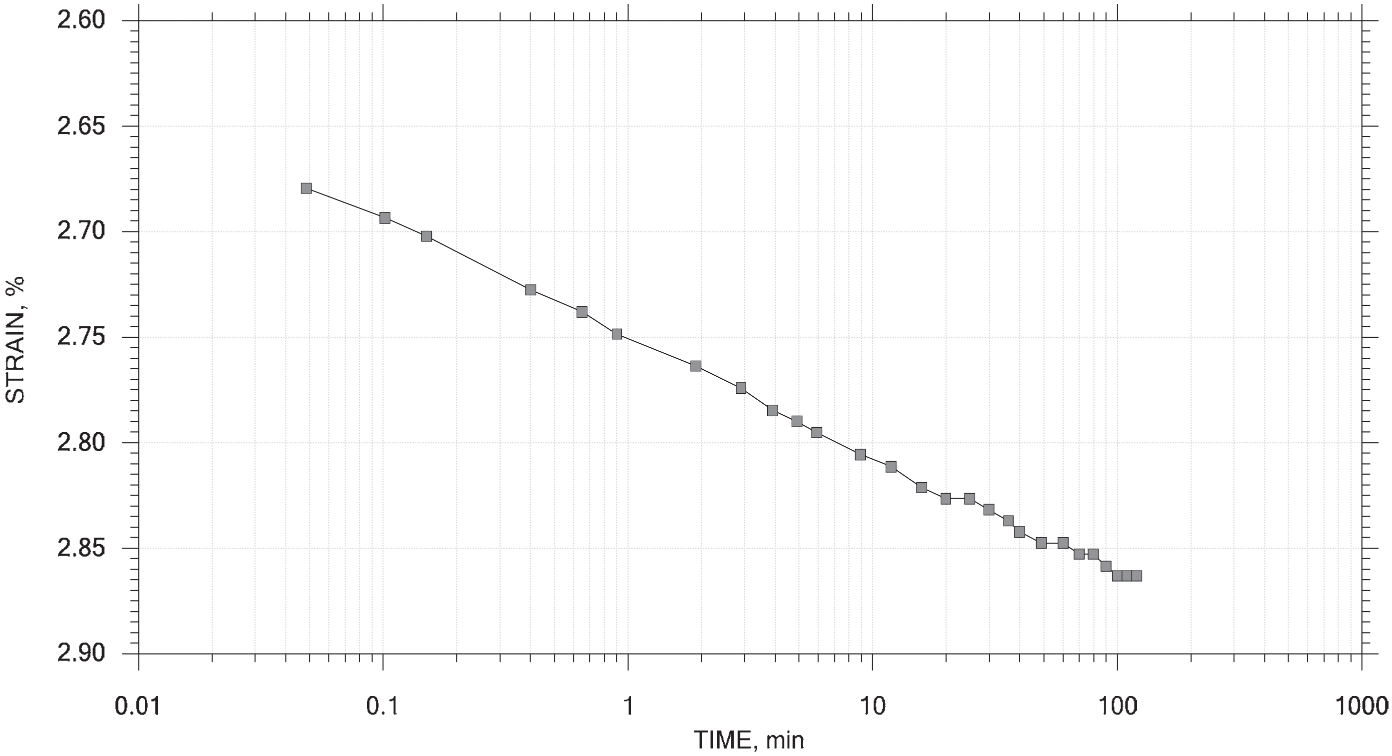
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

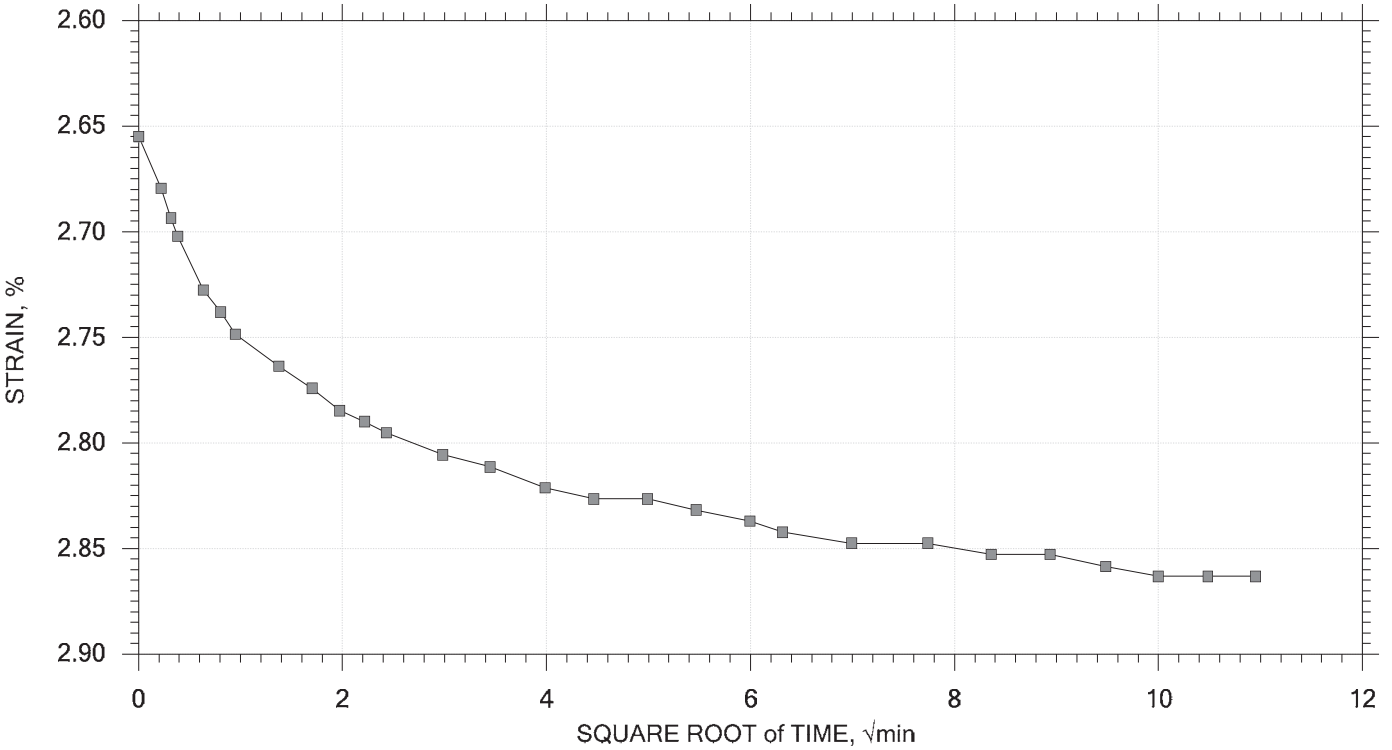
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 20

Stress: 1 tsf





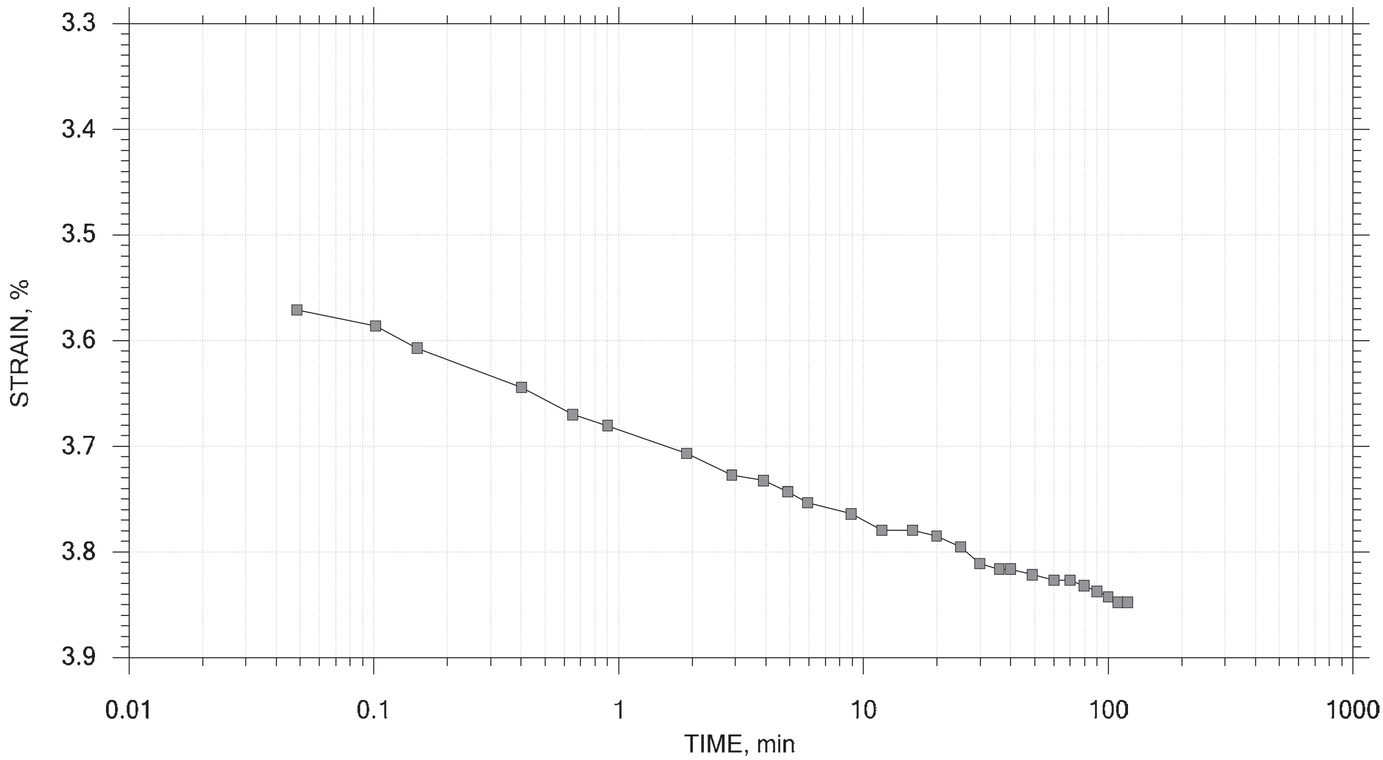
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

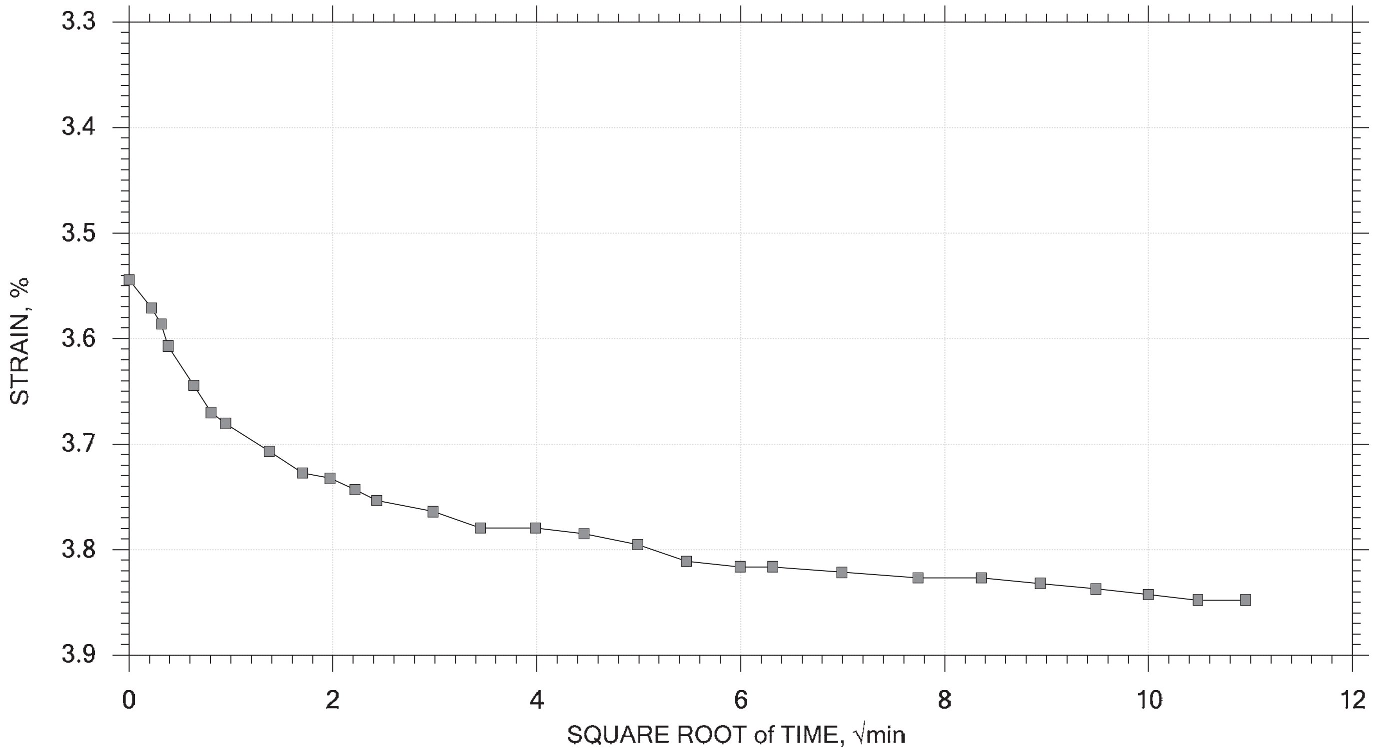
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 20

Stress: 2 tsf





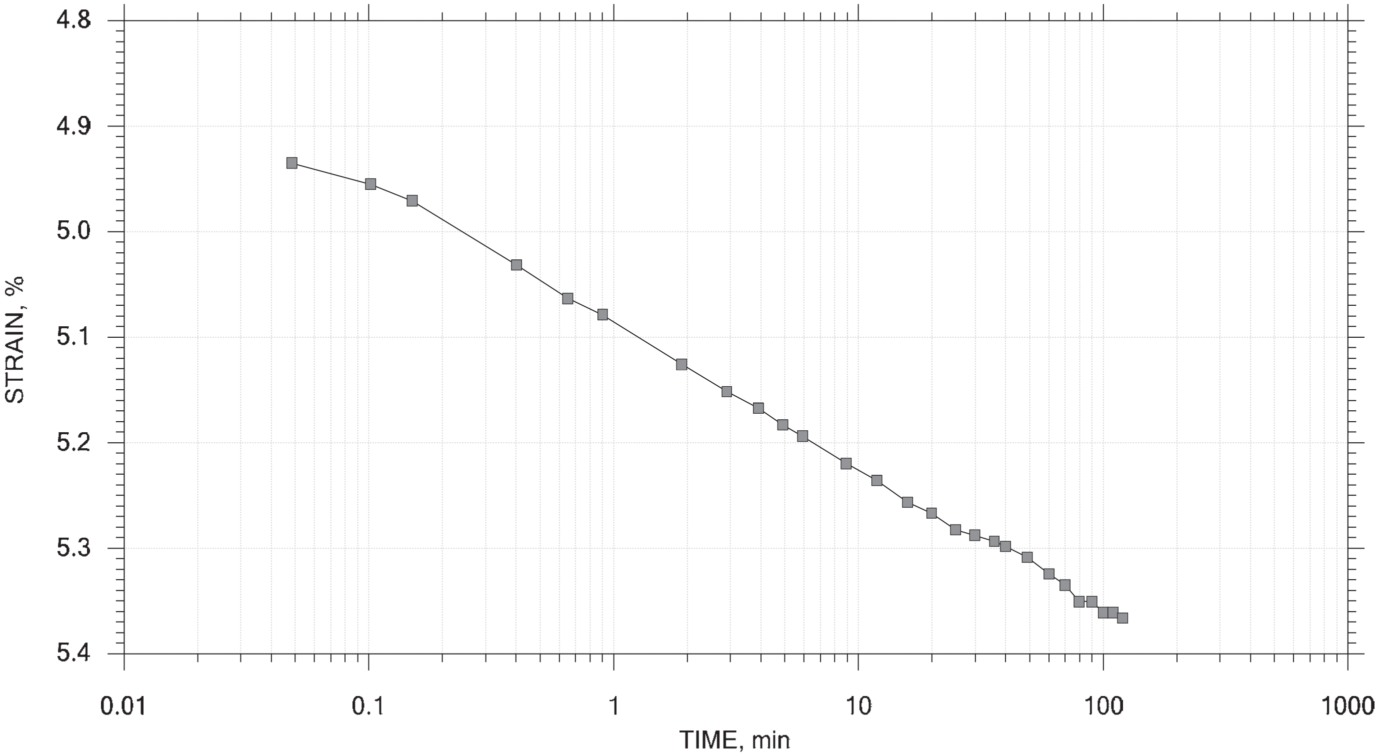
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

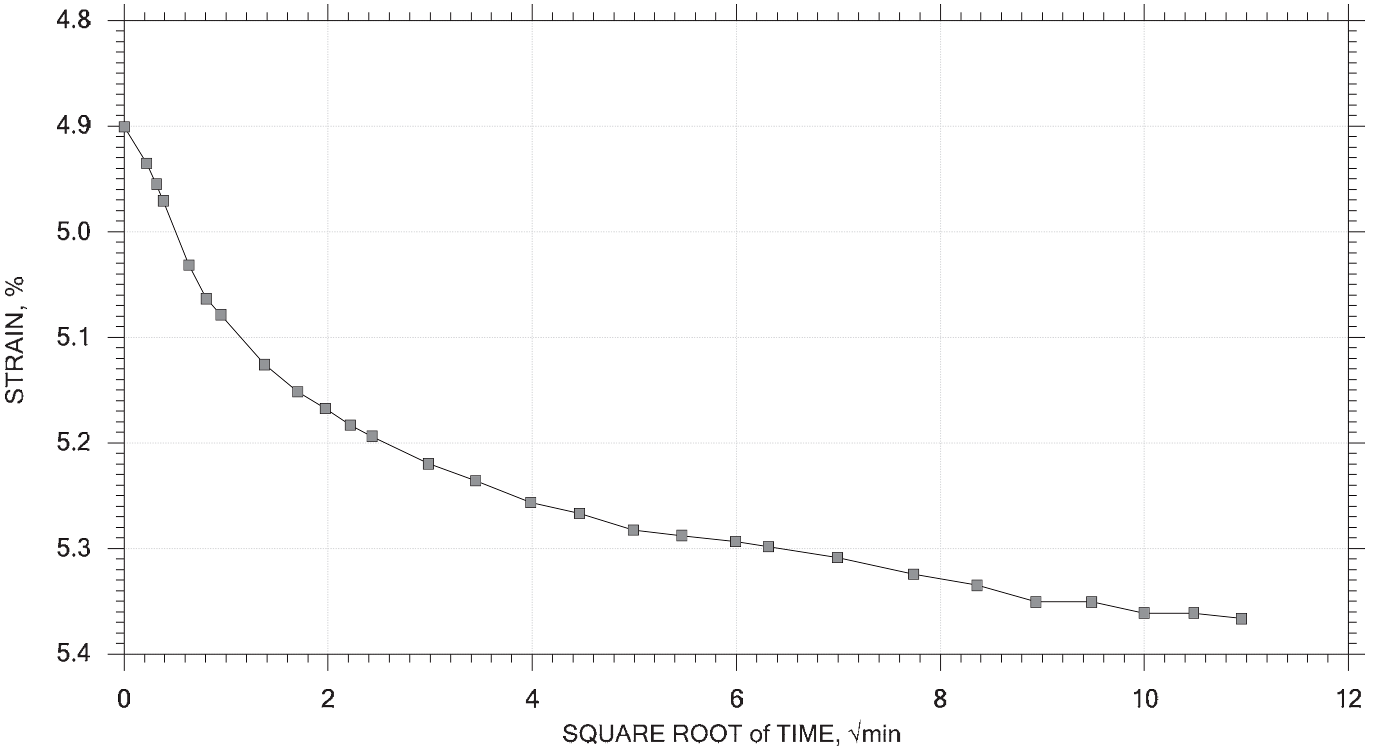
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 20

Stress: 4 tsf





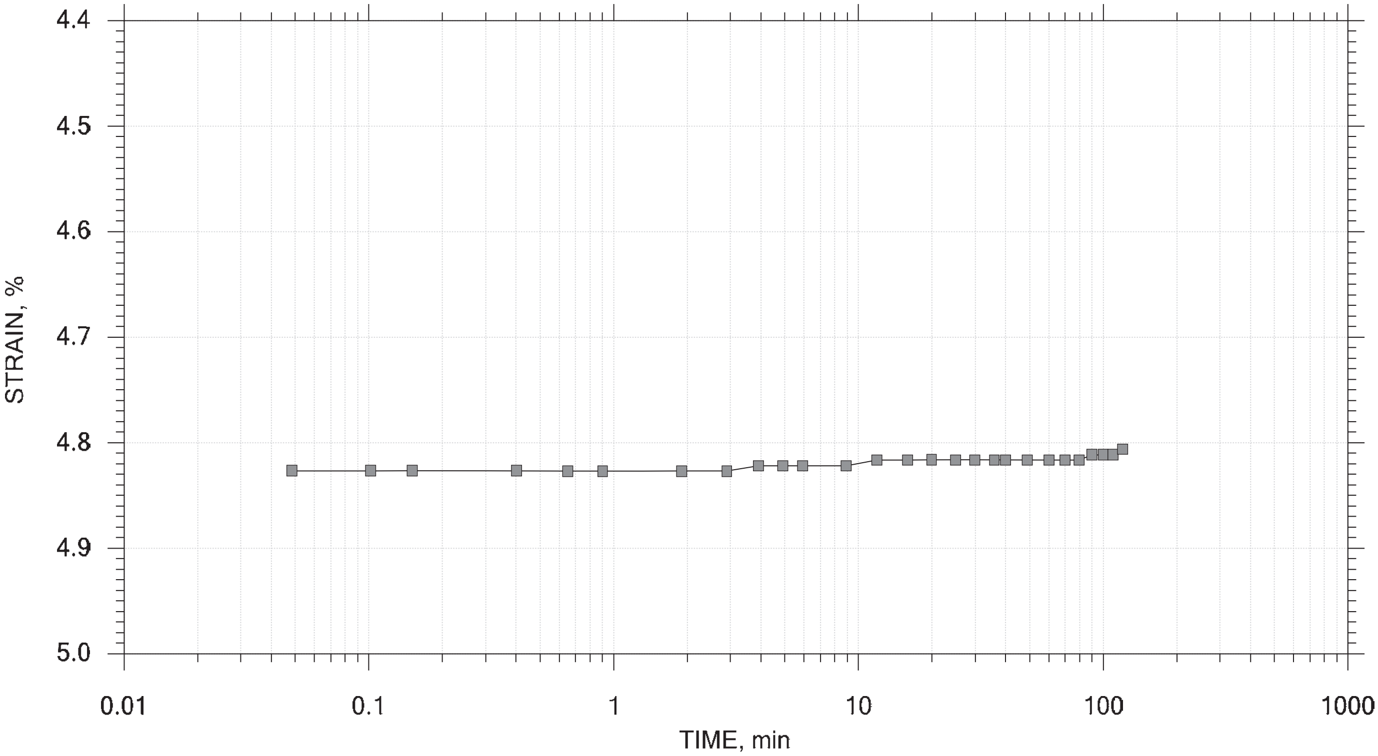
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

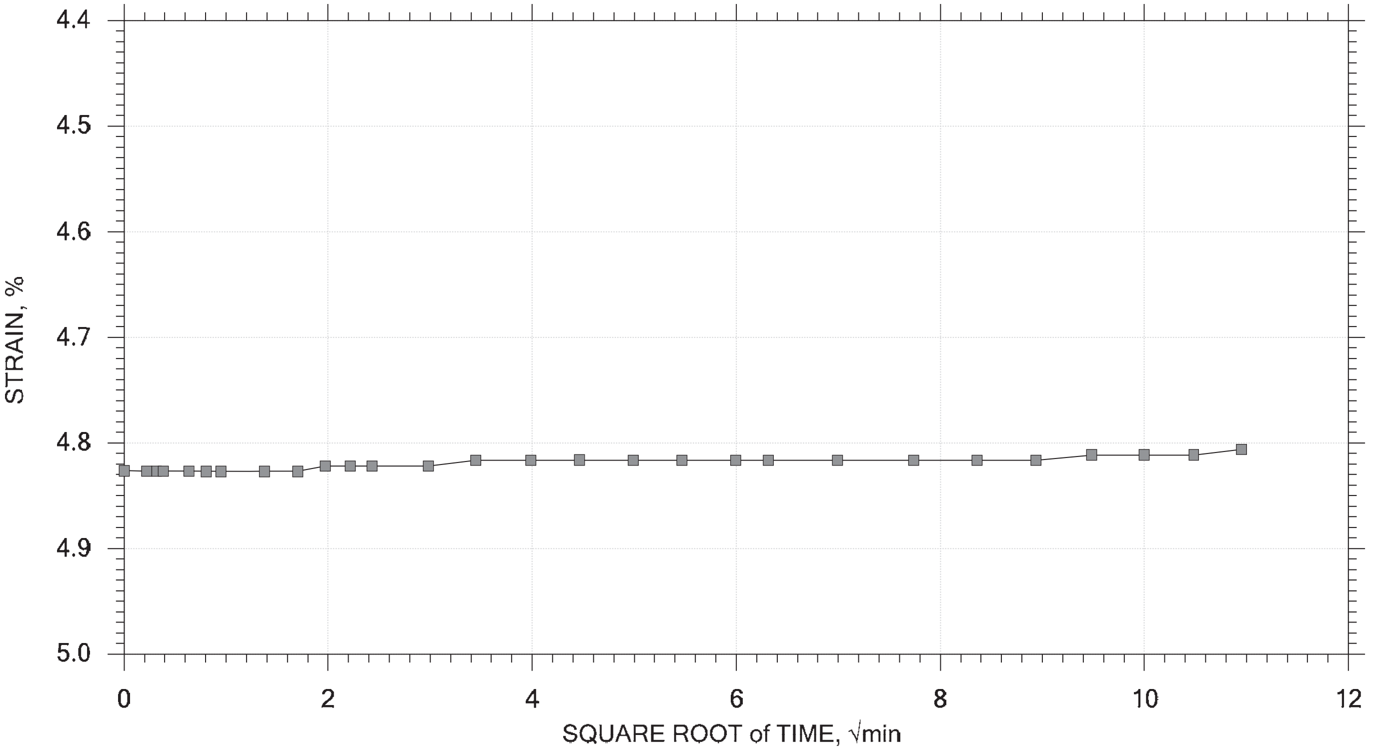
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 20

Stress: 1 tsf





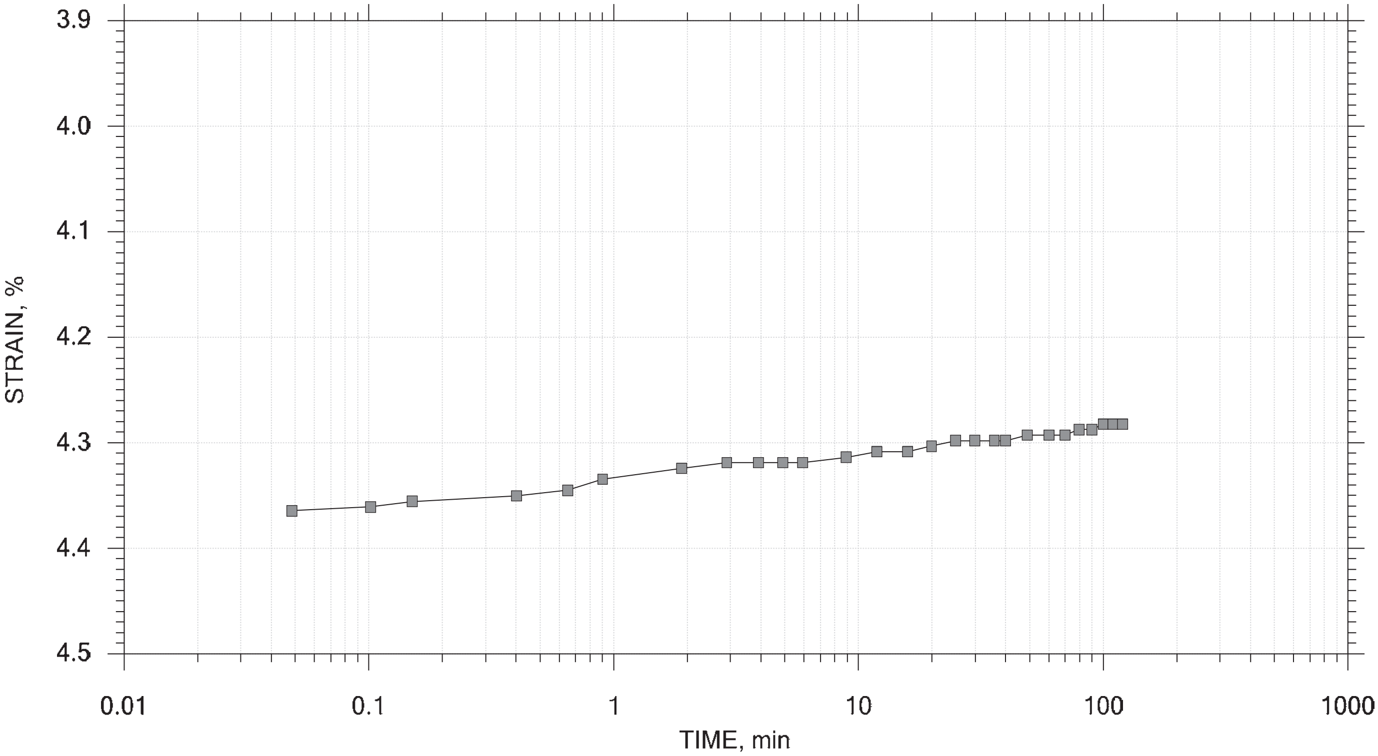
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

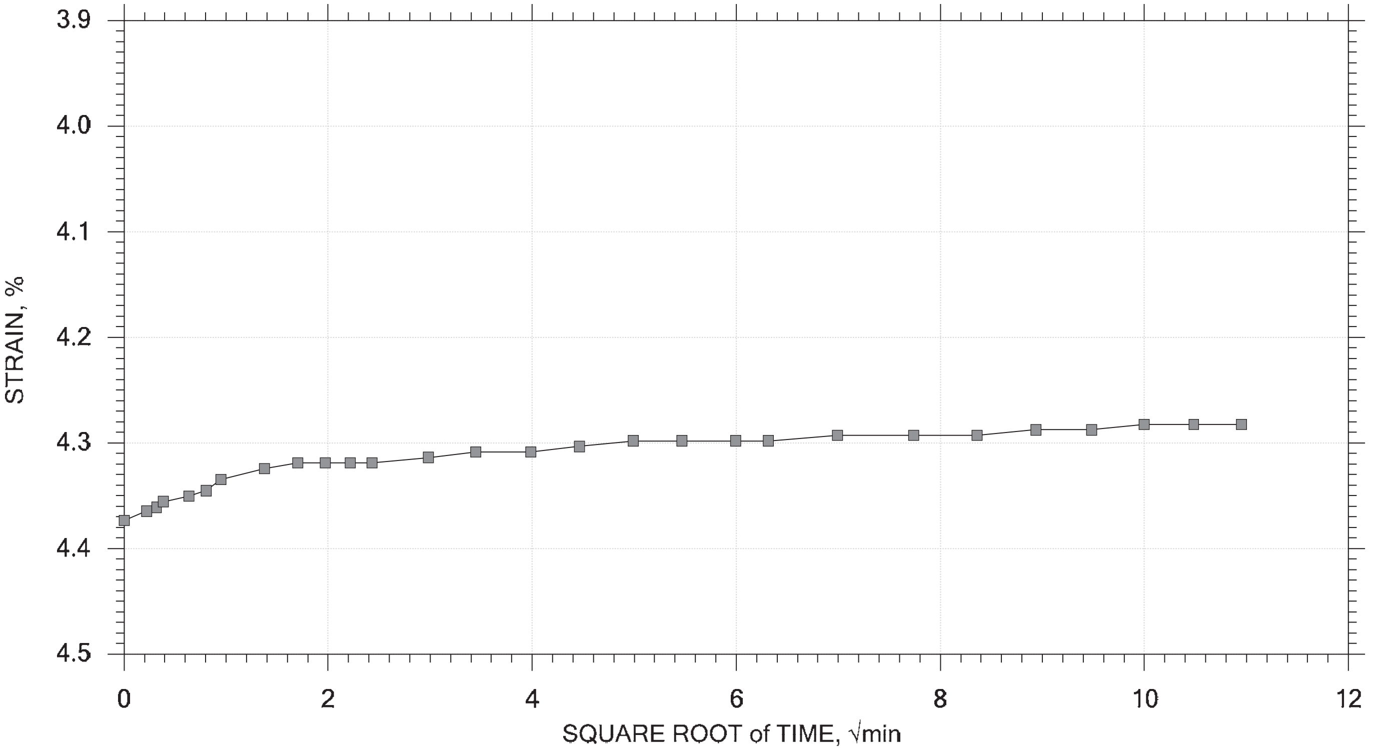
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 20

Stress: 0.25 tsf





Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---

Description: Moist, dark gray silty sand (ASH)

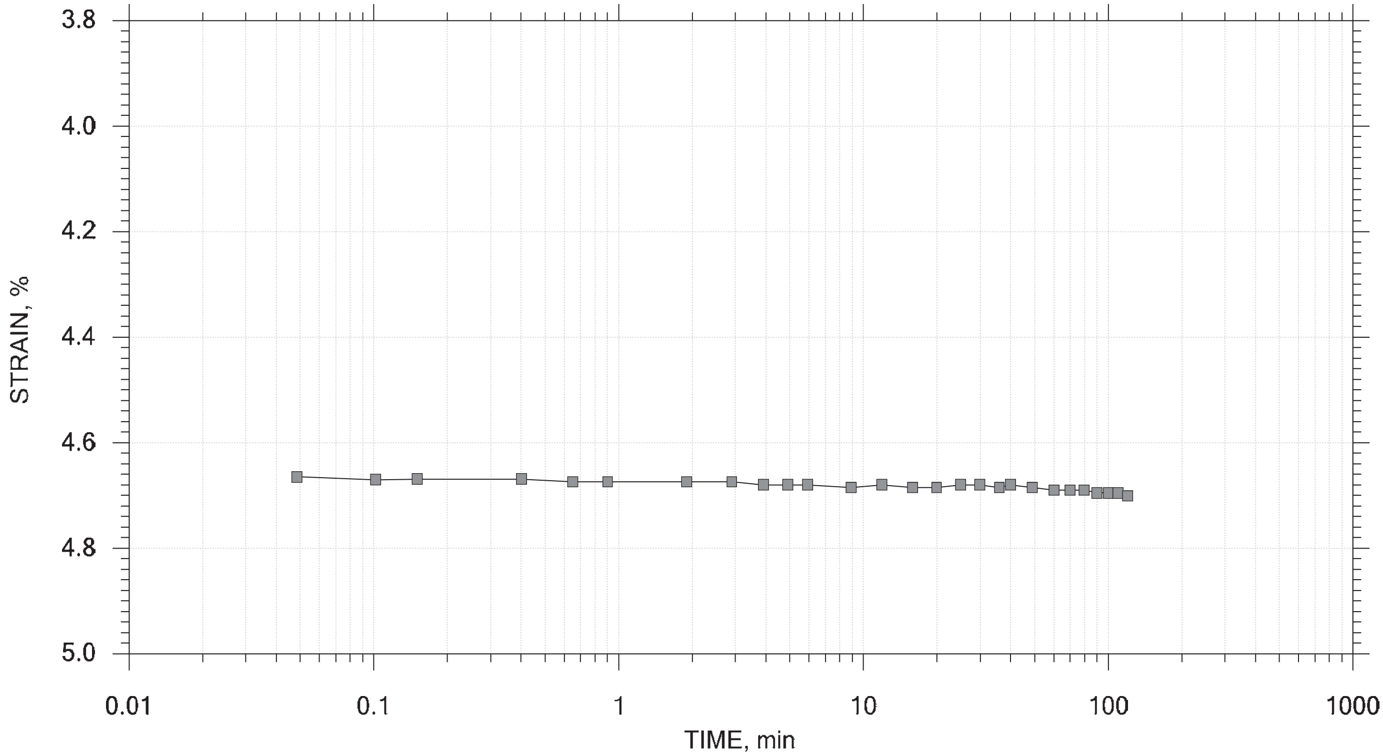
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.

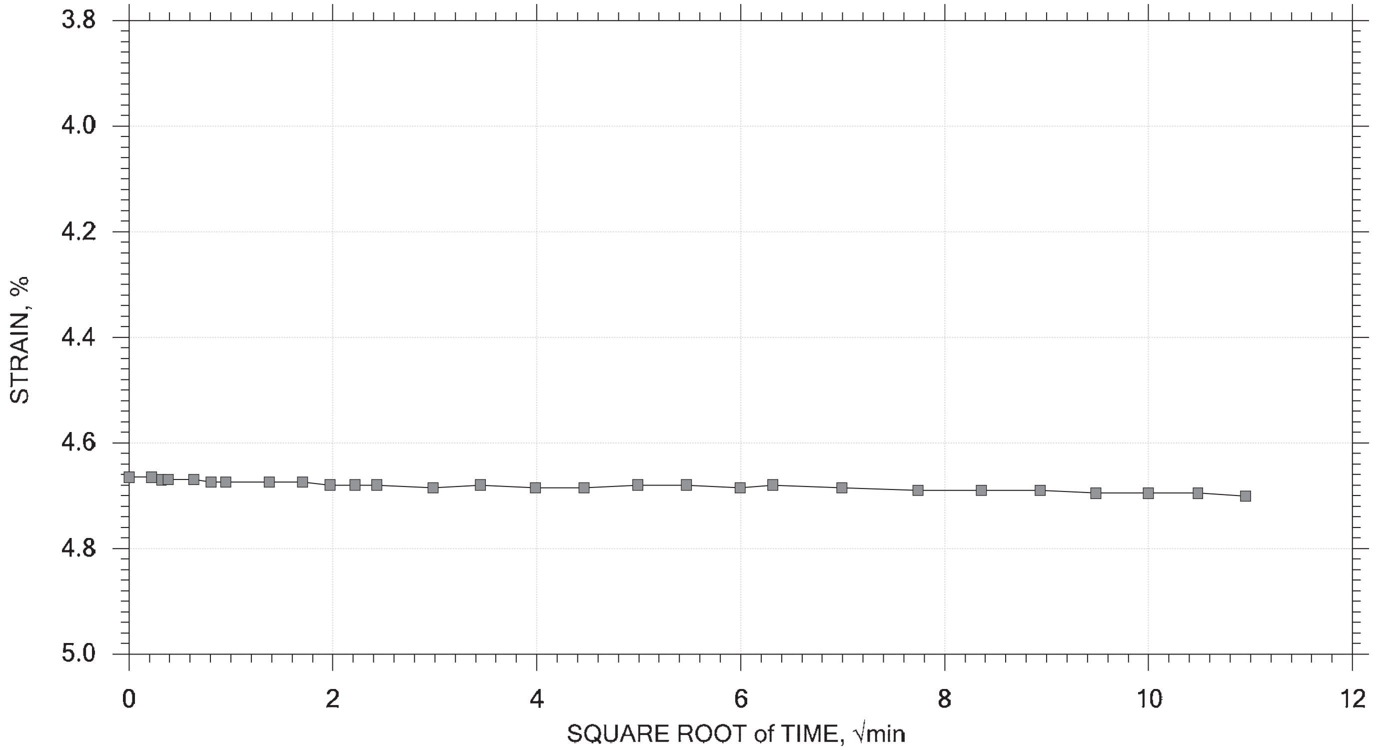
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 20

Stress: 0.5 tsf





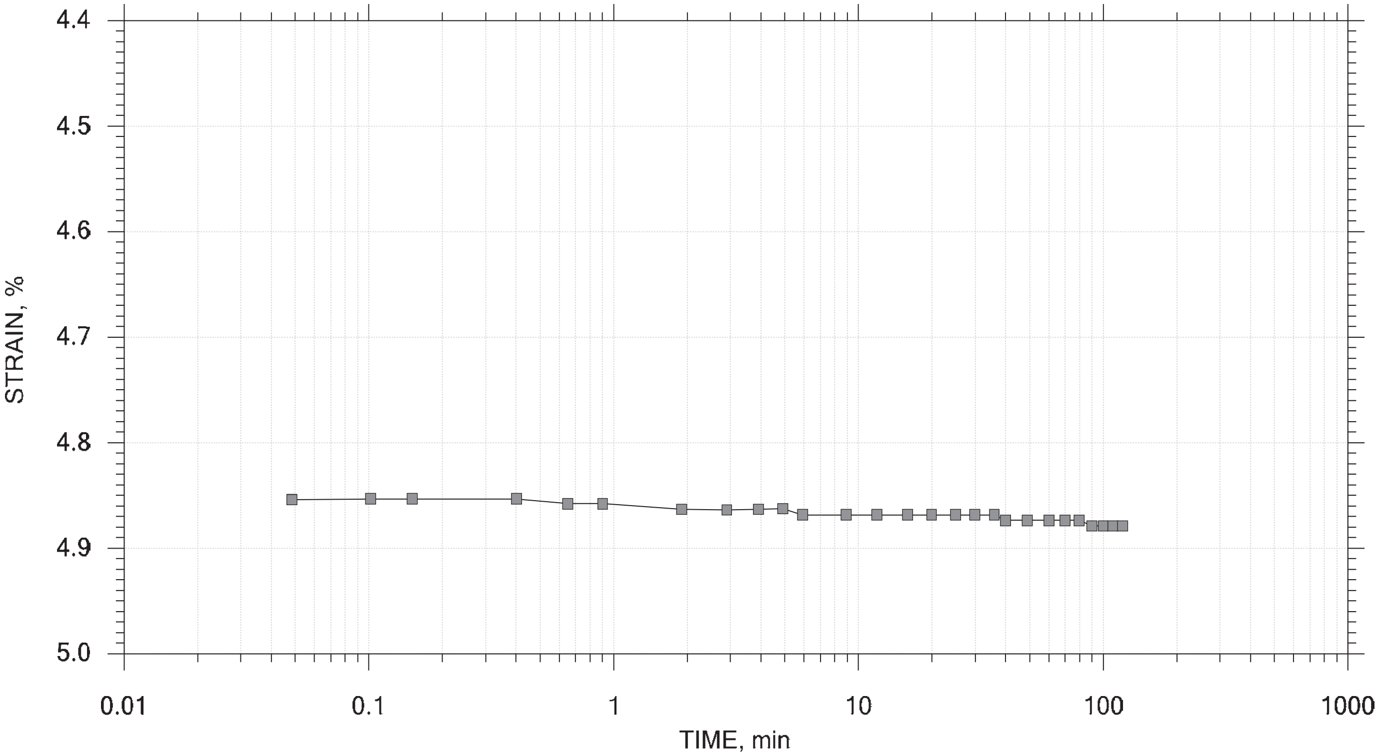
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-102	Tested By: jm	Checked By: mcm
	Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
	Depth: 63-65 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silty sand (ASH)		
	Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

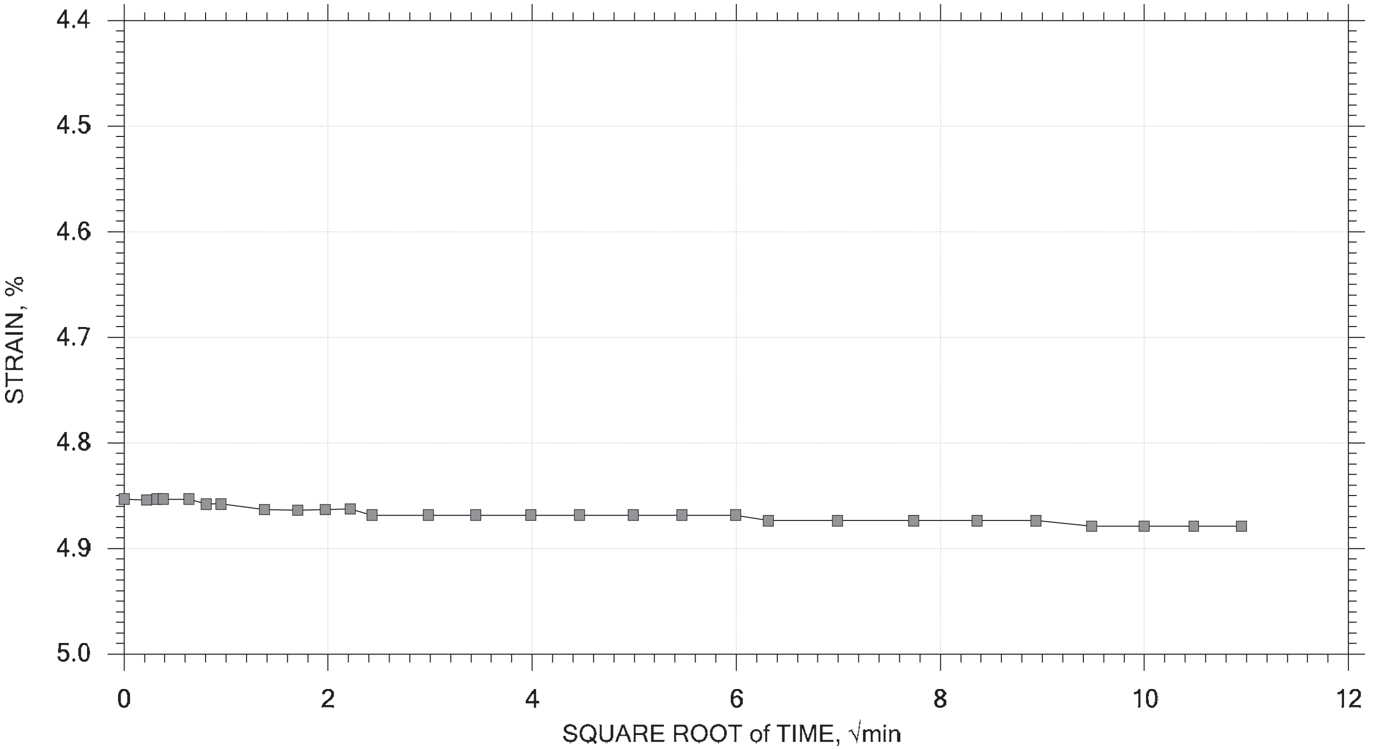
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 20

Stress: 1 tsf





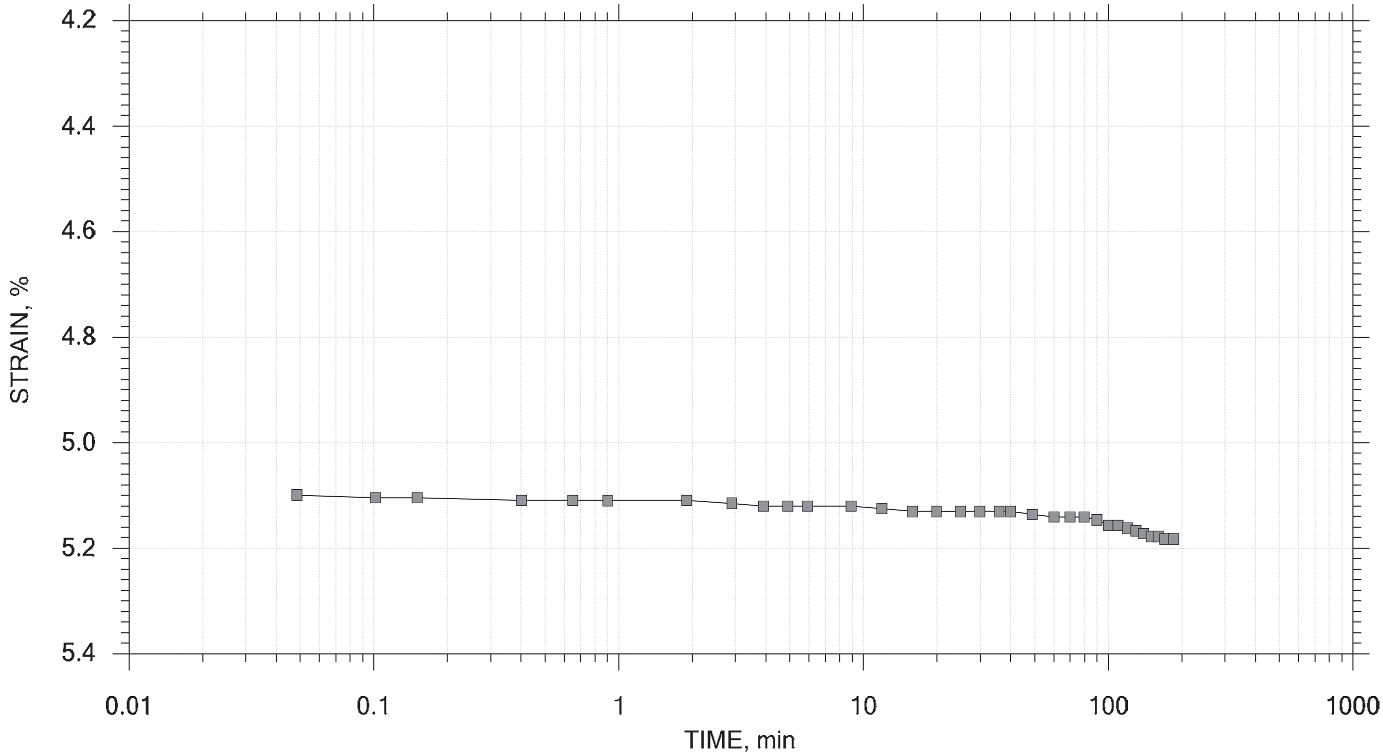
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

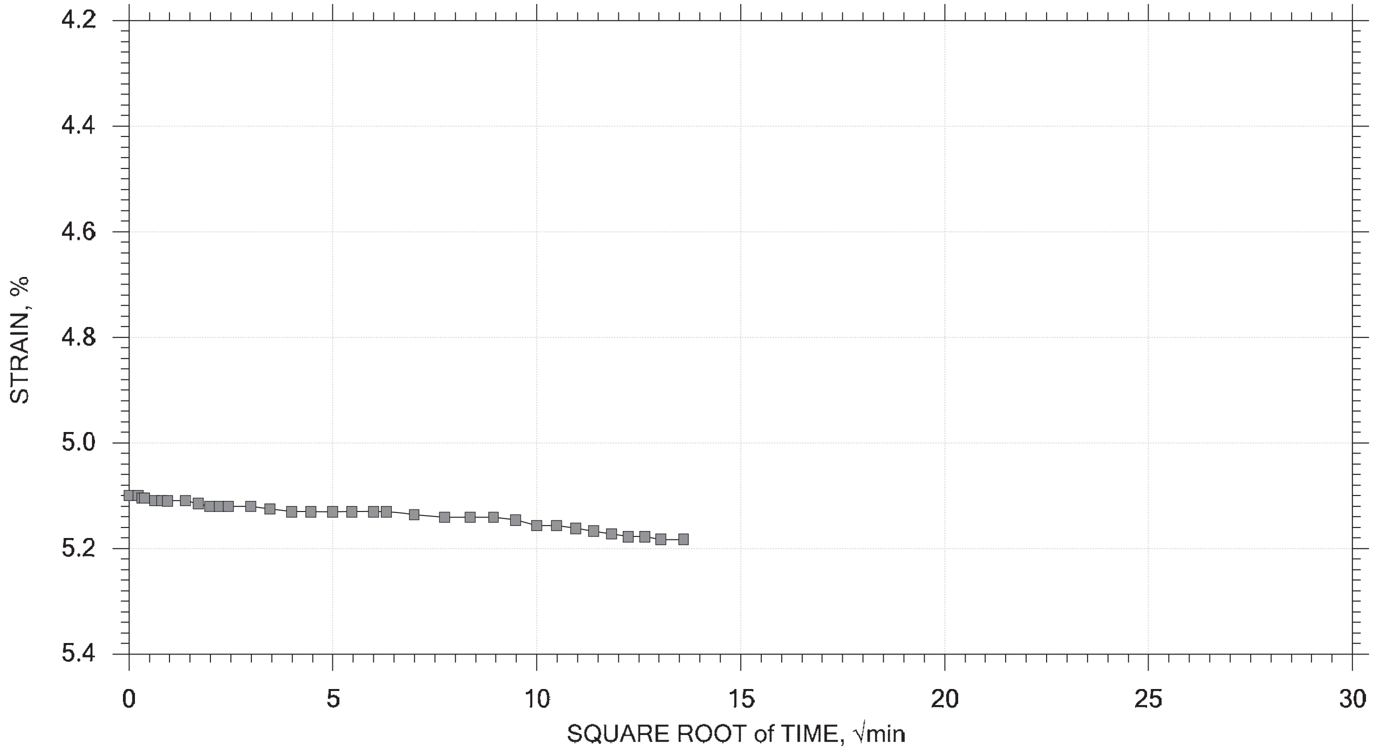
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 20

Stress: 2 tsf





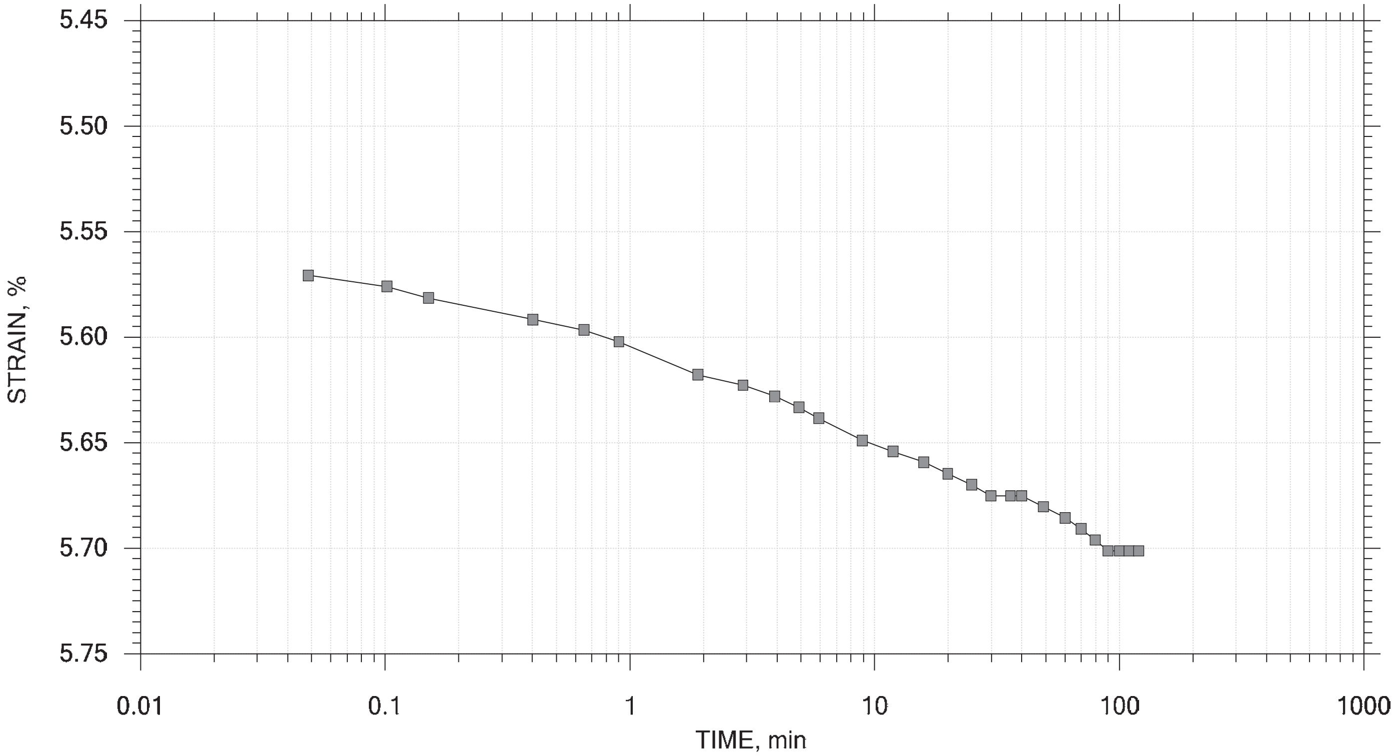
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

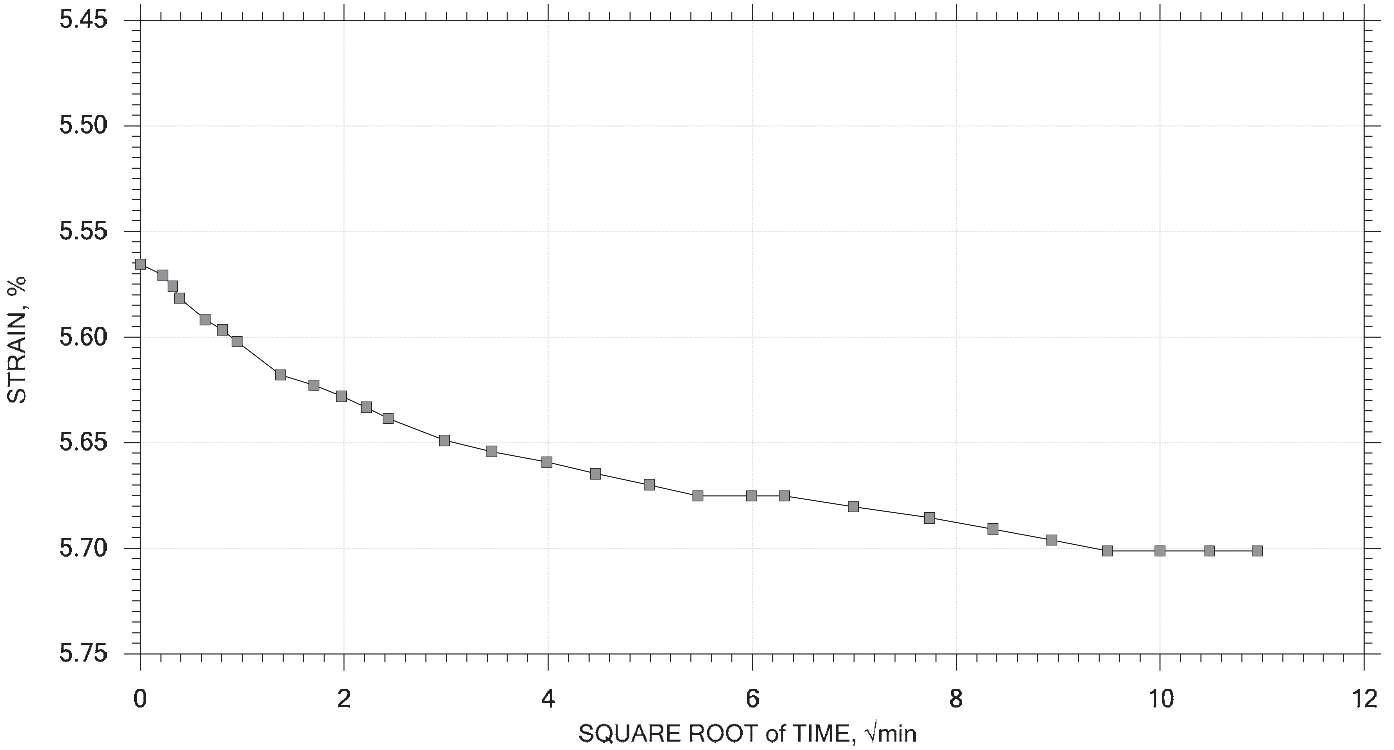
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 20

Stress: 4 tsf





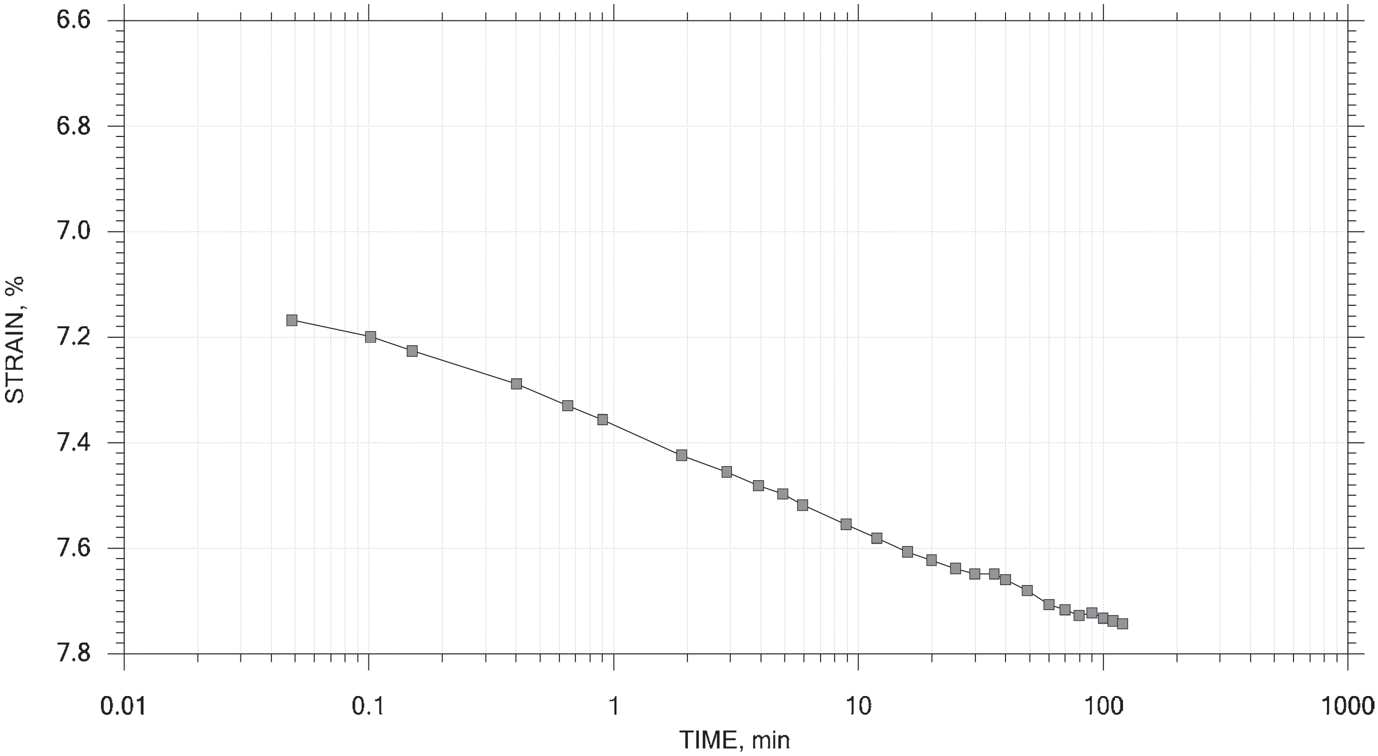
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

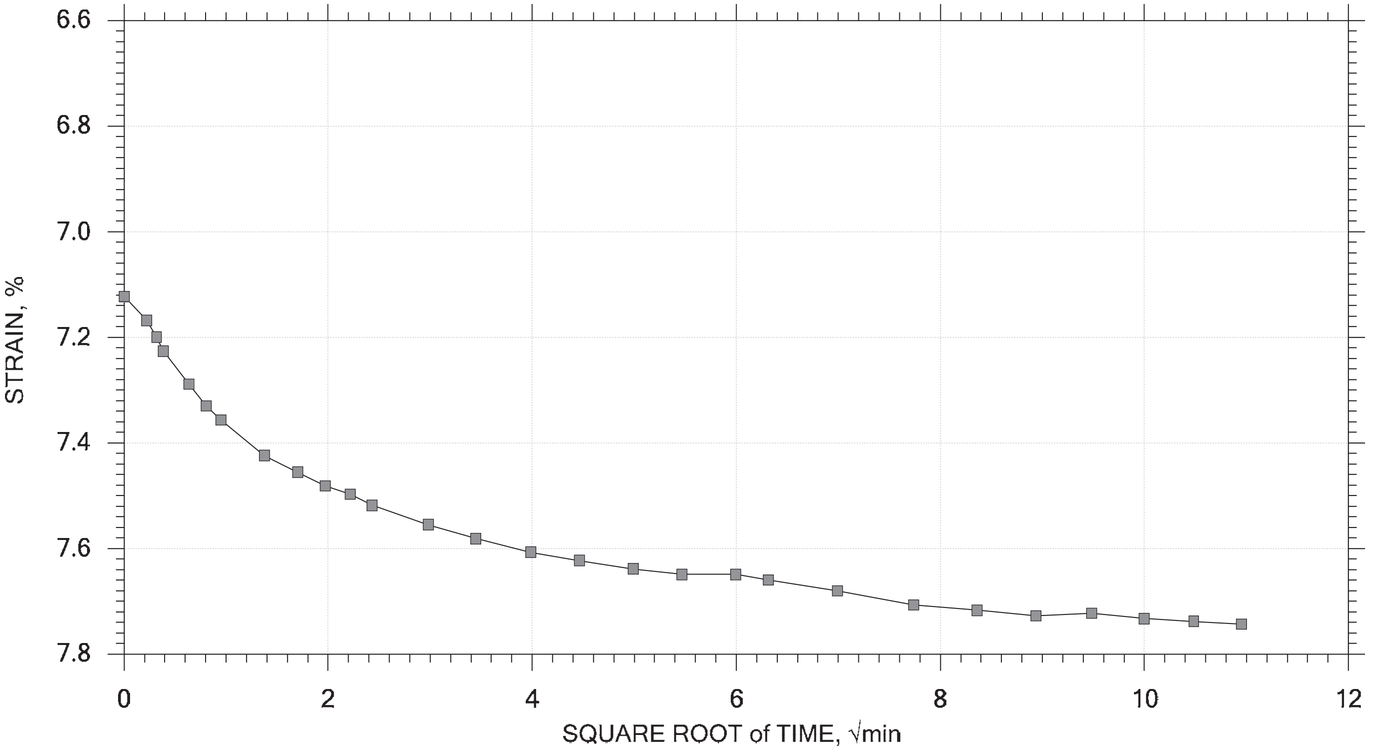
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 20

Stress: 8 tsf





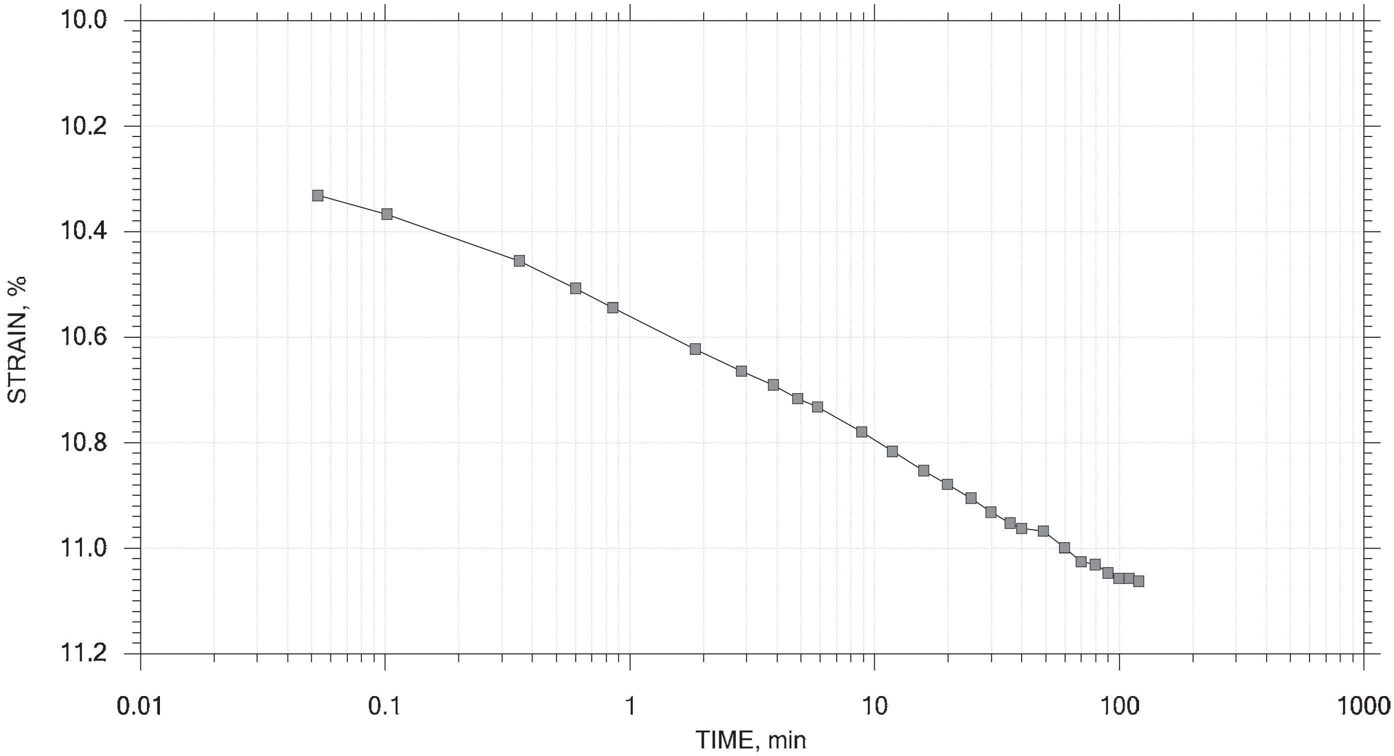
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

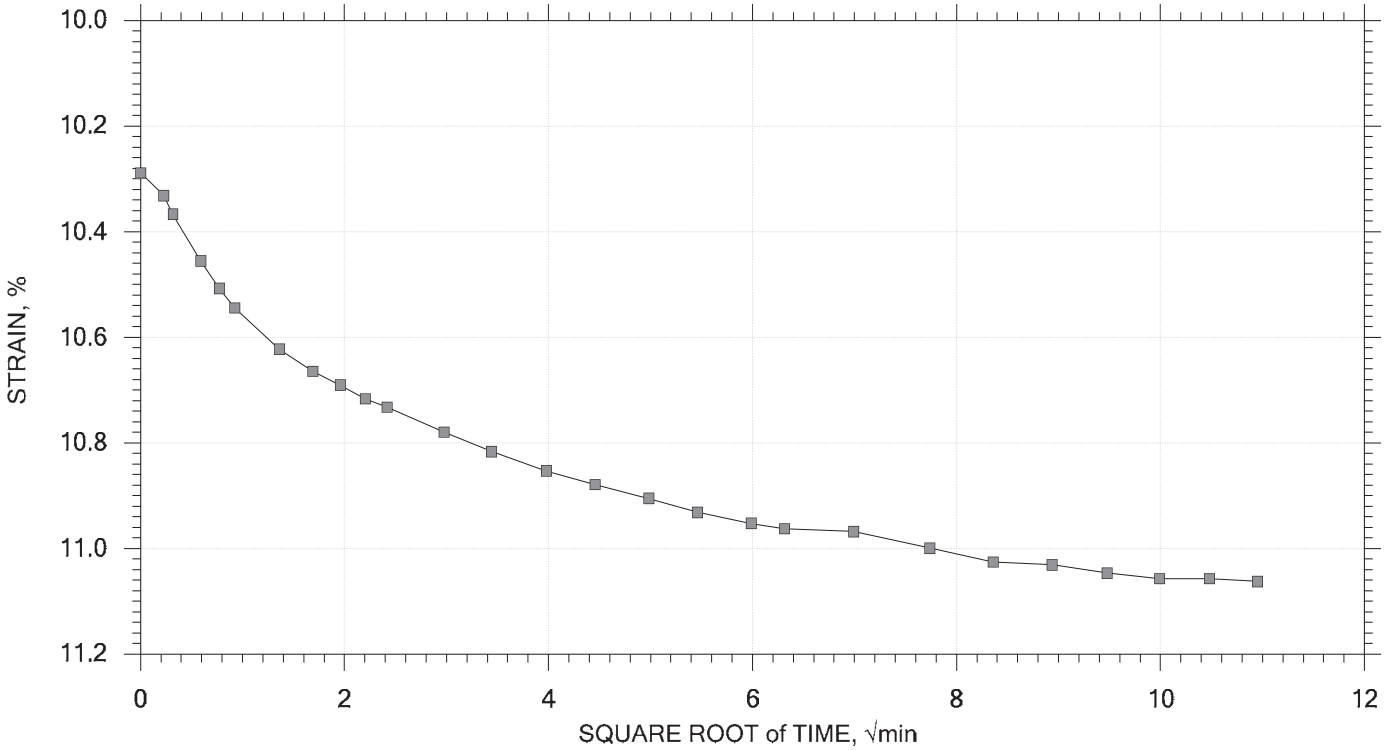
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 20

Stress: 16 tsf





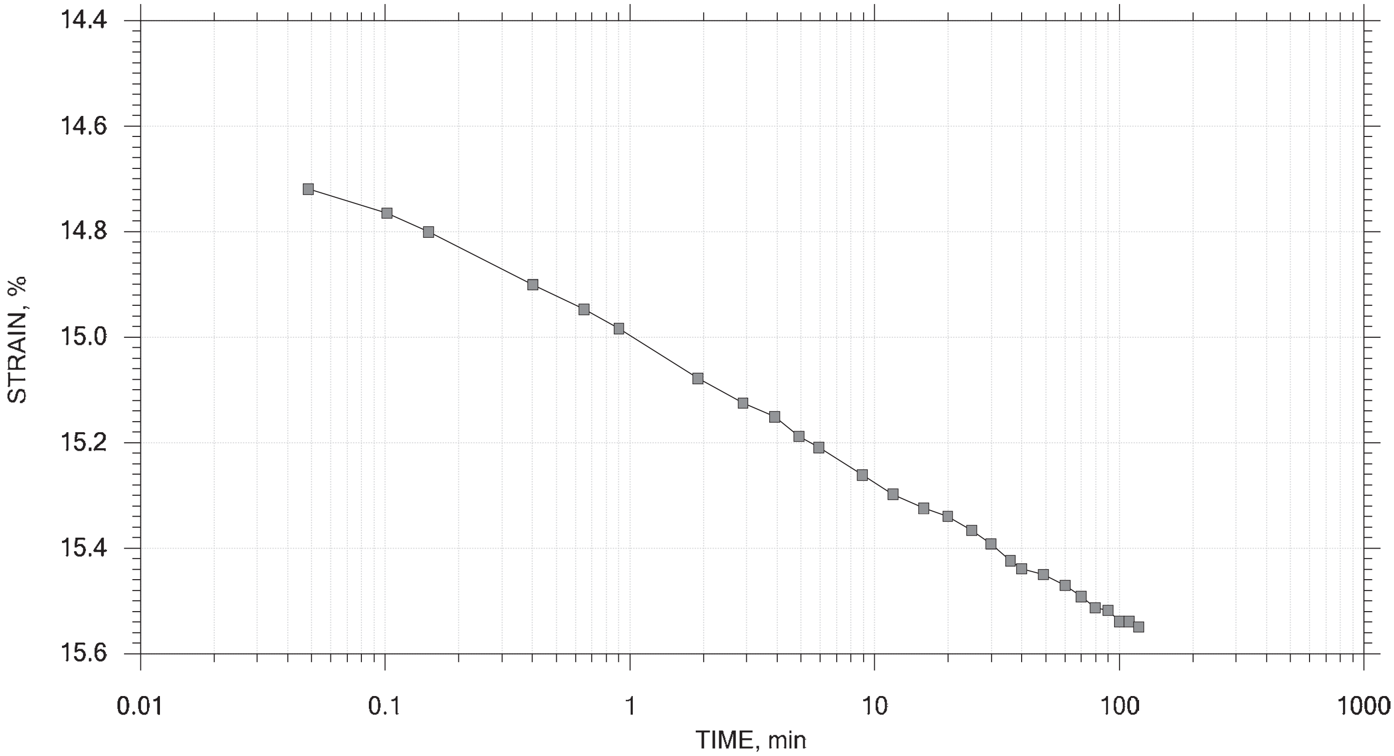
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

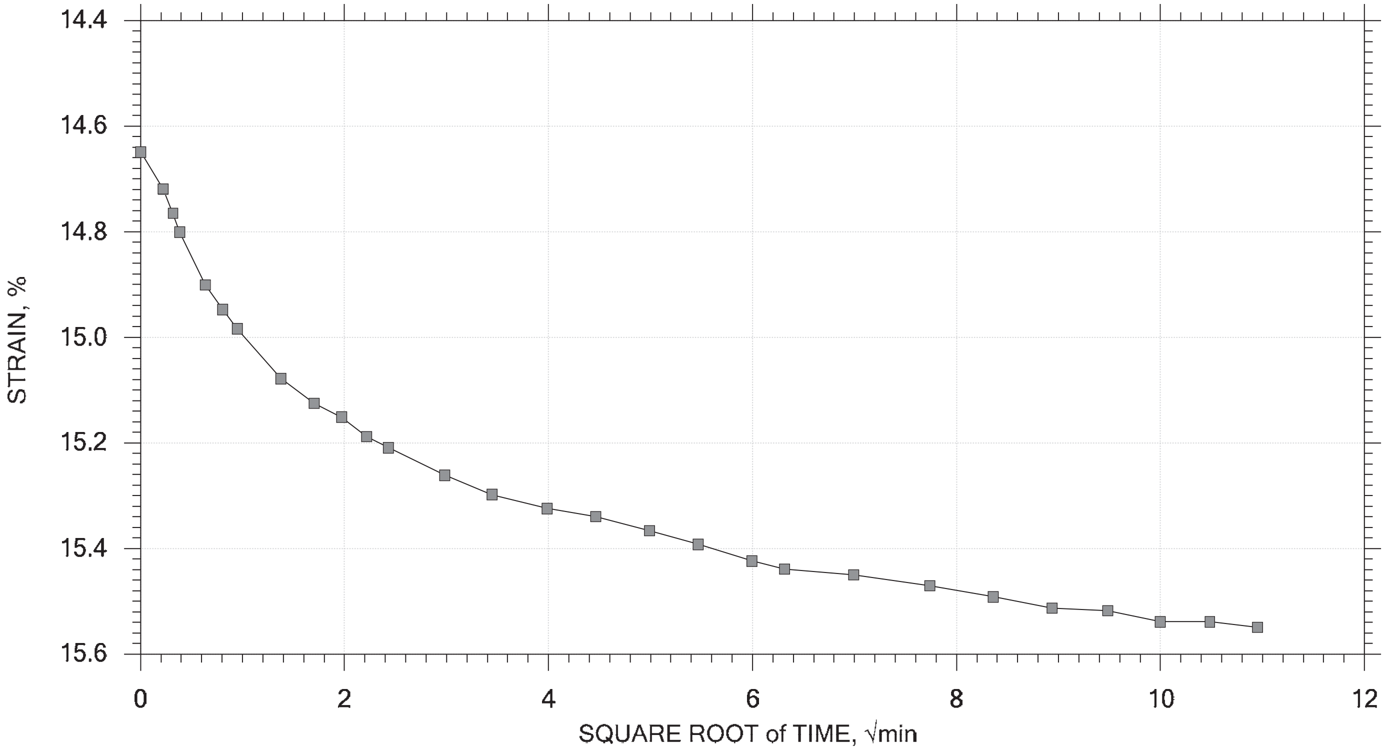
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 20

Stress: 32 tsf





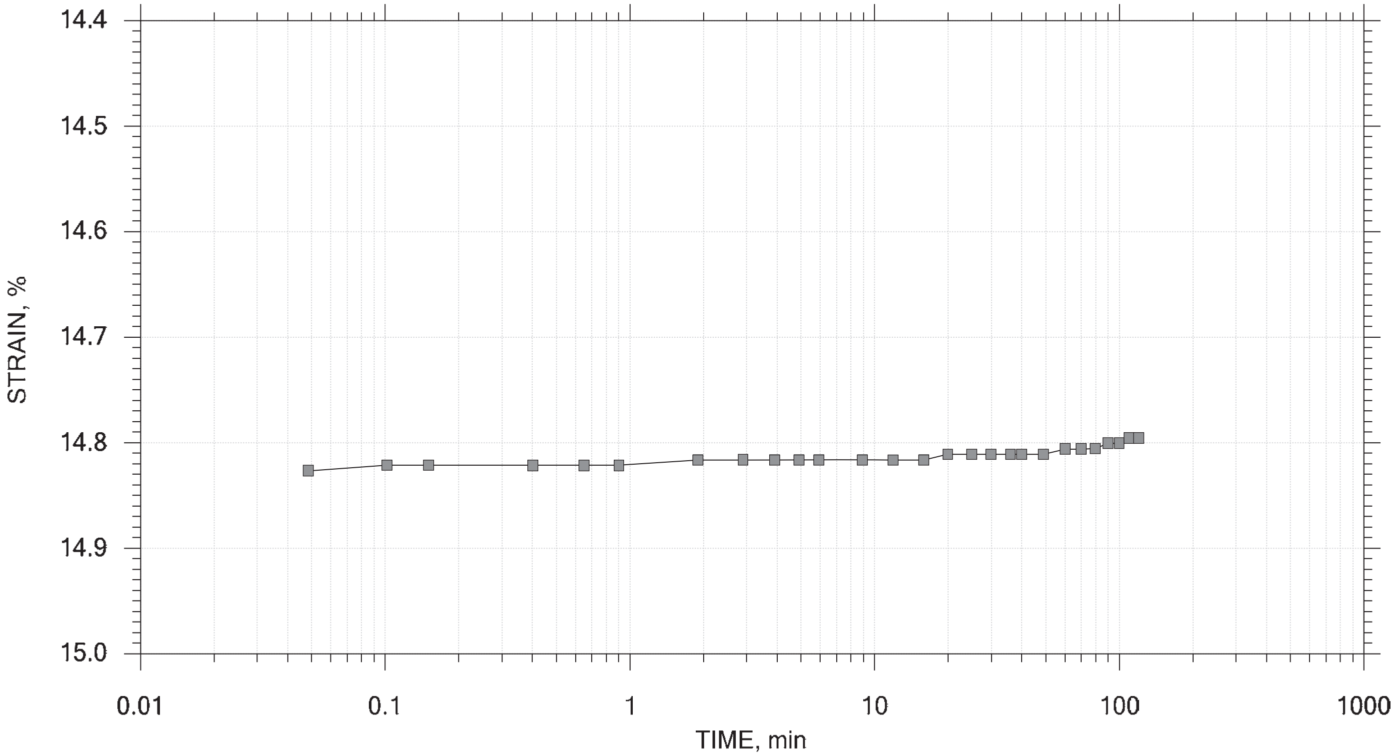
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

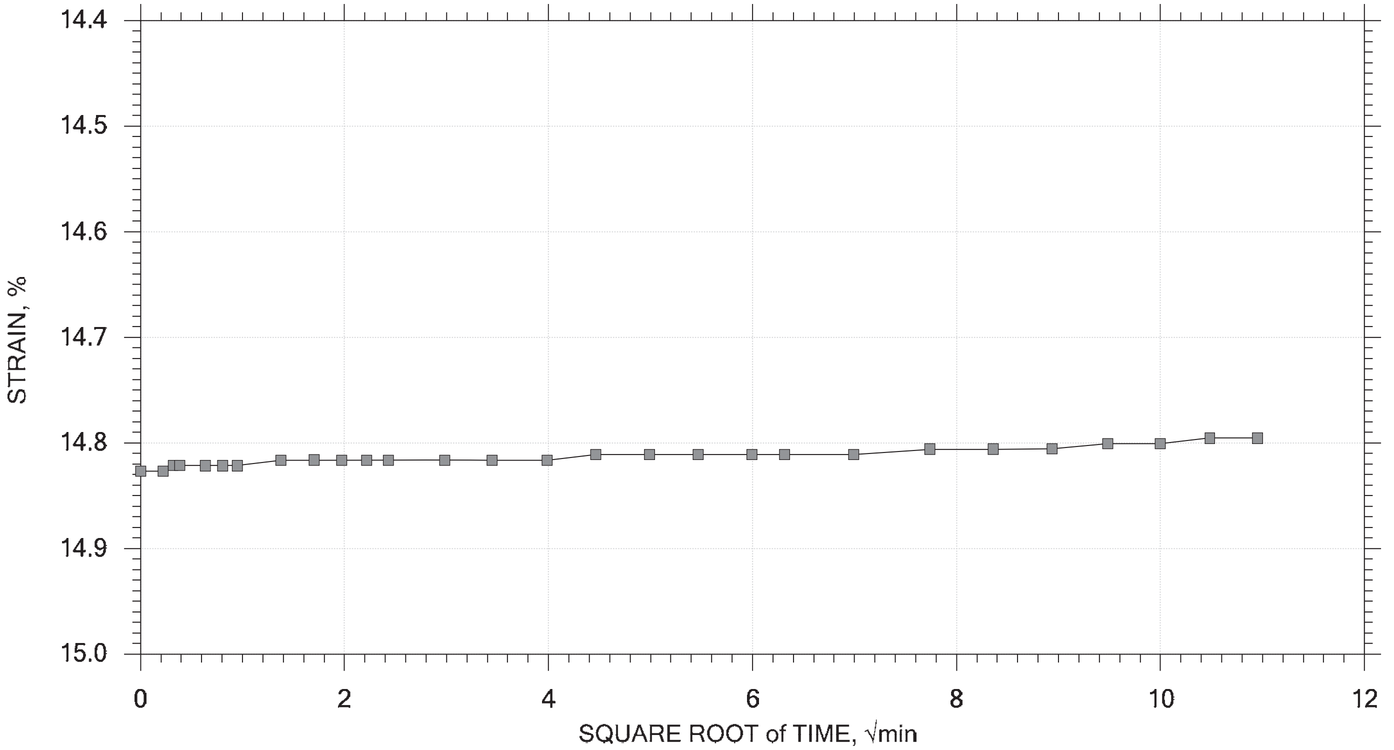
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 20

Stress: 8 tsf





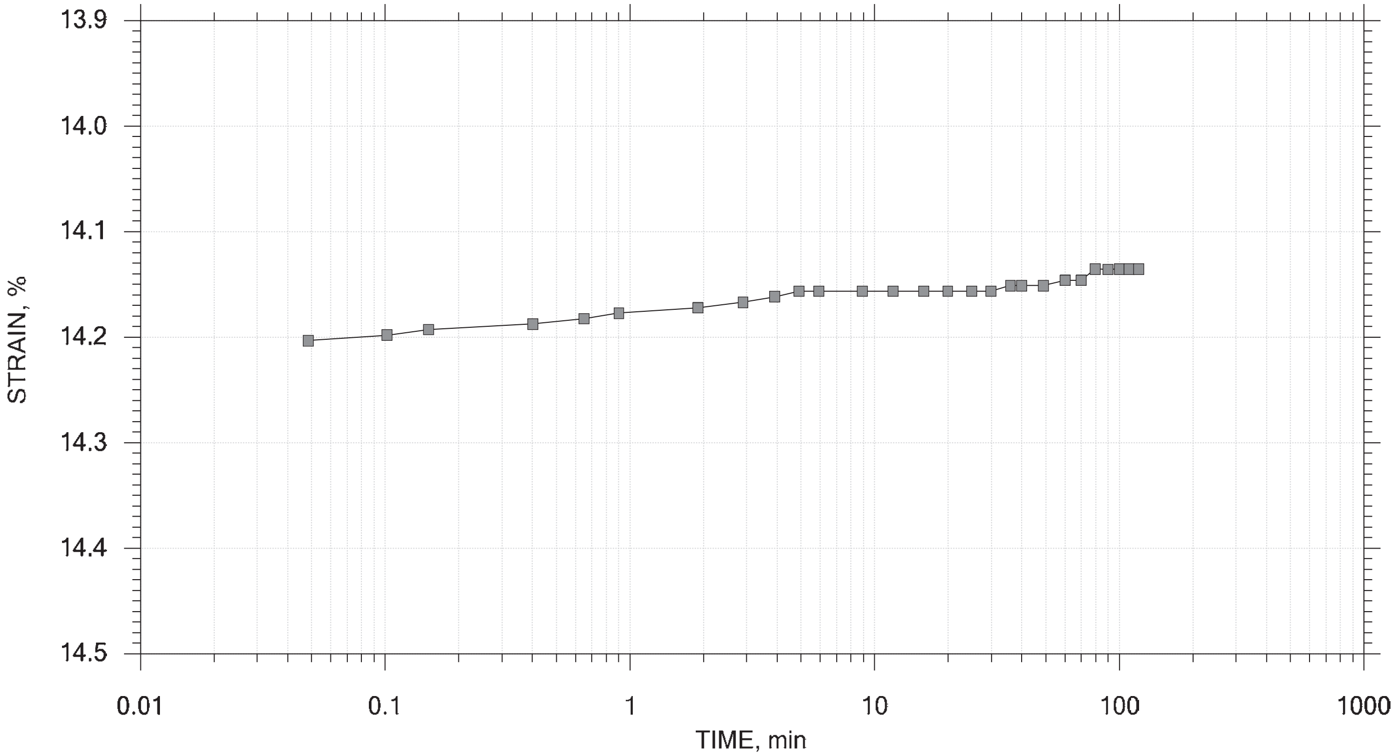
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

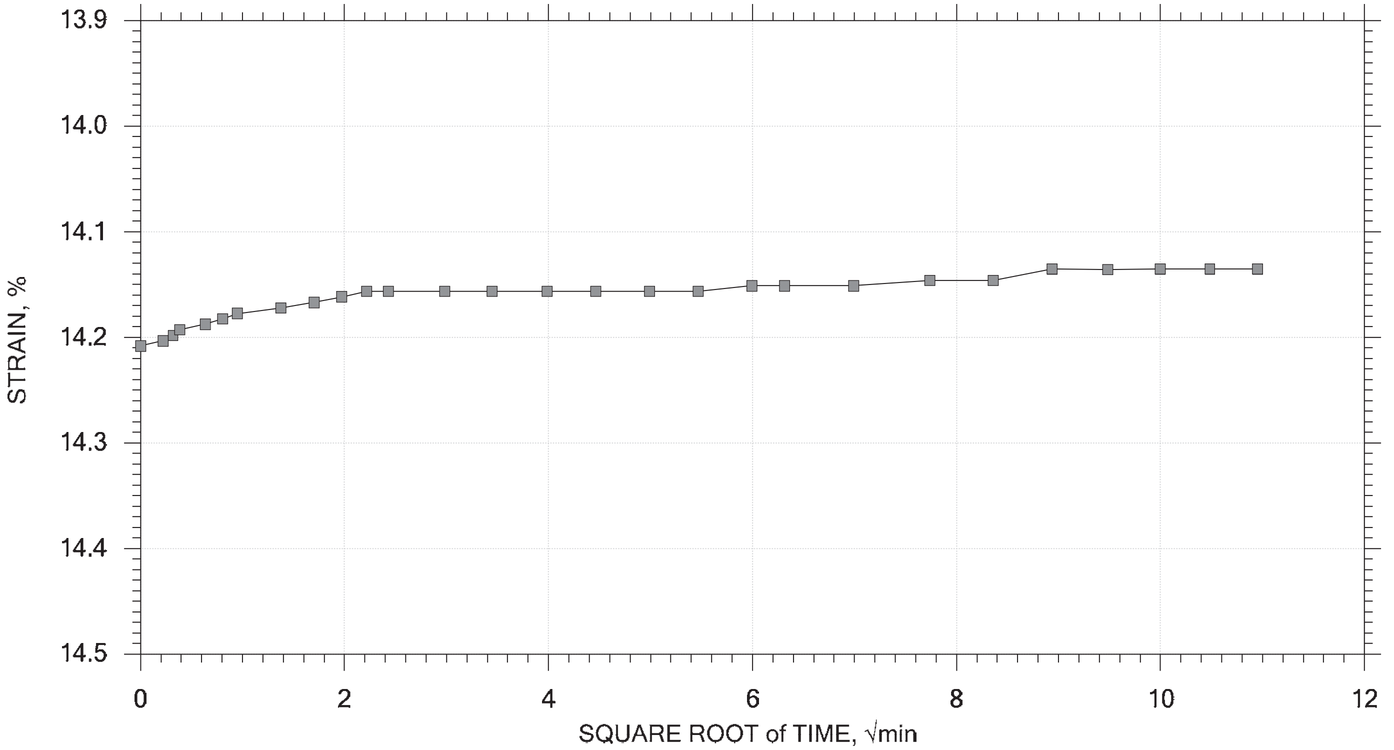
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 18 of 20

Stress: 2 tsf





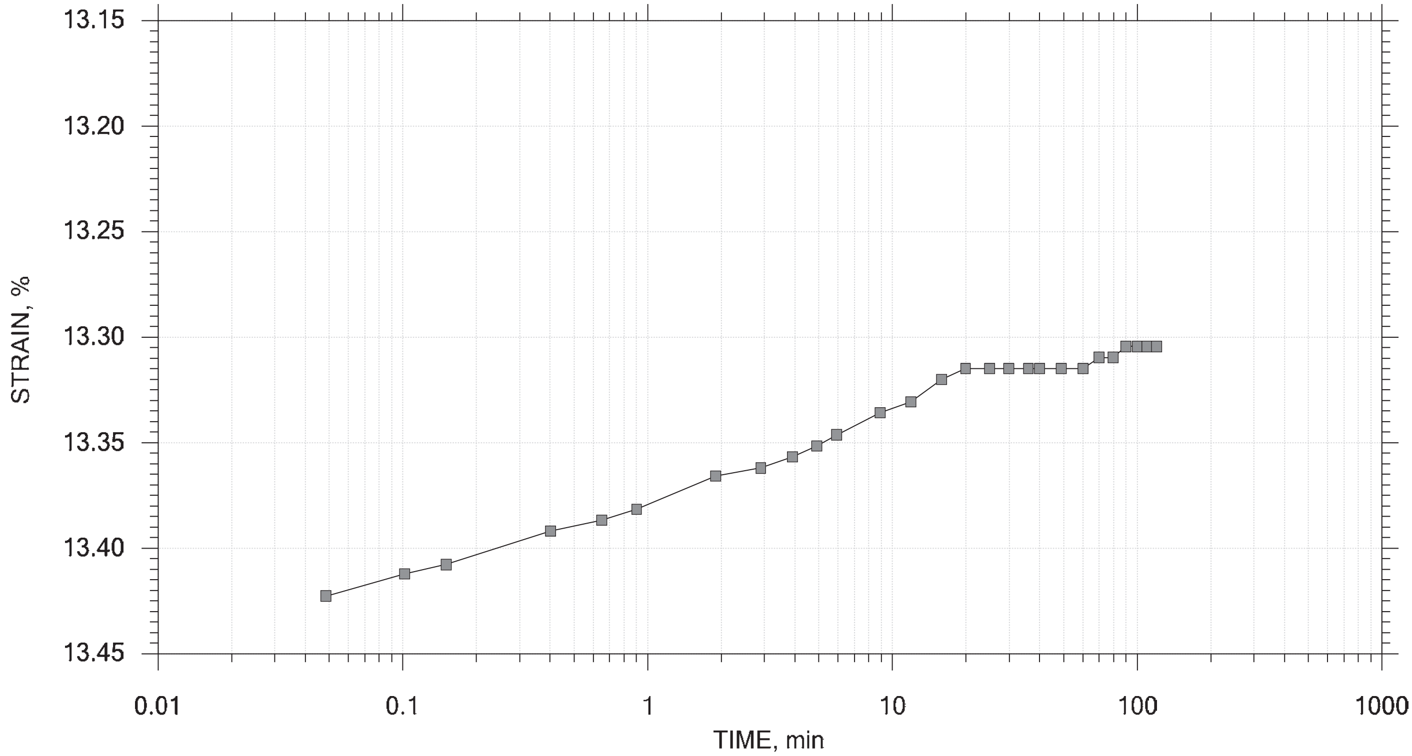
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

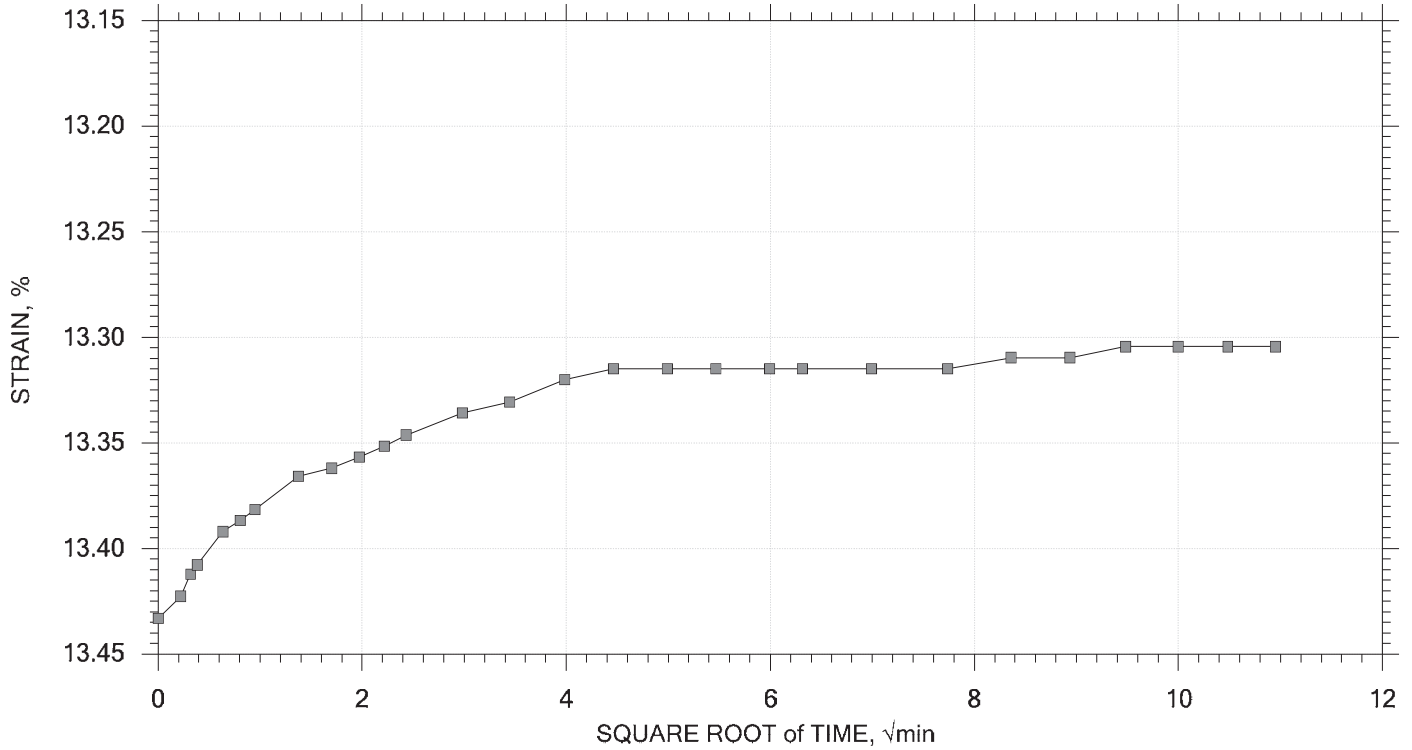
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 19 of 20

Stress: 0.5 tsf





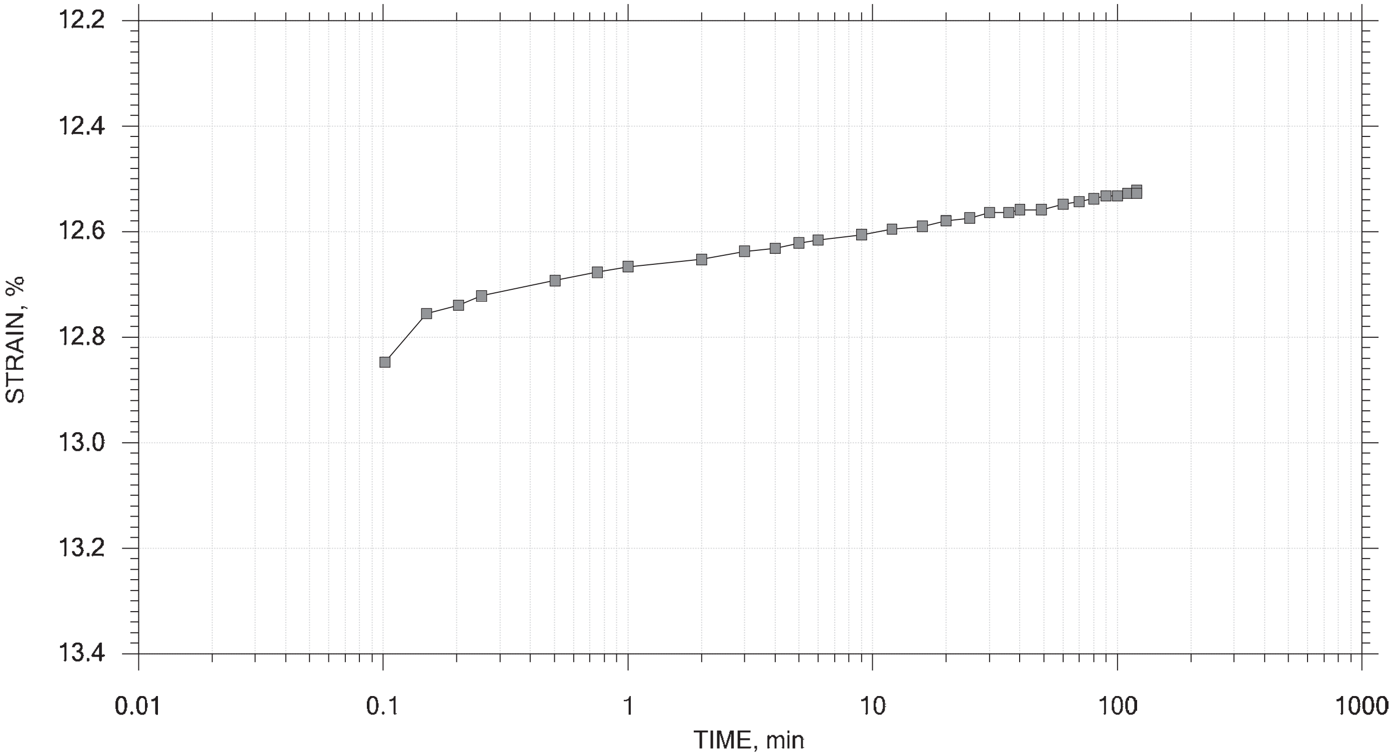
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-102	Tested By: jm	Checked By: mcm
Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
Depth: 63-65 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silty sand (ASH)		
Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

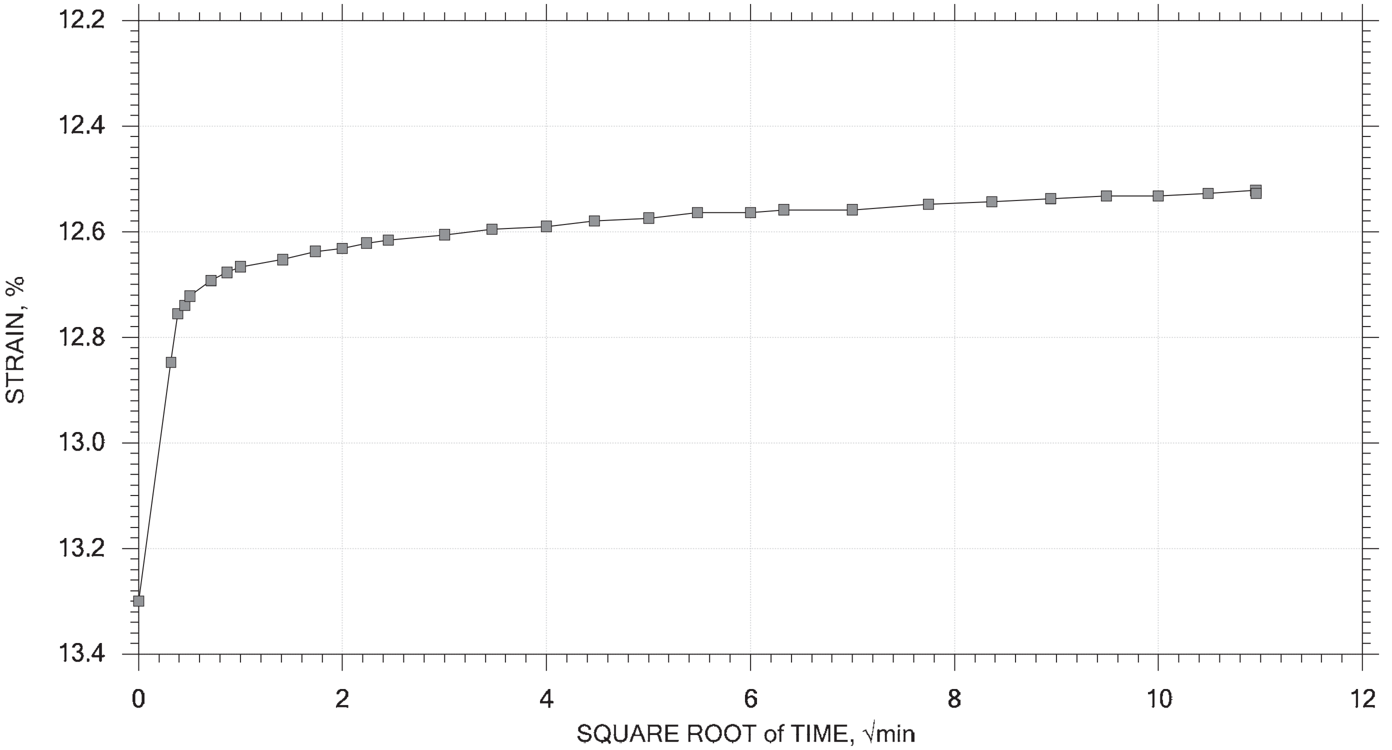
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 20 of 20

Stress: 0.125 tsf





GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-102	Tested By: jm	Checked By: mcm
	Sample No.: S-16	Test Date: 4/9/16	Test No.: IP-3
	Depth: 63-65 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silty sand (ASH)		
	Remarks: Swell Pressure = 0.0721 tsf. Moisture Content determined at 60° C for ash.		

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/12/16	Checked By:	mcm
Depth :	---	Test Id:	370796		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-103	S- 2 (BAG)	3.5-5 ft	Moist, pale olive sandy silt (ASH)	66.5
B-103	S- 4 (TUBE)	8-10 ft	Moist, olive sandy silt (ASH)	31.8
B-103	S- 8 (BAG)	22-24 ft	Moist, dark gray silt with sand (ASH)	82.7
B-103	S- 11 (TUBE)	38-40 ft	Moist, gray silt with sand (ASH)	77.3
B-103	S- 12 (TUBE)	43-45 ft	Moist, olive silt (ASH)	61.8
B-103	S- 13 (TUBE)	48.5-50.5 ft	Moist, dark gray silt with sand (ASH)	69.1
B-103	S- 14 (TUBE)	53-55 ft	Moist, olive silt (ASH)	54.5
B-103	S- 15 (TUBE)	58-60 ft	Moist, dark gray silt (ASH)	40.2
B-103	S- 17 (BAG)	68.5-70 ft	Moist, dark gray sandy silt (ASH)	53.3
B-103	S- 19 (BAG)	78.5-80 ft	Moist, dark gray silt with sand (ASH)	64.4

Notes: Temperature of Drying : 60º Celsius

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/05/16	Checked By:	mcm
Depth :	---	Test Id:	370798		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-103	S- 20 (BAG)	83.5-85 ft	Moist, brown sand with clay	26.6
B-103	S- 22 (BAG)	93.5-95 ft	Moist, greenish gray clayey sand	13.3

Notes: Temperature of Drying : 110º Celsius

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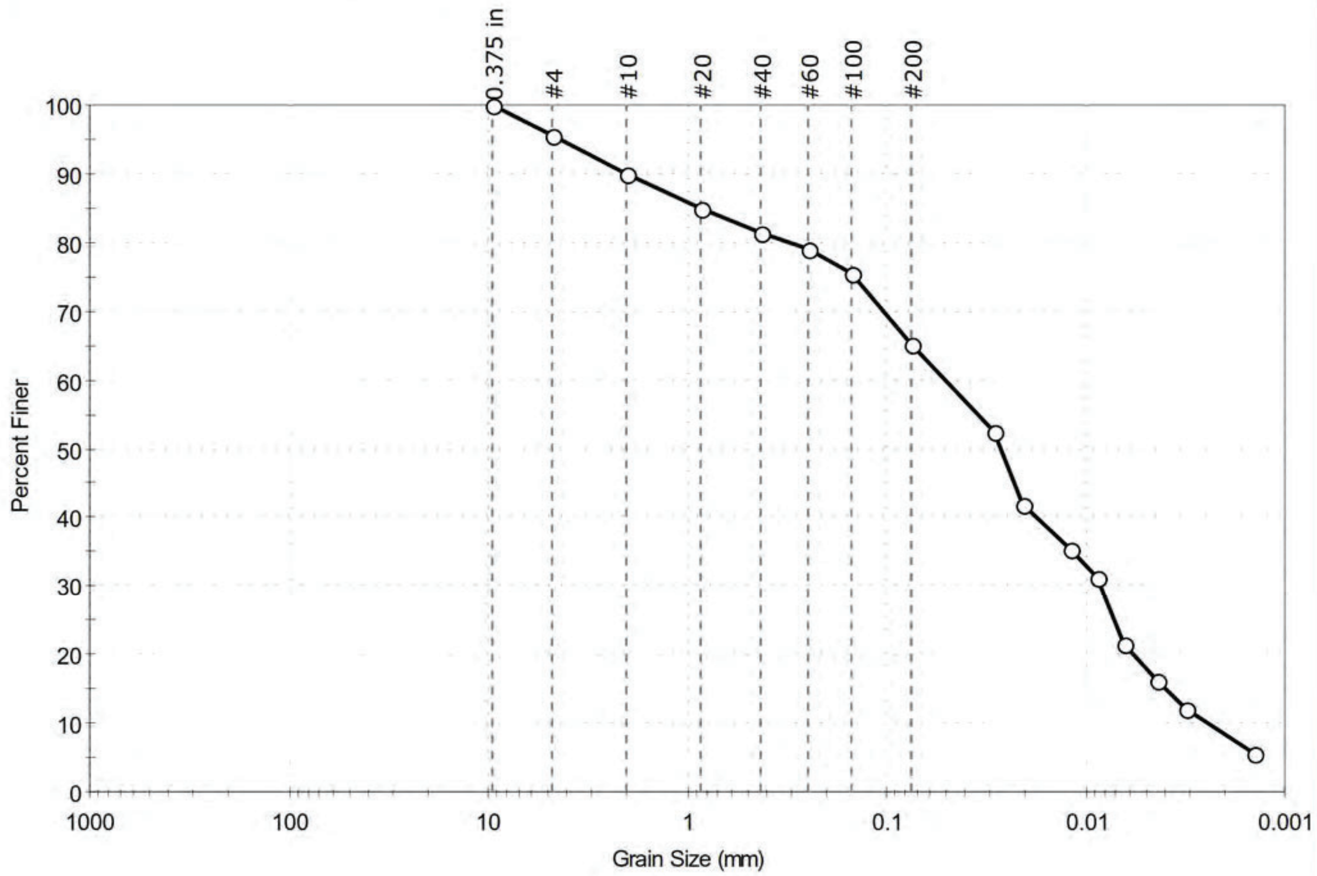
GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	bag	Tested By:	GA
Sample ID:	S-2 (BAG)	Test Date:	04/12/16	Checked By:	mcm
Depth :	3.5-5 ft	Test Id:	370799		

Test Comment: ---
Visual Description: Moist, pale olive sandy silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	4.3	30.4	65.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	96		
#10	2.00	90		
#20	0.85	85		
#40	0.42	82		
#60	0.25	79		
#100	0.15	76		
#200	0.075	65		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0287	53		
---	0.0207	42		
---	0.0120	36		
---	0.0088	31		
---	0.0064	22		
---	0.0044	16		
---	0.0032	12		
---	0.0014	6		

Coefficients

D_{85} =0.8592 mm	D_{30} =0.0084 mm
D_{60} =0.0502 mm	D_{15} =0.0040 mm
D_{50} =0.0265 mm	D_{10} =0.0024 mm
C_u =20.917	C_c =0.586

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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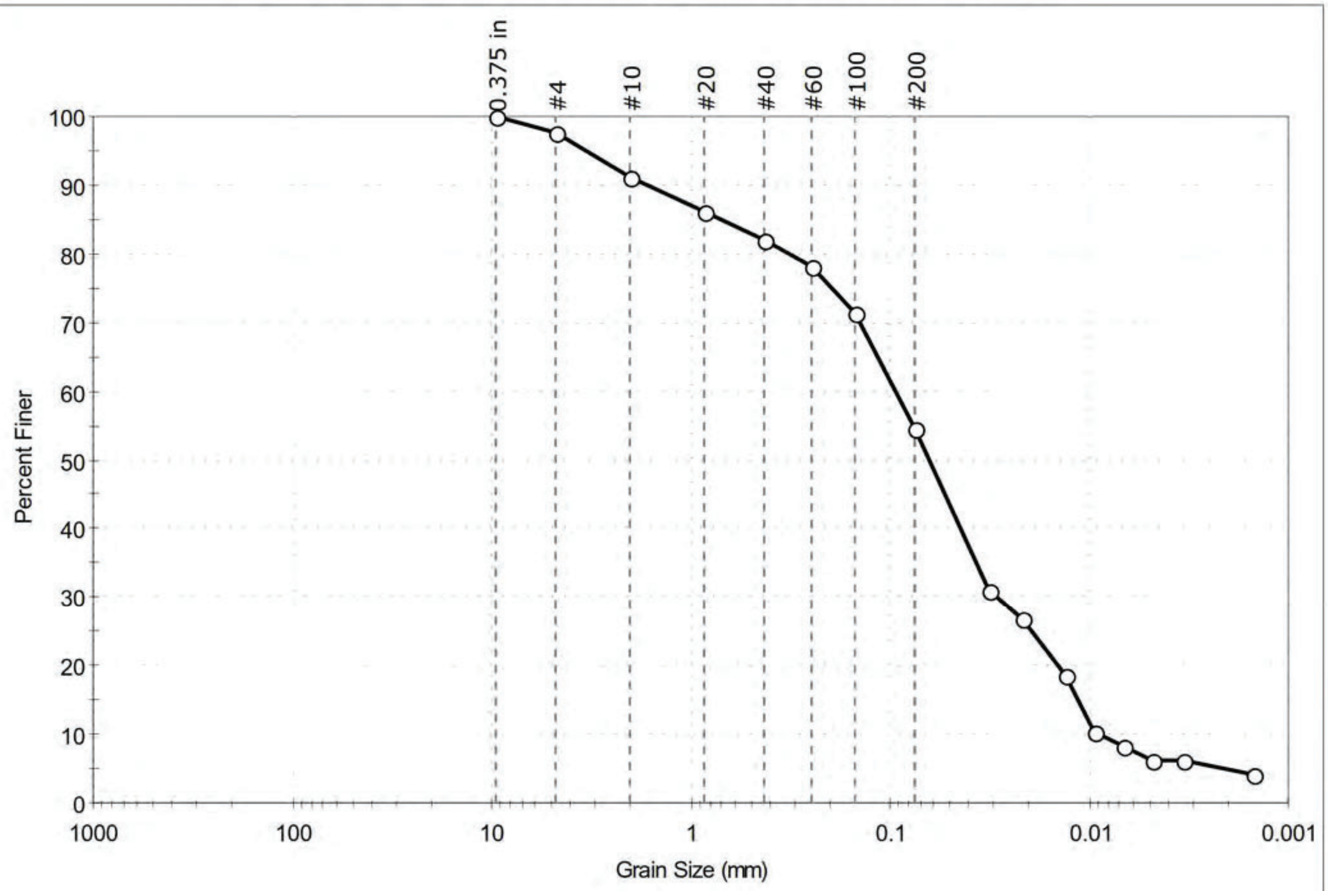
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-103
Sample Type: tube
Tested By: jbr
Sample ID: S-4 (TUBE)
Test Date: 04/11/16
Checked By: mcm
Depth : 8-10 ft
Test Id: 370800
Test Comment: ---
Visual Description: Moist, olive sandy silt (ASH)
Sample Comment: Moisture Conent deternmined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	2.4	43.0	54.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	91		
#20	0.85	86		
#40	0.42	82		
#60	0.25	78		
#100	0.15	71		
#200	0.075	55		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0319	31		
---	0.0216	27		
---	0.0132	19		
---	0.0095	10		
---	0.0068	8		
---	0.0048	6		
---	0.0034	6		
---	0.0015	4		

Coefficients

D_{85} =0.7094 mm
D_{30} =0.0291 mm
D_{60} =0.0938 mm
D_{15} =0.0114 mm
D_{50} =0.0634 mm
D_{10} =0.0090 mm
C_u =10.422
C_c =1.003

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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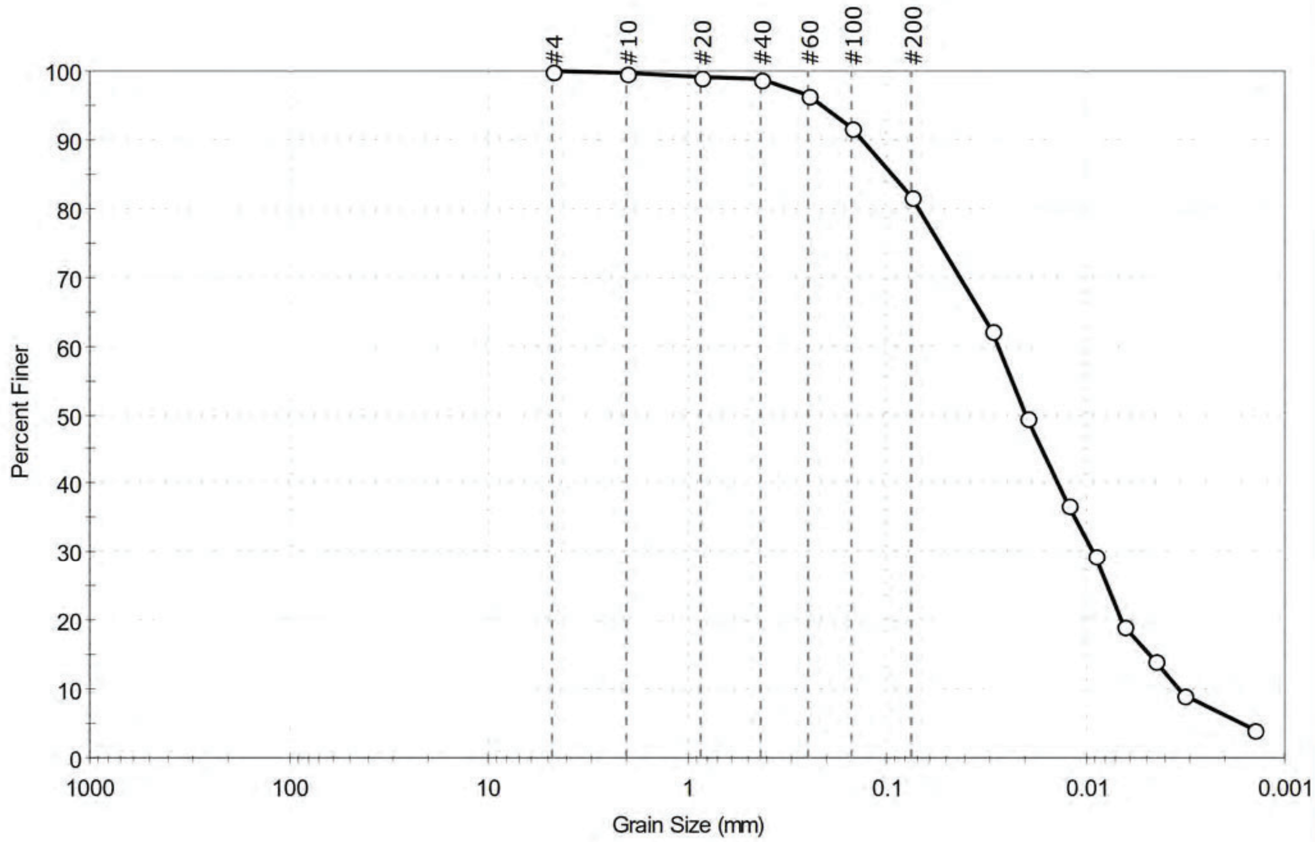
GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	bag	Tested By:	GA
Sample ID:	S-8 (BAG)	Test Date:	04/12/16	Checked By:	mcm
Depth :	22-24 ft	Test Id:	370801		

Test Comment: ---
Visual Description: Moist, dark gray silt with sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	18.3	81.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	96		
#100	0.15	92		
#200	0.075	82		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0293	62		
---	0.0199	50		
---	0.0122	37		
---	0.0089	29		
---	0.0064	19		
---	0.0045	14		
---	0.0032	9		
---	0.0014	4		

Coefficients

D_{85} =0.0944 mm	D_{30} =0.0091 mm
D_{60} =0.0274 mm	D_{15} =0.0047 mm
D_{50} =0.0202 mm	D_{10} =0.0034 mm
C_u =8.059	C_c =0.889

Classification

ASTM	N/A
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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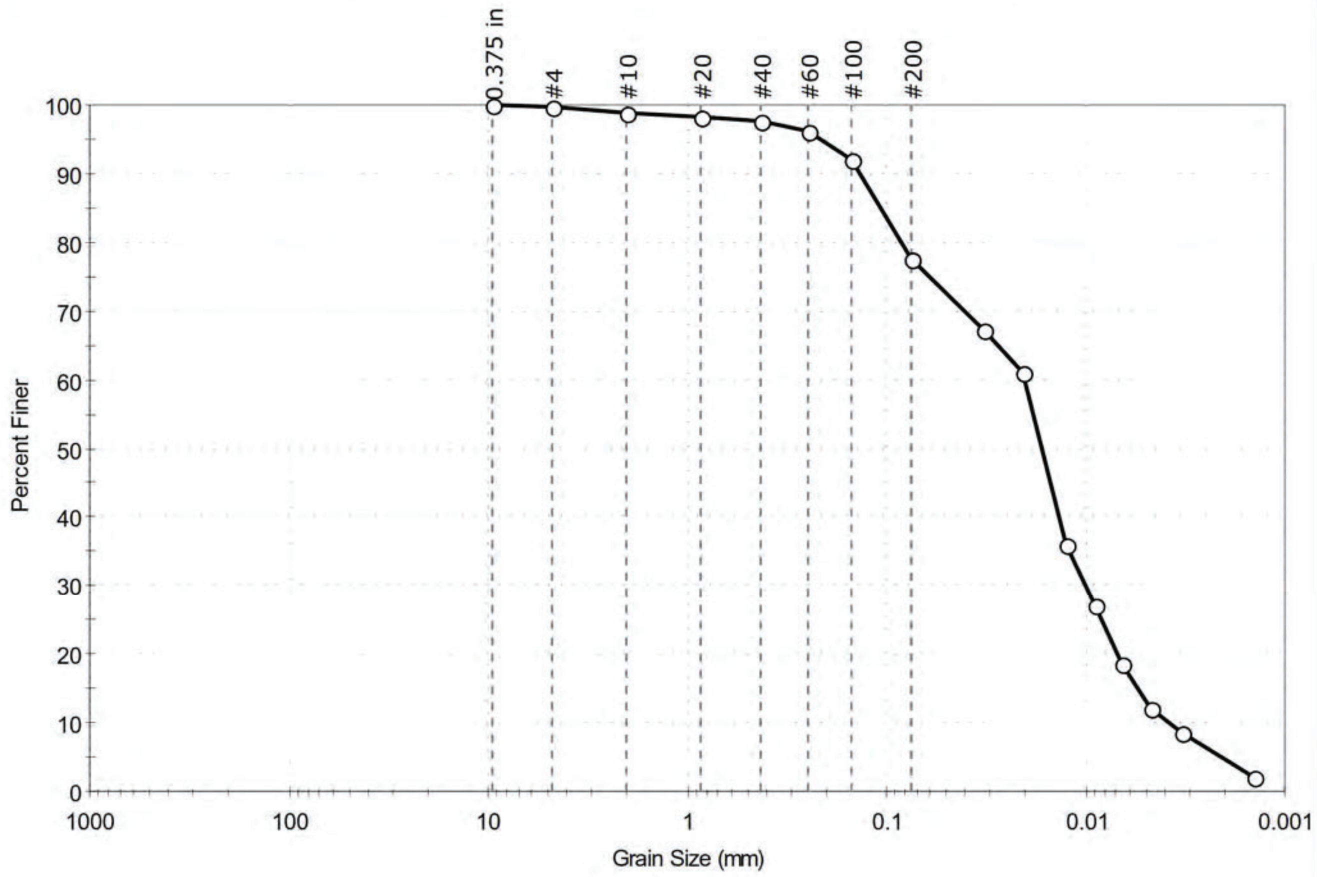
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	tube	Tested By:	GA
Sample ID:	S-11 (TUBE)	Test Date:	04/14/16	Checked By:	mcm
Depth :	38-40 ft	Test Id:	370802		

Test Comment: ---
Visual Description: Moist, gray silt with sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.3	22.0	77.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	98		
#40	0.42	98		
#60	0.25	96		
#100	0.15	92		
#200	0.075	78		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0322	67		
---	0.0205	61		
---	0.0125	36		
---	0.0091	27		
---	0.0065	18		
---	0.0047	12		
---	0.0033	8		
---	0.0014	2		

Coefficients

D_{85} =0.1065 mm	D_{30} =0.0101 mm
D_{60} =0.0201 mm	D_{15} =0.0055 mm
D_{50} =0.0165 mm	D_{10} =0.0038 mm
C_u =5.289	C_c =1.336

Classification

ASTM	N/A
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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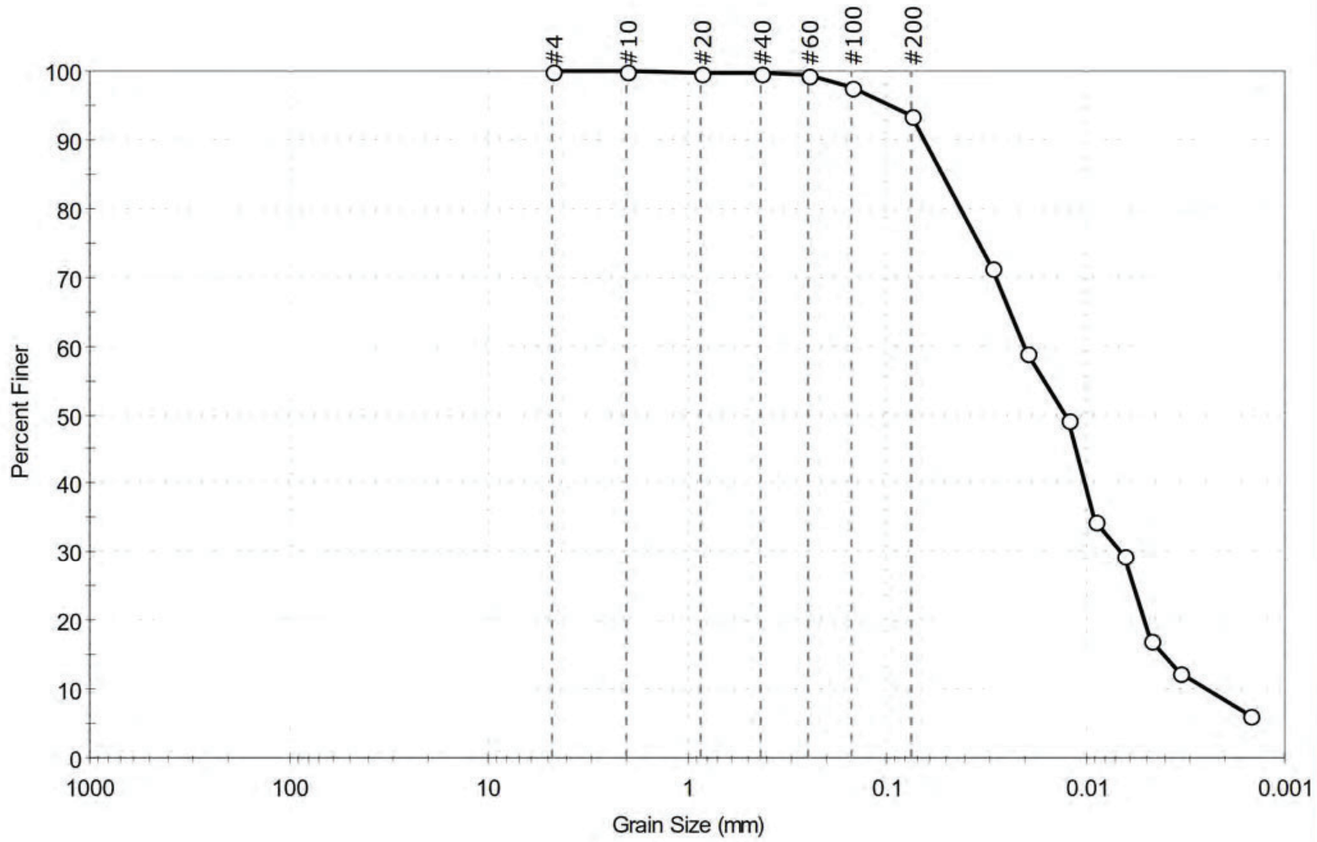
GeoTesting
EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	tube	Tested By:	jbr
Sample ID:	S-12 (TUBE)	Test Date:	04/11/16	Checked By:	mcm
Depth :	43-45 ft	Test Id:	370803		

Test Comment: ---
Visual Description: Moist, olive silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	6.4	93.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	99		
#100	0.15	98		
#200	0.075	94		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0293	71		
---	0.0196	59		
---	0.0124	49		
---	0.0090	34		
---	0.0064	30		
---	0.0047	17		
---	0.0034	12		
---	0.0015	6		

Coefficients

D_{85} =0.0522 mm	D_{30} =0.0067 mm
D_{60} =0.0202 mm	D_{15} =0.0040 mm
D_{50} =0.0128 mm	D_{10} =0.0025 mm
C_u =8.080	C_c =0.889

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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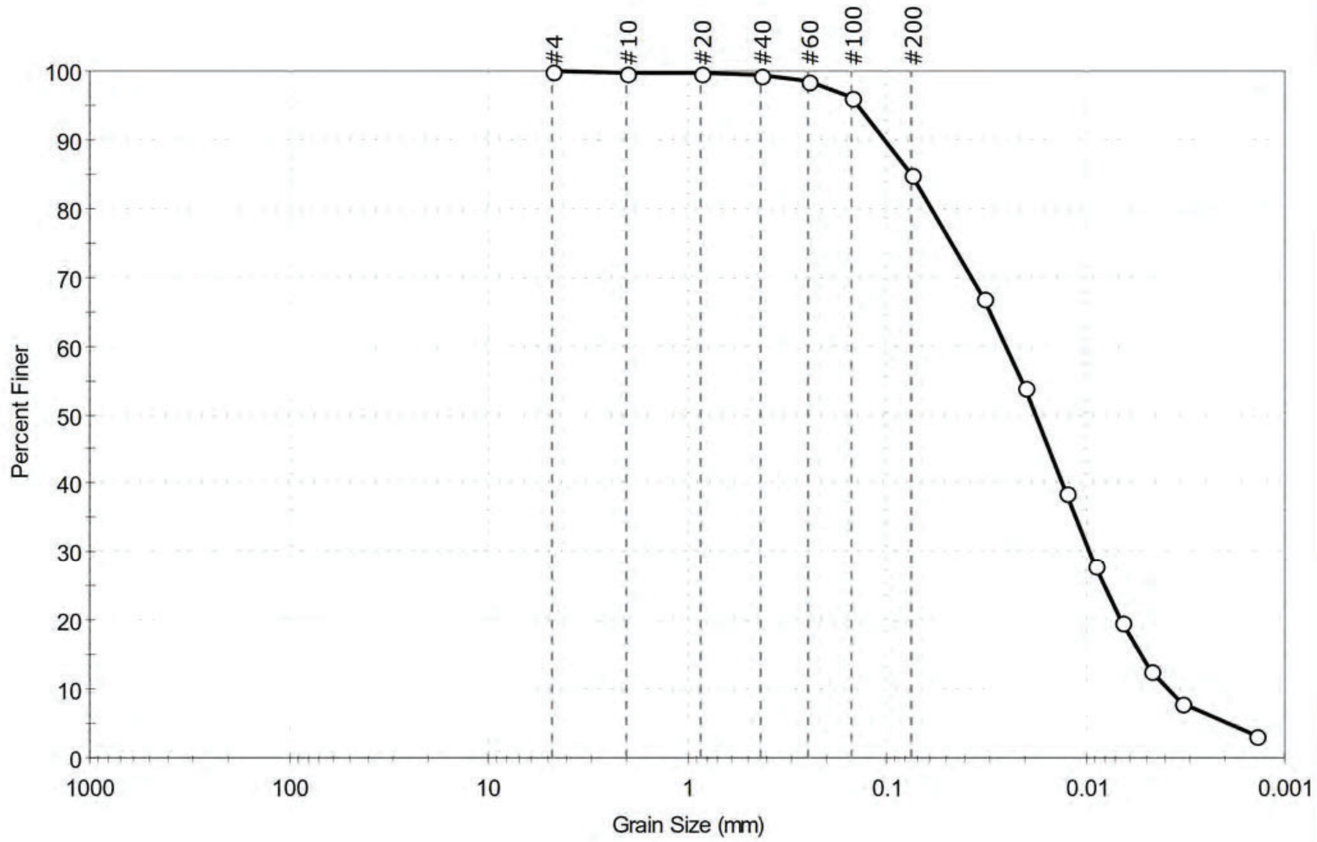
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	tube	Tested By:	GA
Sample ID:	S-13 (TUBE)	Test Date:	04/14/16	Checked By:	mcm
Depth :	48.5-50.5 ft	Test Id:	370804		

Test Comment: ---
Visual Description: Moist, dark gray silt with sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	15.1	84.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	99		
#100	0.15	96		
#200	0.075	85		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0322	67		
---	0.0205	54		
---	0.0125	39		
---	0.0090	28		
---	0.0065	20		
---	0.0047	13		
---	0.0033	8		
---	0.0014	3		

Coefficients

D_{85} =0.0756 mm	D_{30} =0.0096 mm
D_{60} =0.0252 mm	D_{15} =0.0052 mm
D_{50} =0.0179 mm	D_{10} =0.0038 mm
C_u =6.632	C_c =0.962

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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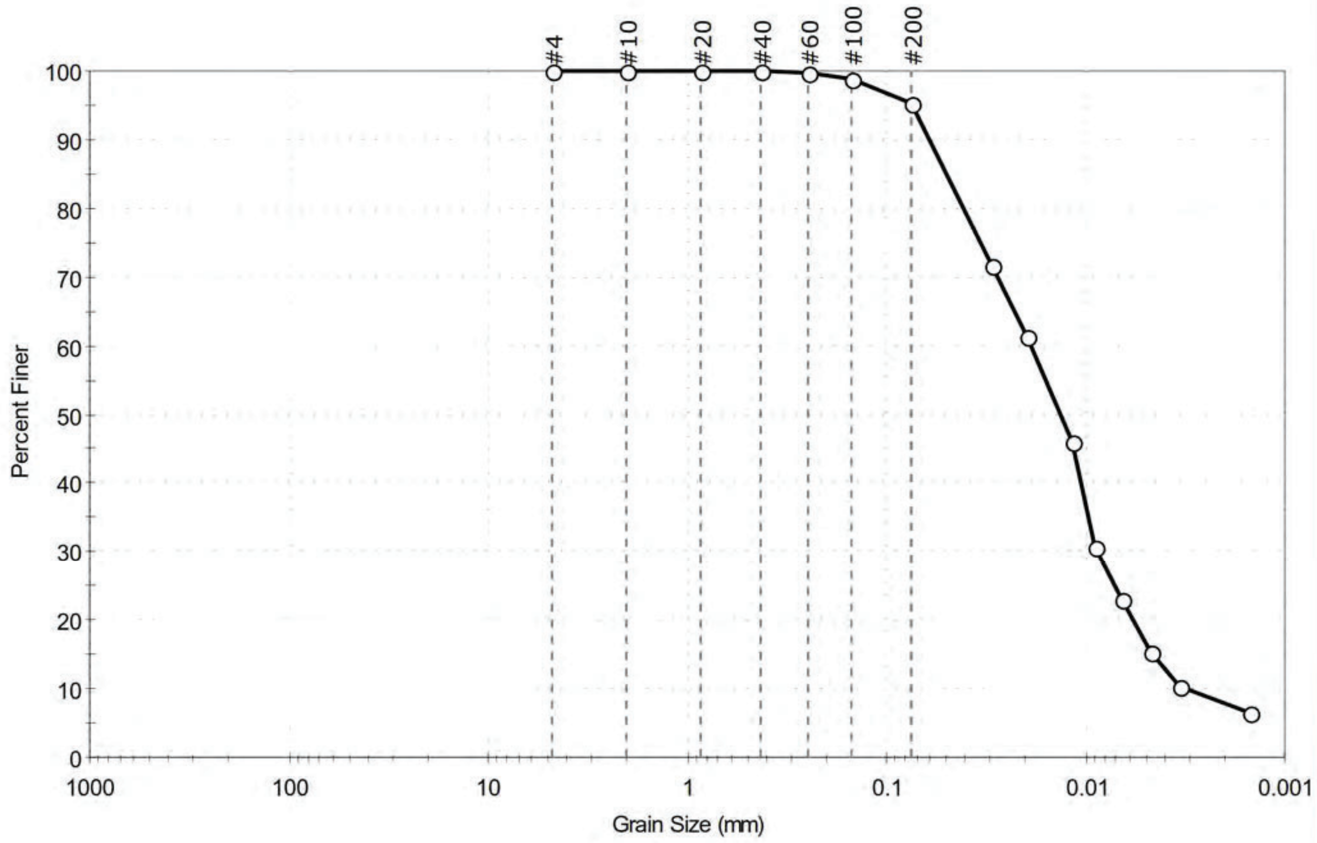
GeoTesting
EXPRESS

Client:	AECOM		
Project:	SCS Plant Scherer Ph.2		
Location:	Monroe County, GA	Project No:	GTX-304548
Boring ID:	B-103	Sample Type: tube	Tested By: jbr
Sample ID:	S-14 (TUBE)	Test Date: 04/11/16	Checked By: mcm
Depth :	53-55 ft	Test Id: 370805	
Test Comment:	---		
Visual Description:	Moist, olive silt (ASH)		
Sample Comment:	Moisture Content determined at 60° C for ash.		

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	4.9	95.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	99		
#200	0.075	95		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0297	72		
---	0.0199	61		
---	0.0118	46		
---	0.0091	31		
---	0.0065	23		
---	0.0047	15		
---	0.0034	10		
---	0.0015	6		

Coefficients

D_{85} =0.0503 mm
D_{30} =0.0088 mm
D_{60} =0.0190 mm
D_{15} =0.0046 mm
D_{50} =0.0135 mm
D_{10} =0.0032 mm
C_u =5.938
C_c =1.274

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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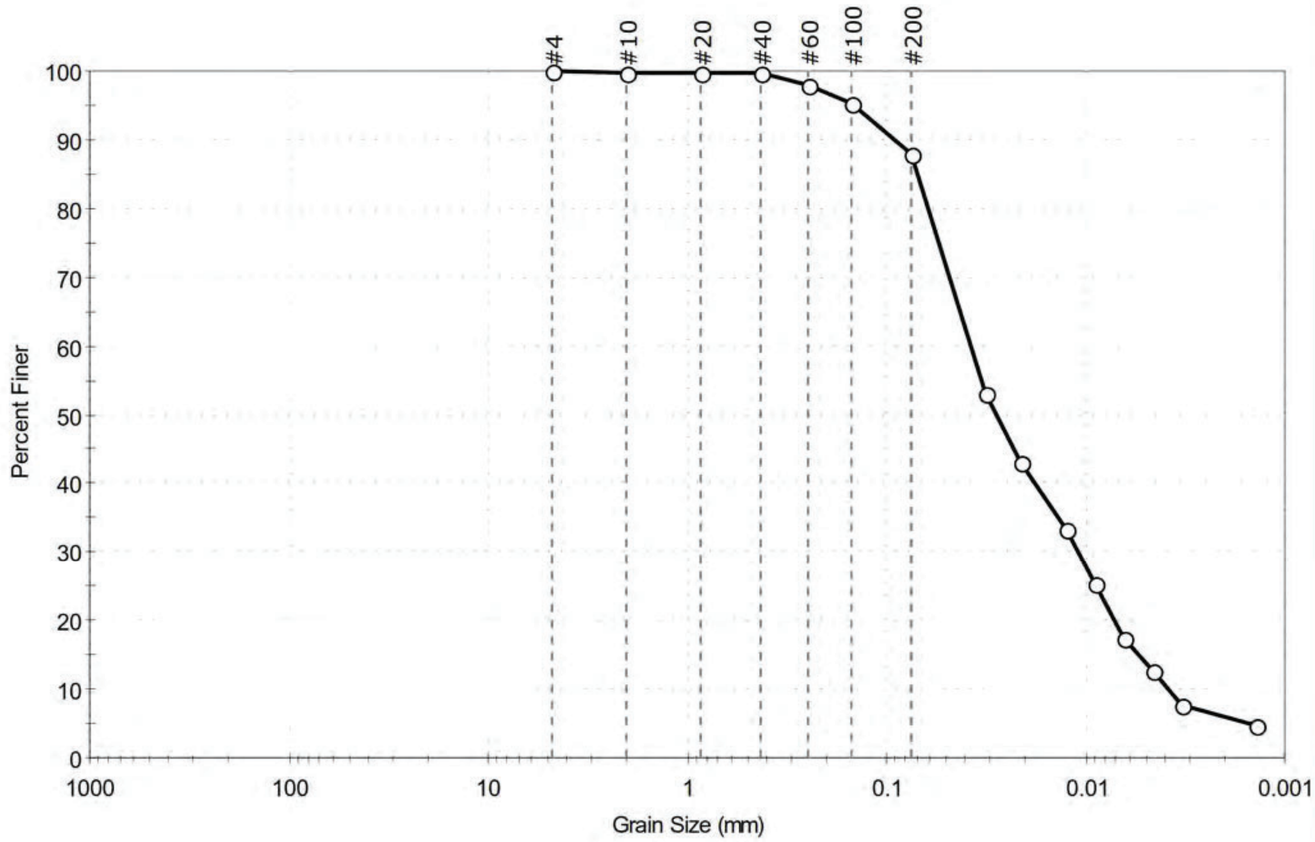
GeoTesting EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-103
Sample Type: tube
Tested By: GA
Sample ID: S-15 (TUBE)
Test Date: 04/14/16
Checked By: mcm
Depth : 58-60 ft
Test Id: 370806
Test Comment: ---
Visual Description: Moist, dark gray silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	12.1	87.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	98		
#100	0.15	95		
#200	0.075	88		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0320	53		
---	0.0210	43		
---	0.0124	33		
---	0.0090	25		
---	0.0065	17		
---	0.0047	13		
---	0.0033	8		
---	0.0014	5		

Coefficients

D_{85} =0.0700 mm	D_{30} =0.0108 mm
D_{60} =0.0379 mm	D_{15} =0.0055 mm
D_{50} =0.0281 mm	D_{10} =0.0039 mm
C_u =9.718	C_c =0.789

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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GeoTesting EXPRESS

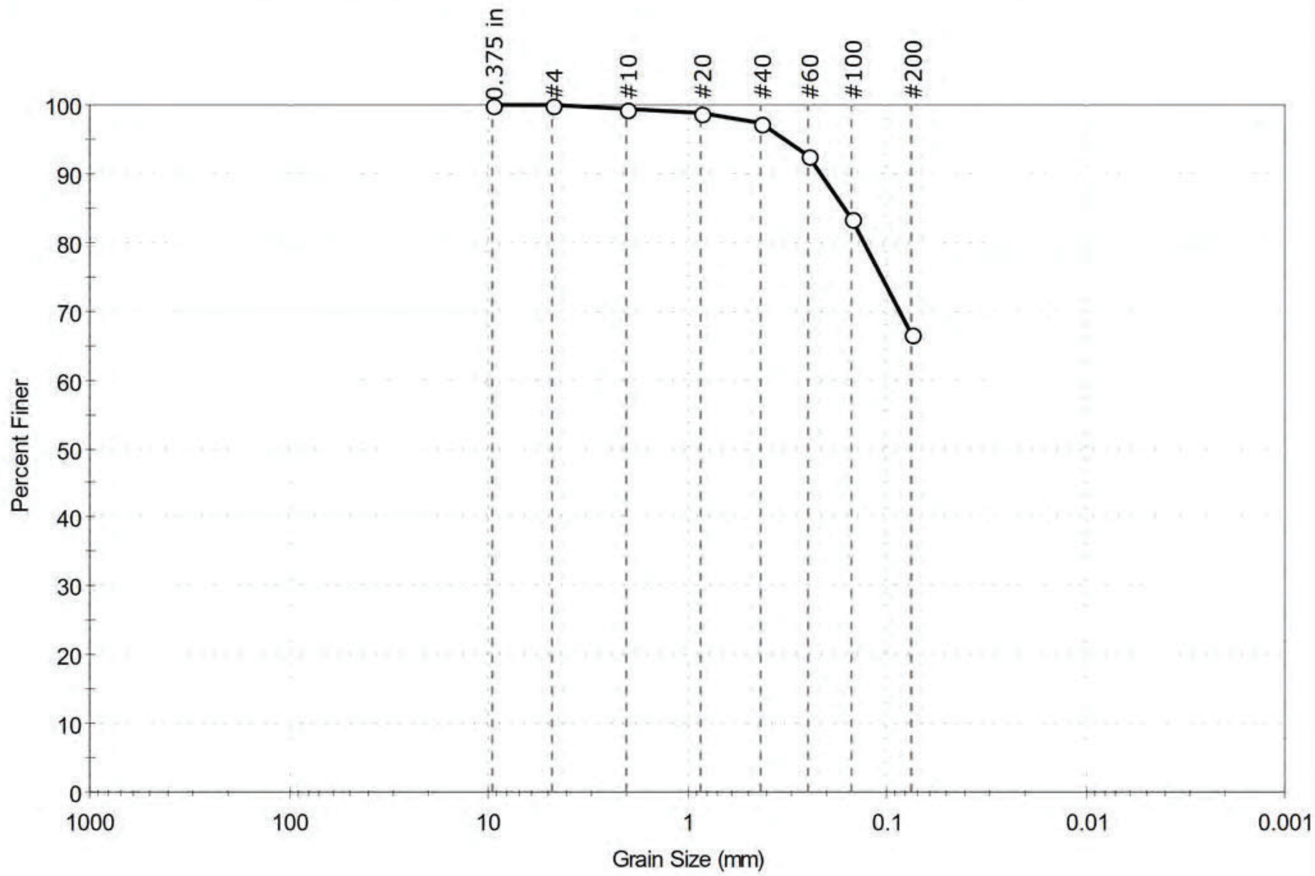
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	bag	Tested By:	GA
Sample ID:	S-17 (BAG)	Test Date:	04/05/16	Checked By:	mcm
Depth :	68.5-70 ft	Test Id:	370808		

Test Comment: ---

Visual Description: Moist, dark gray sandy silt (ASH)

Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.1	33.3	66.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	99		
#40	0.42	97		
#60	0.25	93		
#100	0.15	83		
#200	0.075	67		

Coefficients

D_{85} =0.1640 mm	D_{30} =N/A
D_{60} =N/A	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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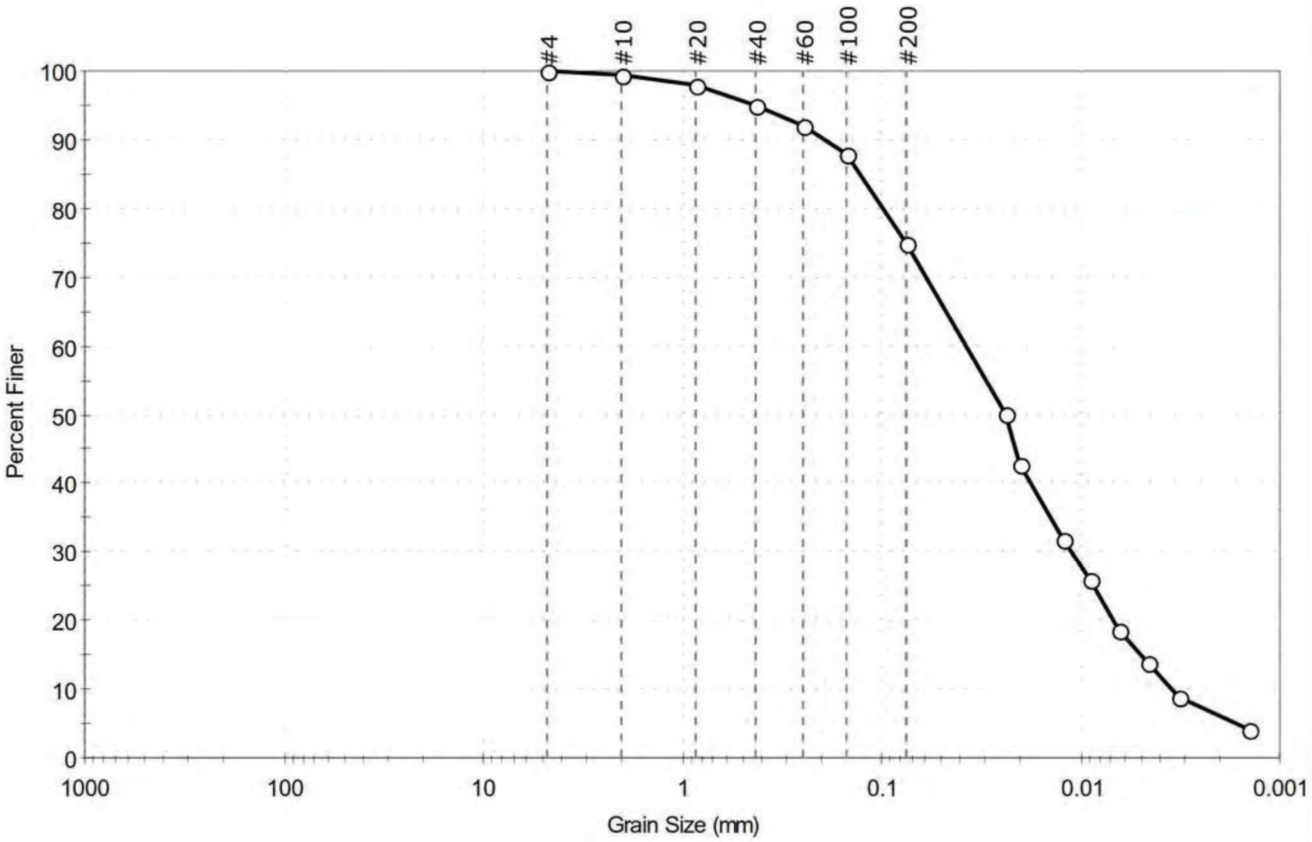
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	bag	Tested By:	GA
Sample ID:	S-19 (BAG)	Test Date:	04/12/16	Checked By:	mcm
Depth :	78.5-80 ft	Test Id:	370807		

Test Comment: ---
Visual Description: Moist, dark gray silt with sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	25.0	75.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	98		
#40	0.42	95		
#60	0.25	92		
#100	0.15	88		
#200	0.075	75		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0241	50		
---	0.0201	43		
---	0.0122	32		
---	0.0090	26		
---	0.0064	19		
---	0.0046	14		
---	0.0032	9		
---	0.0014	4		

Coefficients

D_{85} =0.1283 mm	D_{30} =0.0111 mm
D_{60} =0.0379 mm	D_{15} =0.0050 mm
D_{50} =0.0240 mm	D_{10} =0.0035 mm
C_u =10.829	C_c =0.929

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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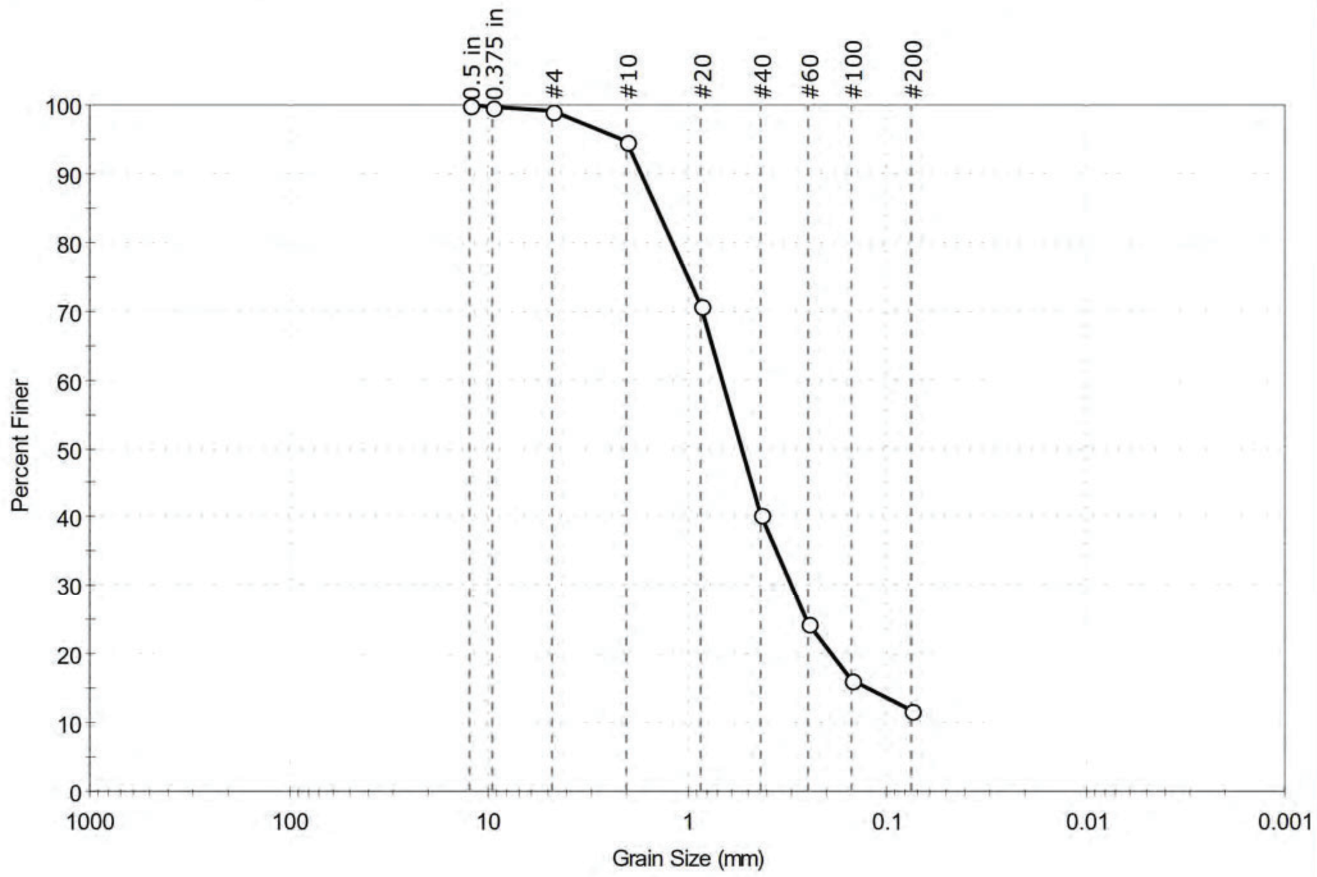
GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	bag	Tested By:	GA
Sample ID:	S-20 (BAG)	Test Date:	04/05/16	Checked By:	mcm
Depth :	83.5-85 ft	Test Id:	370809		

Test Comment: ---
Visual Description: Moist, brown sand with clay
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	1.0	87.3	11.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	95		
#20	0.85	71		
#40	0.42	41		
#60	0.25	25		
#100	0.15	16		
#200	0.075	12		

Coefficients

D_{85} =1.4153 mm	D_{30} =0.2993 mm
D_{60} =0.6648 mm	D_{15} =0.1235 mm
D_{50} =0.5285 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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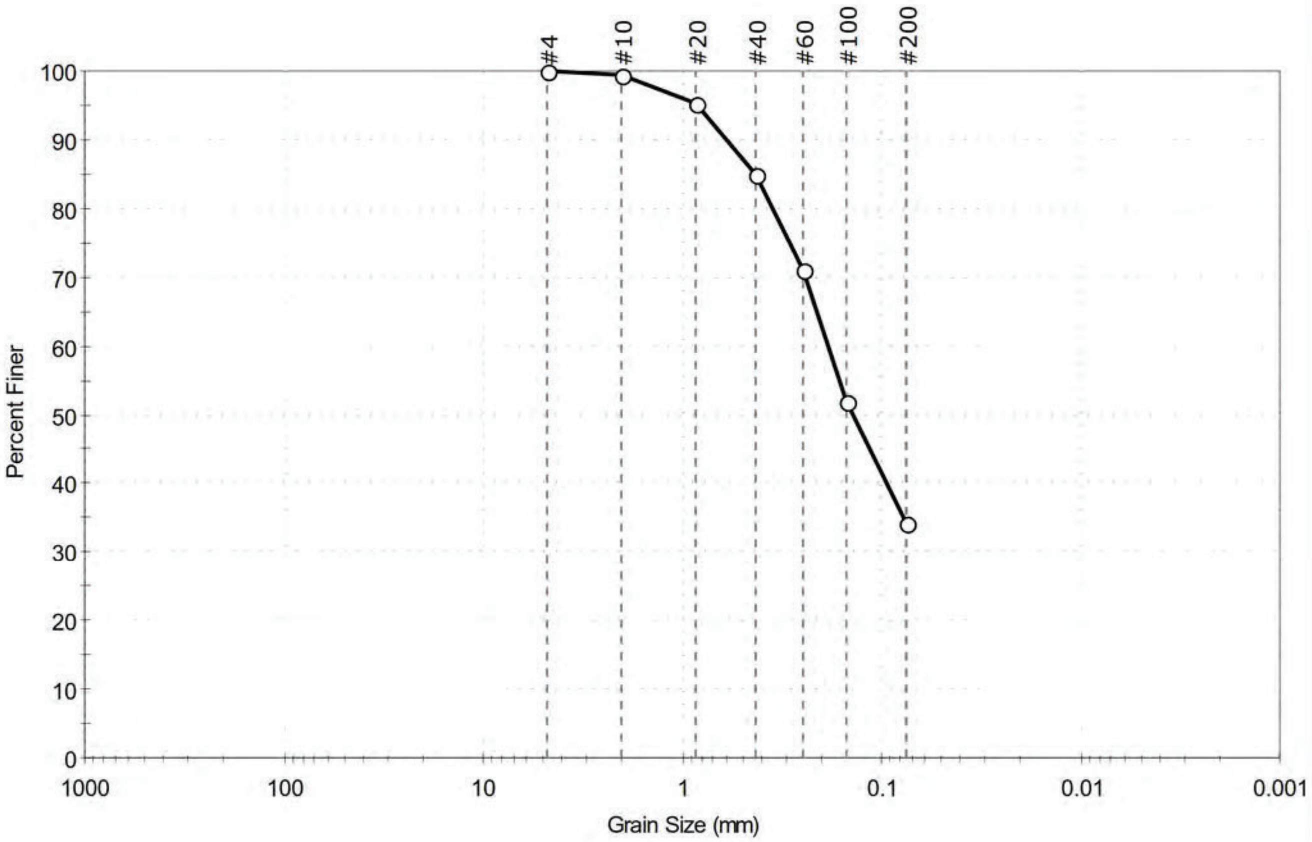
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	bag	Tested By:	GA
Sample ID:	S-22 (BAG)	Test Date:	04/05/16	Checked By:	mcm
Depth :	93.5-95 ft	Test Id:	370810		

Test Comment: ---
Visual Description: Moist, greenish gray clayey sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	65.8	34.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	95		
#40	0.42	85		
#60	0.25	71		
#100	0.15	52		
#200	0.075	34		

Coefficients

D_{85} =0.4259 mm	D_{30} =N/A
D_{60} =0.1859 mm	D_{15} =N/A
D_{50} =0.1385 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-103	Sample Type:	bag	Tested By:	GA
Sample ID:	S-10	Test Date:	06/03/16	Checked By:	n/a
Depth :	26-28 ft	Test Id:	380259		

Test Comment: ---
Visual Description: Moist, dark gray silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-10	B-103	26-28 ft	76	n/a	n/a	n/a	n/a	

Dry Strength: NONE
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/22/16	Checked By:	n/a
Depth :	---	Test Id:	370813		

Specific Gravity of Soils by ASTM D854

Boring ID	Sample ID	Depth	Visual Description	Specific Gravity	Comment
B-103	S-4 (TUBE)	8-10 ft	Moist, olive sandy silt (ASH)	2.37	
B-103	S-13 (TUBE)	48.5-50.5 ft	Moist, dark gray silt with sand (ASH)	2.34	
B-103	S-17 (BAG)	68.5-70 ft	Moist, dark gray sandy silt (ASH)	2.33	

Notes: Specific Gravity performed by using method B (oven dried specimens) of ASTM D854
Moisture Content determined by ASTM D2216.

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/14/16	Checked By:	mcm
Depth :	---	Test Id:	370828		

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	Sample ID	Depth	Visual Description	Bulk Density pcf	Moisture Content %	Dry Density pcf	*
B-103	S- 4 (TUBE)	8-10 ft	Moist, olive sandy silt (ASH)	109.5	38.05	79.33	(1)
B-103	S- 11 (TUBE)	38-40 ft	Moist, gray silt with sand (ASH)	90.71	77.33	51.15	(2)
B-103	S- 12 (TUBE)	43-45 ft	Moist, olive silt (ASH)	89.18	87.22	47.63	(3)
B-103	S- 13 (TUBE)	48.5-50.5 ft	Moist, dark gray silt with sand (ASH)	92.79	69.11	54.87	(4)
B-103	S- 14 (TUBE)	53-55 ft	Moist, olive silt (ASH)	90.06	70.13	52.94	(5)
B-103	S- 15 (TUBE)	58-60 ft	Moist, dark gray silt (ASH)	99.50	40.16	70.99	(6)

* Sample Comments

(1): Moisture Conent deternmined at 60° C for ash.
Method B-Cylinder, Intact
(2): Moisture Content determined at 60° C for ash.
Method B-Cylinder, Intact
(3): Moisture Content determined at 60° C for ash.
Method B-Cylinder, Intact
(4): Moisture Content determined at 60° C for ash.
Method B-Cylinder, Intact
(5): Moisture Content determined at 60° C for ash.
Method B-Cylinder, Intact
(6): Moisture Content determined at 60° C for ash.
Method B-Cylinder, Intact

Notes: Moisture Content determined by ASTM D2216.

GeoTesting
EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe County, GA		
GTX #:	304548		
Start Date:	4/12/2016	Tested By:	jcw
End Date:	4/18/2016	Checked By:	mcm
Boring #:	B-103		
Sample #:	S-11 (TUBE)		
Depth:	38-40 ft		
Visual Description:	Moist, olive silt (ASH)		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Gradient

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	6/7

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Moisture Content determined at 60° C for ash.

Assumed Specific Gravity: 2.35

Parameter	Initial	Final
Height, in	2.66	2.59
Diameter, in	2.85	2.85
Area, in^2	6.38	6.38
Volume, in^3	17.0	16.5
Mass, g	395	392
Bulk Density, pcf	89	90
Moisture Content, %	75.0	73.7
Dry Density, pcf	50.6	52.0
Degree of Saturation, %	93	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90.01	Increased Cell Pressure, psi:	94.99	Cell Pressure Increment, psi:	4.98
Sample Pressure, psi:	78.98	Corresponding Sample Pressure, psi:	83.69	Sample Pressure Increment, p	4.71
				B Coefficient:	0.95

FLOW DATA

Date	Time, sec	Pressure, psi			Gradient	Flow Volume, cc				Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Inlet	Outlet		In	Out	Δ In	Δ Out			
4/14	---	90.0	79.1	78.9	1.7	12.30	14.10	---	---	---	---	---
4/14	68	90.0	79.1	78.9	1.7	12.90	13.50	0.60	0.60	20.5	0.988	1.2E-04
4/14	----	90.0	79.1	78.9	1.7	13.40	13.90	---	---	---	---	---
4/14	66	90.0	79.1	78.9	1.7	13.90	13.40	0.50	0.50	20.5	0.988	1.1E-04
4/14	----	90.0	79.1	78.9	1.7	13.10	13.90	---	---	---	---	---
4/14	62	90.0	79.1	78.9	1.7	13.60	13.40	0.50	0.50	20.5	0.988	1.1E-04
4/14	----	90.0	79.1	78.9	1.7	13.30	14.00	---	---	---	---	---
4/14	63	90.0	79.1	78.9	1.7	13.80	13.50	0.50	0.50	20.5	0.988	1.1E-04

PERMEABILITY AT 20° C: 1.1×10^{-4} cm/sec (@ 11 psi effective stress)

GeoTesting EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe County, GA		
GTX #:	304548		
Start Date:	4/12/2016	Tested By:	jcw
End Date:	4/18/2016	Checked By:	mcm
Boring #:	B-103		
Sample #:	S-13 (TUBE)		
Depth:	48.5-50.5 ft		
Visual Description:	Moist, olive silt (ASH)		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Gradient

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	2/5

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Moisture Content determined at 60° CC for ash.

Assumed Specific Gravity: 2.35

Parameter	Initial	Final
Height, in	2.62	2.56
Diameter, in	2.86	2.84
Area, in^2	6.42	6.33
Volume, in^3	16.8	16.2
Mass, g	415	409
Bulk Density, pcf	94	96
Moisture Content, %	58.6	56.4
Dry Density, pcf	59.0	61.3
Degree of Saturation, %	93	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90.03	Increased Cell Pressure, psi:	96.54	Cell Pressure Increment, psi:	6.51
Sample Pressure, psi:	76.99	Corresponding Sample Pressure, psi:	83.18	Sample Pressure Increment, p	6.19
				B Coefficient:	0.95

FLOW DATA

	Time,	Pressure, psi				Flow Volume, cc				Temp,		Permeability K @ 20 °C,
Date	sec	Cell	Inlet	Outlet	Gradient	In	Out	Δ In	Δ Out	°C	R_t	cm/sec
4/14	---	90.0	77.2	76.8	4.3	12.30	13.70	---	---	---	---	---
4/14	35	90.0	77.2	76.8	4.3	12.70	13.30	0.40	0.40	20.5	0.988	6.4E-05
4/14	----	90.0	77.2	76.8	4.3	12.60	13.60	---	---	---	---	---
4/14	36	90.0	77.2	76.8	4.3	13.00	13.20	0.40	0.40	20.5	0.988	6.2E-05
4/14	----	90.0	77.2	76.8	4.3	12.80	13.50	---	---	---	---	---
4/14	35	90.0	77.2	76.8	4.3	13.20	13.10	0.40	0.40	20.5	0.988	6.4E-05
4/14	----	90.0	77.2	76.8	4.3	12.70	13.30	---	---	---	---	---
4/14	36	90.0	77.2	76.8	4.3	13.10	12.90	0.40	0.40	20.5	0.988	6.2E-05

PERMEABILITY AT 20° C: 6.3×10^{-5} cm/sec (@ 13 psi effective stress)

GeoTesting
EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe County, GA		
GTX #:	304548		
Start Date:	4/12/2016	Tested By:	jcw
End Date:	4/18/2016	Checked By:	mcm
Boring #:	B-103		
Sample #:	S-15 (TUBE)		
Depth:	58-60 ft		
Visual Description:	Moist, olive silt (ASH)		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Gradient

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	8/13

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Moisture Content determined at 60° C for ash.

Assumed Specific Gravity: 2.35

Parameter	Initial	Final
Height, in	3.49	3.39
Diameter, in	2.86	2.84
Area, in^2	6.42	6.33
Volume, in^3	22.4	21.5
Mass, g	544	543
Bulk Density, pcf	92	96
Moisture Content, %	55.9	55.6
Dry Density, pcf	59.1	61.7
Degree of Saturation, %	89	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90.01	Increased Cell Pressure, psi:	95.11	Cell Pressure Increment, psi:	5.10
Sample Pressure, psi:	74.98	Corresponding Sample Pressure, psi:	79.91	Sample Pressure Increment, p	4.93
				B Coefficient:	0.97

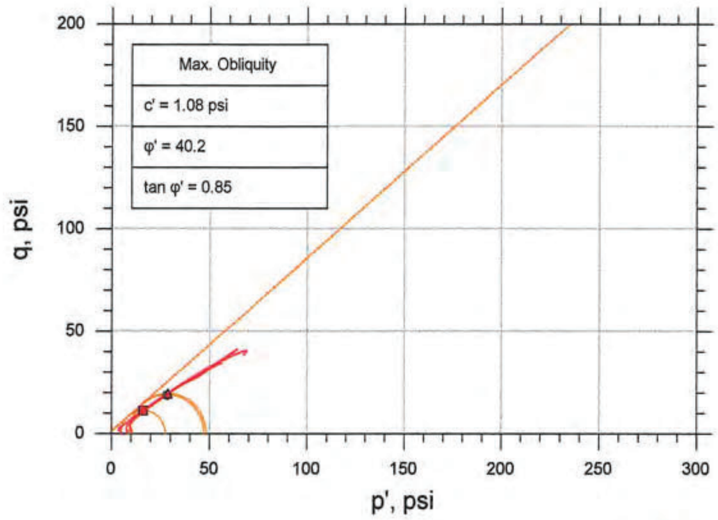
FLOW DATA

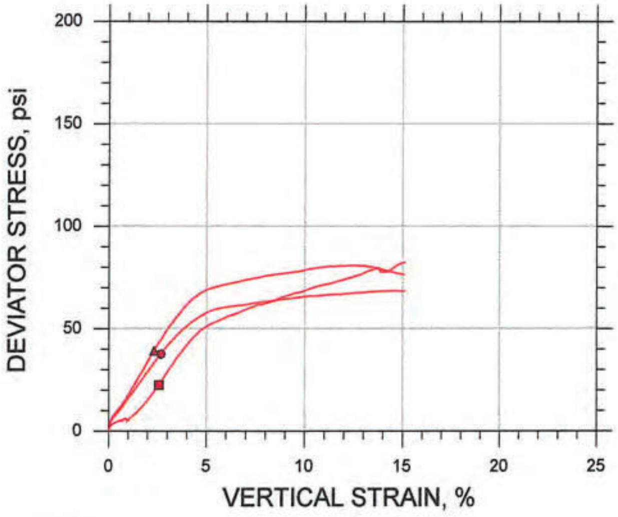
Date	Time, sec	Pressure, psi			Gradient	Flow Volume, cc				Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Inlet	Outlet		In	Out	Δ In	Δ Out			
4/14	---	90.0	75.11	74.91	1.6	12.40	13.50	---	---	---	---	---
4/14	40	90.0	75.1	74.9	1.6	12.80	13.10	0.40	0.40	20.5	0.988	1.5E-04
4/14	----	90.0	75.1	74.9	1.6	12.50	13.40	---	---	---	---	---
4/14	38	90.0	75.1	74.9	1.6	12.90	13.00	0.40	0.40	20.5	0.988	1.6E-04
4/14	----	90.0	75.1	74.9	1.6	13.00	13.50	---	---	---	---	---
4/14	41	90.0	75.1	74.9	1.6	13.40	13.10	0.40	0.40	20.5	0.988	1.4E-04
4/14	----	90.0	75.1	74.9	1.6	13.10	13.50	---	---	---	---	---
4/14	40	90.0	75.1	74.9	1.6	13.50	13.10	0.40	0.40	20.5	0.988	1.5E-04

PERMEABILITY AT 20° C: 1.5 x 10^{-4} cm/sec (@ 15 psi effective stress)

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: md	Checked By: mcm
Boring ID: B-103	
Preparation: intact	
Description: Moist, olive sandy silt (ASH)	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Measured Specific Gravity: 2.37

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

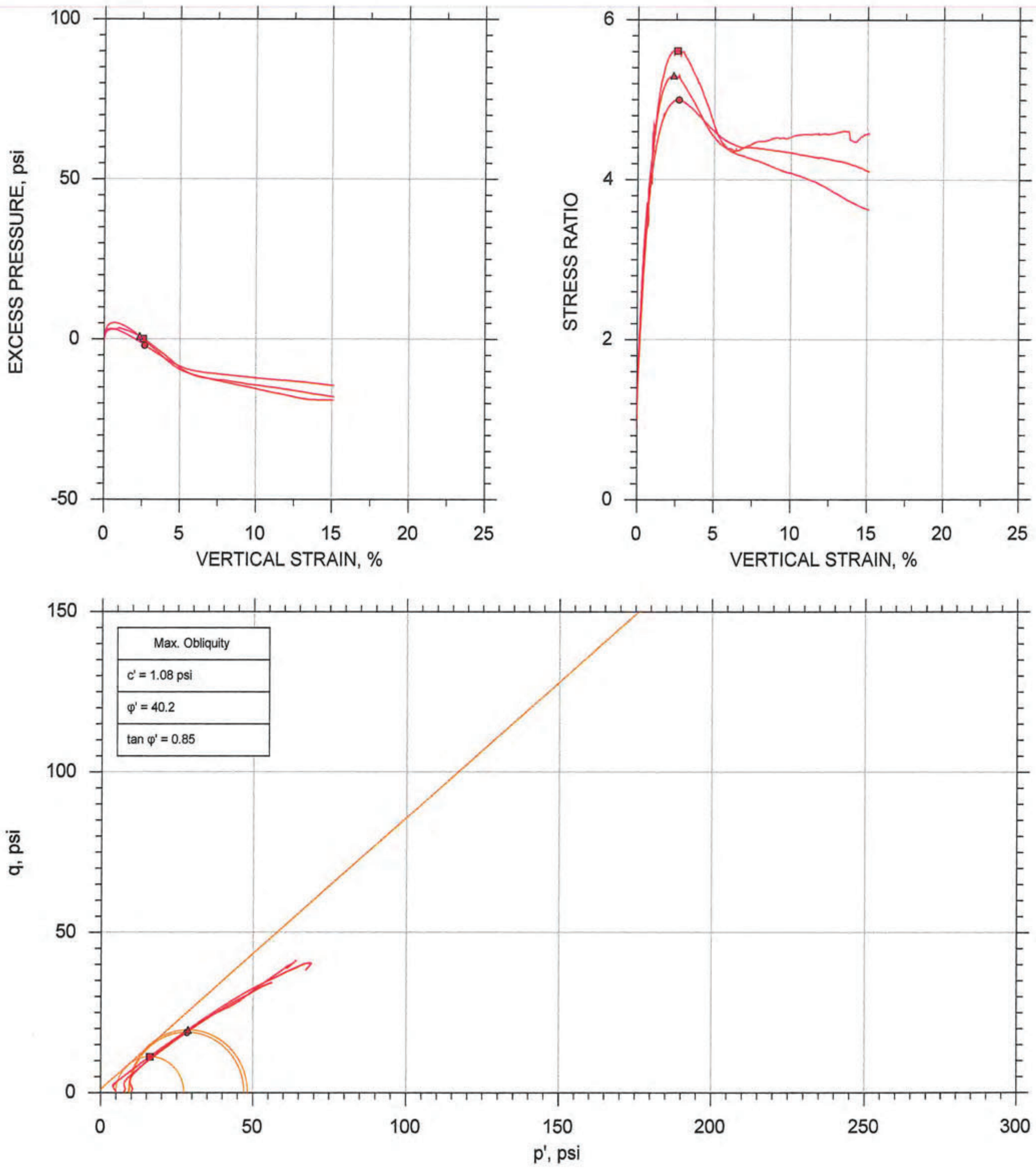




	Symbol	■	●	▲	
	Sample ID	S-4 (TUBE))	S-4 (TUBE)	S-4 (TUBE)	
	Depth, ft	8-10 ft	8-10 ft	8-10 ft	
	Test Number	CU-3-1	CU-3-2	CU-3-3	
Initial	Height, in	5.900	5.960	6.200	
	Diameter, in	2.870	2.870	2.860	
	Moisture Content (from Cuttings), %	34.2	31.3	38.1	
	Dry Density, pcf	81.7	84.1	79.3	
	Saturation (Wet Method), %	99.8	98.3	104.2	
	Void Ratio	0.812	0.751	0.865	
Before Shear	Moisture Content, %	32.6	30.9	36.0	
	Dry Density, pcf	83.5	85.2	79.8	
	Cross-sectional Area (Method A), in^2	6.383	6.391	6.385	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	0.772	0.730	0.853	
	Back Pressure, psi	95.00	79.00	142.9	
	Vertical Effective Consolidation Stress, psi	4.998	7.498	9.991	
	Horizontal Effective Consolidation Stress, psi	5.008	7.499	9.993	
	Vertical Strain after Consolidation, %	0.2485	0.02150	0.1096	
	Volumetric Strain after Consolidation, %	0.3286	1.242	0.8717	
	Time to 50% Consolidation, min	1.000	1.000	1.000	
	Shear Strength, psi	11.24	18.84	19.58	
	Strain at Failure, %	2.58	2.68	2.33	
	Strain Rate, %/min	0.01600	0.01600	0.01600	
	Deviator Stress at Failure, psi	22.49	37.68	39.17	
	Effective Minor Principal Stress at Failure, psi	4.876	9.421	9.102	
	Effective Major Principal Stress at Failure, psi	27.36	47.10	48.27	
	B-Value	0.95	0.95	0.96	
	Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Specific Gravity determined by ASTM D854. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:				

Moisture Content determined at 60° C for ash.

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



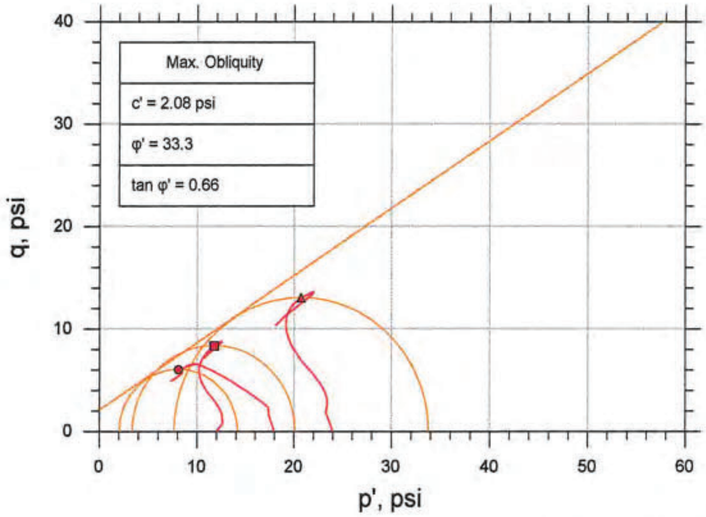
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	S-4 (TUBE))	CU-3-1	8-10 ft	md	4/2/16	mcm	4/19/16	304548-CU-3-1m.dat
●	S-4 (TUBE)	CU-3-2	8-10 ft	md	4/2/16	mcm	4/19/16	304548-CU-3-2m.dat
▲	S-4 (TUBE)	CU-3-3	8-10 ft	md	4/2/16	mcm	4/19/16	304548-CU-3-3m.dat

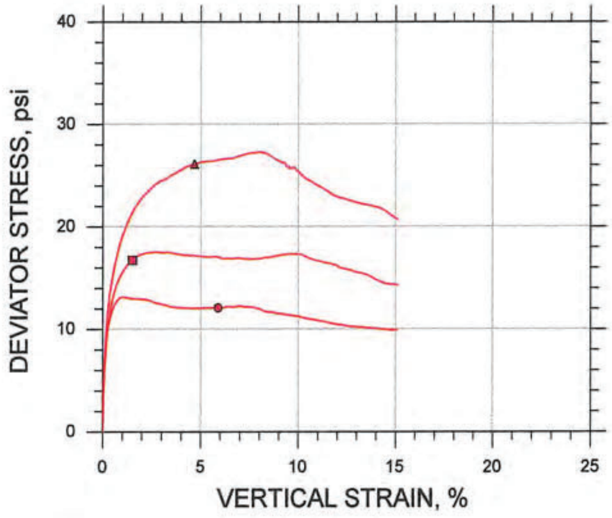
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-103	Sample Type: intact	
	Description: Moist, olive sandy silt (ASH)		
	Remarks: Moisture Content determined at 60° C for ash.		

GeoTesting EXPRESS

Client: AECOM	
Project Name: SCS Plant Scherer Ph. 2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: md	Checked By: mcm
Boring ID: B-103	
Preparation: intact	
Description: Moist, olive silt (ASH)	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Estimated Specific Gravity: 2.35

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

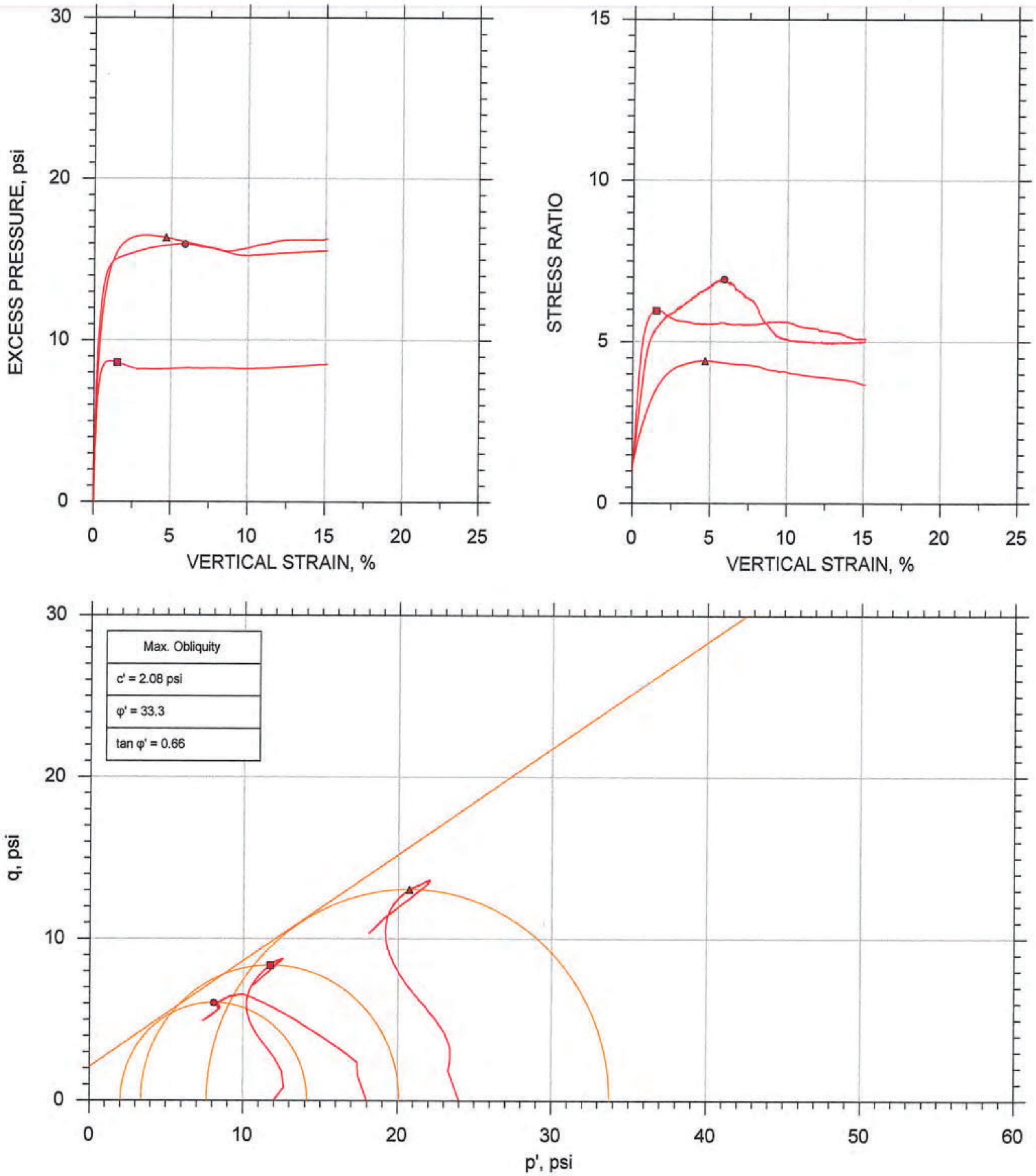




Symbol		■	●	▲	
Sample ID		S-12 (TUBE)	S-12 (TUBE)	S-12 (TUBE)	
Depth, ft		43-45 ft	43-45 ft	43-45 ft	
Test Number		CU-2-1	CU-2-2	CU-2-3	
Initial	Height, in	6.000	5.980	6.310	
	Diameter, in	2.850	2.850	2.860	
	Moisture Content (from Cuttings), %	70.1	73.5	61.8	
	Dry Density, pcf	54.2	51.4	58.0	
	Saturation (Wet Method), %	96.6	93.2	87.6	
	Void Ratio	1.71	1.85	1.90	
Before Shear	Moisture Content, %	71.7	75.2	66.4	
	Dry Density, pcf	54.7	53.0	60.4	
	Cross-sectional Area (Method A), in²	6.351	6.284	6.367	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	1.68	1.77	1.79	
	Back Pressure, psi	140.9	140.9	142.9	
Vertical Effective Consolidation Stress, psi		11.98	17.91	23.82	
Horizontal Effective Consolidation Stress, psi		11.99	17.99	23.98	
Vertical Strain after Consolidation, %		0.3724	1.604	2.992	
Volumetric Strain after Consolidation, %		0.9120	3.089	3.818	
Time to 50% Consolidation, min		1.210	1.210	0.6400	
Shear Strength, psi		8.366	6.050	13.05	
Strain at Failure, %		1.51	5.89	4.67	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		16.73	12.10	26.11	
Effective Minor Principal Stress at Failure, psi		3.374	2.038	7.653	
Effective Major Principal Stress at Failure, psi		20.11	14.14	33.76	
B-Value		0.95	0.96	0.95	
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:					

Moisture content determined at 60° C for ash.

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



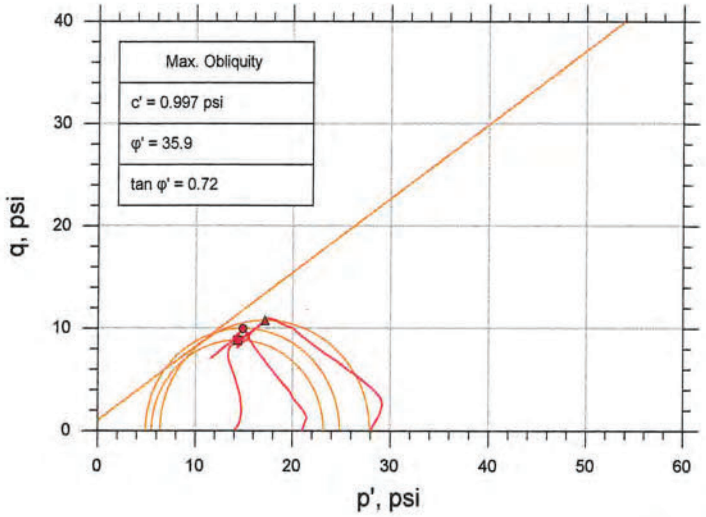
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	S-12 (TUBE)	CU-2-1	43-45 ft	md	4/2/16	mcm	4/19/16	304548-CU-2-1m.dat
●	S-12 (TUBE)	CU-2-2	43-45 ft	md	4/2/16	mcm	4/19/16	304548-CU-2-2m.dat
▲	S-12 (TUBE)	CU-2-3	43-45 ft	md	4/2/16	mcm	4/19/16	304548-CU-2-3m.dat

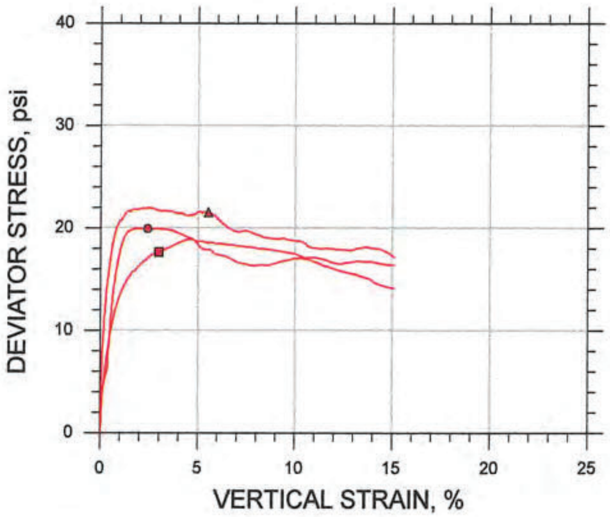
GeoTesting EXPRESS

Project: SCS Plant Scherer Ph. 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Sample Type: intact	
Description: Moist, olive silt (ASH)		
Remarks: Moisture content determined at 60° C for ash.		

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: md	Checked By: mcm
Boring ID: B-103	
Preparation: intact	
Description: Moist, olive silt (ASH)	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Estimated Specific Gravity: 2.35

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

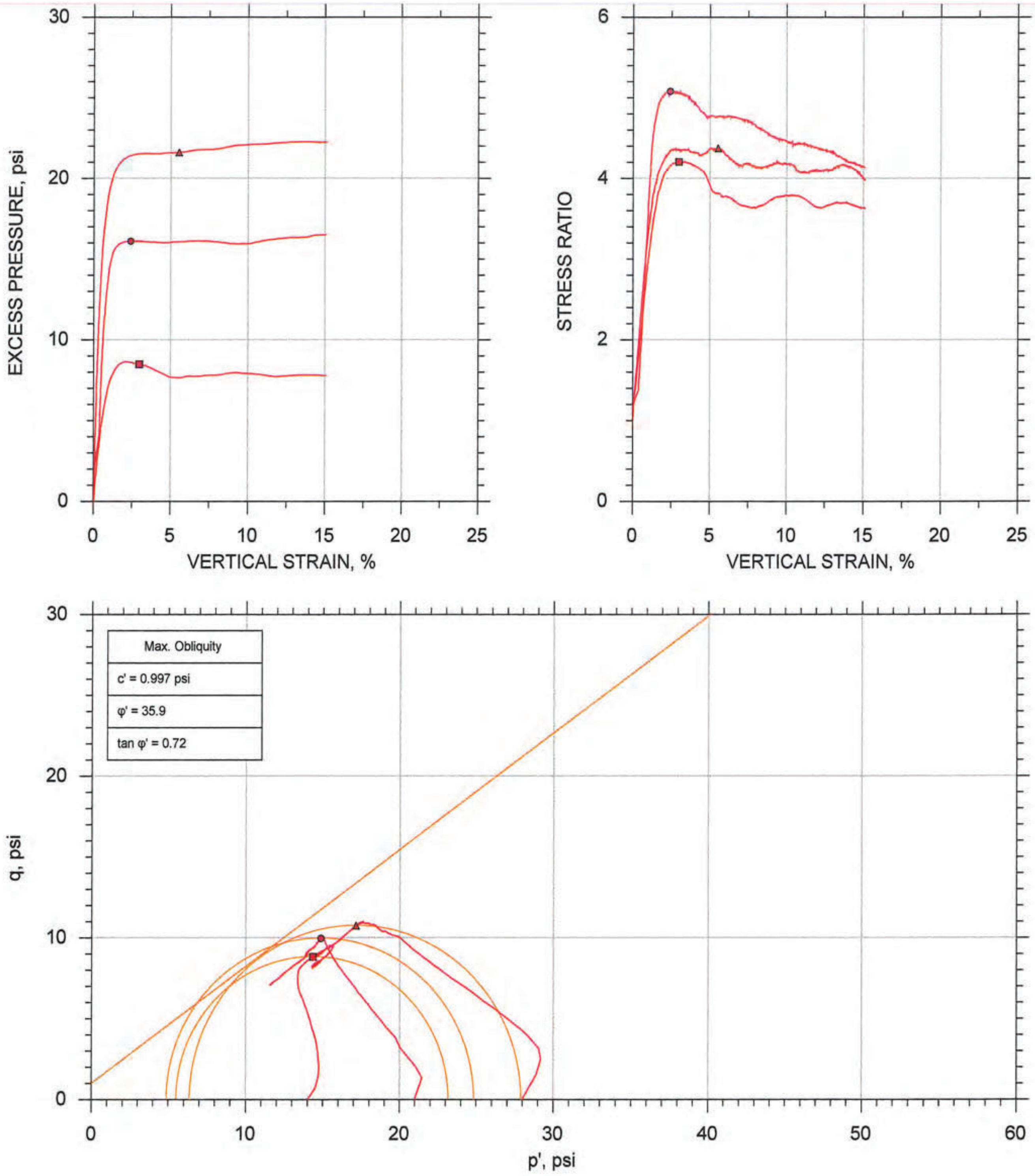




Symbol		🟥	●	▲
Sample ID		S-14 (TUBE)	S-14 (TUBE)	S-14 (TUBE)
Depth, ft		53-55 ft	53-55 ft	53-55 ft
Test Number		CU-1-1	CU-1-2	CU-1-3
Initial	Height, in	4.100	4.500	4.650
	Diameter, in	2.030	2.030	2.040
	Moisture Content (from Cuttings), %	71.5	70.1	69.7
	Dry Density, pcf	63.8	52.9	53.0
	Saturation (Wet Method), %	129.4	93.0	92.5
	Void Ratio	1.30	1.77	1.77
Before Shear	Moisture Content, %	67.3	73.5	70.6
	Dry Density, pcf	56.8	53.8	55.2
	Cross-sectional Area (Method A), in²	3.784	3.197	3.195
	Saturation, %	100.0	100.0	100.0
	Void Ratio	1.58	1.73	1.66
	Back Pressure, psi	32.99	140.8	142.8
Vertical Effective Consolidation Stress, psi		13.72	20.96	27.86
Horizontal Effective Consolidation Stress, psi		14.00	21.00	27.99
Vertical Strain after Consolidation, %		3.471	0.4620	1.649
Volumetric Strain after Consolidation, %		-14.07	1.940	3.503
Time to 50% Consolidation, min		0.6400	0.6400	0.6400
Shear Strength, psi		8.833	9.974	10.76
Strain at Failure, %		2.98	2.40	5.53
Strain Rate, %/min		0.01600	0.01600	0.01600
Deviator Stress at Failure, psi		17.67	19.95	21.52
Effective Minor Principal Stress at Failure, psi		5.511	4.887	6.379
Effective Major Principal Stress at Failure, psi		23.18	24.84	27.90
B-Value		0.96	0.96	0.95
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:				

Moisture Content determined at 60° C for ash.

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

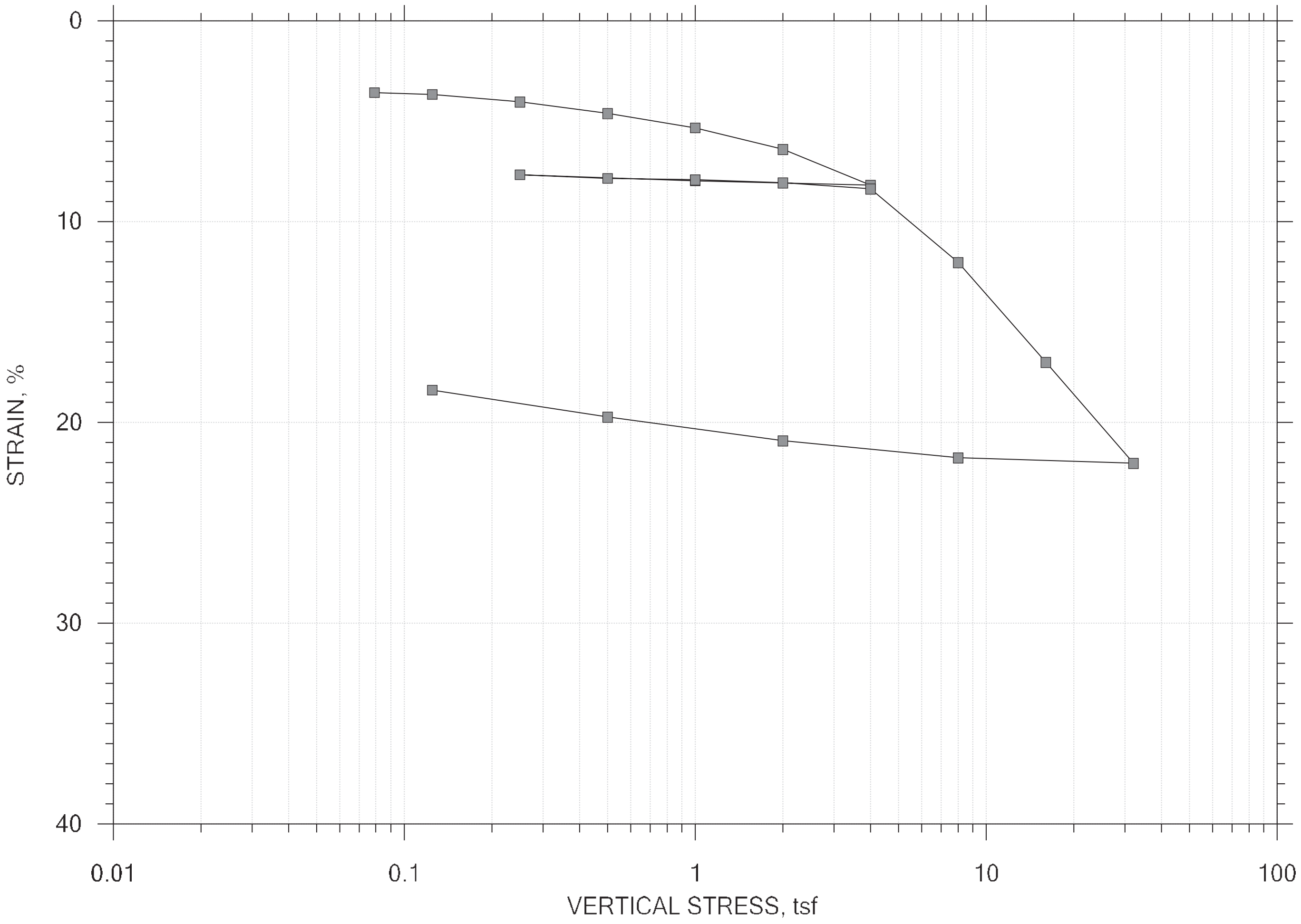


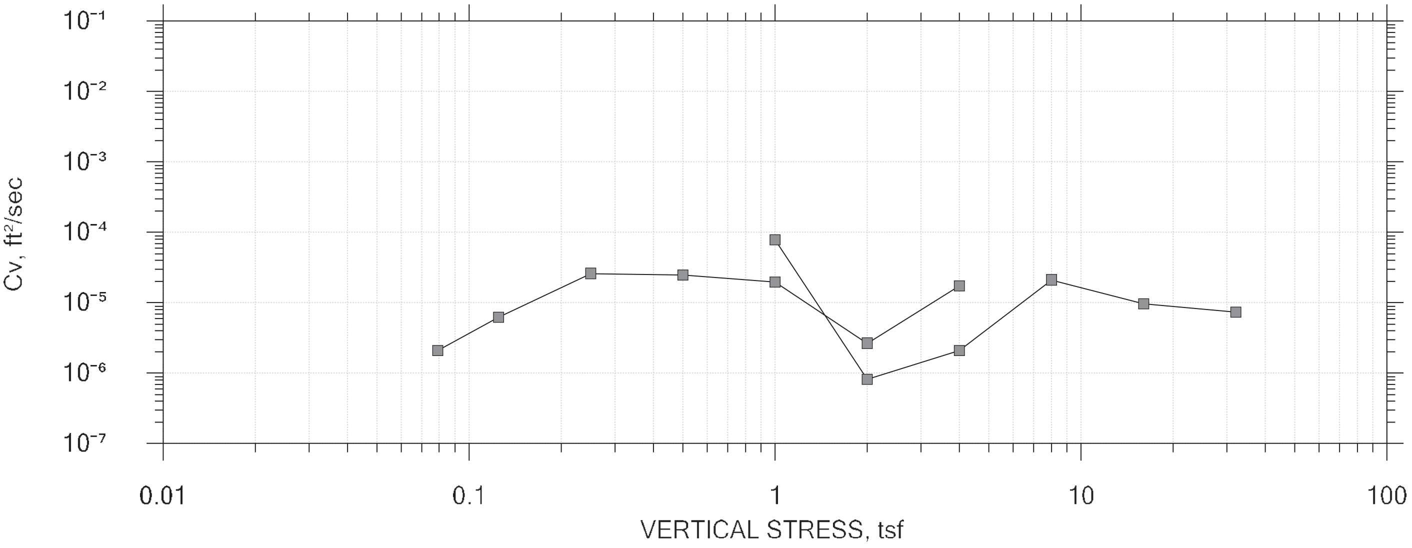
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	S-14 (TUBE)	CU-1-1	53-55 ft	md	4/1/16	mcm	4/21/16	304548-CU-1-1m.dat
●	S-14 (TUBE)	CU-1-2	53-55 ft	md	4/1/16	mcm	4/21/16	304548-CU-1-2m.dat
▲	S-14 (TUBE)	CU-1-3	53-55 ft	md	4/1/16	mcm	4/21/16	304548-CU-1-3m.dat

GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-103	Sample Type: intact	
	Description: Moist, olive silt (ASH)		
	Remarks: Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

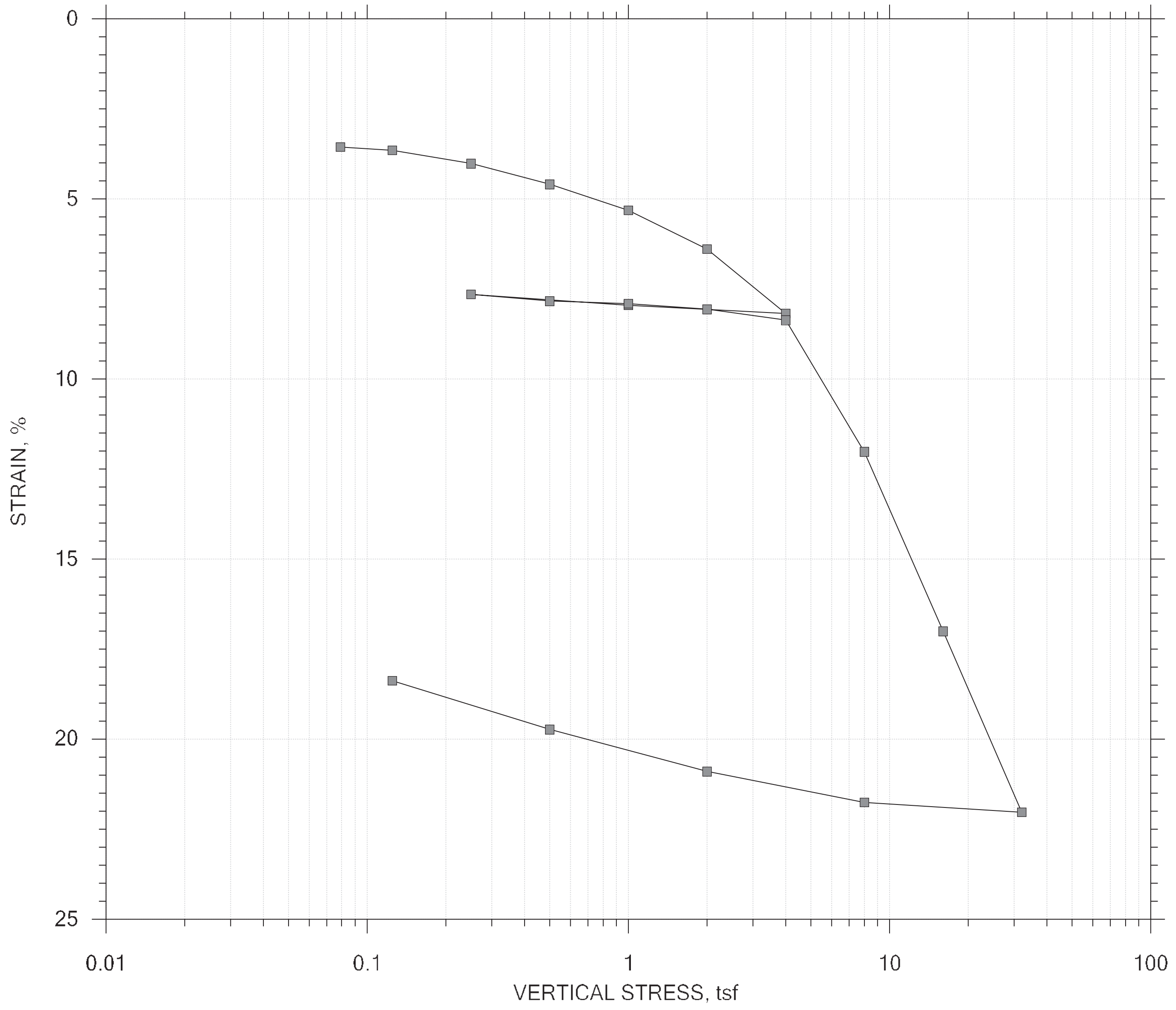




GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
	Boring No.: B-103	Tested By: jm	Checked By: mcm
	Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
	Depth: 38-40 ft	Sample Type: intact	Elevation: ---
	Description: Moist. dark gray silt with sand (ASH)		
	Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: ---				Water Content, %	65.66	52.67
Preconsolidation Stress: ---				Dry Unit Weight, pcf	55.107	64.491
Compression Ratio: ---				Saturation, %	94.94	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.57	1.19
LL: ---	PL: ---	PI: ---	GS: 2.27			

Project: SCS Plant Scherer Ph.2	Location: Monroe, GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph.2
Location: Monroe, GA
Project No.: GTX-304432
Boring No.: B-103
Tested By: jm
Checked By: mcm
Sample No.: S-11
Test Date: 4/2/16
Depth: 38-40 ft
Test No.: IP-1
Sample Type: intact
Elevation: ---

Soil Description: Moist, dark gray silt with sand (ASH)
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.

Estimated Specific Gravity: 2.27
Initial Void Ratio: 1.57
Final Void Ratio: 1.19
Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.85 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	a6	RING	5077	a10
Wt. Container + Wet Soil, gm	102.97	328.03	318.81	124.55
Wt. Container + Dry Soil, gm	66.010	281.41	281.41	87.230
Wt. Container, gm	16.920	210.40	210.40	16.380
Wt. Dry Soil, gm	49.090	71.007	71.007	70.850
Water Content, %	75.29	65.66	52.67	52.67
Void Ratio	---	1.57	1.19	---
Degree of Saturation, %	---	94.94	100.00	---
Dry Unit Weight, pcf	---	55.107	64.491	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph.2	Location: Monroe, GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Depth: 38-40 ft
Test No.: IP-1	Sample Type: intact	Elevation: ---

Soil Description: Moist, dark gray silt with sand (ASH)
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k cm/sec
1	0.0792	0.03558	1.48	3.56	9.065	2.61e-006	4.49e-001	1.12e-006
2	0.125	0.03655	1.47	3.65	4.731	4.82e-006	2.10e-002	9.64e-008
3	0.250	0.04025	1.46	4.02	1.083	2.09e-005	2.96e-002	5.90e-007
4	0.500	0.04601	1.45	4.60	1.184	1.90e-005	2.31e-002	4.16e-007
5	1.00	0.05321	1.43	5.32	1.157	1.91e-005	1.44e-002	2.62e-007
6	2.00	0.06392	1.40	6.39	8.608	2.53e-006	1.07e-002	2.57e-008
7	4.00	0.08183	1.36	8.18	1.268	1.66e-005	8.96e-003	1.42e-007
8	1.00	0.07953	1.36	7.95	0.793	2.62e-005	7.68e-004	1.91e-008
9	0.250	0.07654	1.37	7.65	3.299	6.32e-006	3.99e-003	2.40e-008
10	0.500	0.07837	1.37	7.84	0.000	0.00e+000	7.34e-003	0.00e+000
11	1.00	0.07909	1.36	7.91	0.381	5.47e-005	1.44e-003	7.47e-008
12	2.00	0.08066	1.36	8.07	30.546	6.80e-007	1.57e-003	1.02e-009
13	4.00	0.08370	1.35	8.37	10.409	1.99e-006	1.52e-003	2.87e-009
14	8.00	0.1203	1.26	12.0	1.305	1.52e-005	9.14e-003	1.32e-007
15	16.0	0.1701	1.13	17.0	3.152	5.69e-006	6.22e-003	3.37e-008
16	32.0	0.2203	1.00	22.0	3.303	4.81e-006	3.14e-003	1.44e-008
17	8.00	0.2176	1.01	21.8	15.474	9.67e-007	1.14e-004	1.05e-010
18	2.00	0.2091	1.03	20.9	61.312	2.48e-007	1.42e-003	3.34e-010
19	0.500	0.1973	1.06	19.7	0.844	1.85e-005	7.82e-003	1.37e-007
20	0.125	0.1839	1.10	18.4	1.226	1.31e-005	3.59e-002	4.48e-007

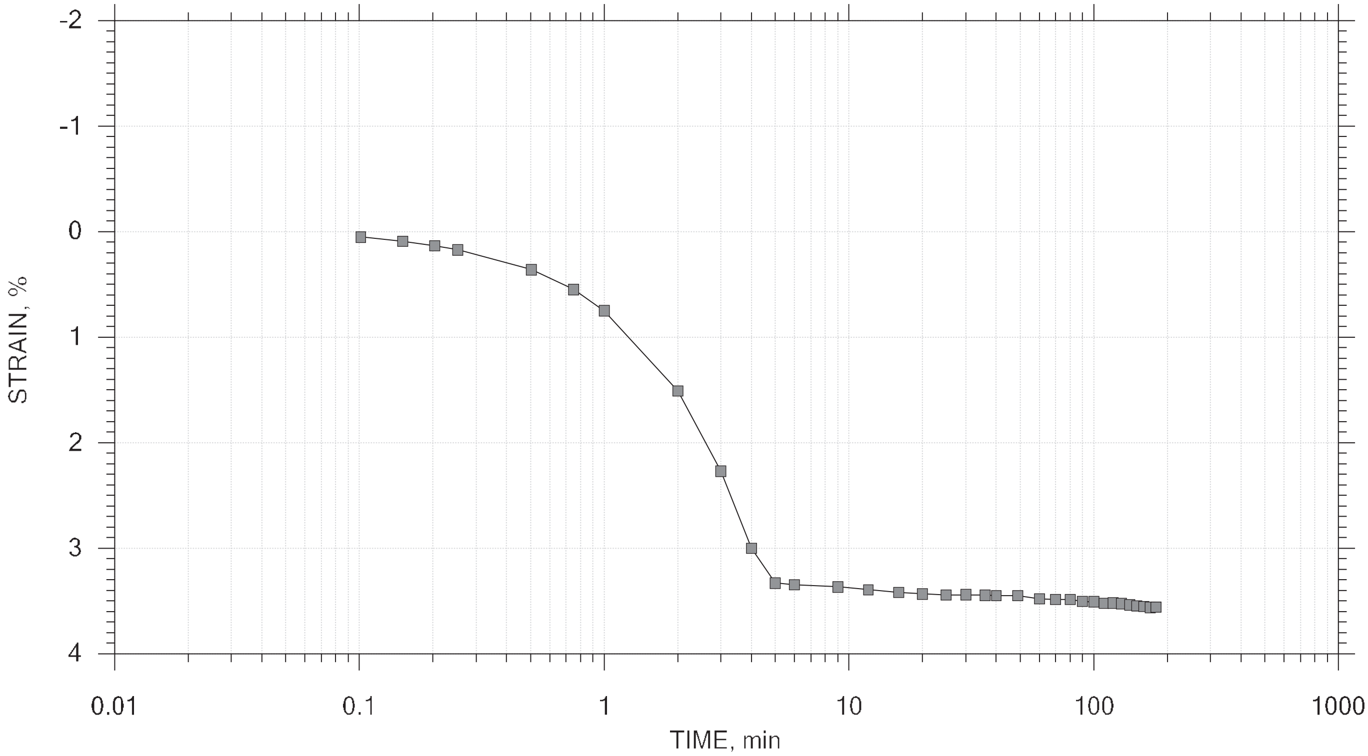
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k cm/sec	Ca %
1	0.0792	0.03558	1.48	3.56	0.000	0.00e+000	4.49e-001	0.00e+000	0.00e+000
2	0.125	0.03655	1.47	3.65	0.689	7.69e-006	2.10e-002	1.54e-007	0.00e+000
3	0.250	0.04025	1.46	4.02	0.174	3.04e-005	2.96e-002	8.55e-007	0.00e+000
4	0.500	0.04601	1.45	4.60	0.160	3.27e-005	2.31e-002	7.17e-007	0.00e+000
5	1.00	0.05321	1.43	5.32	0.000	0.00e+000	1.44e-002	0.00e+000	0.00e+000
6	2.00	0.06392	1.40	6.39	0.000	0.00e+000	1.07e-002	0.00e+000	0.00e+000
7	4.00	0.08183	1.36	8.18	0.000	0.00e+000	8.96e-003	0.00e+000	0.00e+000
8	1.00	0.07953	1.36	7.95	0.000	0.00e+000	7.68e-004	0.00e+000	0.00e+000
9	0.250	0.07654	1.37	7.65	0.000	0.00e+000	3.99e-003	0.00e+000	0.00e+000
10	0.500	0.07837	1.37	7.84	0.000	0.00e+000	7.34e-003	0.00e+000	0.00e+000
11	1.00	0.07909	1.36	7.91	0.000	0.00e+000	1.44e-003	0.00e+000	0.00e+000
12	2.00	0.08066	1.36	8.07	0.000	0.00e+000	1.57e-003	0.00e+000	0.00e+000
13	4.00	0.08370	1.35	8.37	0.000	0.00e+000	1.52e-003	0.00e+000	0.00e+000
14	8.00	0.1203	1.26	12.0	0.146	3.14e-005	9.14e-003	2.73e-007	0.00e+000
15	16.0	0.1701	1.13	17.0	0.201	2.08e-005	6.22e-003	1.23e-007	0.00e+000
16	32.0	0.2203	1.00	22.0	0.295	1.25e-005	3.14e-003	3.75e-008	0.00e+000
17	8.00	0.2176	1.01	21.8	0.000	0.00e+000	1.14e-004	0.00e+000	0.00e+000
18	2.00	0.2091	1.03	20.9	0.000	0.00e+000	1.42e-003	0.00e+000	0.00e+000
19	0.500	0.1973	1.06	19.7	0.138	2.62e-005	7.82e-003	1.95e-007	0.00e+000
20	0.125	0.1839	1.10	18.4	0.000	0.00e+000	3.59e-002	0.00e+000	0.00e+000

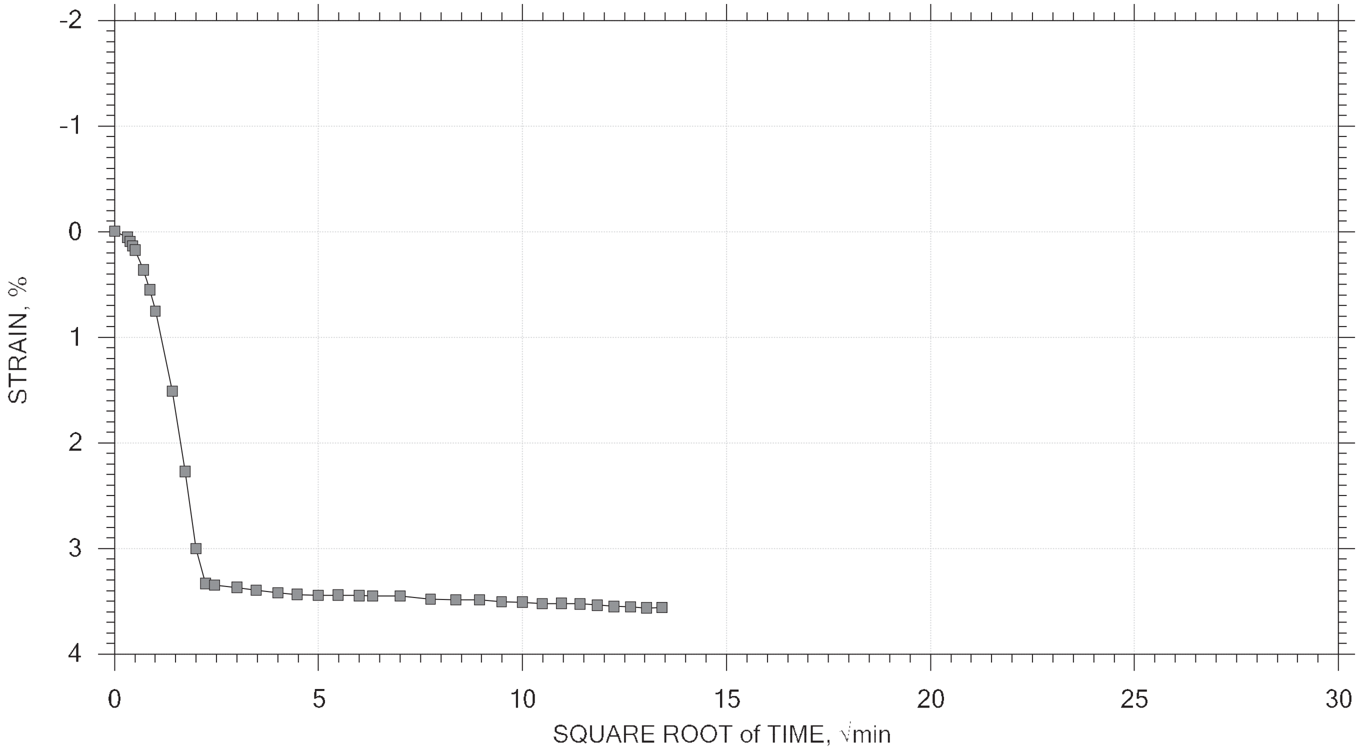
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 20

Stress: 0.079167 tsf





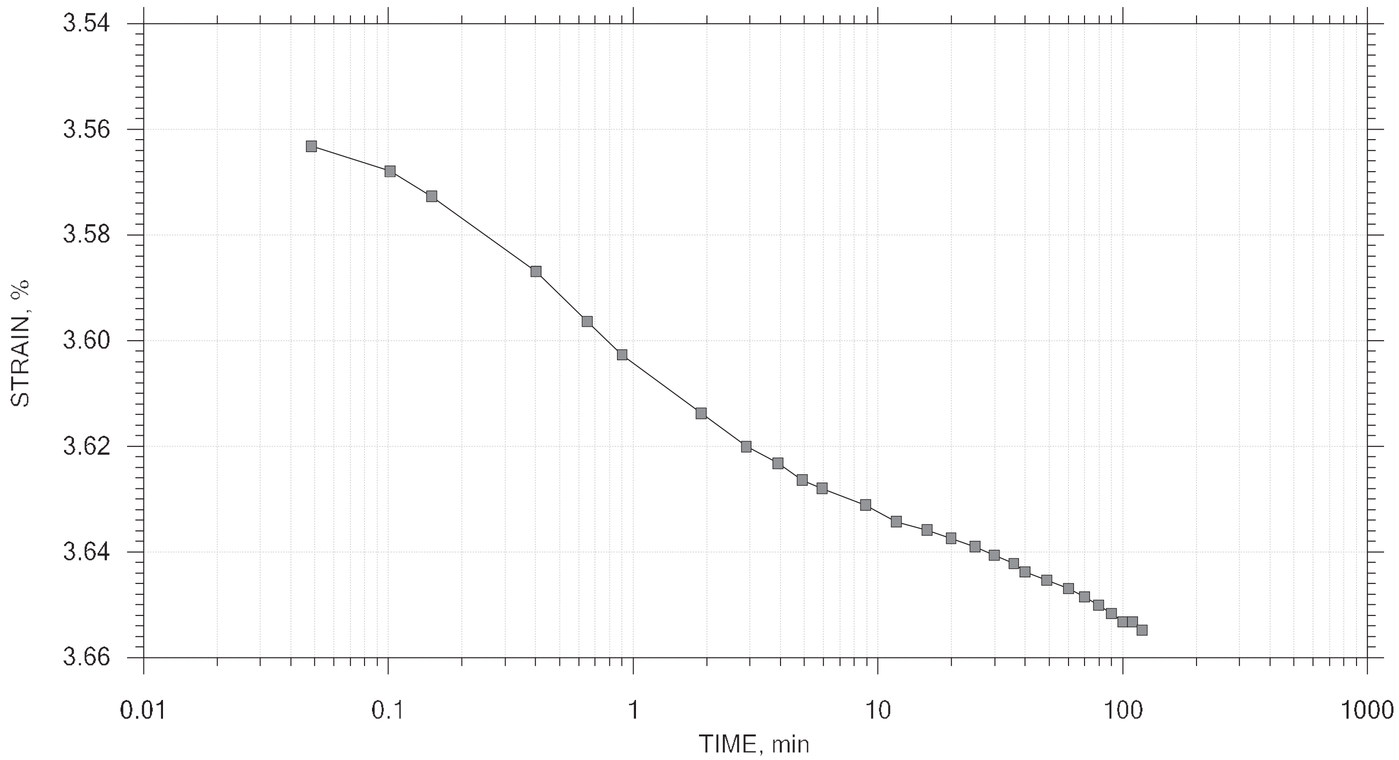
Project: SCS Plant Scherer Ph.2	Location: Monroe, GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

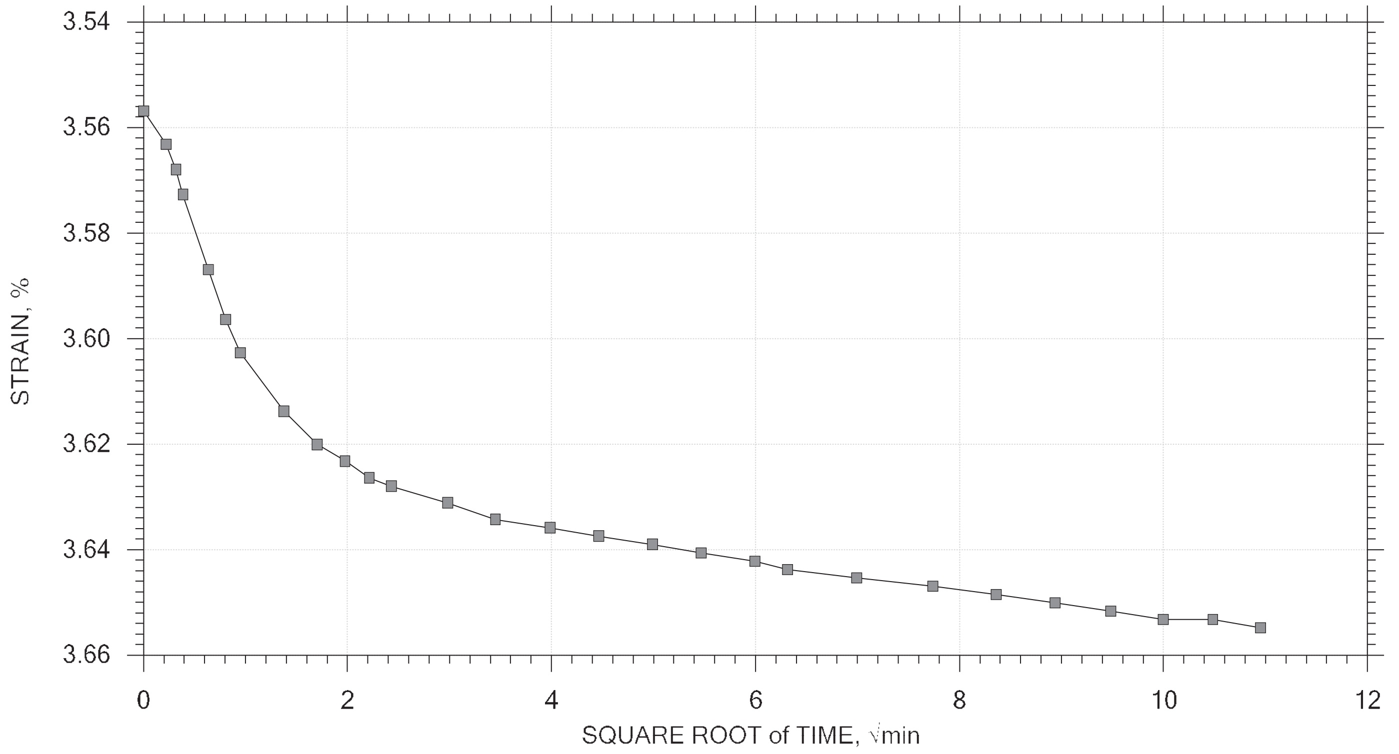
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 20

Stress: 0.125 tsf





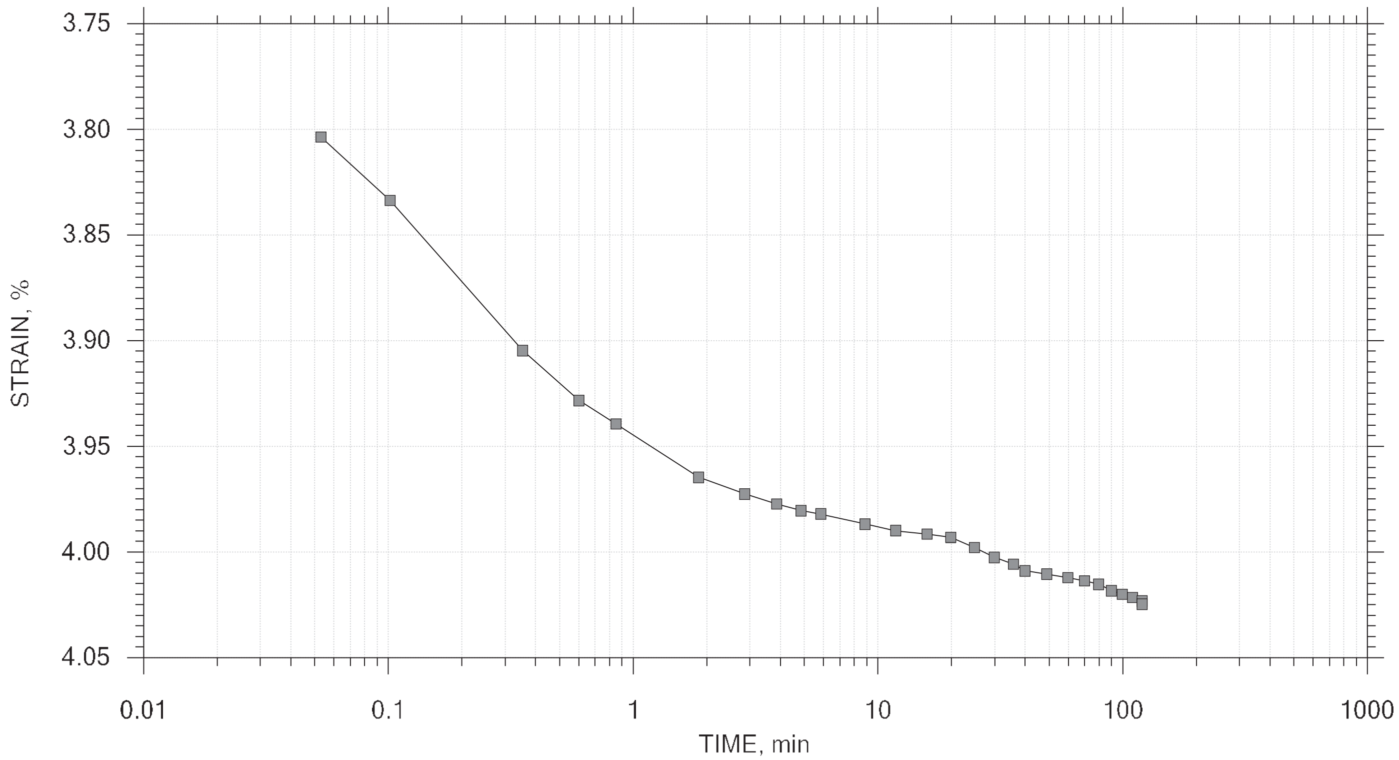
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
	Boring No.: B-103	Tested By: jm	Checked By: mcm
	Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
	Depth: 38-40 ft	Sample Type: intact	Elevation: ---
	Description: Moist. dark gray silt with sand (ASH)		
	Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

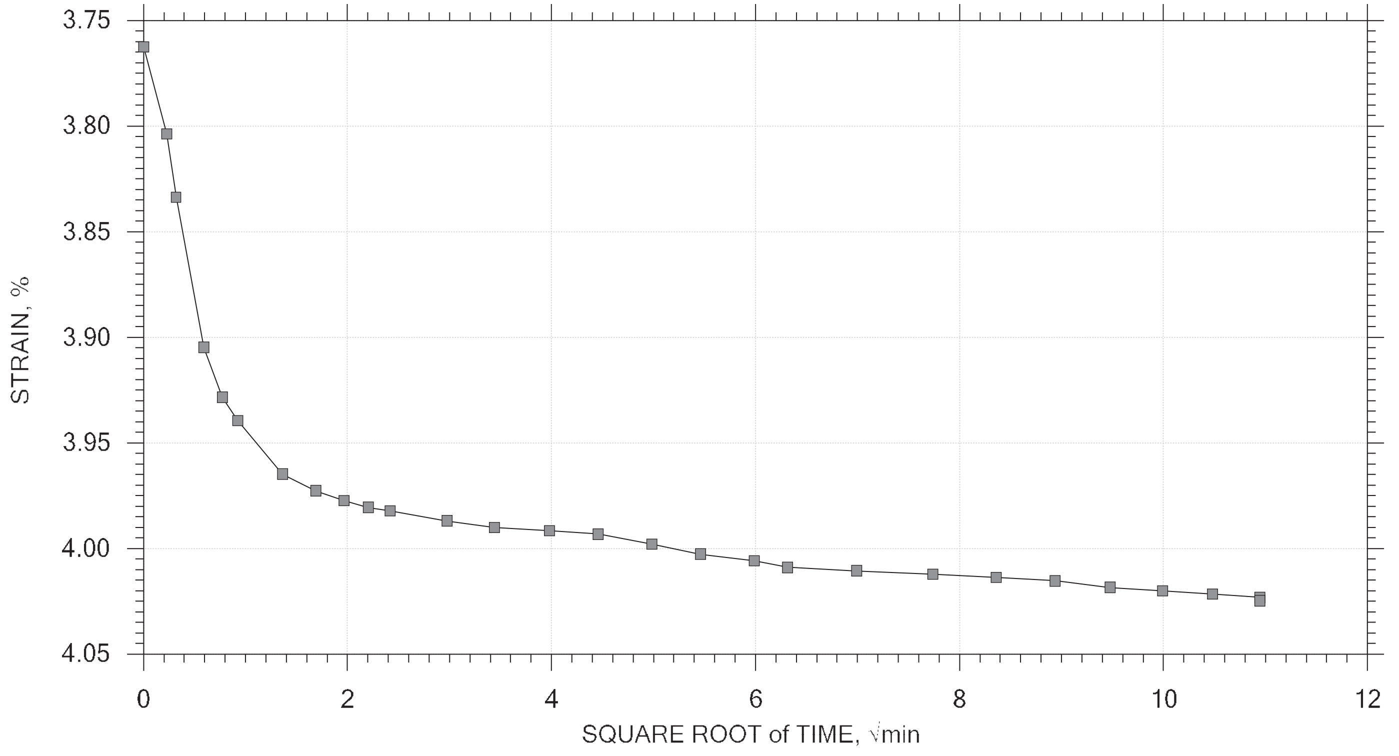
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 20

Stress: 0.25 tsf





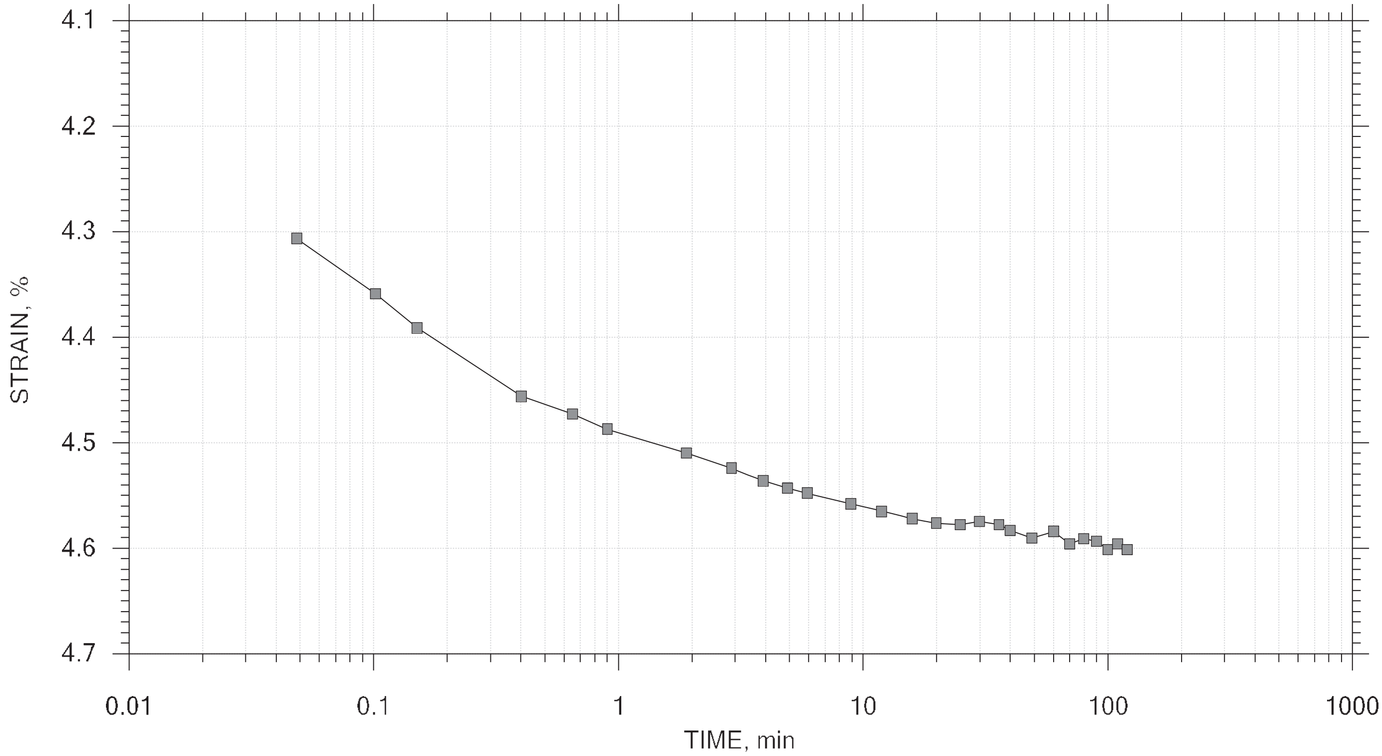
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

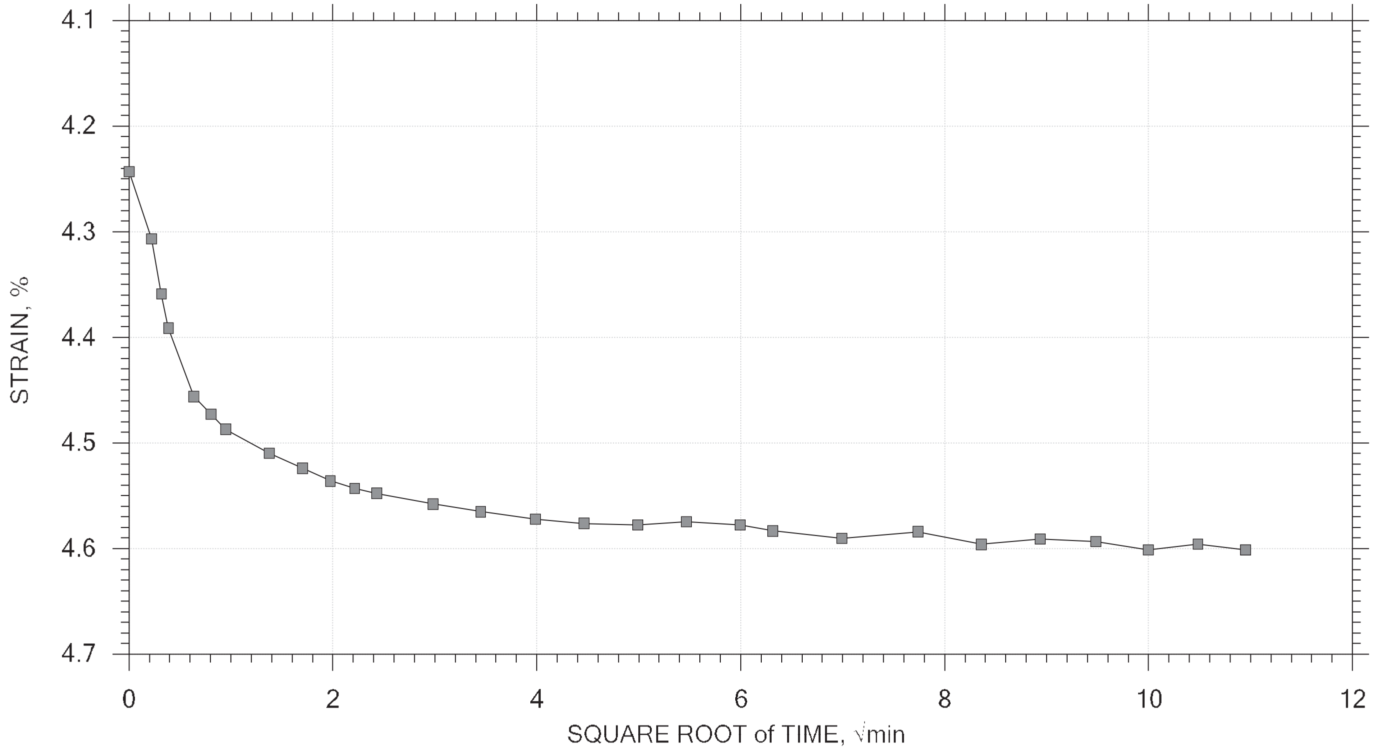
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 20

Stress: 0.5 tsf





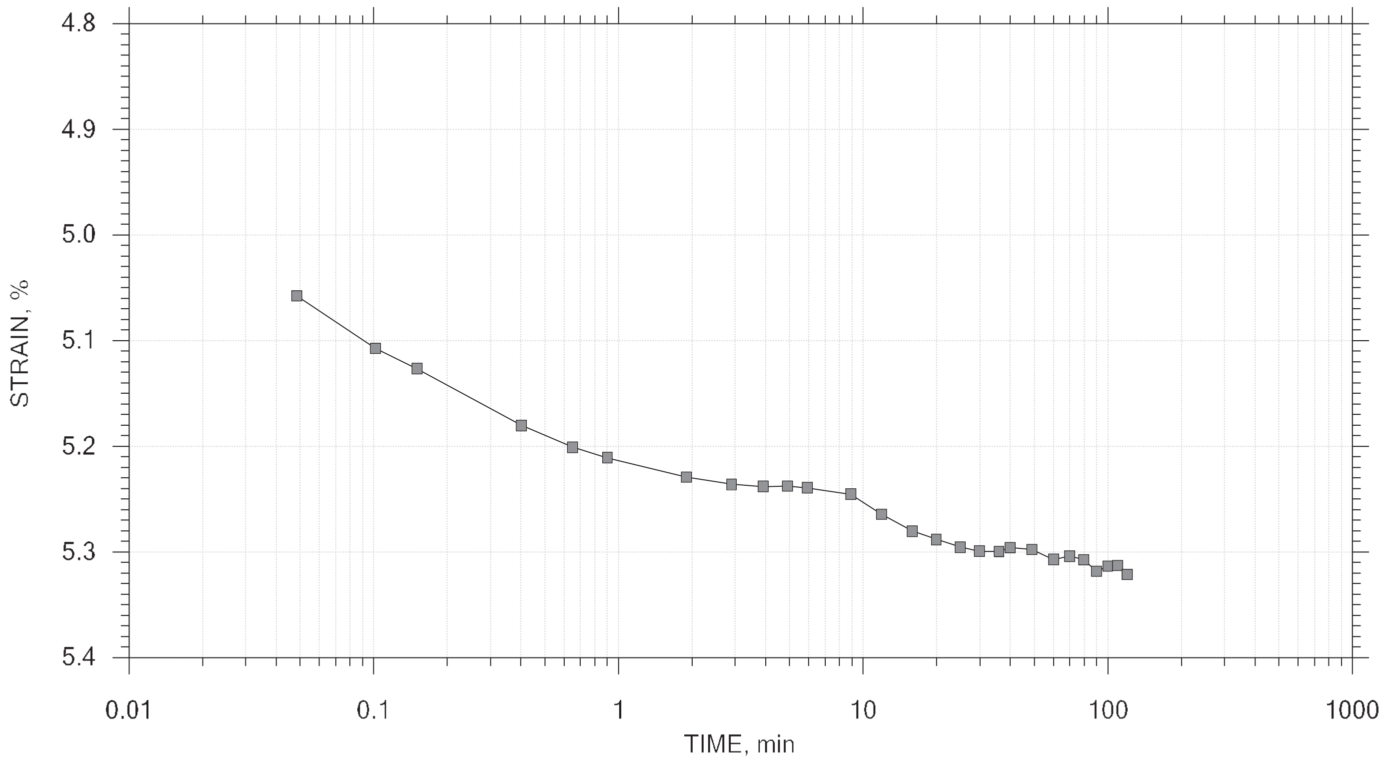
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

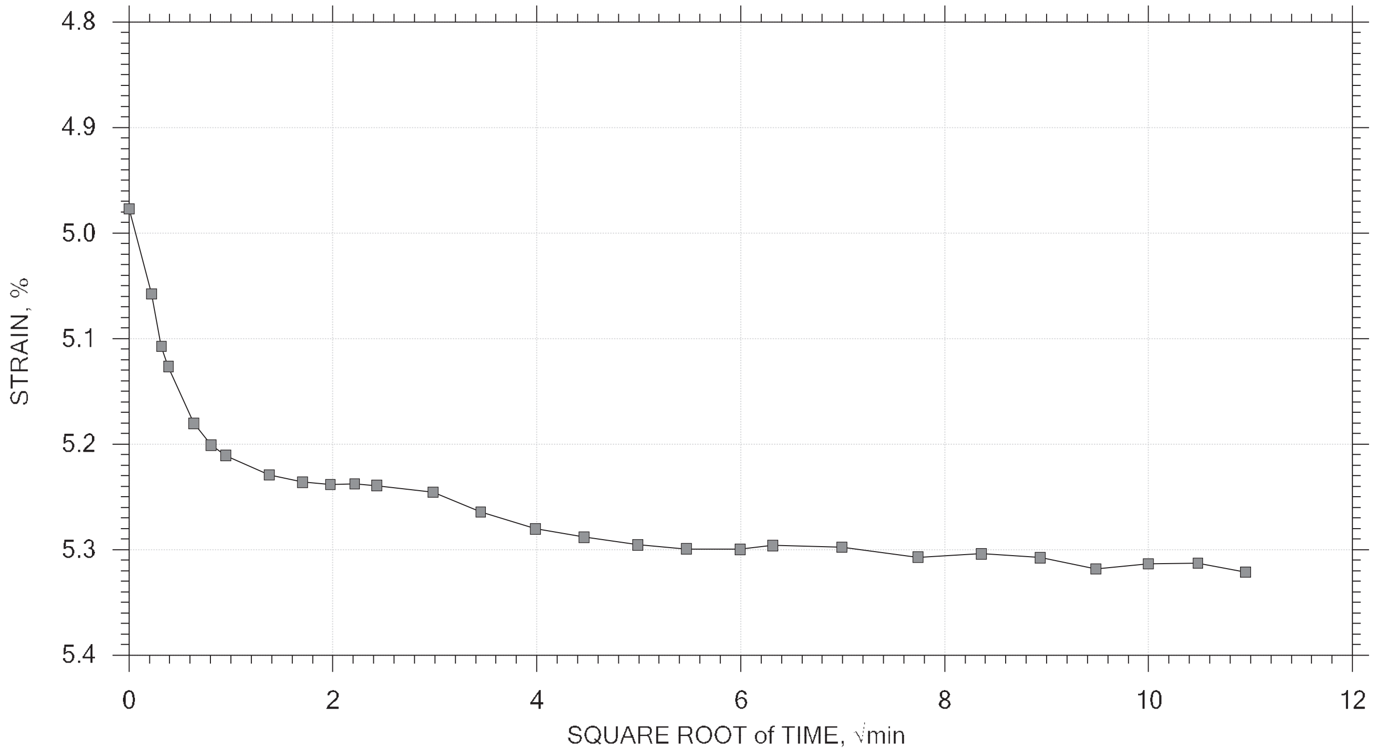
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 20

Stress: 1 tsf





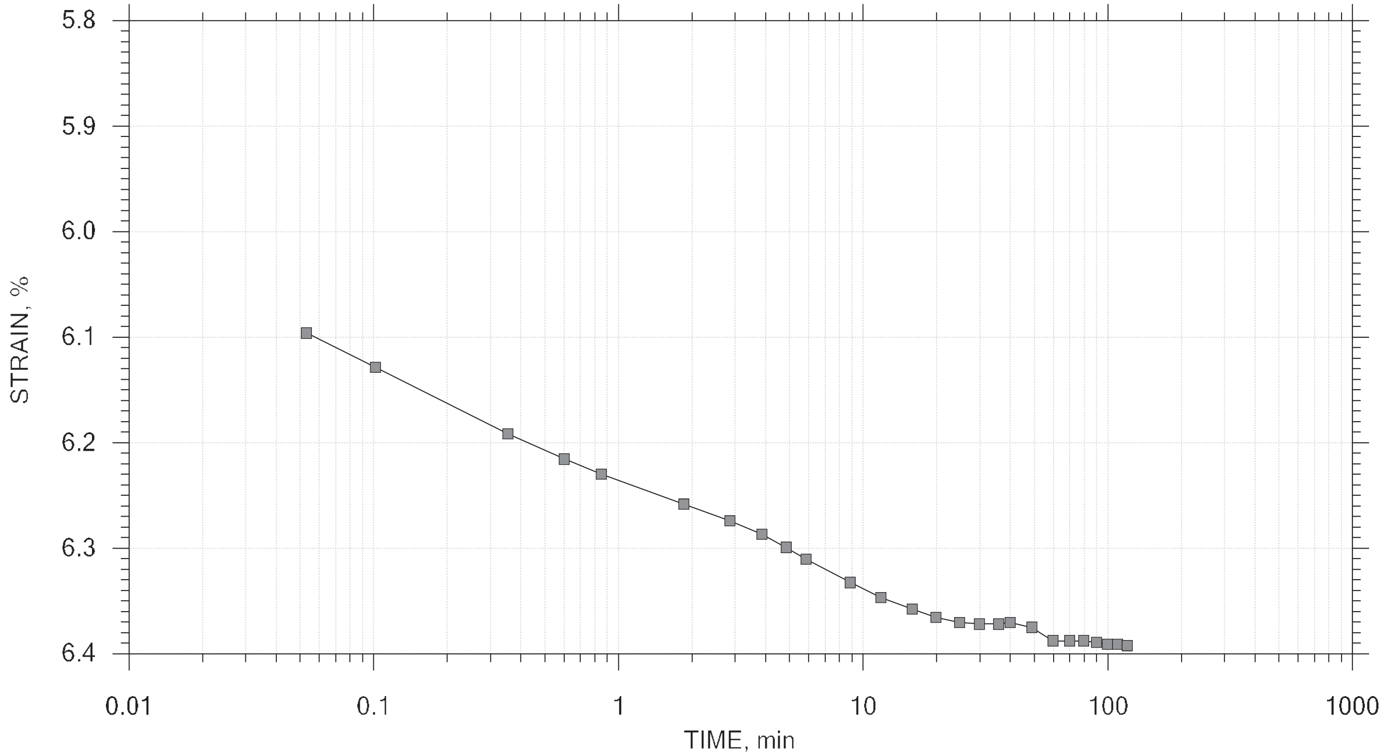
Project: SCS Plant Scherer Ph.2	Location: Monroe, GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

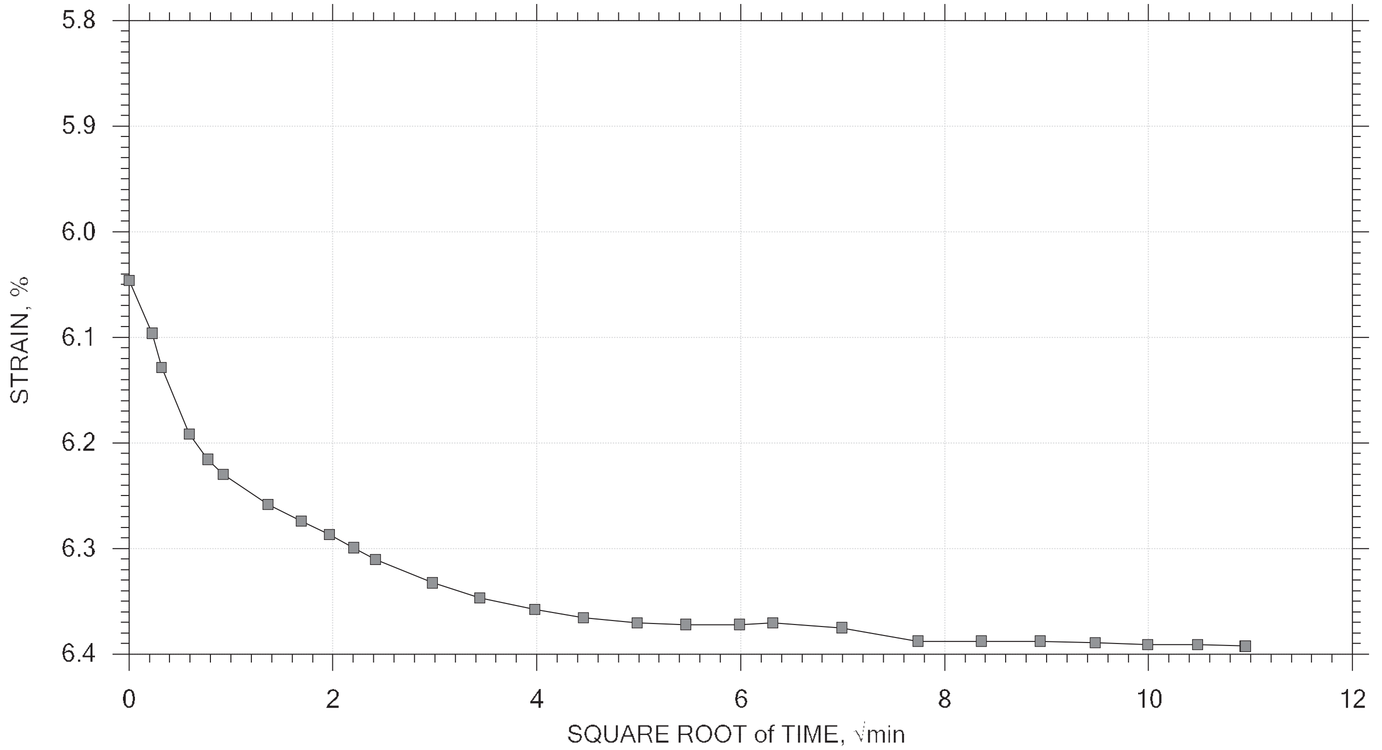
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 20

Stress: 2 tsf





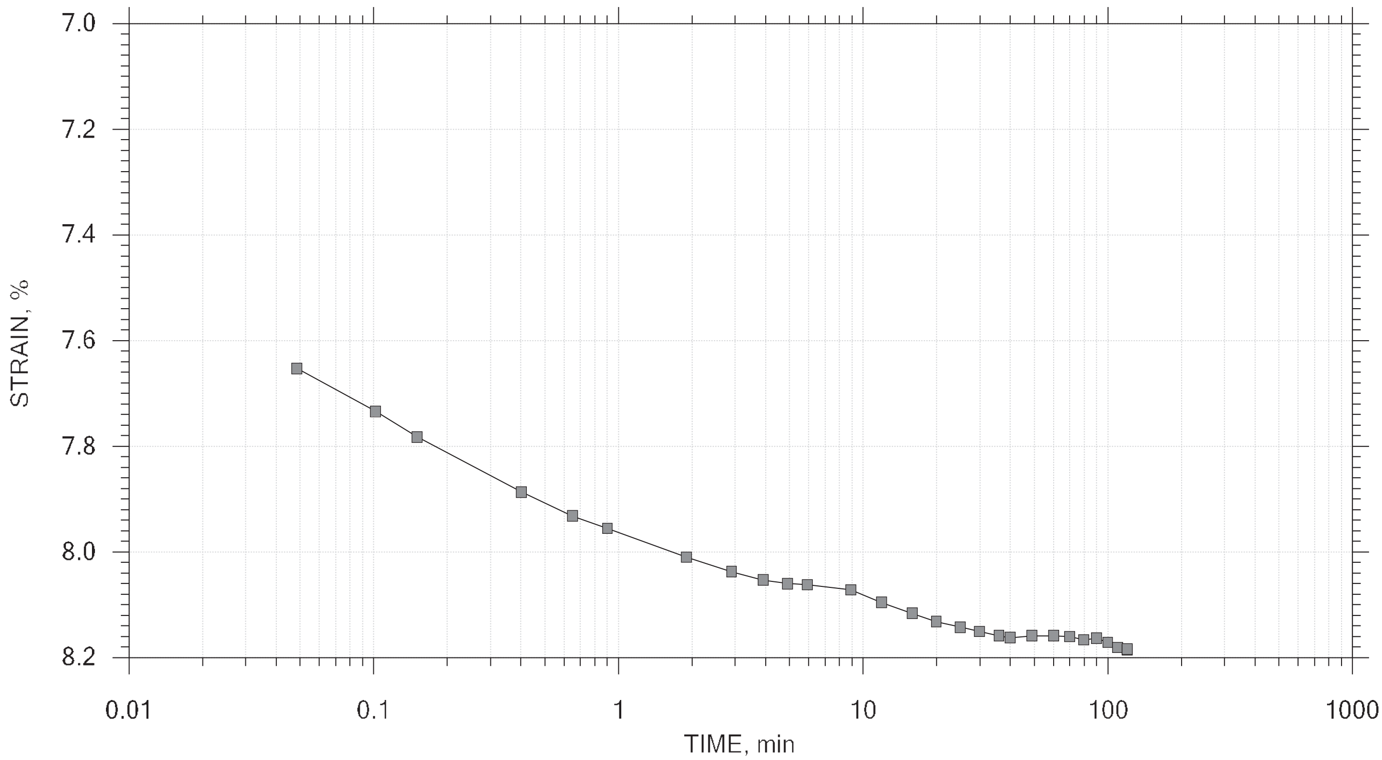
Project: SCS Plant Scherer Ph.2	Location: Monroe, GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

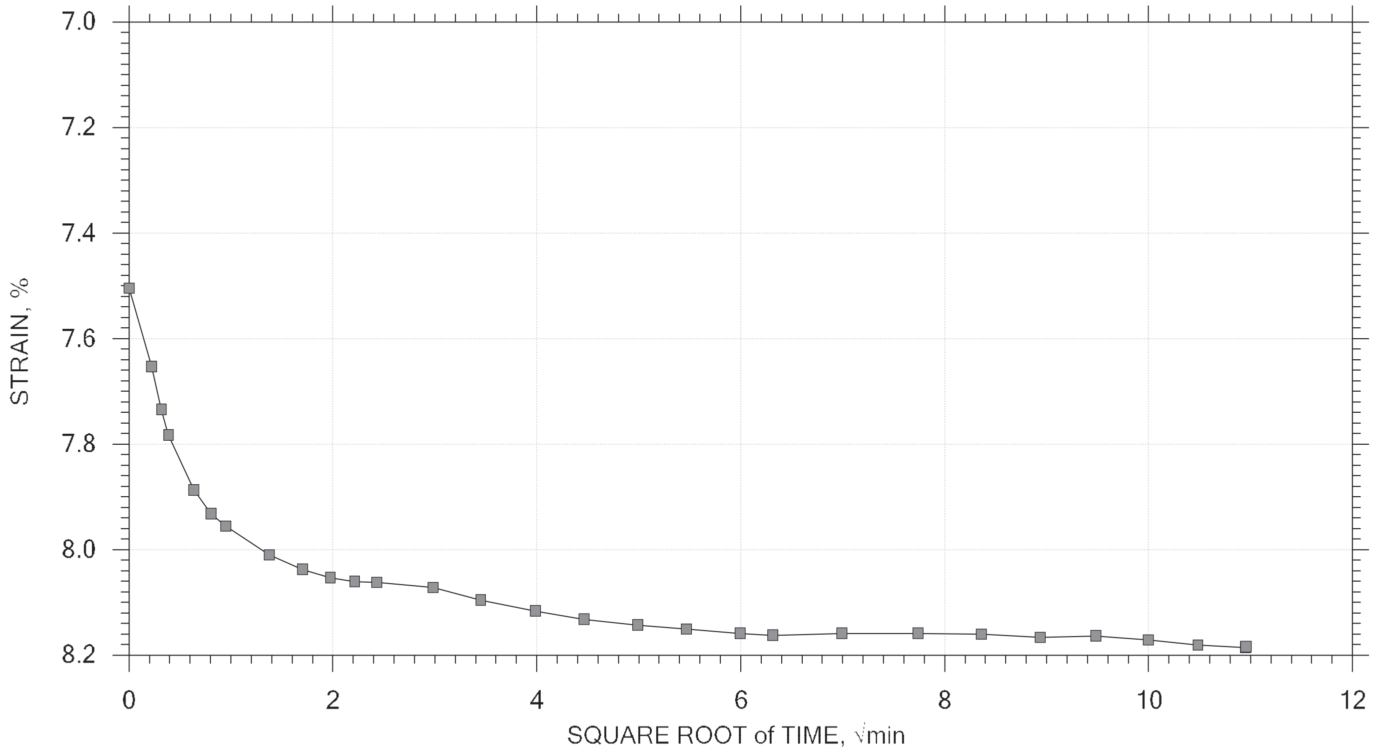
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 20

Stress: 4 tsf





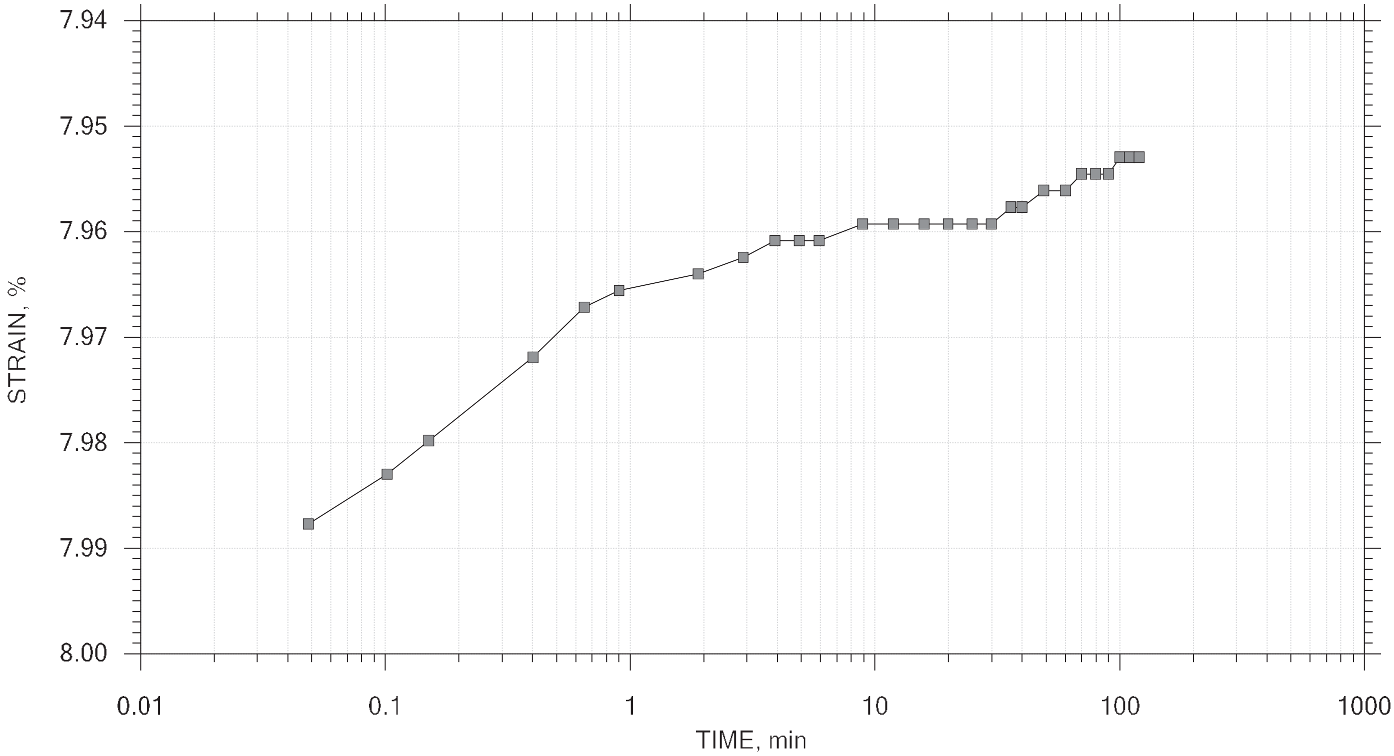
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

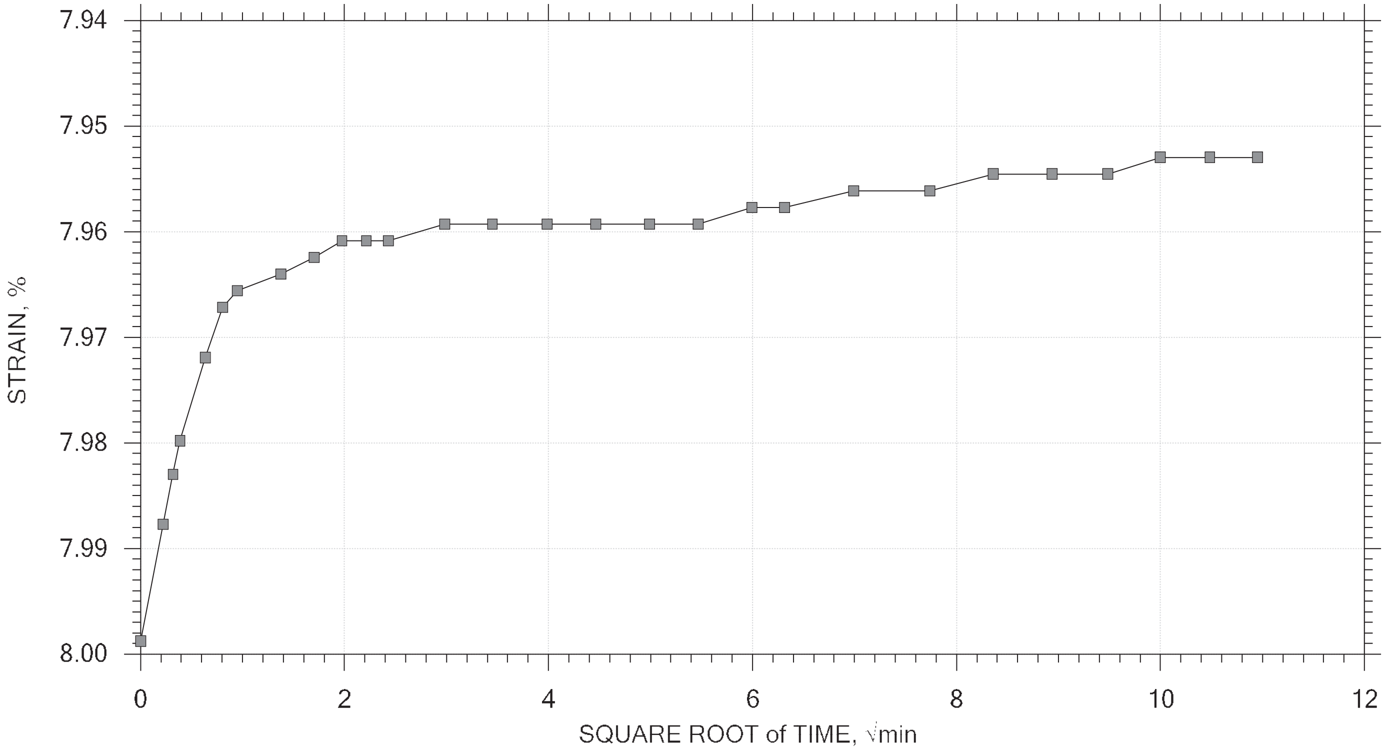
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 20

Stress: 1 tsf





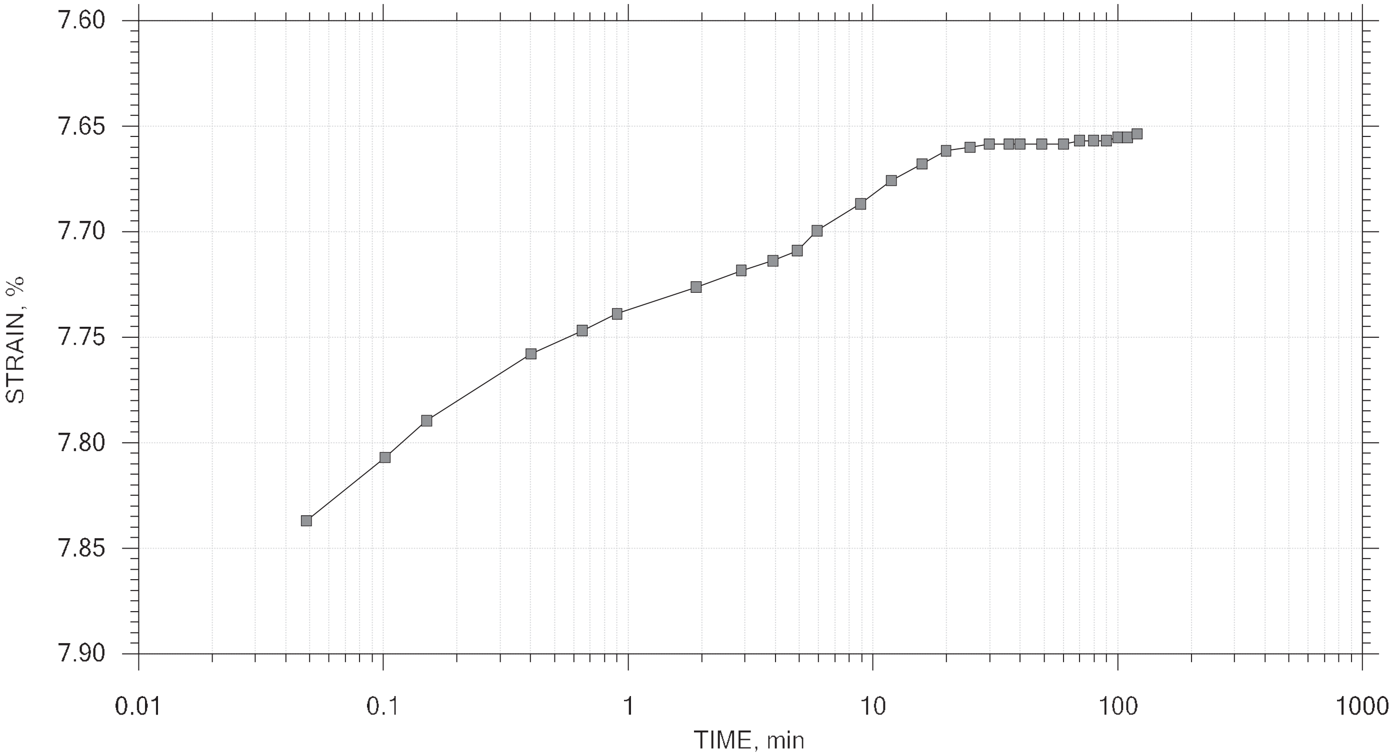
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

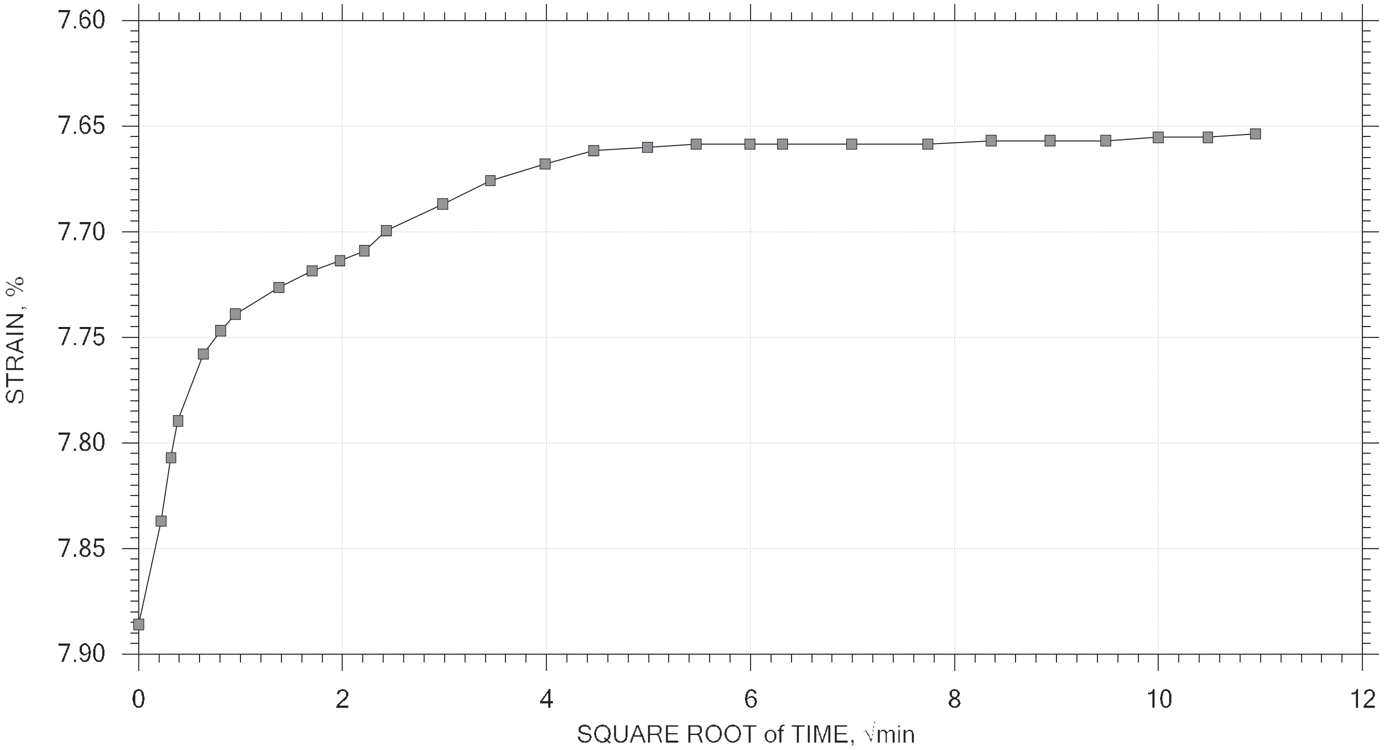
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 20

Stress: 0.25 tsf





GeoTesting EXPRESS

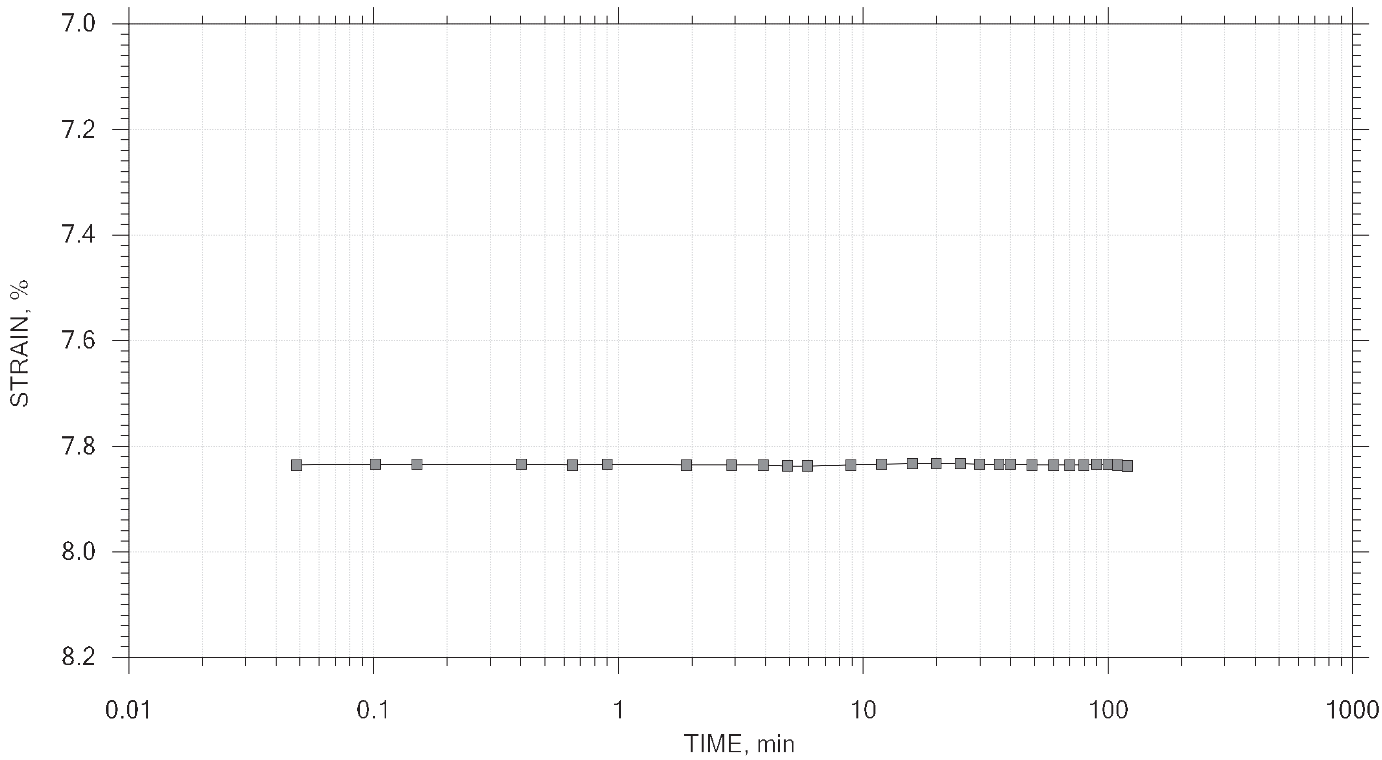
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

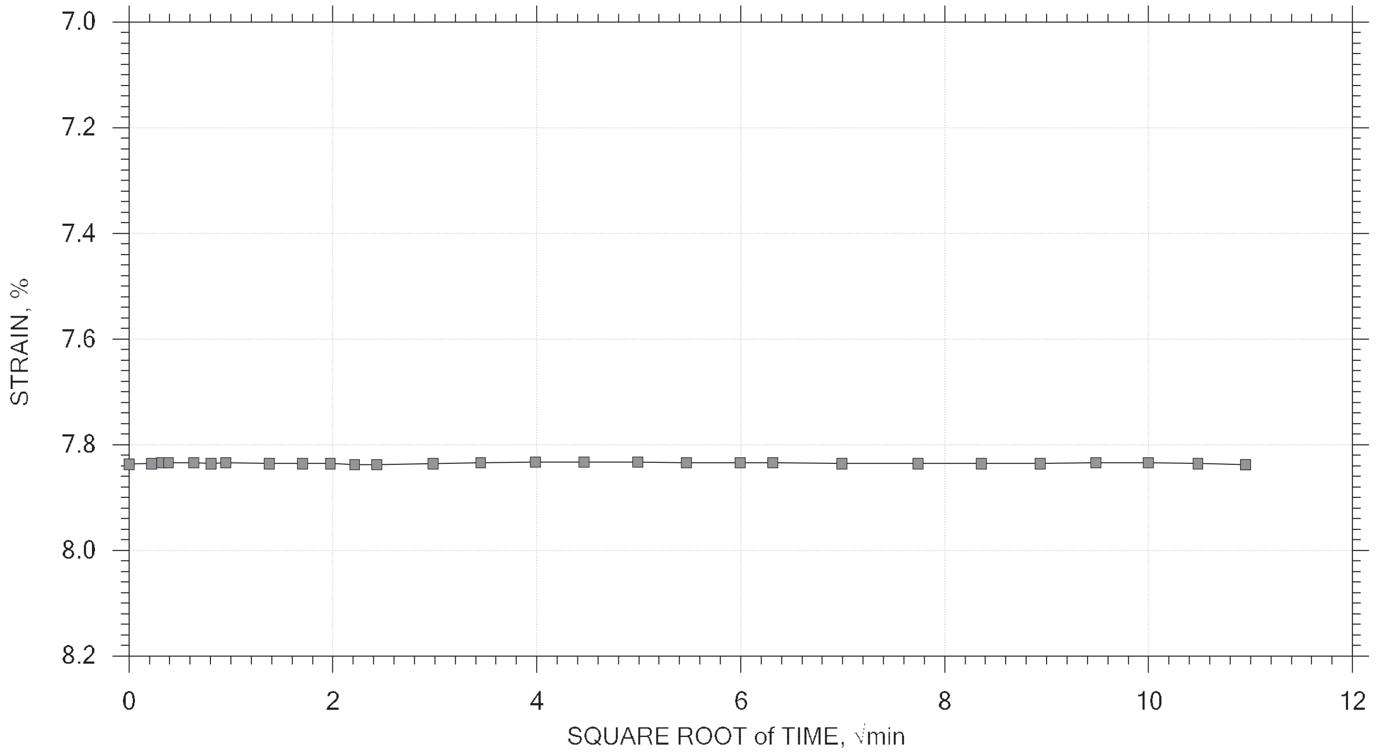
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 20

Stress: 0.5 tsf





GeoTesting EXPRESS

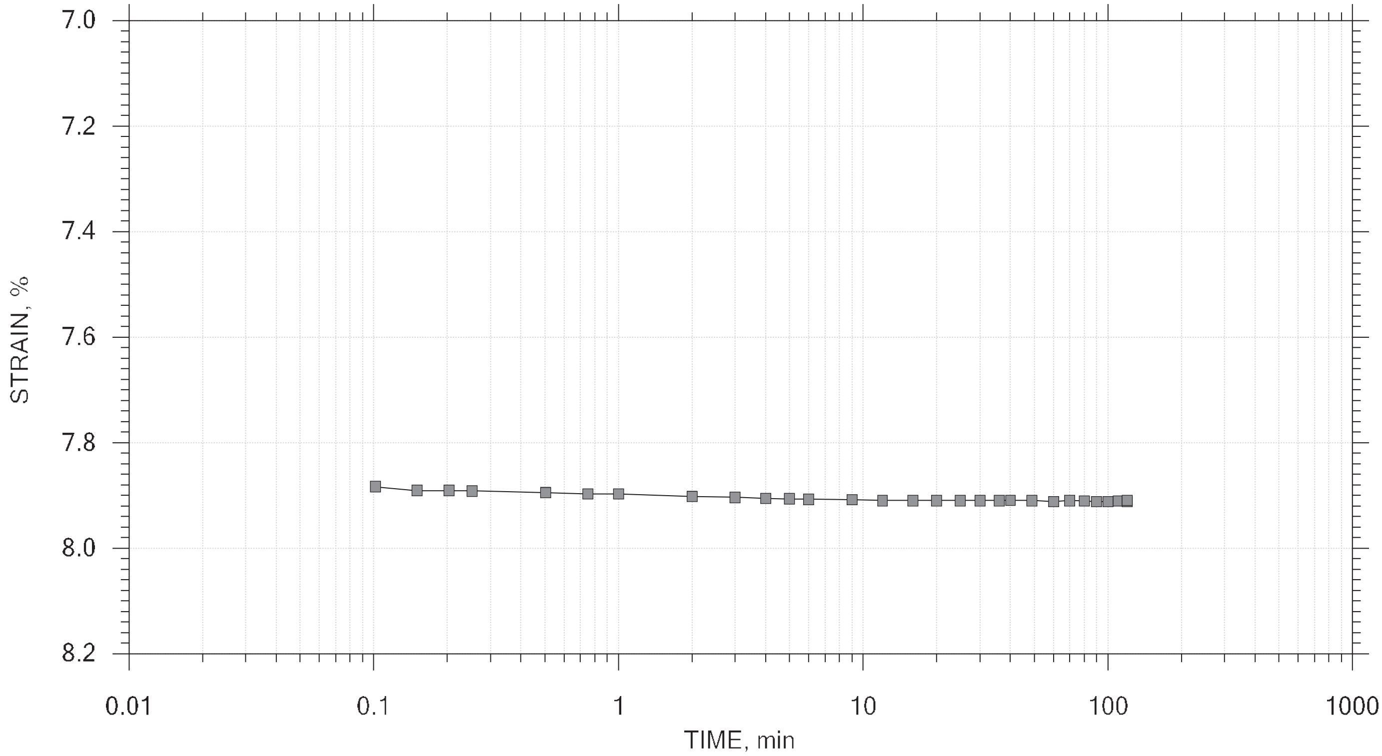
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

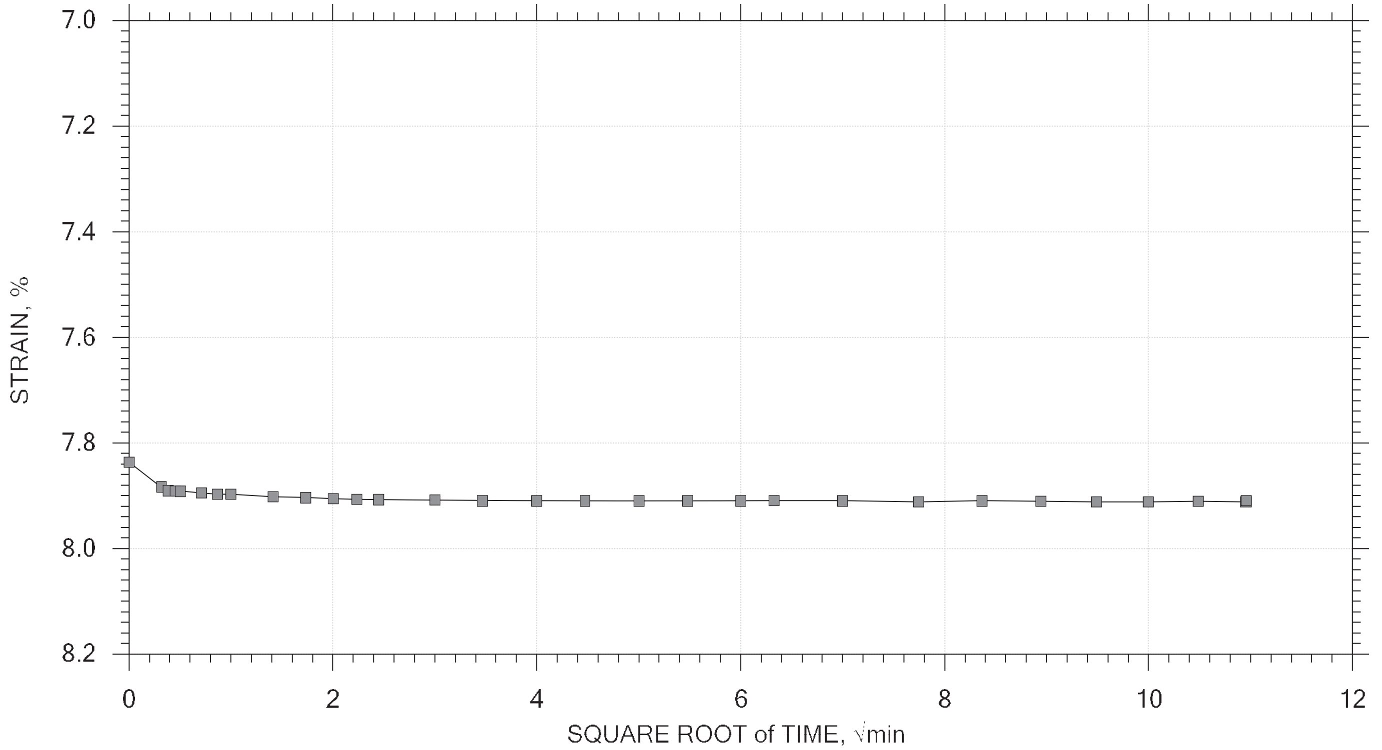
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 20

Stress: 1 tsf





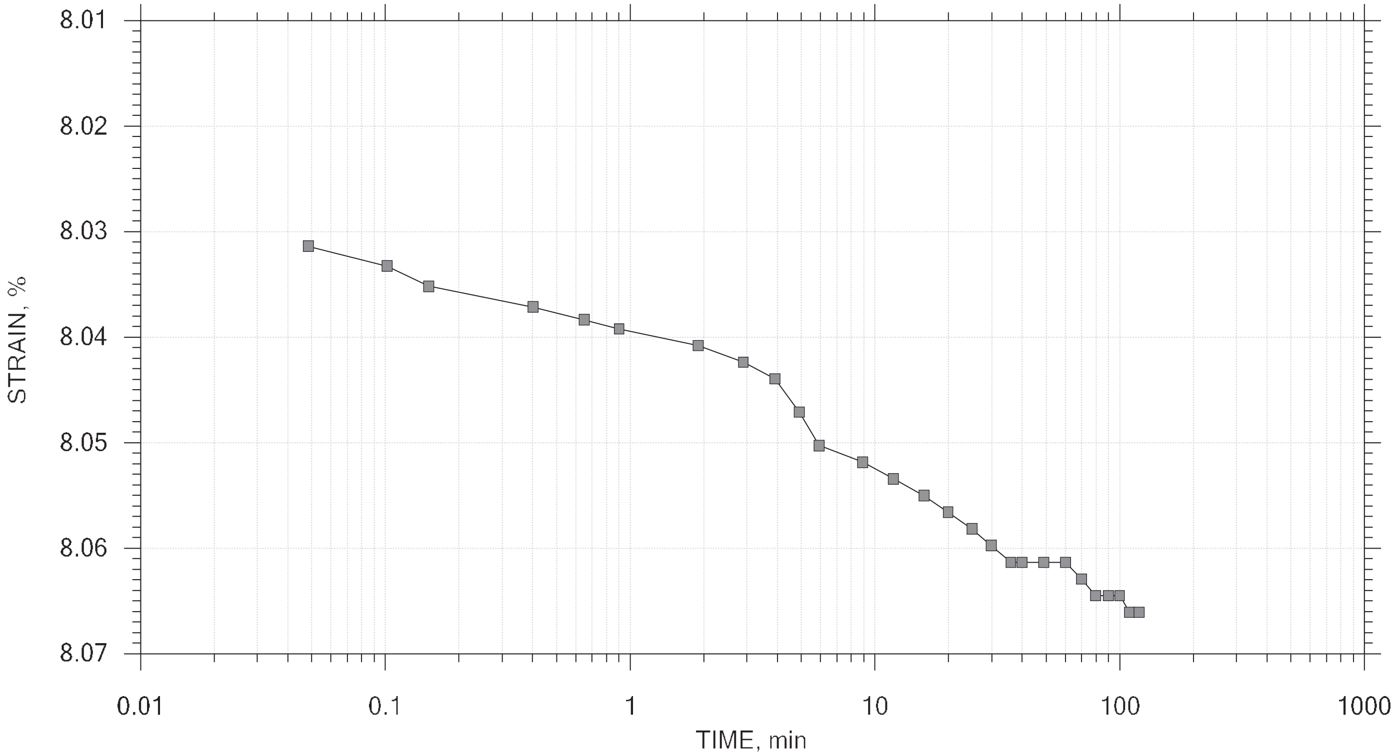
Project: SCS Plant Scherer Ph.2	Location: Monroe, GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

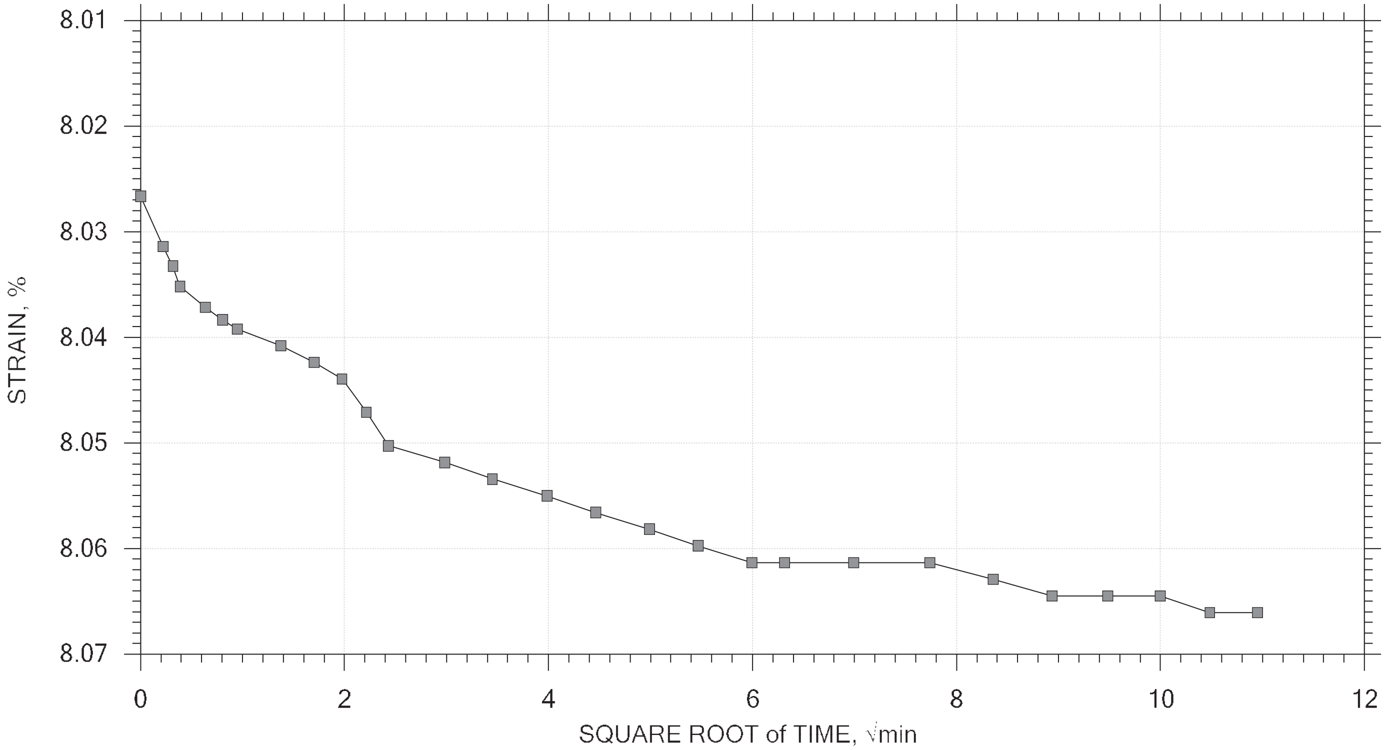
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 20

Stress: 2 tsf





GeoTesting EXPRESS

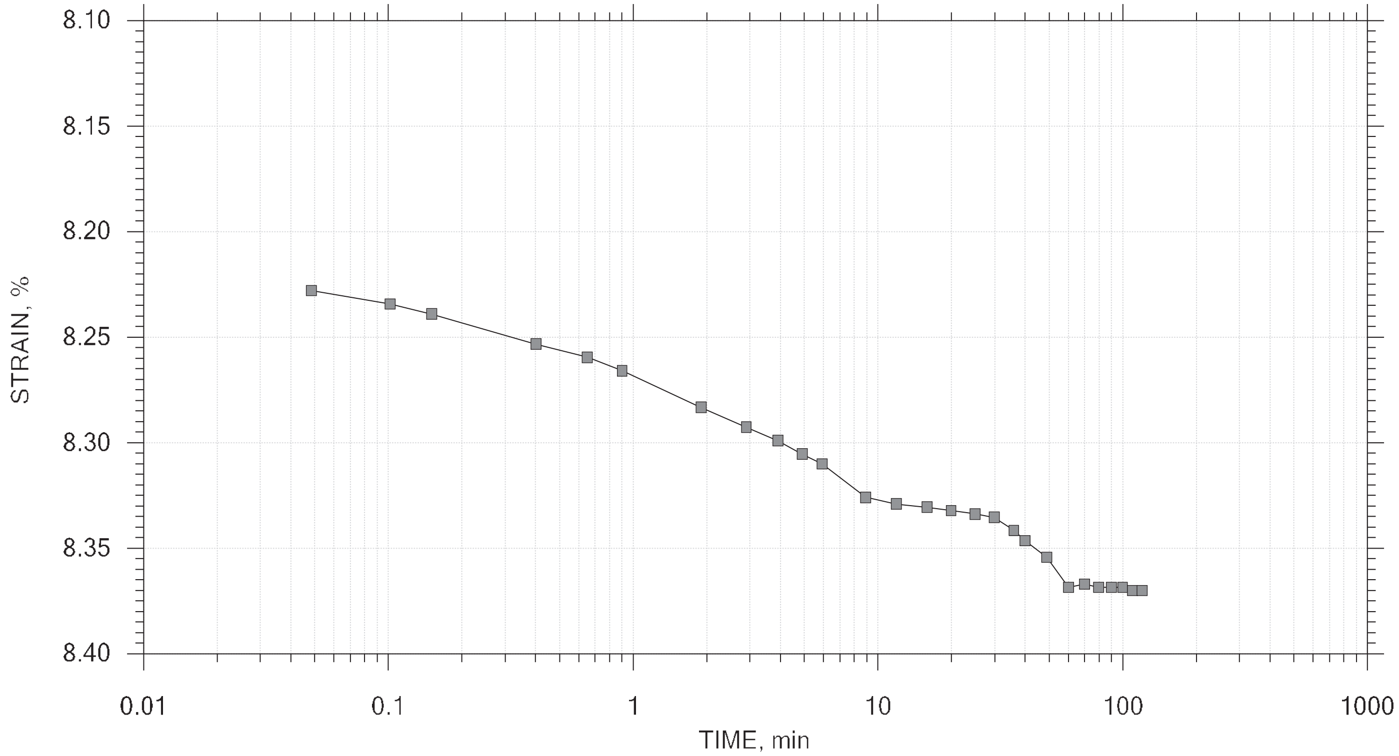
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

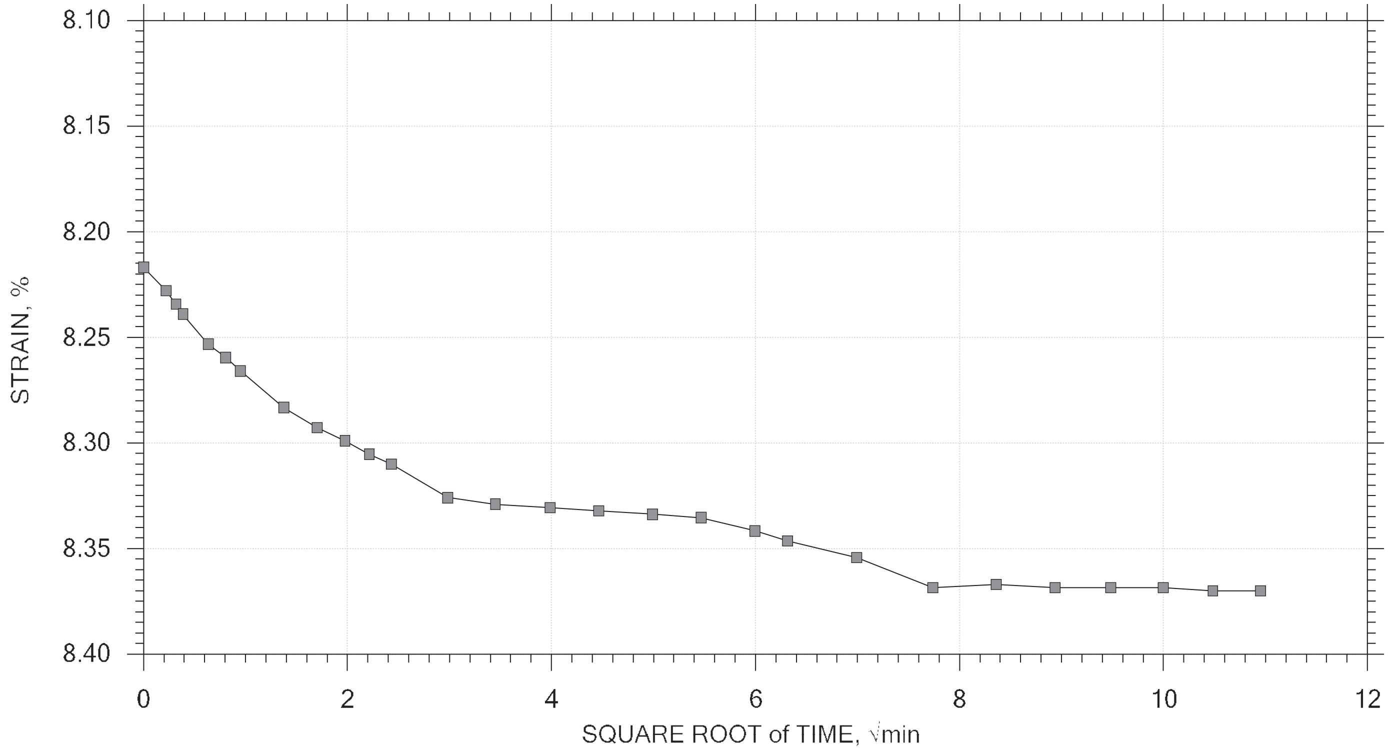
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 20

Stress: 4 tsf





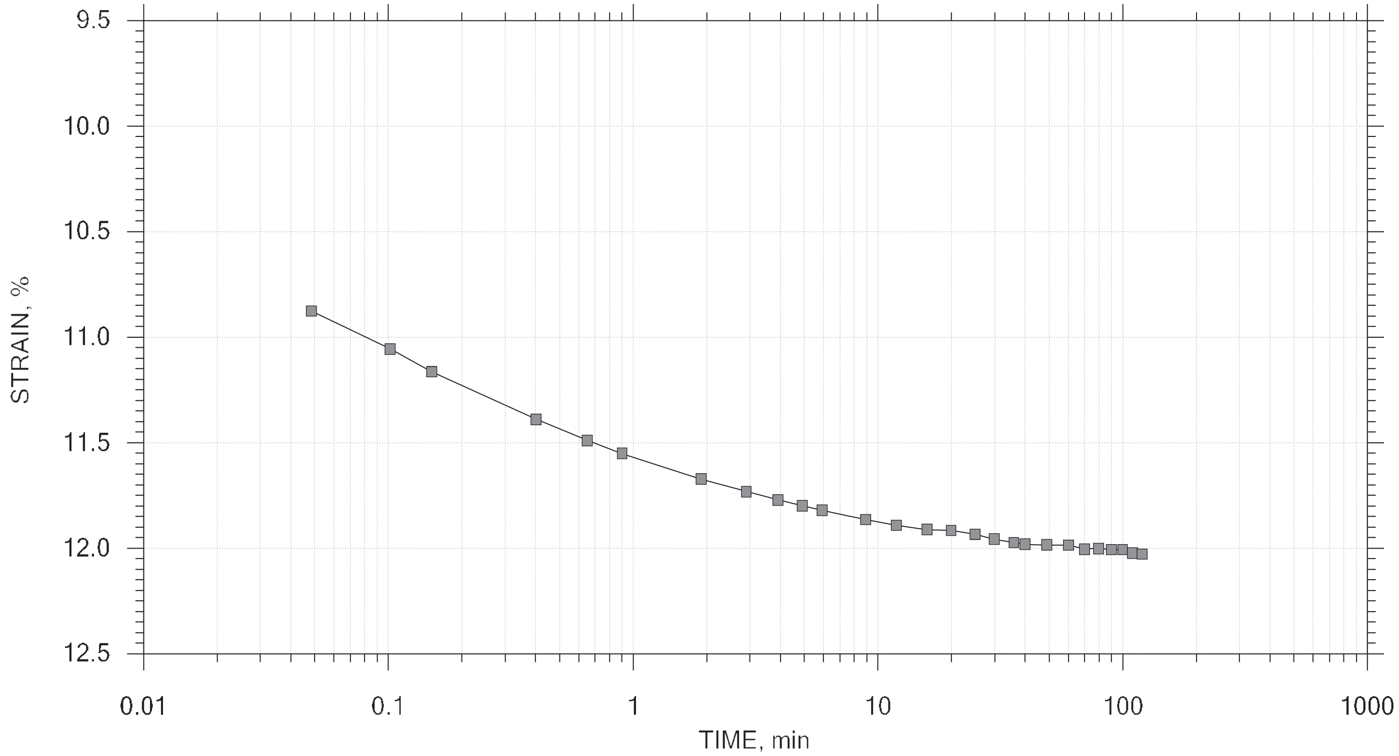
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

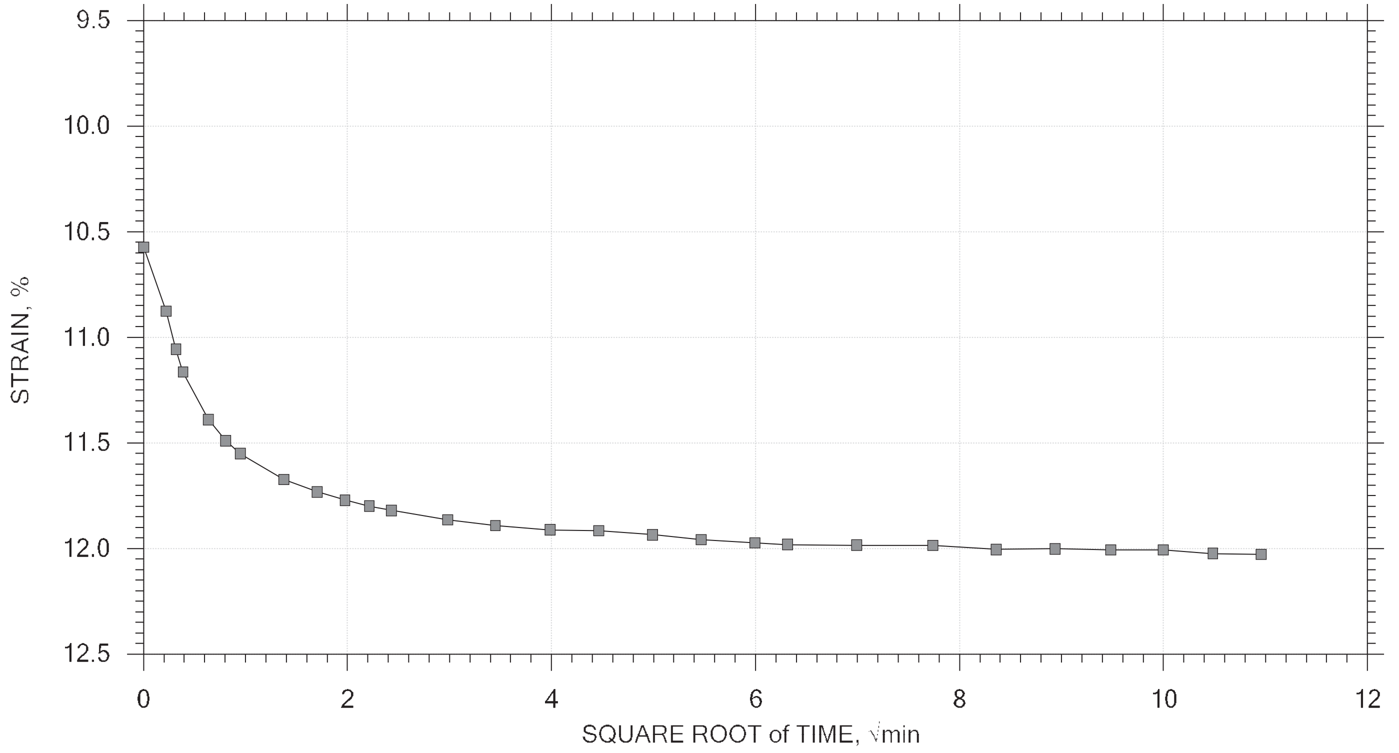
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 20

Stress: 8 tsf





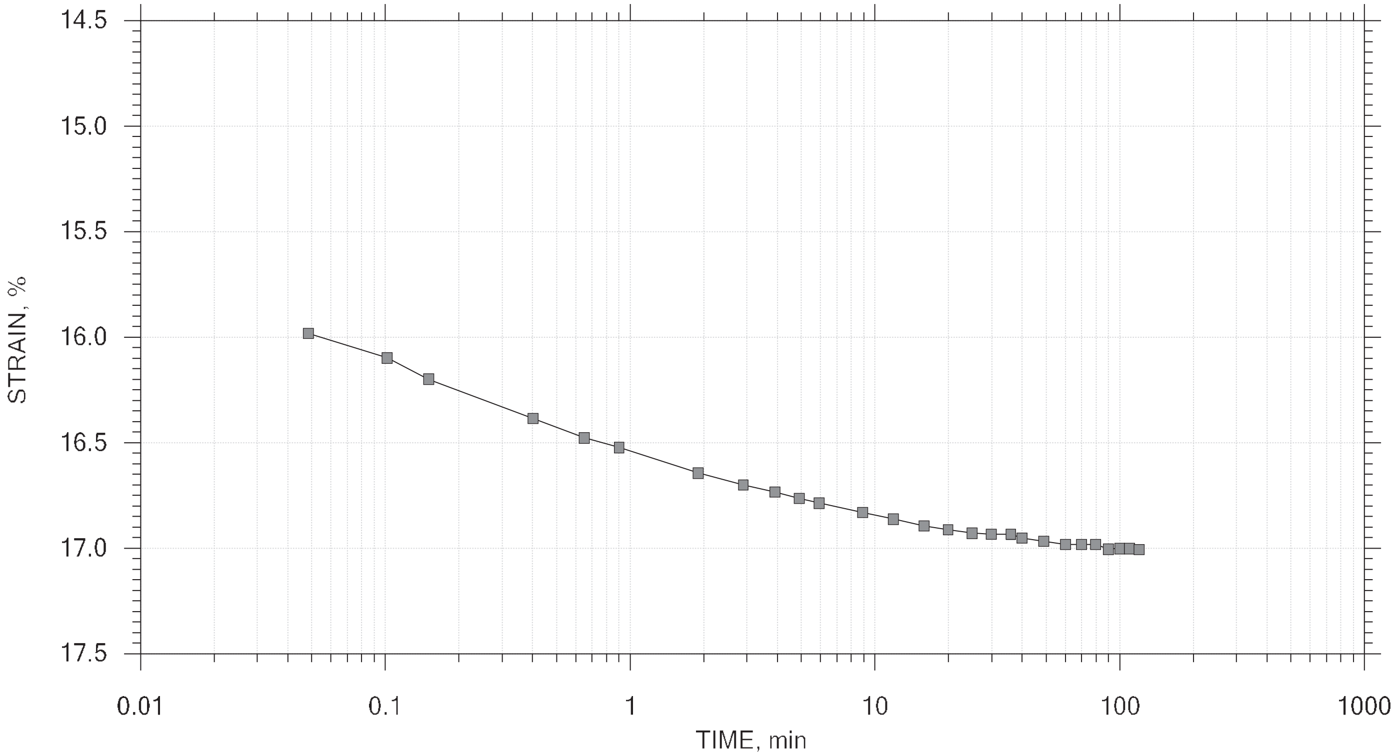
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

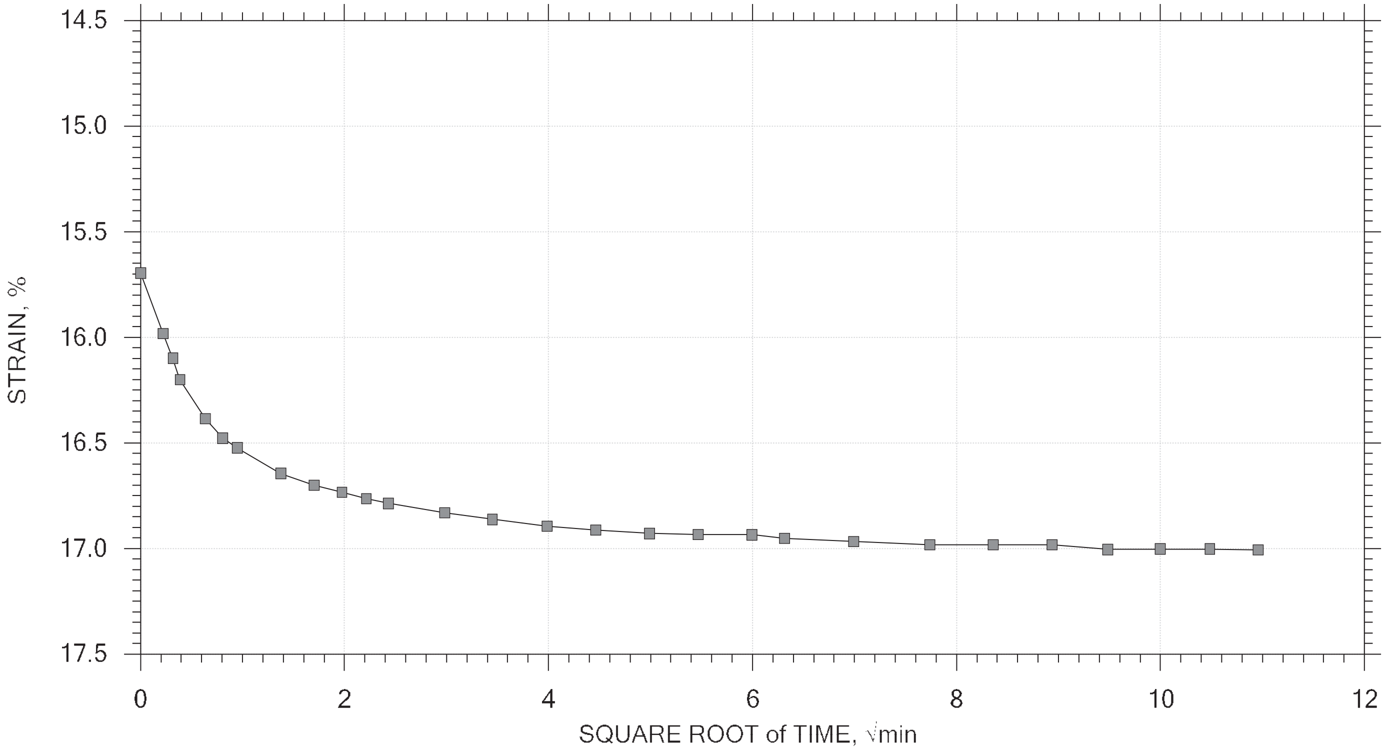
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 20

Stress: 16 tsf





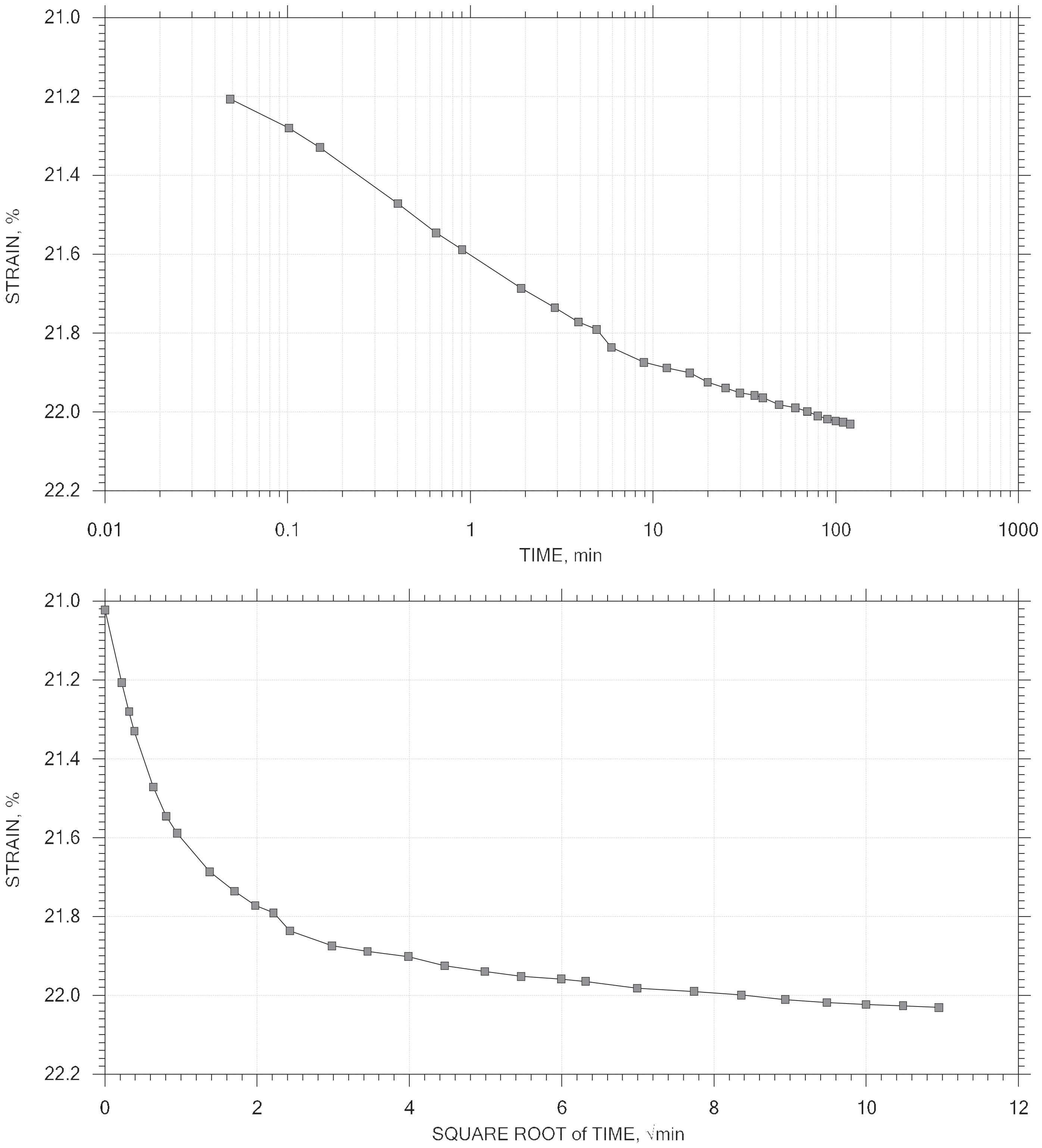
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 20

Stress: 32 tsf



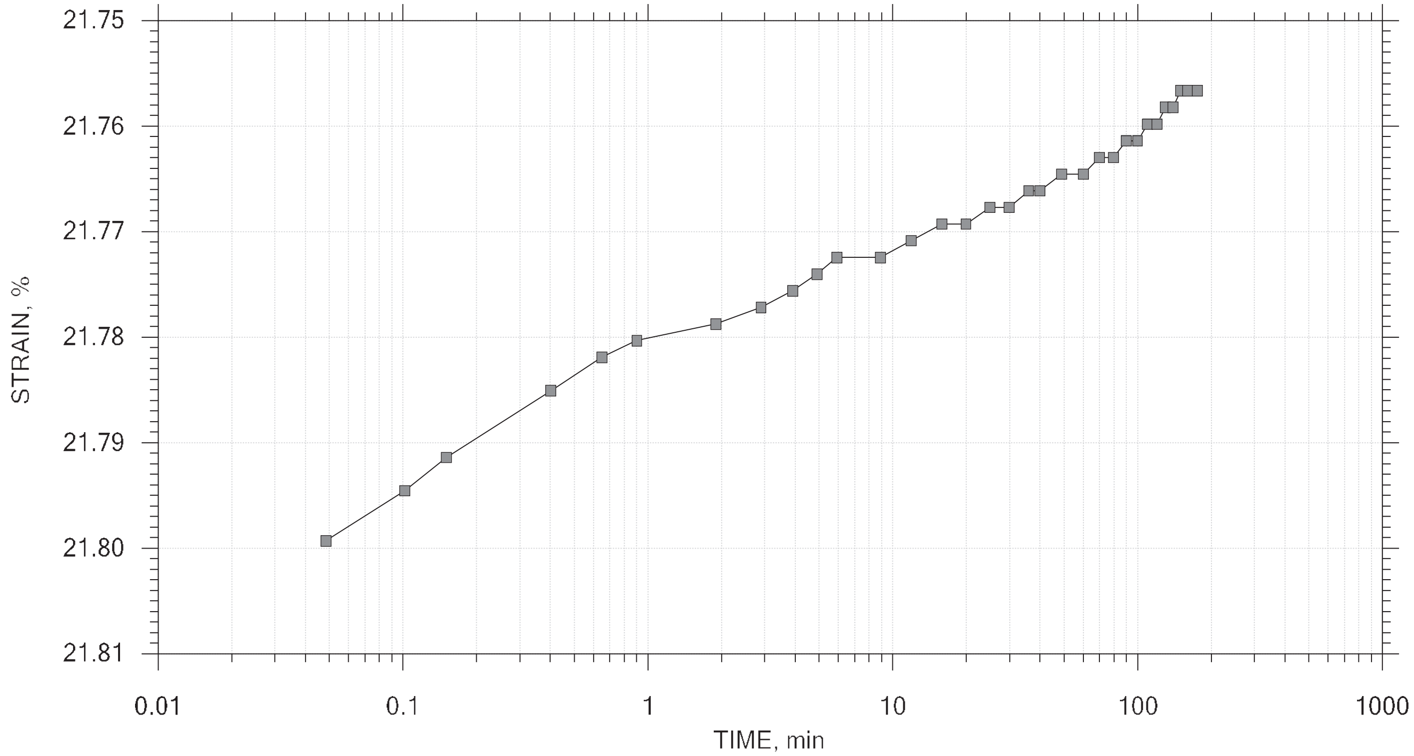
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

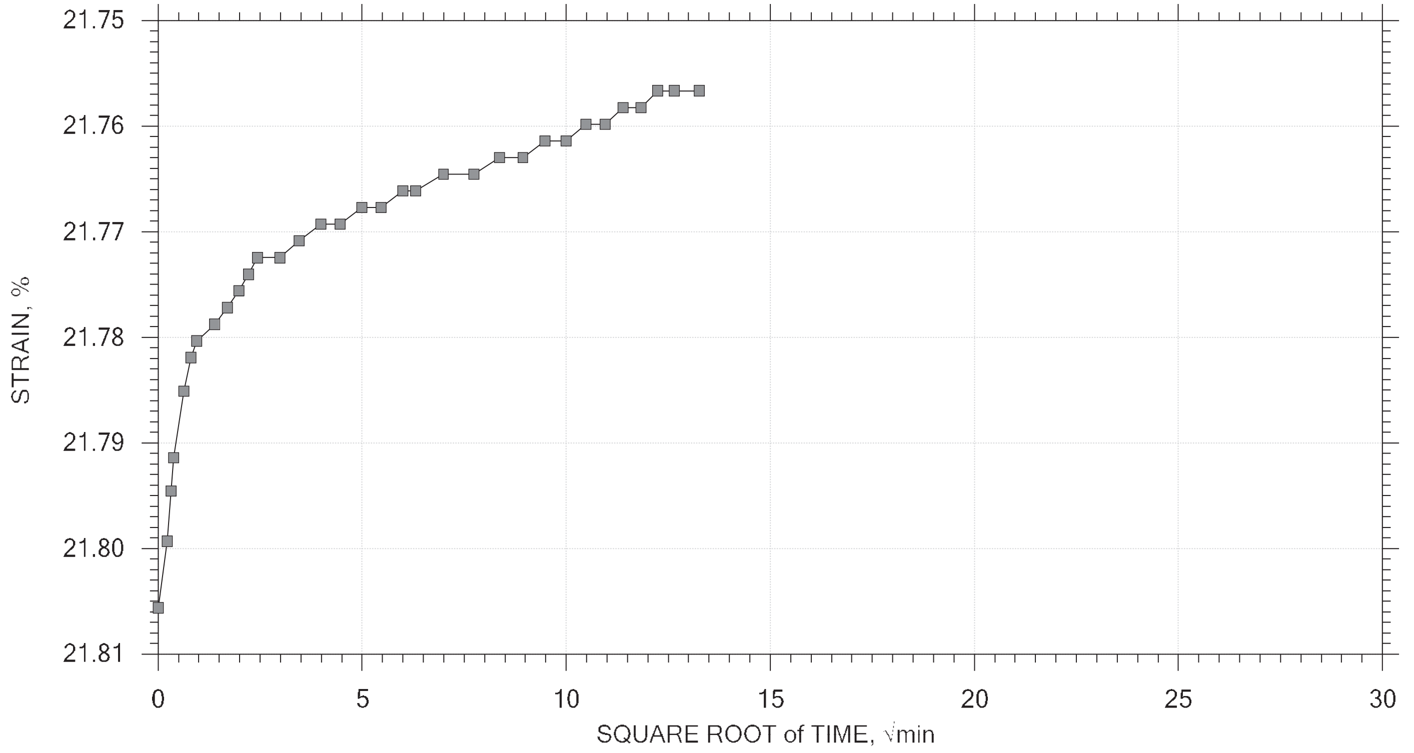
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 20

Stress: 8 tsf





GeoTesting EXPRESS

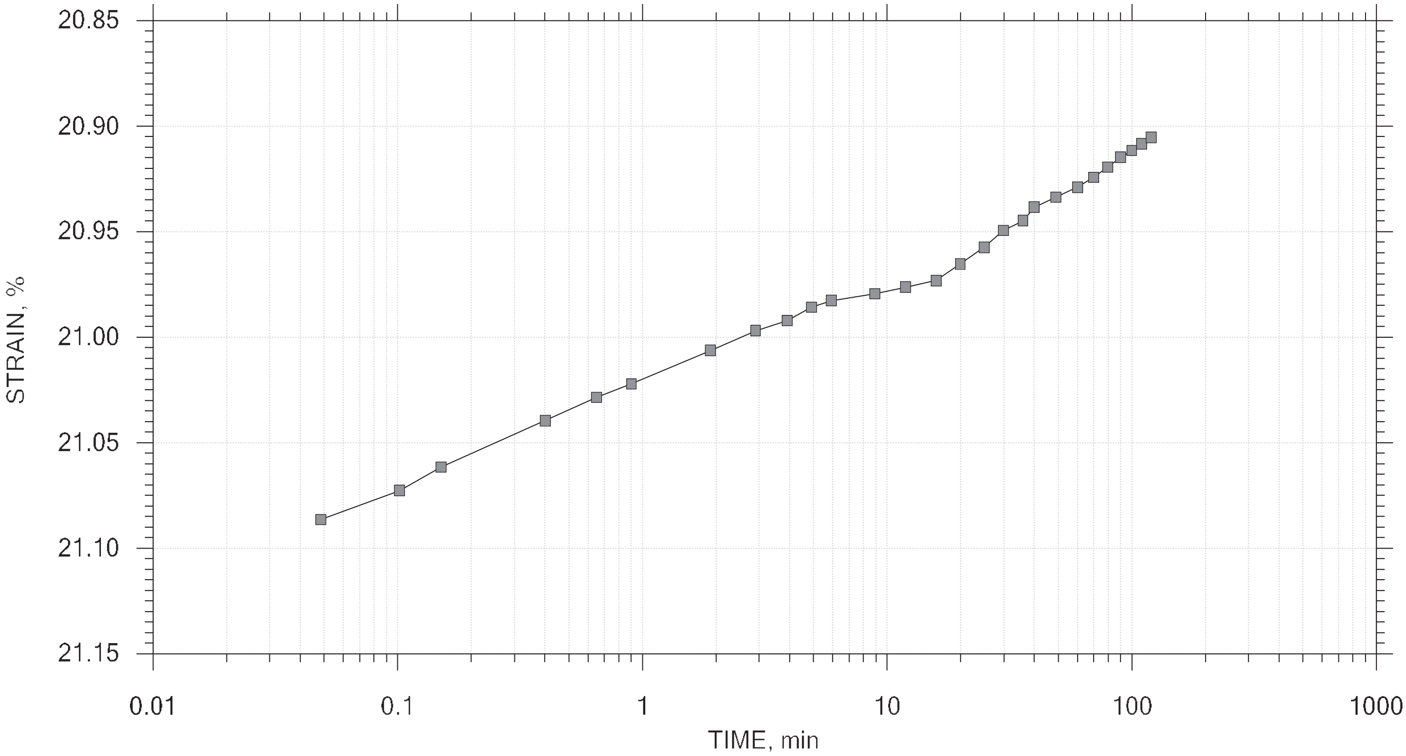
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

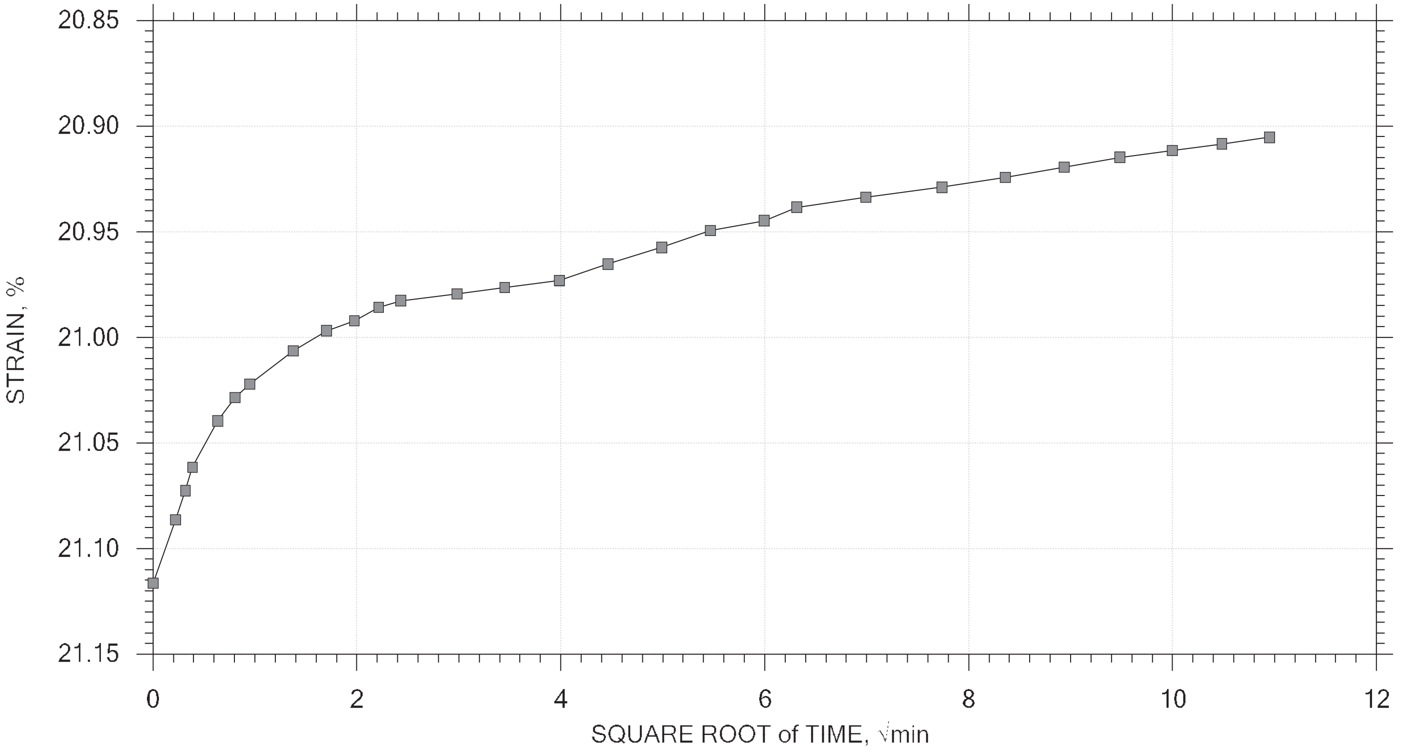
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 18 of 20

Stress: 2 tsf





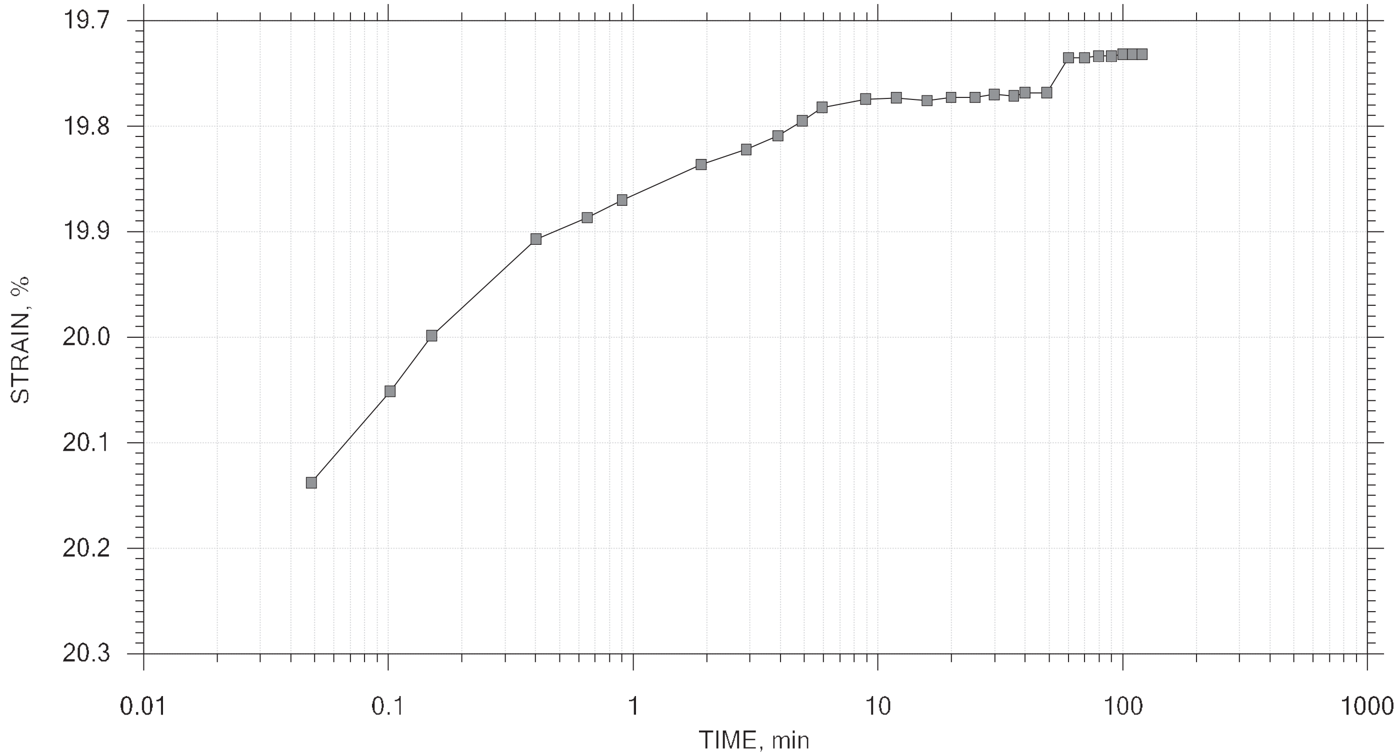
Project: SCS Plant Scherer Ph.2	Location: Monroe. GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

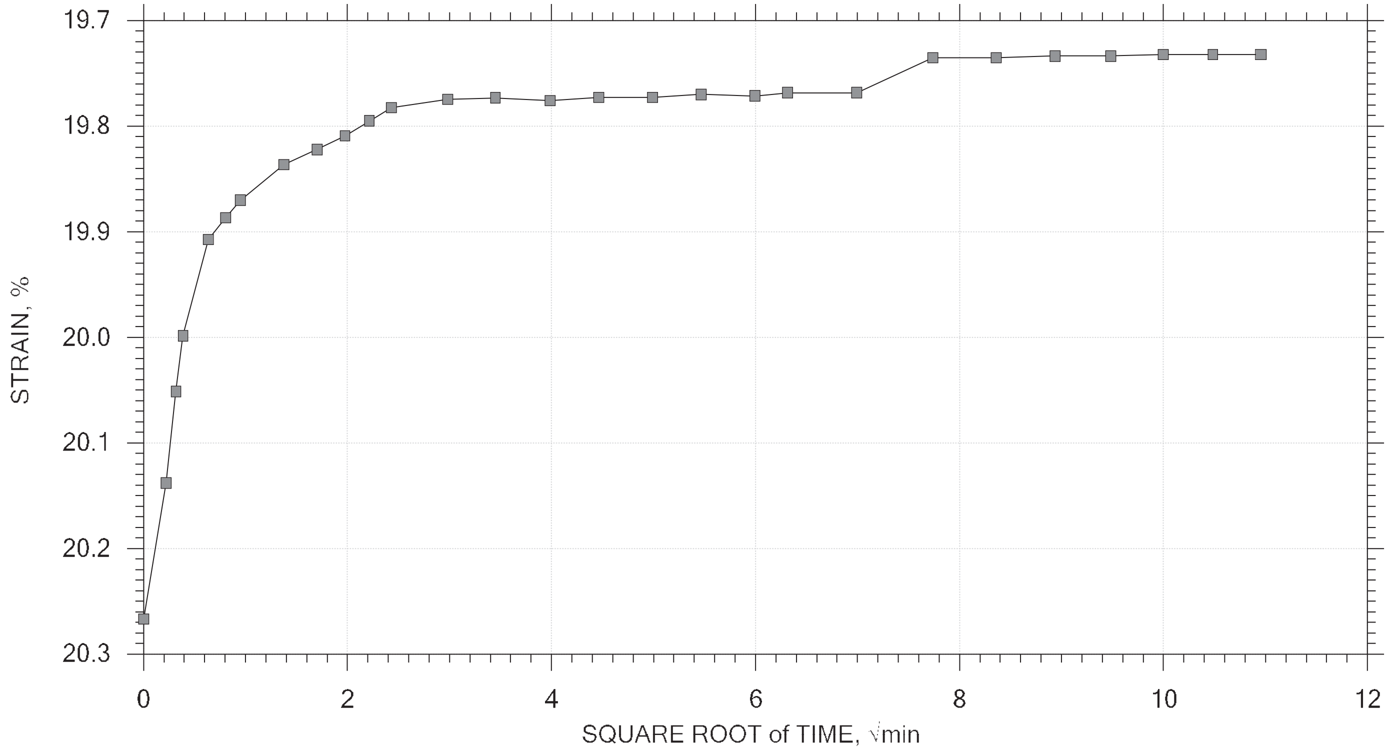
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 19 of 20

Stress: 0.5 tsf





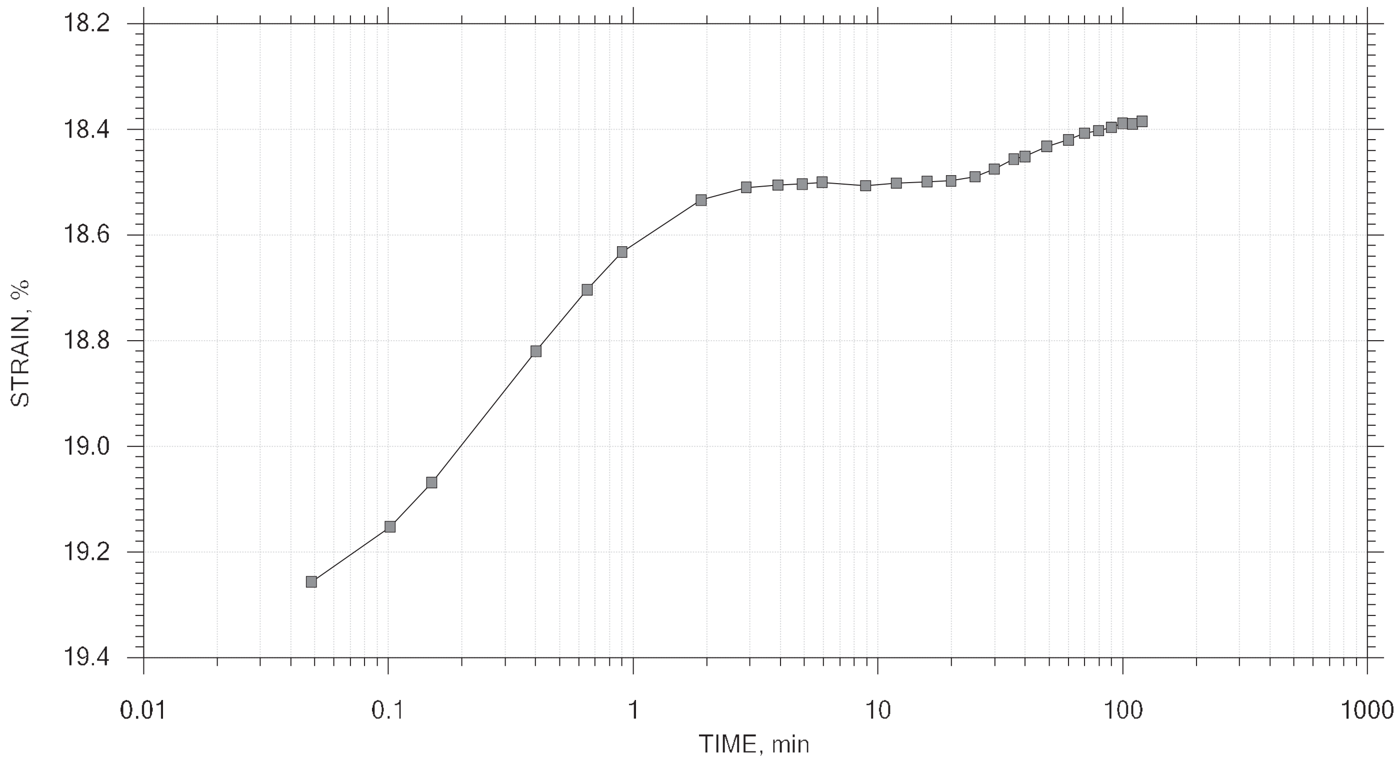
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph.2	Location: Monroe, GA	Project No.: GTX-304432
	Boring No.: B-103	Tested By: jm	Checked By: mcm
	Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
	Depth: 38-40 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand (ASH)		
	Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

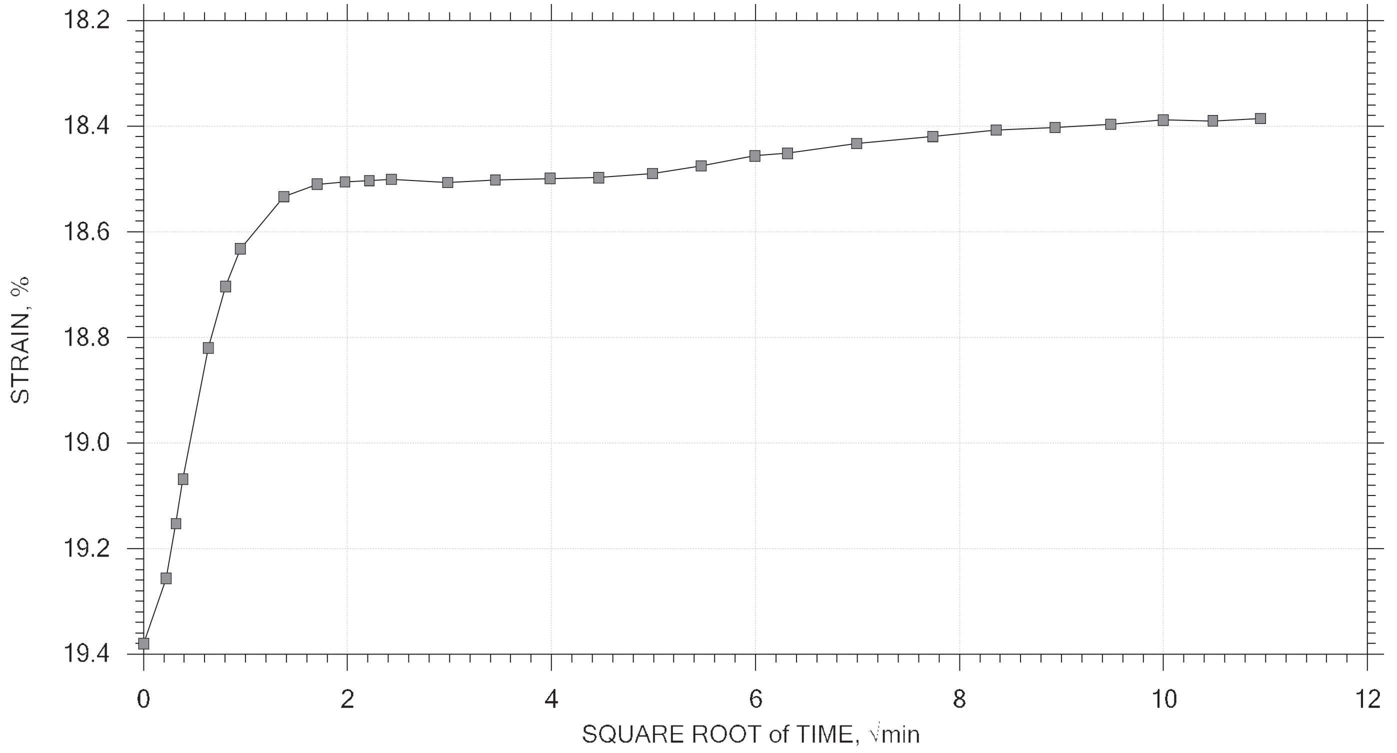
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 20 of 20

Stress: 0.125 tsf

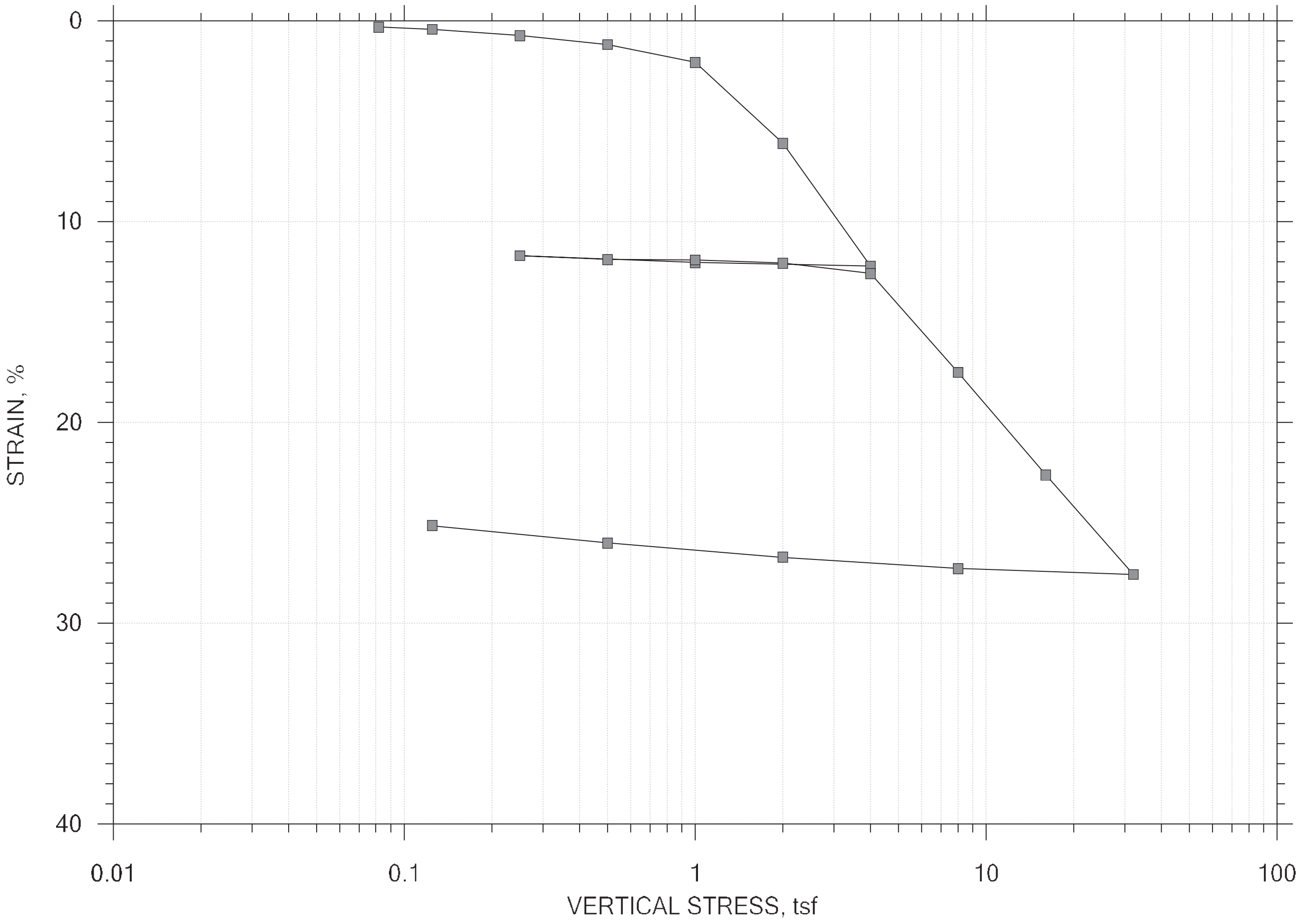


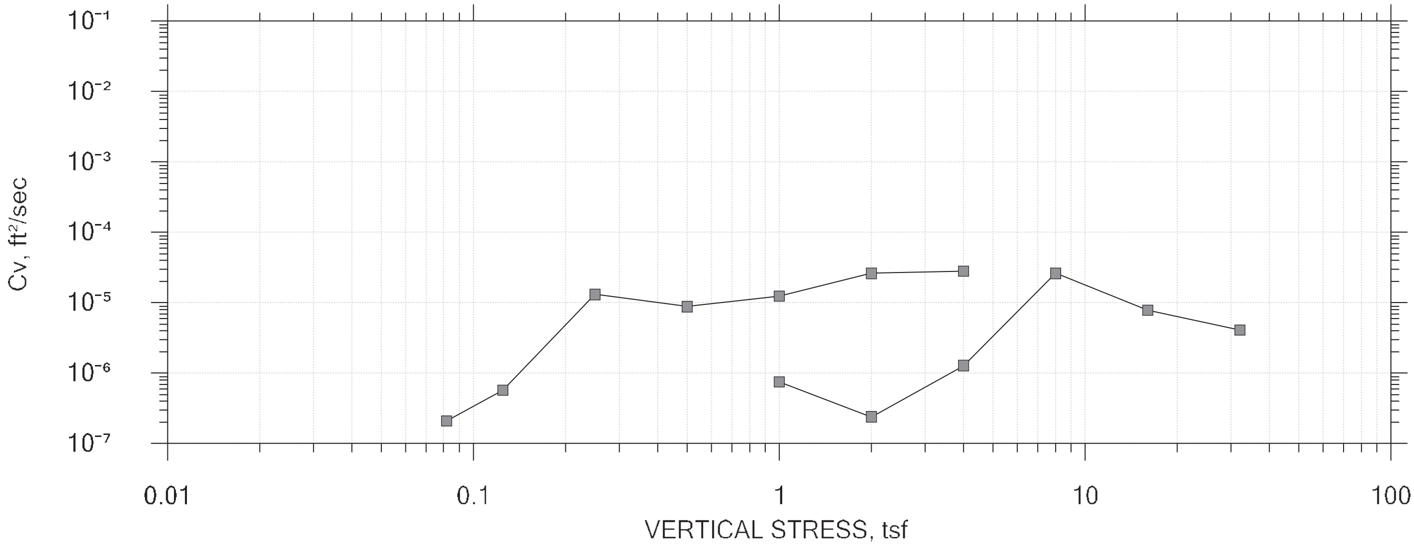


Project: SCS Plant Scherer Ph.2	Location: Monroe, GA	Project No.: GTX-304432
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-11	Test Date: 4/2/16	Test No.: IP-1
Depth: 38-40 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0792 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

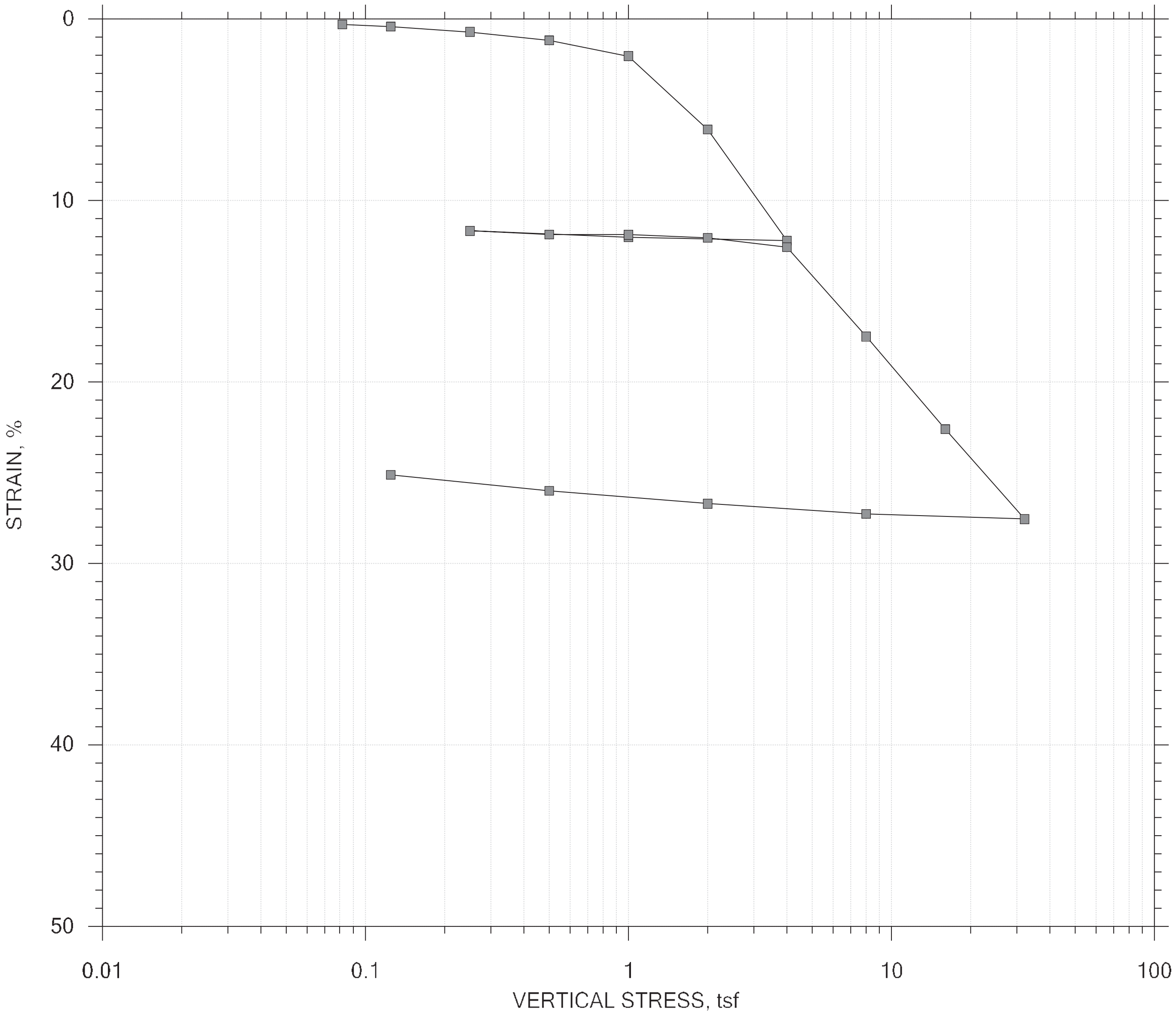




GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-103	Tested By: jm	Checked By: mcm
	Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
	Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand (ASH)		
	Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: ---				Water Content, %	75.83	49.80
Preconsolidation Stress: ---				Dry Unit Weight, pcf	51.32	67.437
Compression Ratio: ---				Saturation, %	96.14	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.84	1.16
LL: ---	PL: ---	PI: ---	GS: 2.34			

GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-103	Tested By: jm	Checked By: mcm
	Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
	Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand (ASH)		
	Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph 2
Location: Monroe County, GA
Project No.: GTX-304548
Boring No.: B-103
Tested By: jm
Checked By: mcm
Sample No.: S-13
Test Date: 4/9/16
Depth: 48.5-50. ft
Test No.: IP-4
Sample Type: intact
Elevation: ---

Soil Description: Moist, dark gray silt with sand (ASH)
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.

Estimated Specific Gravity: 2.34
Liquid Limit: ---
Specimen Diameter: 2.50 in
Initial Void Ratio: 1.84
Plastic Limit: ---
Initial Height: 1.00 in
Final Void Ratio: 1.16
Plasticity Index: ---
Final Height: 0.76 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	a7	RING	5077	a23
Wt. Container + Wet Soil, gm	145.60	326.67	309.46	116.81
Wt. Container + Dry Soil, gm	92.940	276.53	276.53	83.930
Wt. Container, gm	17.180	210.40	210.40	17.910
Wt. Dry Soil, gm	75.760	66.127	66.127	66.020
Water Content, %	69.51	75.83	49.80	49.80
Void Ratio	---	1.84	1.16	---
Degree of Saturation, %	---	96.14	100.00	---
Dry Unit Weight, pcf	---	51.320	67.437	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Depth: 48.5-50. ft
Test No.: IP-4	Sample Type: intact	Elevation: ---

Soil Description: Moist, dark gray silt with sand (ASH)
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k cm/sec
1	0.0819	0.003083	1.84	0.308	169.655	1.44e-007	3.76e-002	5.16e-009
2	0.125	0.004182	1.83	0.418	38.644	6.30e-007	2.55e-002	1.53e-008
3	0.250	0.007224	1.82	0.722	3.039	7.98e-006	2.43e-002	1.85e-007
4	0.500	0.01181	1.81	1.18	4.812	5.00e-006	1.83e-002	8.72e-008
5	1.00	0.02055	1.79	2.06	3.047	7.79e-006	1.75e-002	1.30e-007
6	2.00	0.06086	1.67	6.09	0.929	2.43e-005	4.03e-002	9.32e-007
7	4.00	0.1221	1.50	12.2	0.850	2.38e-005	3.06e-002	6.94e-007
8	1.00	0.1202	1.50	12.0	8.900	2.13e-006	6.31e-004	1.28e-009
9	0.250	0.1168	1.51	11.7	3.123	6.11e-006	4.57e-003	2.65e-008
10	0.500	0.1188	1.51	11.9	0.000	0.00e+000	8.04e-003	0.00e+000
11	1.00	0.1189	1.51	11.9	24.725	7.70e-007	2.58e-004	1.89e-010
12	2.00	0.1207	1.50	12.1	105.934	1.79e-007	1.71e-003	2.91e-010
13	4.00	0.1258	1.49	12.6	13.559	1.39e-006	2.56e-003	3.39e-009
14	8.00	0.1749	1.35	17.5	0.905	1.96e-005	1.23e-002	2.29e-007
15	16.0	0.2260	1.20	22.6	3.438	4.56e-006	6.39e-003	2.77e-008
16	32.0	0.2756	1.06	27.6	4.051	3.40e-006	3.10e-003	1.00e-008
17	8.00	0.2727	1.07	27.3	55.721	2.32e-007	1.24e-004	2.74e-011
18	2.00	0.2671	1.08	26.7	115.531	1.13e-007	9.30e-004	1.00e-010
19	0.500	0.2600	1.10	26.0	5.222	2.55e-006	4.74e-003	1.15e-008
20	0.125	0.2513	1.13	25.1	2.683	5.07e-006	2.31e-002	1.12e-007

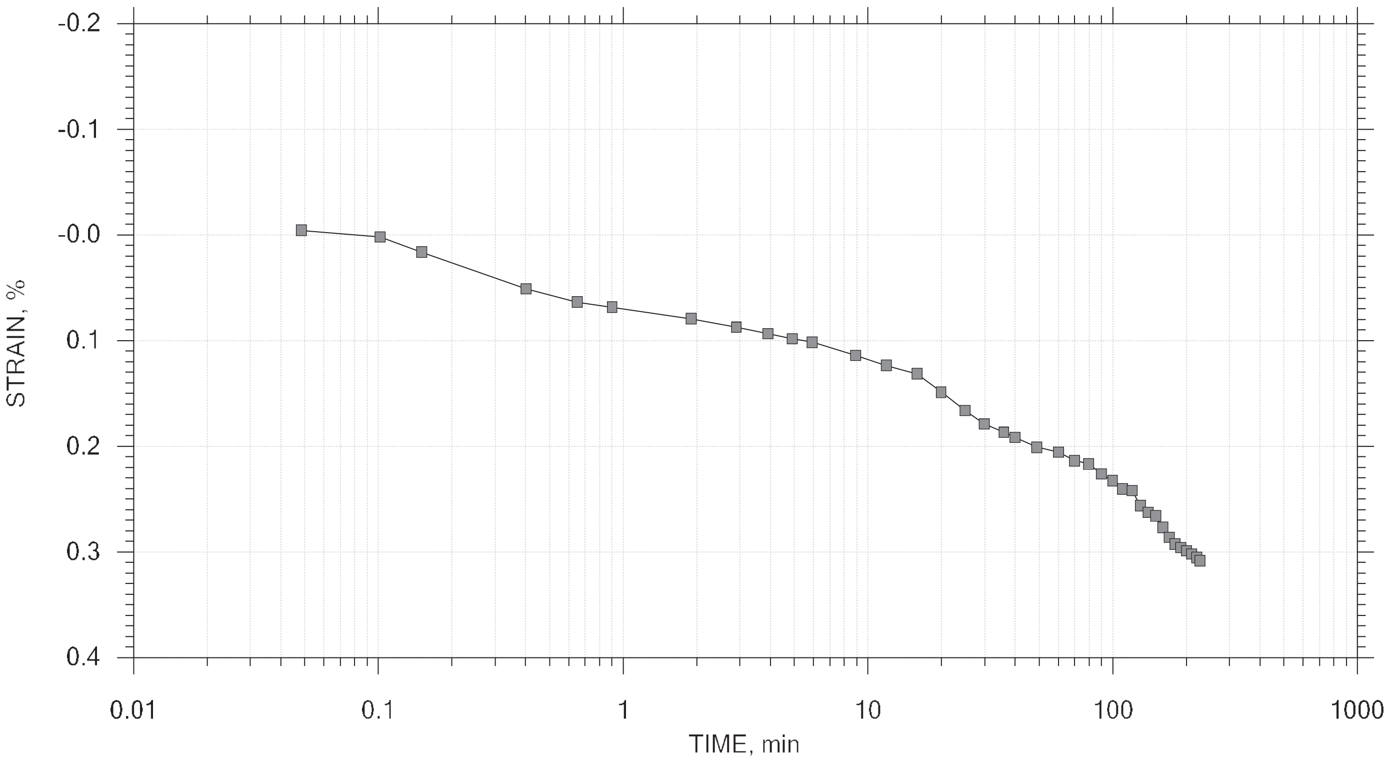
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k cm/sec	Ca %
1	0.0819	0.003083	1.84	0.308	0.000	0.00e+000	3.76e-002	0.00e+000	0.00e+000
2	0.125	0.004182	1.83	0.418	9.183	6.16e-007	2.55e-002	1.50e-008	0.00e+000
3	0.250	0.007224	1.82	0.722	0.184	3.07e-005	2.43e-002	7.10e-007	0.00e+000
4	0.500	0.01181	1.81	1.18	0.181	3.10e-005	1.83e-002	5.40e-007	0.00e+000
5	1.00	0.02055	1.79	2.06	0.236	2.33e-005	1.75e-002	3.88e-007	0.00e+000
6	2.00	0.06086	1.67	6.09	0.201	2.60e-005	4.03e-002	9.99e-007	0.00e+000
7	4.00	0.1221	1.50	12.2	0.162	2.90e-005	3.06e-002	8.44e-007	0.00e+000
8	1.00	0.1202	1.50	12.0	0.000	0.00e+000	6.31e-004	0.00e+000	0.00e+000
9	0.250	0.1168	1.51	11.7	0.208	2.13e-005	4.57e-003	9.26e-008	0.00e+000
10	0.500	0.1188	1.51	11.9	0.000	0.00e+000	8.04e-003	0.00e+000	0.00e+000
11	1.00	0.1189	1.51	11.9	0.000	0.00e+000	2.58e-004	0.00e+000	0.00e+000
12	2.00	0.1207	1.50	12.1	0.000	0.00e+000	1.71e-003	0.00e+000	0.00e+000
13	4.00	0.1258	1.49	12.6	3.738	1.17e-006	2.56e-003	2.85e-009	0.00e+000
14	8.00	0.1749	1.35	17.5	0.132	3.12e-005	1.23e-002	3.65e-007	0.00e+000
15	16.0	0.2260	1.20	22.6	0.187	1.95e-005	6.39e-003	1.19e-007	0.00e+000
16	32.0	0.2756	1.06	27.6	0.676	4.73e-006	3.10e-003	1.40e-008	0.00e+000
17	8.00	0.2727	1.07	27.3	10.119	2.97e-007	1.24e-004	3.50e-011	0.00e+000
18	2.00	0.2671	1.08	26.7	0.000	0.00e+000	9.30e-004	0.00e+000	0.00e+000
19	0.500	0.2600	1.10	26.0	0.000	0.00e+000	4.74e-003	0.00e+000	0.00e+000
20	0.125	0.2513	1.13	25.1	0.309	1.02e-005	2.31e-002	2.25e-007	0.00e+000

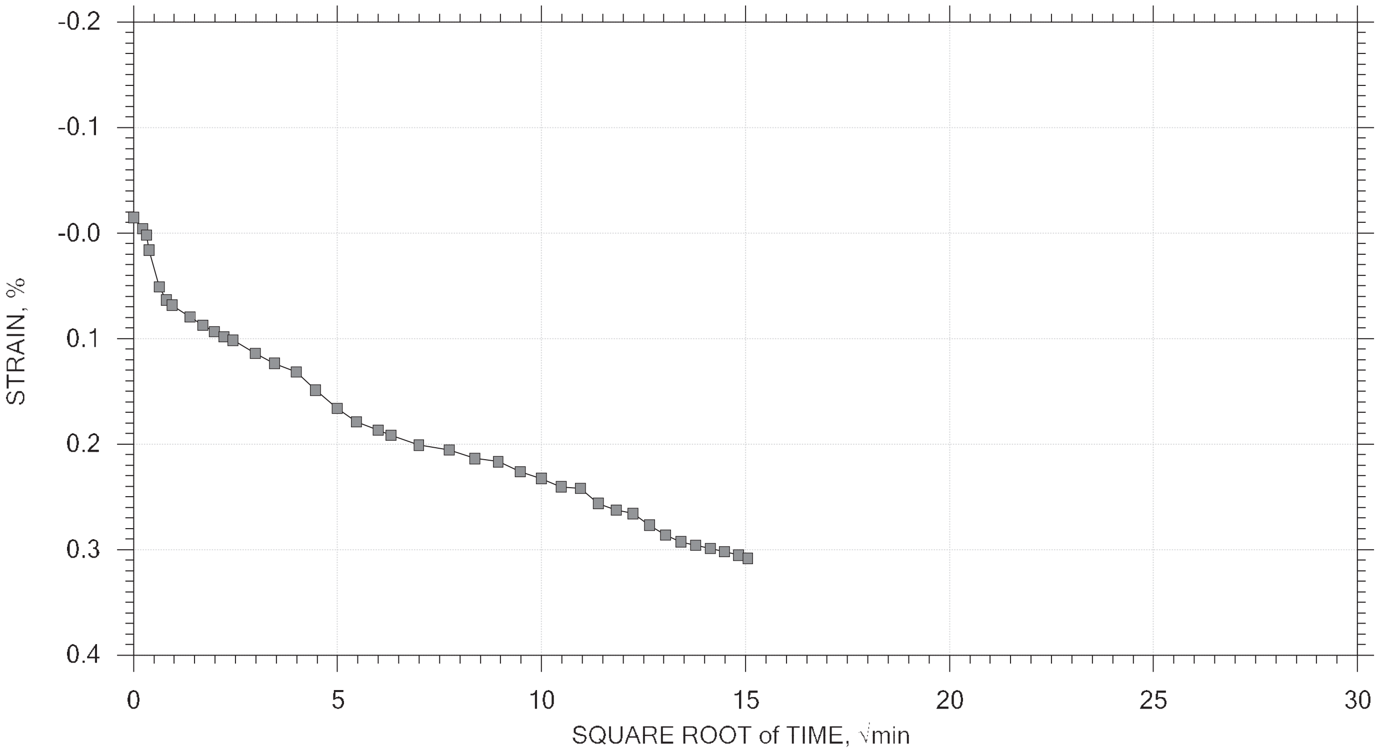
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 20

Stress: 0.081915 tsf





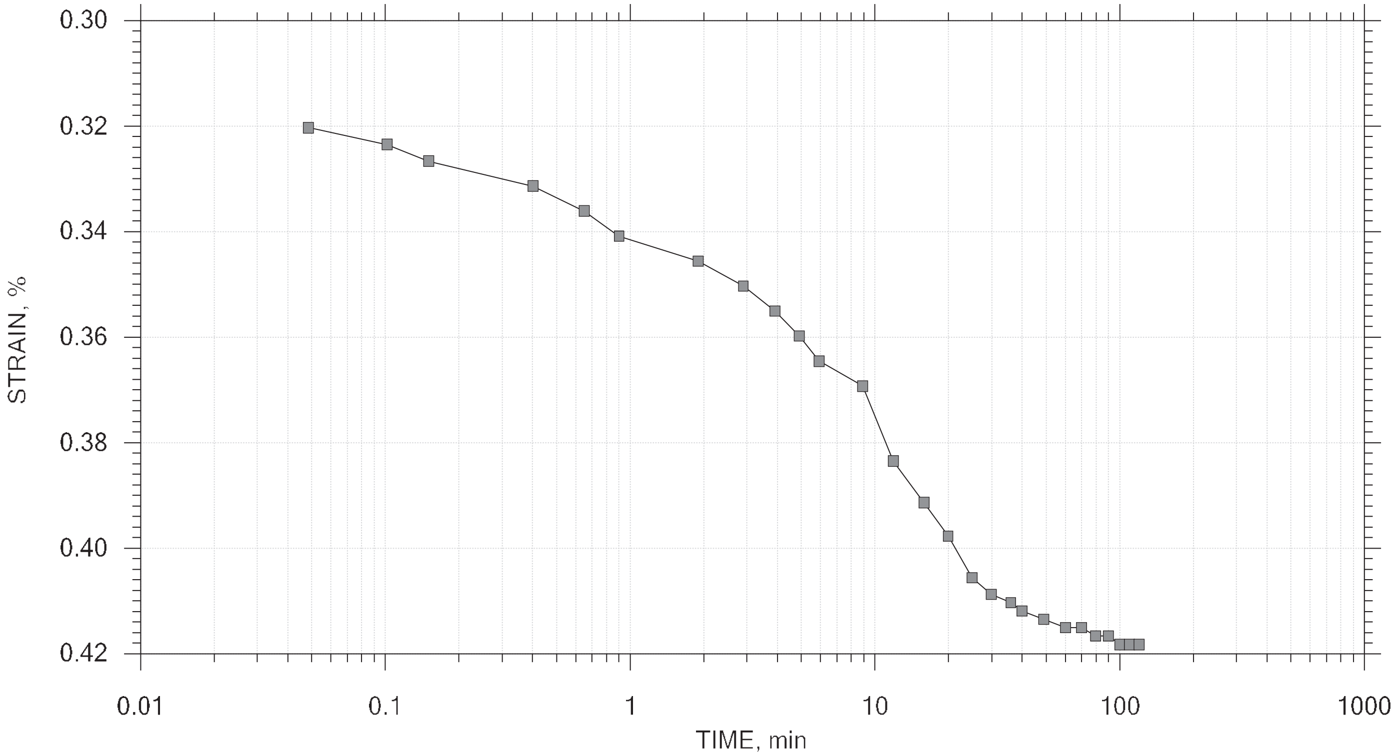
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

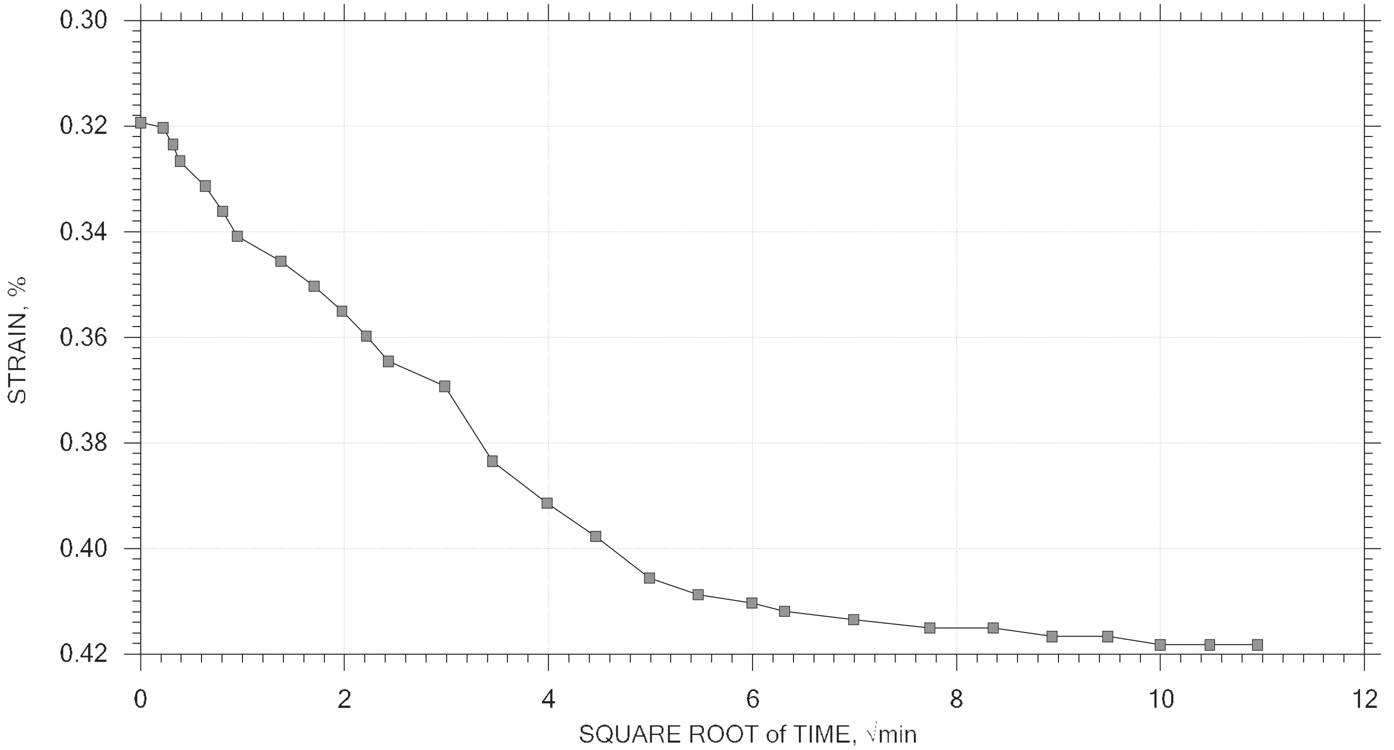
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 20

Stress: 0.125 tsf





GeoTesting EXPRESS

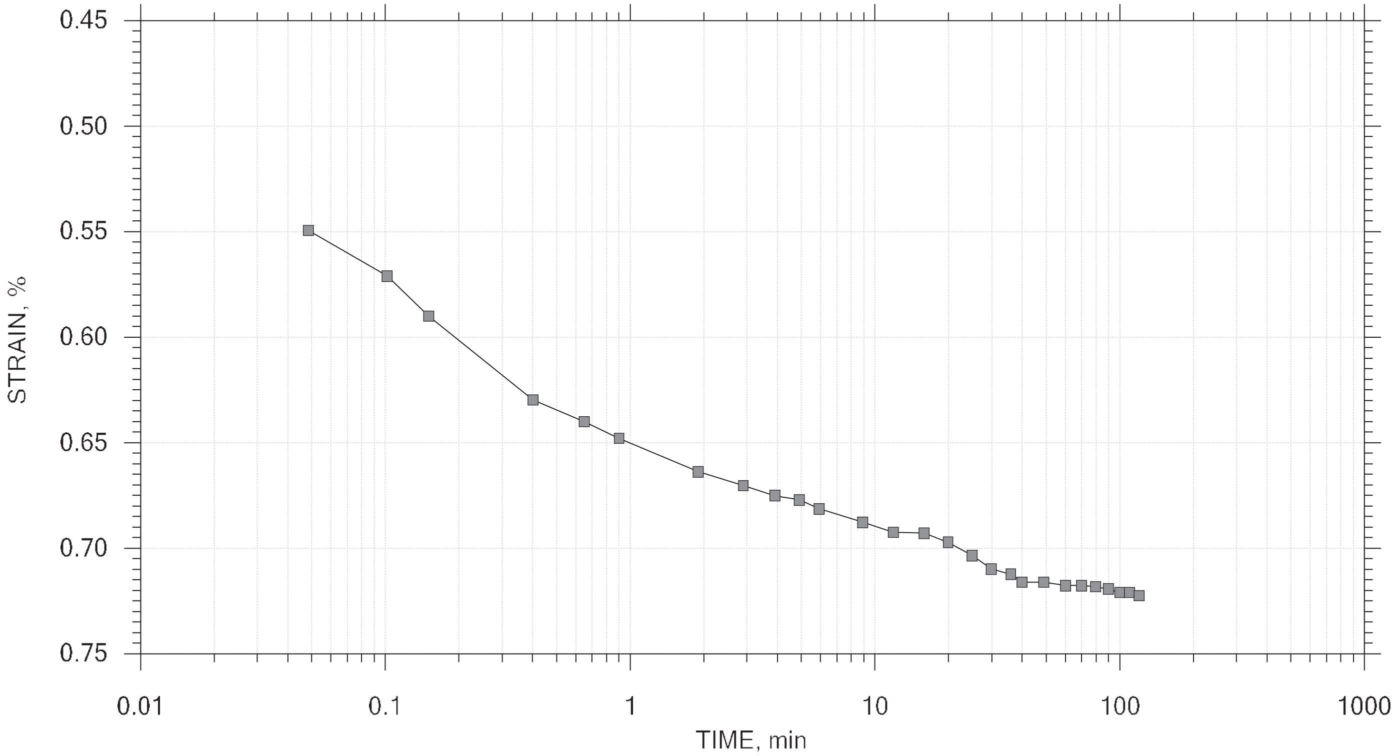
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

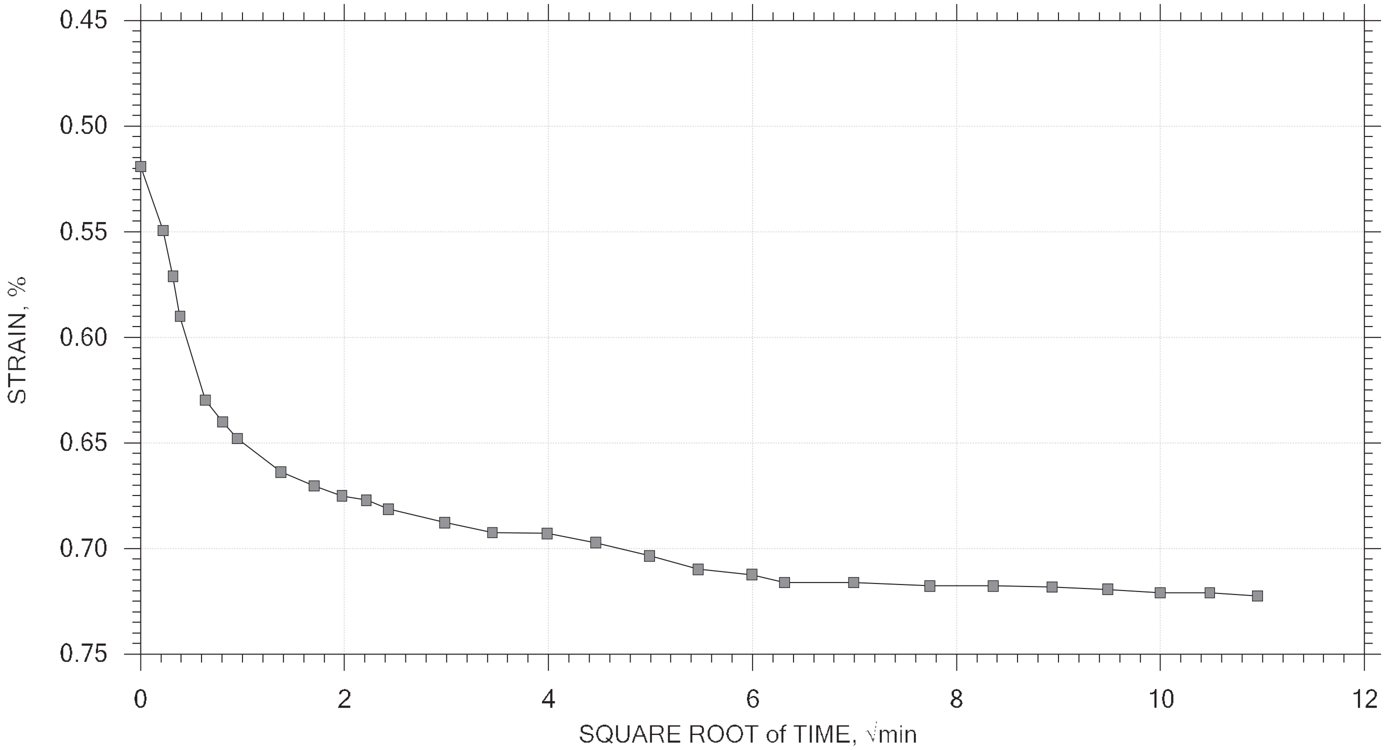
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 20

Stress: 0.25 tsf





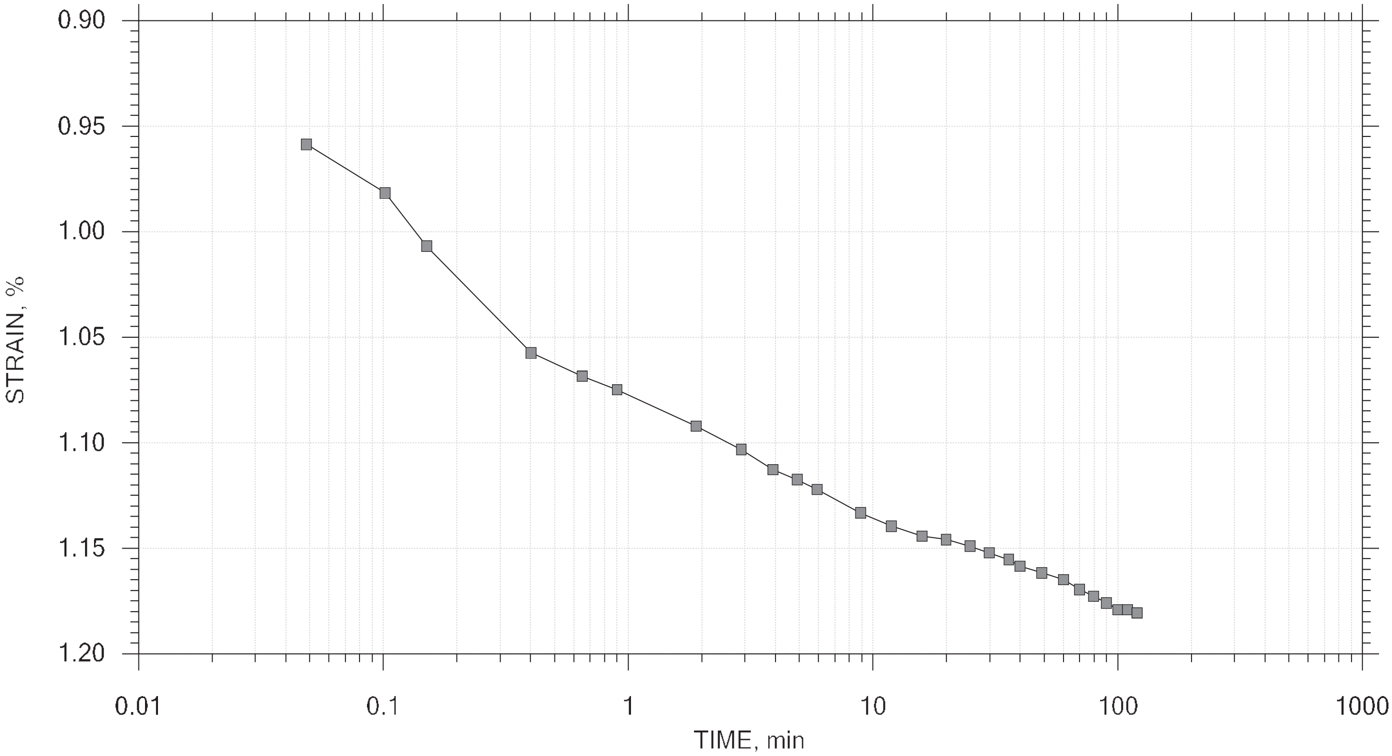
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

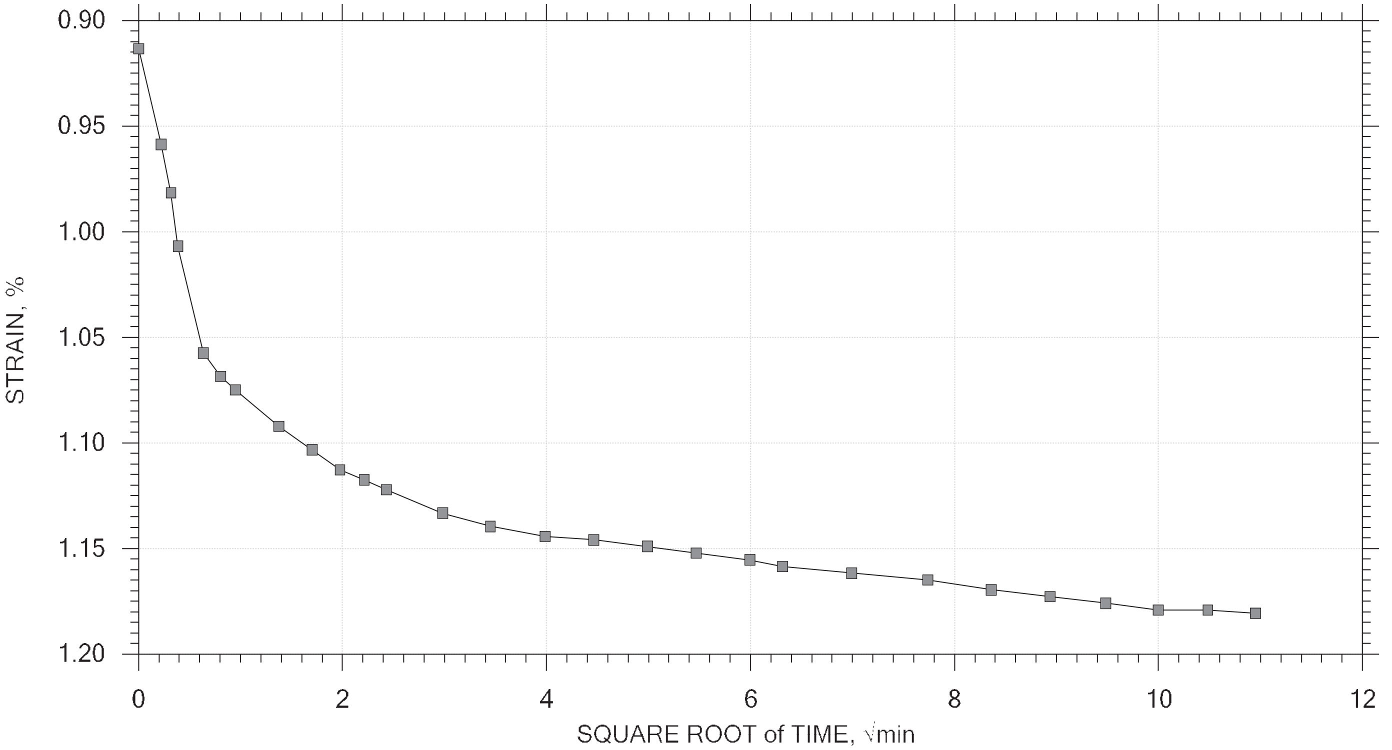
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 20

Stress: 0.5 tsf





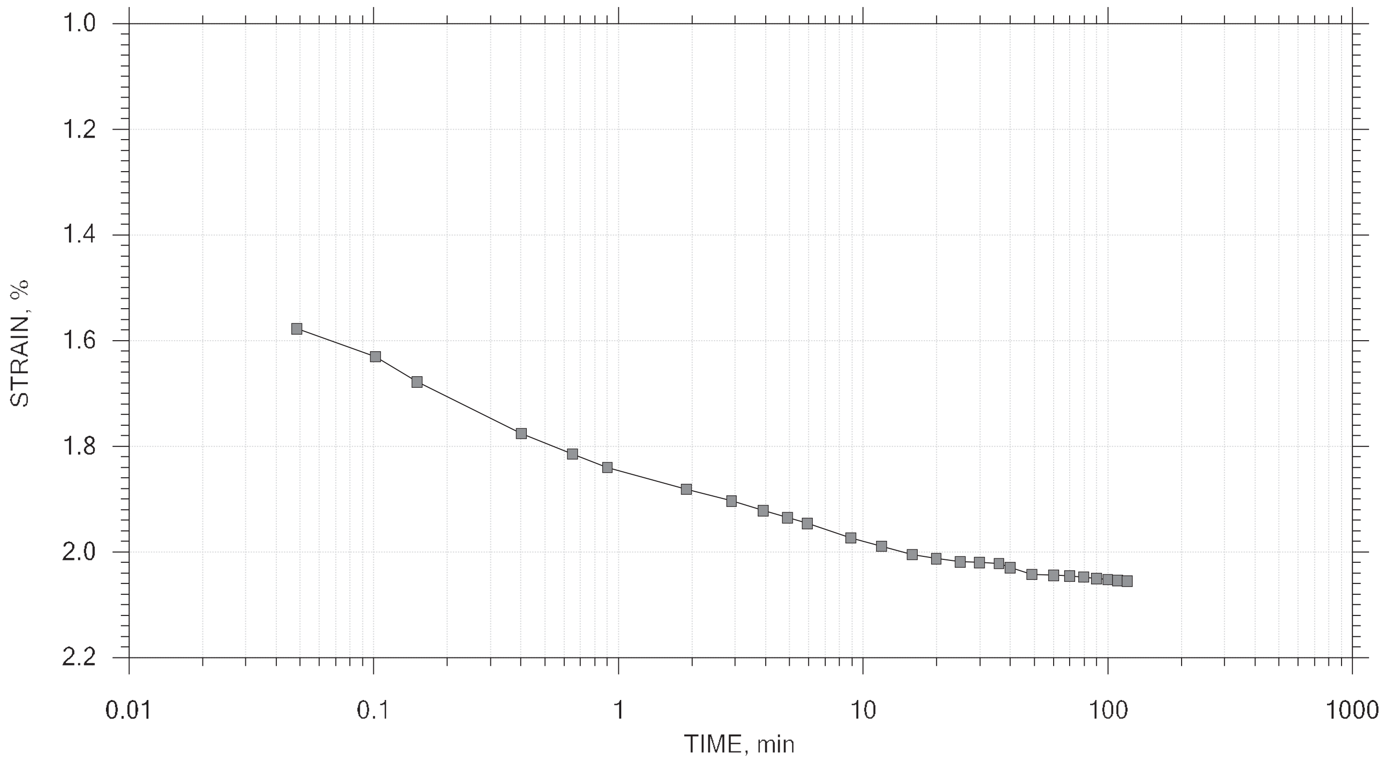
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

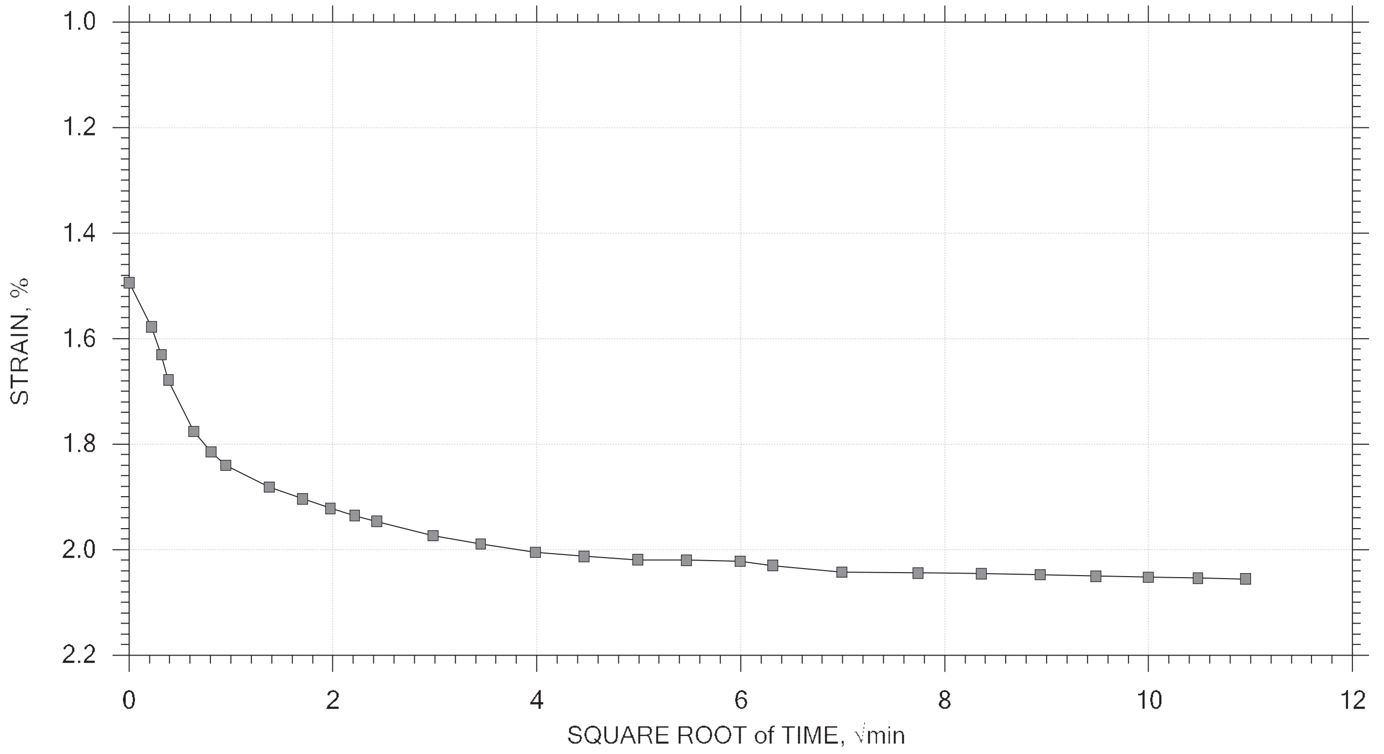
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 20

Stress: 1 tsf





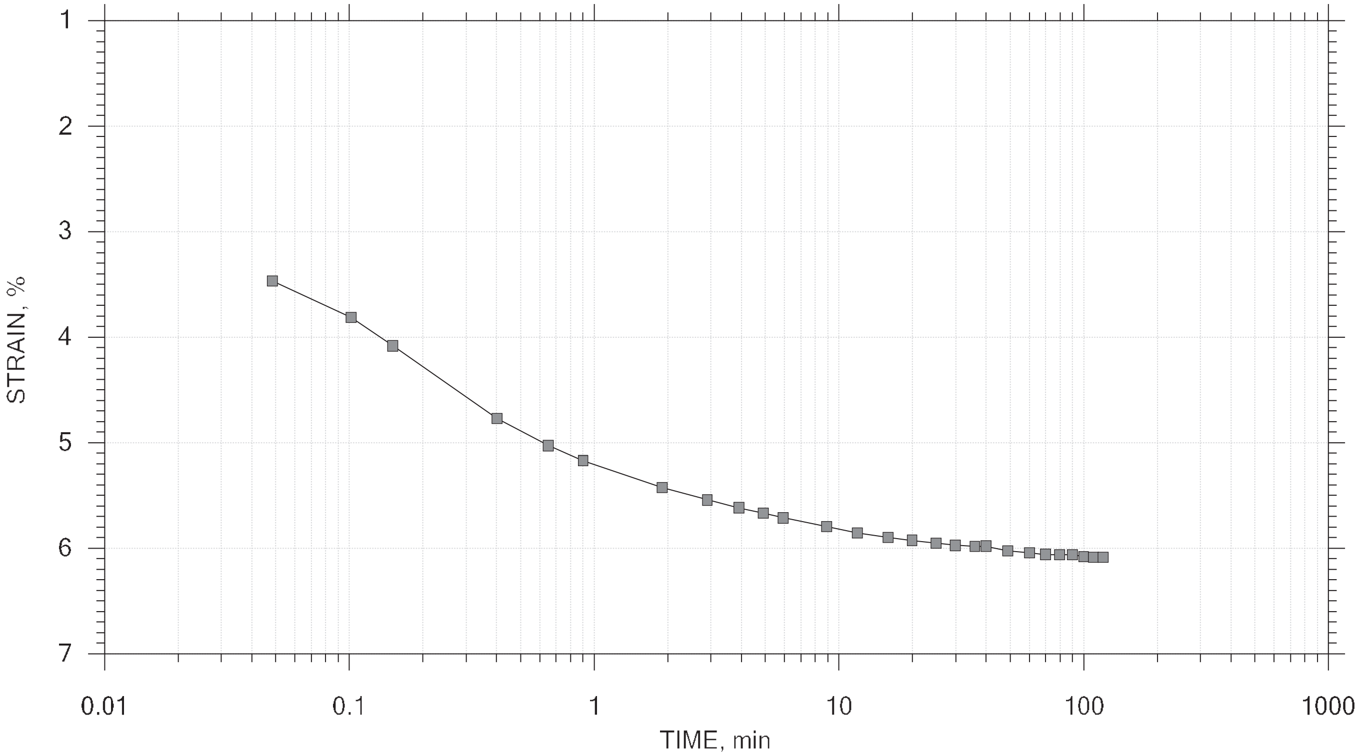
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

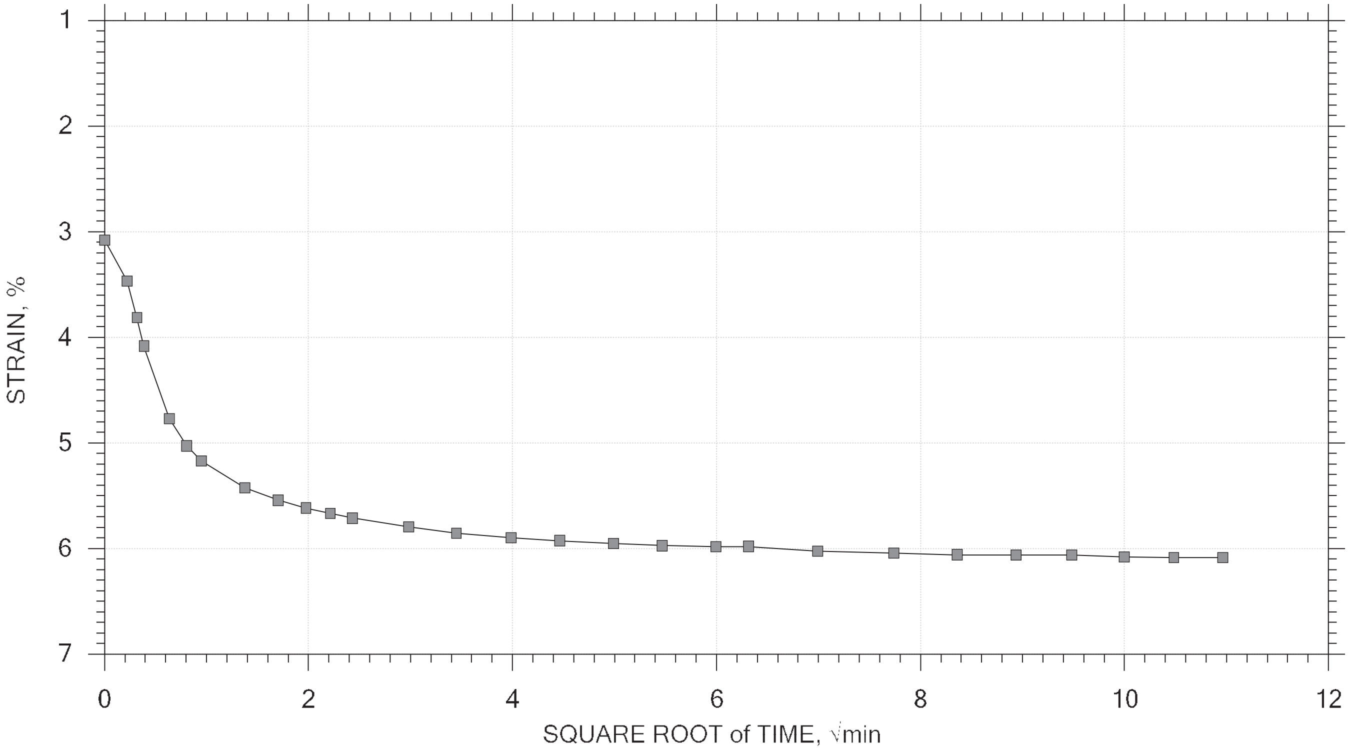
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 20

Stress: 2 tsf





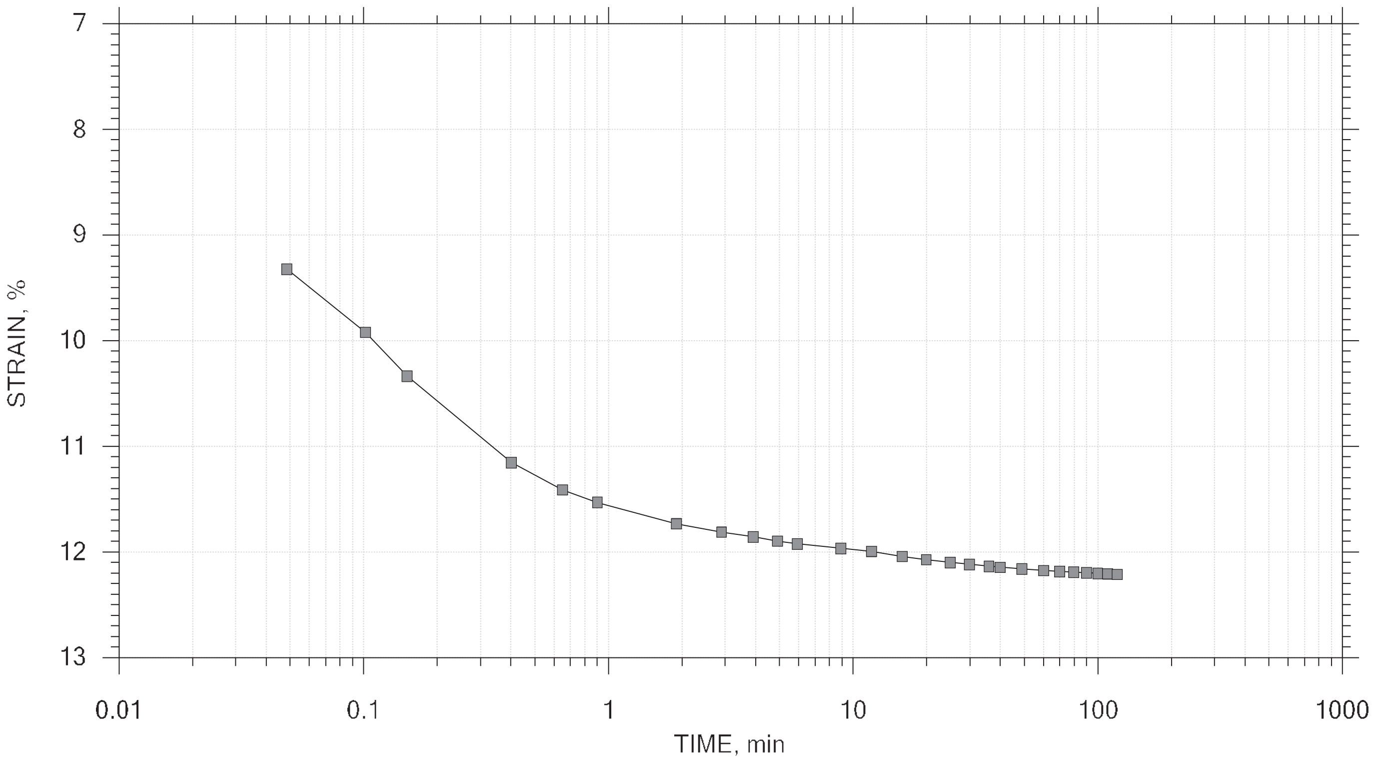
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-103	Tested By: jm	Checked By: mcm
	Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
	Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray silt with sand (ASH)		
	Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

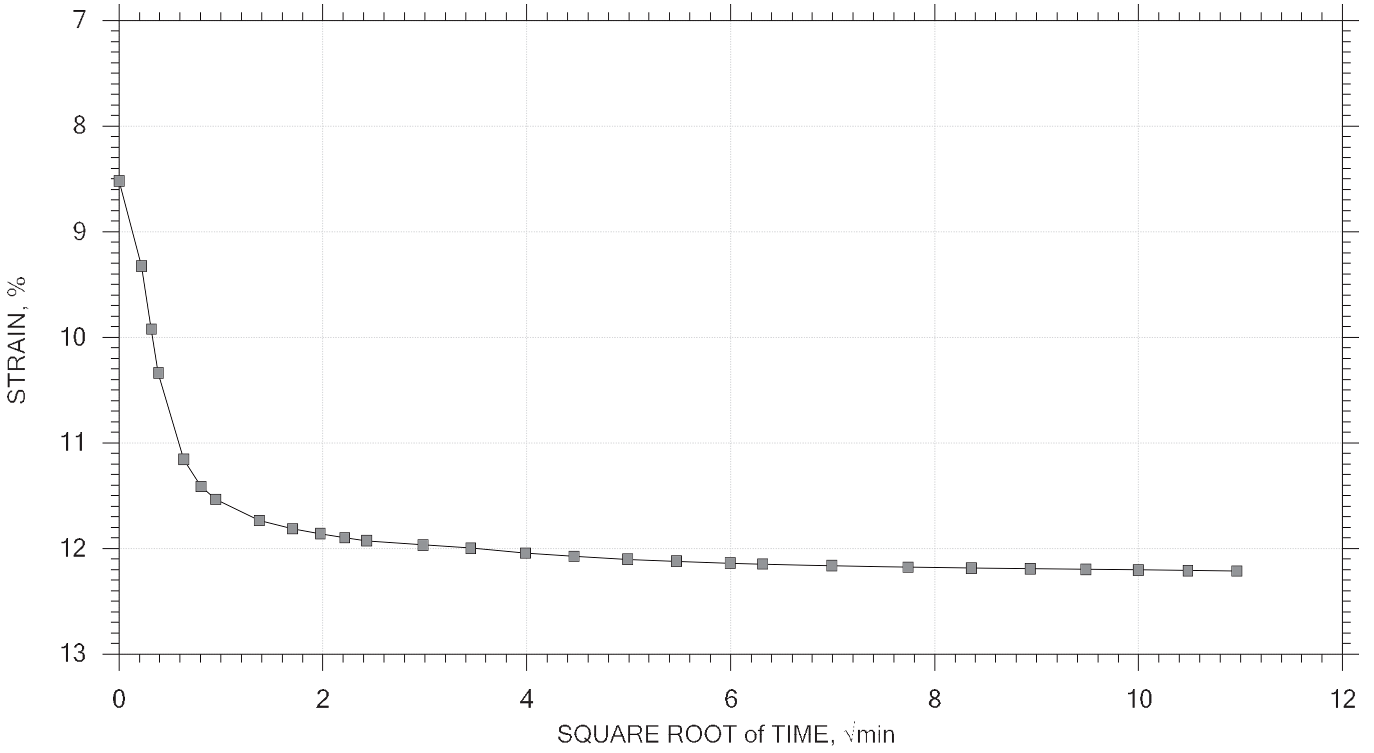
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 20

Stress: 4 tsf





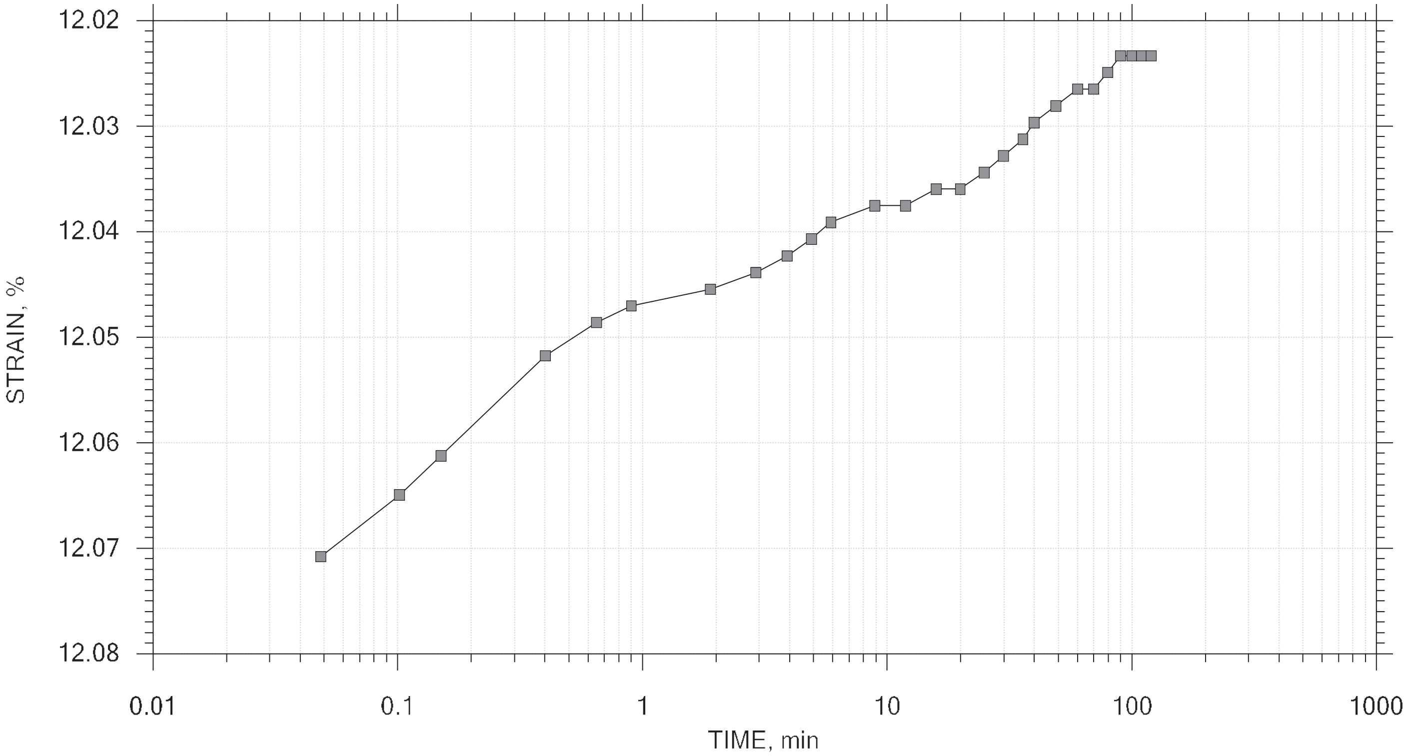
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

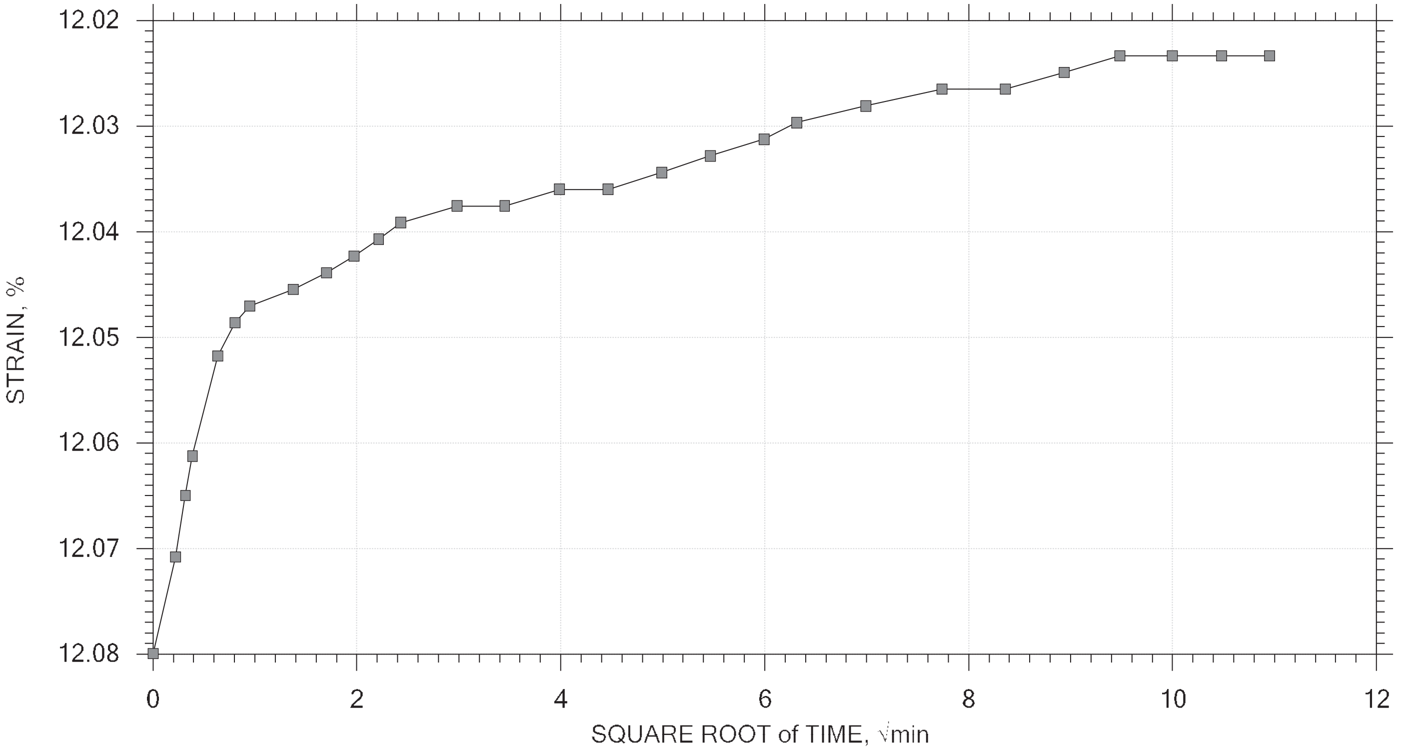
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 20

Stress: 1 tsf





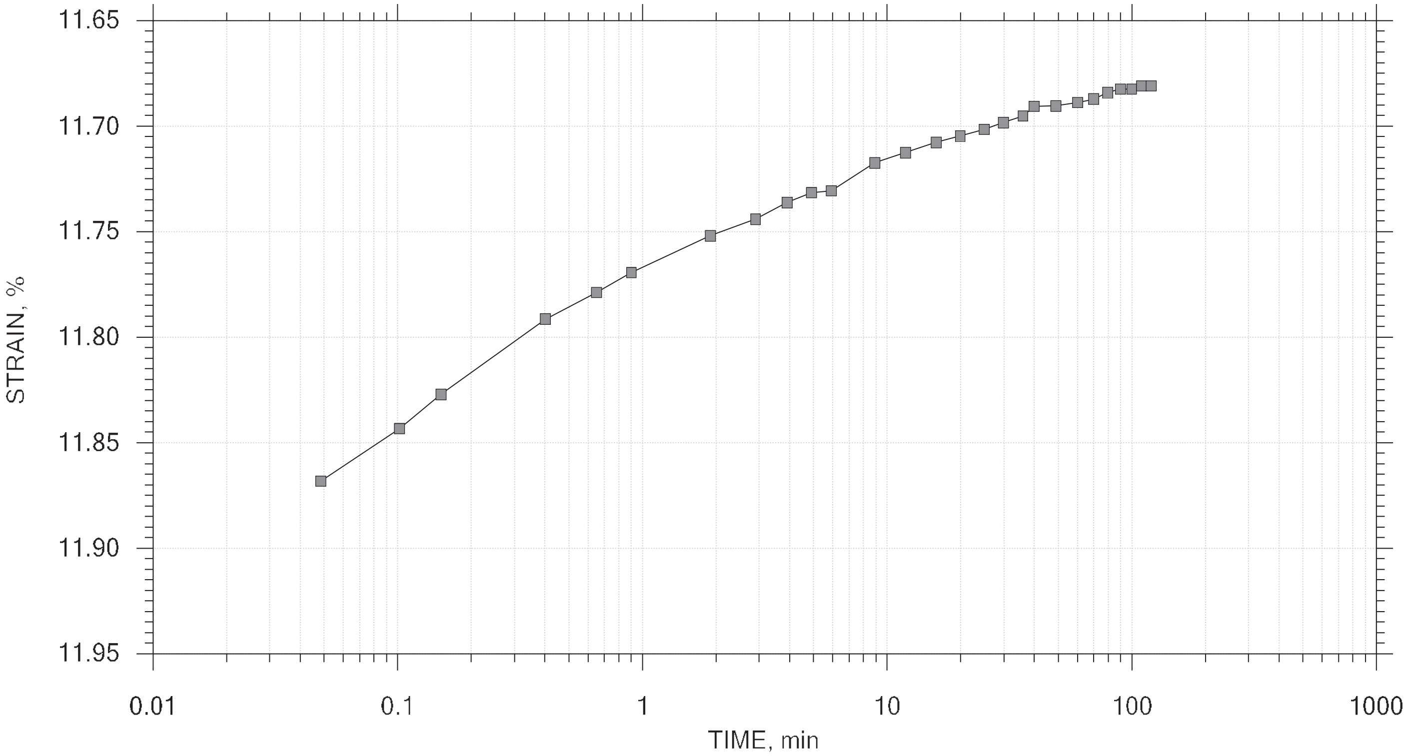
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-103	Tested By: jm	Checked By: mcm
	Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
	Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
	Description: Moist. dark gray silt with sand (ASH)		
	Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

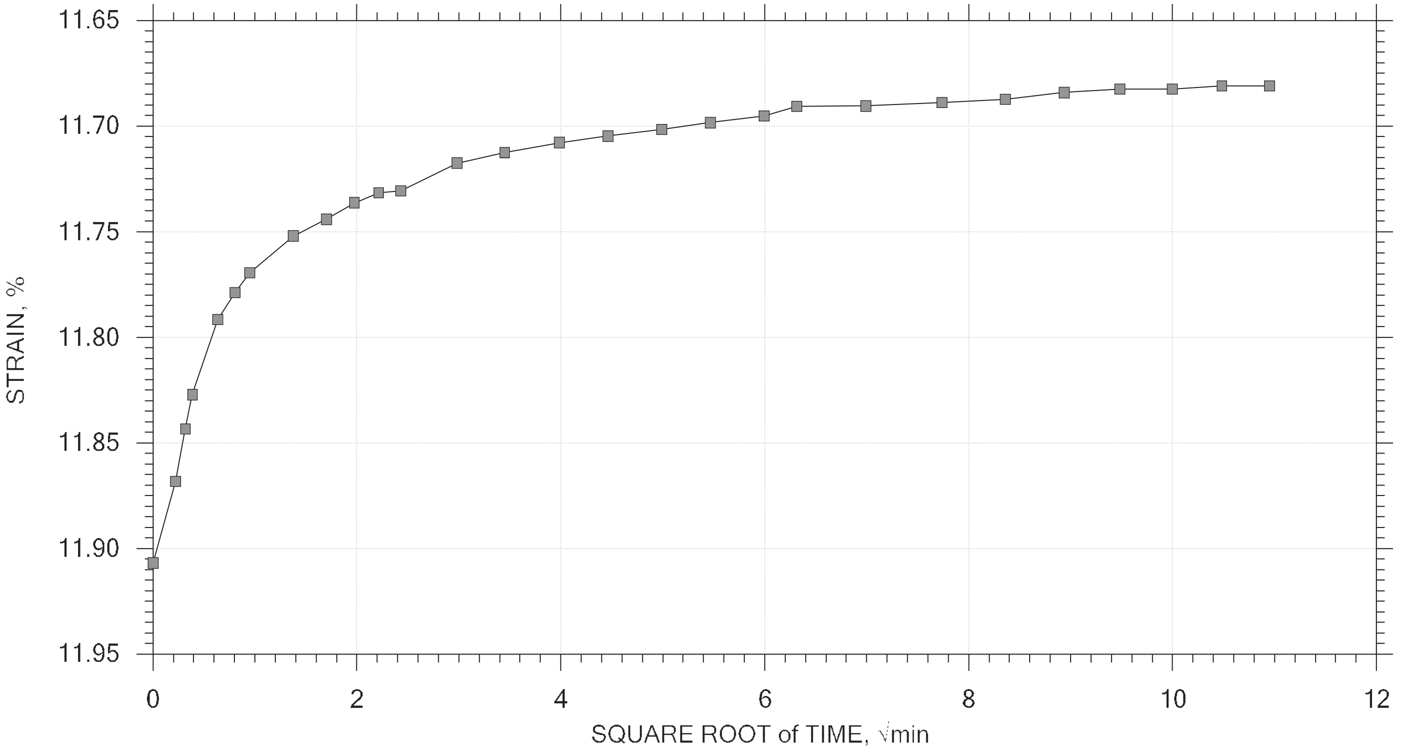
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 20

Stress: 0.25 tsf





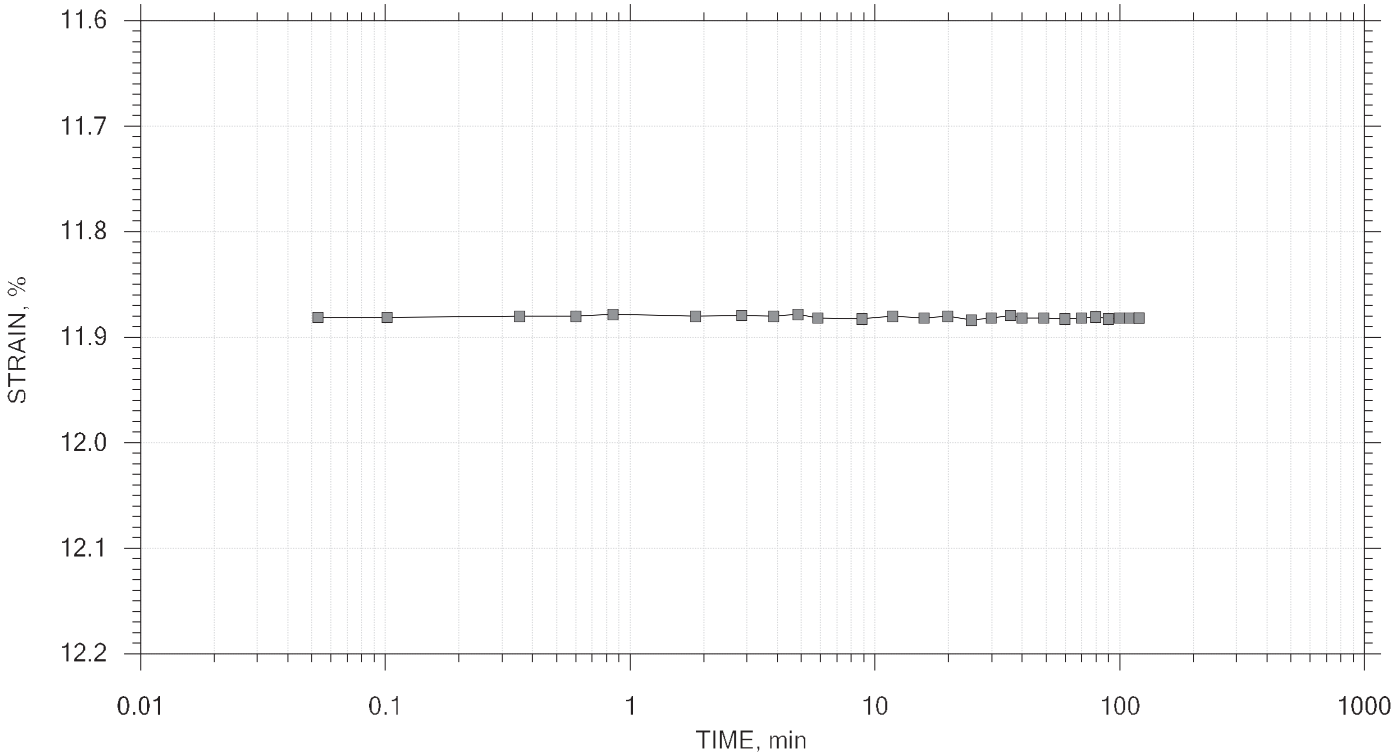
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

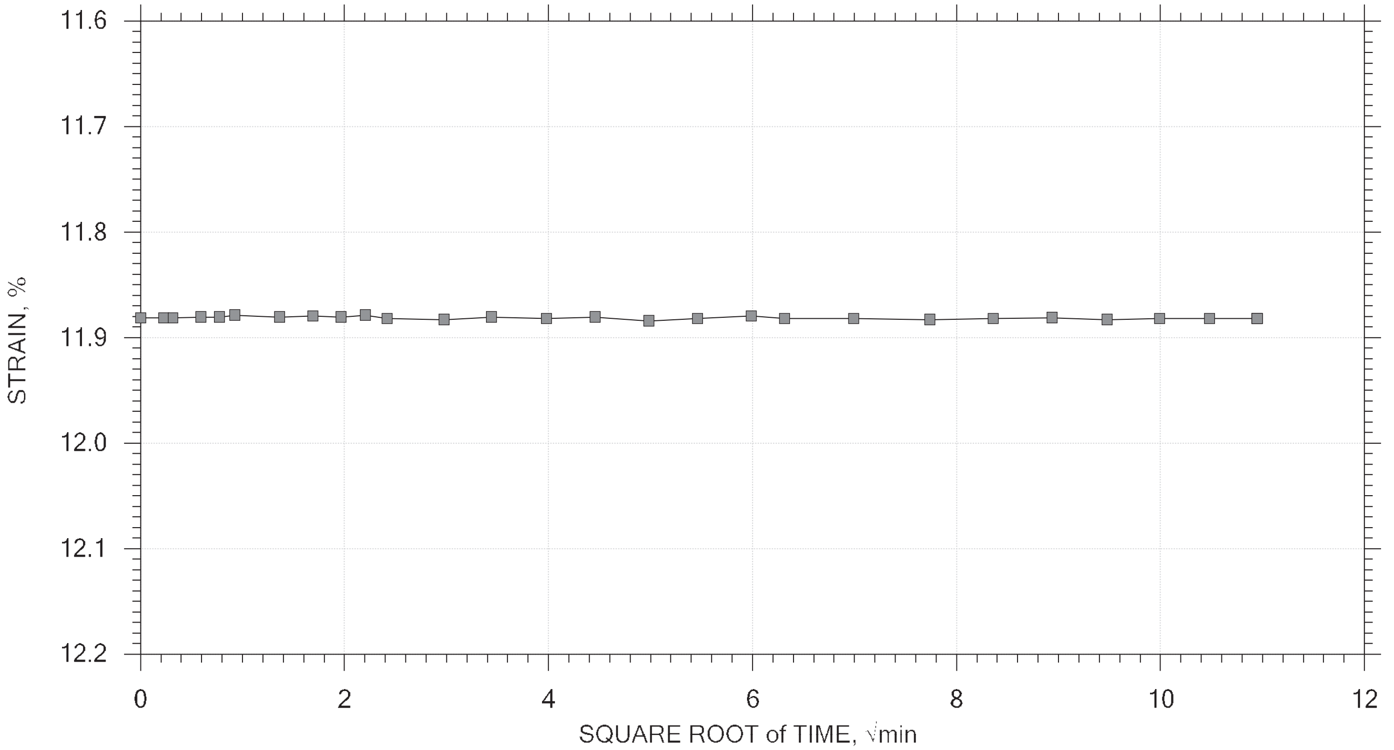
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 20

Stress: 0.5 tsf





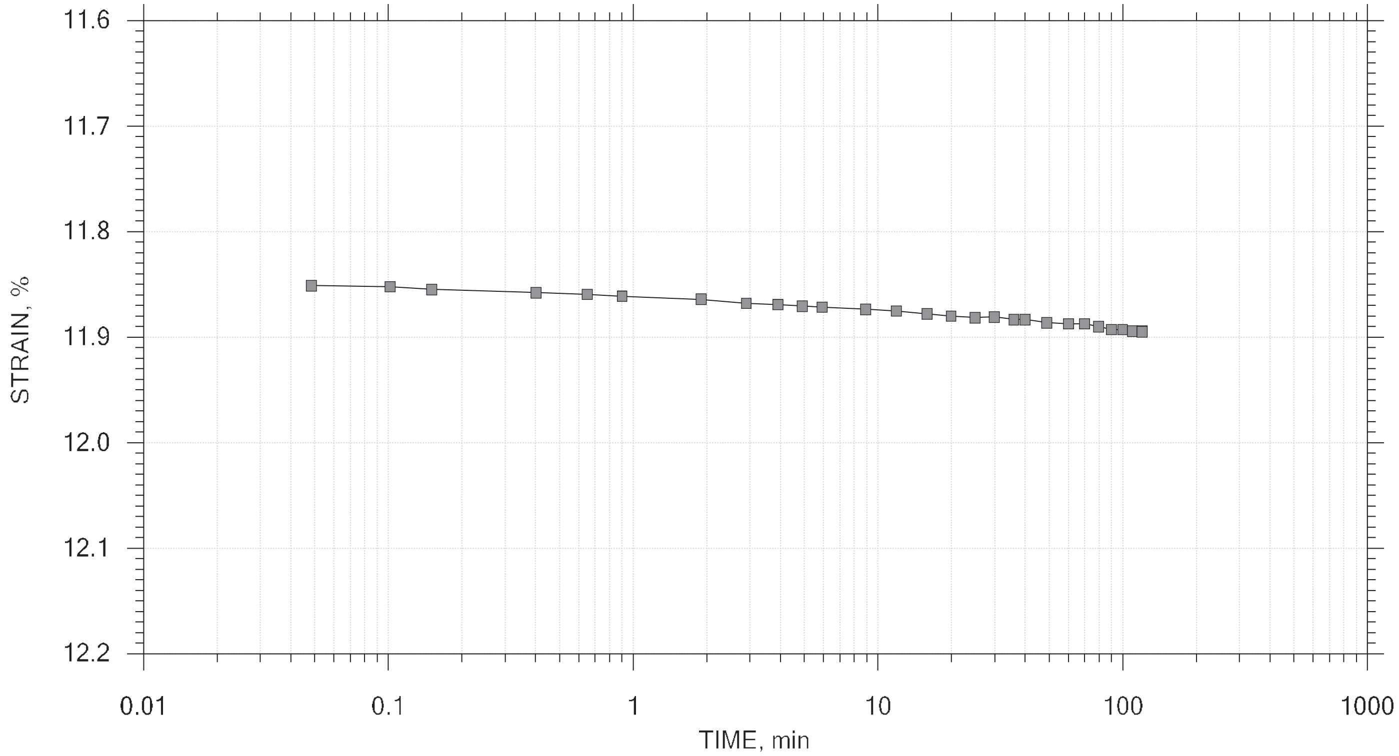
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

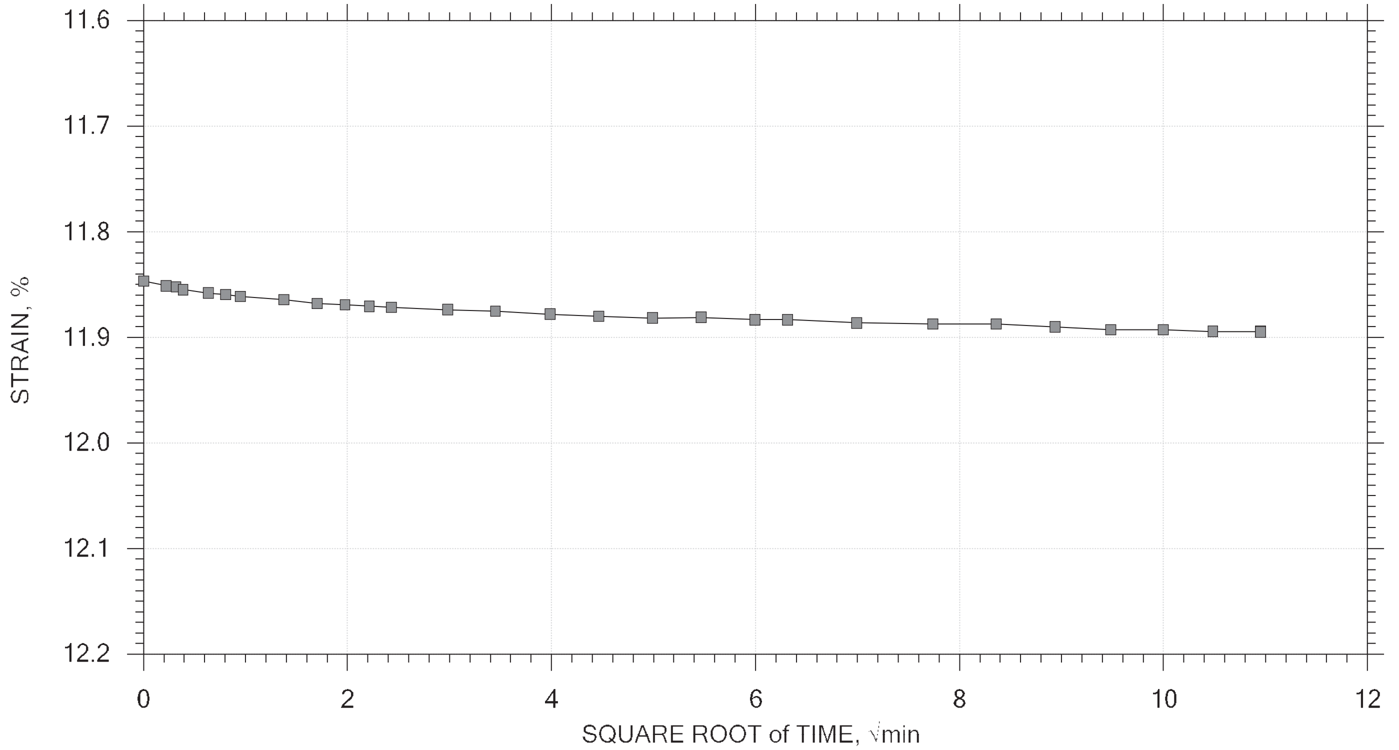
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 20

Stress: 1 tsf





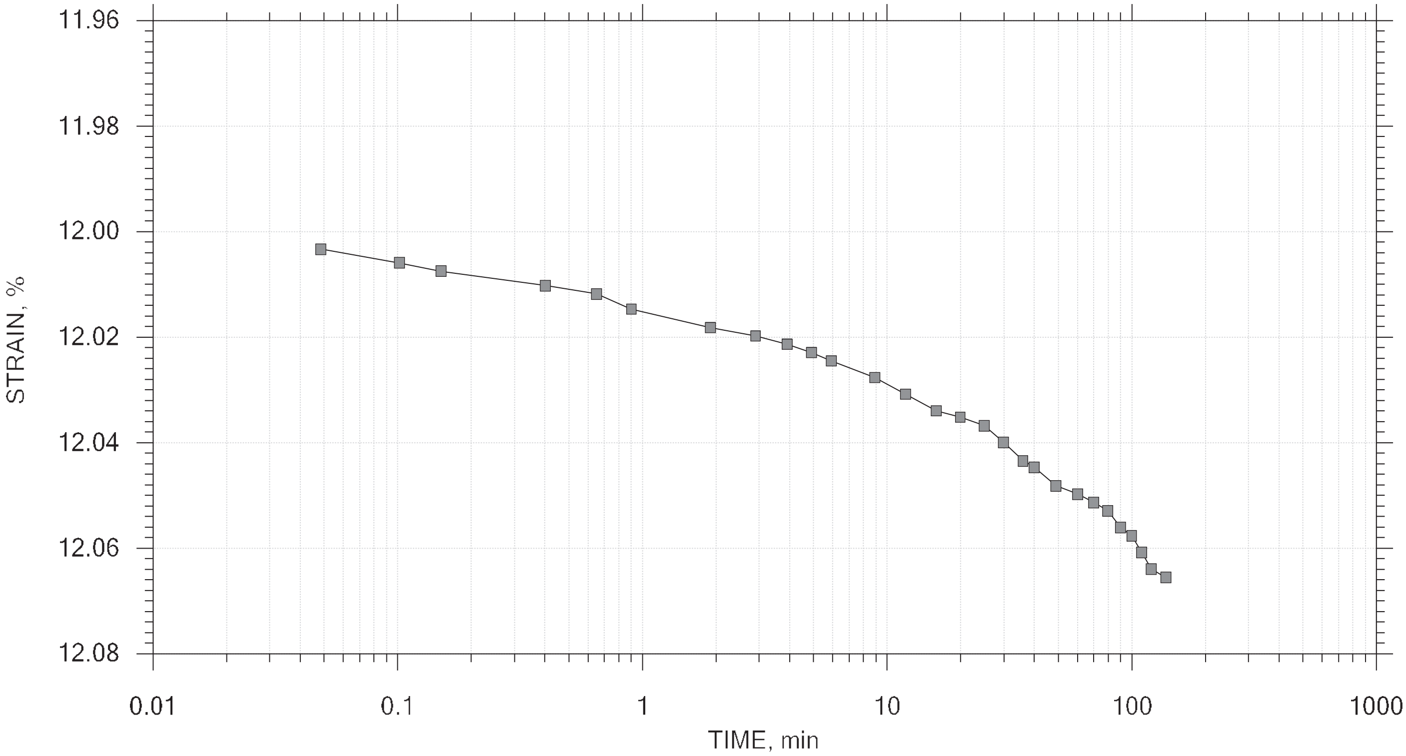
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-103	Tested By: jm	Checked By: mcm
	Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
	Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
	Description: Moist. dark gray silt with sand (ASH)		
	Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

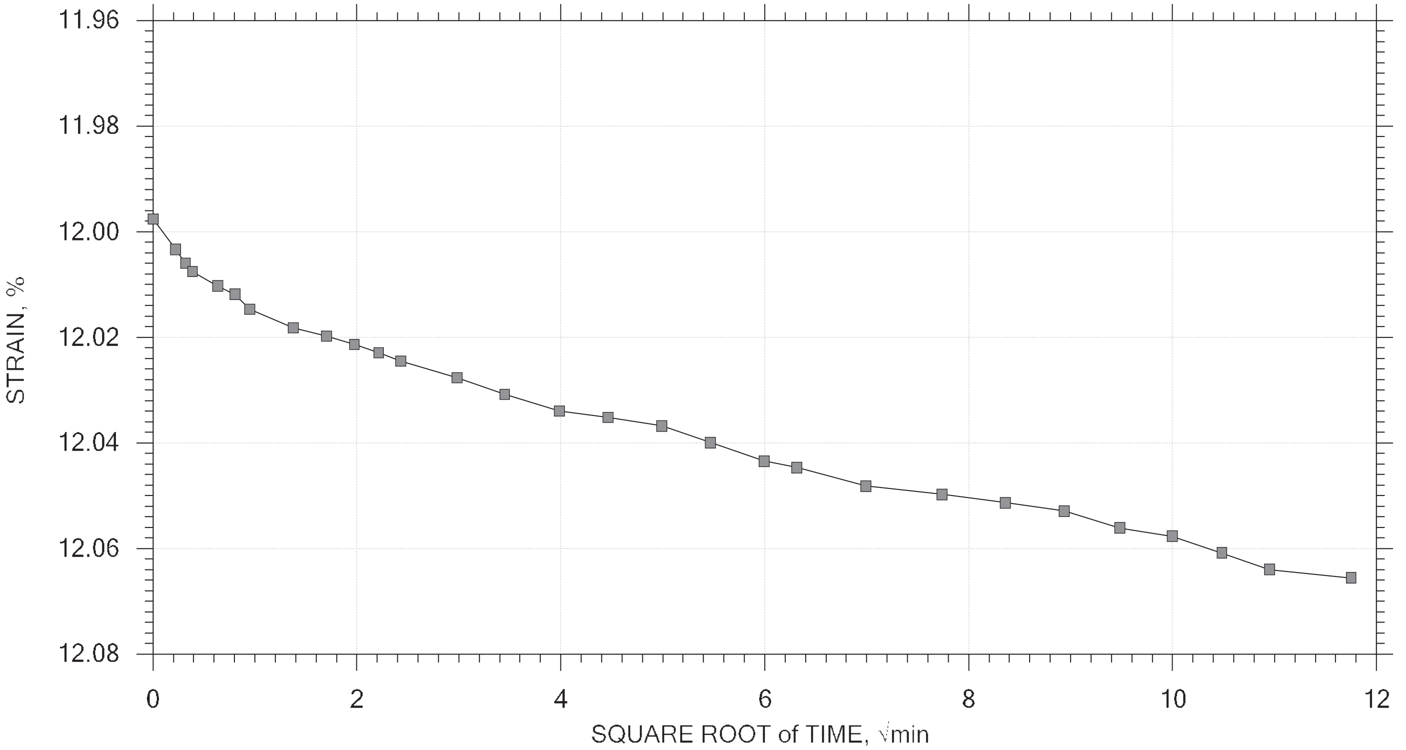
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 20

Stress: 2 tsf





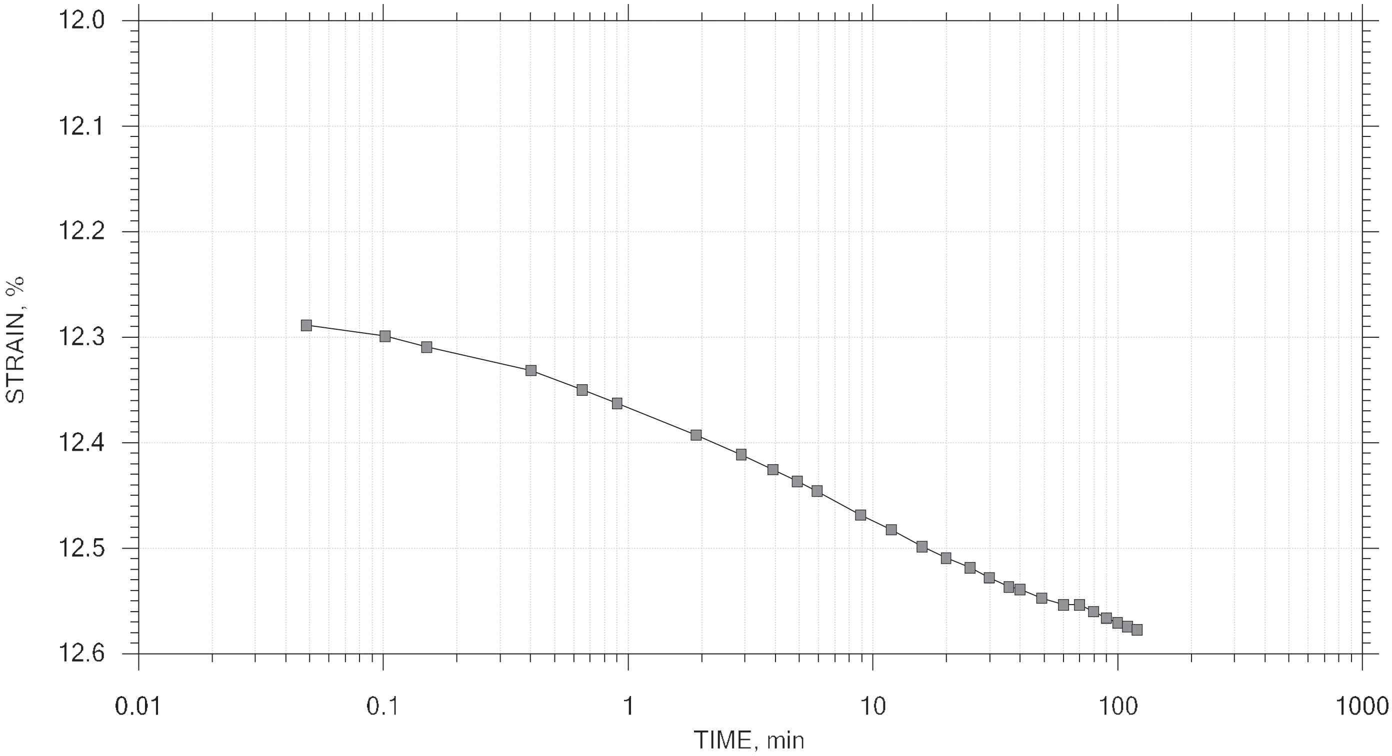
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

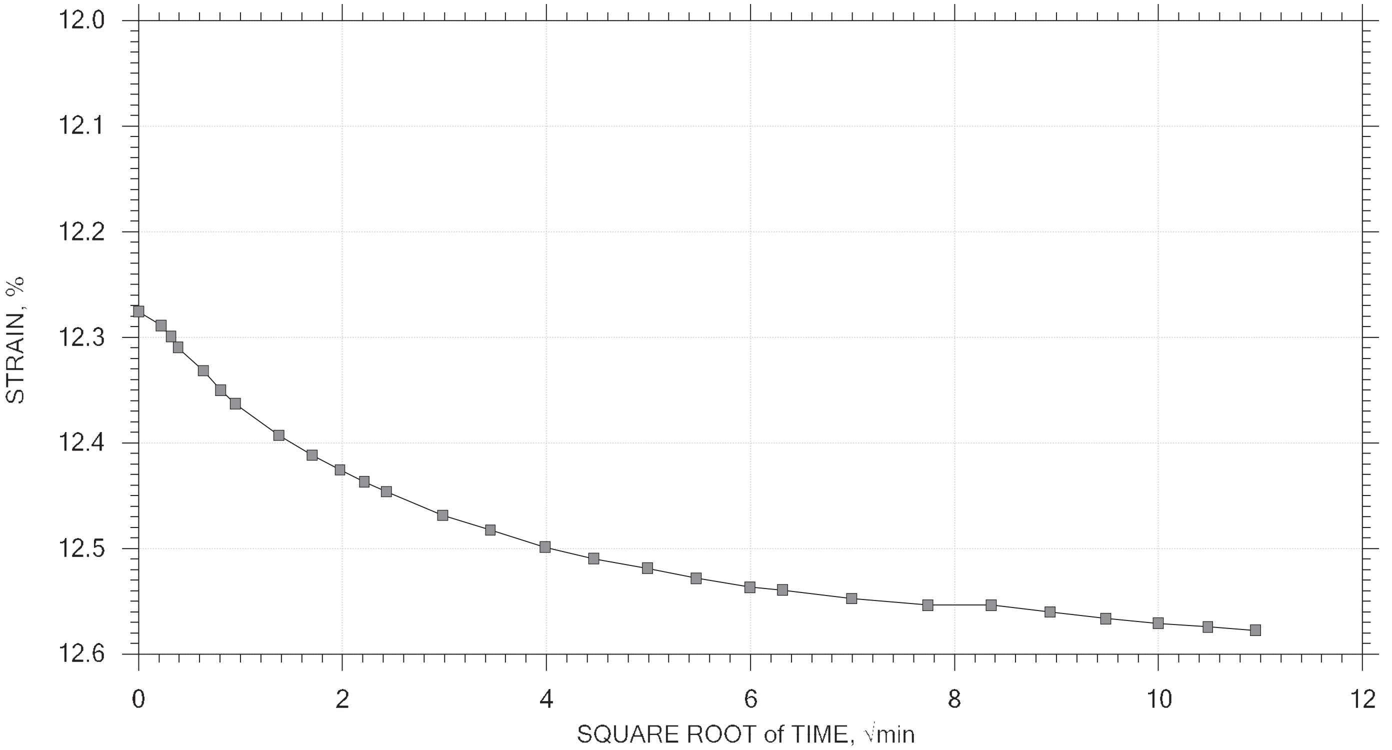
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 20

Stress: 4 tsf





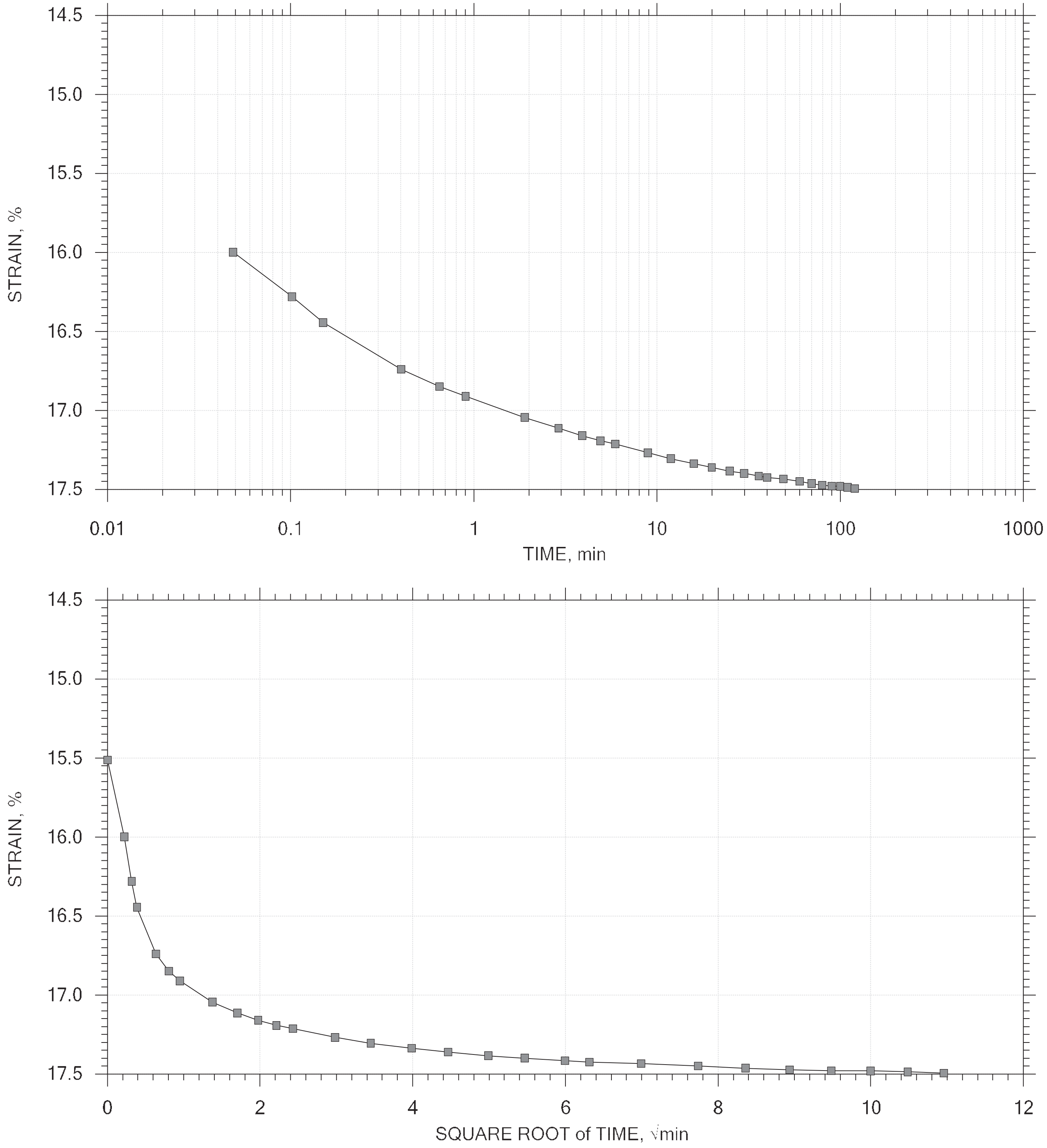
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 20

Stress: 8 tsf



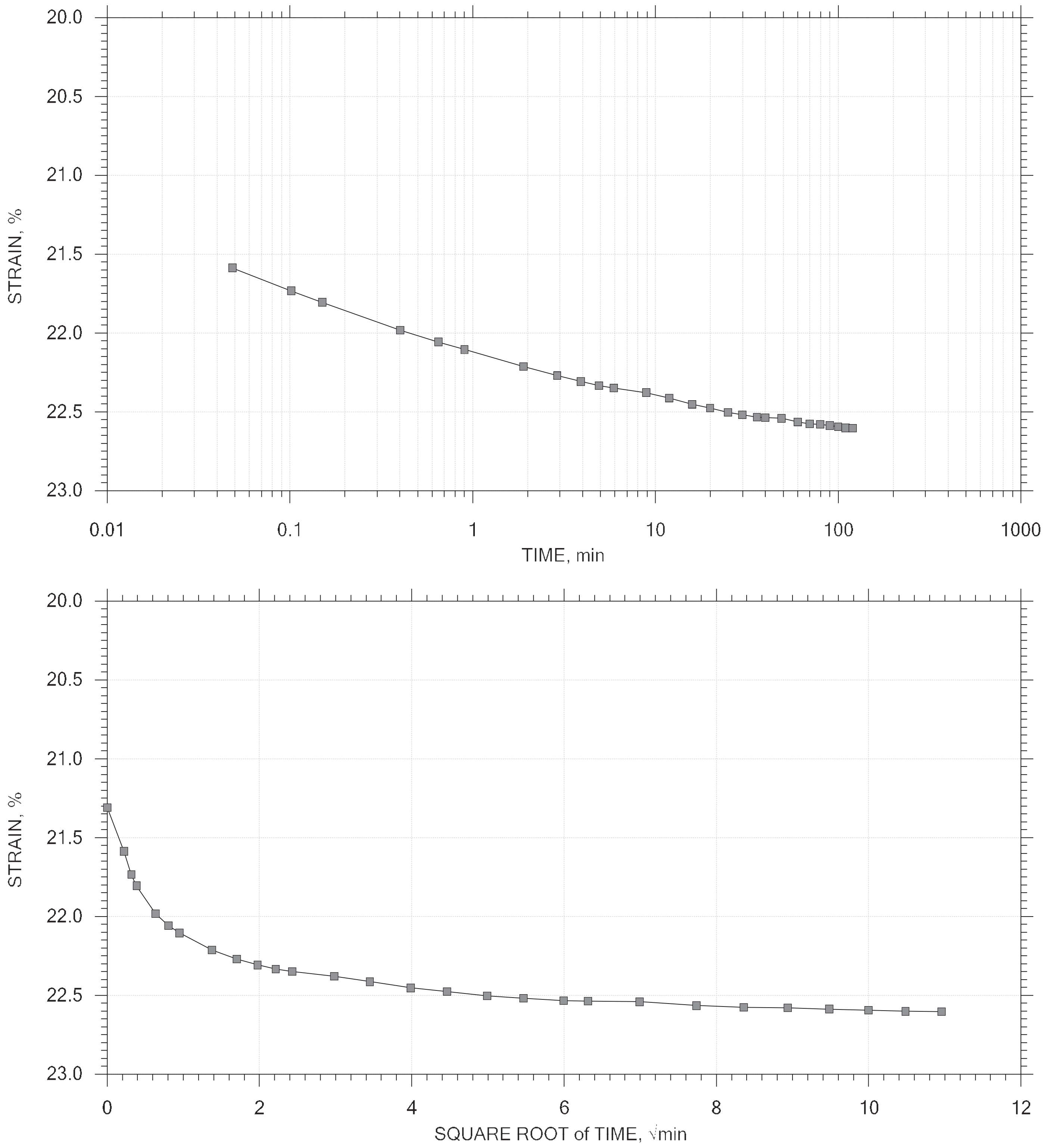
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-103	Tested By: jm	Checked By: mcm
	Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
	Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
	Description: Moist. dark gray silt with sand (ASH)		
	Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 20

Stress: 16 tsf



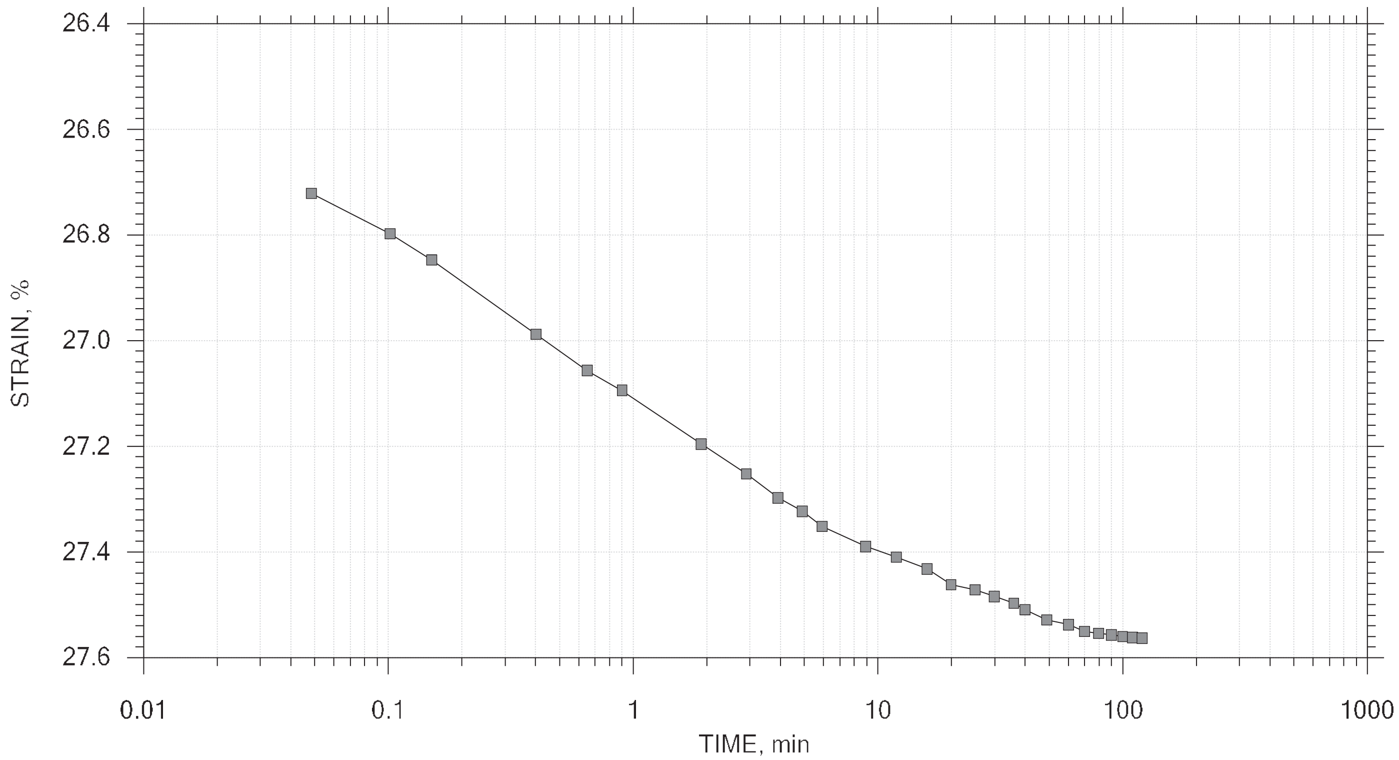
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

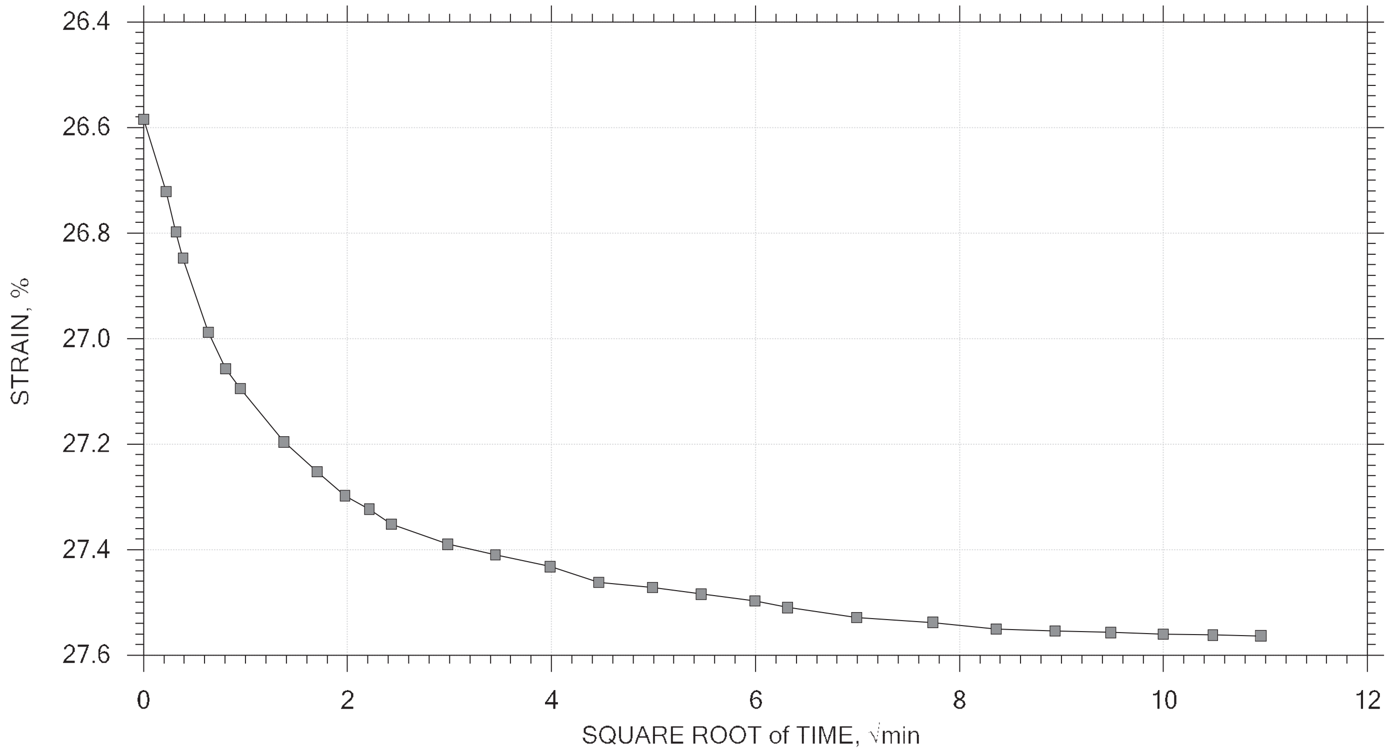
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 20

Stress: 32 tsf





GeoTesting EXPRESS

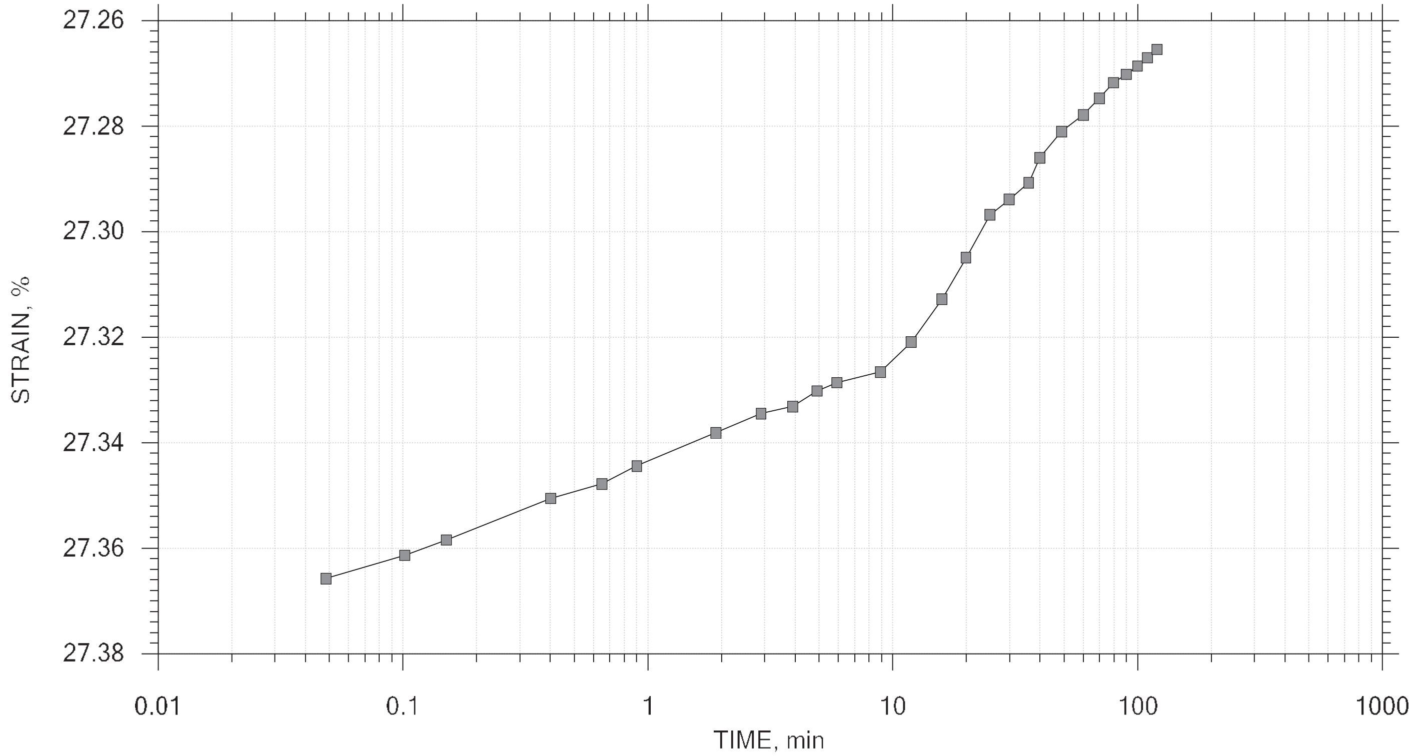
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

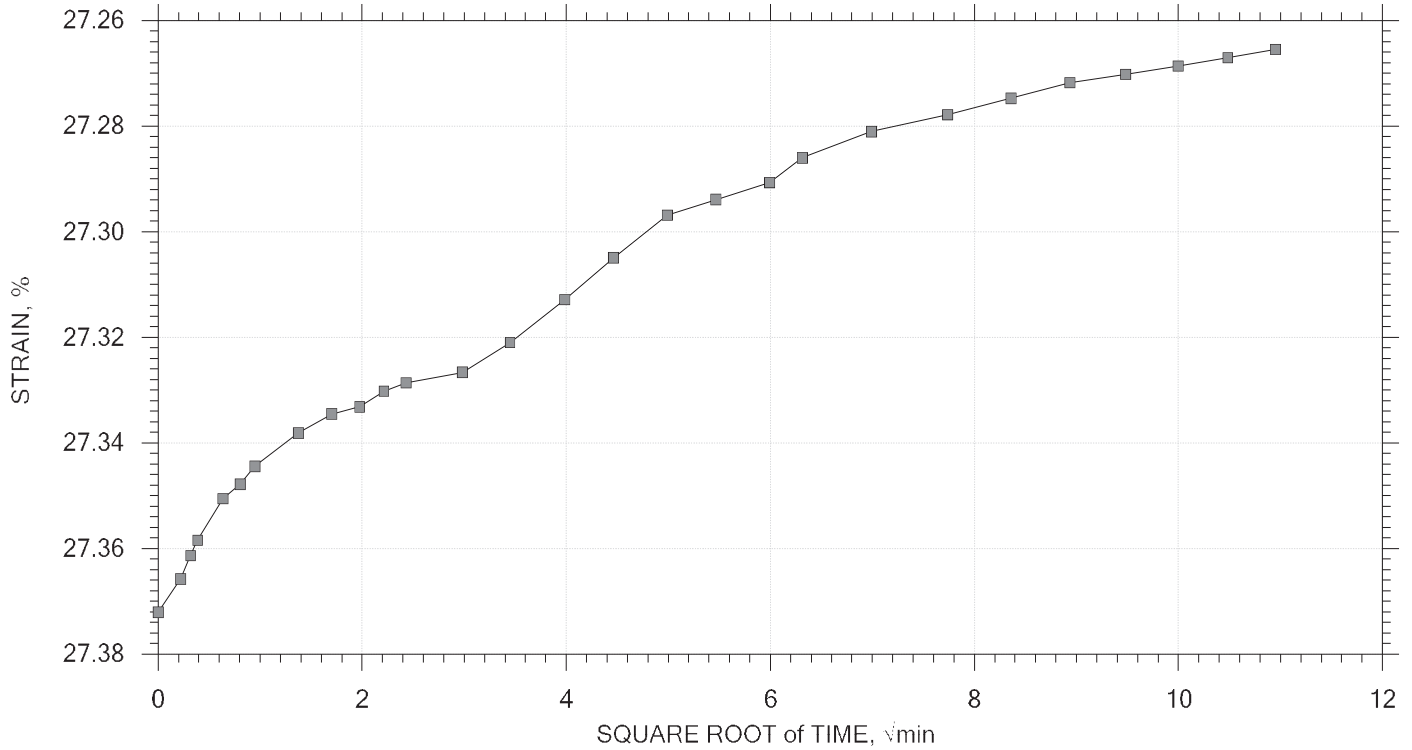
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 20

Stress: 8 tsf





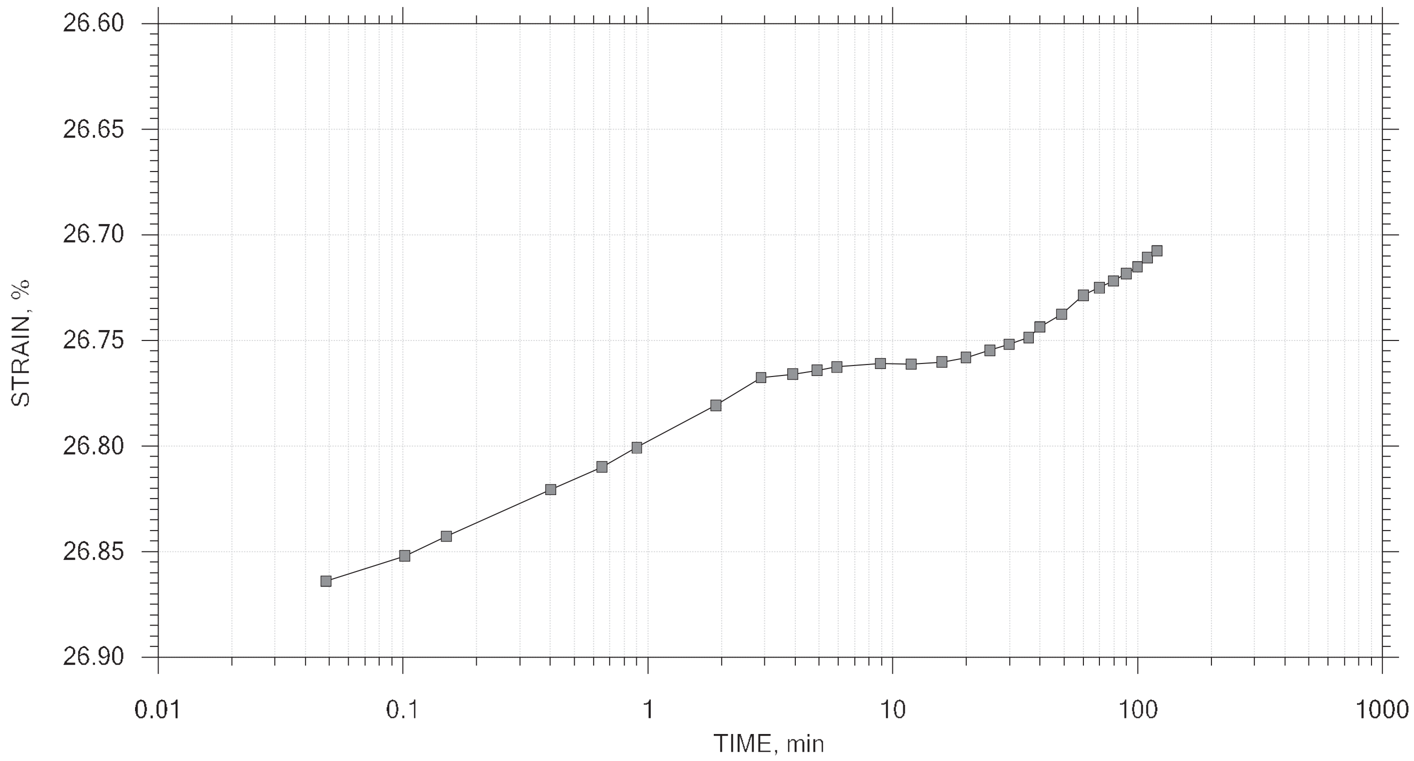
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

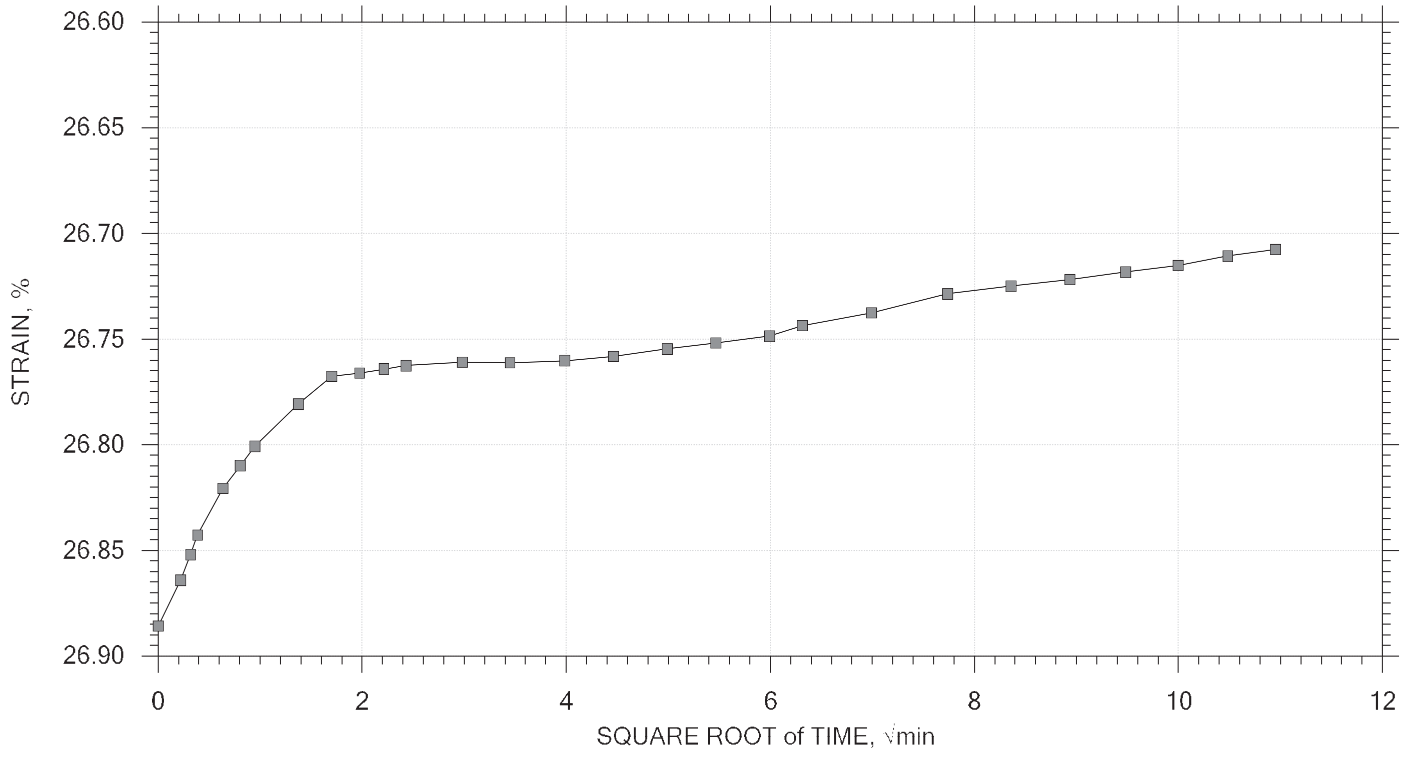
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 18 of 20

Stress: 2 tsf





GeoTesting EXPRESS

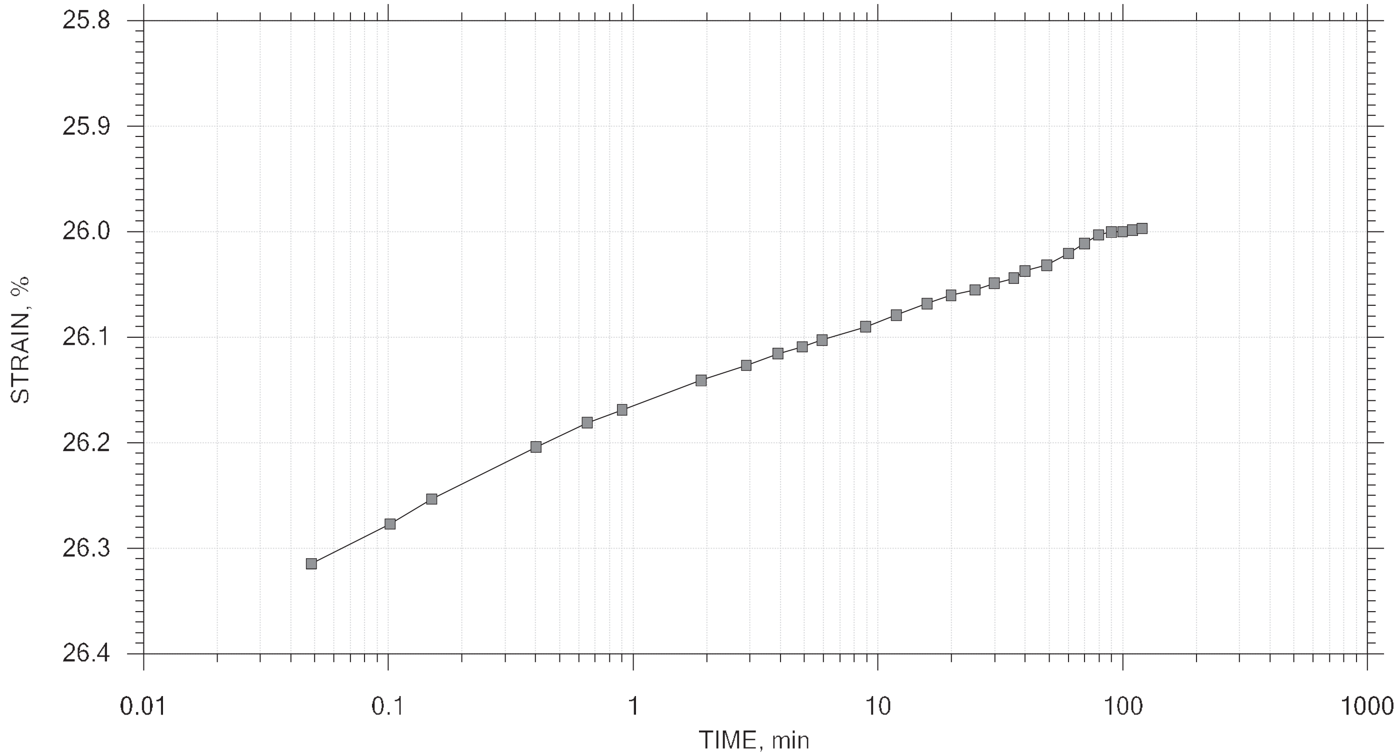
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

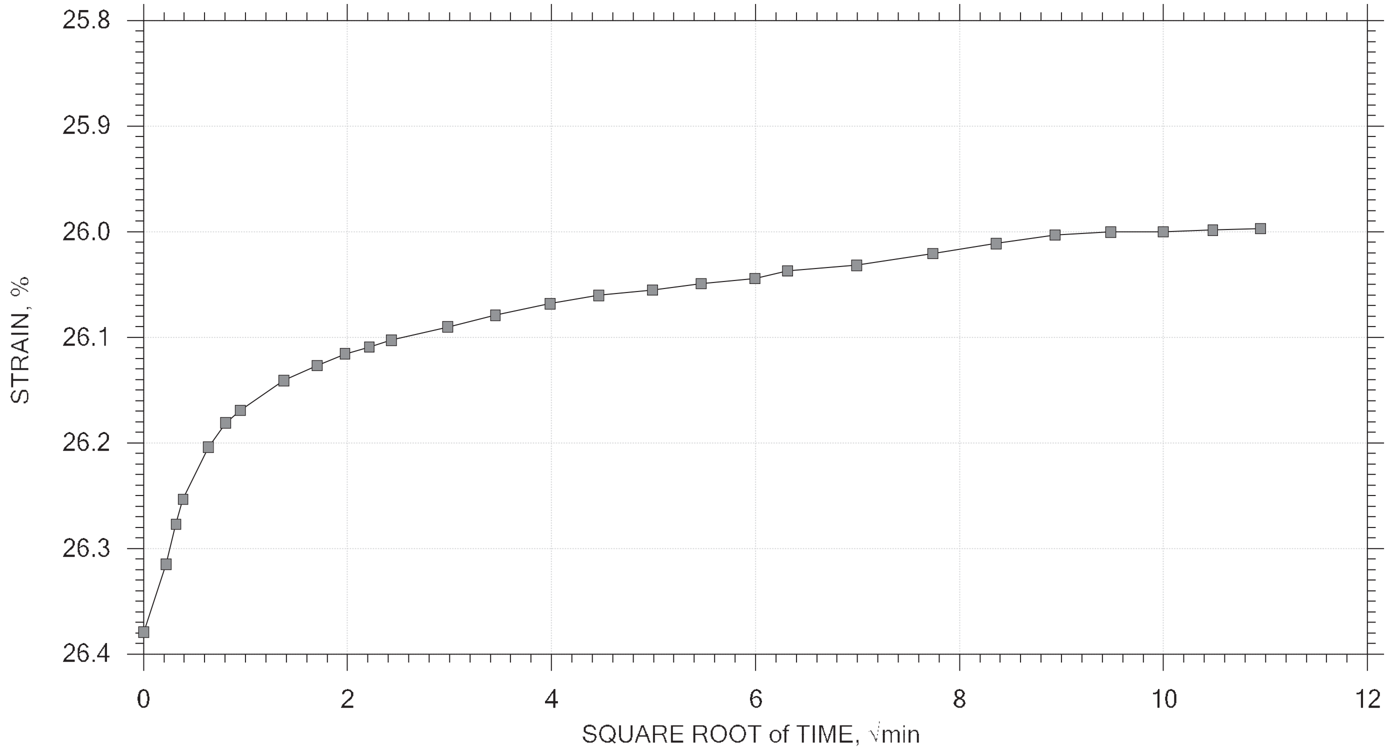
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 19 of 20

Stress: 0.5 tsf





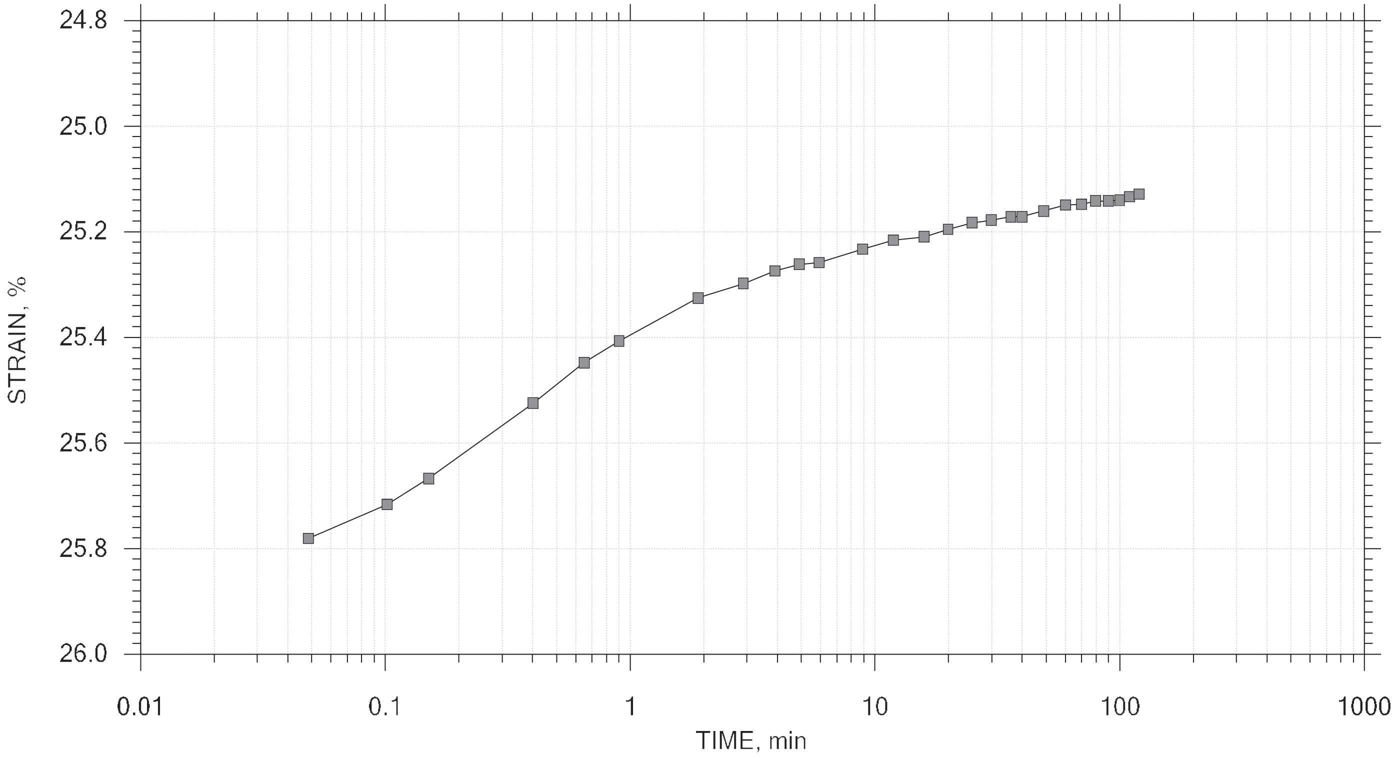
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist. dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

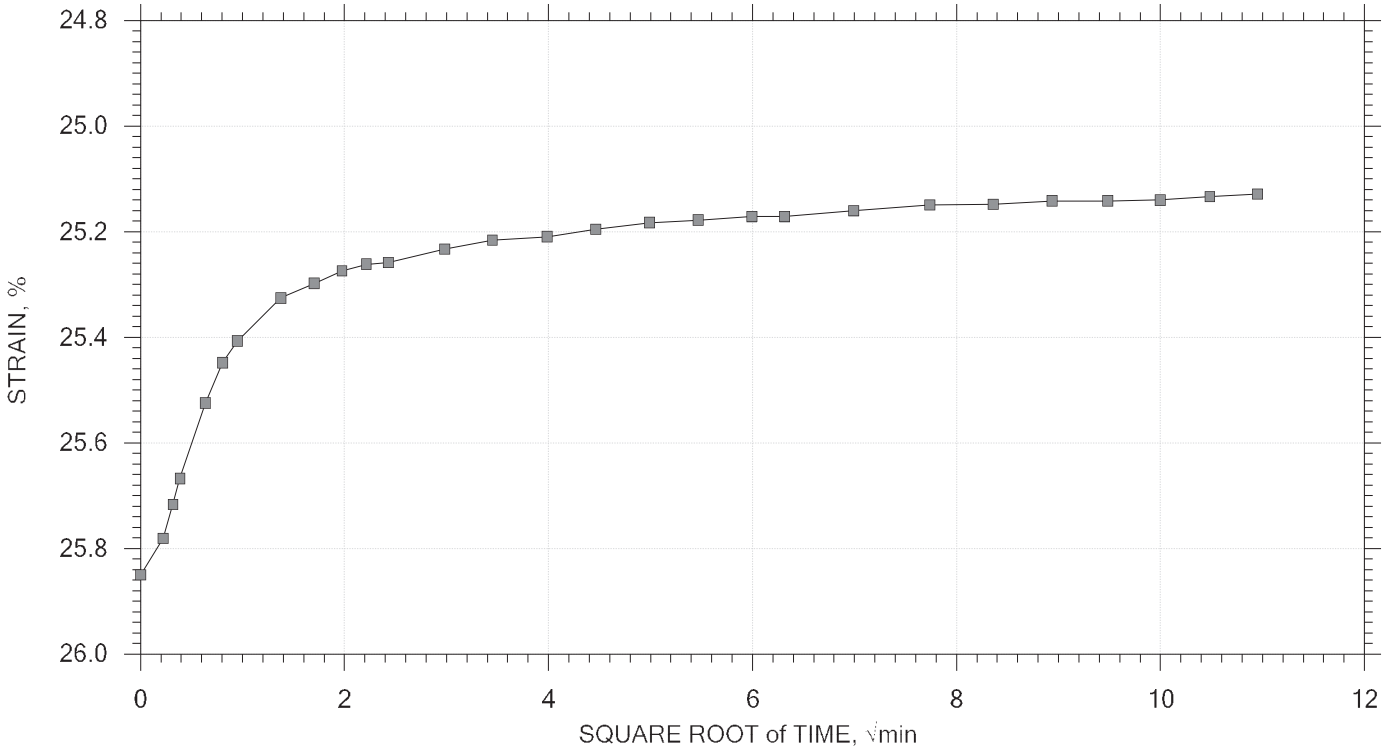
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 20 of 20

Stress: 0.125 tsf





GeoTesting
EXPRESS

Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-103	Tested By: jm	Checked By: mcm
Sample No.: S-13	Test Date: 4/9/16	Test No.: IP-4
Depth: 48.5-50. ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray silt with sand (ASH)		
Remarks: Swell Pressure = 0.0819 tsf. Moisture Content determined at 60° C for ash.		

GeoTesting
EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/13/16	Checked By:	mcm
Depth :	---	Test Id:	372268		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-104	S- 2	3.5-5 ft	Moist, olive brown sand with silt and gravel	19.1
B-104	S- 20	83.5-83.8 ft	Moist, dark gray sandy clay	52.5
B-104	S- 21	83.8-84.7 ft	Moist, very dark gray silty sand	72.7
B-104	S- 22	84.7-85 ft	Moist, reddish brown sandy clay	24.9
B-104	S- 23	88.5-90 ft	Moist, reddish brown clayey sand	24.3
B-104	S- 24	83.5-94 ft	Moist, grayish brown silty sand	17.2

Notes: Temperature of Drying : 110º Celsius

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/21/16	Checked By:	mcm
Depth :	---	Test Id:	372263		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-104	S- 6 (TUBE)	13-15 ft	Moist, dark gray silty sand (ASH)	41.5
B-104	S9 (TUBE)	28-30 ft	Moist, gray silt (ASH)	60.0
B-104	S- 10 (TUBE)	33-35 ft	Moist, dark gray sandy silt (ASH)	67.5
B-104	S- 12	43.5-45 ft	Moist, gray sandy silt with sand (ASH)	79.0
B-104	S- 13 (TUBE)	48-50 ft	Moist, dark gray sandy silt (ASH)	30.3
B-104	S- 15 (TUBE)	58-60 ft	Moist, dark gray silt with sand (ASH)	83.5
B-104	S- 17	68.5-70 ft	Moist, dark gray silt with sand (ASH)	48.3
B-104	S- 19	78.5-80 ft	Moist, gray sandy silt with sand (ASH)	45.4

Notes: Temperature of Drying : 60º Celsius

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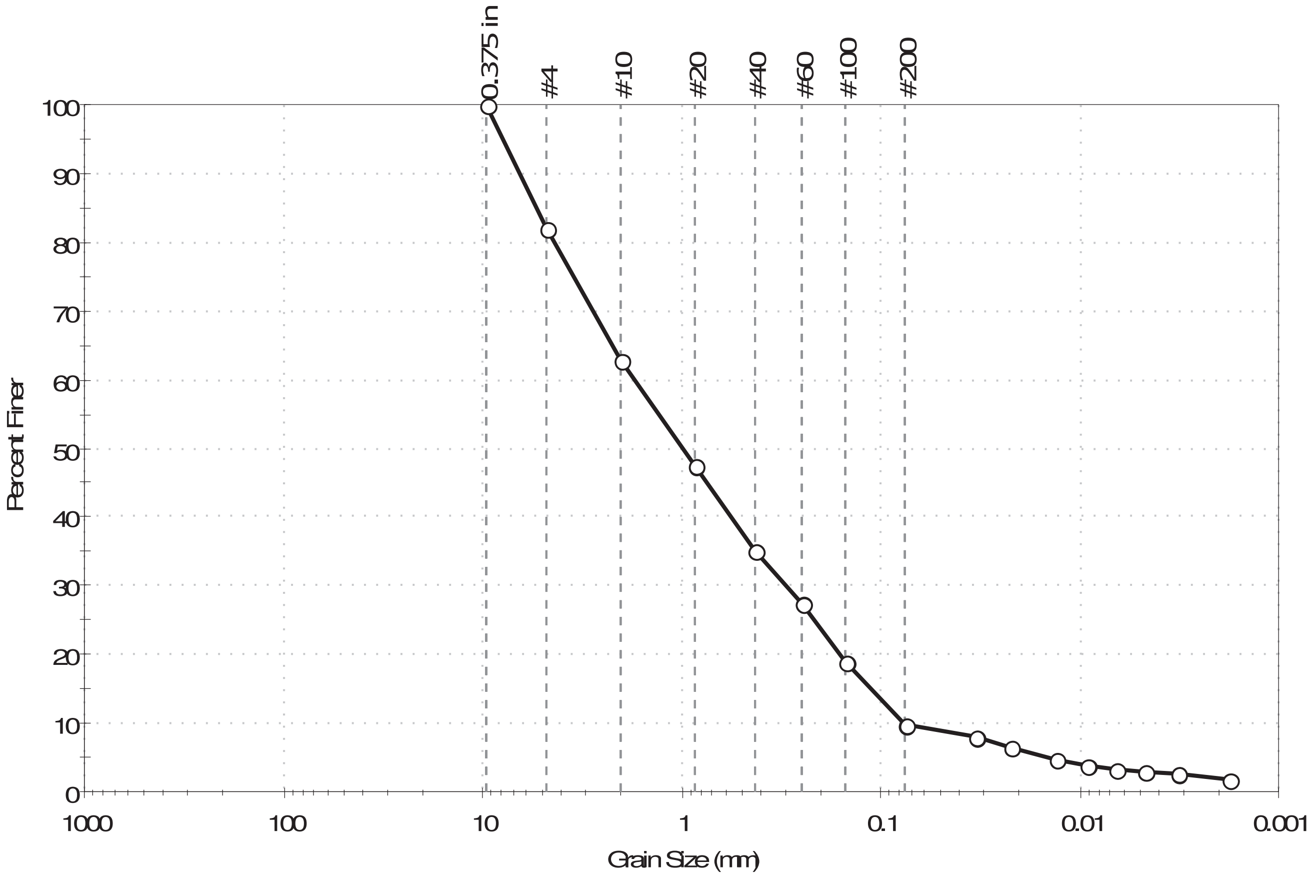
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-104	Sample Type:	bag	Tested By:	GA
Sample ID:	S-2	Test Date:	04/26/16	Checked By:	mcm
Depth :	3.5-5 ft	Test Id:	372269		

Test Comment: ---
Visual Description: Moist, olive brown sand with silt and gravel
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	18.1	72.1	9.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	82		
#10	2.00	63		
#20	0.85	47		
#40	0.42	35		
#60	0.25	27		
#100	0.15	19		
#200	0.075	9.8		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0331	8		
---	0.0224	6		
---	0.0131	5		
---	0.0093	4		
---	0.0066	3		
---	0.0047	3		
---	0.0032	3		
---	0.0018	2		

Coefficients

D_{85} =5.3435 mm	D_{30} =0.2968 mm
D_{60} =1.7002 mm	D_{15} =0.1108 mm
D_{50} =0.9801 mm	D_{10} =0.0759 mm
C_u =22.401	C_c =0.683

Classification

ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-b (1))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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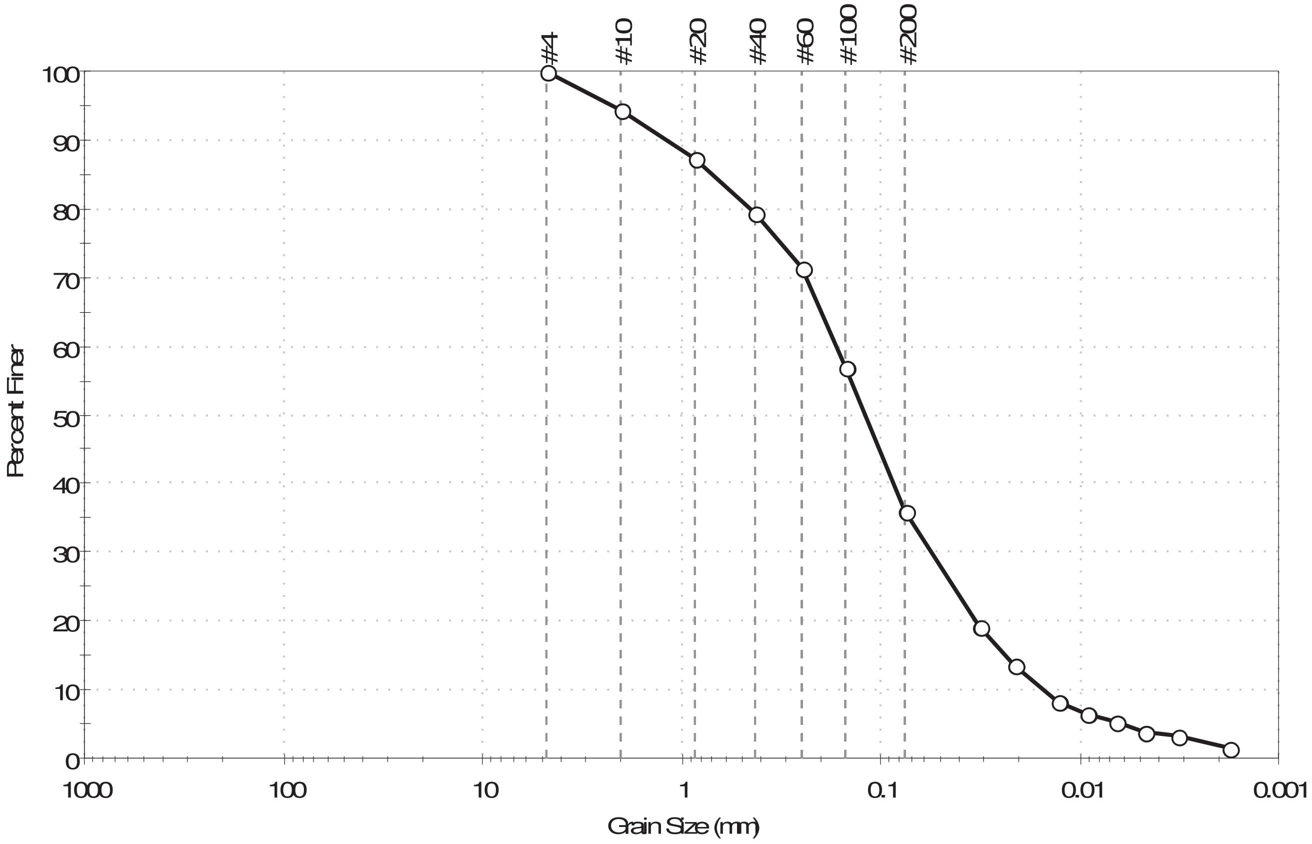
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-104
Sample Type: tube
Tested By: GA
Sample ID: S-6 (TUBE)
Test Date: 04/26/16
Checked By: mcm
Depth : 13-15 ft
Test Id: 372271
Test Comment: ---
Visual Description: Moist, dark gray silty sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	64.1	35.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	94		
#20	0.85	87		
#40	0.42	79		
#60	0.25	71		
#100	0.15	57		
#200	0.075	36		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0315	19		
---	0.0213	14		
---	0.0129	8		
---	0.0091	6		
---	0.0066	5		
---	0.0047	4		
---	0.0033	3		
---	0.0018	2		

Coefficients

D_{85} =0.7014 mm
D_{30} =0.0554 mm
D_{60} =0.1665 mm
D_{15} =0.0235 mm
D_{50} =0.1190 mm
D_{10} =0.0153 mm
C_u =10.882
C_c =1.205

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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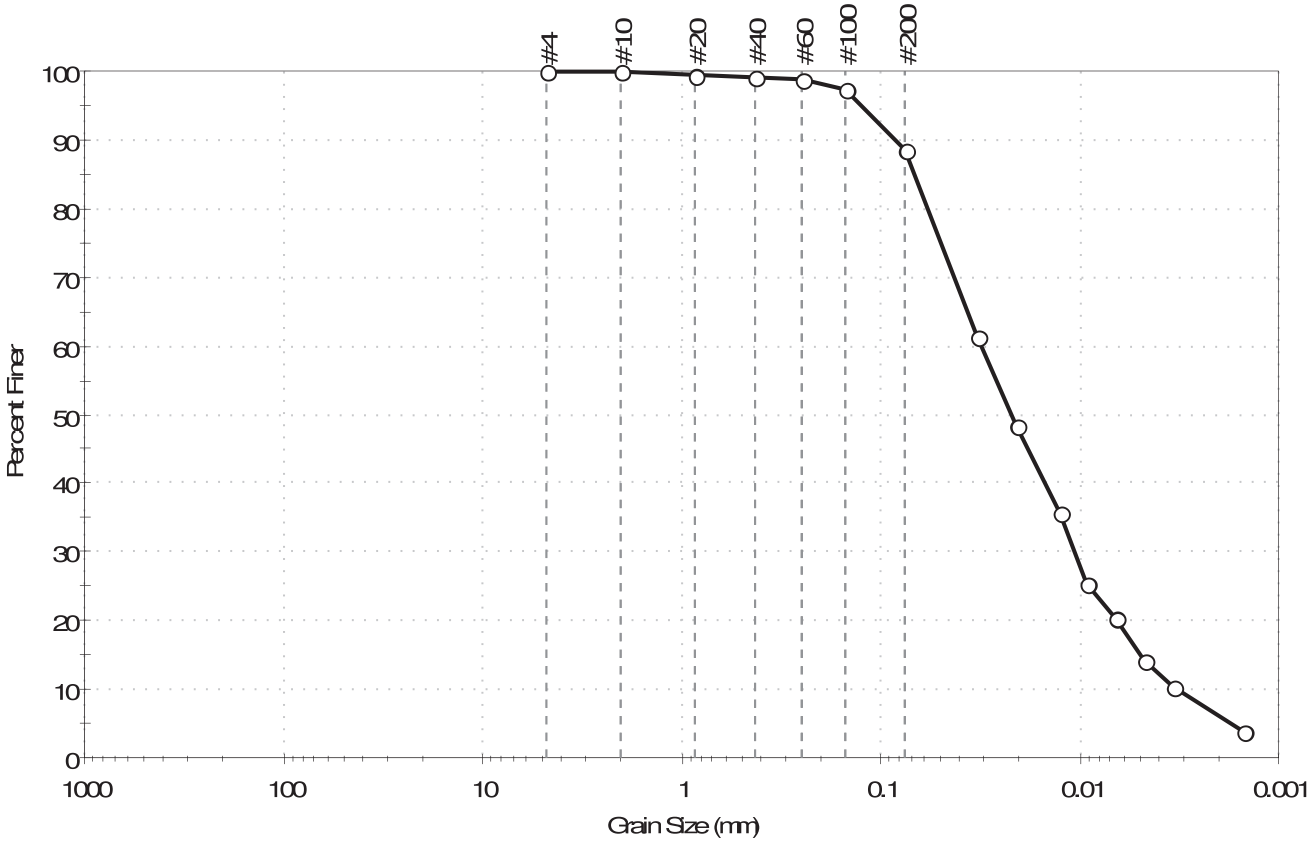
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-104	Sample Type:	tube	Tested By:	jbr
Sample ID:	S9 (TUBE)	Test Date:	04/20/16	Checked By:	mcm
Depth :	28-30 ft	Test Id:	372272		
Test Comment:	---				
Visual Description:	Moist, gray silt (ASH)				
Sample Comment:	Moisture Content determined at 60° C for ash.				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	11.6	88.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	99		
#100	0.15	97		
#200	0.075	88		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0322	61		
---	0.0208	48		
---	0.0125	36		
---	0.0092	26		
---	0.0066	20		
---	0.0047	14		
---	0.0033	10		
---	0.0015	4		

Coefficients

D_{85} =0.0674 mm	D_{30} =0.0105 mm
D_{60} =0.0309 mm	D_{15} =0.0049 mm
D_{50} =0.0219 mm	D_{10} =0.0033 mm
C_u =9.364	C_c =1.081

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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GeoTesting EXPRESS

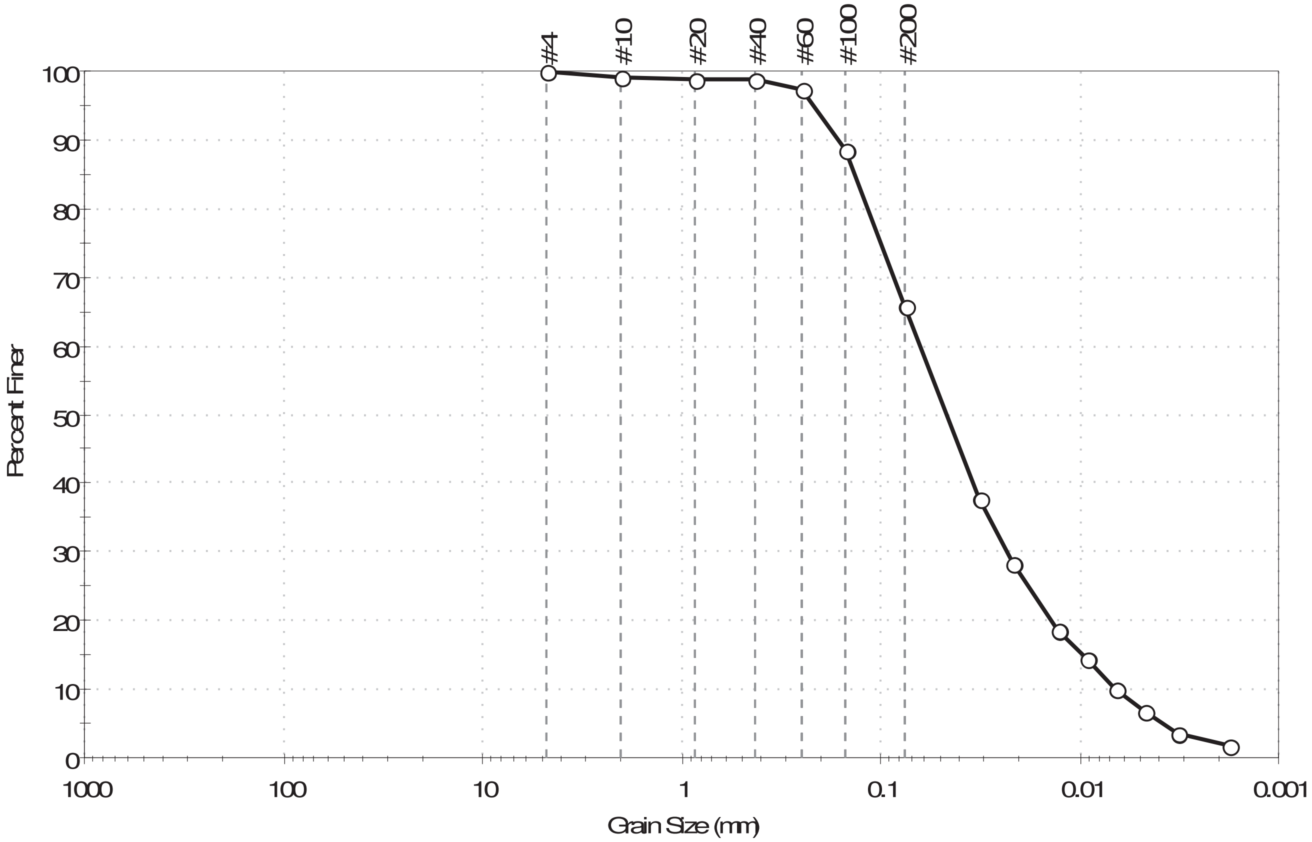
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-104	Sample Type:	tube	Tested By:	GA
Sample ID:	S-10 (TUBE)	Test Date:	04/26/16	Checked By:	mcm
Depth :	33-35 ft	Test Id:	372273		

Test Comment: ---

Visual Description: Moist, dark gray sandy silt (ASH)

Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	34.3	65.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	99		
#40	0.42	99		
#60	0.25	97		
#100	0.15	88		
#200	0.075	66		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0322	38		
---	0.0216	28		
---	0.0128	19		
---	0.0091	14		
---	0.0066	10		
---	0.0047	7		
---	0.0033	4		
---	0.0018	2		

Coefficients

D_{85} =0.1354 mm	D_{30} =0.0233 mm
D_{60} =0.0632 mm	D_{15} =0.0096 mm
D_{50} =0.0467 mm	D_{10} =0.0064 mm
C_u =9.875	C_c =1.342

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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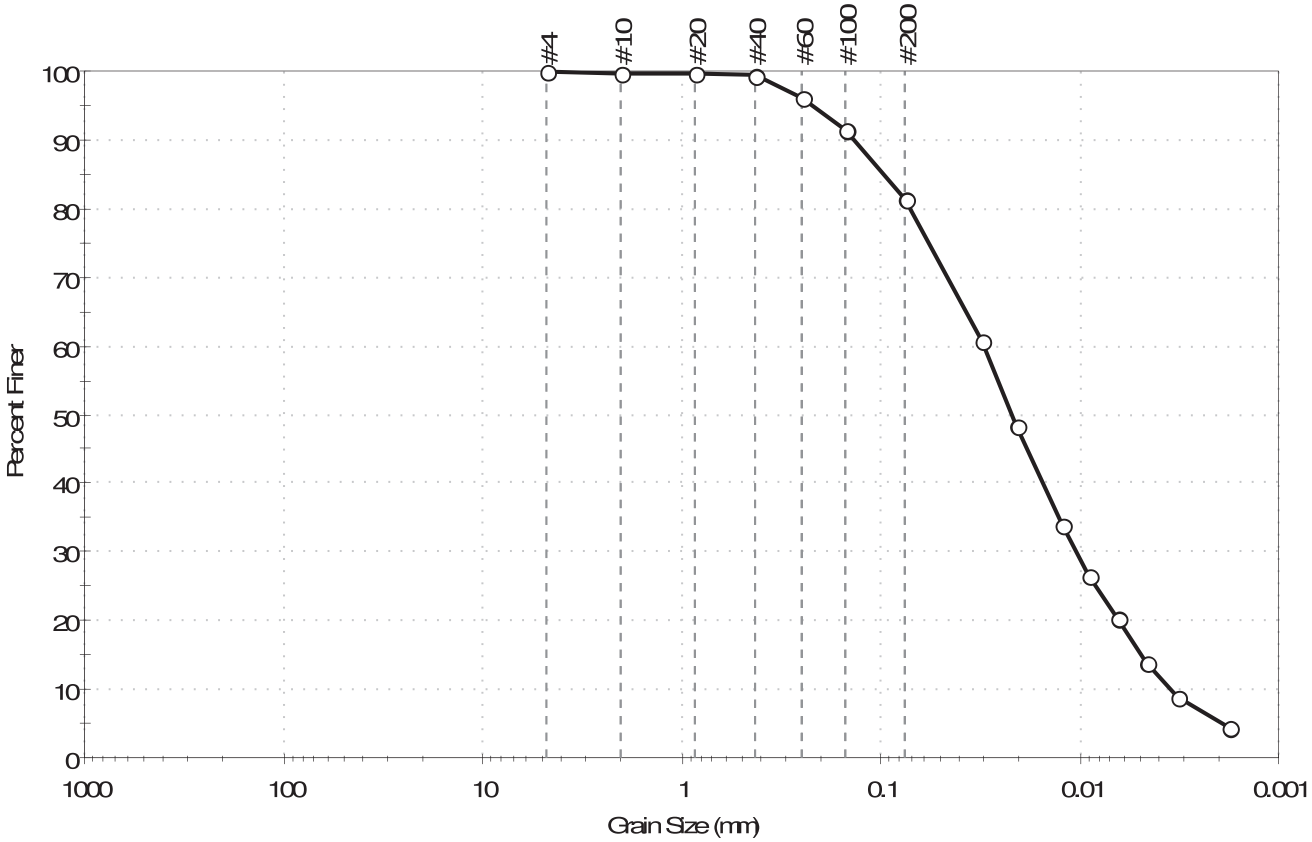
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-104	Sample Type:	bag	Tested By:	GA
Sample ID:	S-12	Test Date:	04/27/16	Checked By:	mcm
Depth :	43.5-45 ft	Test Id:	372274		

Test Comment: ---
Visual Description: Moist, gray sandy silt with sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	18.4	81.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	96		
#100	0.15	92		
#200	0.075	82		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0308	61		
---	0.0205	48		
---	0.0123	34		
---	0.0089	26		
---	0.0064	20		
---	0.0046	14		
---	0.0032	9		
---	0.0018	4		

Coefficients

D_{85} =0.0953 mm	D_{30} =0.0105 mm
D_{60} =0.0301 mm	D_{15} =0.0049 mm
D_{50} =0.0215 mm	D_{10} =0.0035 mm
C_u =8.600	C_c =1.047

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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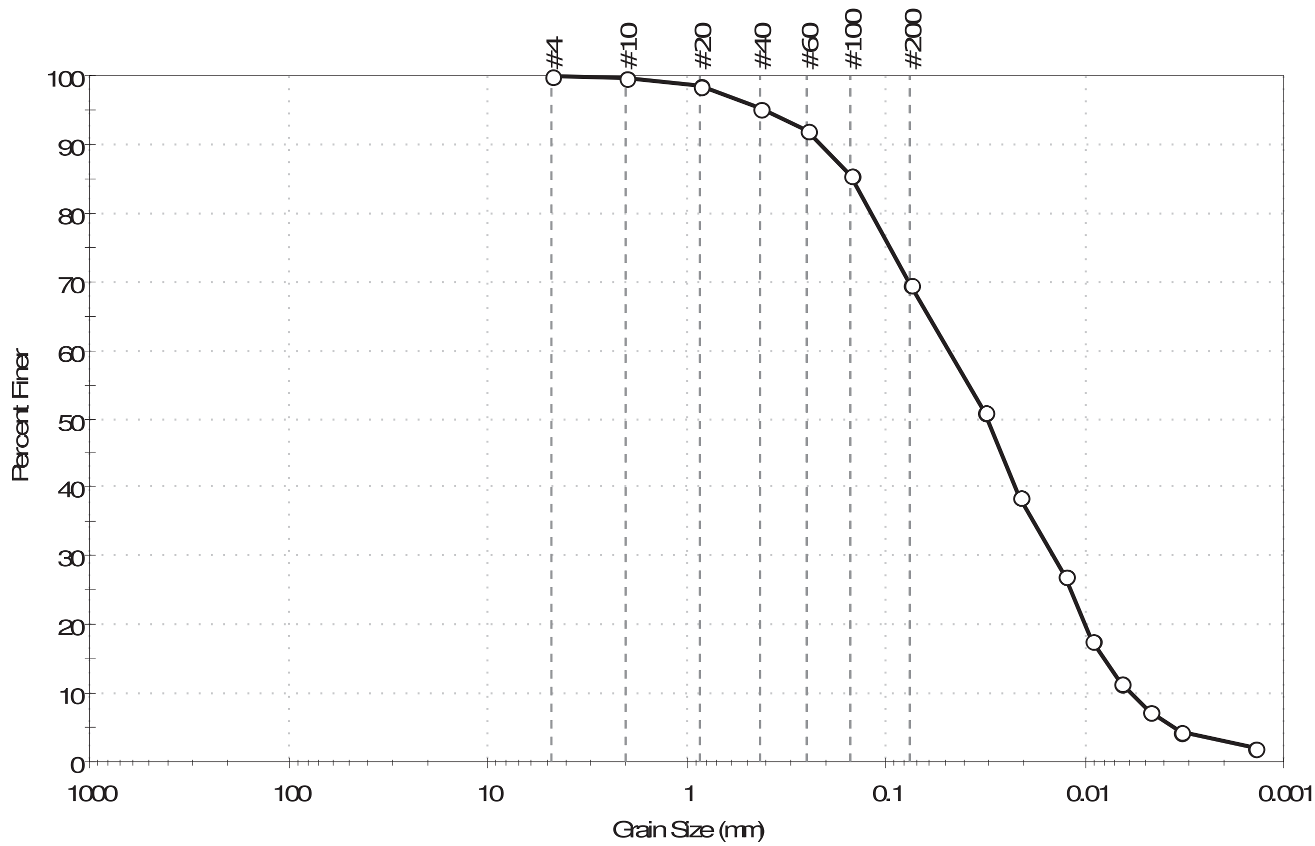
GeoTesting EXPRESS

Client:	AECOM		
Project:	SCS Plant Scherer Ph.2		
Location:	Monroe County, GA	Project No:	GTX-304548

Boring ID:	B-104	Sample Type:	tube	Tested By:	GA
Sample ID:	S-13 (TUBE)	Test Date:	04/27/16	Checked By:	mcm
Depth :	48-50 ft	Test Id:	372275		

Test Comment: ---
Visual Description: Moist, dark gray sandy silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	30.3	69.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	95		
#60	0.25	92		
#100	0.15	85		
#200	0.075	70		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0320	51		
---	0.0211	39		
---	0.0126	27		
---	0.0092	18		
---	0.0066	12		
---	0.0047	7		
---	0.0033	4		
---	0.0014	2		

Coefficients

D_{85} =0.1470 mm	D_{30} =0.0143 mm
D_{60} =0.0482 mm	D_{15} =0.0079 mm
D_{50} =0.0309 mm	D_{10} =0.0058 mm
C_u =8.310	C_c =0.731

Classification

ASTM	N/A
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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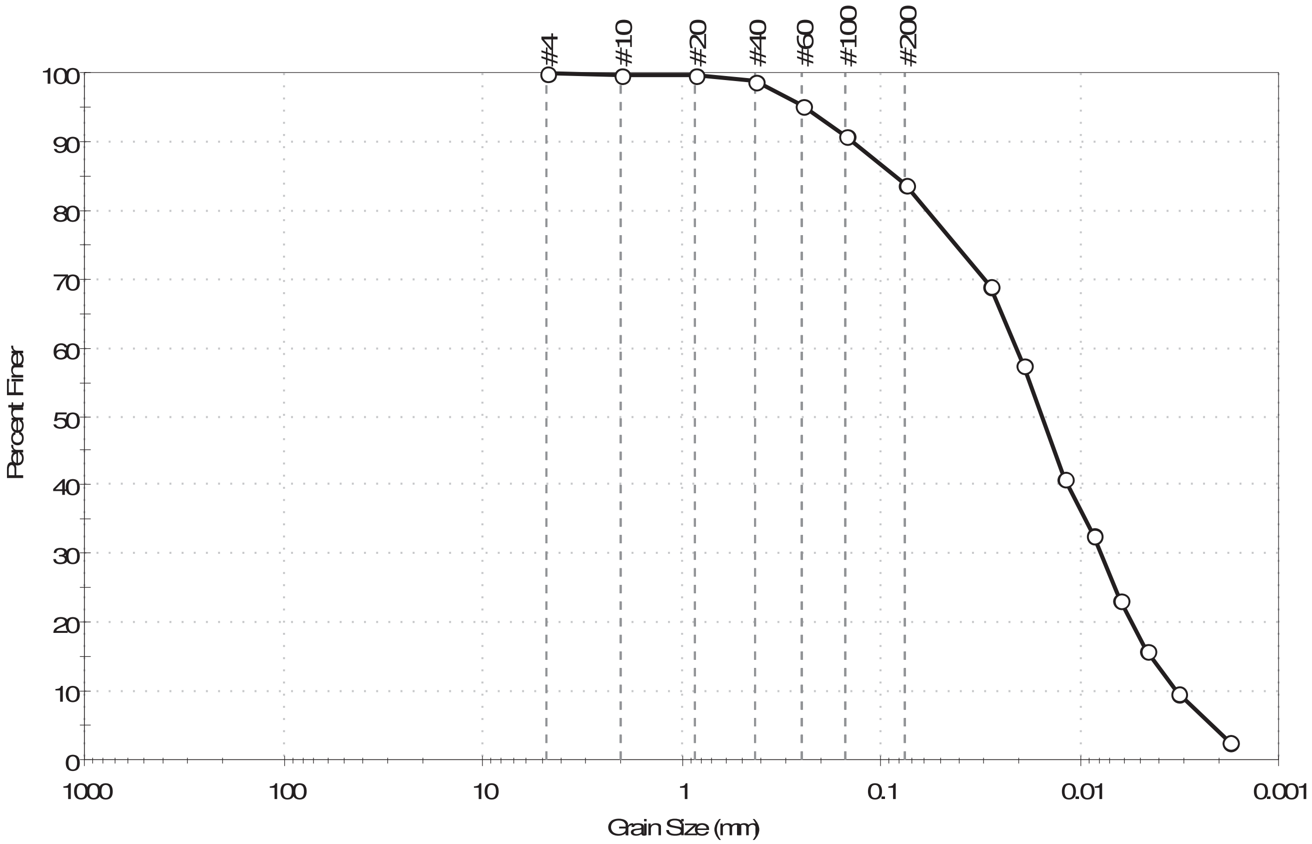
GeoTesting
EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-104
Sample Type: tube
Tested By: GA
Sample ID: S-15 (TUBE)
Test Date: 04/27/16
Checked By: mcm
Depth : 58-60 ft
Test Id: 372276
Test Comment: ---
Visual Description: Moist, dark gray silt with sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	16.3	83.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	99		
#60	0.25	95		
#100	0.15	91		
#200	0.075	84		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0284	69		
---	0.0193	58		
---	0.0120	41		
---	0.0086	33		
---	0.0063	23		
---	0.0046	16		
---	0.0032	10		
---	0.0018	3		

Coefficients

D_{85} =0.0849 mm	D_{30} =0.0079 mm
D_{60} =0.0210 mm	D_{15} =0.0044 mm
D_{50} =0.0155 mm	D_{10} =0.0033 mm
C_u =6.364	C_c =0.901

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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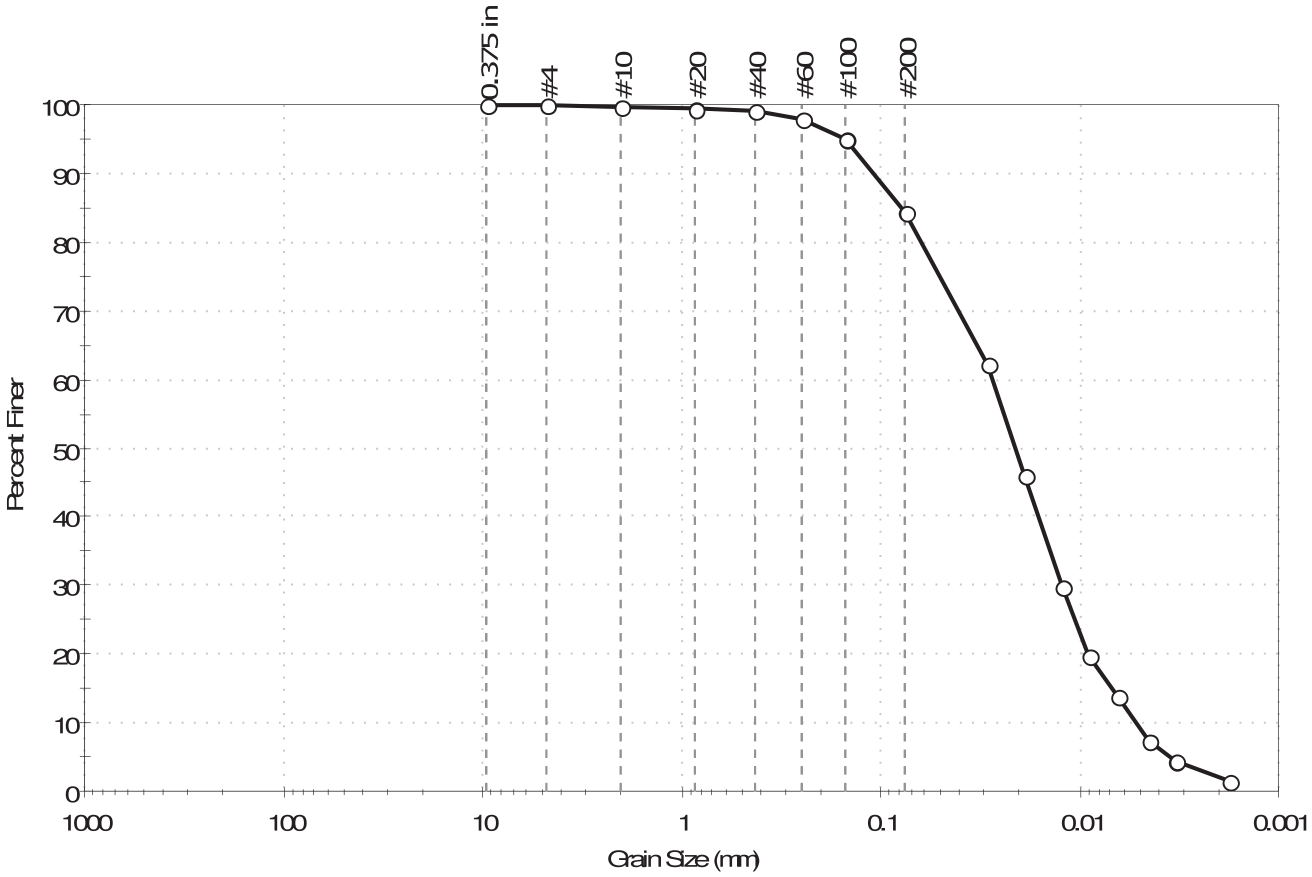
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-104	Sample Type:	bag	Tested By:	GA
Sample ID:	S-17	Test Date:	04/27/16	Checked By:	mcm
Depth :	68.5-70 ft	Test Id:	372277		

Test Comment: ---
Visual Description: Moist, dark gray silt with sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.1	15.6	84.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	99		
#60	0.25	98		
#100	0.15	95		
#200	0.075	84		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0288	62		
---	0.0187	46		
---	0.0123	30		
---	0.0090	20		
---	0.0065	14		
---	0.0045	7		
---	0.0033	4		
---	0.0018	2		

Coefficients

D_{85} =0.0785 mm	D_{30} =0.0123 mm
D_{60} =0.0271 mm	D_{15} =0.0069 mm
D_{50} =0.0207 mm	D_{10} =0.0052 mm
C_u =5.212	C_c =1.074

Classification

ASTM	N/A
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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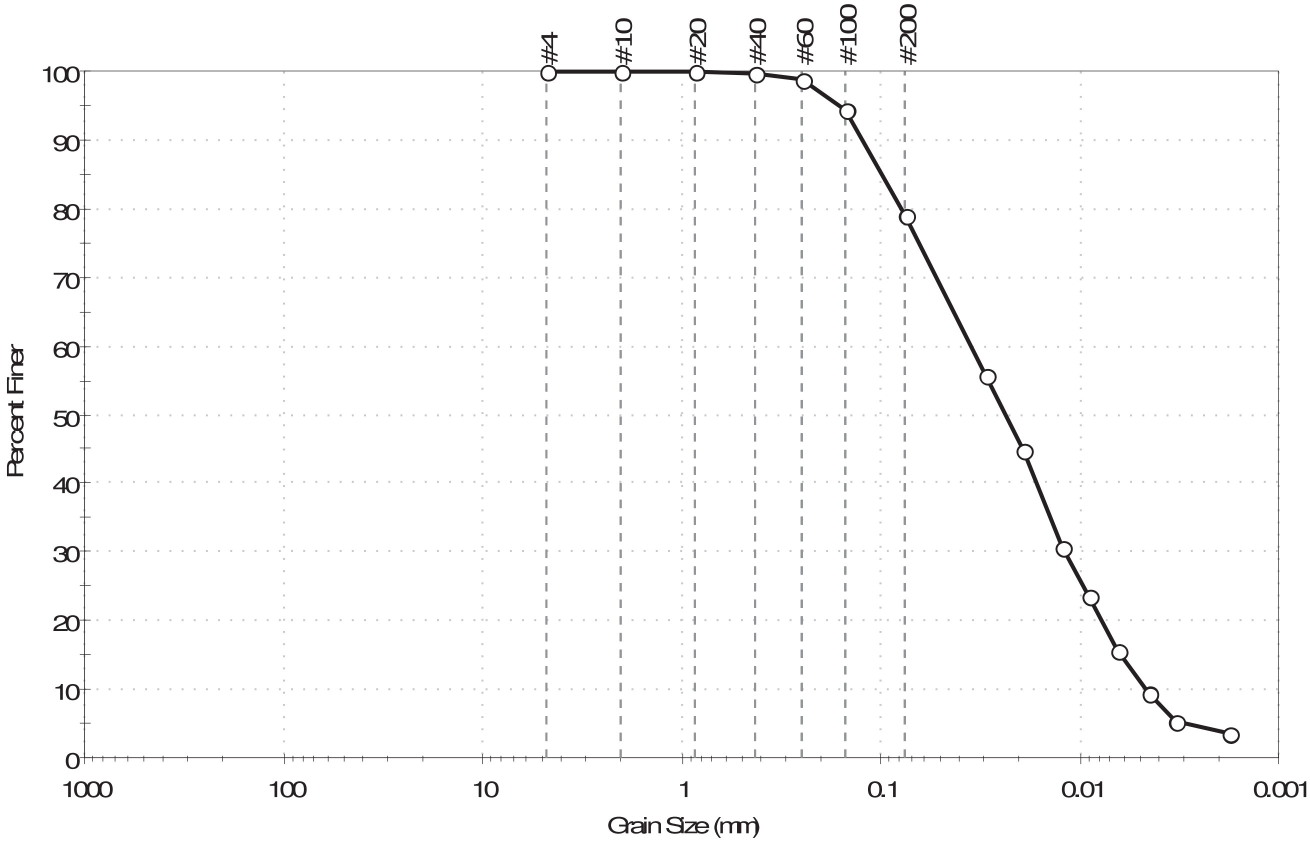
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-104
Sample ID: S-19
Depth : 78.5-80 ft
Sample Type: bag
Test Date: 04/27/16
Test Id: 372278
Tested By: GA
Checked By: mcm

Test Comment: ---
Visual Description: Moist, gray sandy silt with sand (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	20.8	79.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	99		
#100	0.15	94		
#200	0.075	79		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0297	56		
---	0.0191	45		
---	0.0123	31		
---	0.0089	24		
---	0.0064	16		
---	0.0045	9		
---	0.0033	5		
---	0.0018	4		

Coefficients

D_{85} =0.0977 mm
D_{30} =0.0119 mm
D_{60} =0.0351 mm
D_{15} =0.0062 mm
D_{50} =0.0236 mm
D_{10} =0.0047 mm
C_u =7.468
C_c =0.858

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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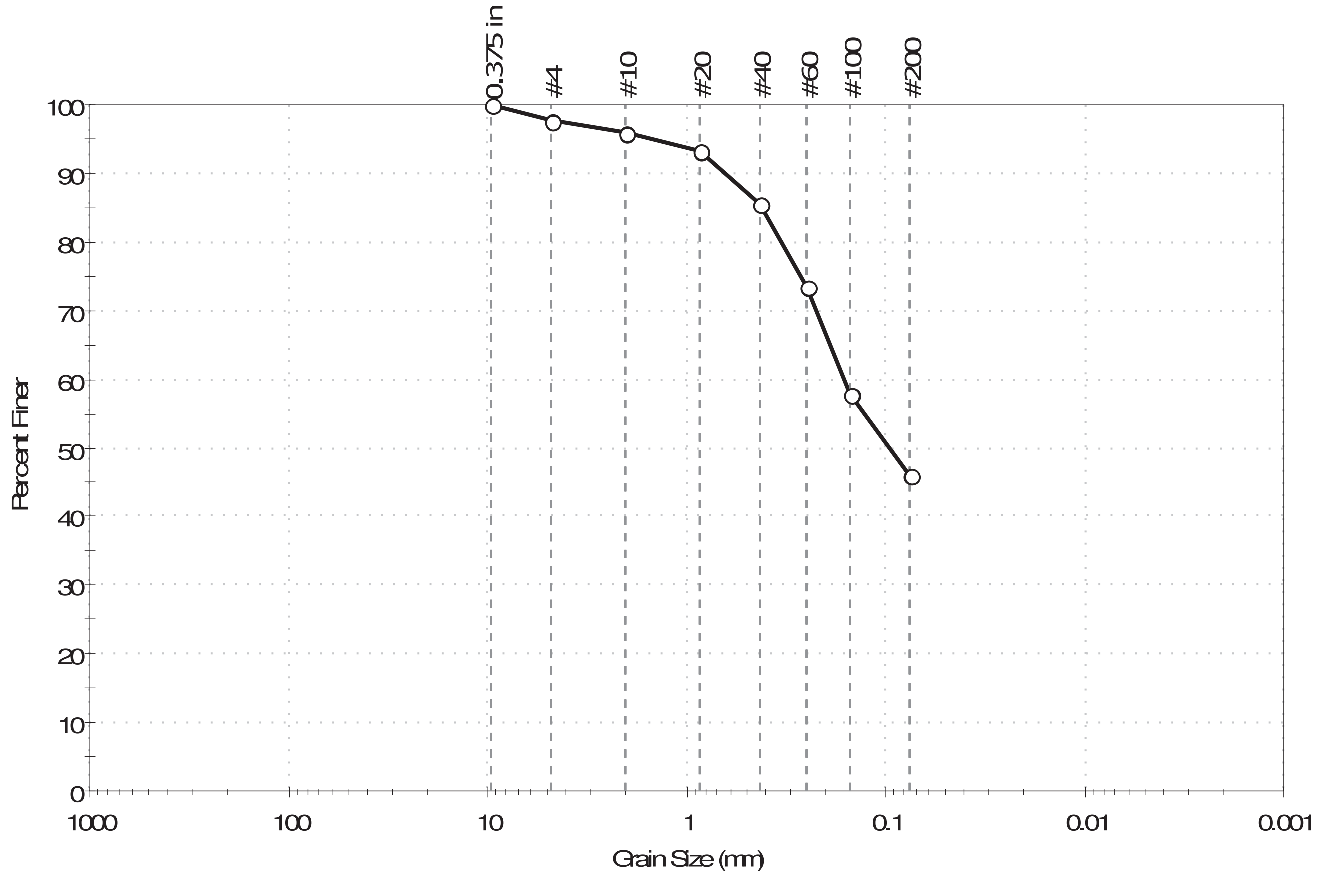
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-104	Sample Type:	bag	Tested By:	GA
Sample ID:	S-23	Test Date:	04/13/16	Checked By:	mcm
Depth :	88.5-90 ft	Test Id:	372279		

Test Comment: ---
Visual Description: Moist, reddish brown clayey sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	2.3	51.6	46.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	96		
#20	0.85	93		
#40	0.42	85		
#60	0.25	73		
#100	0.15	58		
#200	0.075	46		

Coefficients

D_{85} =0.4161 mm	D_{30} =N/A
D_{60} =0.1608 mm	D_{15} =N/A
D_{50} =0.0943 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	Clayey sand (SC)
AASHTO	Clayey Soils (A-6 (4))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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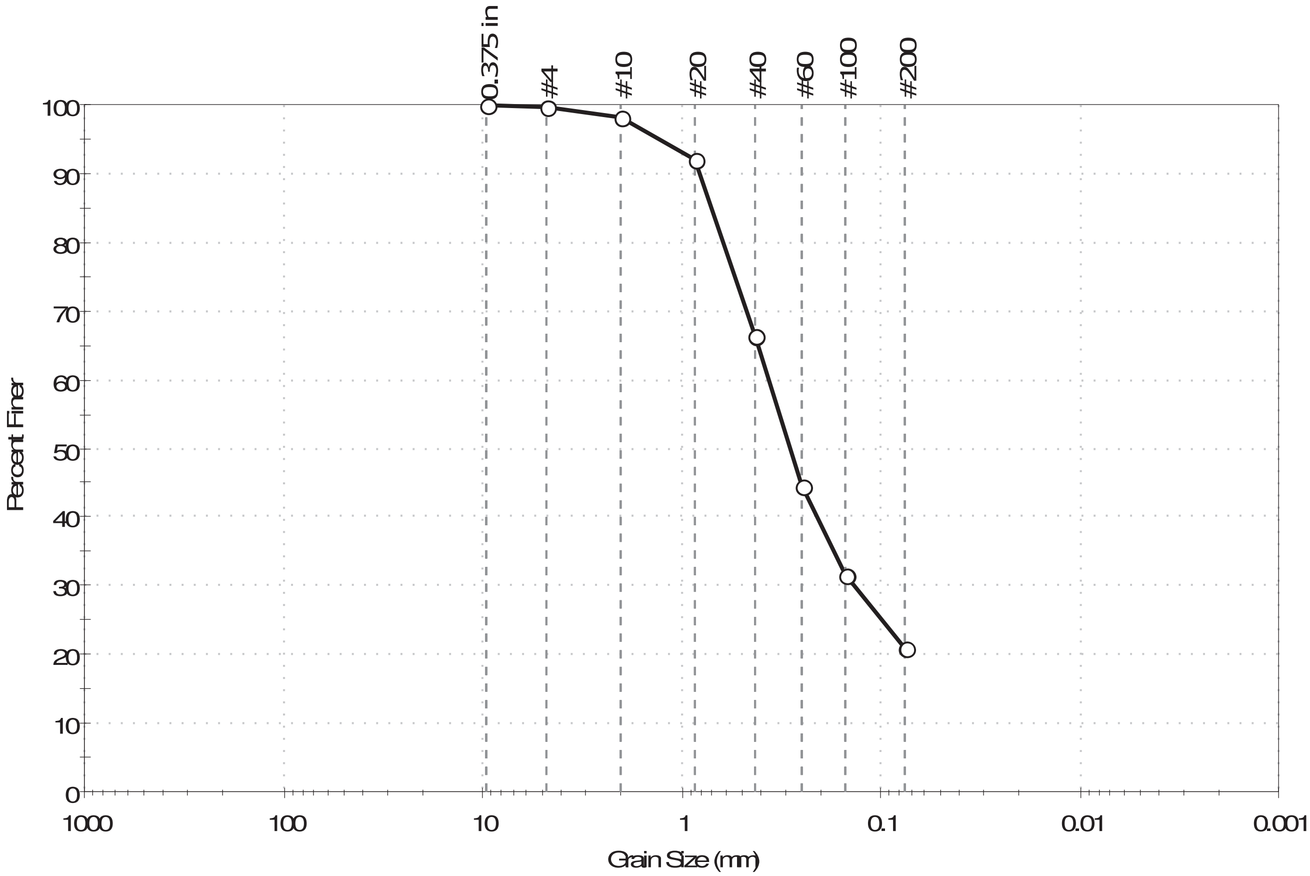
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-104
Sample Type: bag
Tested By: GA
Sample ID: S-24
Test Date: 04/13/16
Checked By: mcm
Depth : 83.5-94 ft
Test Id: 372280

Test Comment: ---
Visual Description: Moist, grayish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.2	79.0	20.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	98		
#20	0.85	92		
#40	0.42	66		
#60	0.25	45		
#100	0.15	32		
#200	0.075	21		

Coefficients

D_{85} =0.7039 mm
D_{30} =0.1360 mm
D_{60} =0.3645 mm
D_{15} =N/A
D_{50} =0.2852 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-104	Sample Type:	bag	Tested By:	GA
Sample ID:	S-18	Test Date:	06/03/16	Checked By:	n/a
Depth :	73.5-75 ft	Test Id:	380260		

Test Comment: ---
Visual Description: Moist, gray silt (ASH)
Sample Comment: Moisture Content determined at 60° C for ash.

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-18	B-104	73.5-75 ft	46	n/a	n/a	n/a	n/a	

Dry Strength: NONE
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

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Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-104
Sample Type: bag
Tested By: GA
Sample ID: S-21
Test Date: 04/14/16
Checked By: mcm
Depth : 83.8-84.7 ft
Test Id: 372281
Test Comment: ---
Visual Description: Moist, very dark gray silty sand
Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-21	B-104	83.8-84.7 ft	73	n/a	n/a	n/a	n/a	

Dry Strength: NONE
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

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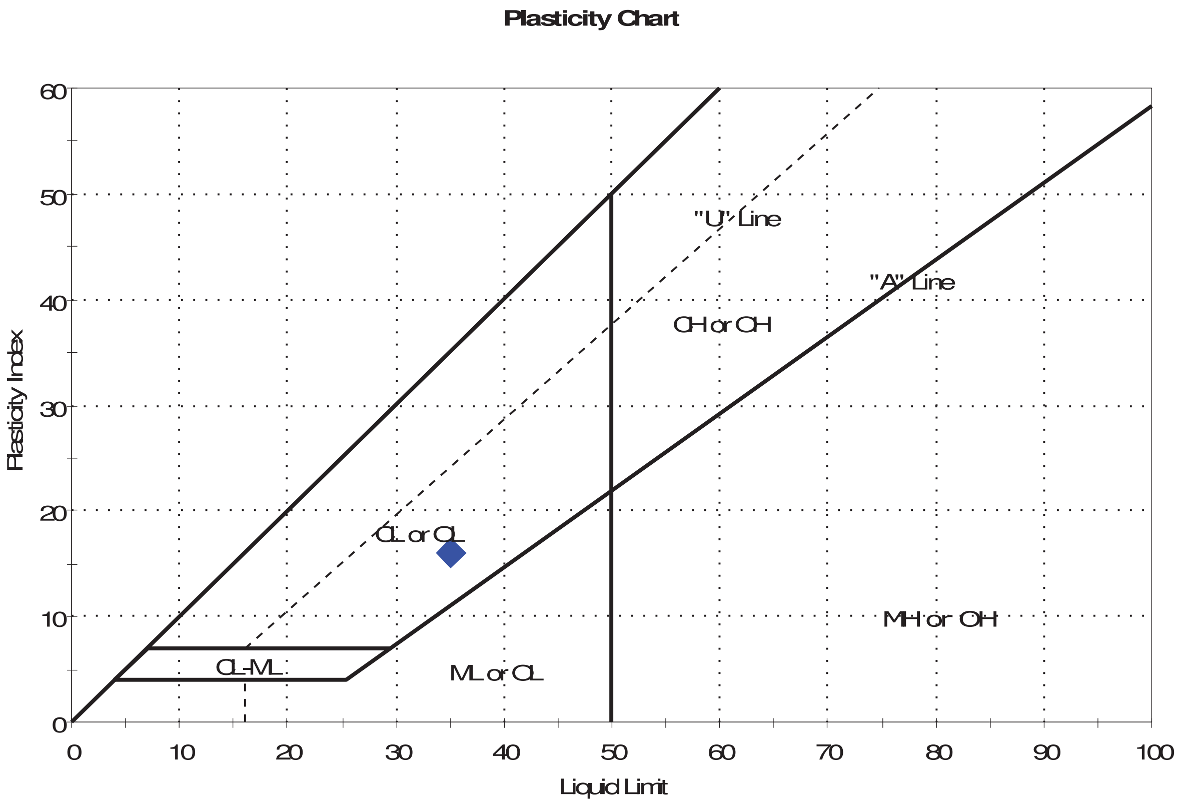
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-104
Sample Type: bag
Tested By: GA
Sample ID: S-23
Test Date: 04/14/16
Checked By: mcm
Depth : 88.5-90 ft
Test Id: 372282
Test Comment: ---
Visual Description: Moist, reddish brown clayey sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	S-23	B-104	88.5-90 ft	24	35	19	16	0.3	Clayey sand (SC)

Sample Prepared using the WET method

15% Retained on #40 Sieve

Dry Strength: HIGH

Dilatancy: NONE

Toughness: MEDIUM

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GeoTesting EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: ---
Sample Type: ---
Tested By: GA
Sample ID: ---
Test Date: 05/03/16
Checked By: mcm
Depth : ---
Test Id: 372284

Specific Gravity of Soils by ASTM D854

Boring ID	Sample ID	Depth	Visual Description	Specific Gravity	Comment
B-104	S-2	3.5-5 ft	Moist, olive brown sand with silt and gravel	2.66	
B-104	S-12	43.5-45 ft	Moist, gray sandy silt with sand (ASH)	2.33	

Notes: Specific Gravity performed by using method B (oven dried specimens) of ASTM D854
Moisture Content determined by ASTM D2216.

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/19/16	Checked By:	mcm
Depth :	---	Test Id:	372306		

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	Sample ID	Depth	Visual Description	Bulk Density pcf	Moisture Content %	Dry Density pcf	*
B-104	S- 6 (TUBE)	13-15 ft	Moist, dark gray silty sand (ASH)	94.83	38.27	68.58	(1)
B-104	S9 (TUBE)	28-30 ft	Moist, gray silt (ASH)	97.22	52.64	63.70	(2)
B-104	S- 10 (TUBE)	33-35 ft	Moist, dark gray sandy silt (ASH)	59.86	67.49	35.74	(3)
B-104	S- 13 (TUBE)	48-50 ft	Moist, dark gray sandy silt (ASH)	90.65	108.7	43.43	(4)
B-104	S- 15 (TUBE)	58-60 ft	Moist, dark gray silt with sand (ASH)	84.13	83.48	45.86	(5)

* Sample Comments

(1): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

(2): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

(3): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

(4): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

(5): Moisture Content determined at 60° C for ash.

Method B-Cylinder, Intact

Notes: Moisture Content determined by ASTM D2216.

GeoTesting EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe County, GA		
GTX #:	304548		
Start Date:	4/22/2016	Tested By:	jcw
End Date:	4/27/2016	Checked By:	mcm
Boring #:	B-104		
Sample #:	S-6 (TUBE)		
Depth:	13-15 ft		
Visual Description:	Moist, dark gray sandy silt (ASH)		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Gradient

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	6/7

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Moisture Content determined at 60° C for ash.

Assumed Specific Gravity: 2.35

Parameter	Initial	Final
Height, in	2.96	2.83
Diameter, in	2.86	2.85
Area, in^2	6.42	6.38
Volume, in^3	19.0	18.1
Mass, g	473	475
Bulk Density, pcf	95	100
Moisture Content, %	45.4	45.9
Dry Density, pcf	65.1	68.5
Degree of Saturation, %	85	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90.02	Increased Cell Pressure, psi:	94.91	Cell Pressure Increment, psi:	4.89
Sample Pressure, psi:	84.96	Corresponding Sample Pressure, psi:	89.74	Sample Pressure Increment, p	4.78
				B Coefficient:	0.98

FLOW DATA

	Time,	Pressure, psi				Flow Volume, cc				Temp,		Permeability K @ 20 °C,
Date	sec	Cell	Inlet	Outlet	Gradient	In	Out	Δ In	Δ Out	°C	R_t	cm/sec
4/25	---	90.0	85.1	84.9	1.8	12.40	14.20	---	---	---	---	---
4/25	48	90.0	85.1	84.9	1.8	13.80	12.80	1.40	1.40	20.1	0.998	4.0E-04
4/25	----	90.0	85.1	84.9	1.8	12.50	13.10	---	---	---	---	---
4/25	43	90.0	85.1	84.9	1.8	13.70	11.90	1.20	1.20	20.1	0.998	3.8E-04
4/25	----	90.0	85.1	84.9	1.8	12.10	13.40	---	---	---	---	---
4/25	40	90.0	85.1	84.9	1.8	13.20	12.30	1.10	1.10	20.1	0.998	3.8E-04
4/25	----	90.0	85.1	84.9	1.8	12.20	13.00	---	---	---	---	---
4/25	37	90.0	85.1	84.9	1.8	13.20	12.00	1.00	1.00	20.1	0.998	3.7E-04

PERMEABILITY AT 20° C: 3.8 x 10^{-4} cm/sec (@ 5 psi effective stress)

GeoTesting EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe County, GA		
GTX #:	304548		
Start Date:	4/21/2016	Tested By:	jcw
End Date:	4/27/2016	Checked By:	mcm
Boring #:	B-104		
Sample #:	S-10 (TUBE)		
Depth:	33-35 ft		
Visual Description:	Moist, dark gray sandy silt (ASH)		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084
Constant Gradient

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	9/15

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Moisture Content determined at 60° C for ash.

Assumed Specific Gravity: 2.35

Parameter	Initial	Final
Height, in	2.75	2.71
Diameter, in	2.86	2.85
Area, in^2	6.42	6.38
Volume, in^3	17.7	17.3
Mass, g	411	405
Bulk Density, pcf	88	89
Moisture Content, %	80.6	78.0
Dry Density, pcf	49.0	50.0
Degree of Saturation, %	95	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	89.98	Increased Cell Pressure, psi:	94.90	Cell Pressure Increment, psi:	4.92
Sample Pressure, psi:	80.98	Corresponding Sample Pressure, psi:	85.74	Sample Pressure Increment, p	4.76
				B Coefficient:	0.97

FLOW DATA

Date	Time, sec	Pressure, psi			Gradient	Flow Volume, cc				Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Inlet	Outlet		In	Out	Δ In	Δ Out			
4/25	---	90.0	81.2	80.8	4.1	11.60	13.80	---	---	---	---	---
4/25	39	90.0	81.2	80.8	4.1	12.10	13.30	0.50	0.50	20.1	0.998	7.6E-05
4/25	----	90.0	81.2	80.8	4.1	12.40	13.50	---	---	---	---	---
4/25	41	90.0	81.2	80.8	4.1	12.90	13.00	0.50	0.50	20.1	0.998	7.2E-05
4/25	----	90.0	81.2	80.8	4.1	12.00	13.10	---	---	---	---	---
4/25	41	90.0	81.2	80.8	4.1	12.50	12.60	0.50	0.50	20.1	0.998	7.2E-05
4/25	----	90.0	81.2	80.8	4.1	12.50	13.00	---	---	---	---	---
4/25	40	90.0	81.2	80.8	4.1	13.00	12.50	0.50	0.50	20.1	0.998	7.4E-05

PERMEABILITY AT 20° C: 7.4 x 10^{-5} cm/sec (@ 9 psi effective stress)

GeoTesting
EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe County, GA		
GTX #:	304548		
Start Date:	4/21/2016	Tested By:	jcw
End Date:	4/27/2016	Checked By:	mcm
Boring #:	B-104		
Sample #:	S-15 (TUBE)		
Depth:	58-60 ft		
Visual Description:	Moist, dark gray silt with sand (ASH)		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084
Constant Gradient

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	2/5

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Moisture Content determined at 60° C for ash.

Assumed Specific Gravity: 2.35

Parameter	Initial	Final
Height, in	3.32	3.27
Diameter, in	2.86	2.86
Area, in^2	6.42	6.42
Volume, in^3	21.3	21.0
Mass, g	510	500
Bulk Density, pcf	91	90
Moisture Content, %	76.6	73.2
Dry Density, pcf	51.5	52.2
Degree of Saturation, %	97	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90.02	Increased Cell Pressure, psi:	95.79	Cell Pressure Increment, psi:	5.77
Sample Pressure, psi:	75.97	Corresponding Sample Pressure, psi:	81.51	Sample Pressure Increment, p	5.54
				B Coefficient:	0.96

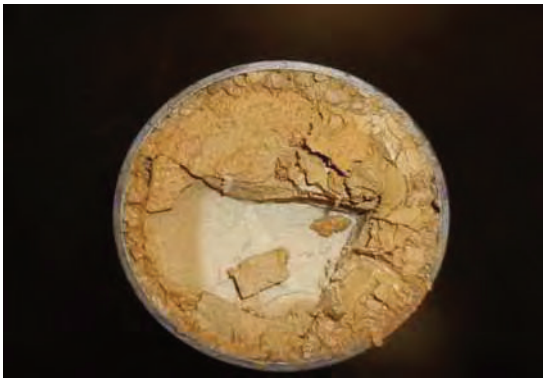
FLOW DATA

		Pressure, psi				Flow Volume, cc						
Date	Time, sec	Cell	Inlet	Outlet	Gradient	In	Out	Δ In	Δ Out	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
4/25	---	90.0	76.1	75.9	1.7	11.50	12.90	---	---	---	---	---
4/25	46	90.0	76.1	75.9	1.7	11.80	12.60	0.30	0.30	20.1	0.998	9.3E-05
4/25	----	90.0	76.1	75.9	1.7	12.00	12.90	---	---	---	---	---
4/25	45	90.0	76.1	75.9	1.7	12.30	12.60	0.30	0.30	20.1	0.998	9.5E-05
4/25	----	90.0	76.1	75.9	1.7	12.40	12.70	---	---	---	---	---
4/25	45	90.0	76.1	75.9	1.7	12.70	12.40	0.30	0.30	20.1	0.998	9.5E-05
4/25	----	90.0	76.1	75.9	1.7	12.10	12.50	---	---	---	---	---
4/25	45	90.0	76.1	75.9	1.7	12.40	12.20	0.30	0.30	20.1	0.998	9.5E-05

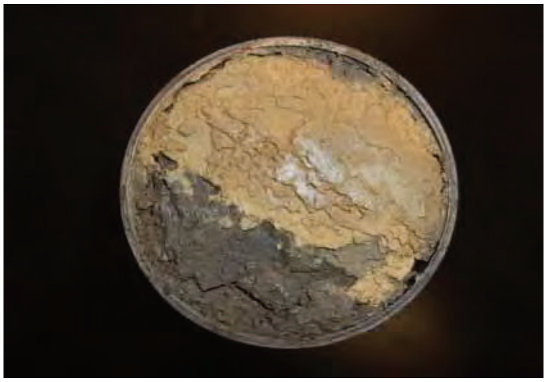
PERMEABILITY AT 20° C: 9.4 x 10^{-5} cm/sec (@ 14 psi effective stress)

Client:	AECOM
Project Name:	SCS Plant Scherer Ph.2
Project Location:	Monroe County, GA
GTX #:	304548
Boring ID:	B-104
Sample ID:	S-4 (TUBE)
Depth, ft:	6-8 ft

Top Section of Tube

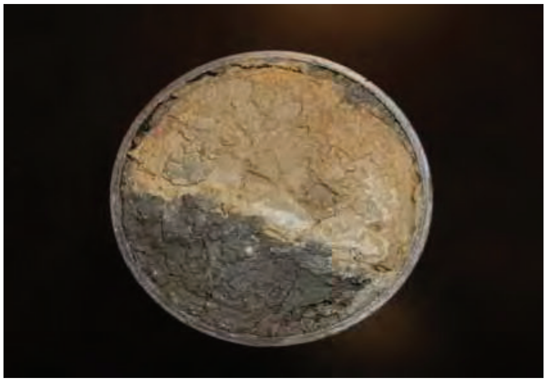


Top of tube



Bottom of tube

Middle Section of Tube



Top of tube

Bottom of tube

Bottom Section of Tube

Top of tube

Bottom of tube

Client:	AECOM
Project Name:	SCS Plant Scherer Ph.2
Project Location:	Monroe County, GA
GTX #:	304548
Boring ID:	B-104
Sample ID:	S-6
Depth, ft:	13-15 ft

Top Section of Tube

Notes: Top Section of tube was continuation of picture below.
During cutting, material shifted and left void

Middle Section of Tube

Bottom Of tube

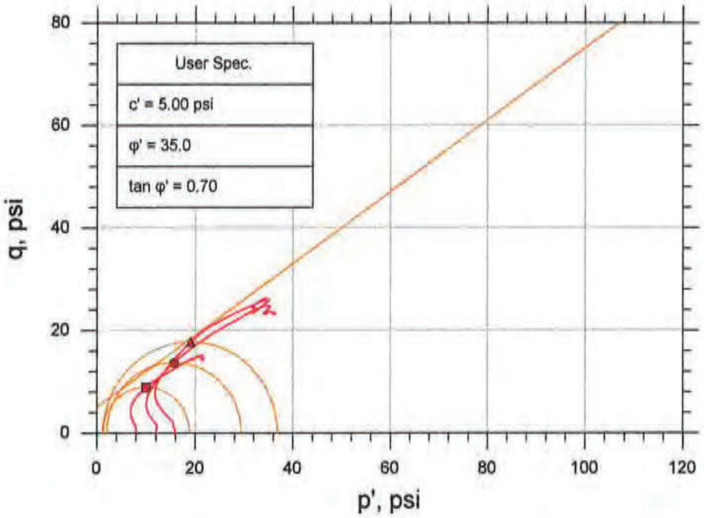
Bottom Section of Tube

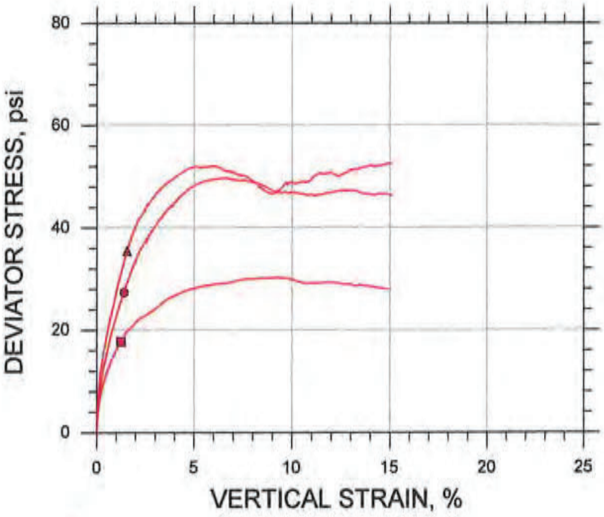
Notes: Moist, dark gray sandy silt (ASH)
Sample was intact and tested successfully
No Photo was obtained of this sample.

GeoTesting
EXPRESS

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: md	Checked By: mcm
Boring ID: B-104	
Preparation: intact	
Description: Moist, gray silt (ASH)	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Estimated Specific Gravity: 2.35

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

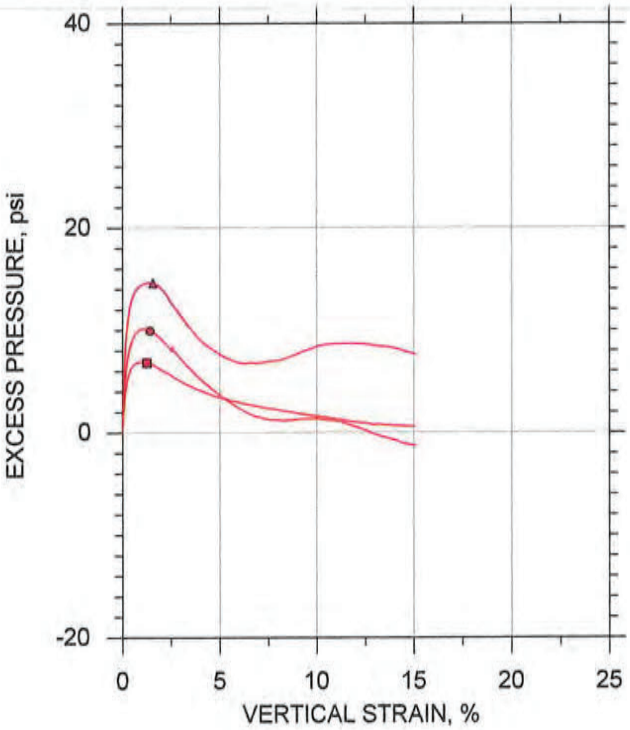


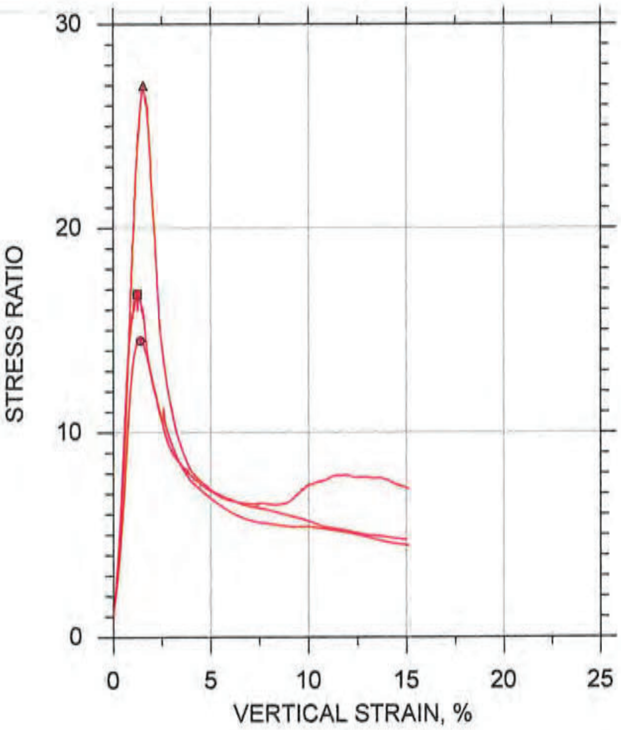


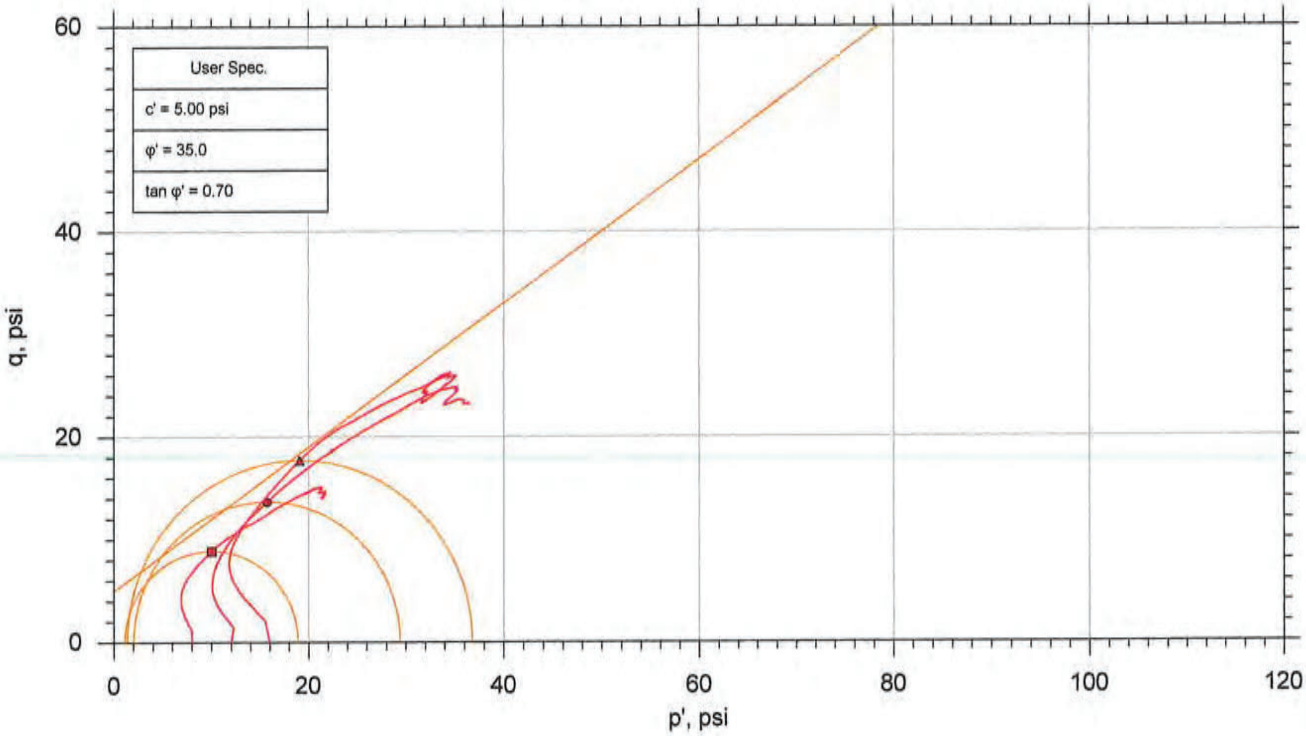
Symbol		■	●	▲	
Sample ID		S-9 (TUBE)	S-9 (TUBE)	S-9 (TUBE)	
Depth, ft		28-30 ft	28-30 ft	28-30 ft	
Test Number		CU-10-1	CU-10-2	CU-10-3	
Initial	Height, in	6.120	6.380	6.200	
	Diameter, in	2.870	2.860	2.870	
	Moisture Content (from Cuttings), %	66.8	52.3	55.1	
	Dry Density, pcf	55.9	63.9	62.8	
	Saturation (Wet Method), %	96.4	94.7	97.0	
	Void Ratio	1.63	1.30	1.33	
Before Shear	Moisture Content, %	68.6	53.9	55.4	
	Dry Density, pcf	56.2	64.7	63.7	
	Cross-sectional Area (Method A), in²	6.442	6.362	6.417	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	1.61	1.27	1.30	
	Back Pressure, psi	136.8	121.0	147.0	
Vertical Effective Consolidation Stress, psi		7.994	11.99	15.98	
Horizontal Effective Consolidation Stress, psi		7.987	12.00	16.00	
Vertical Strain after Consolidation, %		0.1520	0.3431	0.5172	
Volumetric Strain after Consolidation, %		0.5449	1.253	1.167	
Time to 50% Consolidation, min		0.3600	0.2500	0.2500	
Shear Strength, psi		8.884	13.69	17.71	
Strain at Failure, %		1.24	1.40	1.55	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		17.77	27.37	35.43	
Effective Minor Principal Stress at Failure, psi		1.127	2.026	1.363	
Effective Major Principal Stress at Failure, psi		18.89	29.40	36.79	
B-Value		0.94	0.95	0.96	
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:					

Moisture Content determined at 60° C for ash

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767







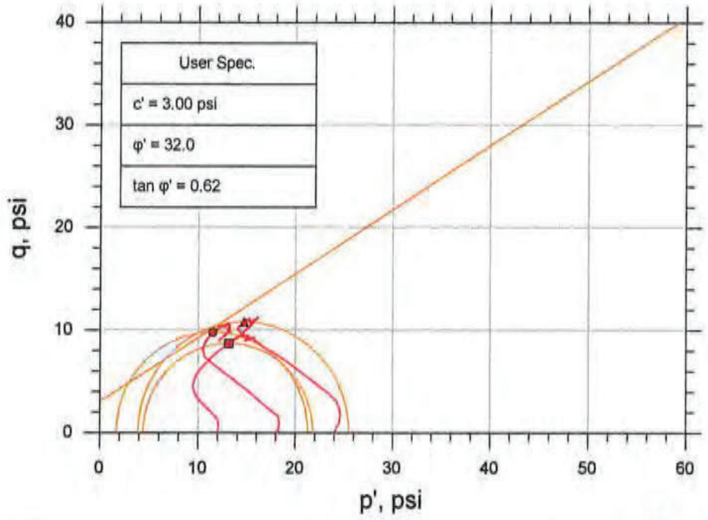
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	S-9 (TUBE)	CU-10-1	28-30 ft	md	4/12/16	mcm	4/26/16	304548-CU-10-1m.dat
●	S-9 (TUBE)	CU-10-2	28-30 ft	md	4/12/16	mcm	4/26/16	304548-CU-10-2m.dat
▲	S-9 (TUBE)	CU-10-3	28-30 ft	md	4/12/16	mcm	4/26/16	304548-CU-10-3m.dat

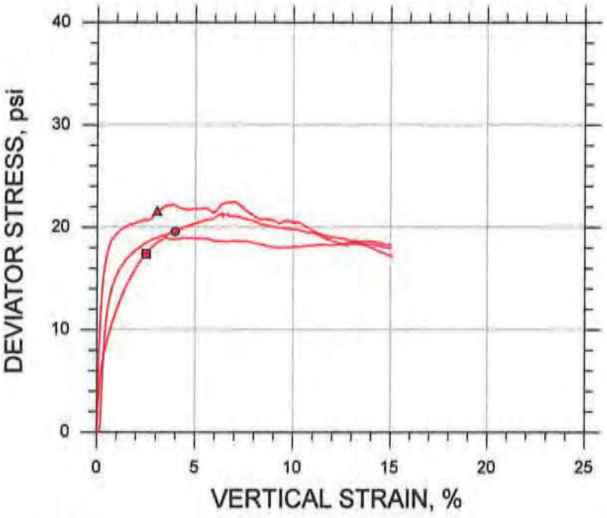
Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Sample Type: intact	
Description: Moist, gray silt (ASH)		
Remarks: Moisture Content determined at 60° C for ash.		

GeoTesting EXPRESS

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: jm	Checked By: mcm
Boring ID: B-104	
Preparation: intact	
Description: Moist, dark gray sandy silt (ASH)	
Classification: ---	
Group Symbol: ---	
Liquid Limit: ---	Plastic Limit: ---
Plasticity Index: ---	Estimated Specific Gravity: 2.35

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

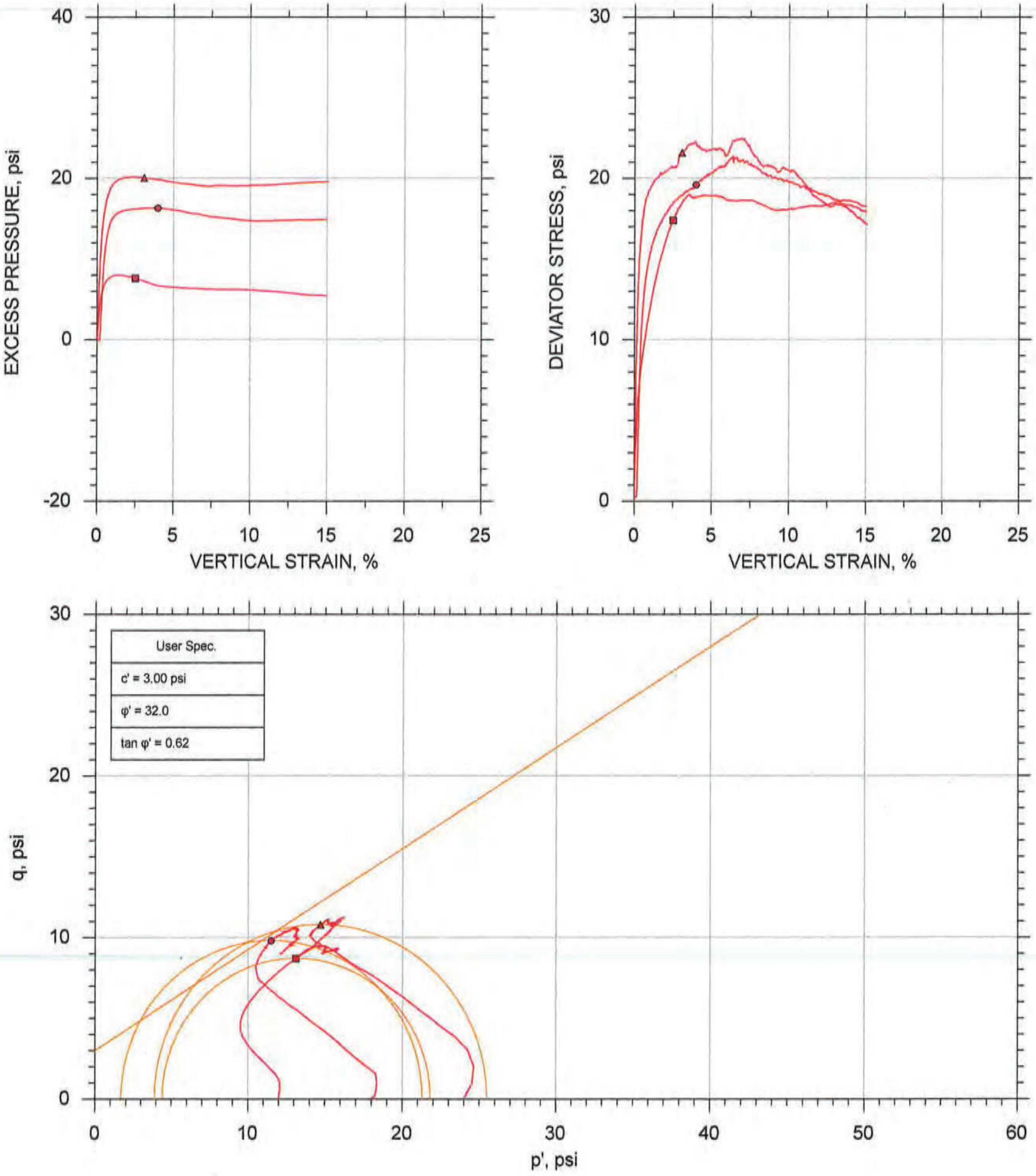




Symbol		■	●	▲	
Sample ID		S-13 (TUBE)	S-13 (TUBE)	S-13 (TUBE)	
Depth, ft		48-50 ft	48-50 ft	48-50 ft	
Test Number		CU-13-1	CU-13-2	CU-13-3	
Initial	Height, in	6.189	6.024	6.093	
	Diameter, in	2.850	2.850	2.850	
	Moisture Content (from Cuttings), %	76.2	66.1	77.9	
	Dry Density, pcf	51.9	54.6	51.2	
	Saturation (Wet Method), %	97.9	92.0	98.1	
	Void Ratio	1.83	1.69	1.87	
Before Shear	Moisture Content, %	75.2	70.1	75.8	
	Dry Density, pcf	53.0	55.4	52.8	
	Cross-sectional Area (Method A), in²	6.294	6.315	6.284	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	1.77	1.65	1.78	
	Back Pressure, psi	88.99	63.00	69.00	
Vertical Effective Consolidation Stress, psi		11.98	18.01	23.96	
Horizontal Effective Consolidation Stress, psi		11.99	18.00	23.99	
Vertical Strain after Consolidation, %		0.6278	0.4732	1.311	
Volumetric Strain after Consolidation, %		1.482	1.302	2.391	
Time to 50% Consolidation, min		0.3600	0.3600	0.2500	
Shear Strength, psi		8.703	9.801	10.79	
Strain at Failure, %		2.50	3.98	3.07	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		17.41	19.60	21.59	
Effective Minor Principal Stress at Failure, psi		4.406	1.688	3.904	
Effective Major Principal Stress at Failure, psi		21.81	21.29	25.49	
B-Value		0.95	0.95	0.96	
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:					

Moisture Content determined at 60° C for ash.

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



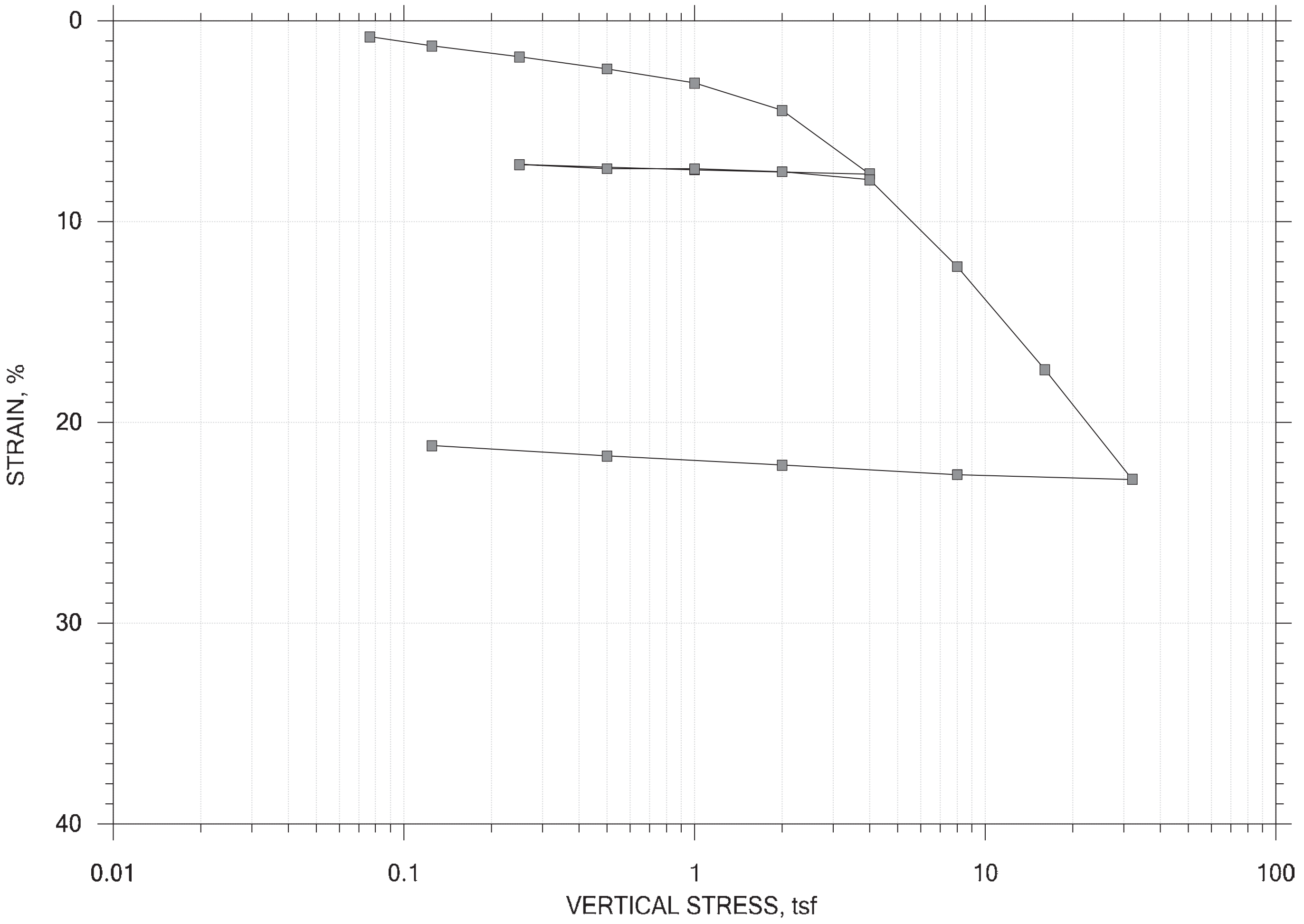
	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	S-13 (TUBE)	CU-13-1	48-50 ft	jm	4/19/16	mcm	4/27/16	304548-CU-13-1m.dat
●	S-13 (TUBE)	CU-13-2	48-50 ft	jm	4/19/16	mcm	4/26/16	304548-CU-13-2-m.dat
▲	S-13 (TUBE)	CU-13-3	48-50 ft	jm	4/19/16	mcm	4/26/16	304548-CU-13-3m.dat

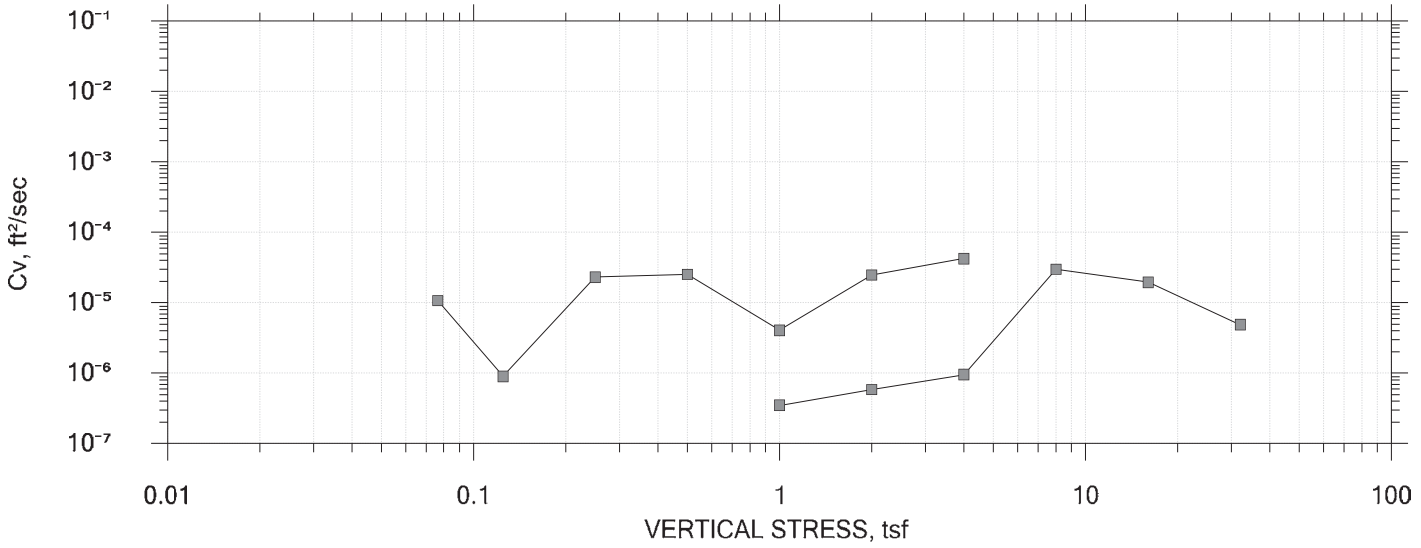
GeoTesting
EXPRESS

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Sample Type: intact	
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

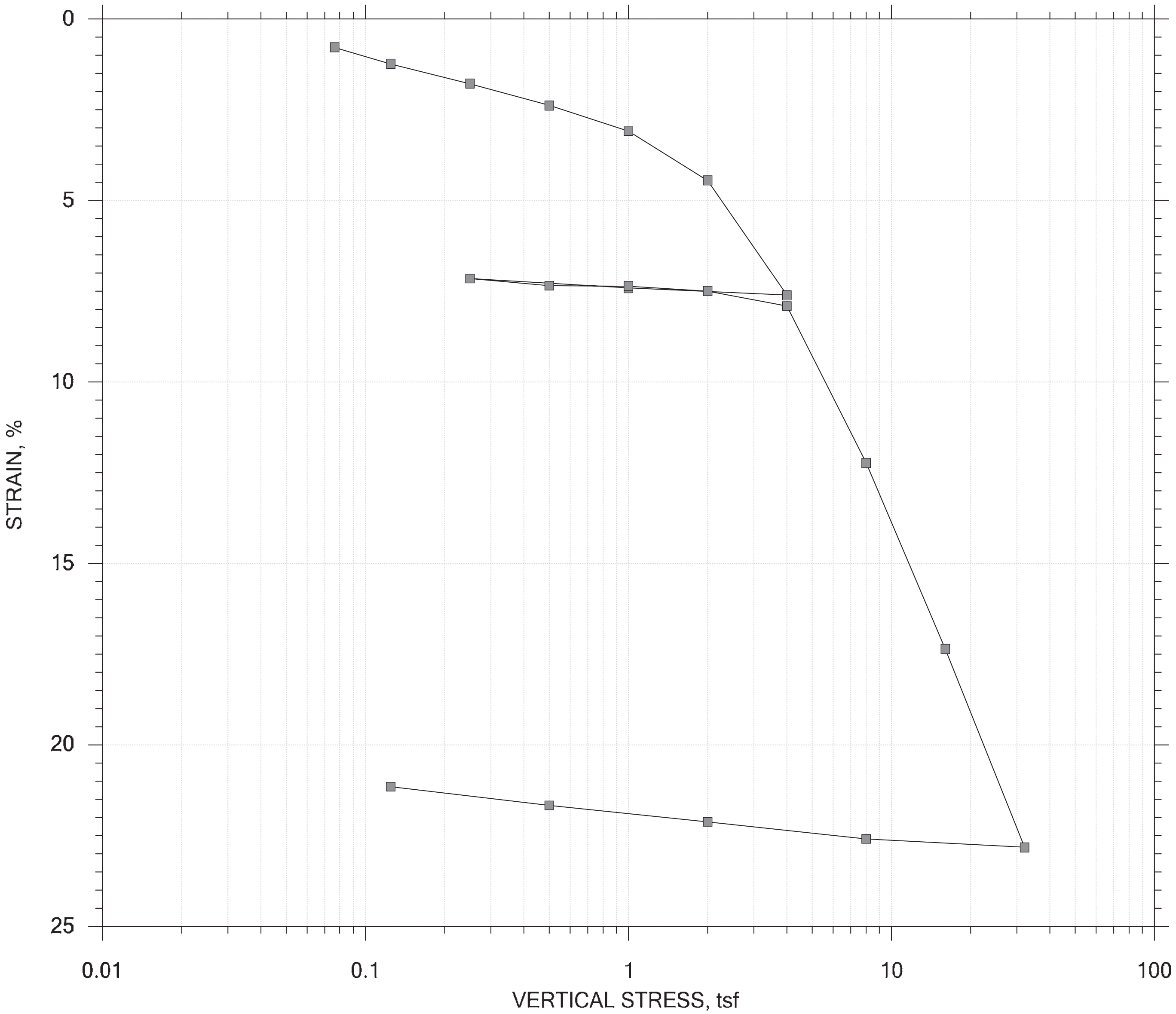




Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: ---				Water Content, %	67.31	50.05
Preconsolidation Stress: ---				Dry Unit Weight, pcf	56.957	67.725
Compression Ratio: ---				Saturation, %	99.76	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.60	1.19
LL: ---	PL: ---	PI: ---	GS: 2.37			

GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-104	Tested By: jm	Checked By: mcm
	Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray sandy silt (ASH)		
	Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph 2
Location: Monroe County, GA
Project No.: GTX-304548
Boring No.: B-104
Tested By: jm
Checked By: mcm
Sample No.: S-10 (TUBE)
Test Date: 5/2/16
Depth: 33-35 ft
Test No.: IP-5
Sample Type: intact
Elevation: ---

Soil Description: Moist, dark gray sandy silt (ASH)
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.

Estimated Specific Gravity: 2.37
Initial Void Ratio: 1.60
Final Void Ratio: 1.19
Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Specimen Diameter: 2.50 in
Initial Height: 1.00 in
Final Height: 0.84 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	a34	RING	ring	a35
Wt. Container + Wet Soil, gm	145.35	333.19	320.52	320.52
Wt. Container + Dry Soil, gm	93.230	283.79	283.79	283.79
Wt. Container, gm	17.040	210.40	210.40	210.40
Wt. Dry Soil, gm	76.190	73.390	73.390	73.390
Water Content, %	68.41	67.31	50.05	50.05
Void Ratio	---	1.60	1.19	---
Degree of Saturation, %	---	99.76	100.00	---
Dry Unit Weight, pcf	---	56.957	67.725	---

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Depth: 33-35 ft
Test No.: IP-5	Sample Type: intact	Elevation: ---

Soil Description: Moist, dark gray sandy silt (ASH)
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k cm/sec
1	0.0764	0.007836	1.58	0.784	3.048	7.99e-006	1.03e-001	7.79e-007
2	0.125	0.01238	1.57	1.24	28.350	8.48e-007	9.36e-002	7.55e-008
3	0.250	0.01787	1.56	1.79	1.143	2.08e-005	4.39e-002	8.69e-007
4	0.500	0.02384	1.54	2.38	1.128	2.08e-005	2.39e-002	4.74e-007
5	1.00	0.03090	1.52	3.09	5.803	4.00e-006	1.41e-002	5.37e-008
6	2.00	0.04450	1.49	4.45	1.211	1.88e-005	1.36e-002	2.43e-007
7	4.00	0.07614	1.40	7.61	0.582	3.72e-005	1.58e-002	5.60e-007
8	1.00	0.07413	1.41	7.41	5.887	3.57e-006	6.67e-004	2.26e-009
9	0.250	0.07150	1.42	7.15	46.421	4.54e-007	3.51e-003	1.52e-009
10	0.500	0.07352	1.41	7.35	2.972	7.10e-006	8.08e-003	5.46e-008
11	1.00	0.07360	1.41	7.36	85.732	2.46e-007	1.65e-004	3.86e-011
12	2.00	0.07496	1.41	7.50	25.051	8.39e-007	1.36e-003	1.09e-009
13	4.00	0.07907	1.40	7.91	21.776	9.60e-007	2.06e-003	1.88e-009
14	8.00	0.1223	1.28	12.2	0.924	2.15e-005	1.08e-002	2.21e-007
15	16.0	0.1736	1.15	17.4	1.333	1.34e-005	6.40e-003	8.14e-008
16	32.0	0.2282	1.01	22.8	3.412	4.59e-006	3.42e-003	1.49e-008
17	8.00	0.2259	1.01	22.6	22.901	6.40e-007	9.82e-005	5.98e-011
18	2.00	0.2212	1.03	22.1	56.963	2.60e-007	7.77e-004	1.92e-010
19	0.500	0.2166	1.04	21.7	53.896	2.78e-007	3.05e-003	8.07e-010
20	0.125	0.2115	1.05	21.2	2.545	5.96e-006	1.37e-002	7.75e-008

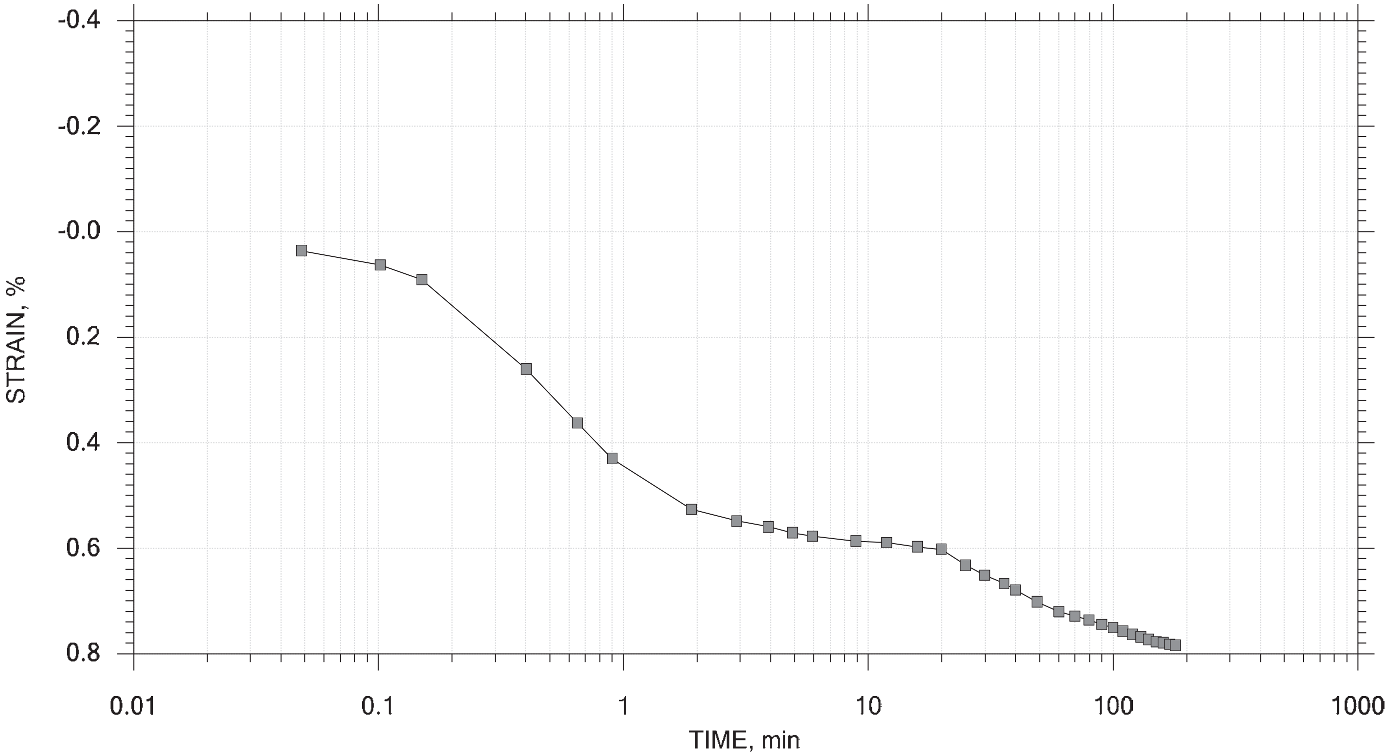
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k cm/sec	Ca %
1	0.0764	0.007836	1.58	0.784	0.498	1.13e-005	1.03e-001	1.11e-006	0.00e+000
2	0.125	0.01238	1.57	1.24	0.000	0.00e+000	9.36e-002	0.00e+000	0.00e+000
3	0.250	0.01787	1.56	1.79	0.220	2.52e-005	4.39e-002	1.05e-006	0.00e+000
4	0.500	0.02384	1.54	2.38	0.175	3.13e-005	2.39e-002	7.11e-007	0.00e+000
5	1.00	0.03090	1.52	3.09	0.000	0.00e+000	1.41e-002	0.00e+000	0.00e+000
6	2.00	0.04450	1.49	4.45	0.158	3.34e-005	1.36e-002	4.33e-007	0.00e+000
7	4.00	0.07614	1.40	7.61	0.000	0.00e+000	1.58e-002	0.00e+000	0.00e+000
8	1.00	0.07413	1.41	7.41	0.000	0.00e+000	6.67e-004	0.00e+000	0.00e+000
9	0.250	0.07150	1.42	7.15	0.000	0.00e+000	3.51e-003	0.00e+000	0.00e+000
10	0.500	0.07352	1.41	7.35	0.000	0.00e+000	8.08e-003	0.00e+000	0.00e+000
11	1.00	0.07360	1.41	7.36	0.000	0.00e+000	1.65e-004	0.00e+000	0.00e+000
12	2.00	0.07496	1.41	7.50	0.000	0.00e+000	1.36e-003	0.00e+000	0.00e+000
13	4.00	0.07907	1.40	7.91	5.058	9.60e-007	2.06e-003	1.88e-009	0.00e+000
14	8.00	0.1223	1.28	12.2	0.124	3.73e-005	1.08e-002	3.84e-007	0.00e+000
15	16.0	0.1736	1.15	17.4	0.130	3.19e-005	6.40e-003	1.94e-007	0.00e+000
16	32.0	0.2282	1.01	22.8	0.000	0.00e+000	3.42e-003	0.00e+000	0.00e+000
17	8.00	0.2259	1.01	22.6	0.000	0.00e+000	9.82e-005	0.00e+000	0.00e+000
18	2.00	0.2212	1.03	22.1	0.000	0.00e+000	7.77e-004	0.00e+000	0.00e+000
19	0.500	0.2166	1.04	21.7	0.000	0.00e+000	3.05e-003	0.00e+000	0.00e+000
20	0.125	0.2115	1.05	21.2	0.000	0.00e+000	1.37e-002	0.00e+000	0.00e+000

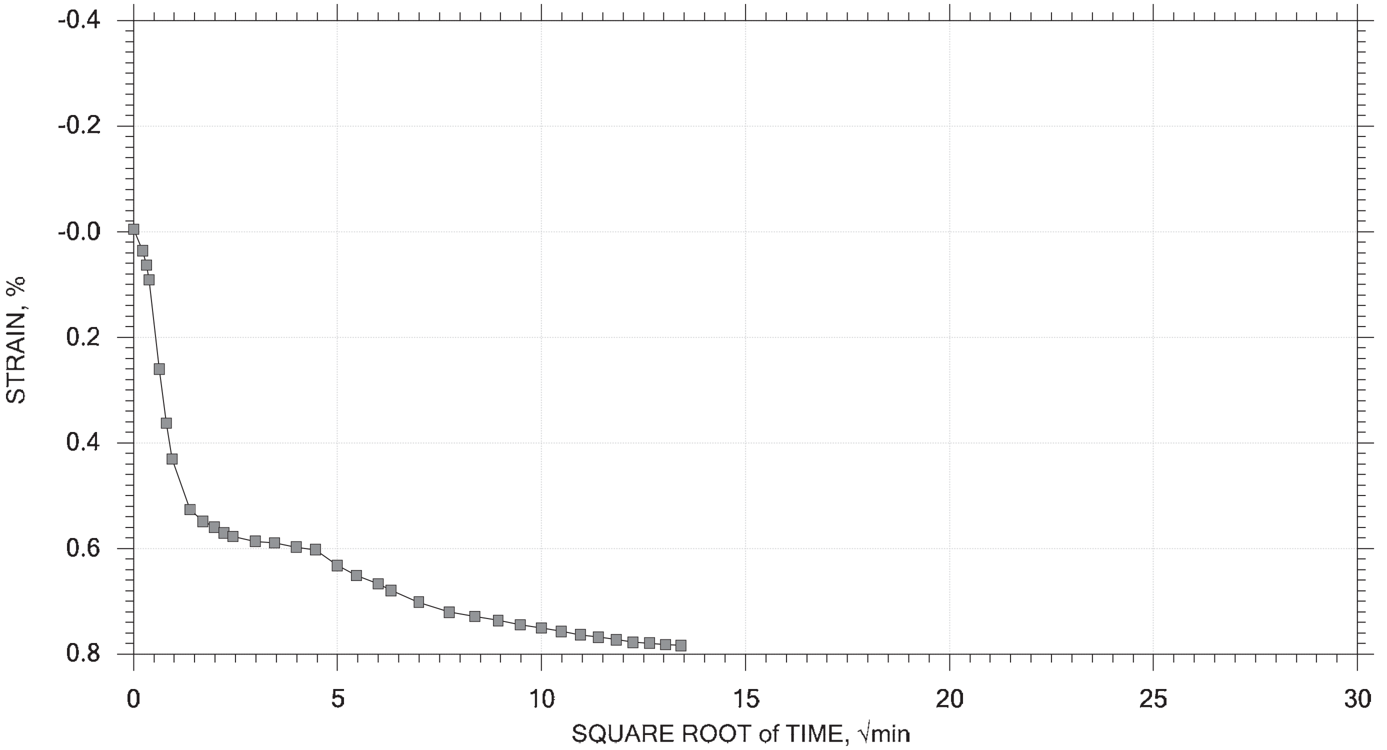
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 20

Stress: 0.076419 tsf





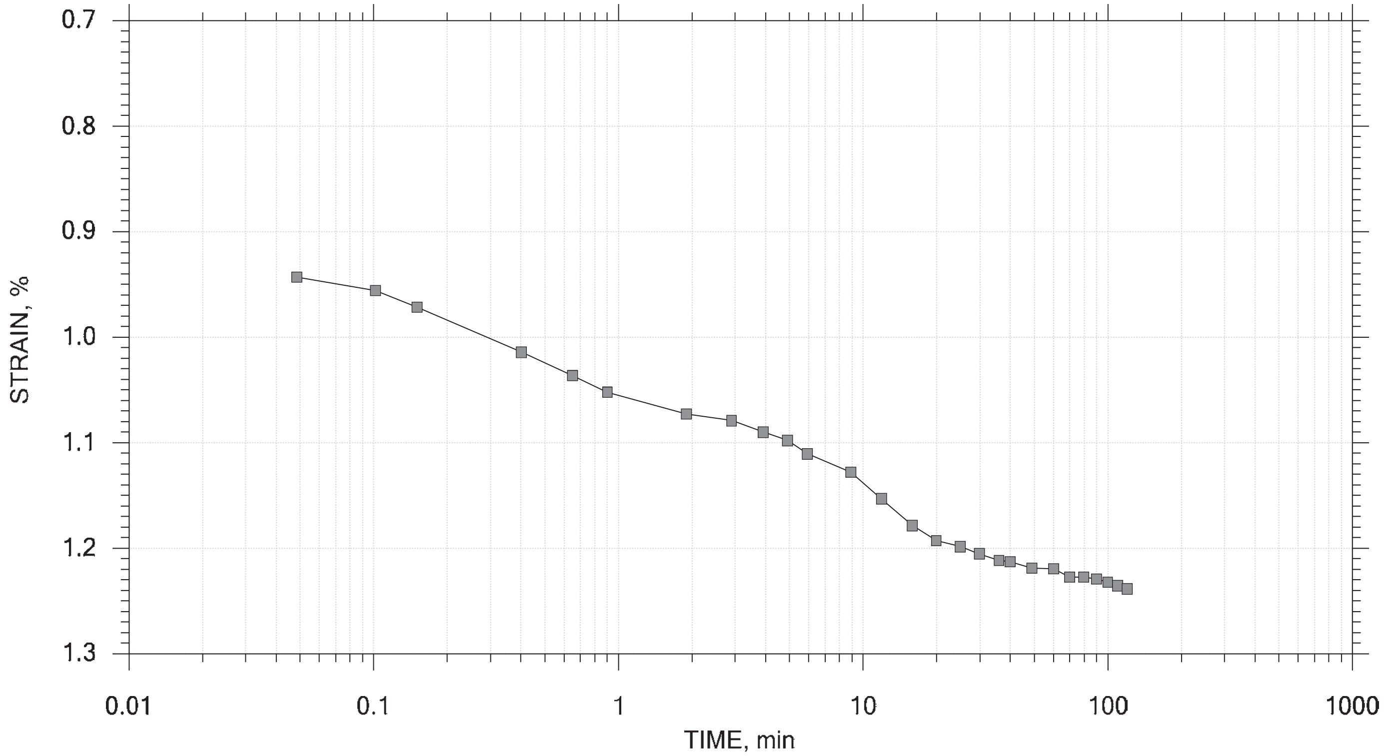
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-104	Tested By: jm	Checked By: mcm
	Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray sandy silt (ASH)		
	Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

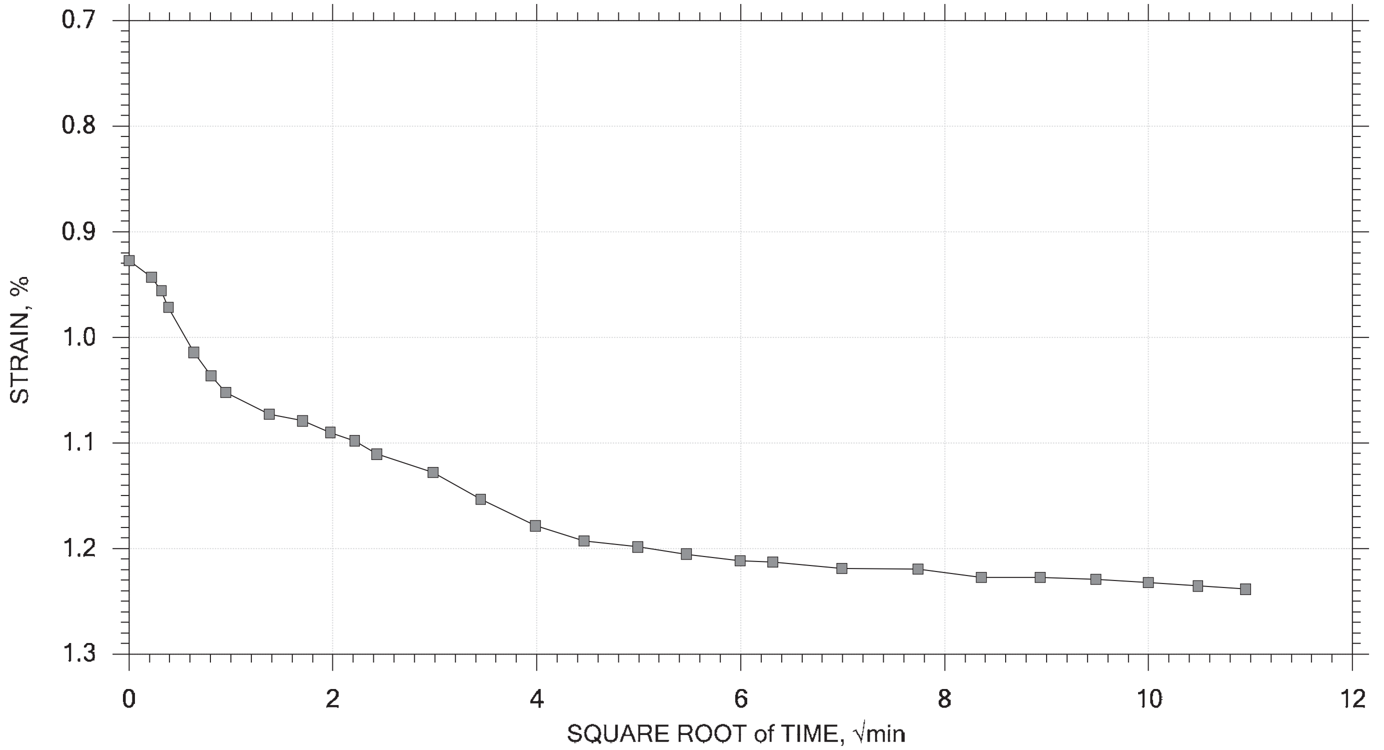
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 20

Stress: 0.125 tsf





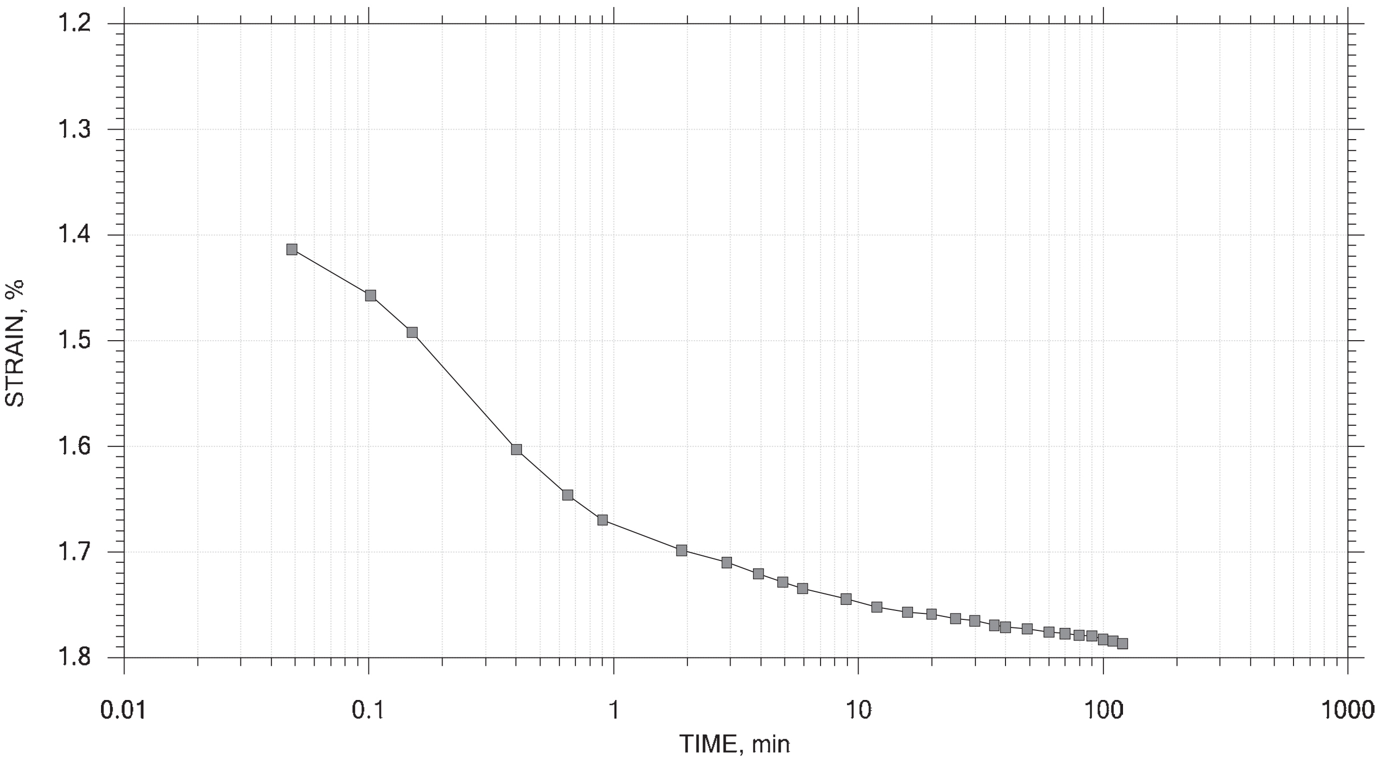
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

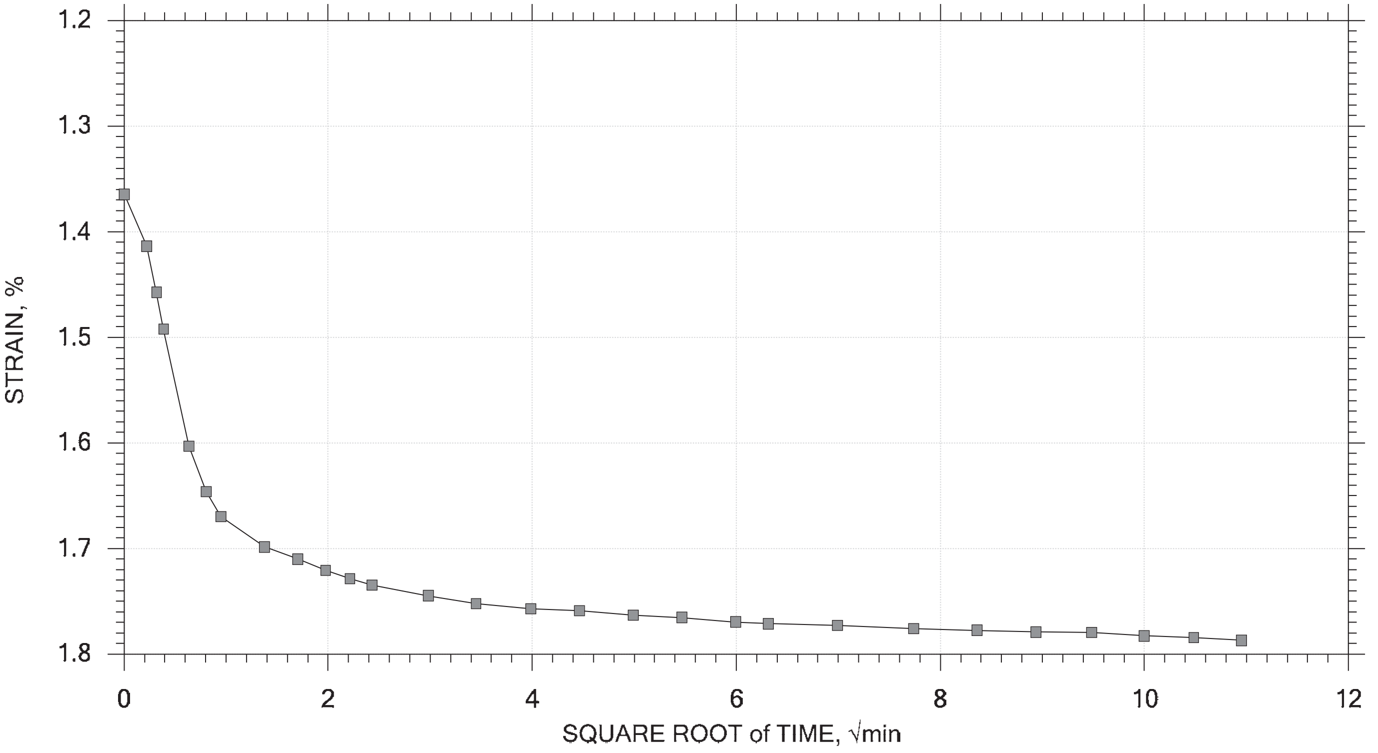
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 20

Stress: 0.25 tsf





GeoTesting EXPRESS

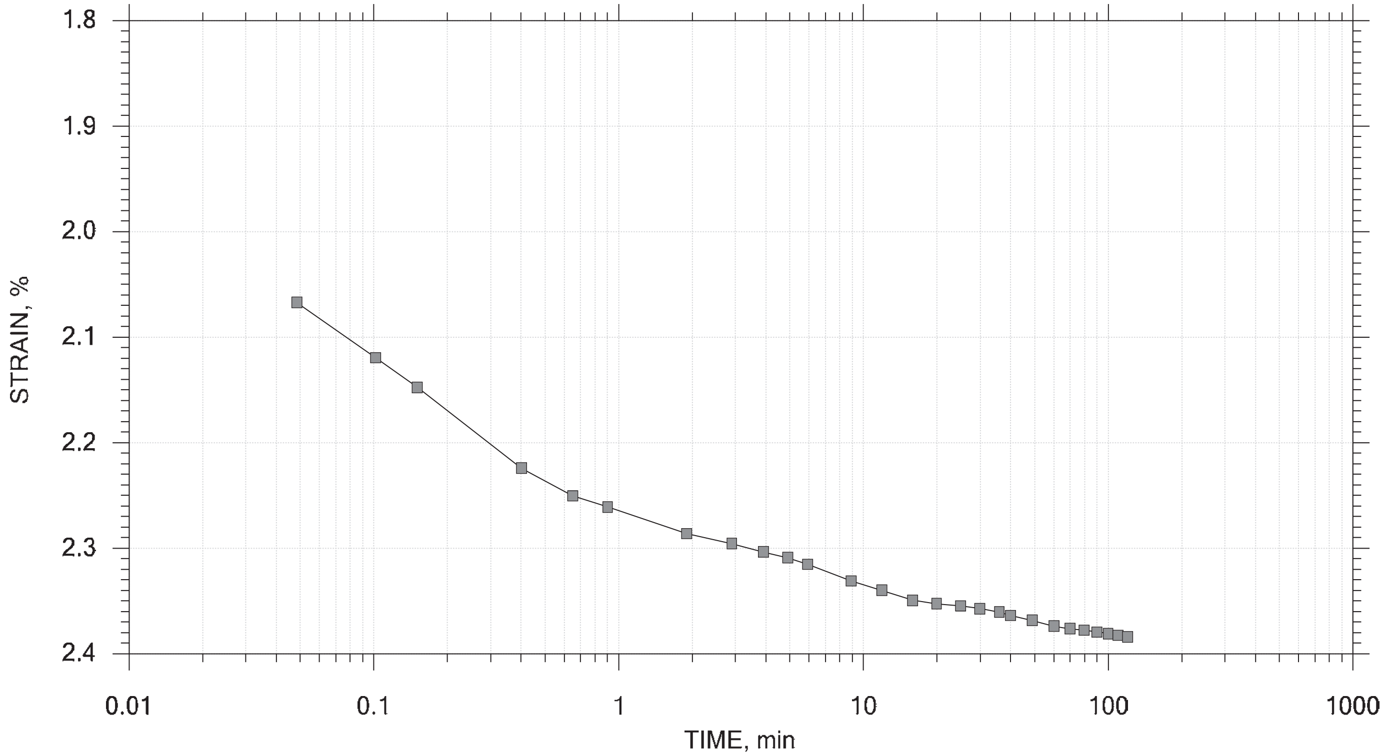
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

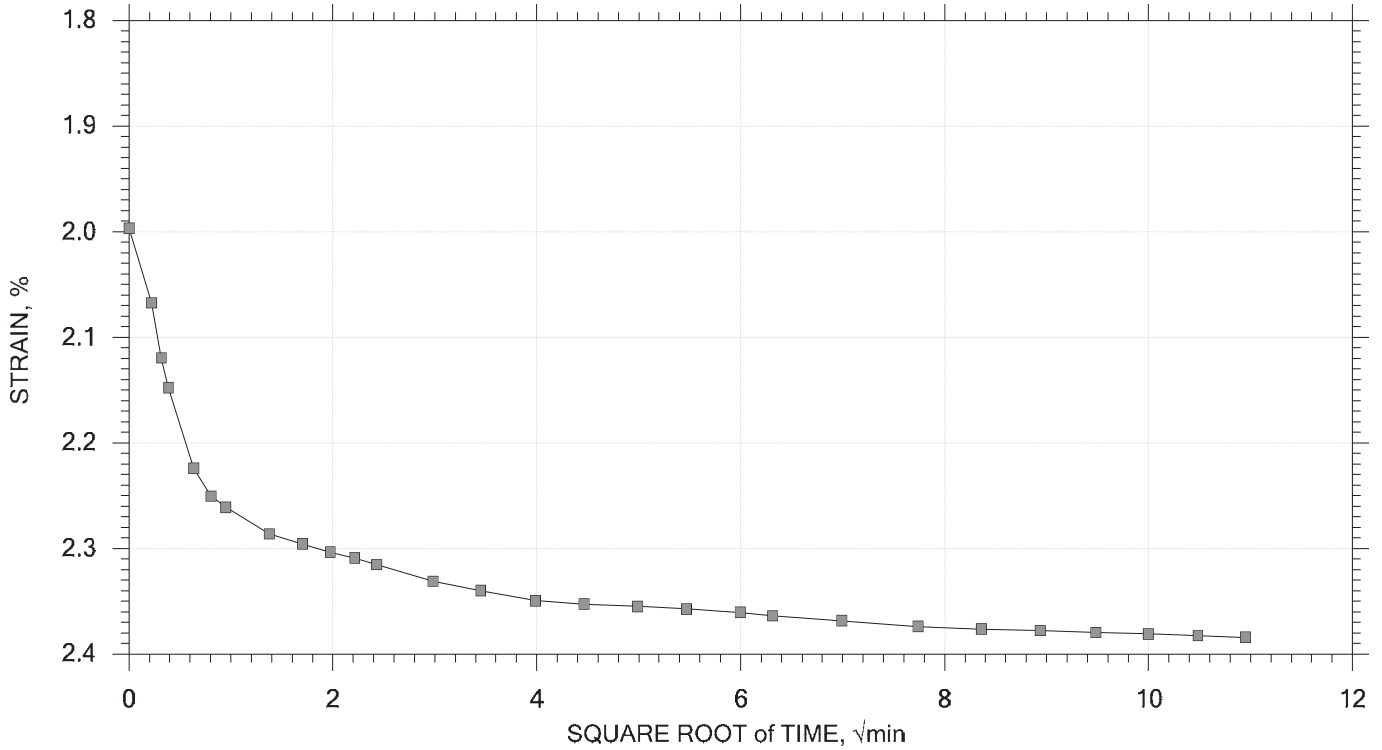
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 20

Stress: 0.5 tsf





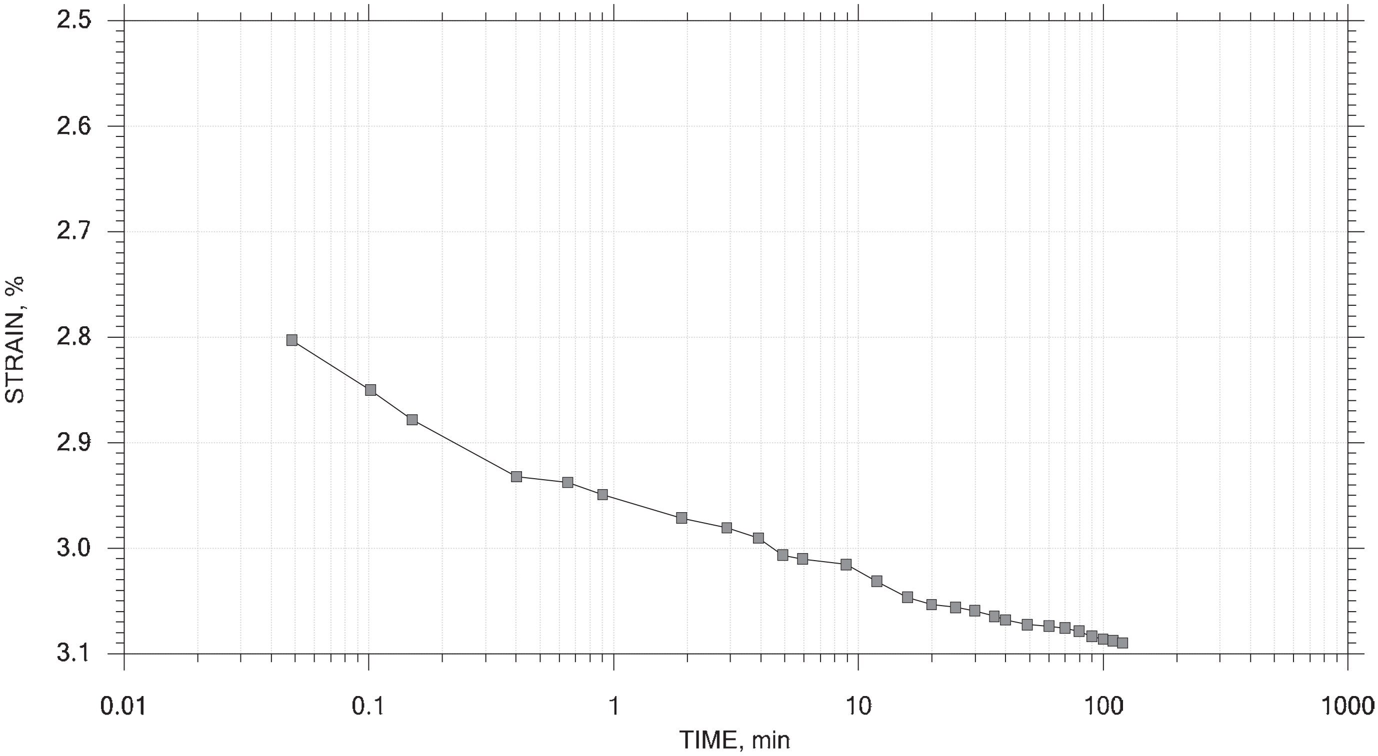
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-104	Tested By: jm	Checked By: mcm
	Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray sandy silt (ASH)		
	Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

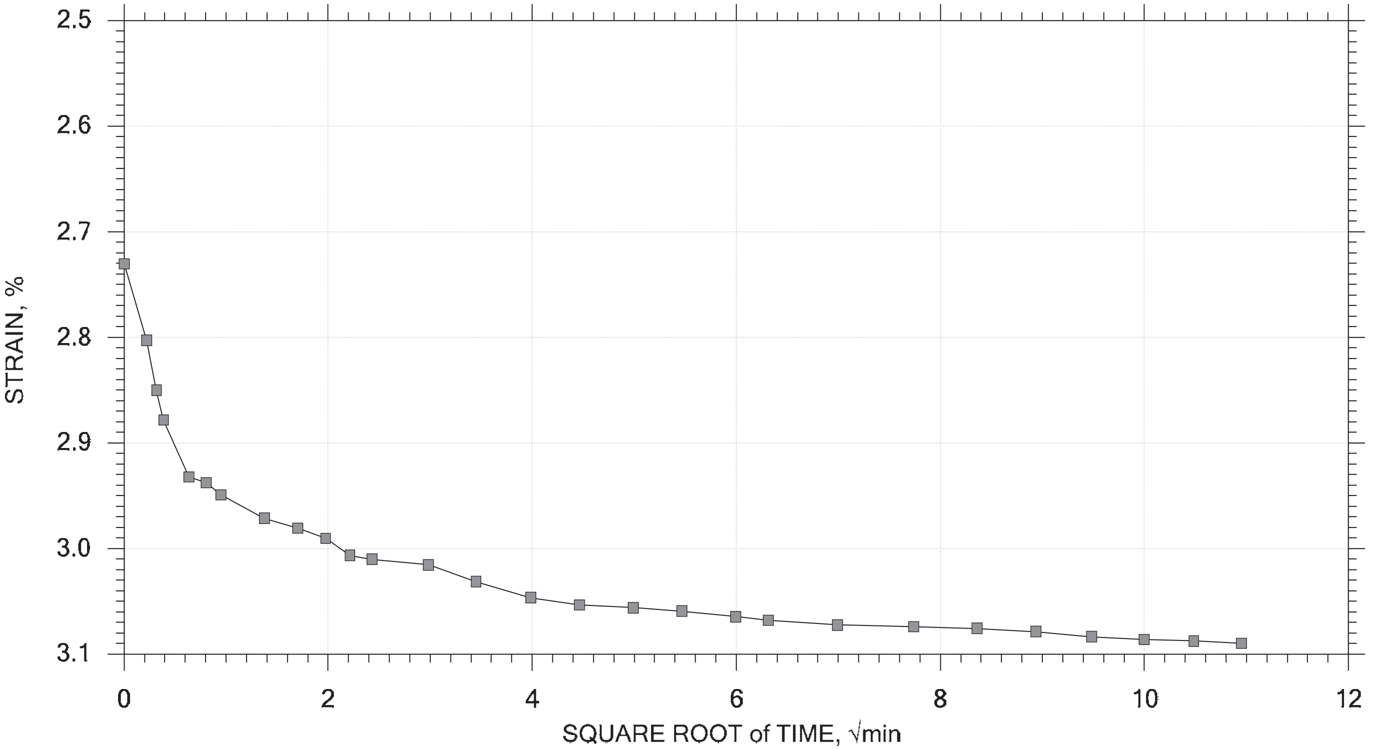
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 20

Stress: 1 tsf





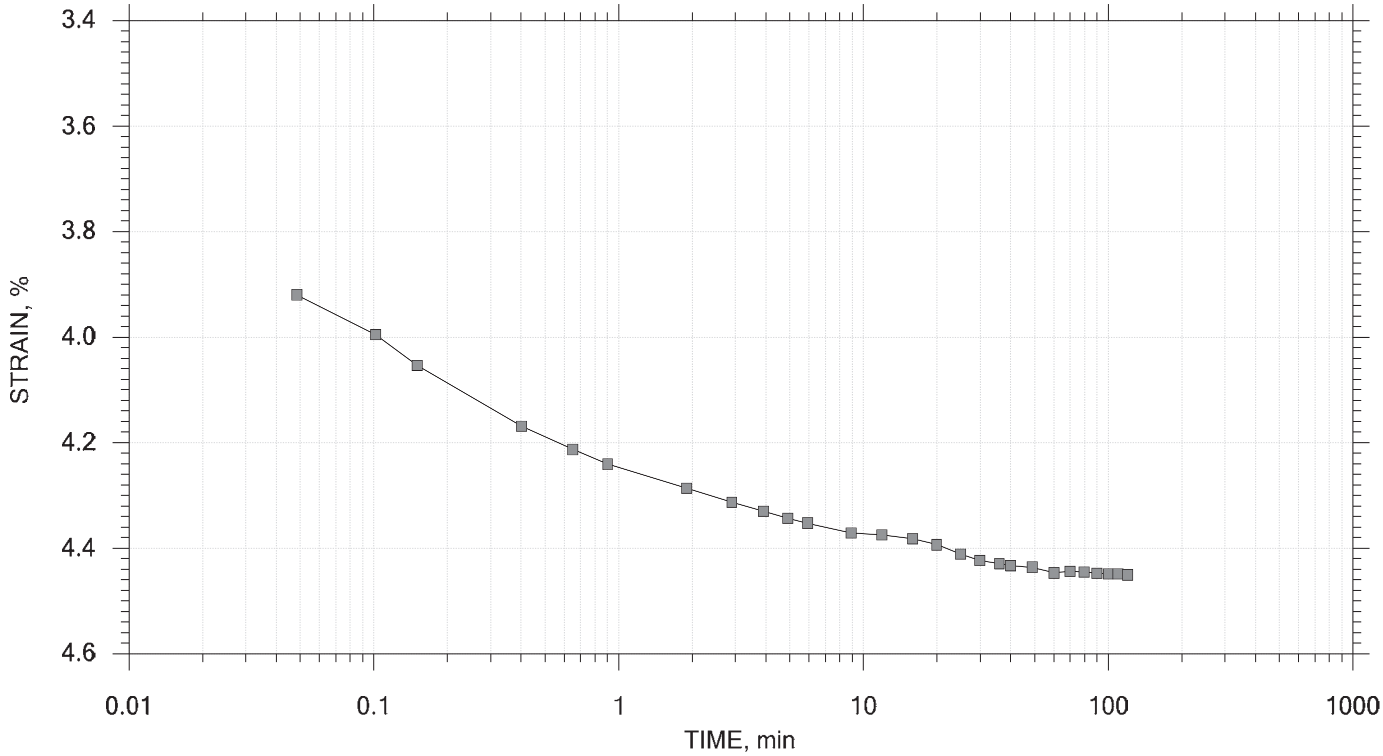
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-104	Tested By: jm	Checked By: mcm
	Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray sandy silt (ASH)		
	Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

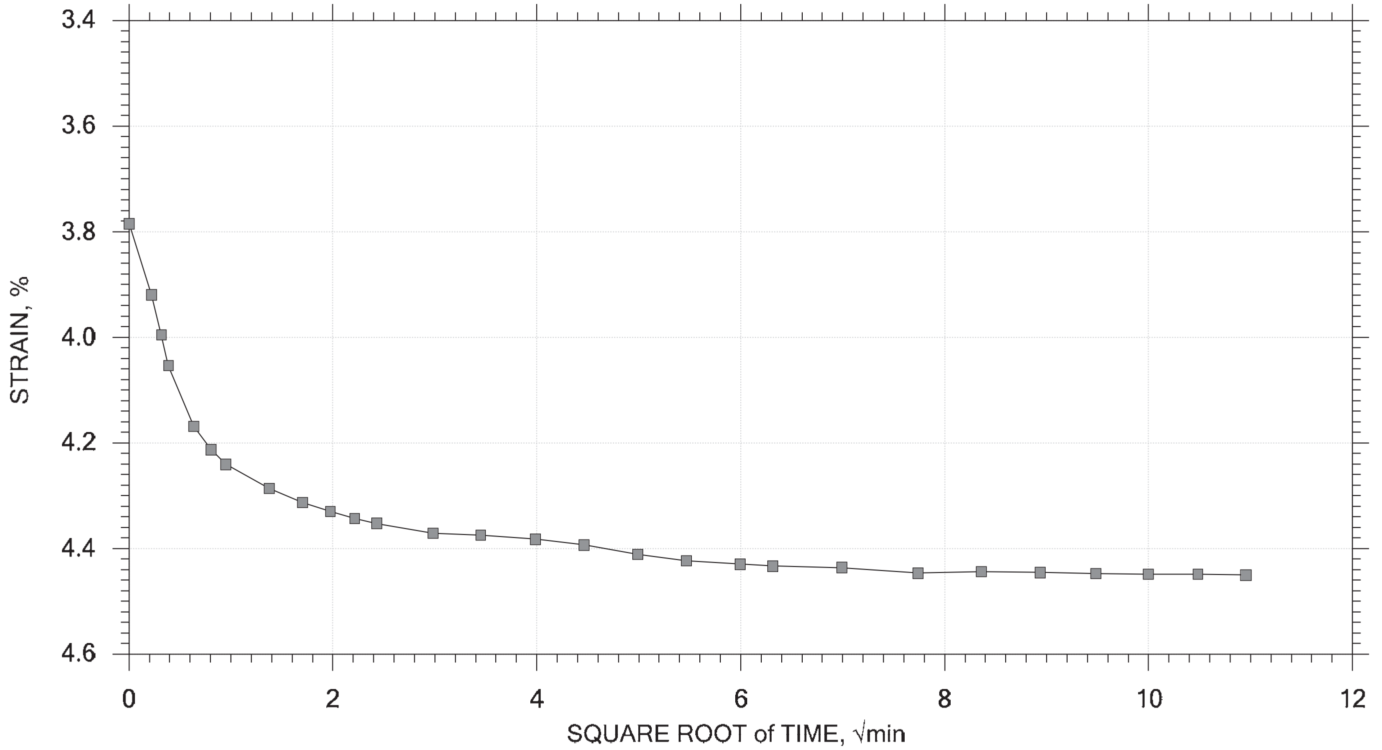
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 20

Stress: 2 tsf





GeoTesting EXPRESS

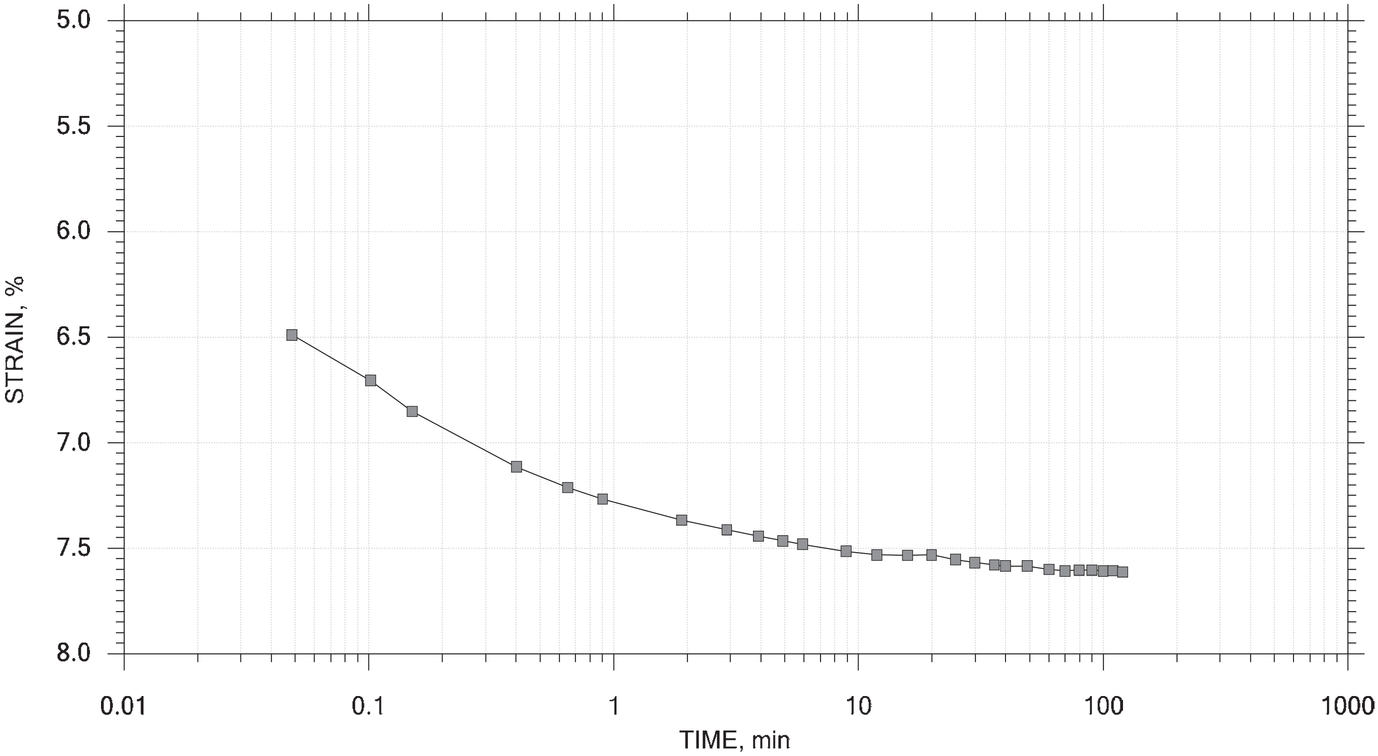
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

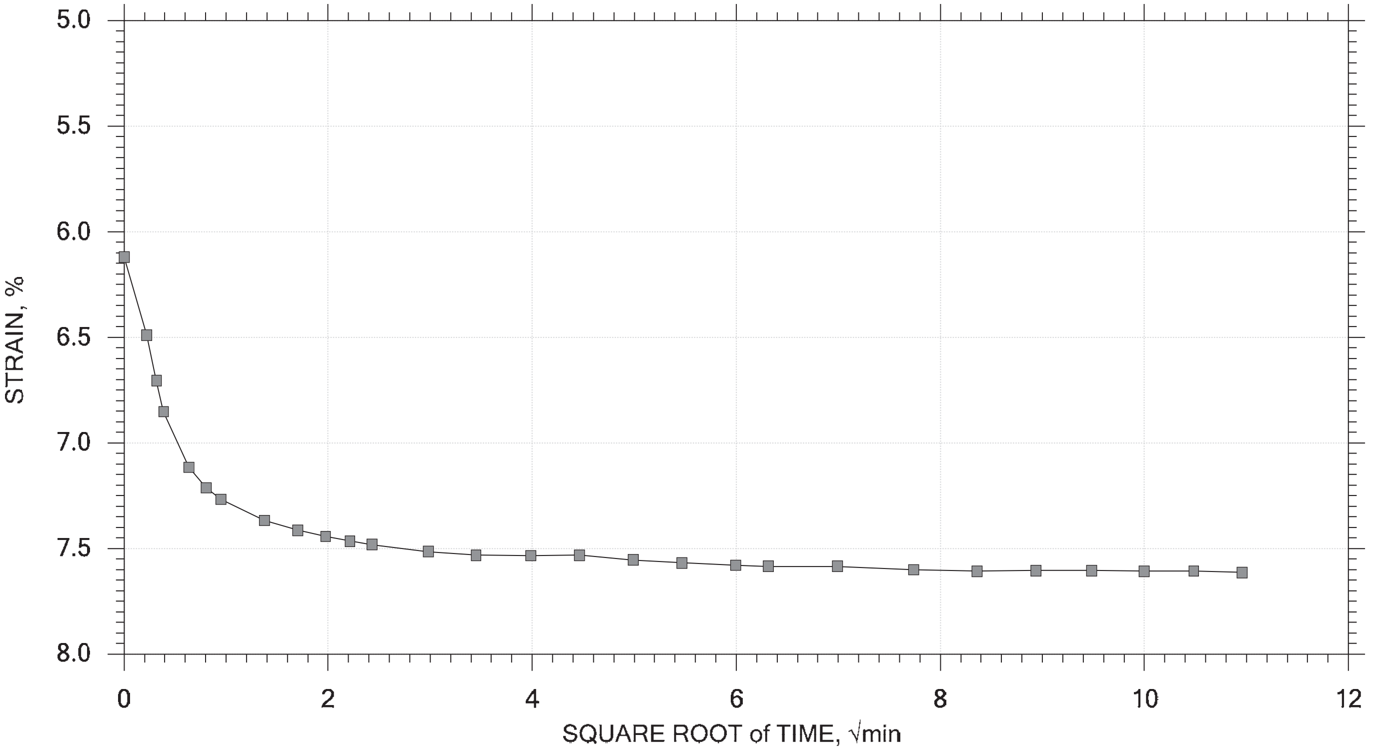
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 20

Stress: 4 tsf





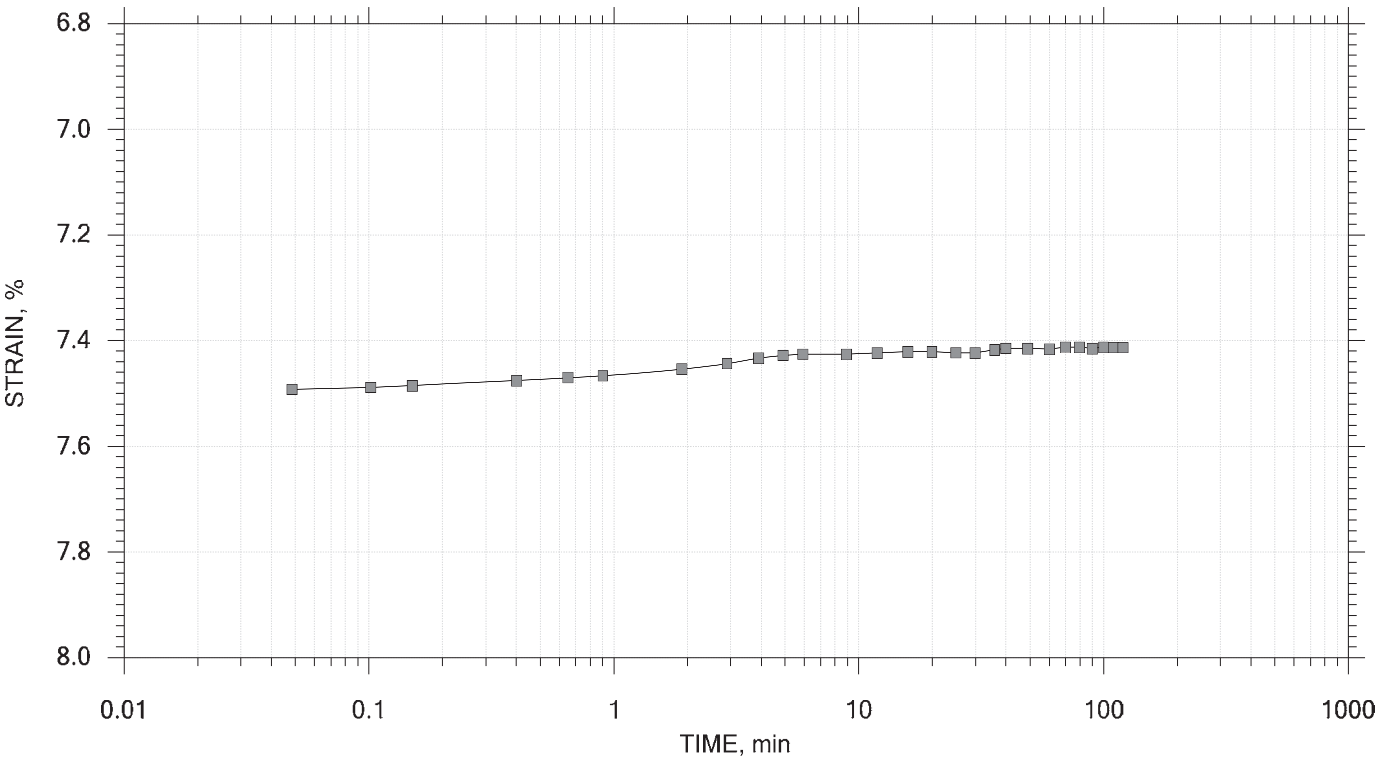
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

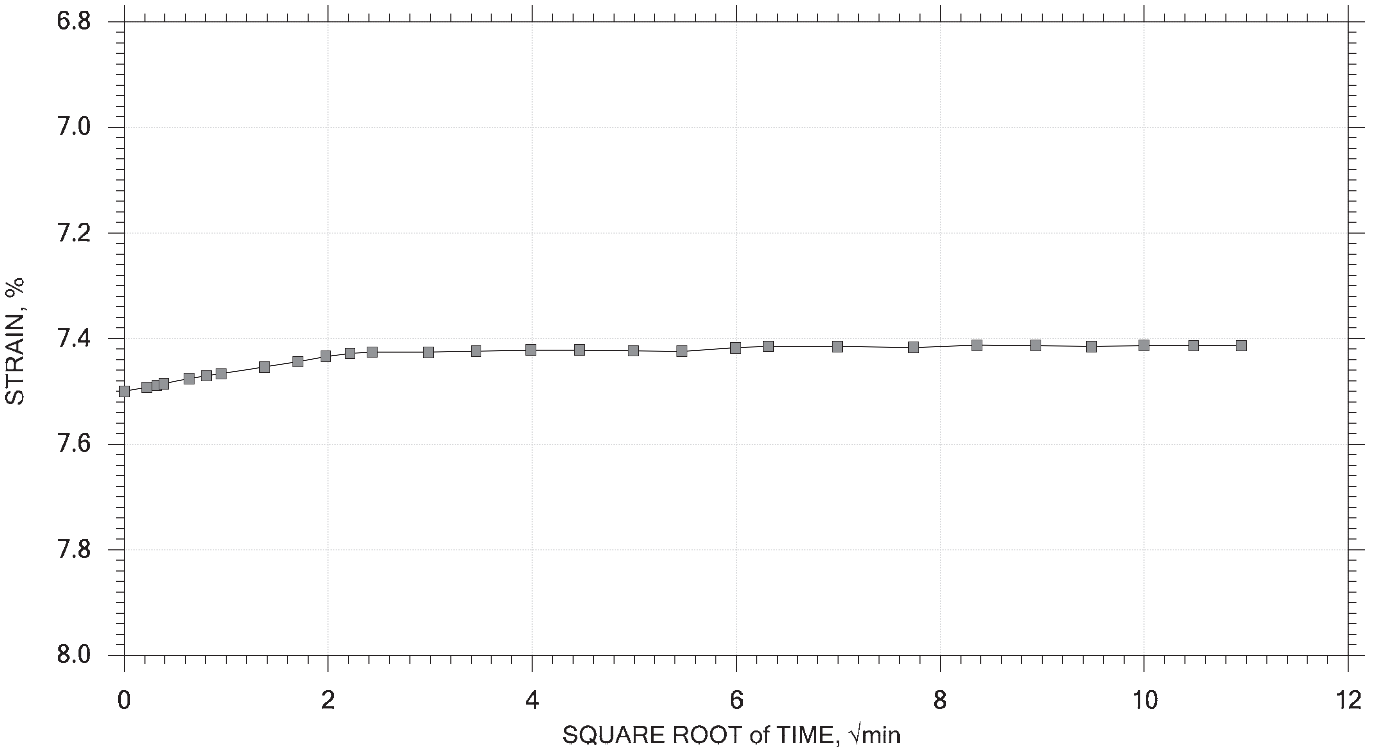
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 20

Stress: 1 tsf





GeoTesting EXPRESS

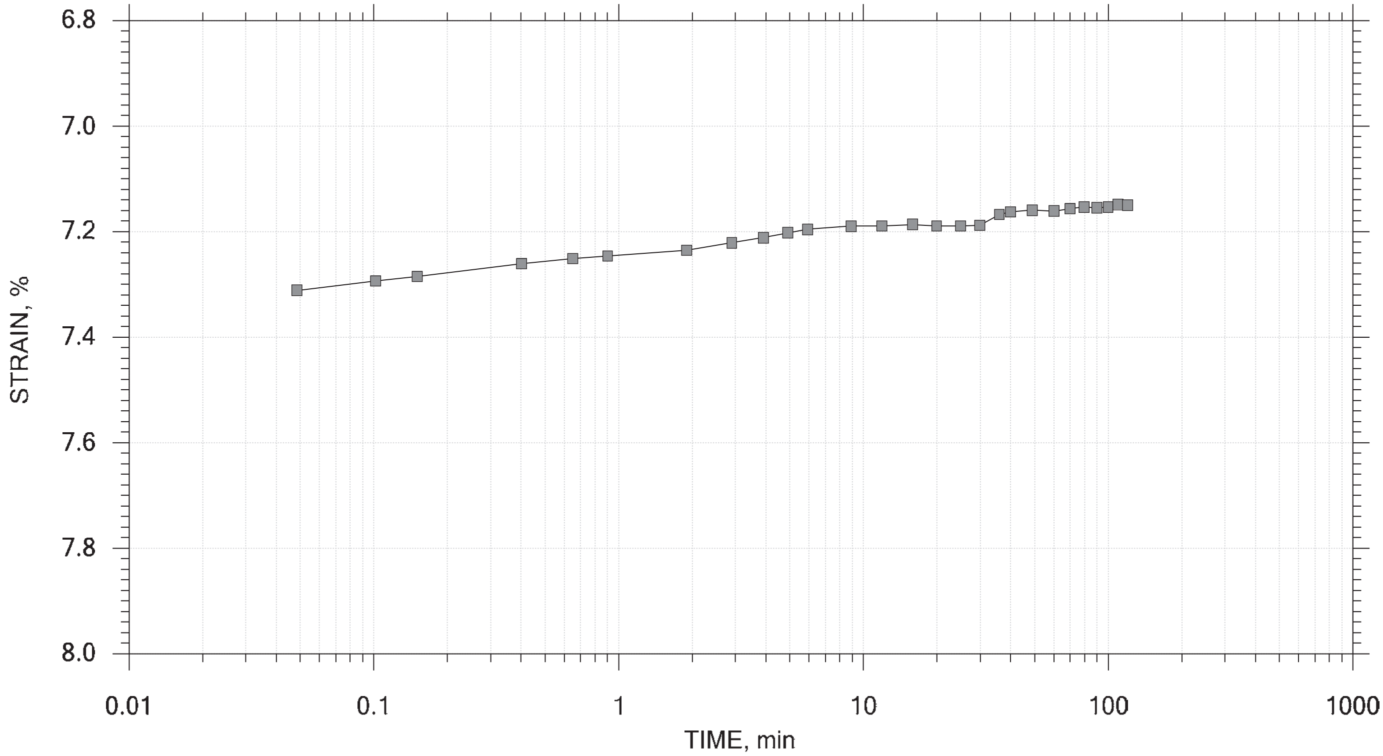
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

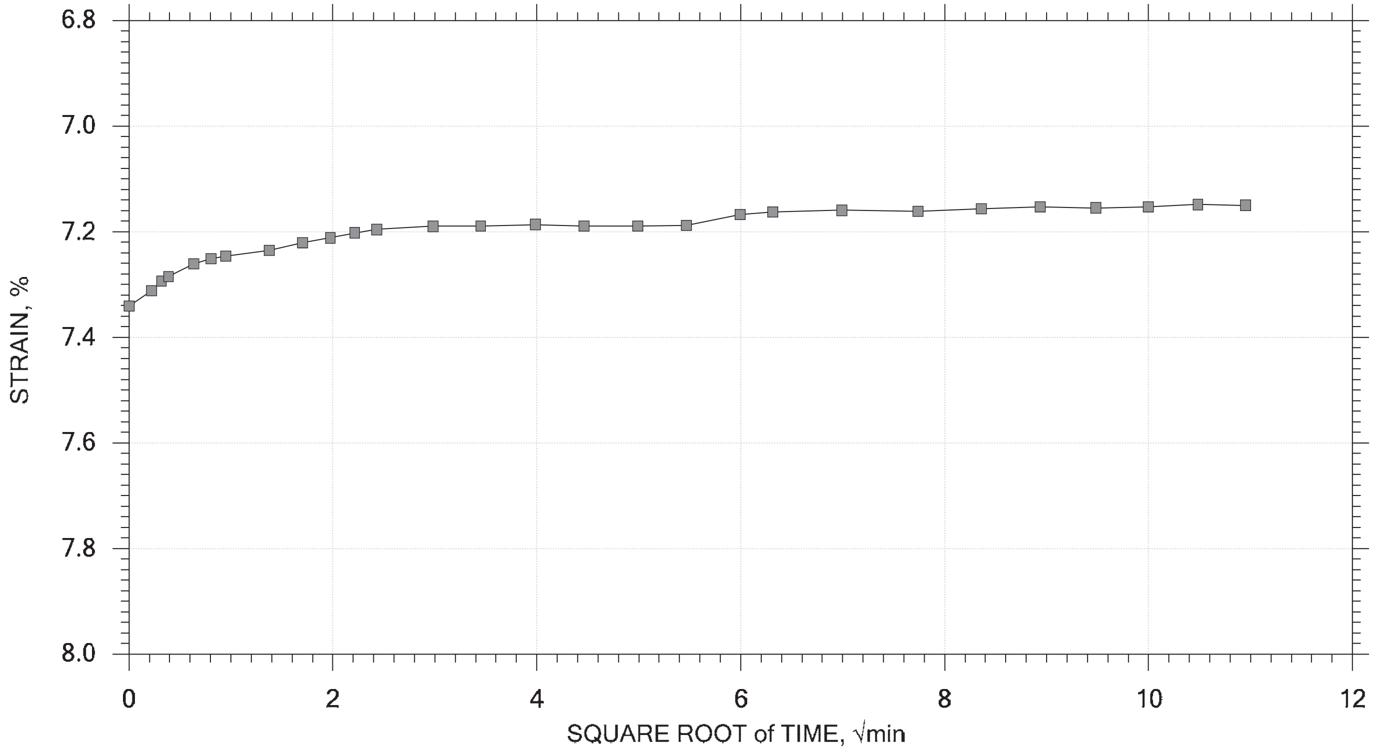
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 20

Stress: 0.25 tsf





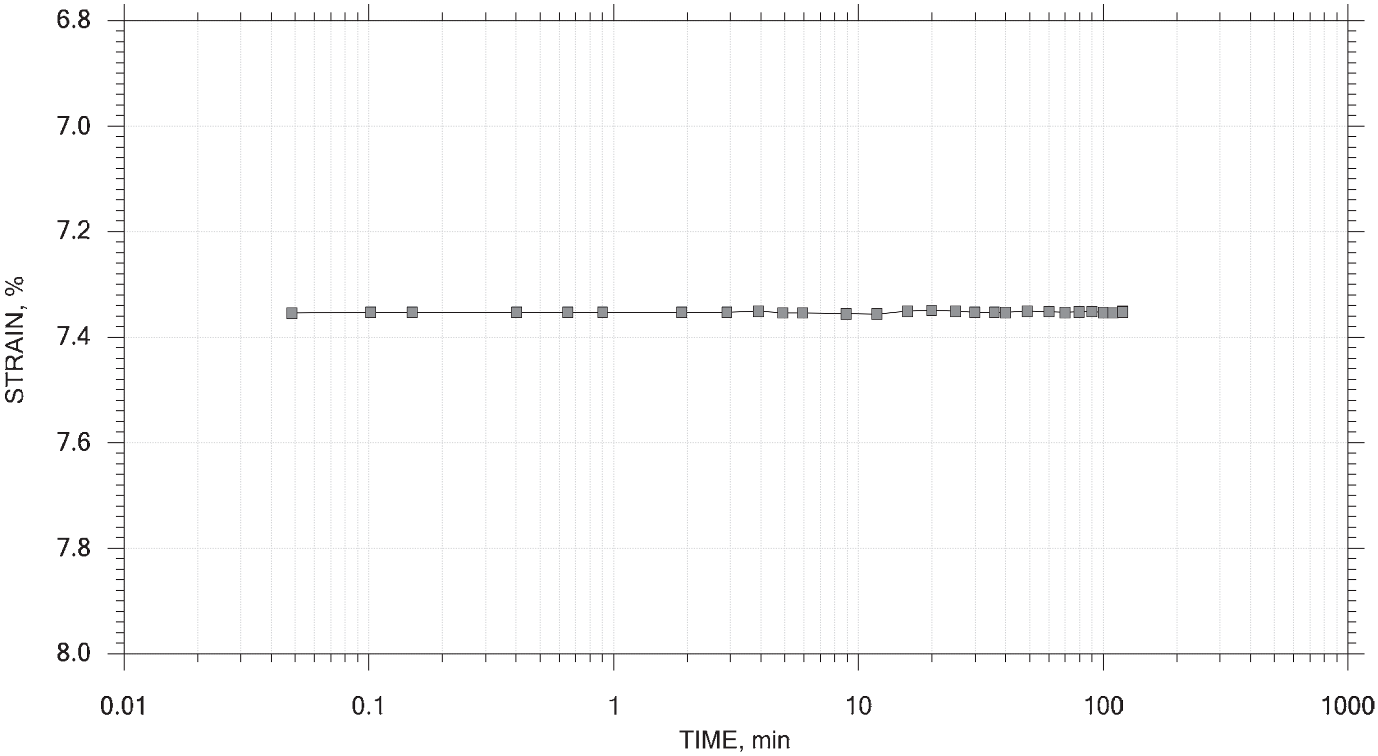
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

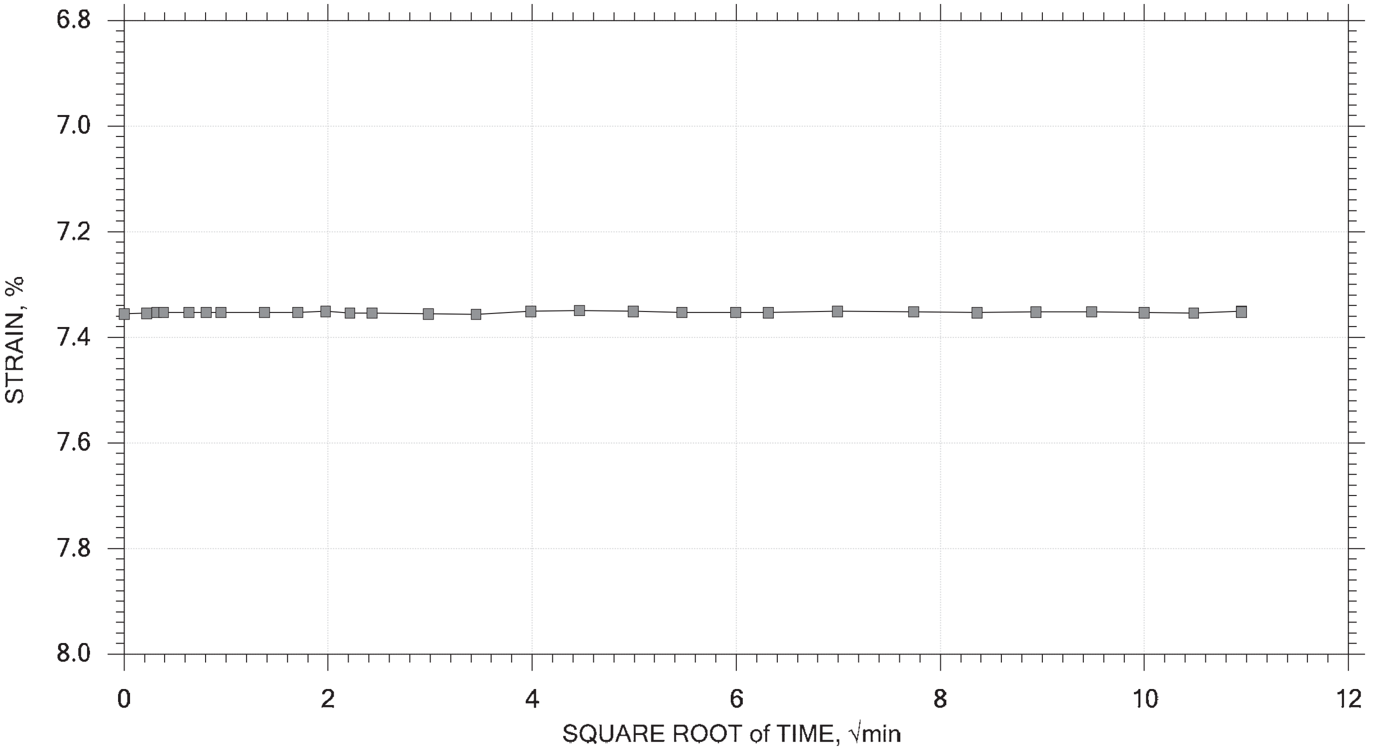
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 20

Stress: 0.5 tsf





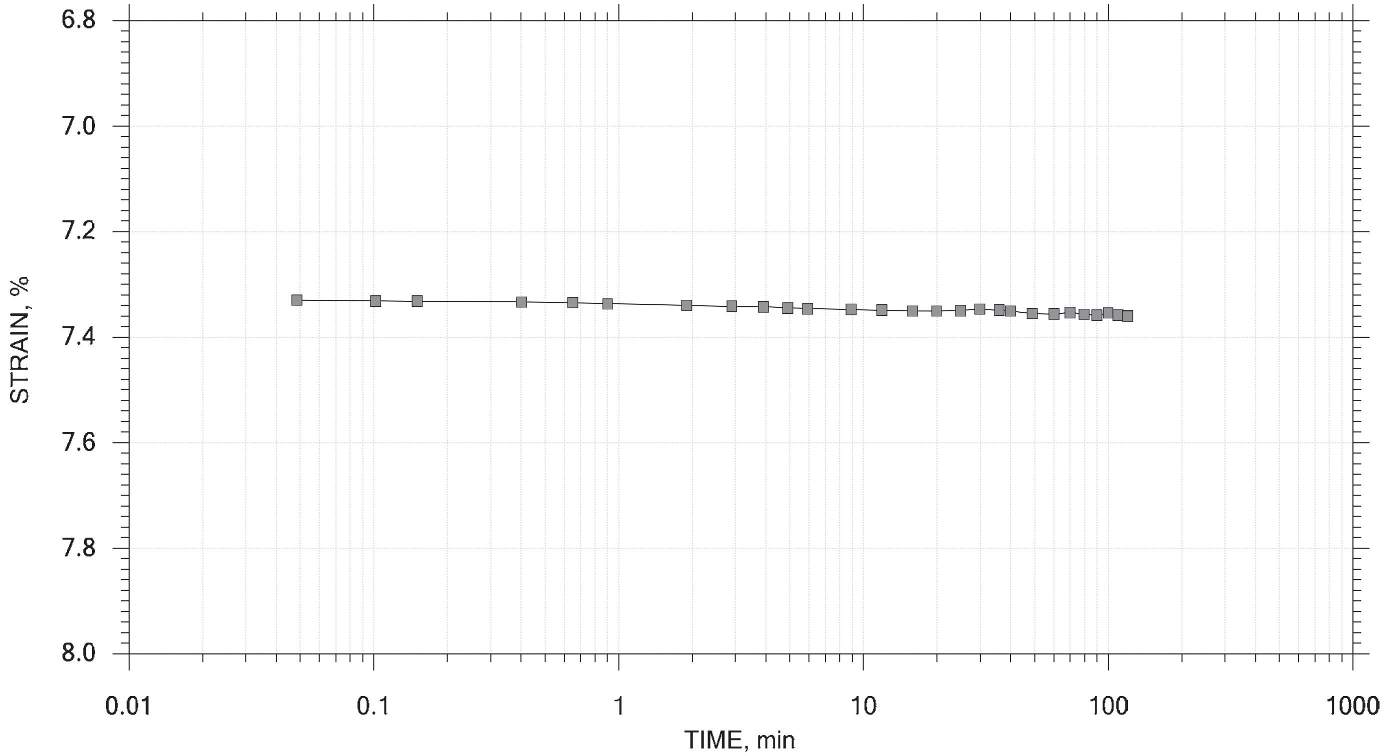
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

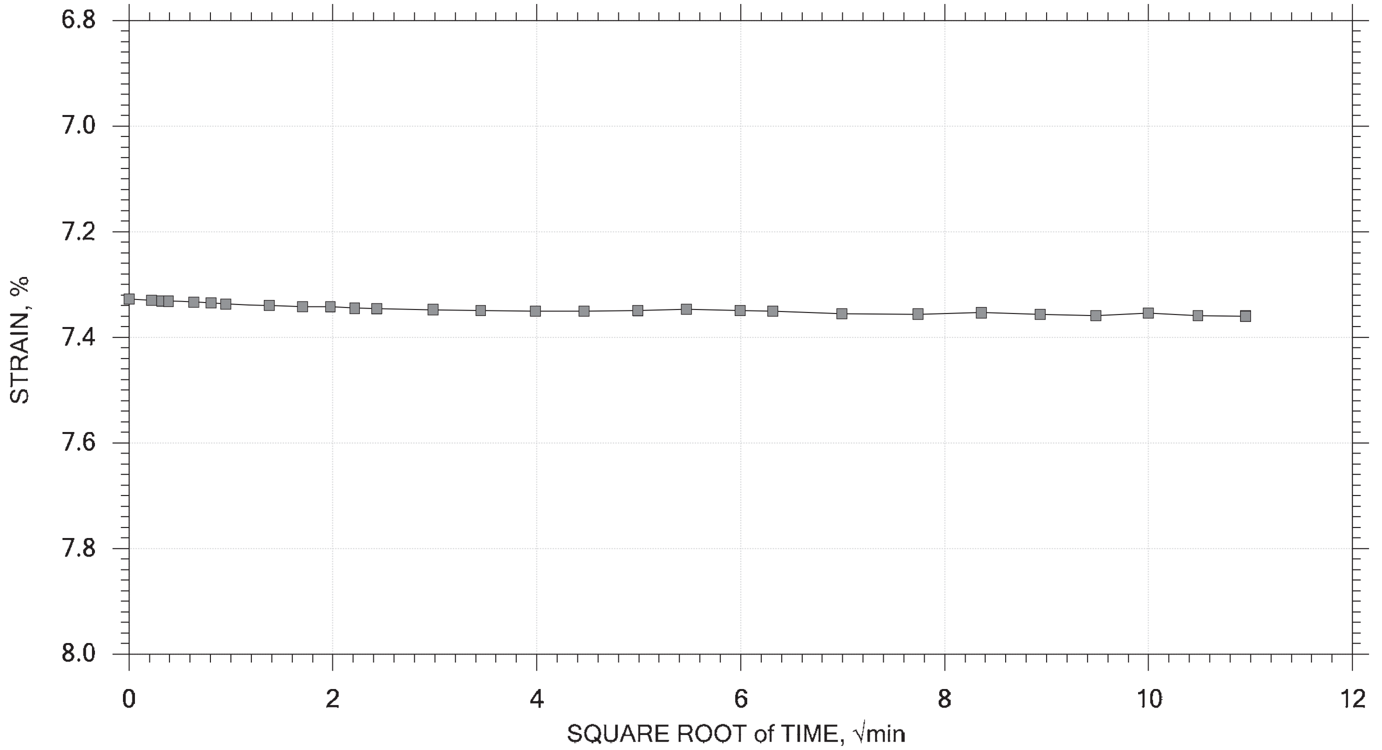
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 20

Stress: 1 tsf





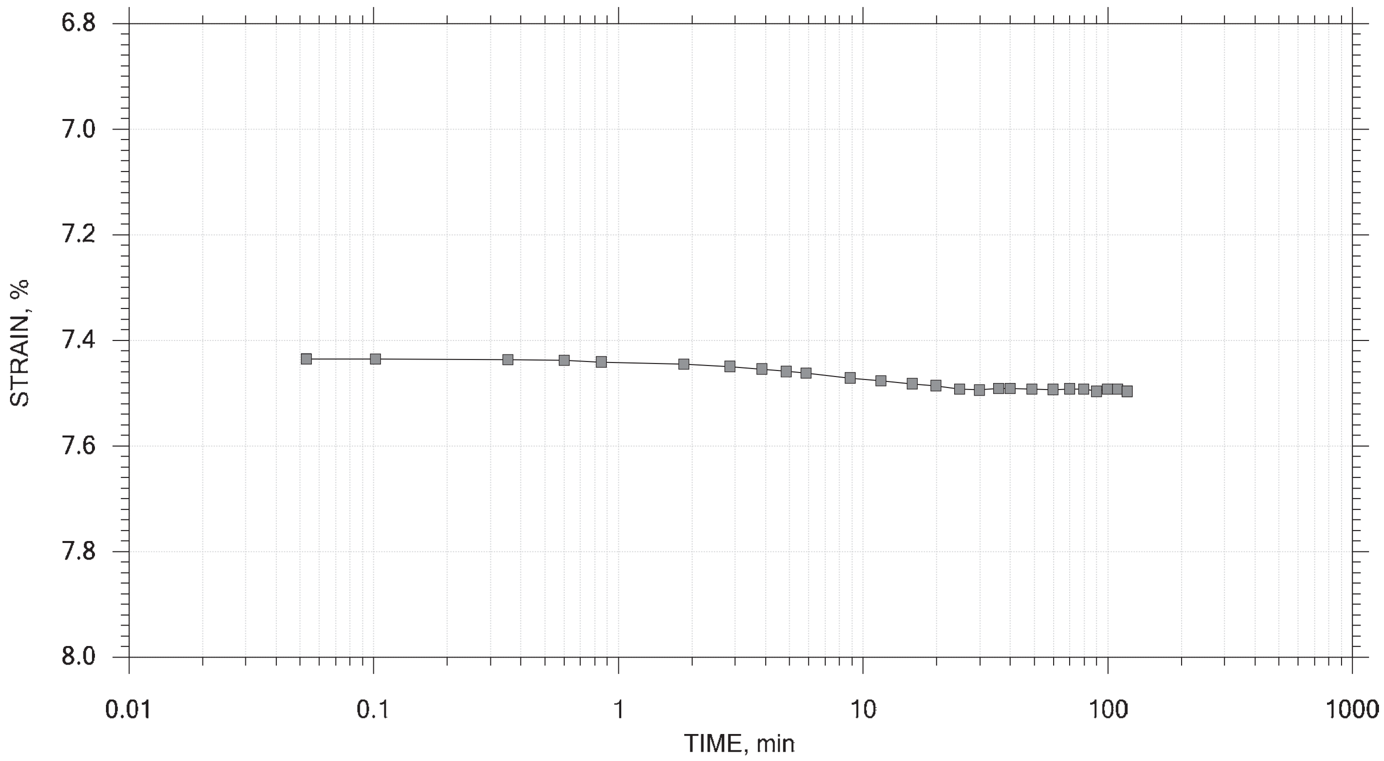
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

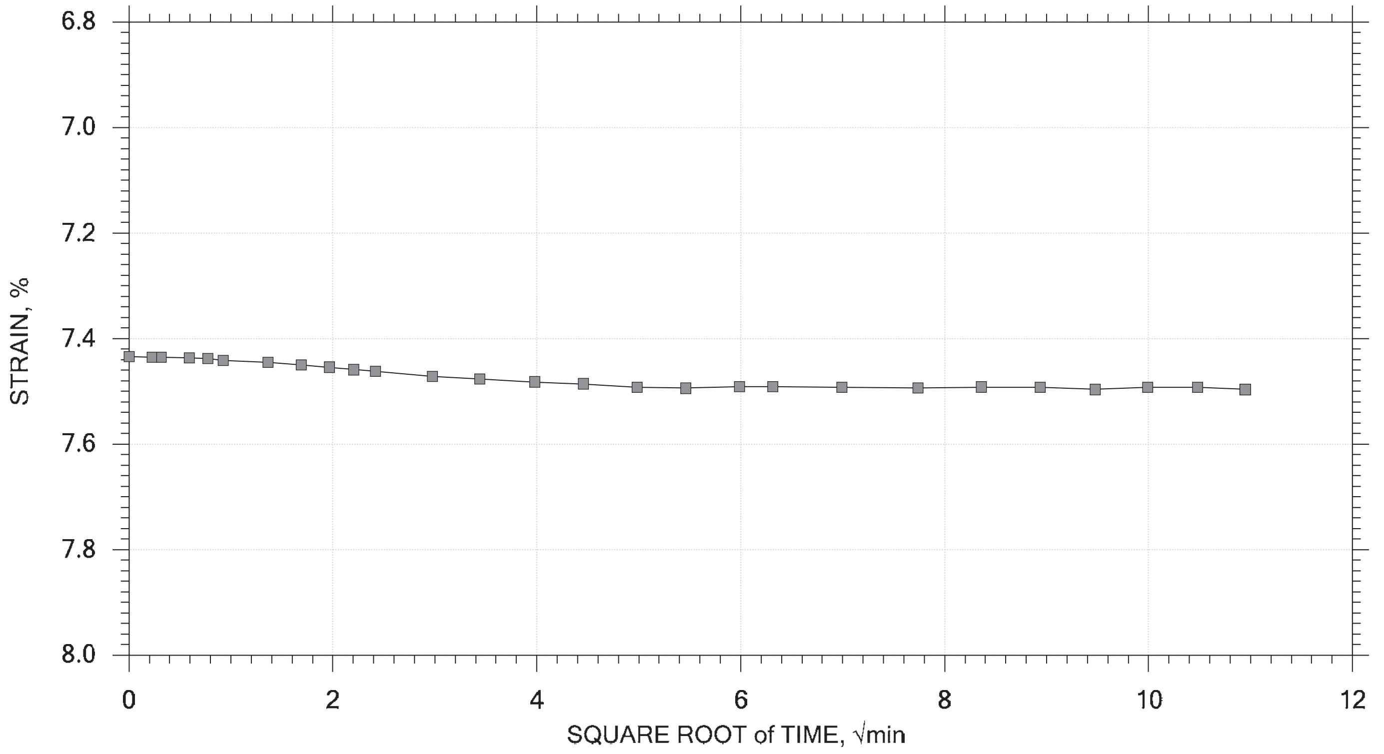
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 20

Stress: 2 tsf





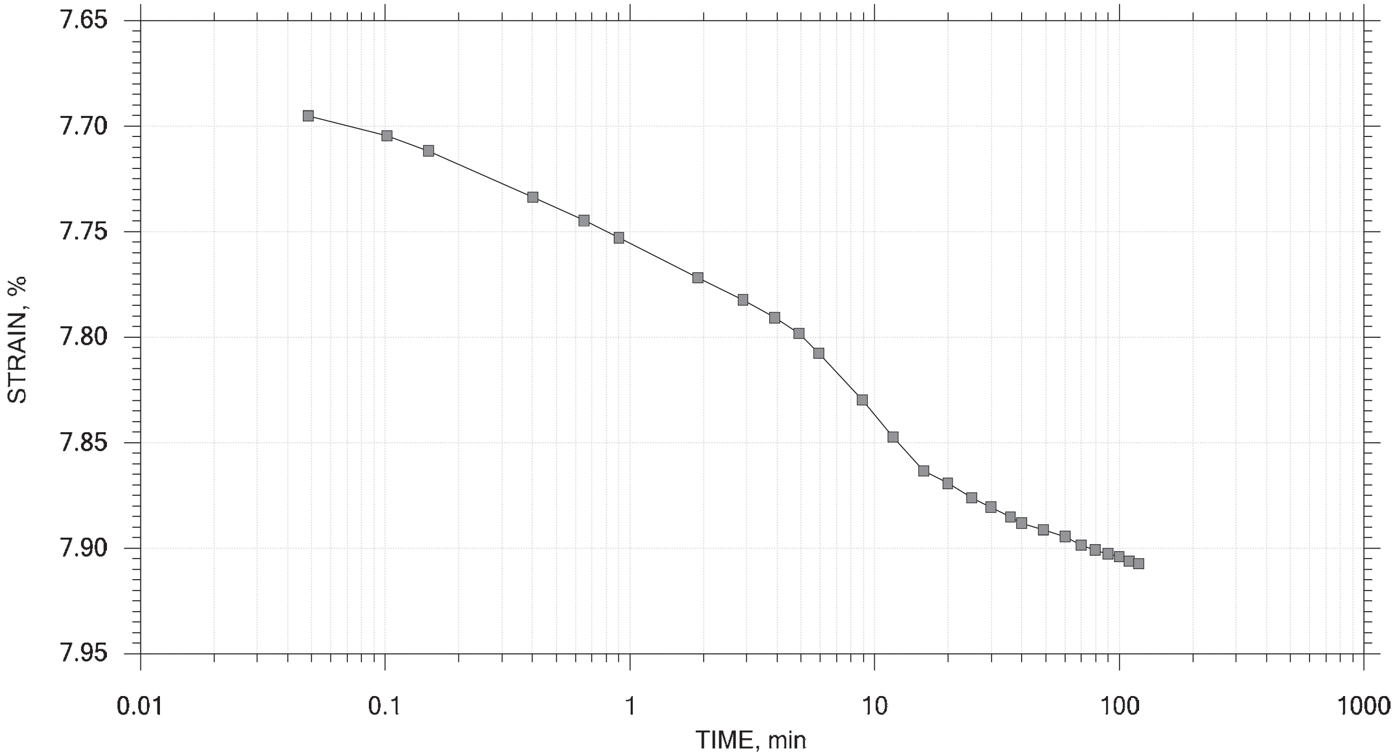
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-104	Tested By: jm	Checked By: mcm
	Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray sandy silt (ASH)		
	Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

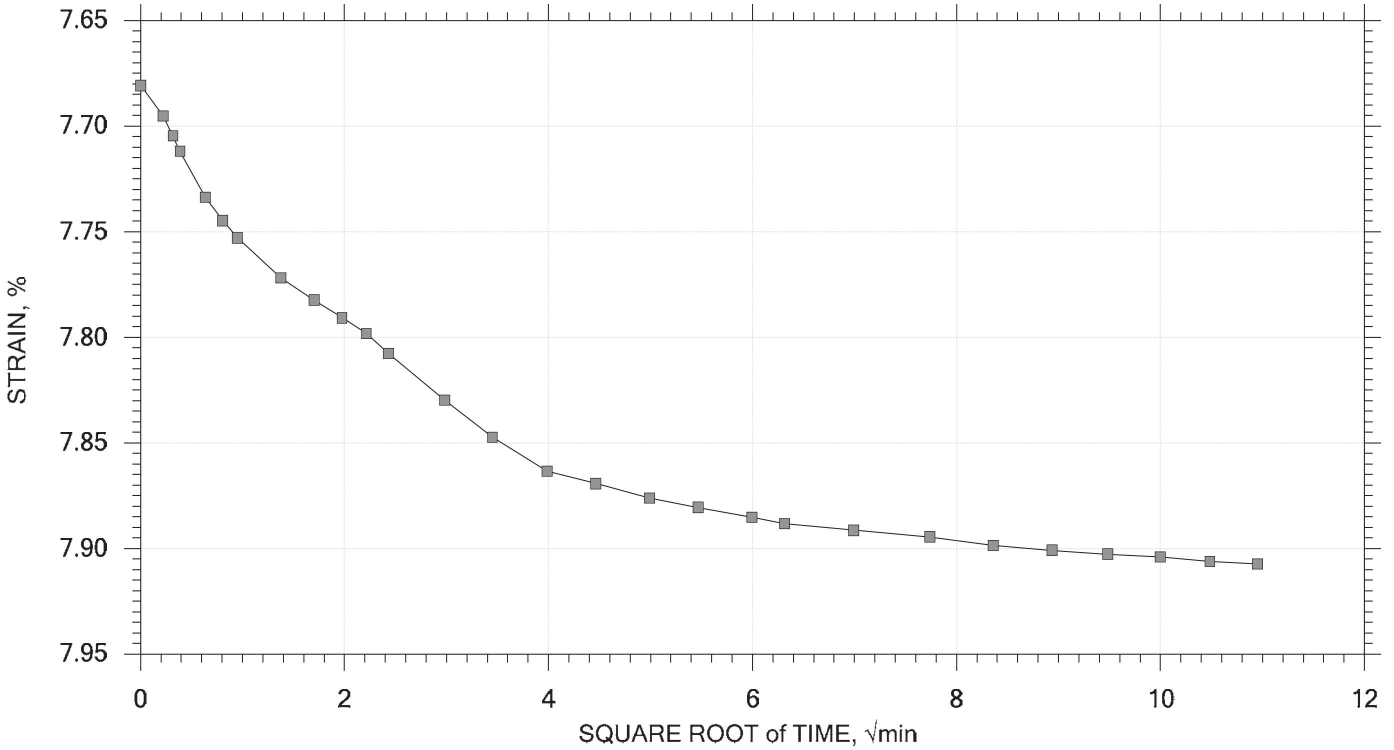
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 20

Stress: 4 tsf





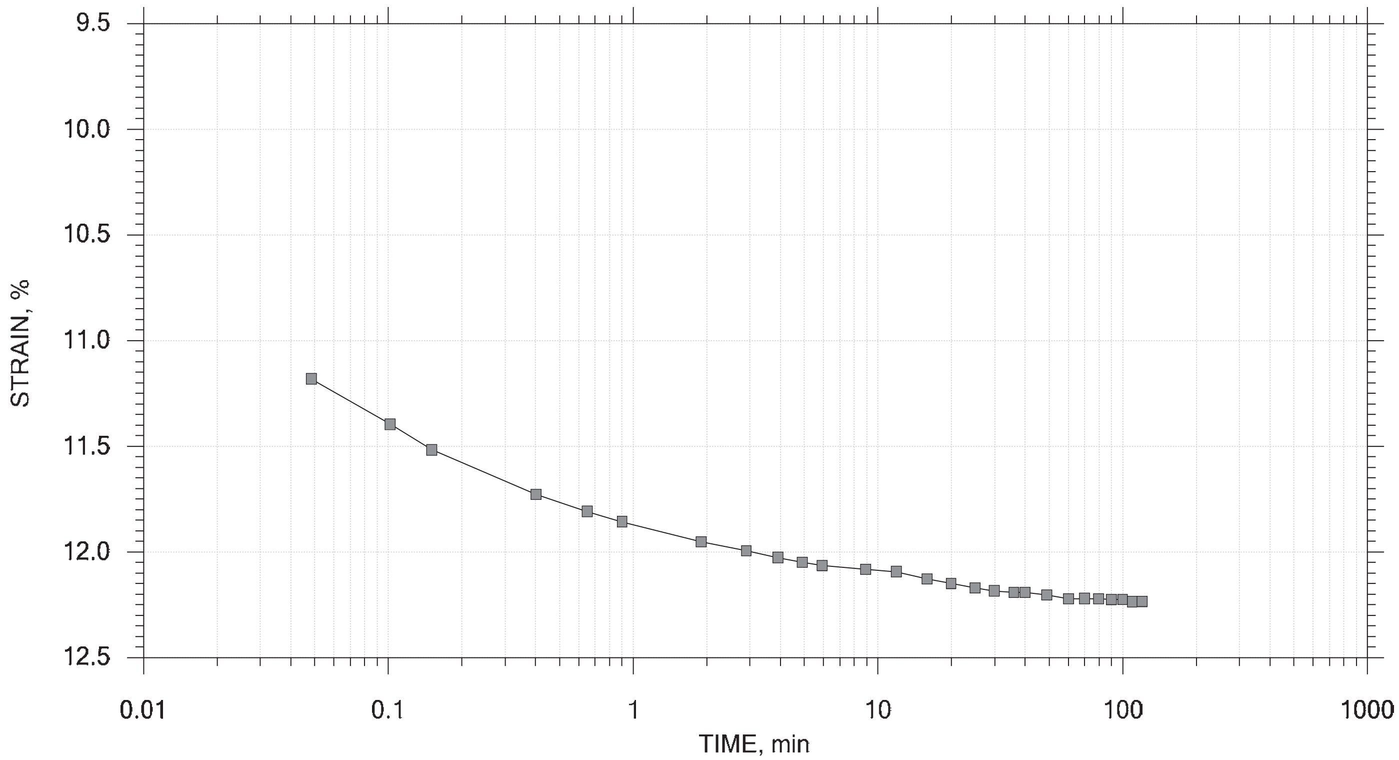
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-104	Tested By: jm	Checked By: mcm
	Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray sandy silt (ASH)		
	Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

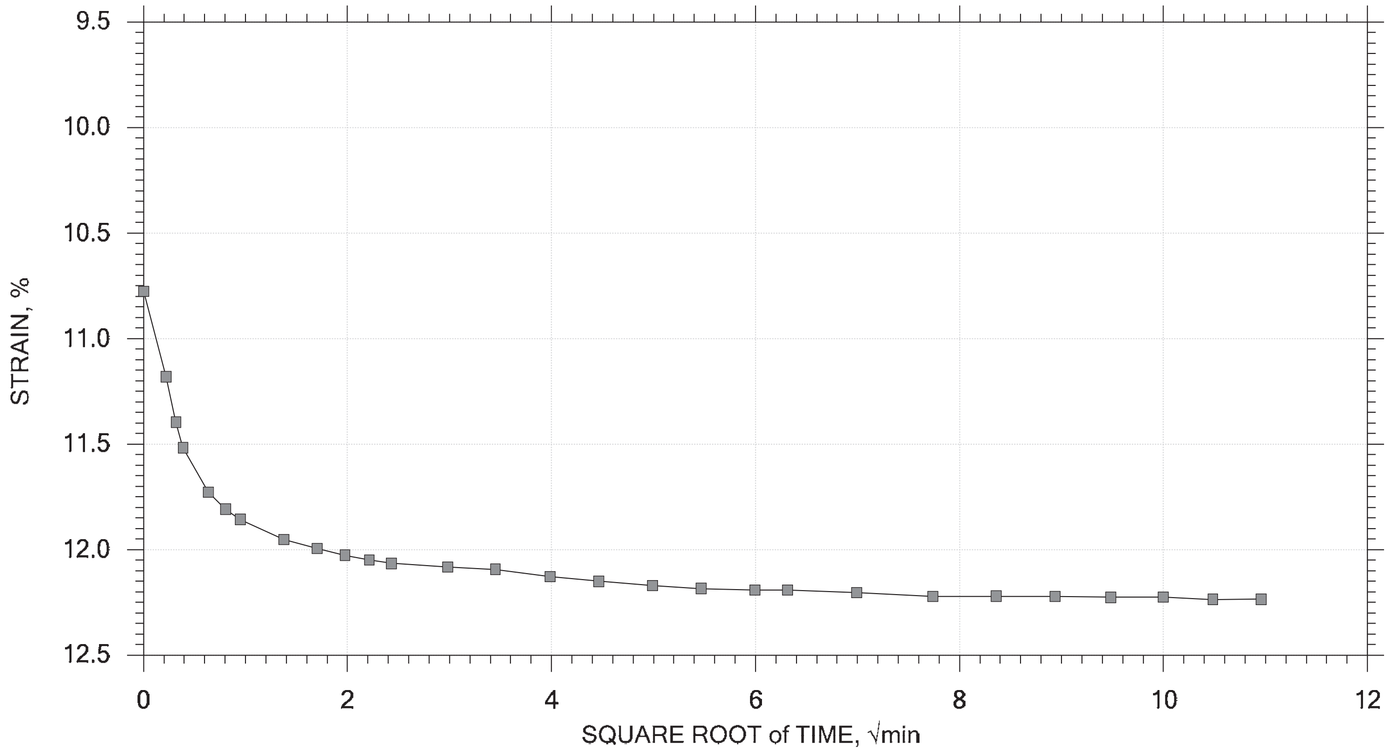
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 20

Stress: 8 tsf





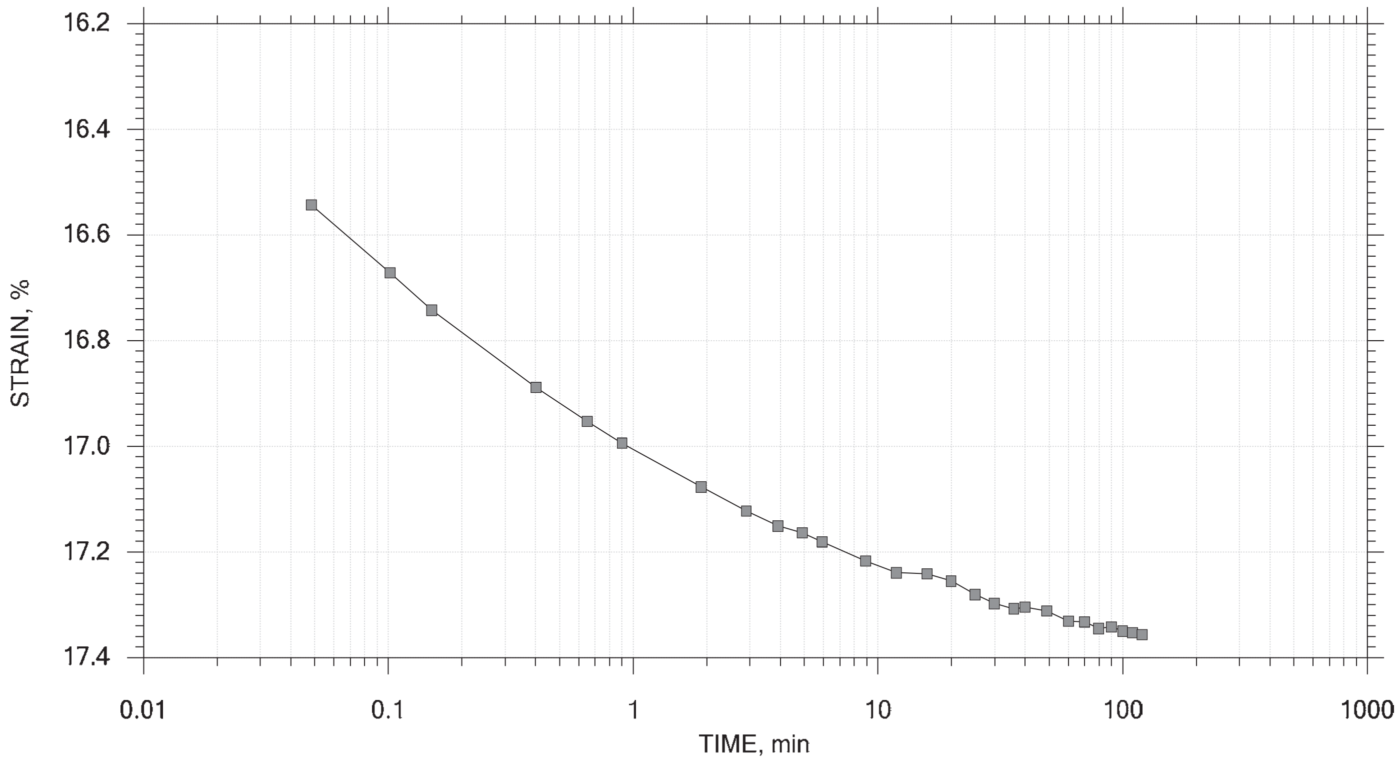
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

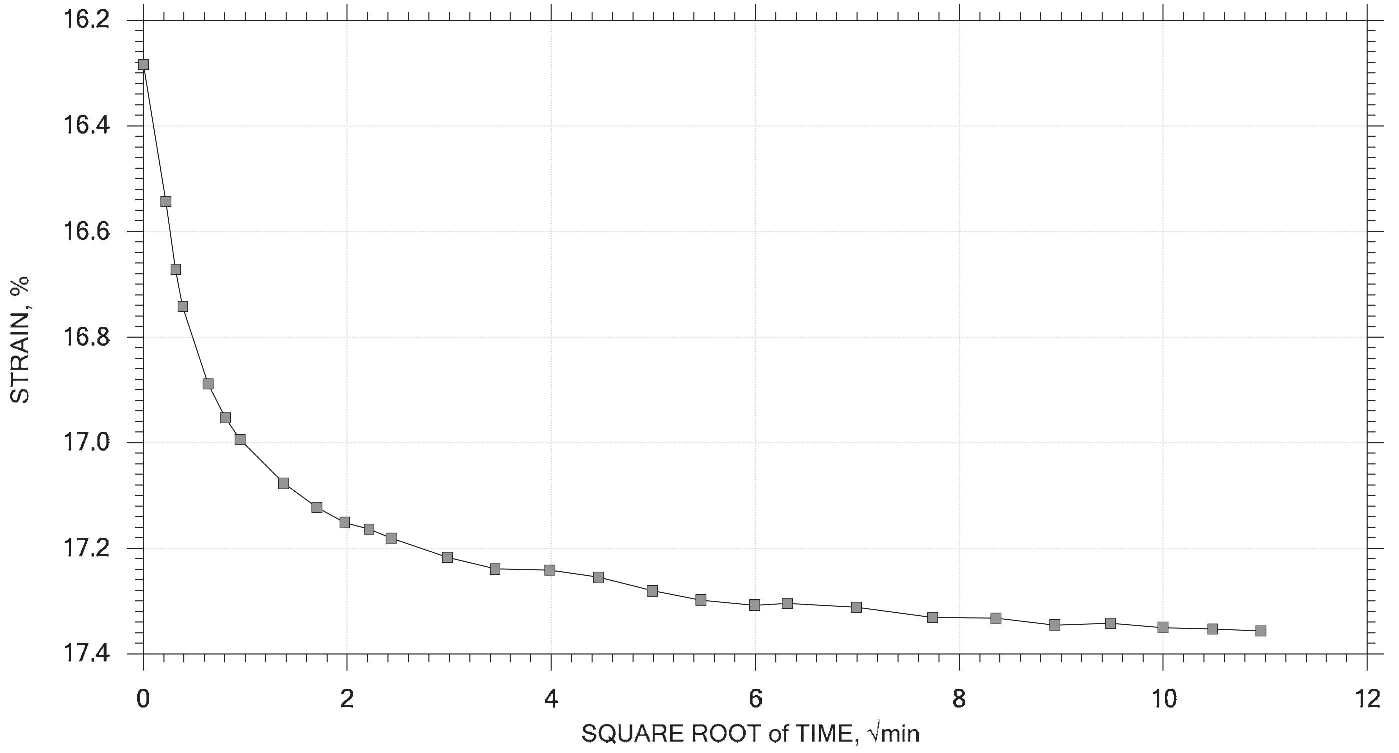
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 15 of 20

Stress: 16 tsf





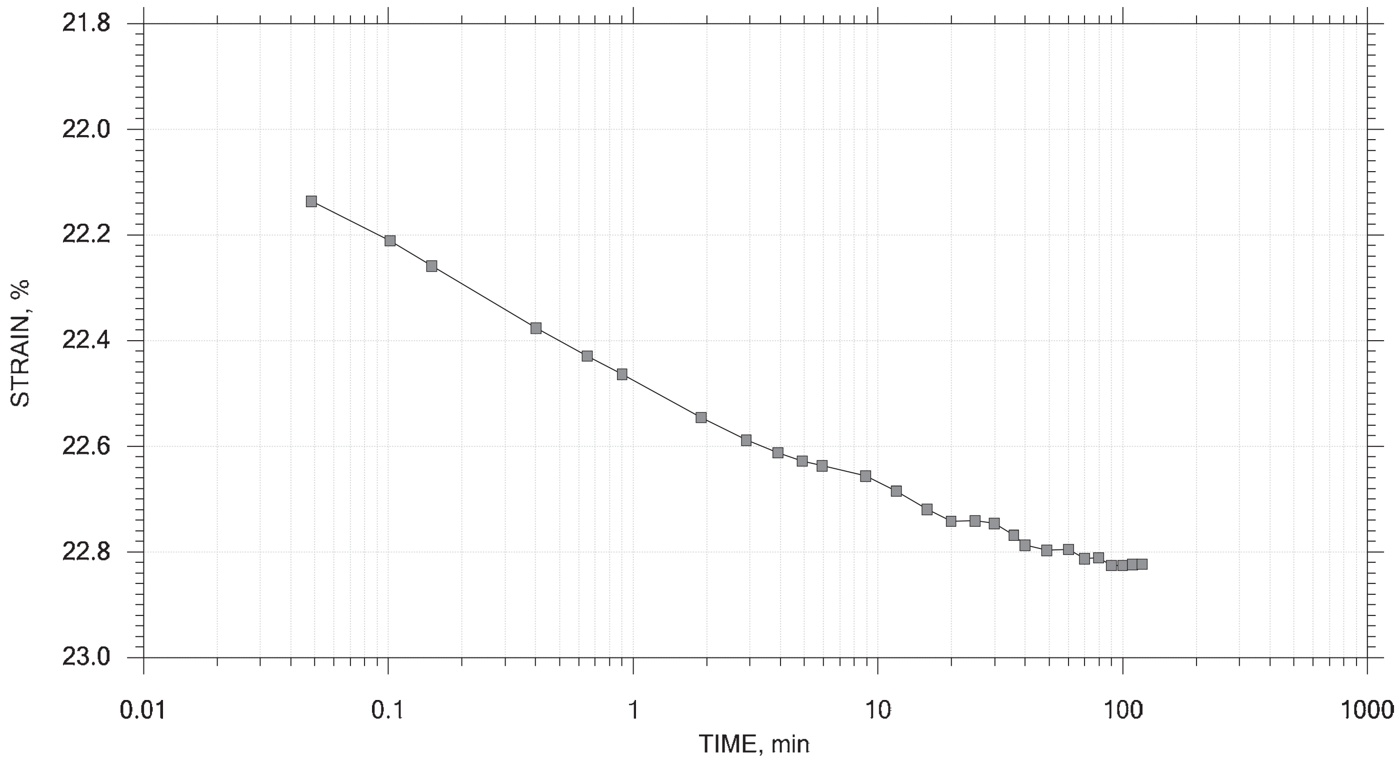
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

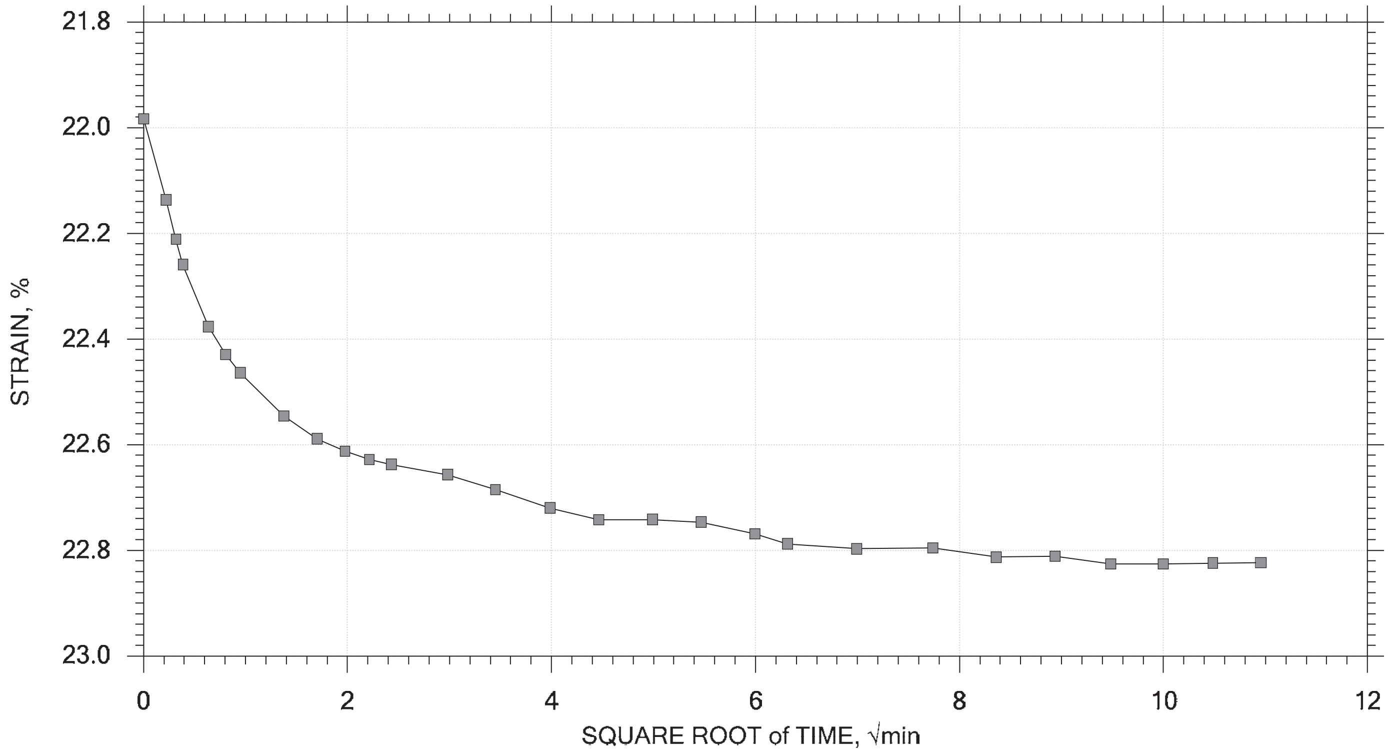
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 16 of 20

Stress: 32 tsf





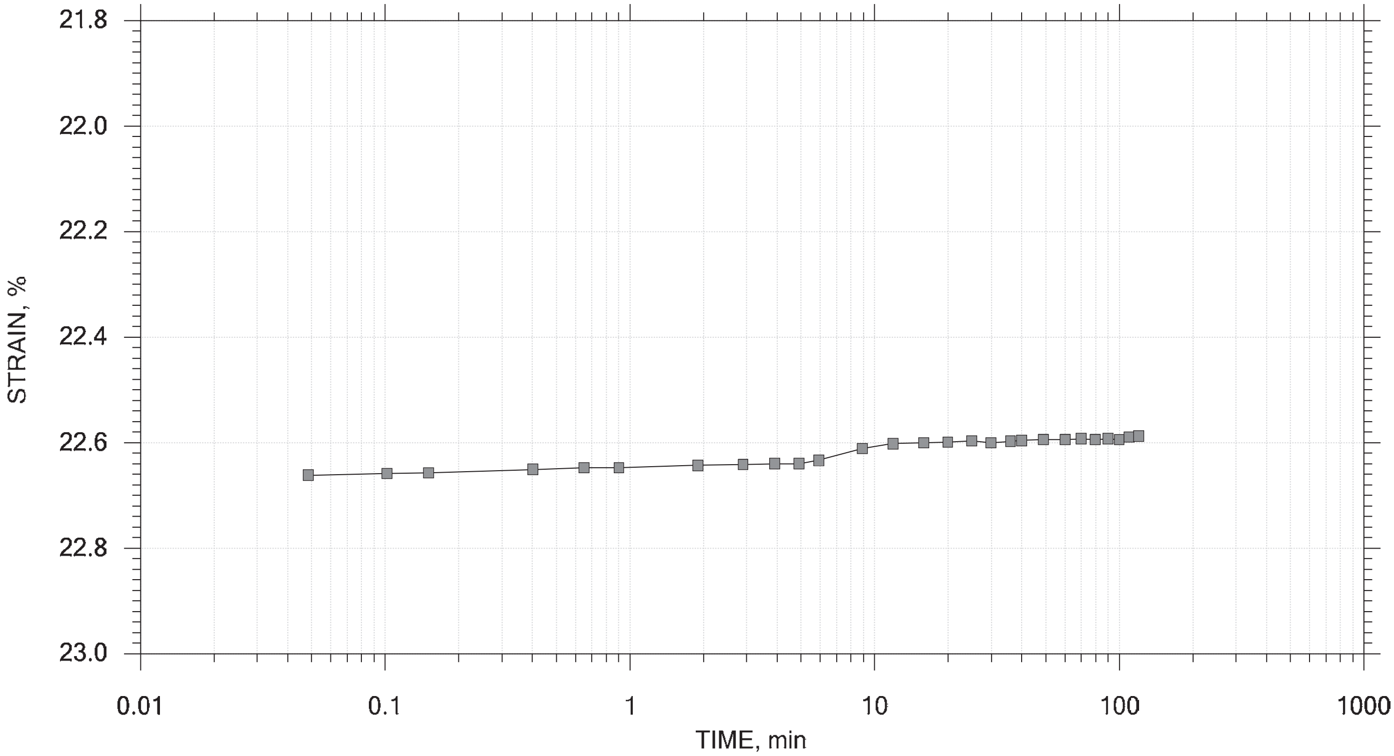
GeoTesting EXPRESS	Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
	Boring No.: B-104	Tested By: jm	Checked By: mcm
	Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
	Depth: 33-35 ft	Sample Type: intact	Elevation: ---
	Description: Moist, dark gray sandy silt (ASH)		
	Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

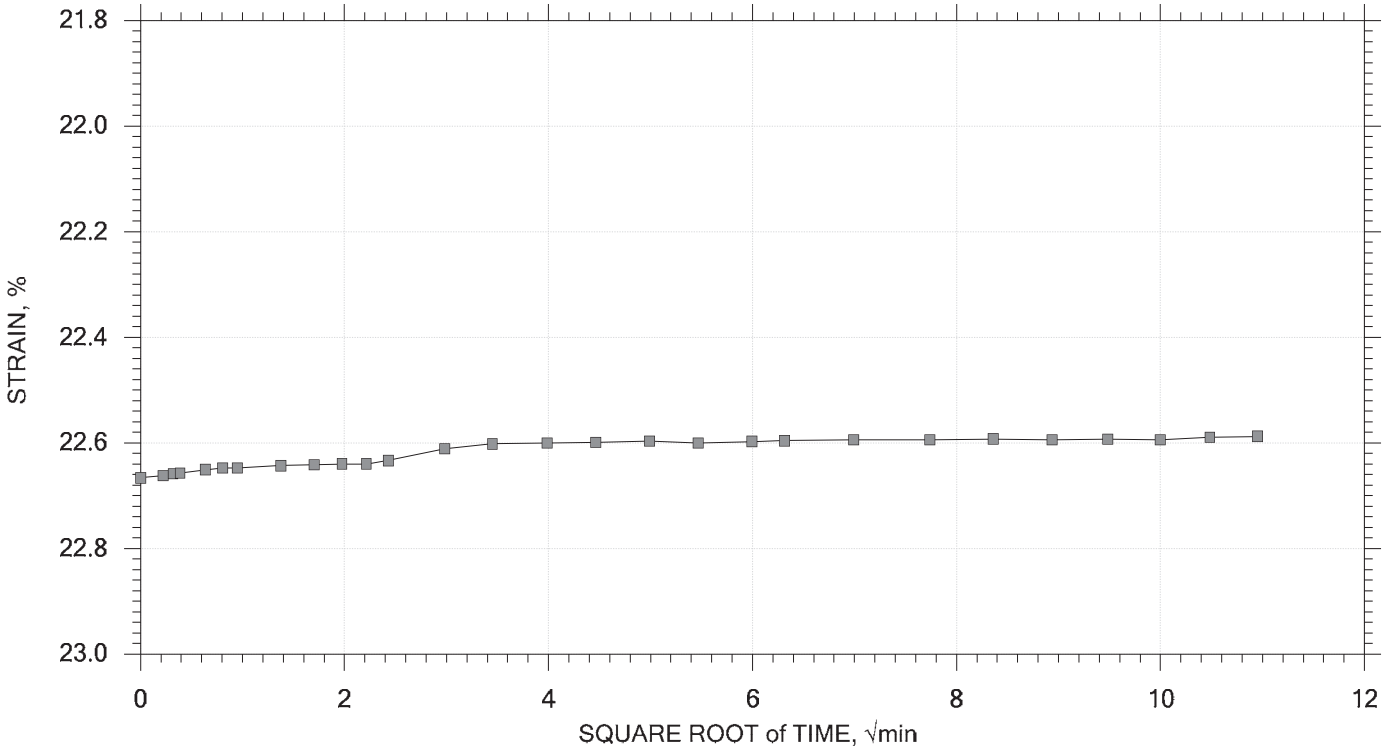
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 17 of 20

Stress: 8 tsf





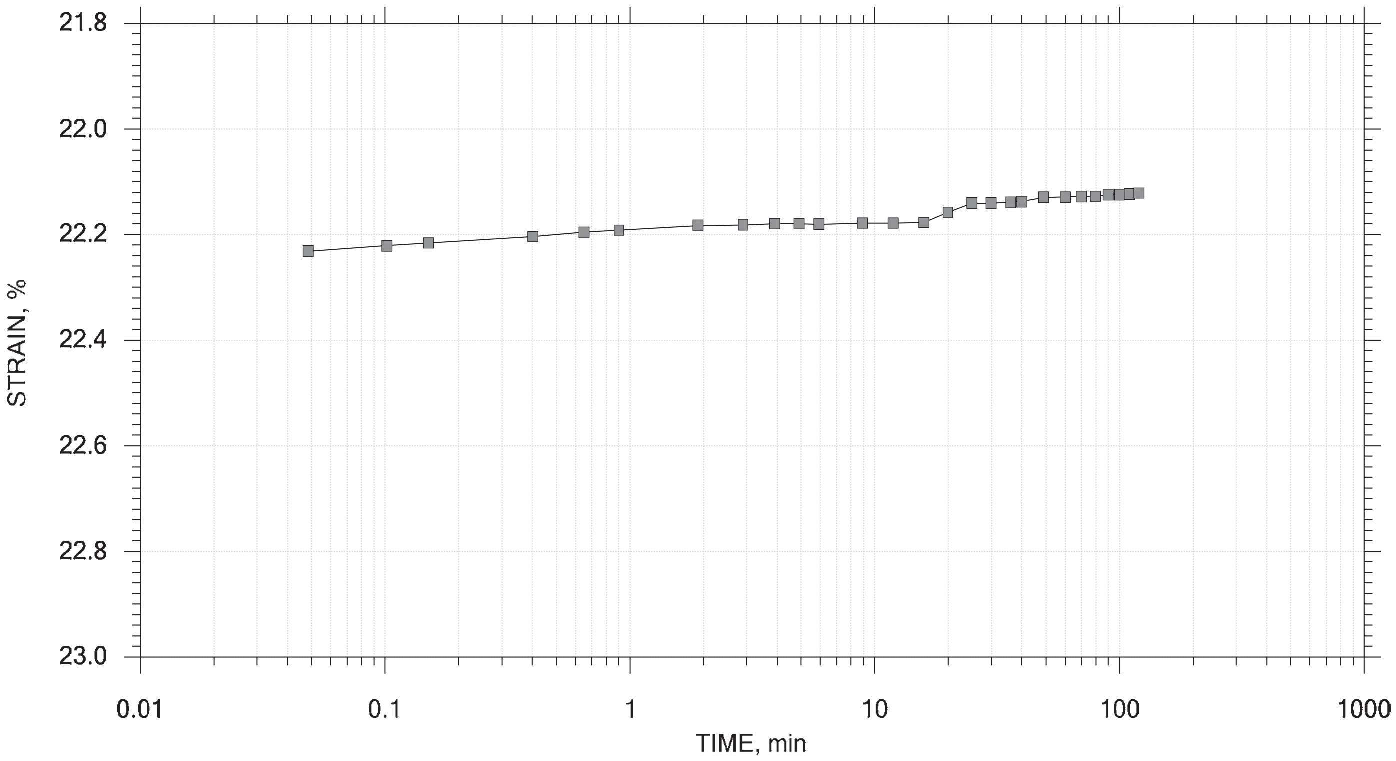
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

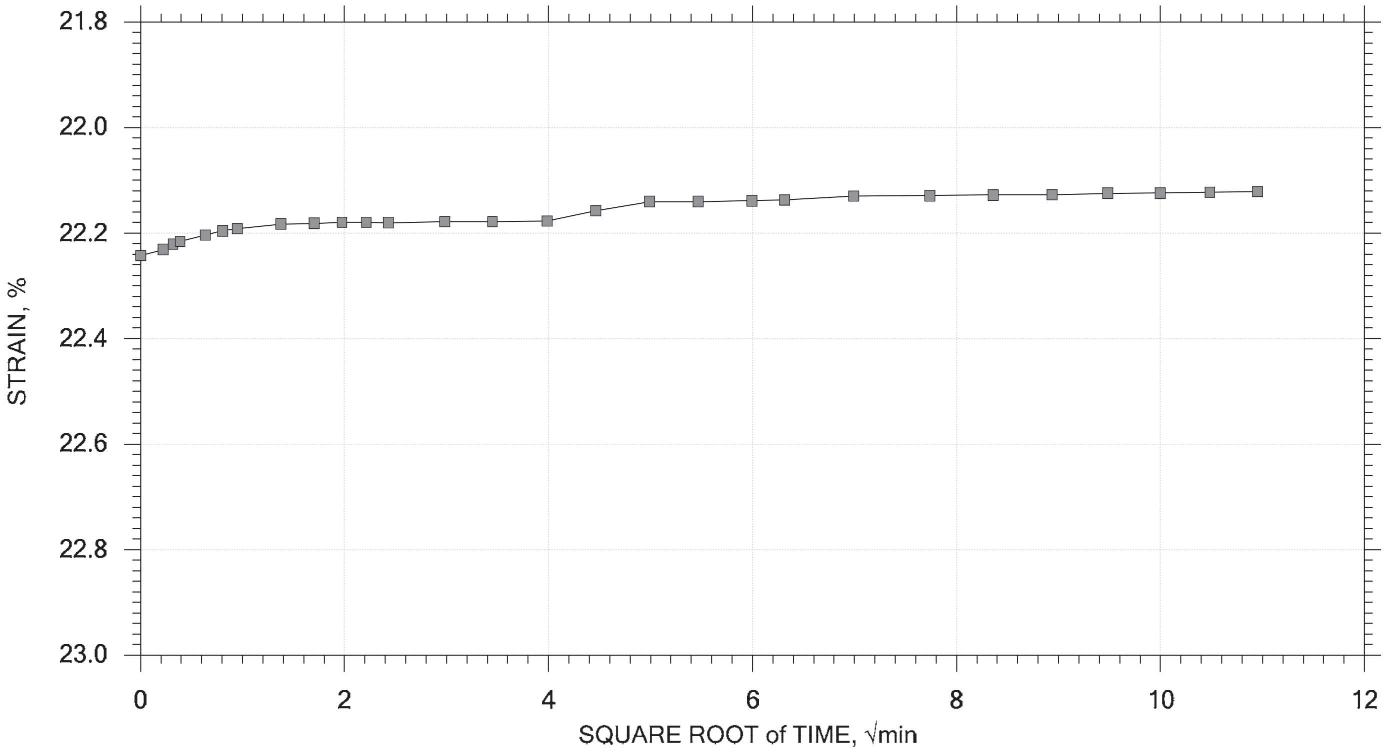
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 18 of 20

Stress: 2 tsf





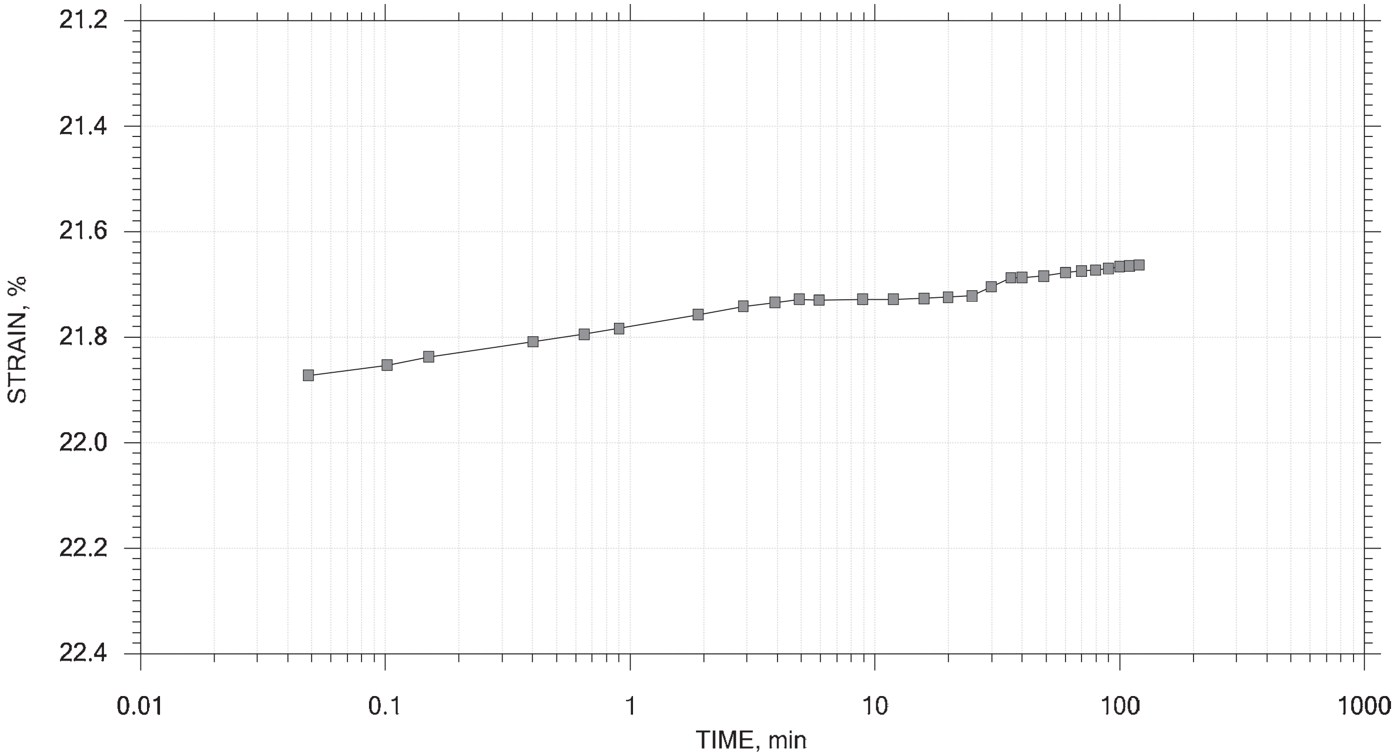
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

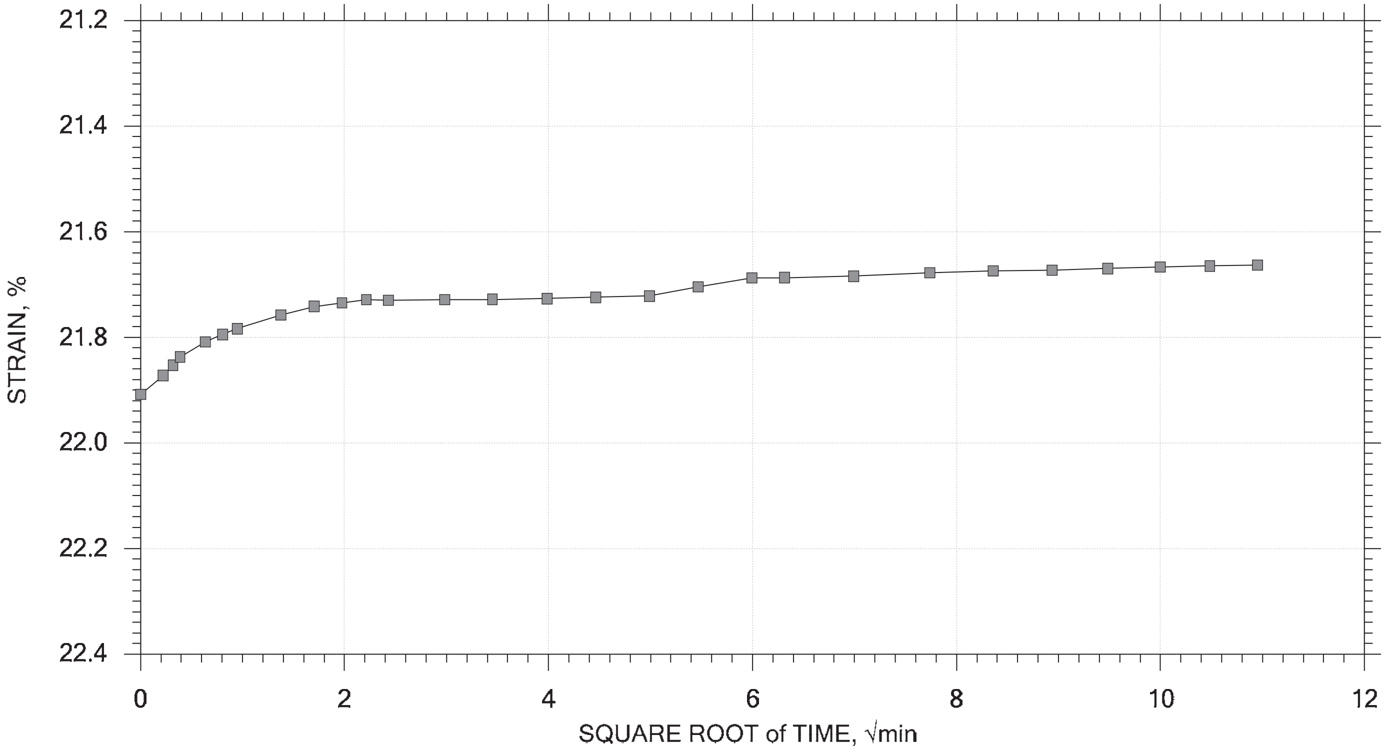
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 19 of 20

Stress: 0.5 tsf





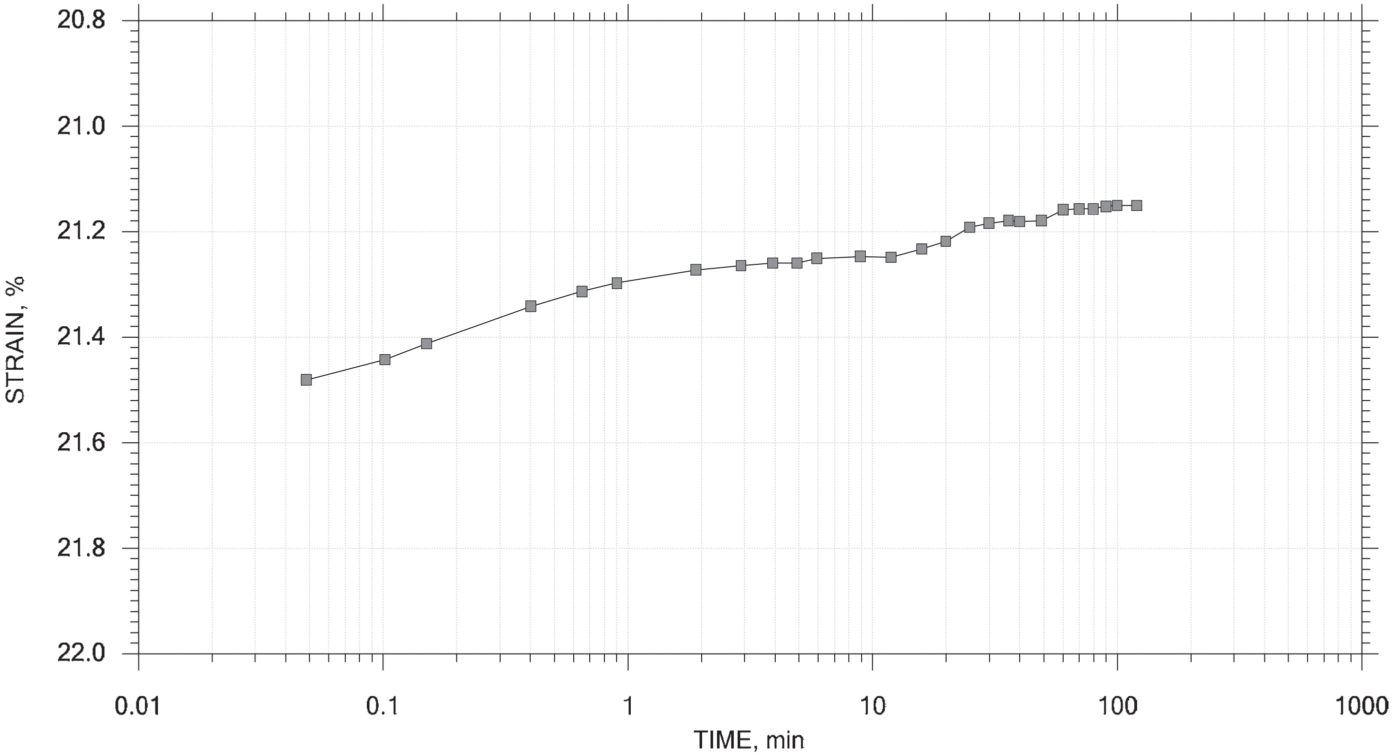
Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

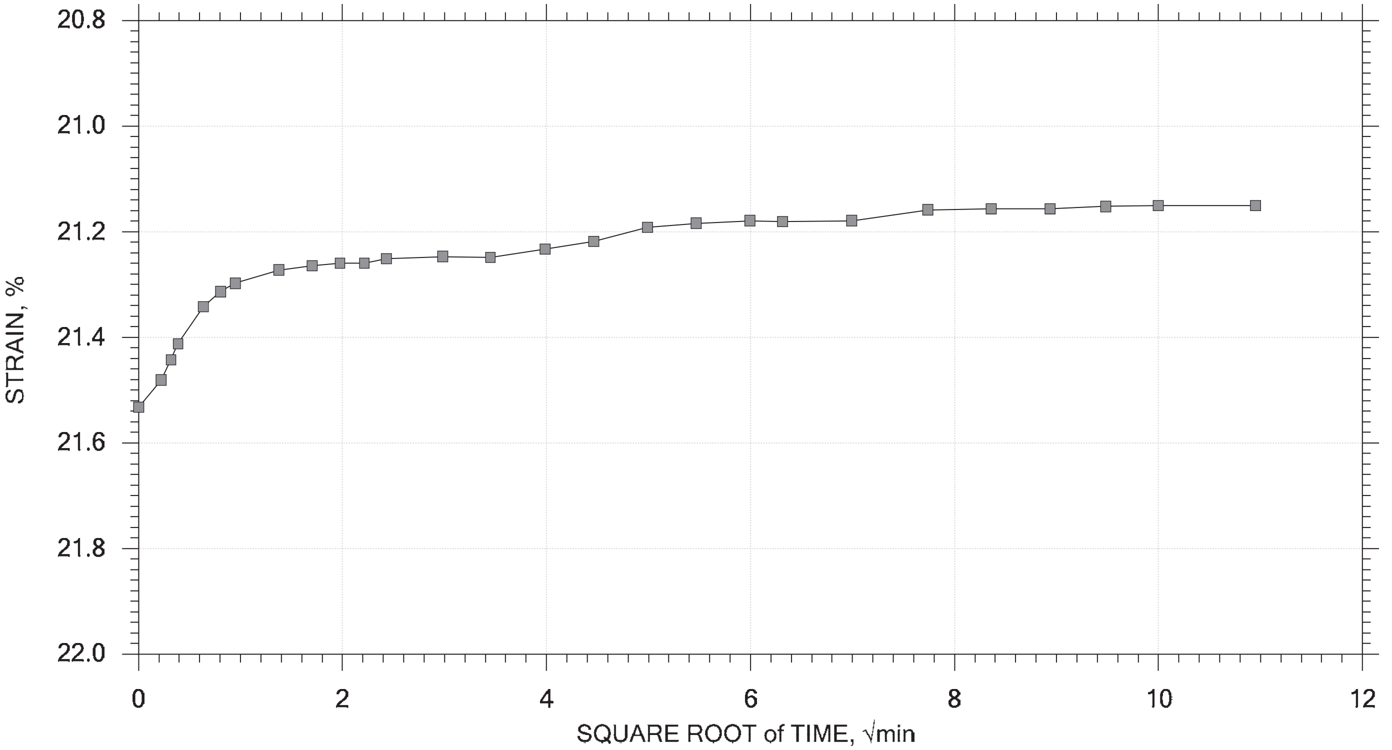
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 20 of 20

Stress: 0.125 tsf





Project: SCS Plant Scherer Ph 2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-104	Tested By: jm	Checked By: mcm
Sample No.: S-10 (TUBE)	Test Date: 5/2/16	Test No.: IP-5
Depth: 33-35 ft	Sample Type: intact	Elevation: ---
Description: Moist, dark gray sandy silt (ASH)		
Remarks: Swell Pressure = 0.0764 tsf. Moisture Content determined at 60° C for ash.		

GeoTesting
EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/20/16	Checked By:	mcm
Depth :	---	Test Id:	373308		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-105	SS- 1	49.5-51.5 ft	Moist, brown clay with sand	38.9
B-105	T- 1 (TUBE)	53-54 ft	Moist, red silt with sand	40.2
B-105	SS- 3	54-55.5 ft	Moist, red silt with sand	39.2
B-105	SS- 5	57-58.5 ft	Moist, red silt with sand	47.1
B-105	SS- 6	58.65-60 ft	Moist, red silt with sand	43.7
B-105	SS- 8	61.5-63 ft	Moist, red silt with sand	59.9
B-105	SS- 10	64.5-66 ft	Moist, reddish brown silt with sand	54.1
B-105	SS- 12	67.5-69 ft	Moist, dark yellowish brown silty sand	53.8
B-105	SS- 13	73.5-75 ft	Moist, yellowish red sandy silt	68.5
B-105	SS- 14	78.5-80 ft	Moist, dark yellowish brown sandy silt	63.8

Notes: Temperature of Drying : 110º Celsius

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105	Sample Type:	tube	Tested By:	GA
Sample ID:	SS-15	Test Date:	04/20/16	Checked By:	mcm
Depth :	83.5-85 ft	Test Id:	373309		

Test Comment: ---
Visual Description: Moist, light yellowish brown sandy silt
Sample Comment: ---

Moisture Content of Soil and Rock - ASTM D2216

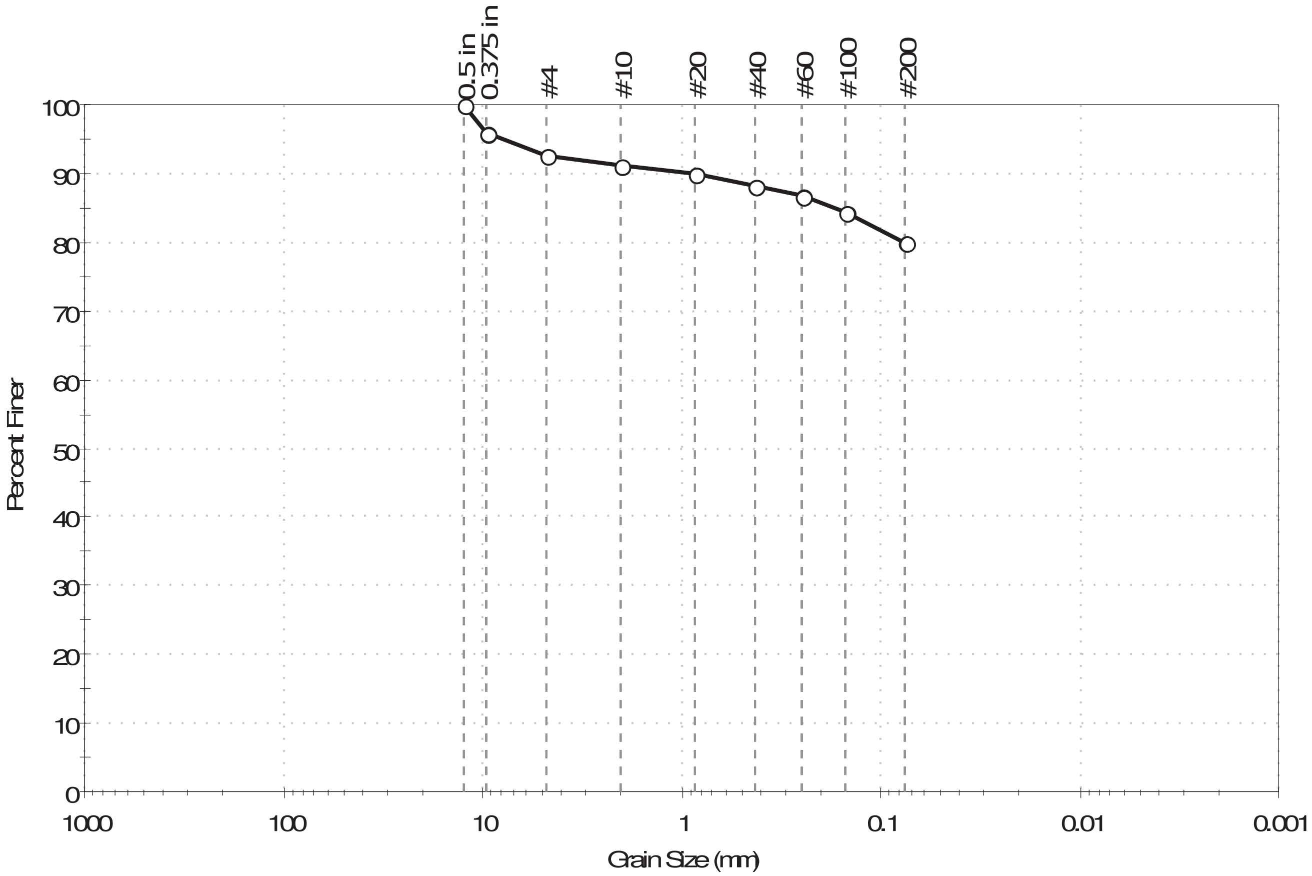
Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-105	SS- 15	83.5-85 ft	Moist, light yellowish brown sandy silt	42.8

Notes: Temperature of Drying : 110º Celsius

GeoTesting
EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-105
Sample Type: tube
Tested By: GA
Sample ID: T-1 (TUBE)
Test Date: 04/21/16
Checked By: mcm
Depth : 53-54 ft
Test Id: 373313
Test Comment: ---
Visual Description: Moist, red silt with sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	7.2	12.8	80.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	96		
#4	4.75	93		
#10	2.00	91		
#20	0.85	90		
#40	0.42	88		
#60	0.25	87		
#100	0.15	84		
#200	0.075	80		

Coefficients

D_{85} =0.1727 mm	D_{30} =N/A
D_{60} =N/A	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	Elastic silt with sand (MH)
AASHTO	Clayey Soils (A-7-5 (49))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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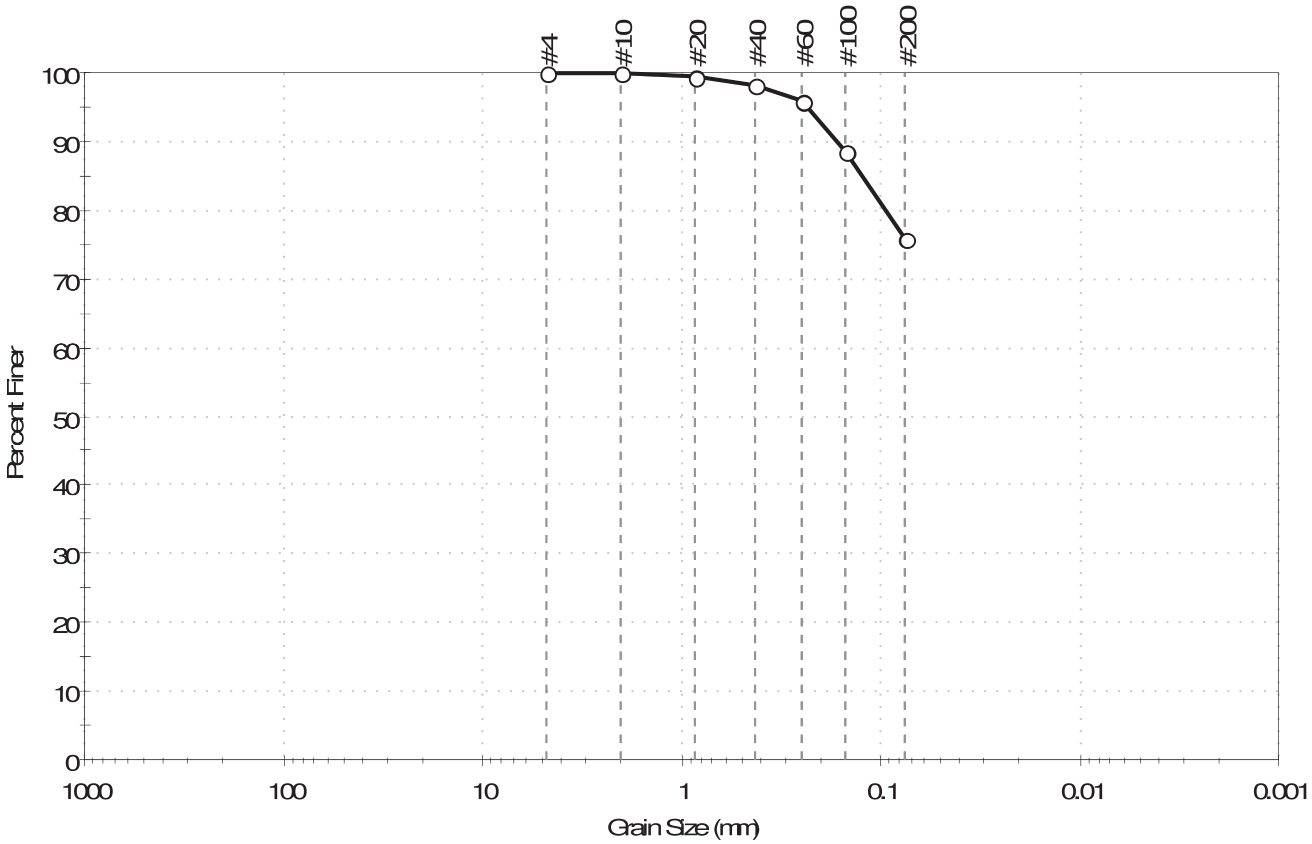
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-8	Test Date:	04/20/16	Checked By:	mcm
Depth :	61.5-63 ft	Test Id:	373314		

Test Comment: ---
Visual Description: Moist, red silt with sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	24.2	75.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	98		
#60	0.25	96		
#100	0.15	88		
#200	0.075	76		

Coefficients

D_{85} =0.1247 mm	D_{30} =N/A
D_{60} =N/A	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	Elastic silt with sand (MH)
AASHTO	Clayey Soils (A-7-5 (22))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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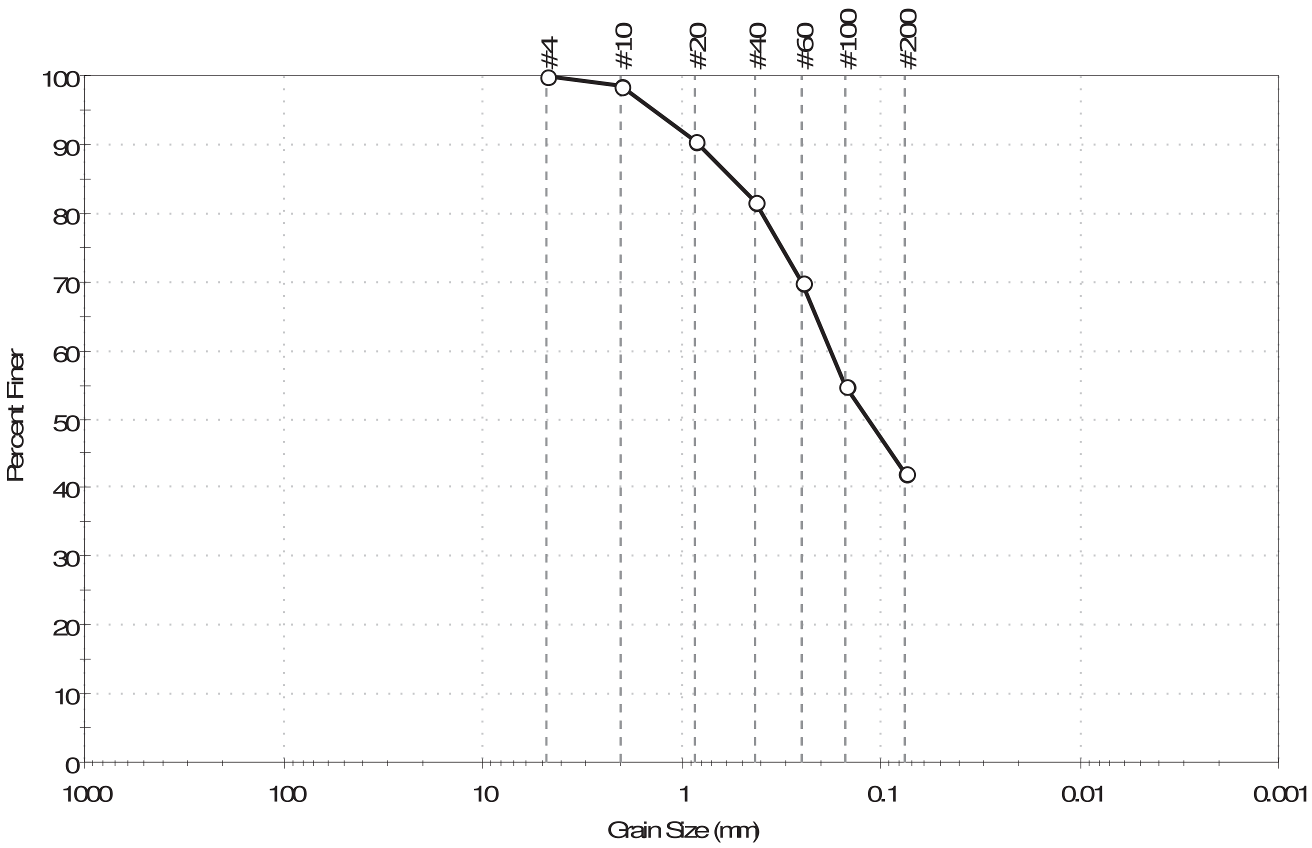
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-12	Test Date:	04/20/16	Checked By:	mcm
Depth :	67.5-69 ft	Test Id:	373315		

Test Comment: ---
Visual Description: Moist, dark yellowish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	57.8	42.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	91		
#40	0.42	82		
#60	0.25	70		
#100	0.15	55		
#200	0.075	42		

Coefficients

D_{85} =0.5501 mm	D_{30} =N/A
D_{60} =0.1783 mm	D_{15} =N/A
D_{50} =0.1147 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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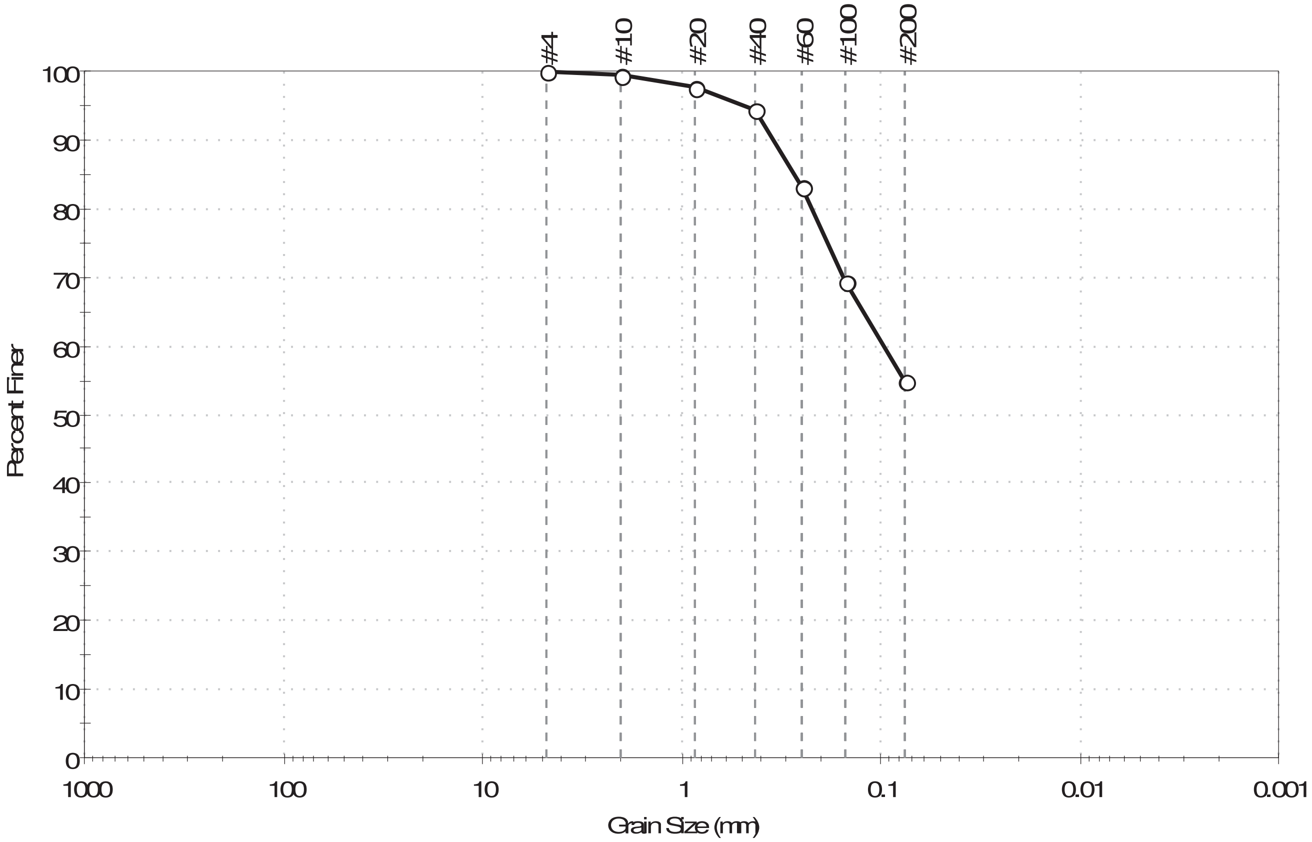
Client:	AECOM		
Project:	SCS Plant Scherer Ph.2		
Location:	Monroe County, GA	Project No:	GTX-304548
Boring ID:	B-105	Sample Type: bag	Tested By: GA
Sample ID:	SS-13	Test Date: 04/20/16	Checked By: mcm
Depth :	73.5-75 ft	Test Id: 373316	
Test Comment:	---		
Visual Description:	Moist, yellowish red sandy silt		
Sample Comment:	---		

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	45.1	54.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	98		
#40	0.42	94		
#60	0.25	83		
#100	0.15	69		
#200	0.075	55		

Coefficients

D_{85} =0.2710 mm — D_{30} =N/A

D_{60} =0.0960 mm — D_{15} =N/A

D_{50} =N/A — D_{10} =N/A

C_u =N/A — C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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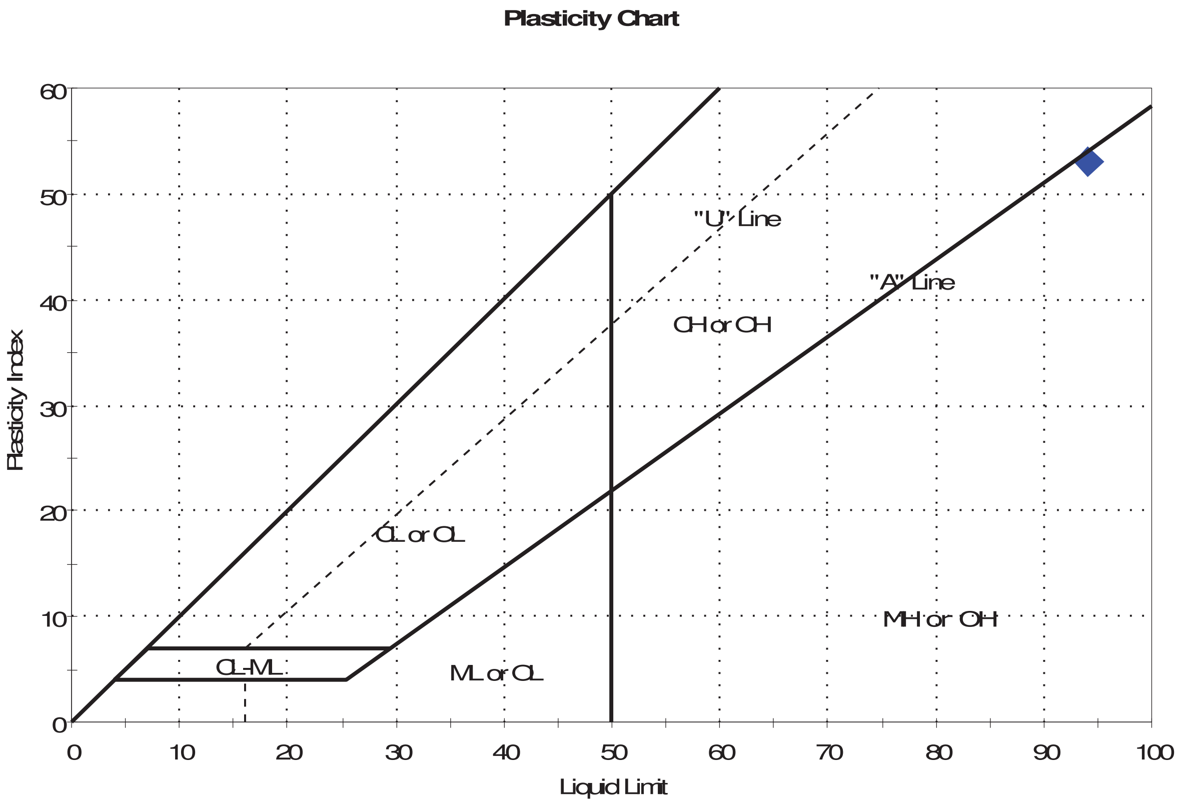
GeoTesting
EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/22/16	Checked By:	mcm
Depth :	53-54 ft	Test Id:	373310		

Test Comment: ---
Visual Description: Moist, red silt with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-1 (TUBE)	B-105	53-54 ft	40	94	41	53	0	Elastic silt with sand (MH)

Sample Prepared using the WET method

12% Retained on #40 Sieve

Dry Strength: HIGH

Dilatancy: NONE

Toughness: MEDIUM

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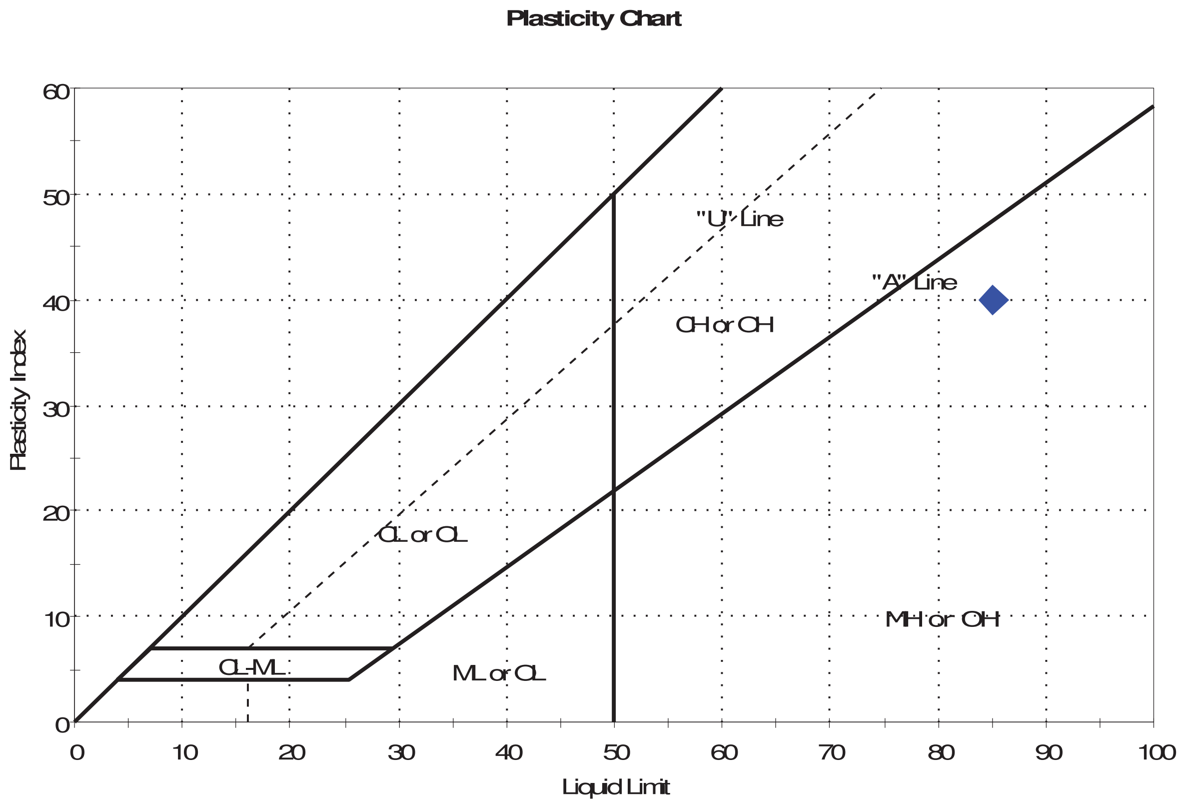
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-105
Sample ID: SS-3
Depth : 54-55.5 ft
Sample Type: bag
Test Date: 04/20/16
Test Id: 373476
Tested By: GA
Checked By: mcm

Test Comment: ---
Visual Description: Moist, red silt with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SS-3	B-105	54-55.5 ft	39	85	45	40	-0.1	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

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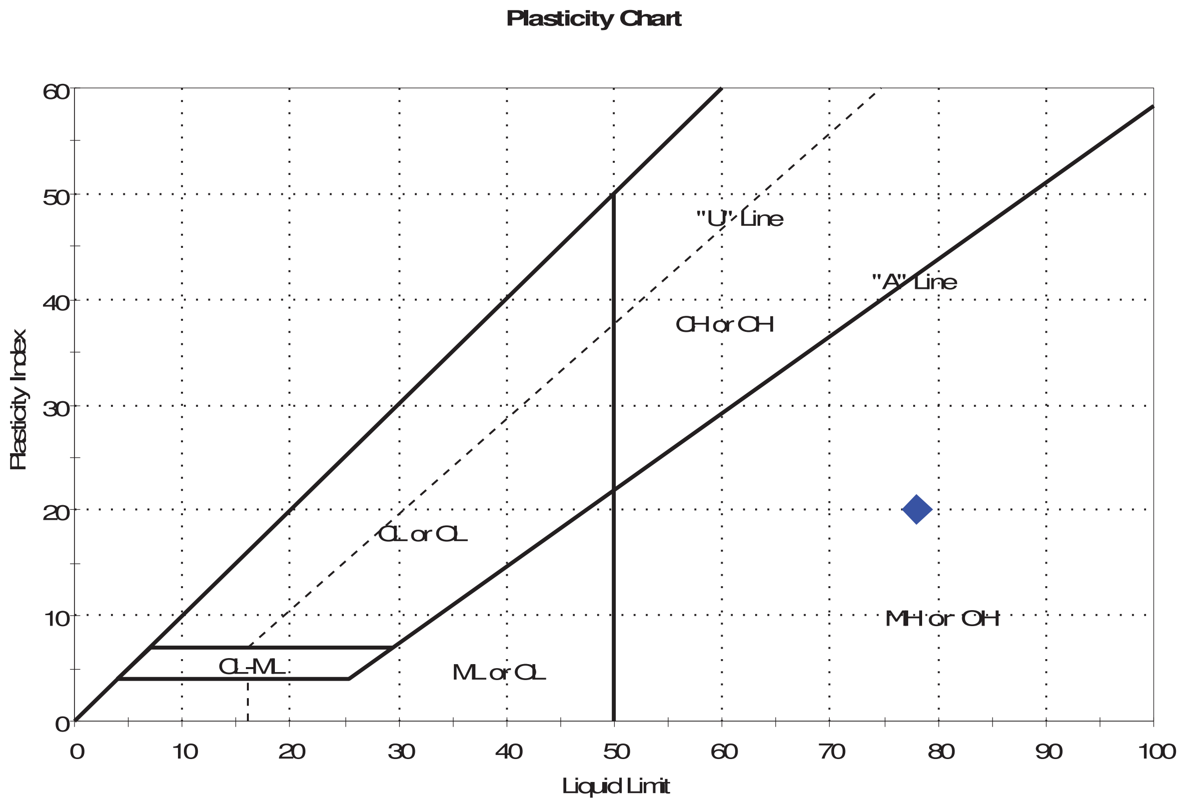
GeoTesting
EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-8	Test Date:	04/20/16	Checked By:	mcm
Depth :	61.5-63 ft	Test Id:	373311		

Test Comment: ---
Visual Description: Moist, red silt with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SS-8	B-105	61.5-63 ft	60	78	58	20	0.1	Elastic silt with sand (MH)

Sample Prepared using the WET method
2% Retained on #40 Sieve
Dry Strength: LOW
Dilatancy: NONE
Toughness: MEDIUM

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GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-14	Test Date:	04/20/16	Checked By:	mcm
Depth :	78.5-80 ft	Test Id:	373312		

Test Comment: ---
Visual Description: Moist, dark yellowish brown sandy silt
Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SS-14	B-105	78.5-80 ft	64	n/a	n/a	n/a	n/a	

Dry Strength: NONE
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/27/16	Checked By:	mcm
Depth :	53-54 ft	Test Id:	373318		

Test Comment: ---

Visual Description: Moist, red silt with sand

Sample Comment: ---

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	Sample ID	Depth	Visual Description	Bulk Density pcf	Moisture Content %	Dry Density pcf
B-105	T- 1 (TUBE)	53-54 ft	Moist, red silt with sand	102.6	46.26	70.18

* Sample Comments

(1): Method B-Cylinder,

Notes: Moisture Content determined by ASTM D2216.

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GeoTesting EXPRESS

Client:	AECOM		
Project Name:	SCS Plant Scherer Ph. 2		
Project Location:	Monroe Couny, GA		
GTX #:	304548		
Start Date:	4/22/2016	Tested By:	jcw
End Date:	4/27/2016	Checked By:	mcm
Boring #:	B-105		
Sample #:	T-1 (TUBE)		
Depth:	53-54 ft		
Visual Description:	Moist, red silt with sand		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084

Constant Volume

Sample Type:	Intact	Permeant Fluid:	De-aired Distilled water
Orientation:	Vertical	Cell #:	19/2

Sample Preparation: Extruded from tube, cut, trimmed and placed into permeameter at as-received density and moisture content. Trimmings moisture content = 49.1%.

Assumed Specific Gravity: 2.60

Parameter	Initial	Final
Height, in	2.87	2.79
Diameter, in	2.86	2.86
Area, in^2	6.42	6.42
Volume, in^3	18.4	17.9
Mass, g	508	497
Bulk Density, pcf	105	105
Moisture Content, %	49.6	46.3
Dry Density, pcf	70.0	72.0
Degree of Saturation, %	98	96

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	92.02	Increased Cell Pressure, psi:	97.07	Cell Pressure Increment, psi:	5.05
Sample Pressure, psi:	86.98	Corresponding Sample Pressure, psi:	91.46	Sample Pressure Increment, psi:	4.48
				B Coefficient:	0.89

*B value did not increase with increase in pressure. Final degree of saturation >95%.

FLOW DATA

Date	Trial #	Pressure, psi		Manometer Readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	Z_1	Z_2	Z_1-Z_2						
4/25	1	92.0	87.0	9.0	8.7	0.3	32	16.0	4.5E-07	20.1	0.998	4.5E-07
4/25	2	92.0	87.0	9.0	8.7	0.3	34	16.0	4.3E-07	20.1	0.998	4.2E-07
4/25	3	92.0	87.0	9.0	8.7	0.3	37	16.0	3.9E-07	20.1	0.998	3.9E-07
4/25	4	92.0	87.0	9.0	8.7	0.3	39	16.0	3.7E-07	20.1	0.998	3.7E-07

PERMEABILITY AT 20° C: 4.1×10^{-7} cm/sec (@ 5 psi effective stress)

GeoTesting
EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/26/16	Checked By:	mcm
Depth :	---	Test Id:	373752		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-105A	T- 1	57-59 ft	Moist, reddish yellow clay	30.9
B-105A	T- 3	63-65 ft	Moist, reddish yellow silt	61.6
B-105A	T- 4	73-75 ft	Moist, yellowish brown silty sand	62.1
B-105A	SPT- 1	83-85 ft	Moist, reddish yellow sandy silt	53.7

Notes: Temperature of Drying : 110º Celsius

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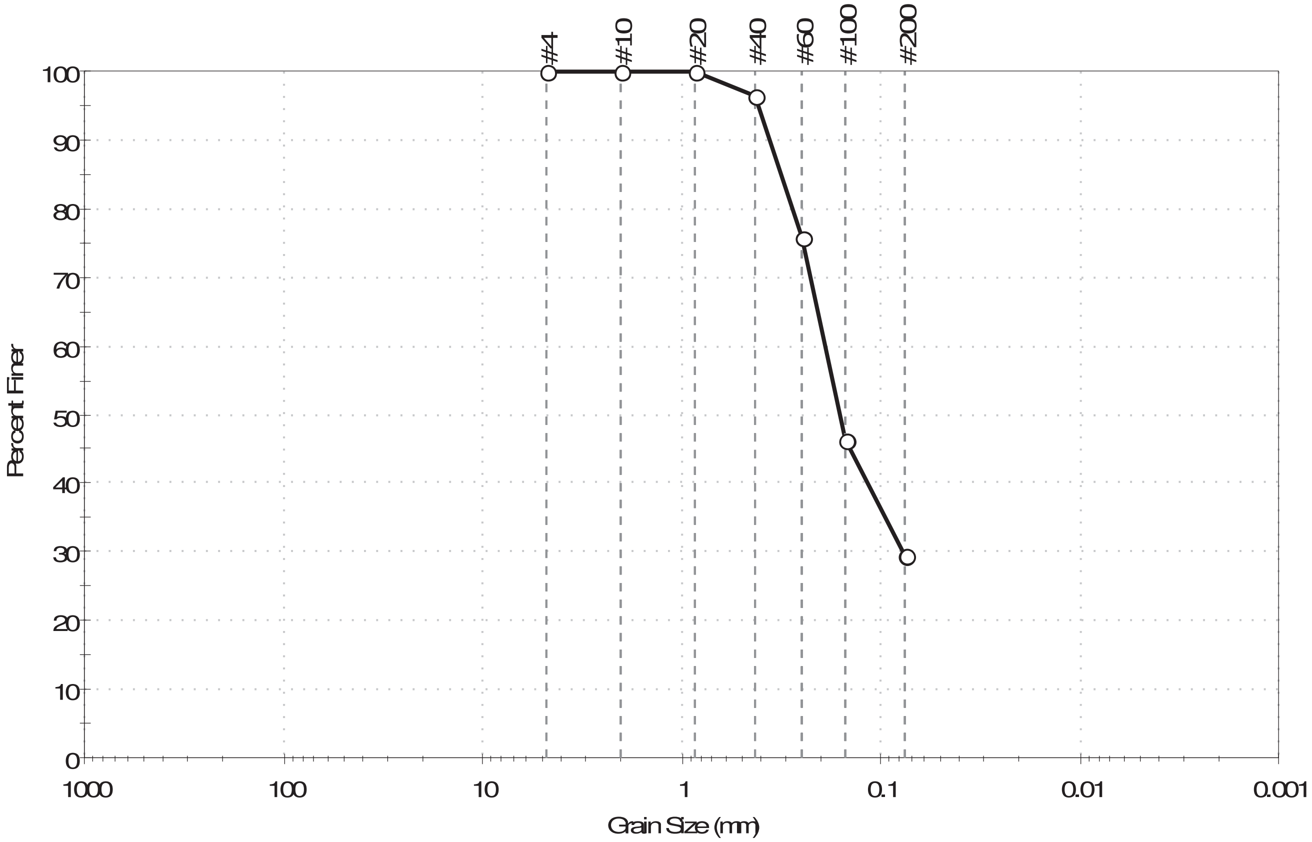
GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105A	Sample Type:	tube	Tested By:	GA
Sample ID:	T-4	Test Date:	05/06/16	Checked By:	n/a
Depth :	73-75 ft	Test Id:	373756		

Test Comment: ---
Visual Description: Moist, yellowish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	70.5	29.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	96		
#60	0.25	76		
#100	0.15	46		
#200	0.075	30		

Coefficients

D_{85} =0.3167 mm
D_{30} =0.0765 mm
D_{60} =0.1899 mm
D_{15} =N/A
D_{50} =0.1598 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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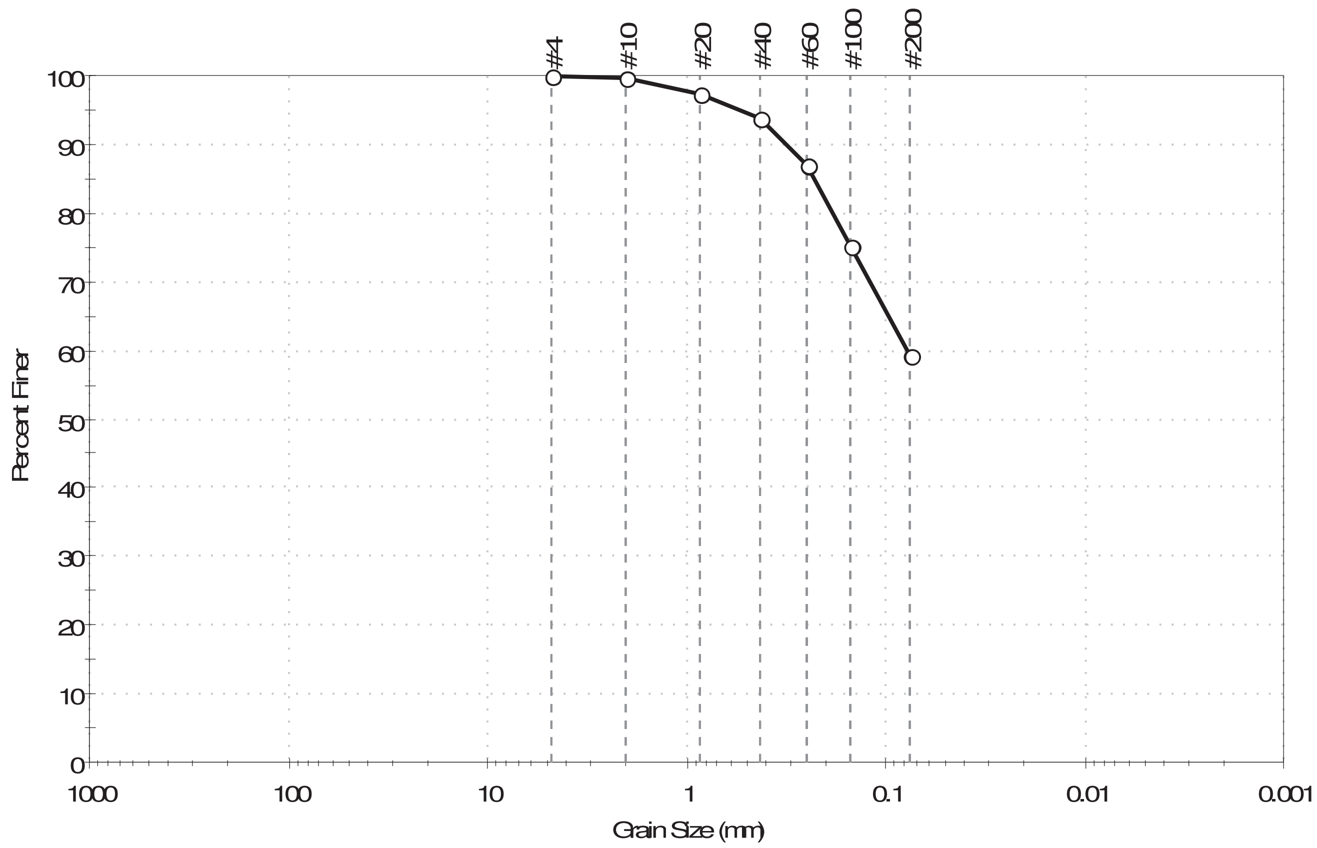
GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105A	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-1	Test Date:	04/26/16	Checked By:	mcm
Depth :	83-85 ft	Test Id:	373757		

Test Comment: ---
Visual Description: Moist, reddish yellow sandy silt
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	40.8	59.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	97		
#40	0.42	94		
#60	0.25	87		
#100	0.15	75		
#200	0.075	59		

Coefficients

D_{85} =0.2282 mm	D_{30} =N/A
D_{60} =0.0777 mm	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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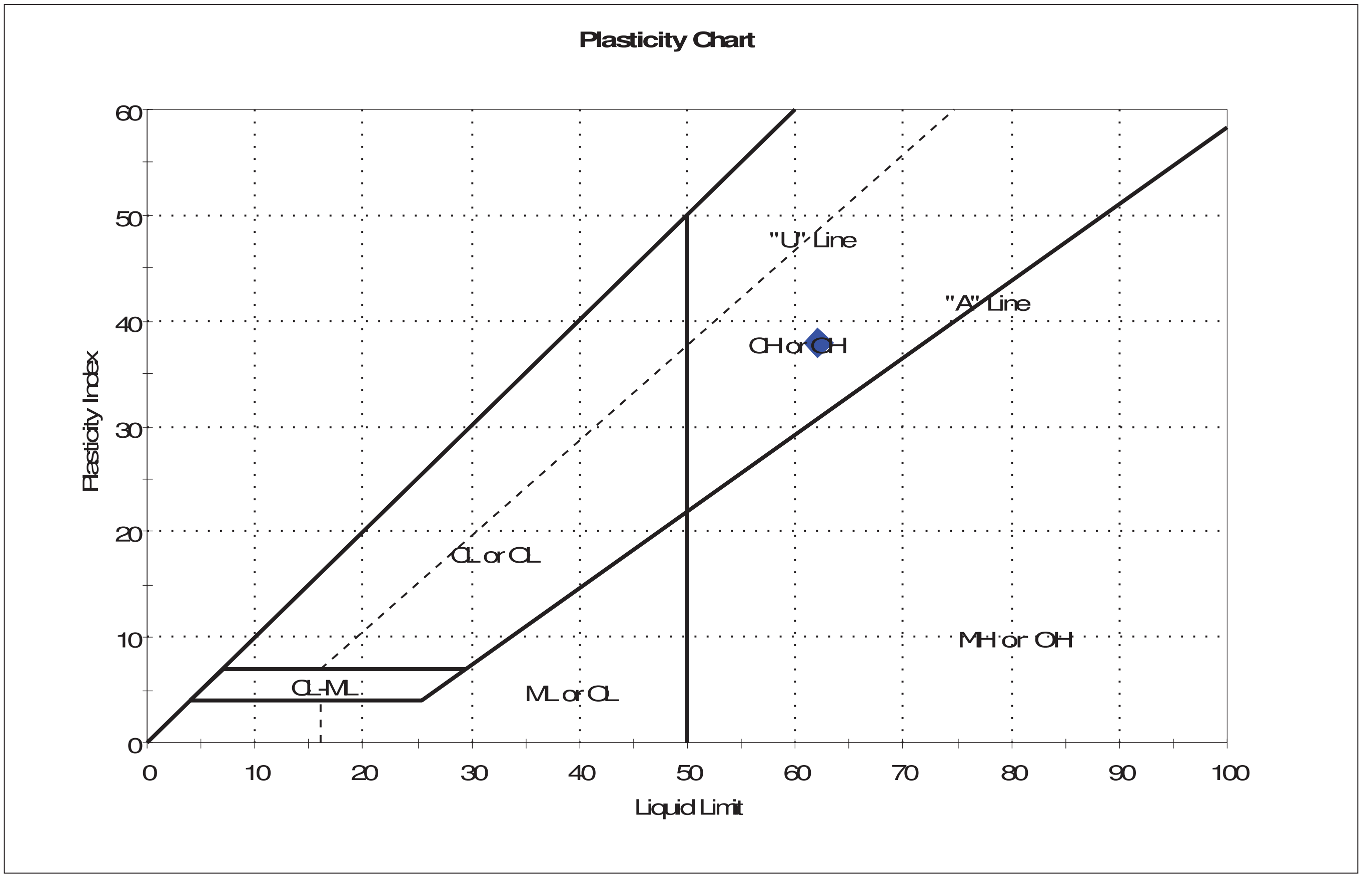
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-105A	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1	Test Date:	05/06/16	Checked By:	mcm
Depth :	57-59 ft	Test Id:	373753		

Test Comment: ---
Visual Description: Moist, reddish yellow clay
Sample Comment: ---

Atterberg Limits - ASTM D4318



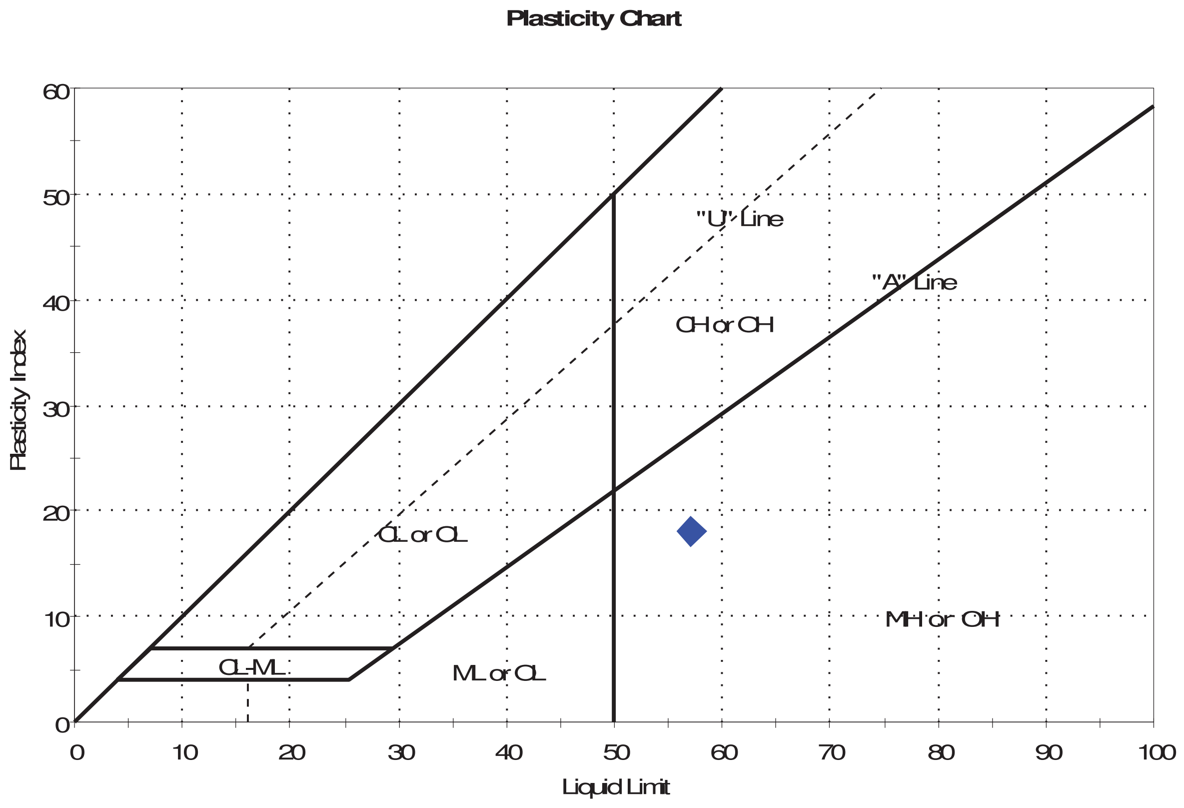
Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-1	B-105A	57-59 ft	31	62	24	38	0.2	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-105A
Sample Type: tube
Tested By: GA
Sample ID: T-3
Test Date: 05/06/16
Checked By: mcm
Depth : 63-65 ft
Test Id: 373754
Test Comment: ---
Visual Description: Moist, reddish yellow silt
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-3	B-105A	63-65 ft	62	57	39	18	1.3	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: LOW

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Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-105A
Sample Type: tube
Tested By: GA
Sample ID: T-4
Test Date: 05/06/16
Checked By: mcm
Depth : 73-75 ft
Test Id: 373755
Test Comment: ---
Visual Description: Moist, yellowish brown silty sand
Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-4	B-105A	73-75 ft	62	n/a	n/a	n/a	n/a	Silty sand (SM)

4% Retained on #40 Sieve
Dry Strength: NONE
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

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GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	05/06/16	Checked By:	mcm
Depth :	---	Test Id:	373761		

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	**Sample ID**	**Depth**	**Visual Description**	**Bulk Density pcf**	**Moisture Content %**	**Dry Density pcf**	*****
B-105A	T- 1	57-59 ft	Moist, reddish yellow clay	112.1	30.87	85.66	(1)
B-105A	T- 3	63-65 ft	Moist, reddish yellow silt	99.37	61.64	61.48	(2)
B-105A	T- 4	73-75 ft	Moist, yellowish brown silty sand	102.6	62.15	63.25	(3)

* Sample Comments

(1): Method B-Cylinder, Intact

(2): Method B-Cylinder, Intact

(3): Method B-Cylinder, Intact

Notes: Moisture Content determined by ASTM D2216.

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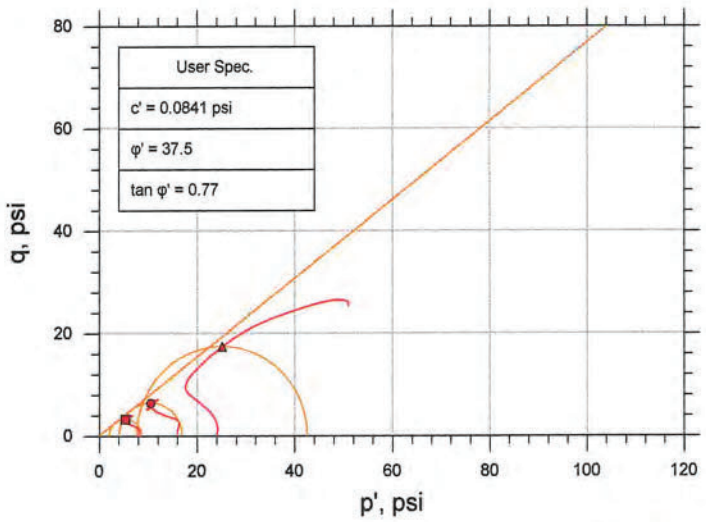
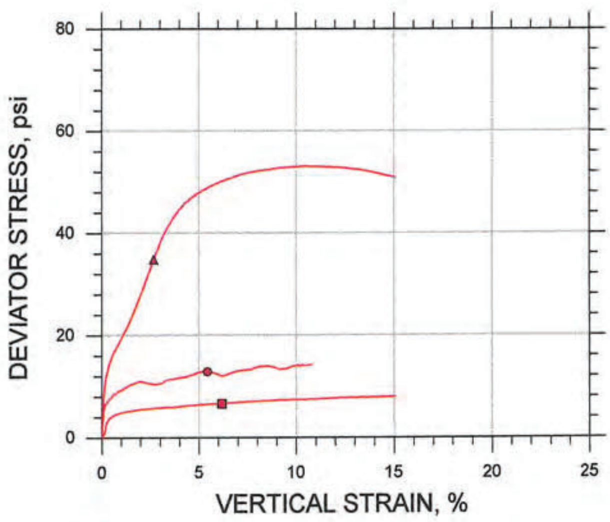
Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: jm	Checked By: mcm
Boring ID: B-105A	
Preparation: intact	
Description: Moist, reddish yellow clay	
Classification: ---	
Group Symbol: ---	
Liquid Limit: 62	Plastic Limit: 24
Plasticity Index: 38	Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

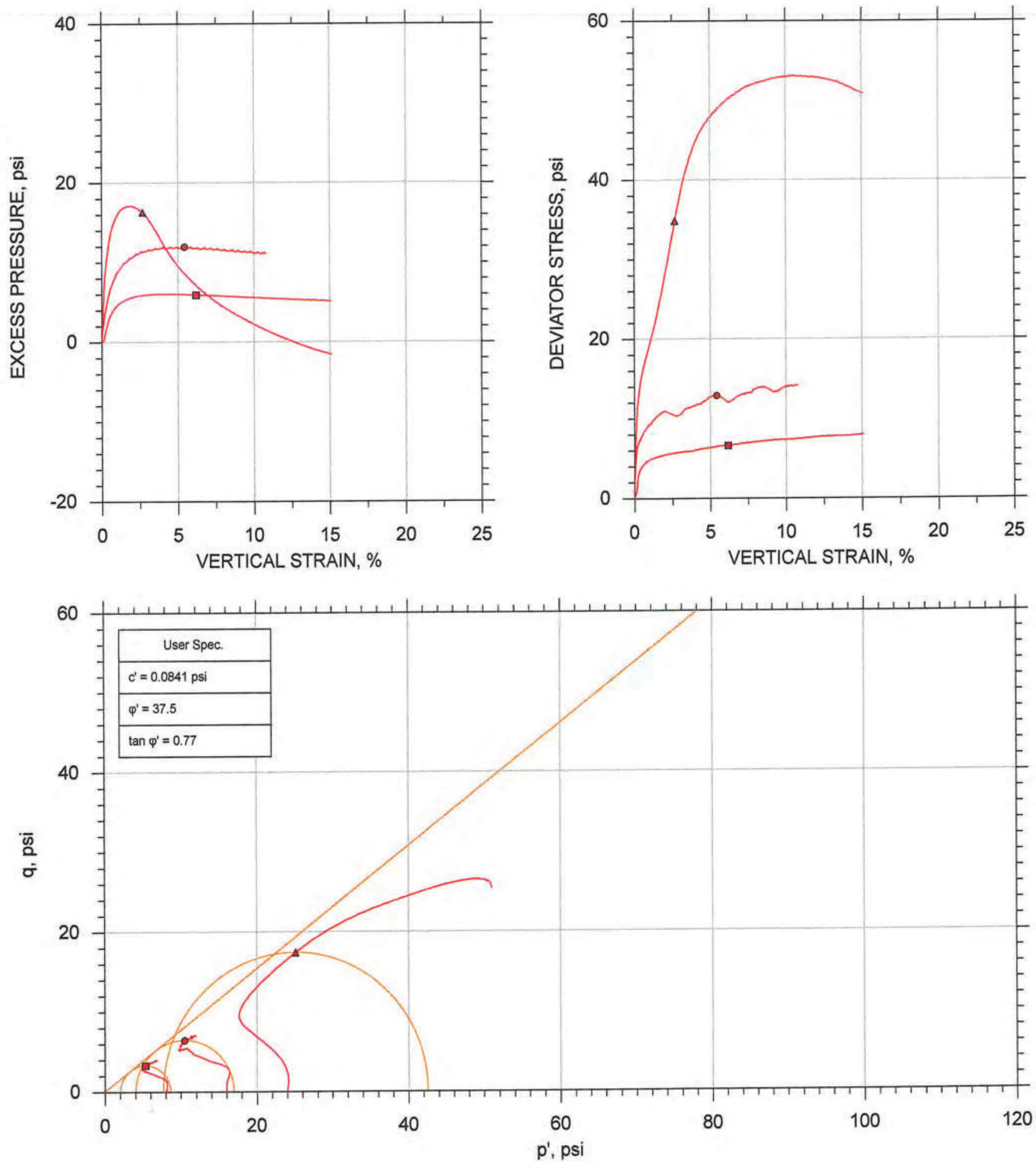




Symbol		■	●	▲	
Sample ID		T-1	T-1	T-1	
Depth, ft		57-59 ft	57-59 ft	57-59 ft	
Test Number		CU-15-1	CU-15-2	CU-15-3	
Initial	Height, in	5.977	5.952	6.420	
	Diameter, in	2.850	2.830	2.840	
	Moisture Content (from Cuttings), %	31.7	35.3	30.9	
	Dry Density, pcf	87.6	82.5	85.7	
	Saturation (Wet Method), %	92.5	91.4	86.1	
	Void Ratio	0.925	1.04	0.968	
Before Shear	Moisture Content, %	30.9	31.4	34.6	
	Dry Density, pcf	91.9	91.2	87.2	
	Cross-sectional Area (Method A), in²	6.169	5.830	6.278	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	0.834	0.848	0.933	
	Back Pressure, psi	29.00	29.00	79.00	
Vertical Effective Consolidation Stress, psi		7.977	15.85	23.98	
Horizontal Effective Consolidation Stress, psi		8.002	15.99	24.00	
Vertical Strain after Consolidation, %		1.197	2.336	0.7826	
Volumetric Strain after Consolidation, %		3.876	9.417	1.527	
Time to 50% Consolidation, min		112.4	105.4	1.690	
Shear Strength, psi		3.310	6.450	17.43	
Strain at Failure, %		6.18	5.43	2.68	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		6.621	12.90	34.86	
Effective Minor Principal Stress at Failure, psi		2.018	4.035	7.672	
Effective Major Principal Stress at Failure, psi		8.639	16.93	42.53	
B-Value		1.01	1.02	0.96	
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Atterberg Limits determined by ASTM D4318. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:					

Test specimen 15.3 not used in cohesion or friction angle determination.

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	T-1	CU-15-1	57-59 ft	jm	4/26/16	mcm	5/6/16	304548-CU-15-1m.dat
●	T-1	CU-15-2	57-59 ft	jm	4/26/16	mcm	5/6/16	304548-CU-15-2m.dat
▲	T-1	CU-15-3	57-59 ft	jm	4/26/16	mcm		304548-CU-15-3m.dat

GeoTesting EXPRESS

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-105A	Sample Type: intact	

Description: Moist, reddish yellow clay

Remarks: Test specimen 15.3 not used in cohesion or friction angle determination.

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/20/16	Checked By:	mcm
Depth :	---	Test Id:	373324		

Moisture Content of Soil and Rock - ASTM D2216

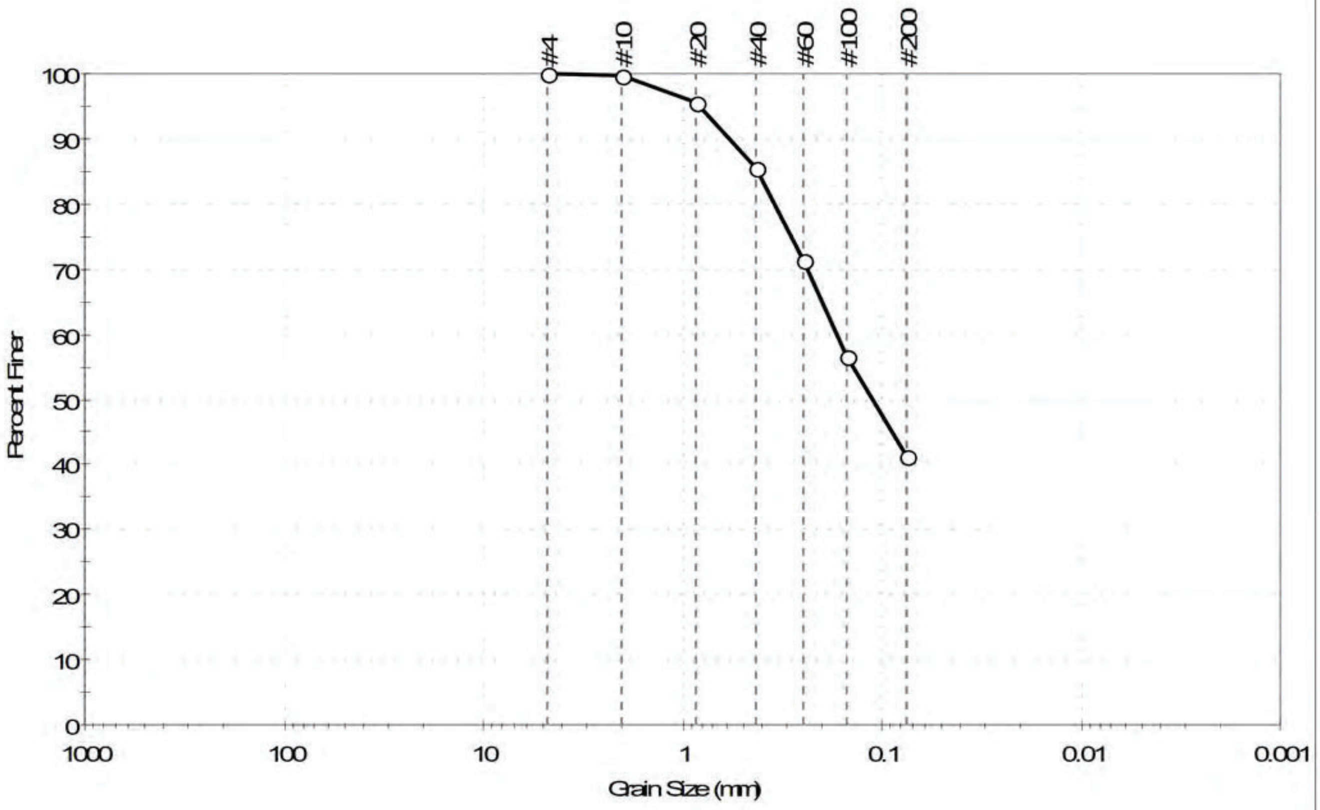
Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-106	SS- 1	29.5-31 ft	Moist, dark grayish brown clay with sand	34.5
B-106	T- 1 (TUBE)	33.5-35.5 ft	Moist, red silty sand	32.8
B-106	SS- 4	37-38.5 ft	Moist, dark yellowish brown silty sand	42.0

Notes: Temperature of Drying : 110º Celsius

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-106	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/25/16	Checked By:	mcm
Depth :	33.5-35.5 ft	Test Id:	373325		

Test Comment: ---
Visual Description: Moist, red silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	58.8	41.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	96		
#40	0.42	86		
#60	0.25	72		
#100	0.15	57		
#200	0.075	41		

Coefficients

D_{85} =0.4167 mm D_{30} =N/A
D_{60} =0.1679 mm D_{15} =N/A
D_{50} =0.1110 mm D_{10} =N/A
C_u =N/A C_c =N/A

Classification

ASTM Silty sand (SM)

AASHTO Silty Soils (A-5 (1))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---

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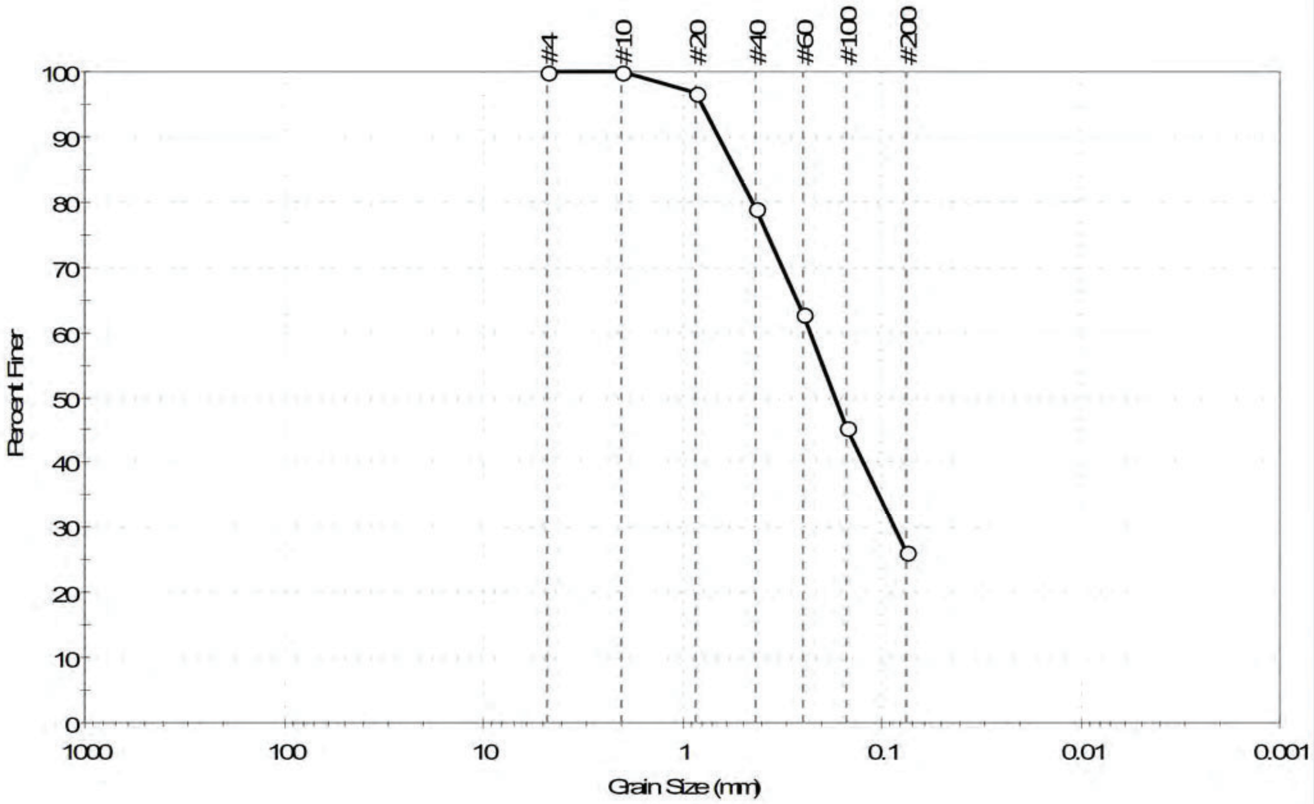
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-106
Sample ID: SS-4
Depth : 37-38.5 ft
Sample Type: bag
Test Date: 04/20/16
Test Id: 373326
Tested By: GA
Checked By: mcm

Test Comment: ---
Visual Description: Moist, dark yellowish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	73.7	26.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	97		
#40	0.42	79		
#60	0.25	63		
#100	0.15	46		
#200	0.075	26		

Coefficients

D_{85} = 0.5384 mm
D_{30} = 0.0857 mm
D_{60} = 0.2303 mm
D_{15} = N/A
D_{50} = 0.1712 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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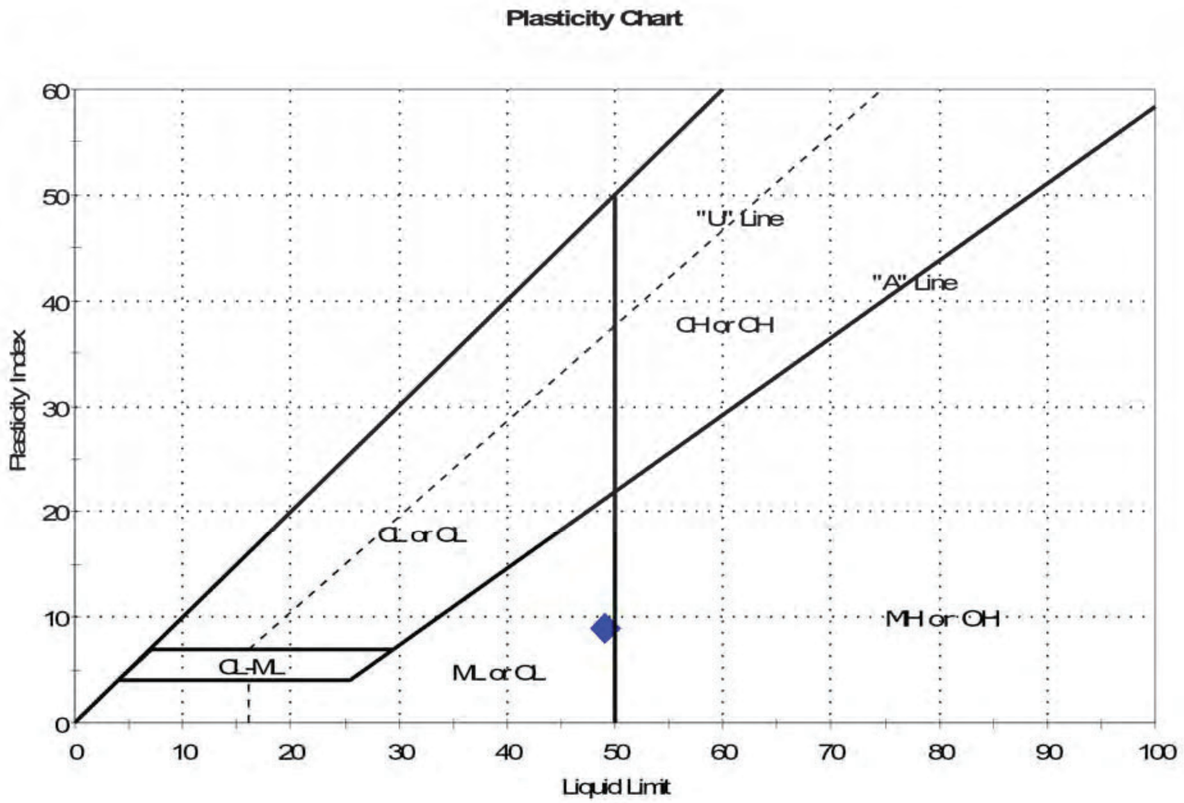
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-106	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/26/16	Checked By:	mcm
Depth :	33.5-35.5 ft	Test Id:	373722		

Test Comment: ---

Visual Description: Moist, red silty sand

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-1 (TUBE)	B-106	33.5-35.5 ft	33	49	40	9	-0.8	Silty sand (SM)

Sample Prepared using the WET method

14% Retained on #40 Sieve

Dry Strength: MEDIUM

Dilatancy: NONE

Toughness: LOW

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-106	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/26/16	Checked By:	mcm
Depth :	33.5-35.5 ft	Test Id:	373328		

Test Comment: ---
Visual Description: Moist, red silty sand
Sample Comment: ---

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	Sample ID	Depth	Visual Description	Bulk Density pcf	Moisture Content %	Dry Density pcf
B-106	T- 1 (TUBE)	33.5-35.5 ft	Moist, red silty sand	112.7	31.62	85.65

* Sample Comments

(1): Method B-Cylinder, Intact

Notes: Moisture Content determined by ASTM D2216.

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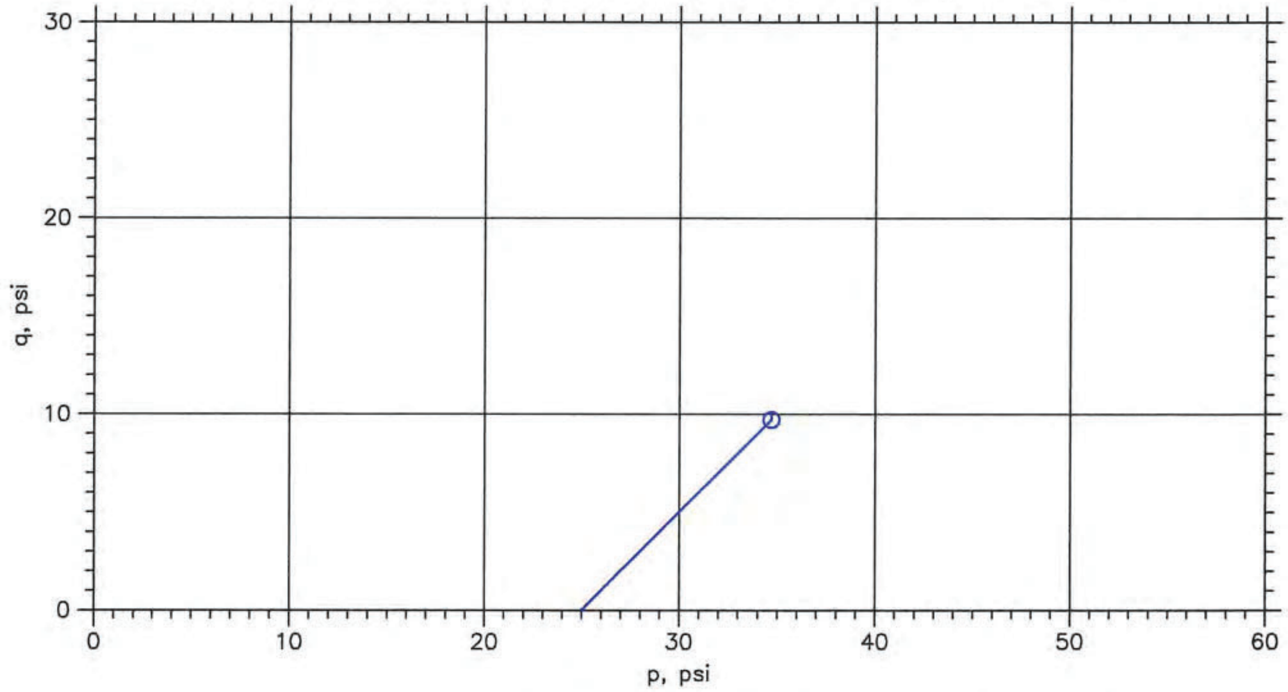
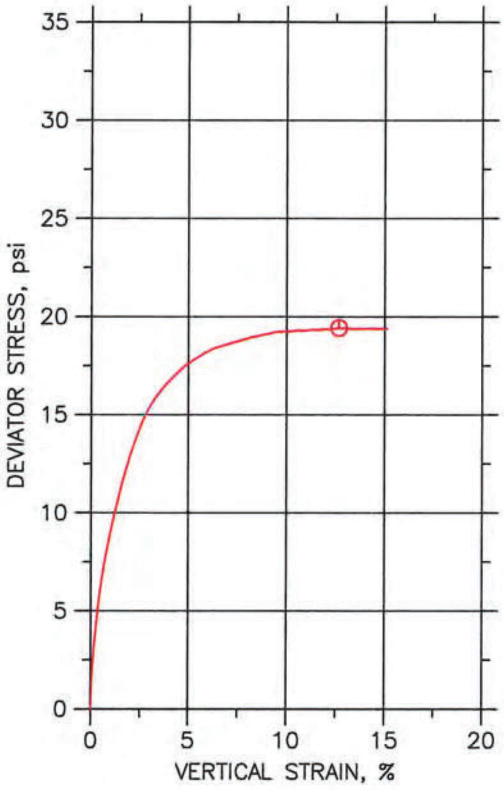
UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	⌽			
Sample No.	T-1(TUBE)			
Test No.	UU-1			
Depth	33.5-35.5			
Tested by	jm			
Test Date	4/21/16			
Checked by	mcm			
Check Date	**04/26/16**			
Diameter, in	2.87			
Height, in	6.292			
Water Content, %	31.6			
Dry Density, pcf	85.62			
Saturation, %	88.1			
Void Ratio	0.969			
Confining Stress, psi	25			
Undrained Strength, psi	9.7			
Max. Dev. Stress, psi	19.4			
Strain at Failure, %	12.7			
Strain Rate, %/min	1			
Estimated Specific Gravity	2.7			
Liquid Limit	49			
Plastic Limit	40			
Plasticity Index	9			

GeoTesting EXPRESS

Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No.: GTX-304548
Boring No.: B-106
Sample Type: intact
Description: Moist, red silty sand
Remarks: 1057

Phase calculations based on start and end of test.

Client:	AECOM		
Project:	SCS Plant Scherer Ph.2		
Location:	Monroe County, GA	Project No:	GTX-304548

Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/20/16	Checked By:	mcm
Depth :	---	Test Id:	373383		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-107	SS- 1	20.5-21.5 ft	Wet, dark olive gray clay with sand	66.6
B-107	SS- 2A	21.5-23.5 ft	Moist, brown clay with sand	36.7
B-107	T- 1 (TUBE)	25-27 ft	Moist, yellowish brown sandy clay	37.8
B-107	SS- 4	28.5-30 ft	Moist, gray clay with sand	20.4

Notes: Temperature of Drying : 110º Celsius

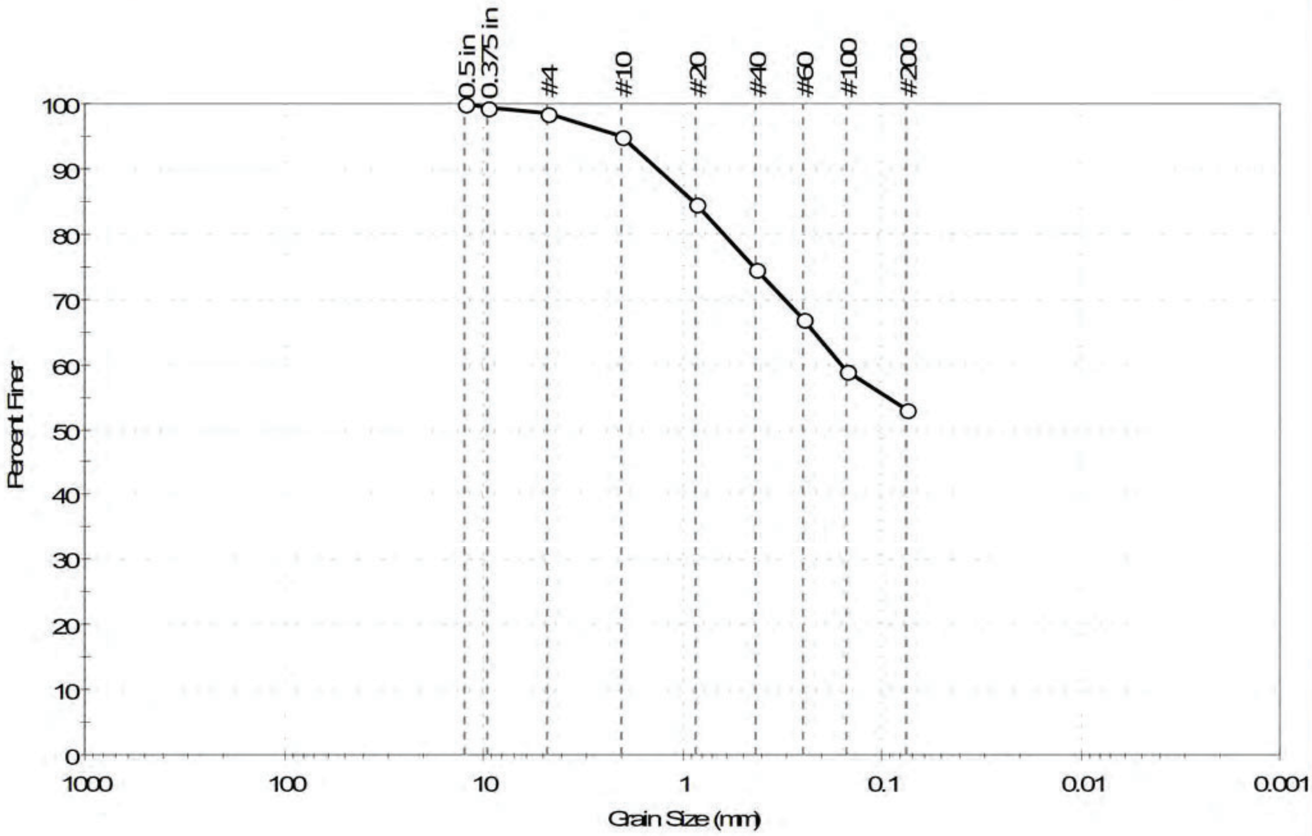
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-107	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/20/16	Checked By:	mcm
Depth :	25-27 ft	Test Id:	373494		

Test Comment: ---

Visual Description: Moist, yellowish brown sandy clay

Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	1.6	45.4	53.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	99		
#4	4.75	98		
#10	2.00	95		
#20	0.85	85		
#40	0.42	75		
#60	0.25	67		
#100	0.15	59		
#200	0.075	53		

Coefficients

D_{85} =0.8737 mm
D_{30} =N/A
D_{60} =0.1586 mm
D_{15} =N/A
D_{50} =N/A
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-107	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/20/16	Checked By:	mcm
Depth :	25-27 ft	Test Id:	373387		

Test Comment: ---
Visual Description: Moist, yellowish brown sandy clay
Sample Comment: ---

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	Sample ID	Depth	Visual Description	Bulk Density pcf	Moisture Content %	Dry Density pcf
B-107	T- 1 (TUBE)	25-27 ft	Moist, yellowish brown sandy clay	112.9	37.81	81.92

* Sample Comments

(1): Method B-Cylinder, Intact

Notes: Moisture Content determined by ASTM D2216.

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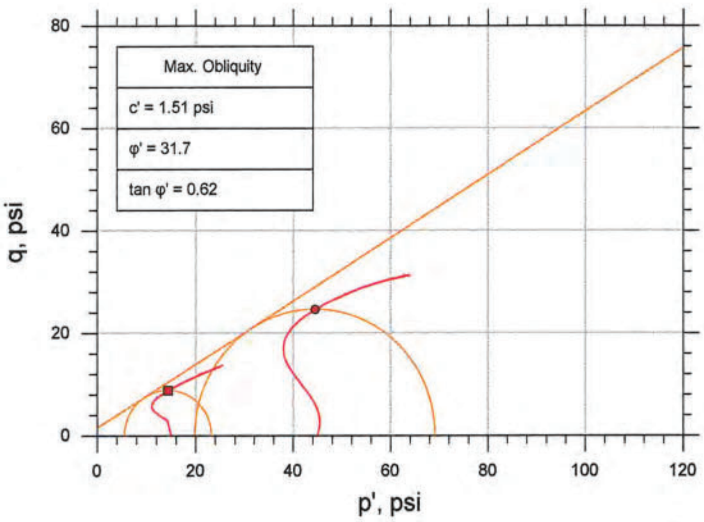
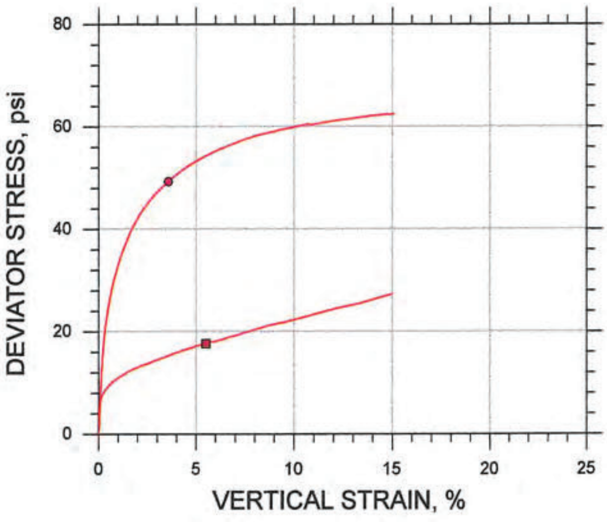
GeoTesting EXPRESS

Client: AECOM
Project Name: SCS Plant Scherer Ph.2
Project Location: Monroe County, GA
Project Number: GTX-304548
Tested By: jm | Checked By: mcm
Boring ID: B-107
Preparation: intact
Description: Moist, yellowish brown sandy clay
Classification: ---
Group Symbol: ---
Liquid Limit: --- | Plastic Limit: ---
Plasticity Index: --- | Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767

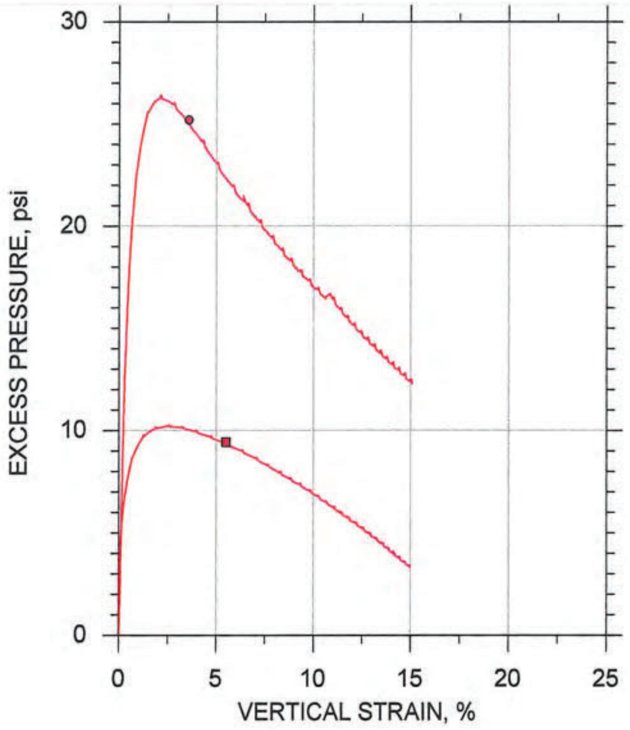


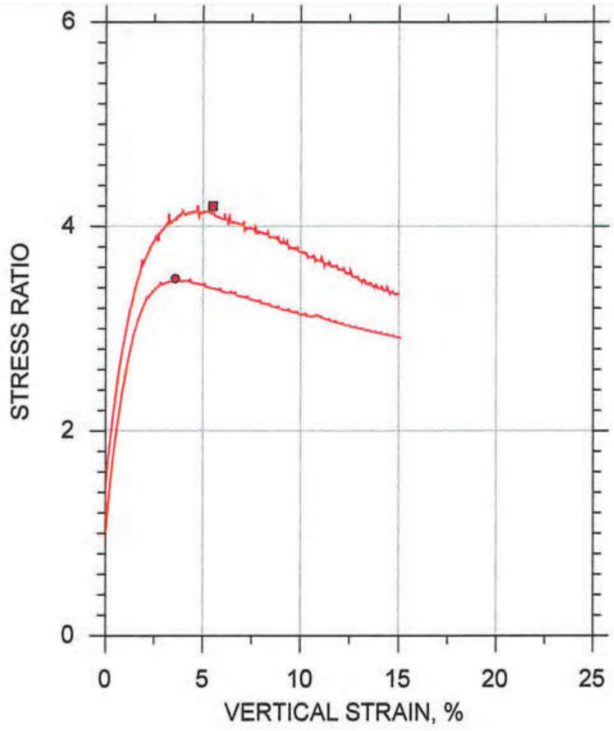


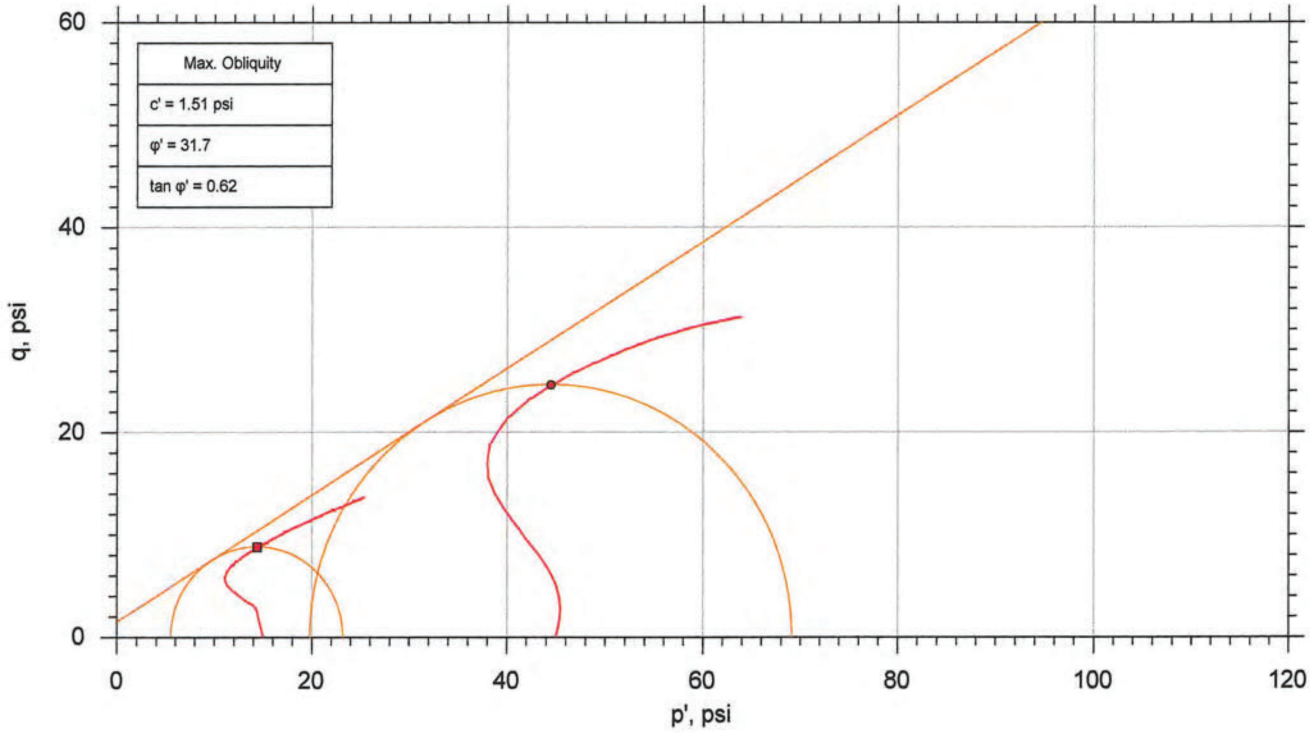
Symbol		■	●		
Sample ID		T-1 (TUBE)	T-1 (TUBE)		
Depth, ft		25-27 ft	25-27 ft		
Test Number		CU-12-1	CU-12-3		
Initial	Height, in	5.965	5.902		
	Diameter, in	2.875	2.870		
	Moisture Content (from Cuttings), %	32.4	23.5		
	Dry Density, pcf	89.8	100.		
	Saturation (Wet Method), %	99.9	93.0		
	Void Ratio	0.877	0.681		
Before Shear	Moisture Content, %	30.0	23.2		
	Dry Density, pcf	93.1	104.		
	Cross-sectional Area (Method A), in²	6.407	6.348		
	Saturation, %	100.0	100.0		
	Void Ratio	0.810	0.625		
	Back Pressure, psi	64.99	89.00		
Vertical Effective Consolidation Stress, psi		14.95	44.96		
Horizontal Effective Consolidation Stress, psi		15.00	45.00		
Vertical Strain after Consolidation, %		1.958	1.378		
Volumetric Strain after Consolidation, %		2.593	3.030		
Time to 50% Consolidation, min		22.09	18.49		
Shear Strength, psi		8.835	24.66		
Strain at Failure, %		5.50	3.58		
Strain Rate, %/min		0.01600	0.01600		
Deviator Stress at Failure, psi		17.67	49.31		
Effective Minor Principal Stress at Failure, psi		5.525	19.80		
Effective Major Principal Stress at Failure, psi		23.20	69.11		
B-Value		0.97	0.96		
Notes: - Before Shear Saturation set to 100% for phase calculation. - Moisture Content determined by ASTM D2216. - Deviator Stress includes membrane correction. - Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions. Remarks:					

System 1057

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767







	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	T-1 (TUBE)	CU-12-1	25-27 ft	jm	4/14/16	mcm	4/27/16	304548-CU-12-1m.dat
●	T-1 (TUBE)	CU-12-3	25-27 ft	jm	4/14/16	mcm	4/27/16	304548-CU-12-3m.dat

GeoTesting EXPRESS

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-107	Sample Type: intact	
Description: Moist, yellowish brown sandy clay		
Remarks: System 1057		

Client:	AECOM		
Project:	SCS Plant Scherer Ph.2		
Location:	Monroe County, GA	Project No:	GTX-304548

Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/26/16	Checked By:	mcm
Depth :	---	Test Id:	373767		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-108	SPT- 1A	46.75-47.5 ft	Moist, reddish brown clay with sand	61.7
B-108	SPT- 1B	47.5-48.5 ft	Moist, reddish brown clay	33.8
B-108	SPT- 2	48.5-50 ft	Moist, brown clay with sand	30.3
B-108	SPT- 4	55.5-57 ft	Moist, olive clay with sand	24.5
B-108	SPT- 6	61-62.5 ft	Moist, light yellowish brown silty sand	48.5
B-108	SPT- 8	70.5-72 ft	Moist, olive silty sand	41.8

Notes: Temperature of Drying : 110º Celsius

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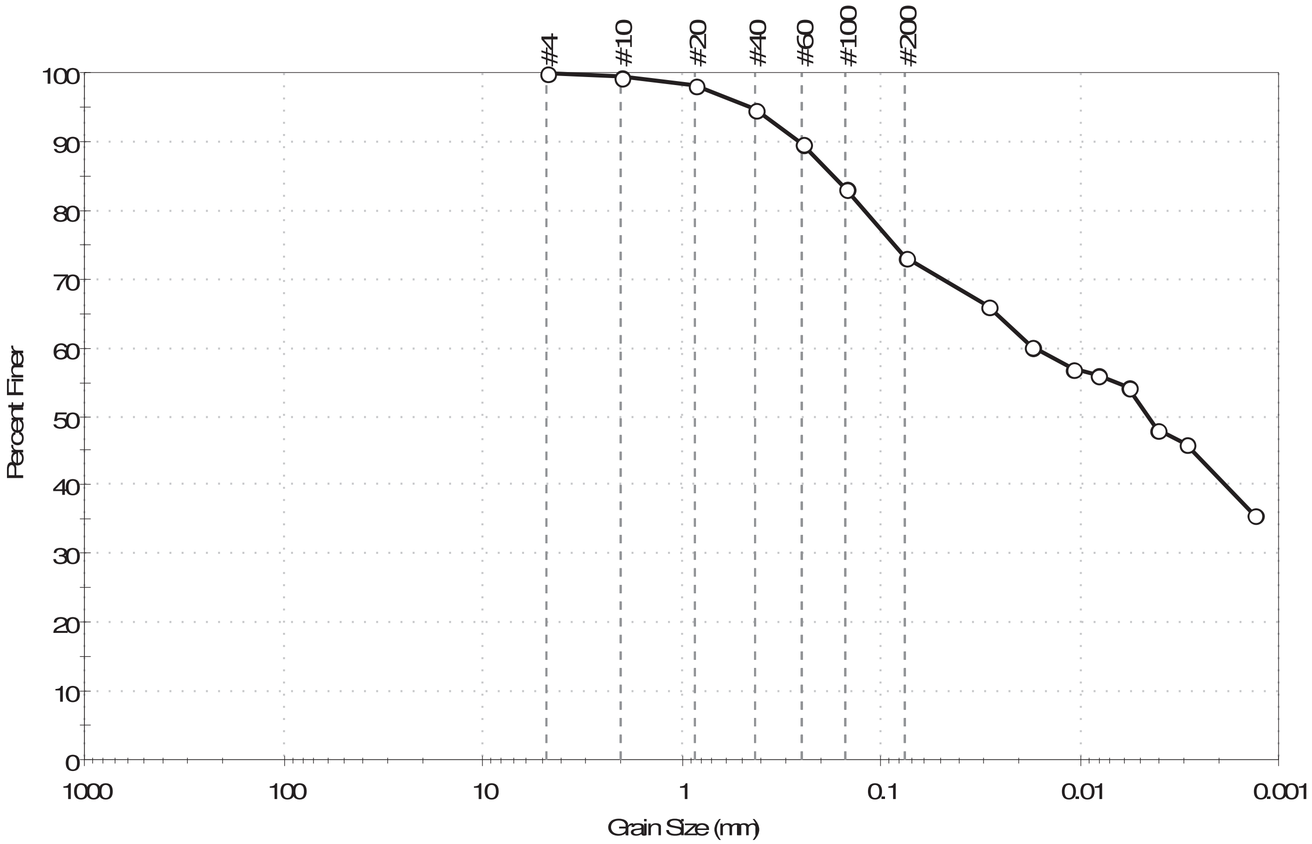
GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-108	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-1A	Test Date:	04/20/16	Checked By:	mcm
Depth :	46.75-47.5 ft	Test Id:	373772		

Test Comment: ---
Visual Description: Moist, reddish brown clay with sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	26.9	73.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	98		
#40	0.42	95		
#60	0.25	90		
#100	0.15	83		
#200	0.075	73		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0290	66		
---	0.0175	60		
---	0.0109	57		
---	0.0081	56		
---	0.0057	54		
---	0.0041	48		
---	0.0029	46		
---	0.0013	36		

Coefficients

D_{85} =0.1728 mm	D_{30} =N/A
D_{60} =0.0172 mm	D_{15} =N/A
D_{50} =0.0045 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	N/A
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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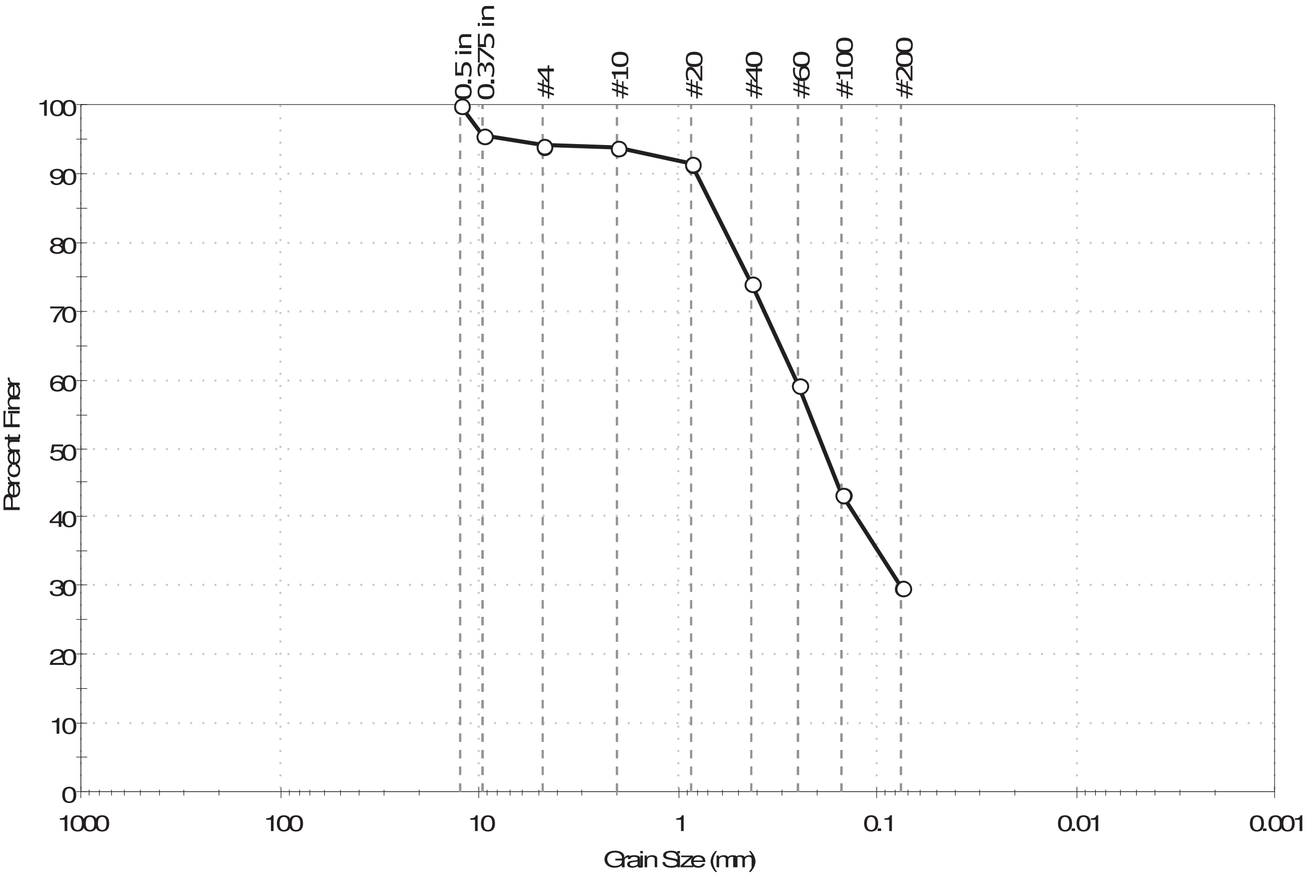
GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-108	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-6	Test Date:	04/26/16	Checked By:	mcm
Depth :	61-62.5 ft	Test Id:	373773		

Test Comment: ---
Visual Description: Moist, light yellowish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	5.8	64.3	29.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	96		
#4	4.75	94		
#10	2.00	94		
#20	0.85	91		
#40	0.42	74		
#60	0.25	59		
#100	0.15	43		
#200	0.075	30		

Coefficients

D_{85} =0.6573 mm
D_{30} =0.0752 mm
D_{60} =0.2554 mm
D_{15} =N/A
D_{50} =0.1858 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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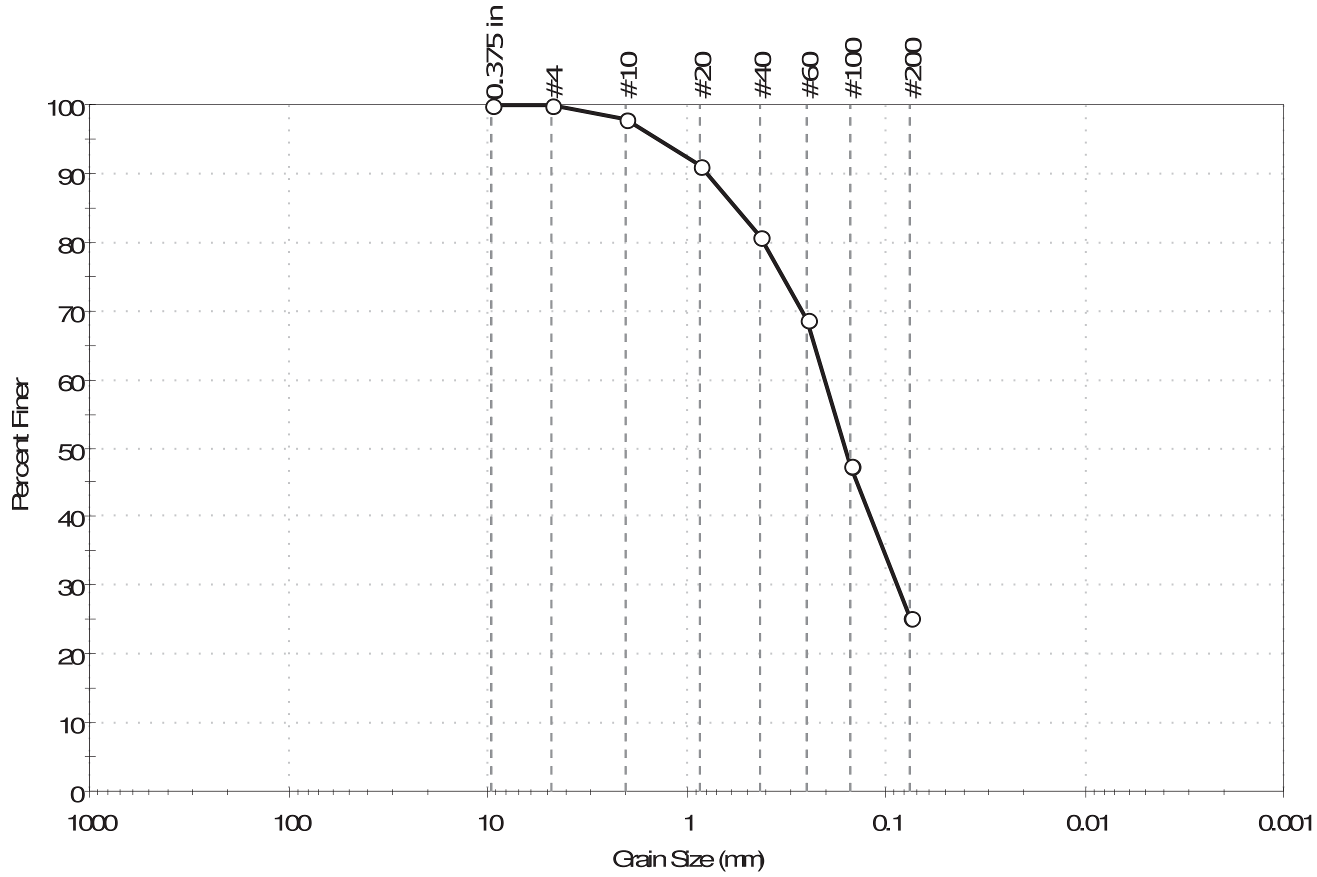
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-108
Sample ID: SPT-8
Depth : 70.5-72 ft
Sample Type: bag
Test Date: 04/26/16
Test Id: 373774
Tested By: GA
Checked By: mcm
Test Comment: ---
Visual Description: Moist, olive silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.1	74.4	25.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	98		
#20	0.85	91		
#40	0.42	81		
#60	0.25	69		
#100	0.15	48		
#200	0.075	25		

Coefficients

D_{85} =0.5662 mm	D_{30} =0.0864 mm
D_{60} =0.2028 mm	D_{15} =N/A
D_{50} =0.1591 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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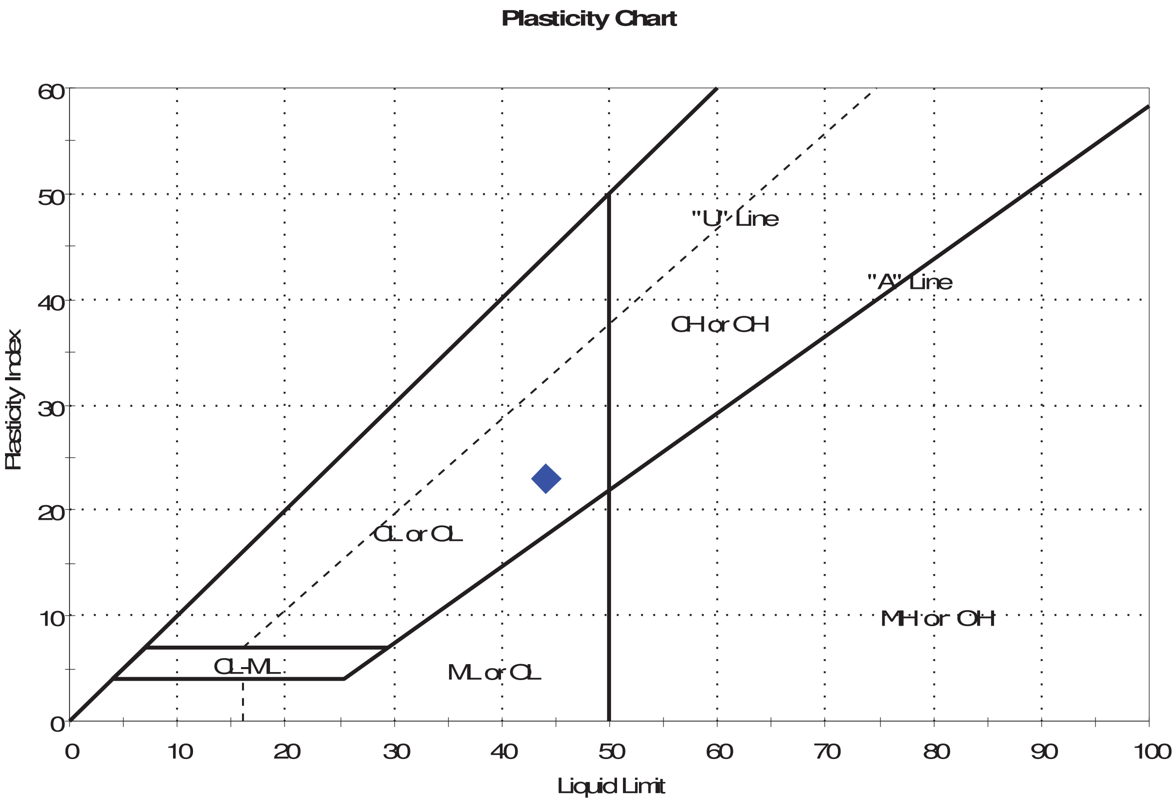
Client:	AECOM		
Project:	SCS Plant Scherer Ph.2		
Location:	Monroe County, GA	Project No:	GTX-304548
Boring ID:	B-108	Sample Type:	bag
Tested By:	GA		
Sample ID:	SPT-1B	Test Date:	04/28/16
Checked By:	mcm		
Depth :	47.5-48.5 ft	Test Id:	373768
Test Comment:	---		
Visual Description:	Moist, reddish brown clay		
Sample Comment:	---		

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SPT-1B	B-108	47.5-48.5 ft	34	44	21	23	0.6	

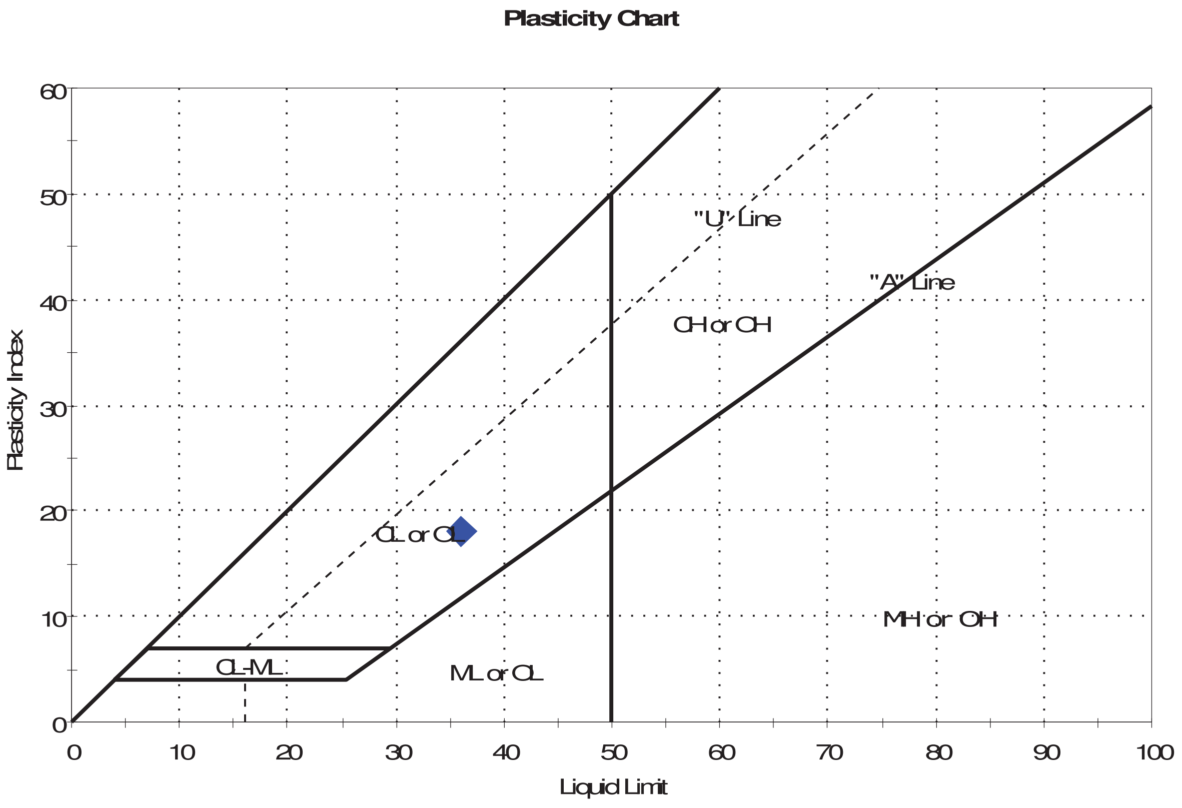
Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilatancy: NONE
Toughness: MEDIUM

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-108	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-2	Test Date:	04/28/16	Checked By:	mcm
Depth :	48.5-50 ft	Test Id:	373769		

Test Comment: ---
Visual Description: Moist, brown clay with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SPT-2	B-108	48.5-50 ft	30	36	18	18	0.7	

Sample Prepared using the WET method

Dry Strength: MEDIUM
Dilatancy: NONE
Toughness: MEDIUM

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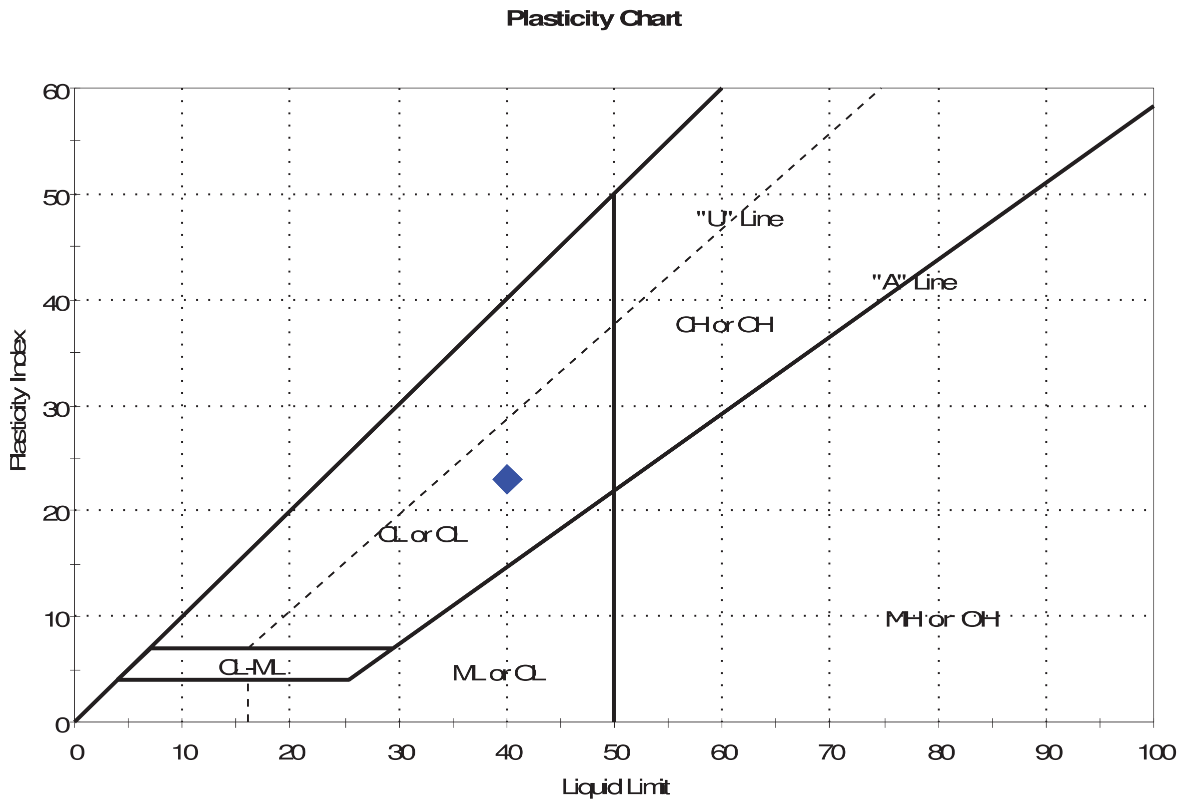
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-108
Sample Type: bag
Tested By: GA
Sample ID: SPT-4
Test Date: 04/29/16
Checked By: mcm
Depth : 55.5-57 ft
Test Id: 373770
Test Comment: ---
Visual Description: Moist, olive clay with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SPT-4	B-108	55.5-57 ft	25	40	17	23	0.3	

Sample Prepared using the WET method

Dry Strength: VERY HIGH
Dilatancy: NONE
Toughness: MEDIUM

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-108	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-6	Test Date:	04/28/16	Checked By:	mcm
Depth :	61-62.5 ft	Test Id:	373771		

Test Comment: ---
Visual Description: Moist, light yellowish brown silty sand
Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SPT-6	B-108	61-62.5 ft	48	n/a	n/a	n/a	n/a	Silty sand (SM)

26% Retained on #40 Sieve
Dry Strength: NONE
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/20/16	Checked By:	mcm
Depth :	---	Test Id:	373390		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-109	SS- 1	31-31.8 ft	Wet, brown clay with sand	90.8
B-109	SS- 2	37-38.5 ft	Moist, dark olive sandy clay	24.6
B-109	SS- 3	40-41.5 ft	Moist, dark olive gray clayey sand	17.3

Notes: Temperature of Drying : 110º Celsius

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Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/26/16	Checked By:	mcm
Depth :	---	Test Id:	373778		

Moisture Content of Soil and Rock - ASTM D2216

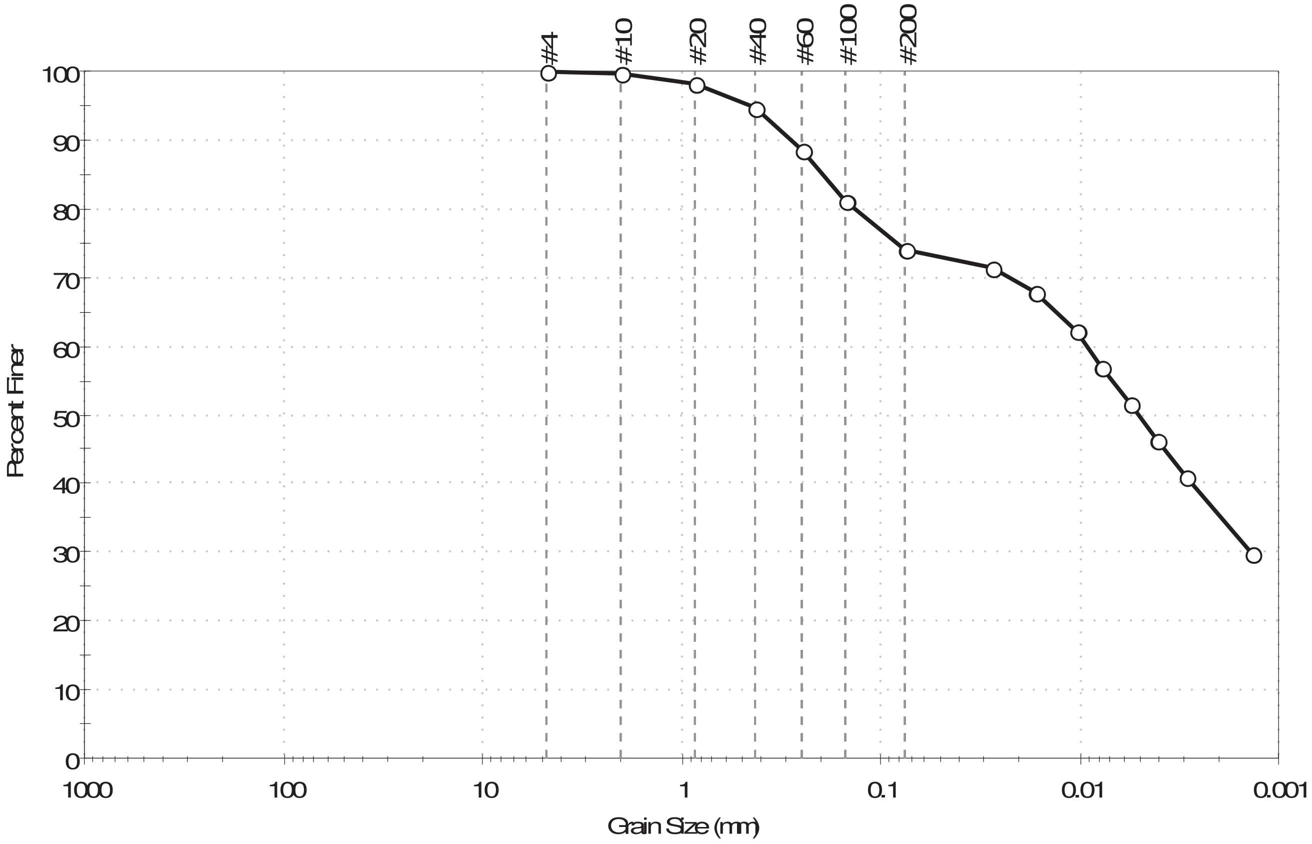
Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-110	SPT- 1A	47.75-48.25 ft	Moist, dark brown clay with sand	86.6
B-110	T- 1	52-54 ft	Moist, yellowish brown silt	20.1
B-110	SPT- 7	63.5-65 ft	Moist, olive yellow silt with sand	40.3
B-110	SPT- 9	73.5-75 ft	Moist, yellowish brown silty sand	25.7

Notes: Temperature of Drying : 110º Celsius

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-110	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-1A	Test Date:	05/06/16	Checked By:	mcm
Depth :	47.75-48.25 ft	Test Id:	373779		

Test Comment: ---
Visual Description: Moist, dark brown clay with sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	26.1	73.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	95		
#60	0.25	88		
#100	0.15	81		
#200	0.075	74		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0275	71		
---	0.0167	68		
---	0.0104	62		
---	0.0078	57		
---	0.0056	52		
---	0.0041	46		
---	0.0029	41		
---	0.0014	30		

Coefficients

D_{85} =0.1963 mm	D_{30} =0.0014 mm
D_{60} =0.0092 mm	D_{15} =N/A
D_{50} =0.0050 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	N/A
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---
Sand/Gravel Hardness : ---
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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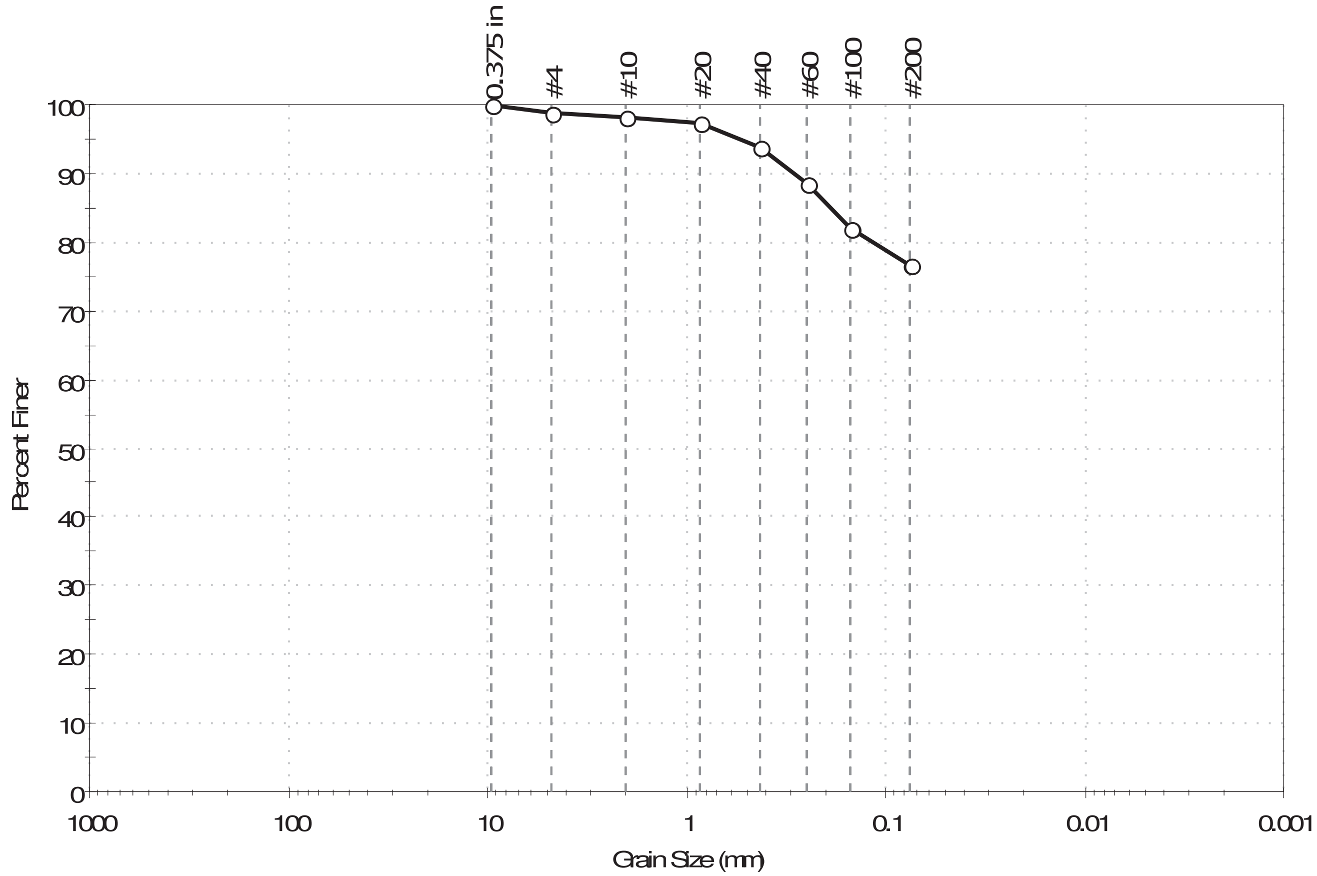
GeoTesting
EXPRESS

Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-110
Sample Type: bag
Tested By: GA
Sample ID: SPT-7
Test Date: 04/26/16
Checked By: mcm
Depth : 63.5-65 ft
Test Id: 373782
Test Comment: ---
Visual Description: Moist, olive yellow silt with sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	1.2	22.0	76.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	98		
#20	0.85	97		
#40	0.42	94		
#60	0.25	89		
#100	0.15	82		
#200	0.075	77		

Coefficients

D_{85} =0.1890 mm
D_{30} =N/A
D_{60} =N/A
D_{15} =N/A
D_{50} =N/A
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM Elastic silt with sand (MH)

AASHTO Clayey Soils (A-7-5 (30))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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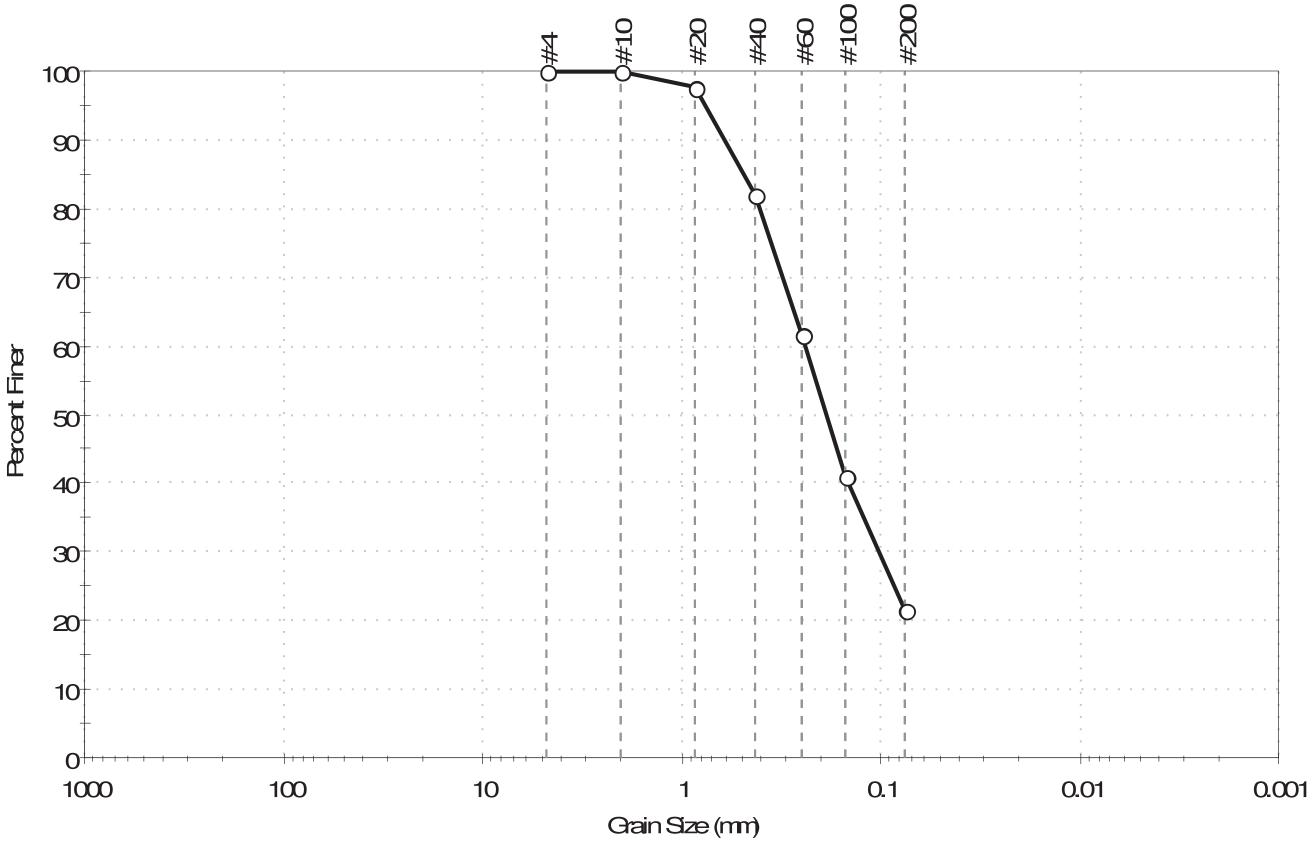
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-110
Sample Type: bag
Tested By: GA
Sample ID: SPT-9
Test Date: 04/26/16
Checked By: mcm
Depth : 73.5-75 ft
Test Id: 373783

Test Comment: ---
Visual Description: Moist, yellowish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	78.5	21.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	82		
#60	0.25	62		
#100	0.15	41		
#200	0.075	22		

Coefficients

D_{85} =0.4834 mm
D_{30} =0.1013 mm
D_{60} =0.2393 mm
D_{15} =N/A
D_{50} =0.1871 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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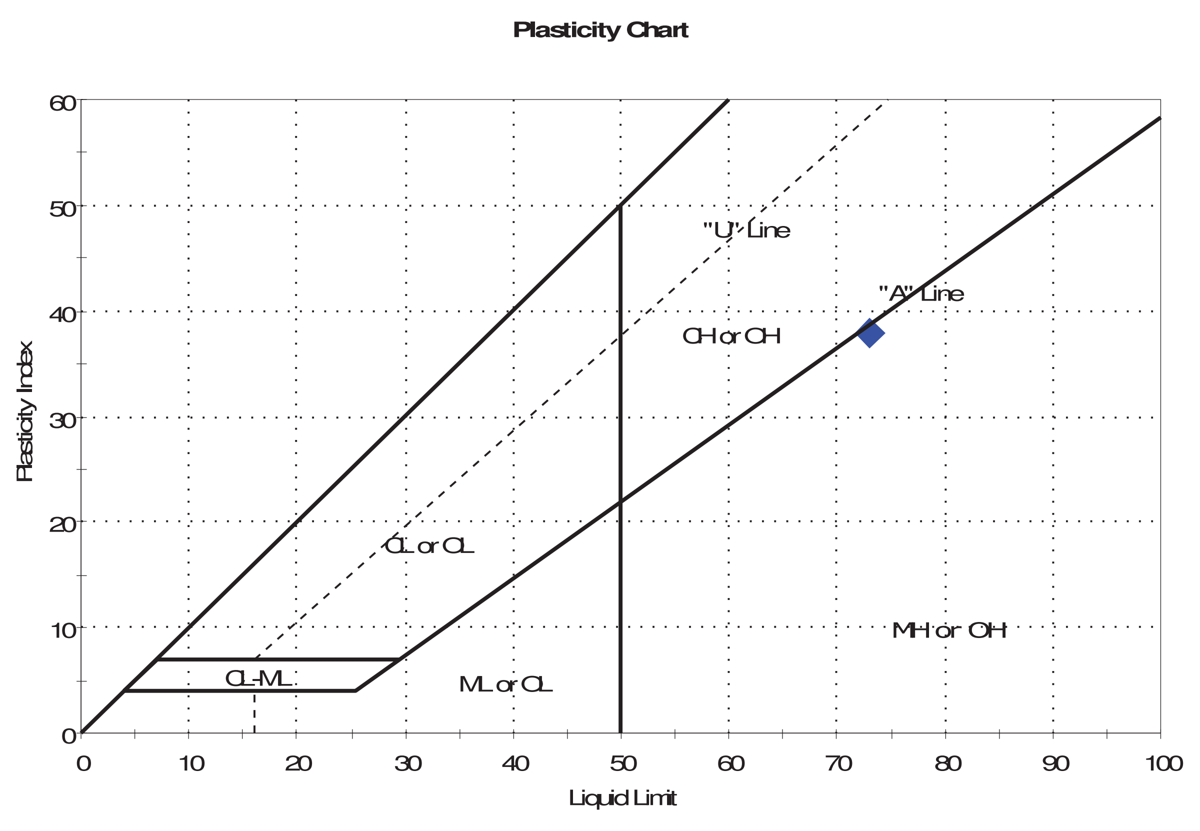
GeoTesting EXPRESS

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-110	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1	Test Date:	04/28/16	Checked By:	mcm
Depth :	52-54 ft	Test Id:	373780		

Test Comment: ---
Visual Description: Moist, yellowish brown silt
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-1	B-110	52-54 ft	20	73	35	38	-0.4	

Sample Prepared using the WET method

Dry Strength: MEDIUM
Dilatancy: NONE
Toughness: MEDIUM

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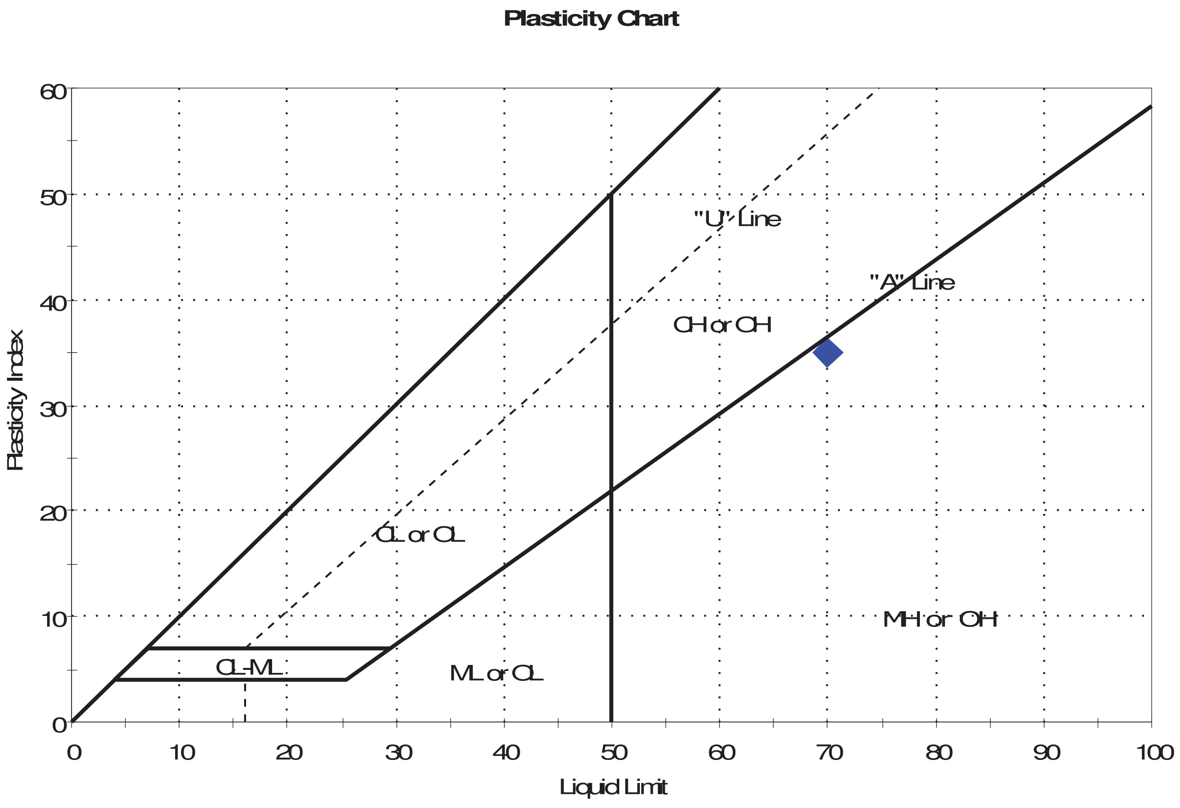
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-110	Sample Type:	bag	Tested By:	GA
Sample ID:	SPT-7	Test Date:	04/28/16	Checked By:	mcm
Depth :	63.5-65 ft	Test Id:	373781		

Test Comment: ---
Visual Description: Moist, olive yellow silt with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SPT-7	B-110	63.5-65 ft	40	70	35	35	0.2	Elastic silt with sand (MH)

Sample Prepared using the WET method

6% Retained on #40 Sieve

Dry Strength: HIGH

Dilatancy: NONE

Toughness: MEDIUM

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-110	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1	Test Date:	05/06/16	Checked By:	GA
Depth :	52-54 ft	Test Id:	373785		

Test Comment: ---
Visual Description: Moist, yellowish brown silt
Sample Comment: ---

Laboratory Determination of Density (Unit Weight) of Soil Specimens by ASTM D7263

Boring ID	Sample ID	Depth	Visual Description	Bulk Density pcf	Moisture Content %	Dry Density pcf
B-110	T- 1	52-54 ft	Moist, yellowish brown silt	122.7	20.10	102.2

* Sample Comments

(1): Method B-Cylinder,

Notes: Moisture Content determined by ASTM D2216.

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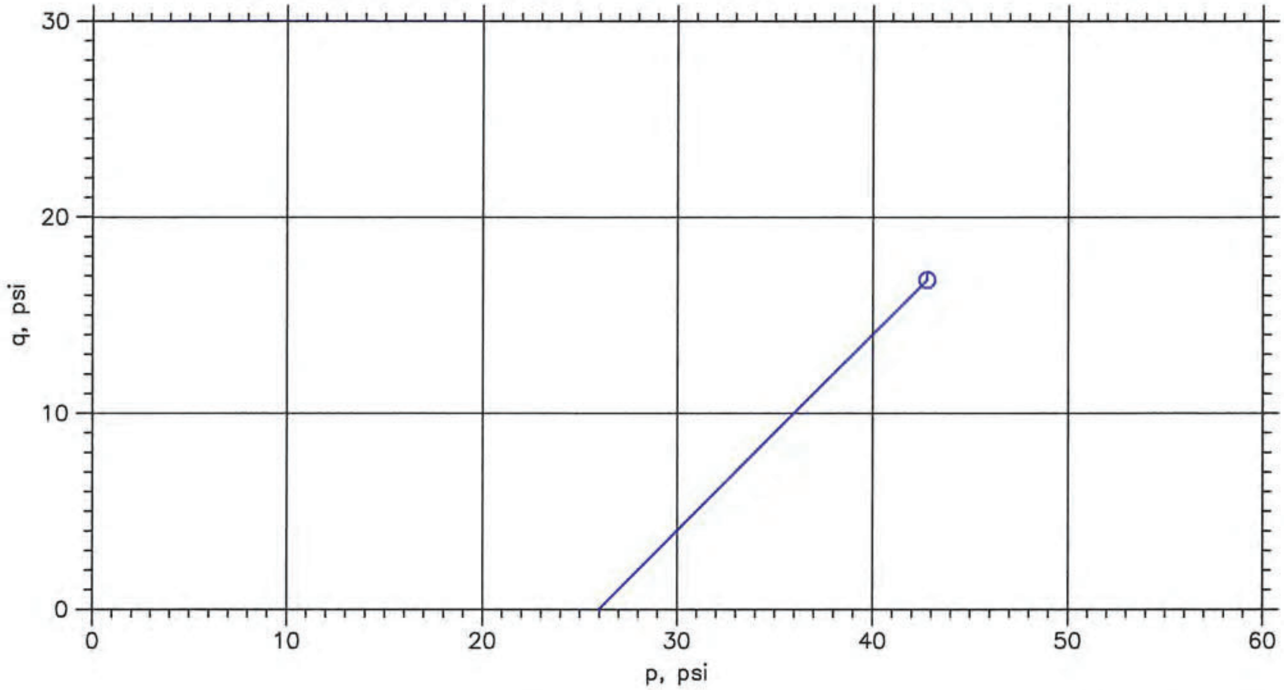
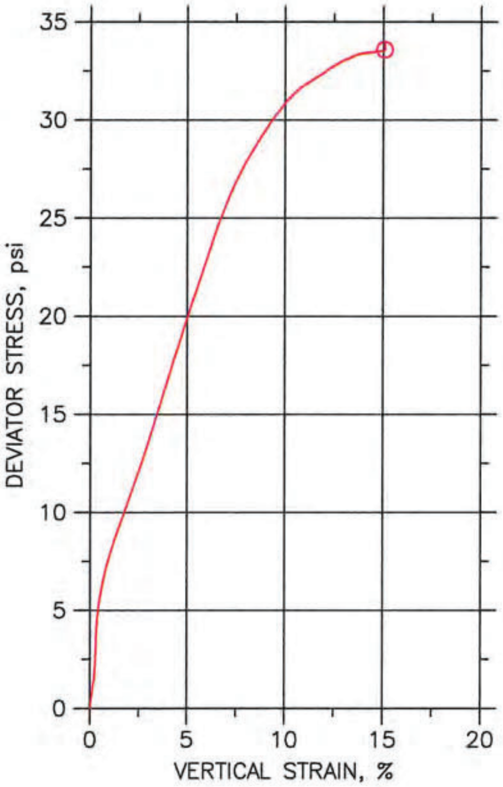
UNCONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D2850





Symbol	○			
Sample No.	T-1			
Test No.	UU-2			
Depth	52-54 ft			
Tested by	jm			
Test Date	4/25/16			
Checked by	mcm			
Check Date	05/06/16			
Diameter, in	2.84			
Height, in	6.529			
Water Content, %	20.1			
Dry Density, pcf	102.2			
Saturation, %	83.6			
Void Ratio	0.649			
Confining Stress, psi	26			
Undrained Strength, psi	16.78			
Max. Dev. Stress, psi	33.56			
Strain at Failure, %	15.1			
Strain Rate, %/min	1			
Estimated Specific Gravity	2.7			
Liquid Limit	73			
Plastic Limit	35			
Plasticity Index	38			

GeoTesting
EXPRESS

Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No.: GTX-304548
Boring No.: B-110
Sample Type: intact

Description: Moist, yellowish brown silt
Remarks: 1057

Phase calculations based on start and end of test.

Mon, 09-MAY-2

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/20/16	Checked By:	mcm
Depth :	---	Test Id:	373395		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-111	SS- 1	59-60.5 ft	Moist, olive brown clayey sand	25.6
B-111	SS- 2A	62-62.5 ft	Moist, olive brown clay with sand	36.4
B-111	SS- 3	65-66.5 ft	Moist, olive brown clayey sand	22.1
B-111	SS- 6	73-74.5 ft	Moist, dark olive gray clayey sand	13.7
B-111	SS- 9	88-89.4 ft	Moist, dark olive gray silty sand	15.9

Notes: Temperature of Drying : 110º Celsius

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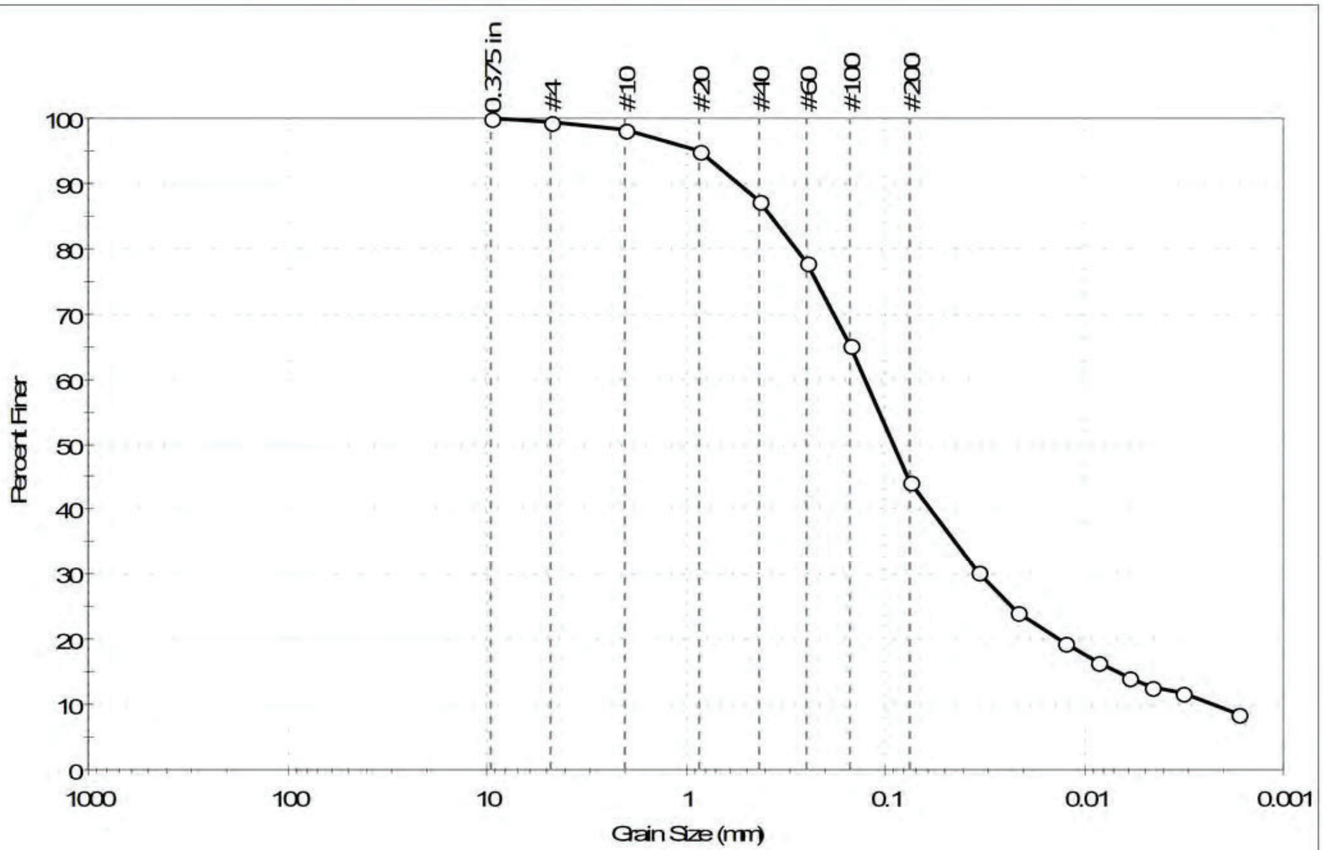
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-111	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-1	Test Date:	04/26/16	Checked By:	mcm
Depth :	59-60.5 ft	Test Id:	373396		

Test Comment: ---
Visual Description: Moist, olive brown clayey sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.6	55.1	44.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	98		
#20	0.85	95		
#40	0.42	87		
#60	0.25	78		
#100	0.15	65		
#200	0.075	44		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0338	31		
---	0.0217	24		
---	0.0127	20		
---	0.0085	16		
---	0.0060	14		
---	0.0046	13		
---	0.0032	12		
---	0.0017	9		

Coefficients

D_{85} =0.3732 mm	D_{30} =0.0325 mm
D_{60} =0.1262 mm	D_{15} =0.0068 mm
D_{50} =0.0907 mm	D_{10} =0.0022 mm
C_u =57.364	C_c =3.804

Classification

ASTM	N/A
AASHTO	Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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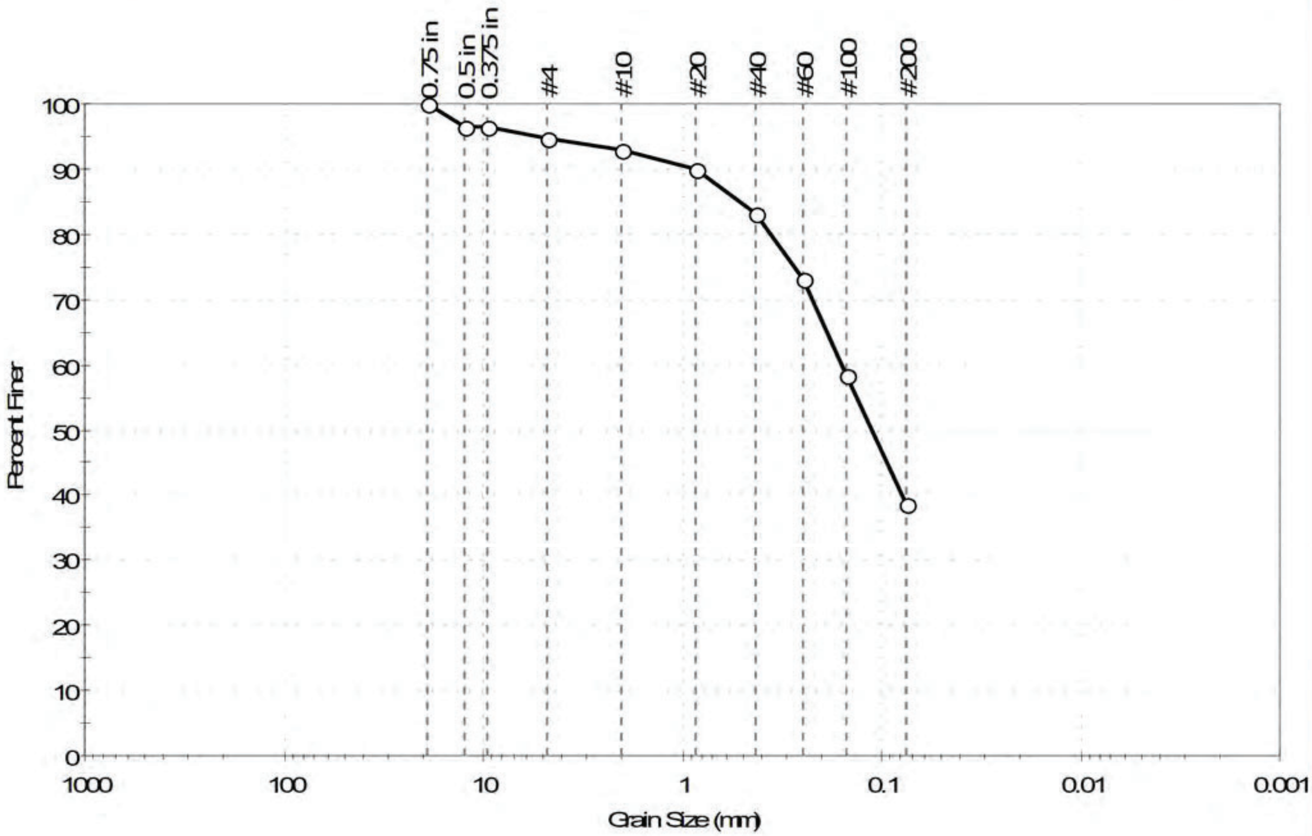
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-111
Sample Type: bag
Tested By: GA
Sample ID: SS-3
Test Date: 04/20/16
Checked By: mcm
Depth : 65-66.5 ft
Test Id: 373398

Test Comment: ---
Visual Description: Moist, olive brown clayey sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	5.4	55.9	38.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	96		
#4	4.75	95		
#10	2.00	93		
#20	0.85	90		
#40	0.42	83		
#60	0.25	73		
#100	0.15	58		
#200	0.075	39		

Coefficients

D_{85} = 0.5070 mm
D_{30} = N/A
D_{60} = 0.1589 mm
D_{15} = N/A
D_{50} = 0.1118 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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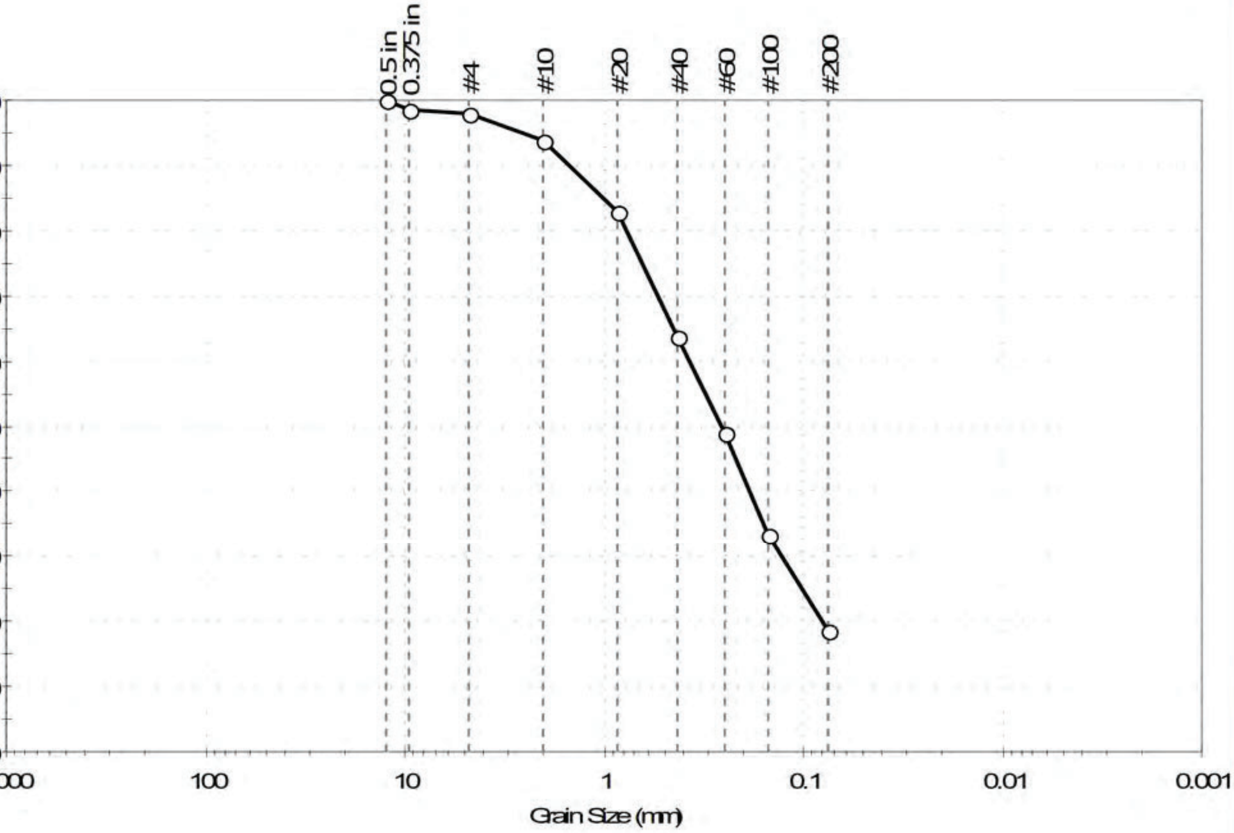
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-111	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-6	Test Date:	04/20/16	Checked By:	mcm
Depth :	73-74.5 ft	Test Id:	373399		

Test Comment: ---
Visual Description: Moist, dark olive gray clayey sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	2.1	79.4	18.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	99		
#4	4.75	98		
#10	2.00	94		
#20	0.85	83		
#40	0.42	64		
#60	0.25	49		
#100	0.15	33		
#200	0.075	18		

Coefficients

D_{85} = 0.9948 mm	D_{30} = 0.1289 mm
D_{60} = 0.3706 mm	D_{15} = N/A
D_{50} = 0.2596 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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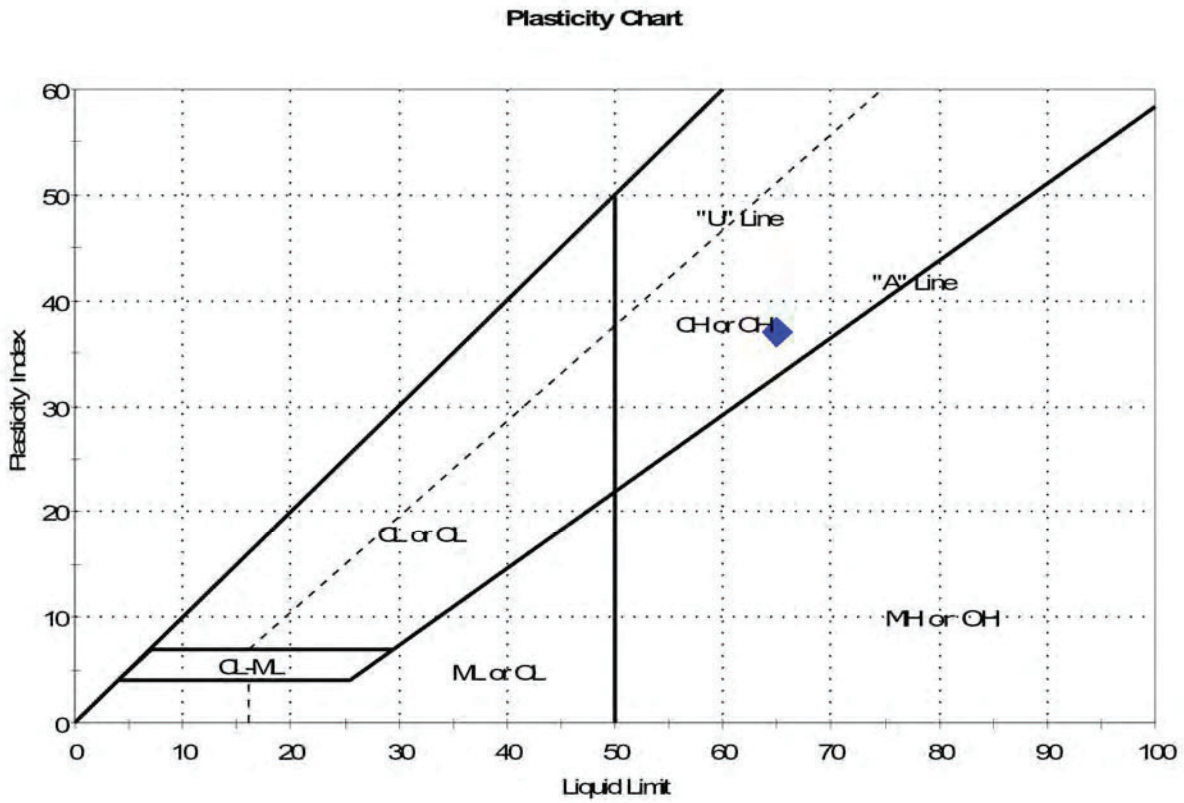
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA　Project No: GTX-304548
Boring ID: B-111　Sample Type: bag　Tested By: GA
Sample ID: SS-2A　Test Date: 04/20/16　Checked By: mcm
Depth : 62-62.5 ft　Test Id: 373397
Test Comment: ---
Visual Description: Moist, olive brown clay with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SS-2A	B-111	62-62.5 ft	36	65	28	37	0.2	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/20/16	Checked By:	mcm
Depth :	---	Test Id:	373407		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-112	SS- 1A	42.5-42.8 ft	Moist, reddish brown clay with sand	53.3
B-112	SS- 1B	42.8-44 ft	Moist, dark brown clay with sand	40.7
B-112	SS- 2	44.5-46 ft	Moist, brown clay with sand	26.4
B-112	SS- 4	47.5-49 ft	Moist, light grayish brown sandy clay	25.0
B-112	T- 2 (Tube)	54-56 ft	Moist, light olive brown silty sand	56.2
B-112	SS- 8	61-62.5 ft	Moist, olive gray clayey sand	35.9
B-112	SS- 10	71-72.5 ft	Moist, olive gray silty sand	19.9

Notes: Temperature of Drying : 110º Celsius

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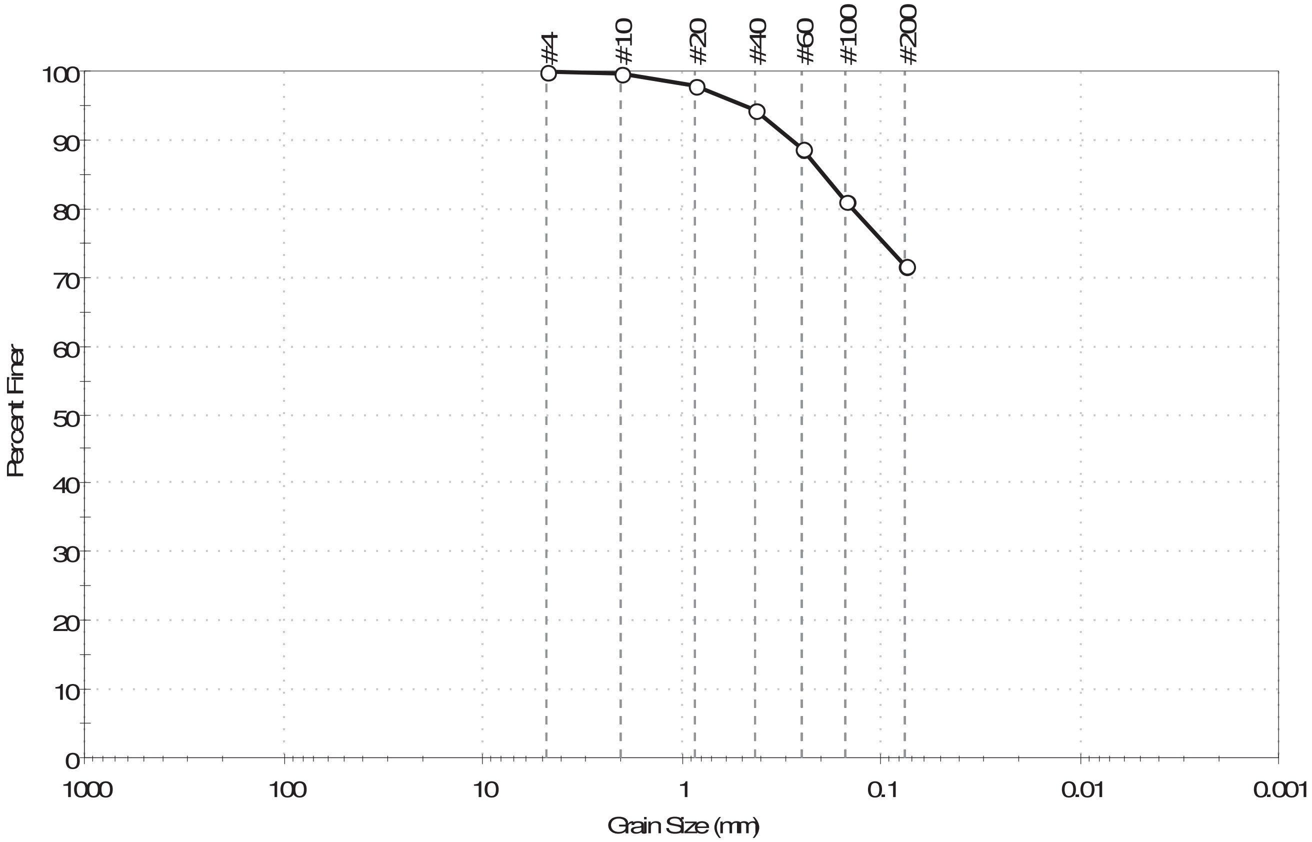
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-112	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-1A	Test Date:	04/20/16	Checked By:	mcm
Depth :	42.5-42.8 ft	Test Id:	373411		

Test Comment: ---
Visual Description: Moist, reddish brown clay with sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	28.3	71.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	94		
#60	0.25	89		
#100	0.15	81		
#200	0.075	72		

Coefficients

D_{85} =0.1935 mm
D_{30} =N/A
D_{60} =N/A
D_{15} =N/A
D_{50} =N/A
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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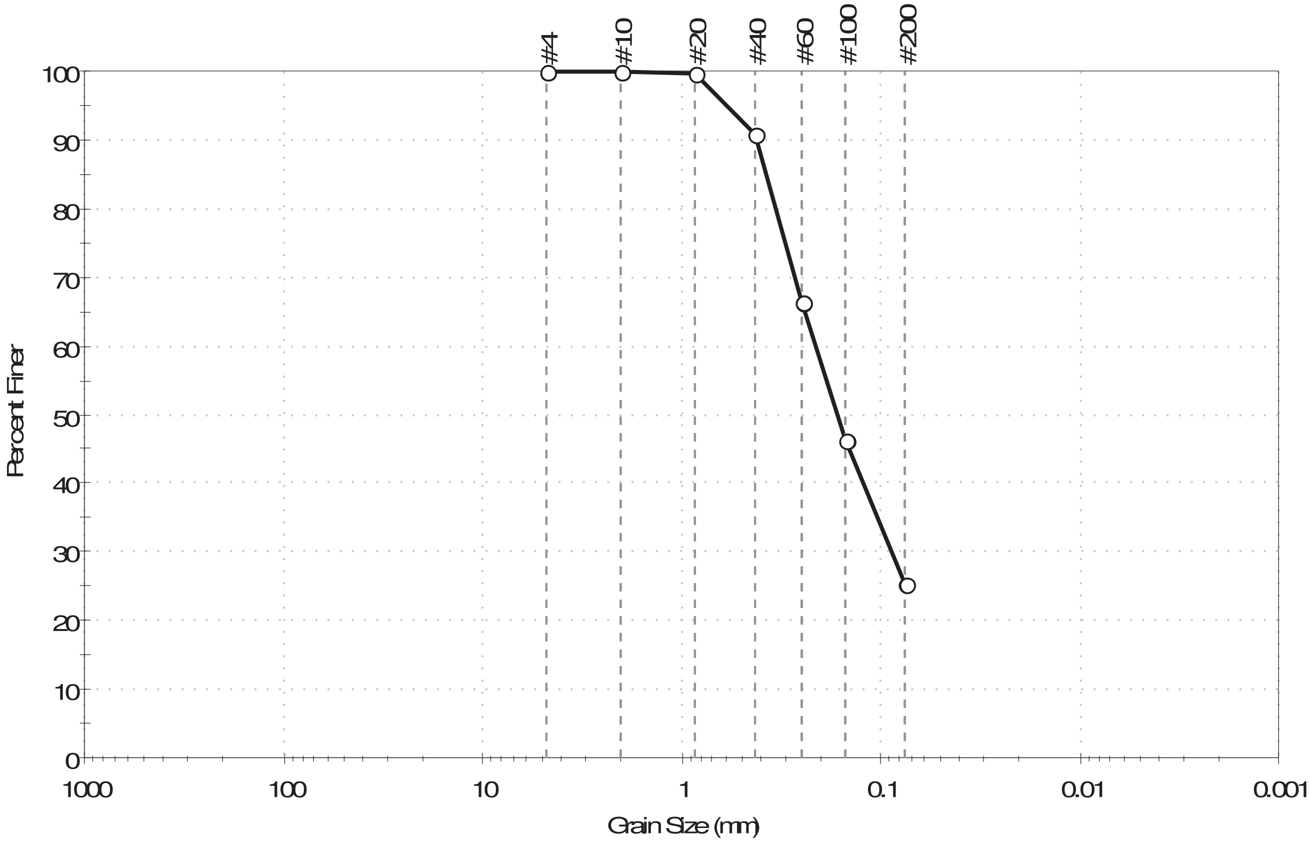
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-112	Sample Type:	tube	Tested By:	GA
Sample ID:	T-2 (Tube)	Test Date:	04/21/16	Checked By:	mcm
Depth :	54-56 ft	Test Id:	373412		

Test Comment: ---
Visual Description: Moist, light olive brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	74.8	25.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	91		
#60	0.25	66		
#100	0.15	46		
#200	0.075	25		

Coefficients

D_{85} =0.3748 mm
D_{30} =0.0877 mm
D_{60} =0.2125 mm
D_{15} =N/A
D_{50} =0.1646 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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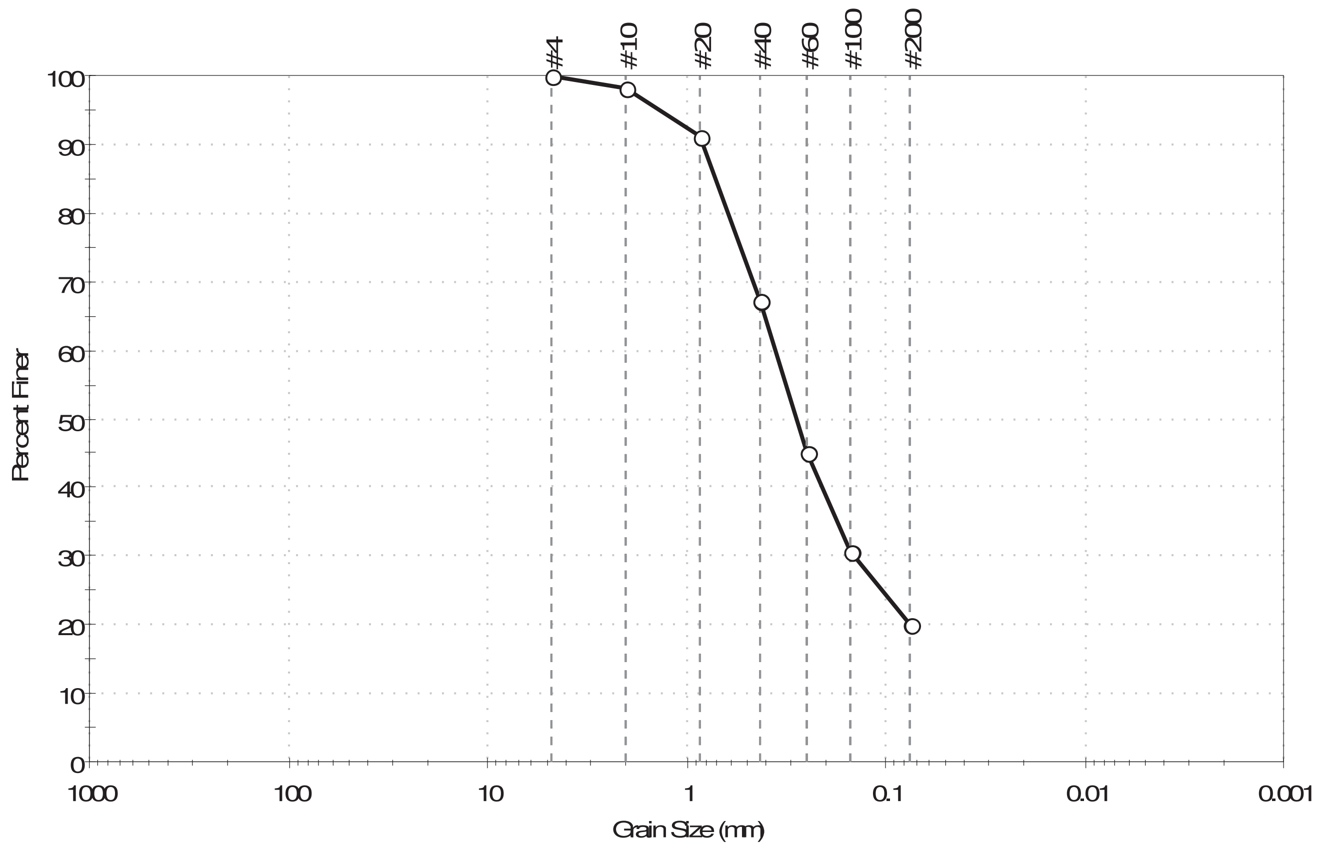
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-112
Sample Type: bag
Tested By: GA
Sample ID: SS-8
Test Date: 04/20/16
Checked By: mcm
Depth : 61-62.5 ft
Test Id: 373413
Test Comment: ---
Visual Description: Moist, olive gray clayey sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	79.9	20.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	98		
#20	0.85	91		
#40	0.42	67		
#60	0.25	45		
#100	0.15	31		
#200	0.075	20		

Coefficients

D_{85} =0.7089 mm
D_{30} =0.1430 mm
D_{60} =0.3569 mm
D_{15} =N/A
D_{50} =0.2808 mm
D_{10} =N/A
C_u =N/A
C_c =N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

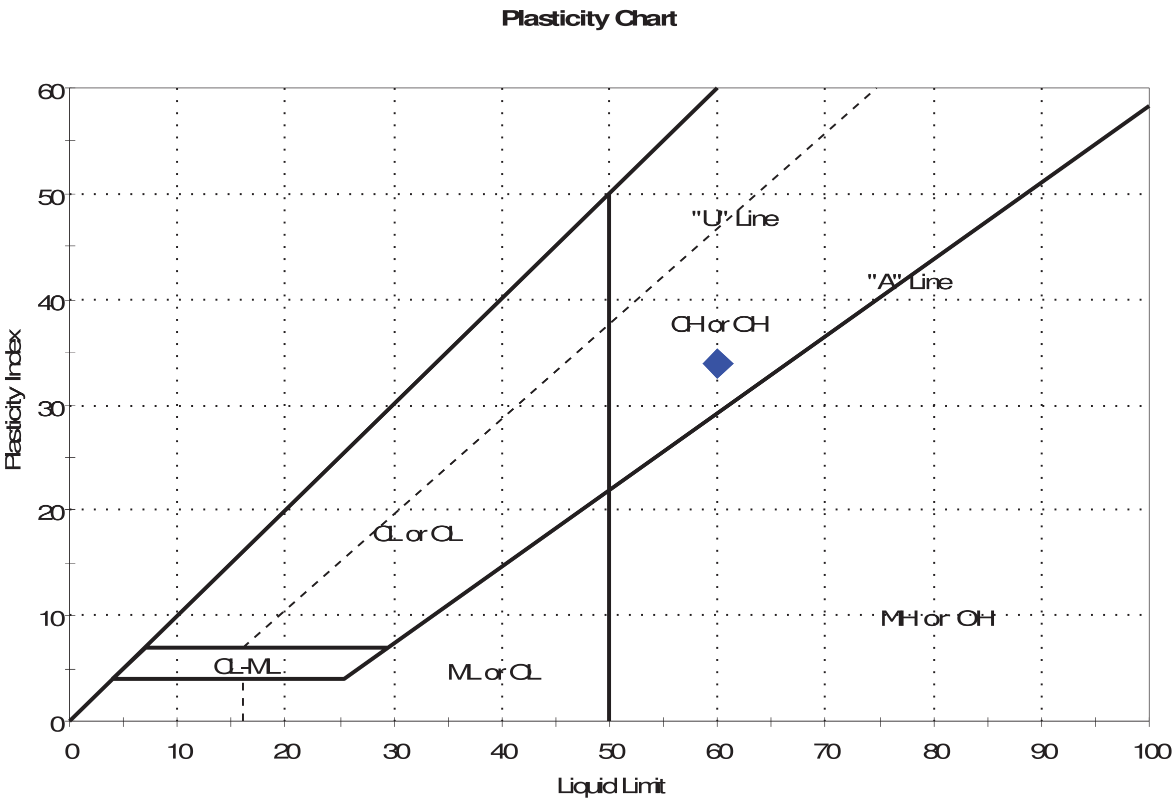
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-112	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-1B	Test Date:	04/20/16	Checked By:	mcm
Depth :	42.8-44 ft	Test Id:	373408		

Test Comment: ---

Visual Description: Moist, dark brown clay with sand

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SS-1B	B-112	42.8-44 ft	41	60	26	34	0.4	

Sample Prepared using the WET method

Dry Strength: HIGH

Dilatancy: NONE

Toughness: MEDIUM

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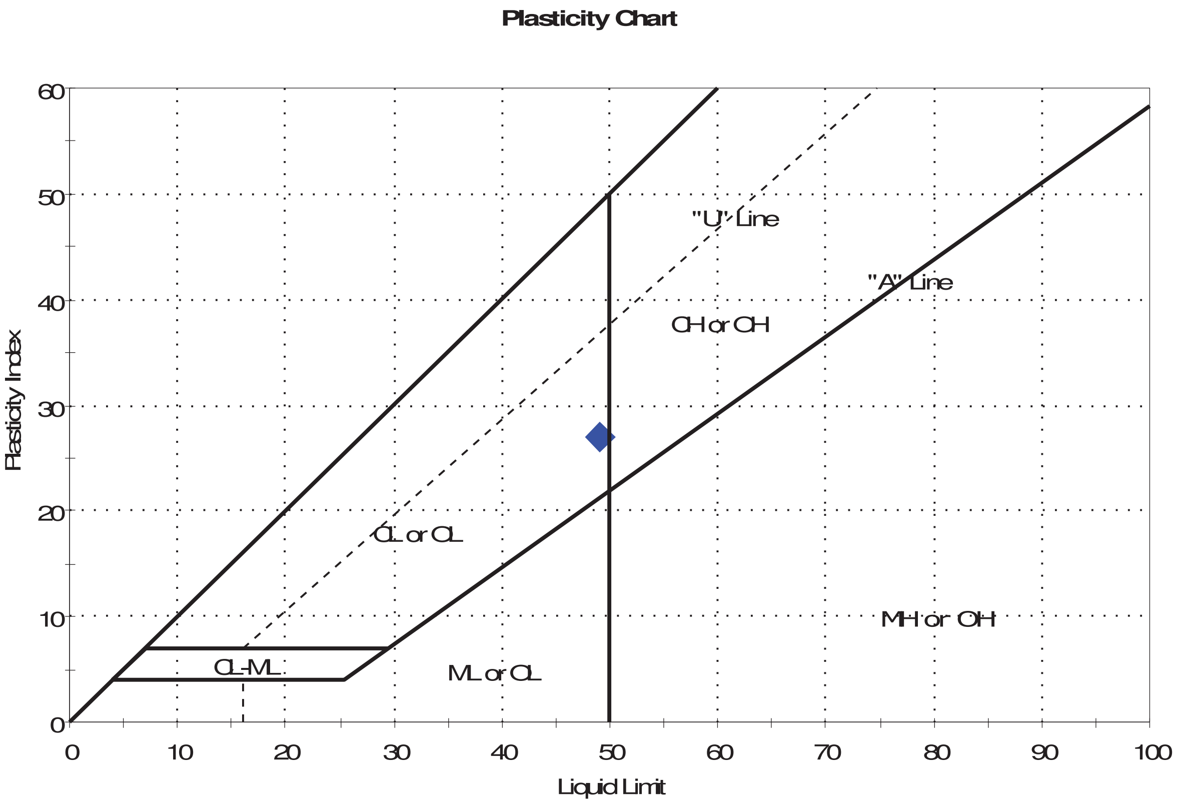
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-112	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-2	Test Date:	04/20/16	Checked By:	mcm
Depth :	44.5-46 ft	Test Id:	373409		

Test Comment: ---
Visual Description: Moist, brown clay with sand
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	SS-2	B-112	44.5-46 ft	26	49	22	27	0.2	

Sample Prepared using the WET method

Dry Strength: LOW
Dilatancy: NONE
Toughness: MEDIUM

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Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548
Boring ID: B-112
Sample Type: tube
Tested By: GA
Sample ID: T-2 (Tube)
Test Date: 04/21/16
Checked By: mcm
Depth : 54-56 ft
Test Id: 373410
Test Comment: ---
Visual Description: Moist, light olive brown silty sand
Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-2 (Tube)	B-112	54-56 ft	56	n/a	n/a	n/a	n/a	Silty sand (SM)

9% Retained on #40 Sieve
Dry Strength: NONE
Dilatancy: RAPID
Toughness: n/a
The sample was determined to be Non-Plastic

Client:	AECOM
Project Name:	SCS Plant Scherer Ph.2
Project Location:	Monroe County, GA
GTX #:	304548
Test Date:	04/25/16
Tested By:	jm
Checked By:	mcm

Dispersive Characteristics of Clay Soil by Double Hydrometer - ASTM D4221

Boring ID	Sample ID	Depth, ft.	Description	% Passing 5 Microns		% Dispersion
				ASTM D4221 (Double Hydrometer)	ASTM D422 (Grain Size)	
B-112	SS-2	44.5-46	Moist, brown clay with sand	14	40	35

Notes:

$$\% \text{ Dispersion} = \frac{\% \text{ Passing 5 microns in ASTM D 4221 (Double Hydrometer)}}{\% \text{ Passing 5 microns in ASTM D 422 (Grain Size)}}$$

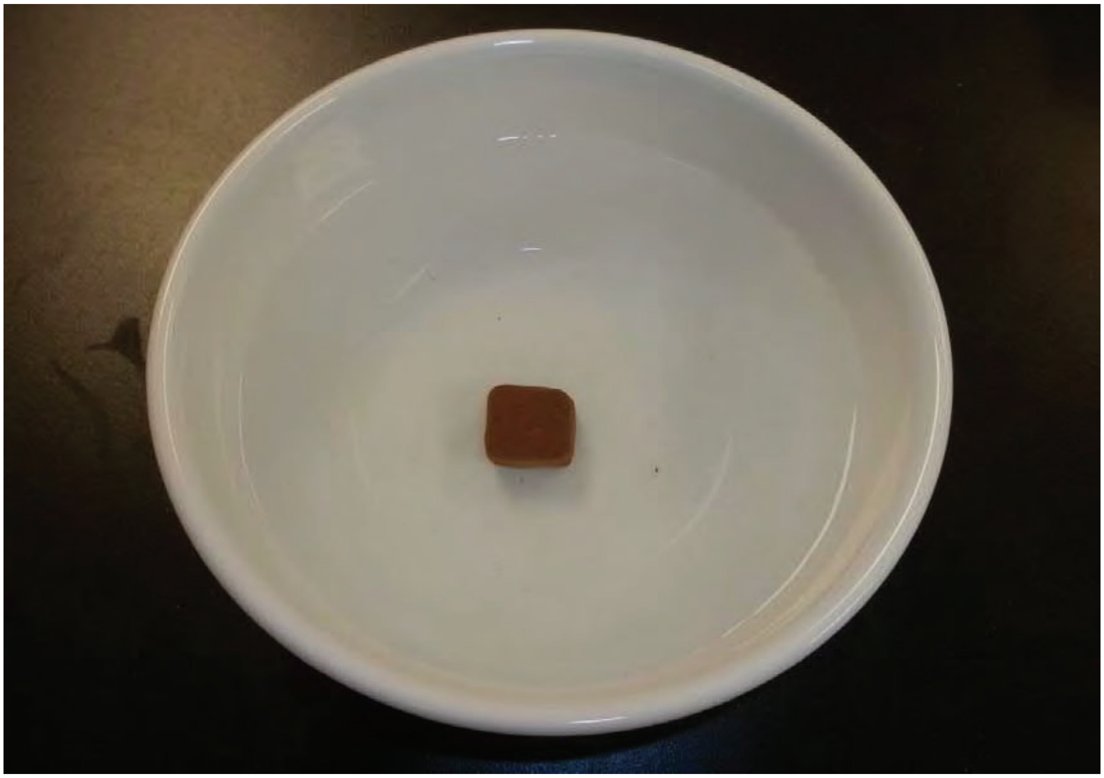
100 % = Dispersive Clay
0% = Non-Dispersive Clay

Client:	AECOM
Project Name:	SCS Plant Scherer Ph.2
Project Location:	Monroe County, GA
GTX #:	304548
Test Date:	04/26/16
Tested By:	jm
Checked By:	mcm

Determining Dispersive Characteristics of Clayey Soils by the Crumb Test ASTM D6572

Type of Test:	Method B - Remolded Crumb Cube
Natural Moisture Content. %:	40.7
Curing Time, min:	---
Time Test Started:	10:24 AM
Initial Water Temperature, °C:	21.5

Boring ID	Sample ID	Depth, ft	Visual Description	2 Minutes		1 Hour		6 hours	
				Grade	°C	Grade	°C	Grade	°C
B-112	SS-1B	42.8-44	Moist, dark brown clay with sand	1	21.5	1	21.5	1	21.7



Notes: Moisture content determined by ASTM D2216 at 110° C
Photo provided was taken after 6 hour reading

Client:	AECOM		
Project:	SCS Plant Scherer Ph.2		
Location:	Monroe County, GA	Project No:	GTX-304548

Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/20/16	Checked By:	mcm
Depth :	---	Test Id:	373419		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-113	SS- 1	12.5-12.9 ft	Moist, light olive brown clayey sand	31.5
B-113	T- 1 (TUBE)	15-17 ft	Moist, yellowish brown sandy silt	34.2
B-113	SS- 3	18.5-20 ft	Moist, yellowish red clay	43.4
B-113	SS- 4	20-21.5 ft	Moist, dark yellowish brown sandy silt	48.1
B-113	SS- 7	27-28.5 ft	Moist, olive gray sandy silt	18.5

Notes: Temperature of Drying : 110º Celsius

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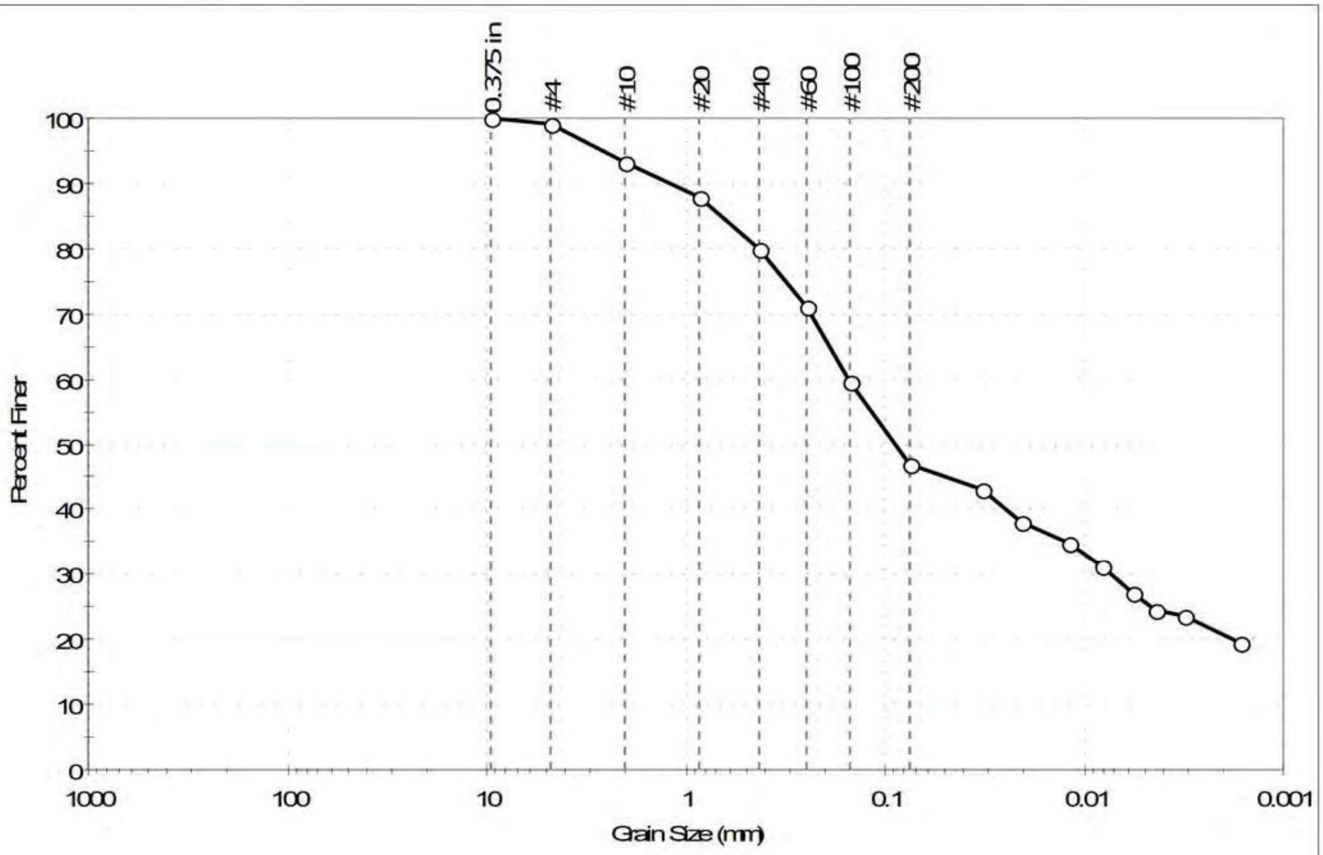
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID:	B-113	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-1	Test Date:	04/26/16	Checked By:	mcm
Depth :	12.5-12.9 ft	Test Id:	373421		

Test Comment: ---
Visual Description: Moist, light olive brown clayey sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.8	52.3	46.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	93		
#20	0.85	88		
#40	0.42	80		
#60	0.25	71		
#100	0.15	60		
#200	0.075	47		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0326	43		
---	0.0207	38		
---	0.0121	35		
---	0.0082	31		
---	0.0058	27		
---	0.0044	25		
---	0.0031	24		
---	0.0016	19		

Coefficients

D_{85} =0.6668 mm	D_{30} =0.0074 mm
D_{60} =0.1533 mm	D_{15} =N/A
D_{50} =0.0889 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Specific Gravity : 2.65
Separation of Sample: #200 Sieve

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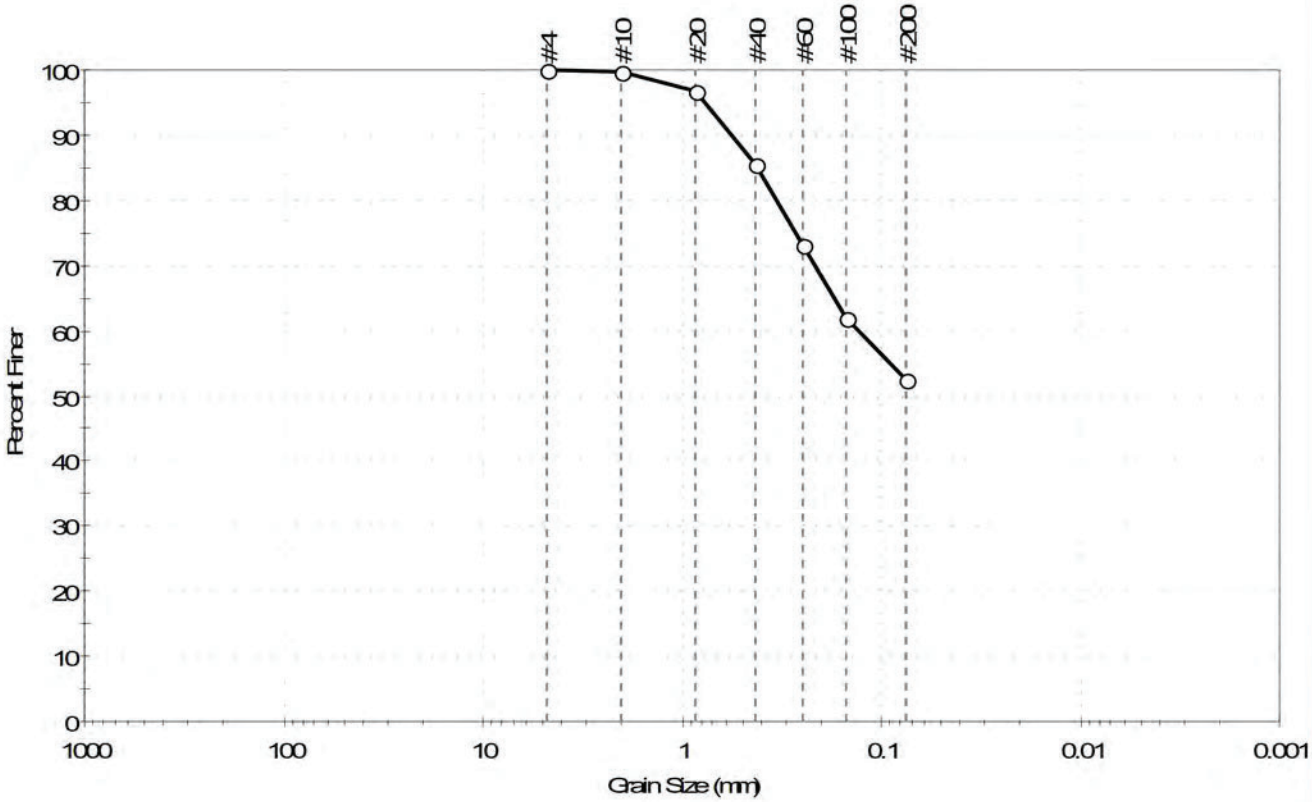
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-113	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/27/16	Checked By:	mcm
Depth :	15-17 ft	Test Id:	373786		

Test Comment: ---
Visual Description: Moist, yellowish brown sandy silt
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	47.5	52.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	97		
#40	0.42	85		
#60	0.25	73		
#100	0.15	62		
#200	0.075	52		

Coefficients

D_{85} =0.4167 mm	D_{30} =N/A
D_{60} =0.1305 mm	D_{15} =N/A
D_{50} =N/A	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM	Sandy Elastic silt (MH)
AASHTO	Clayey Soils (A-7-5 (13))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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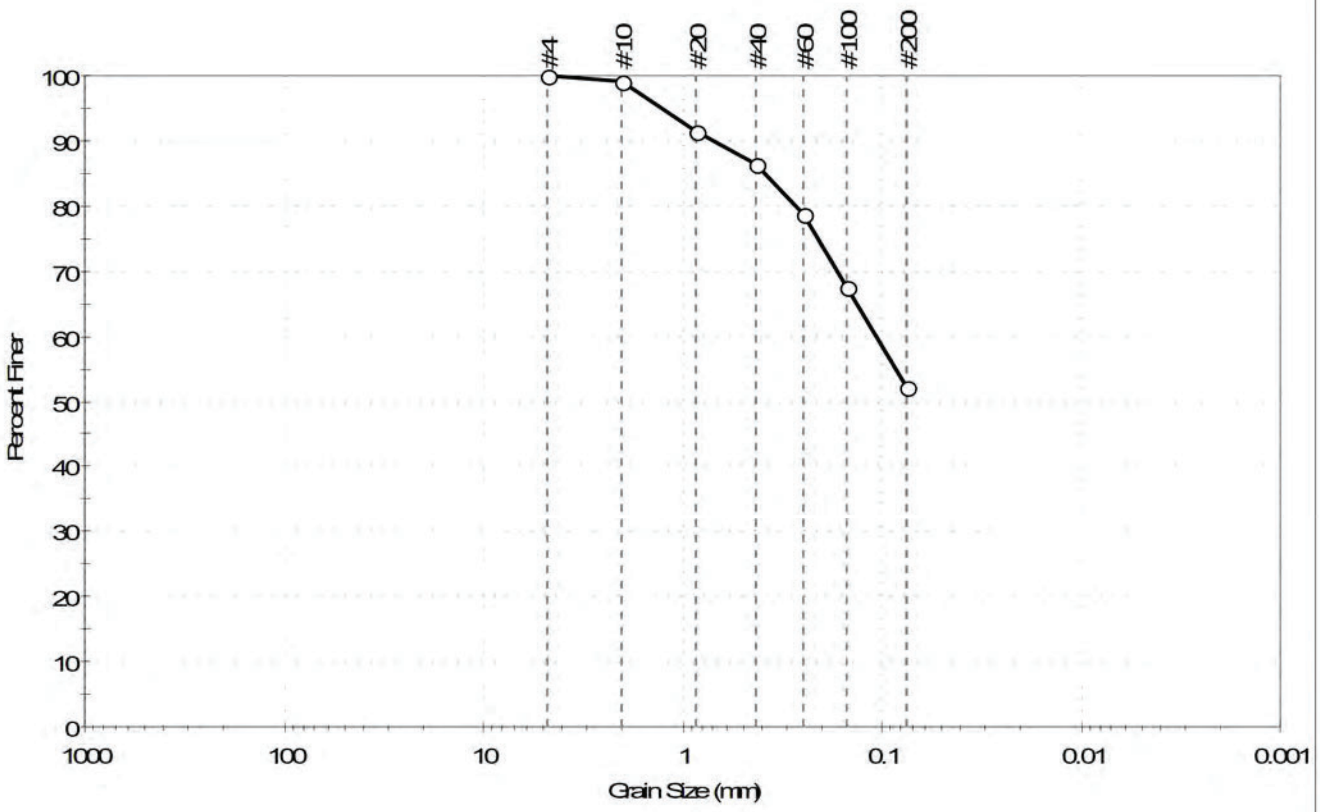
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-113	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-4	Test Date:	04/20/16	Checked By:	mcm
Depth :	20-21.5 ft	Test Id:	373422		

Test Comment: ---

Visual Description: Moist, dark yellowish brown sandy silt

Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	47.8	52.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	92		
#40	0.42	86		
#60	0.25	79		
#100	0.15	67		
#200	0.075	52		

Coefficients

D_{85} = 0.3879 mm

D_{30} = N/A

D_{60} = 0.1069 mm

D_{15} = N/A

D_{50} = N/A

D_{10} = N/A

C_u = N/A

C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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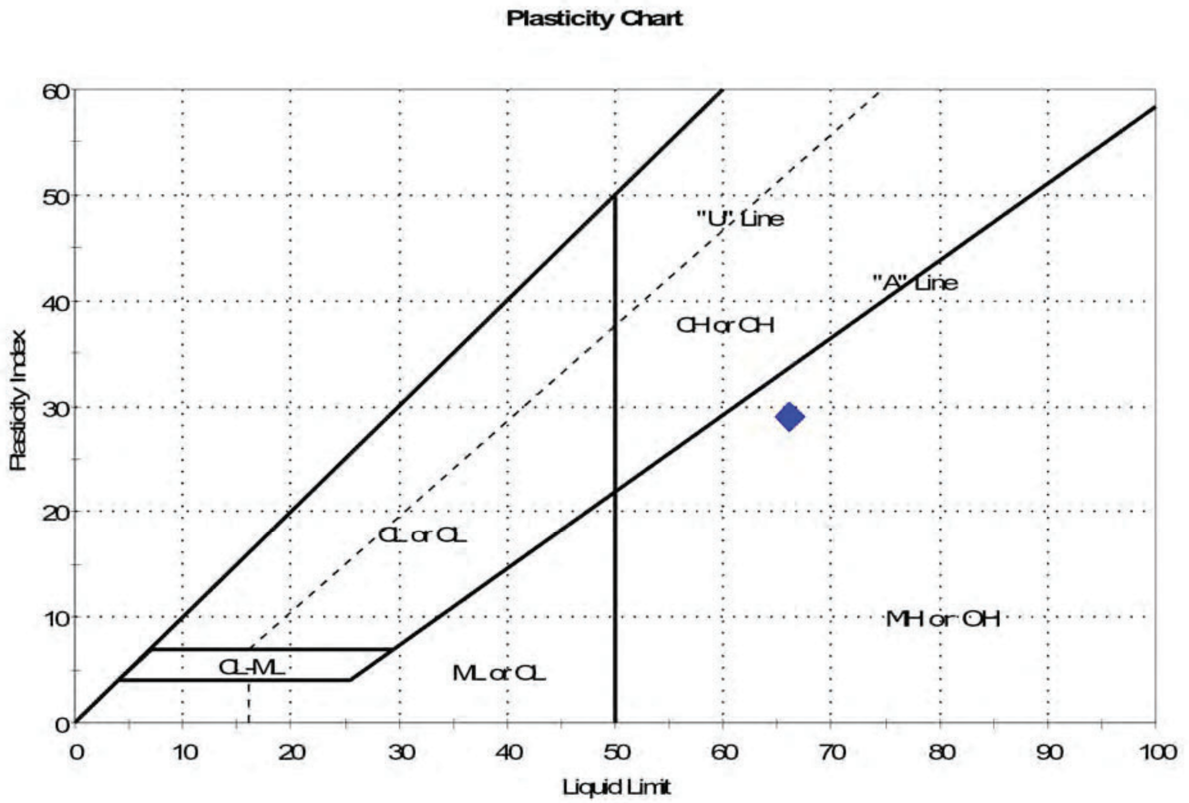
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-113	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/27/16	Checked By:	mcm
Depth :	15-17 ft	Test Id:	373420		

Test Comment: ---
Visual Description: Moist, yellowish brown sandy silt
Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-1 (TUBE)	B-113	15-17 ft	34	66	37	29	-0.1	Sandy Elastic silt (MH)

Sample Prepared using the WET method
15% Retained on #40 Sieve
Dry Strength: HIGH
Dilatancy: NONE
Toughness: MEDIUM

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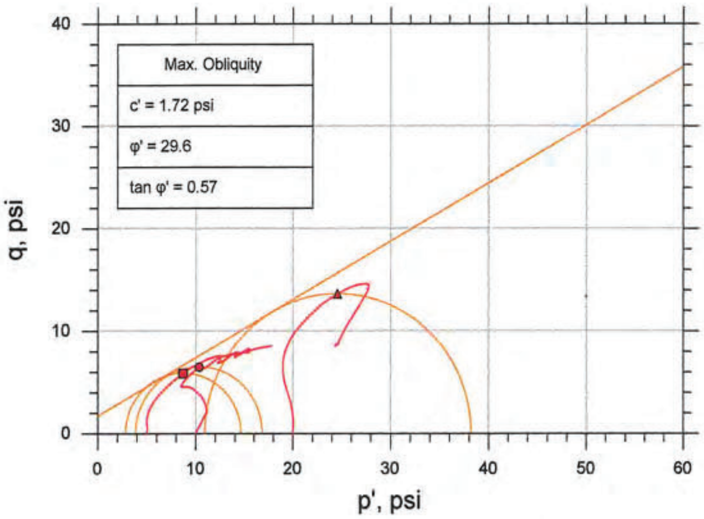
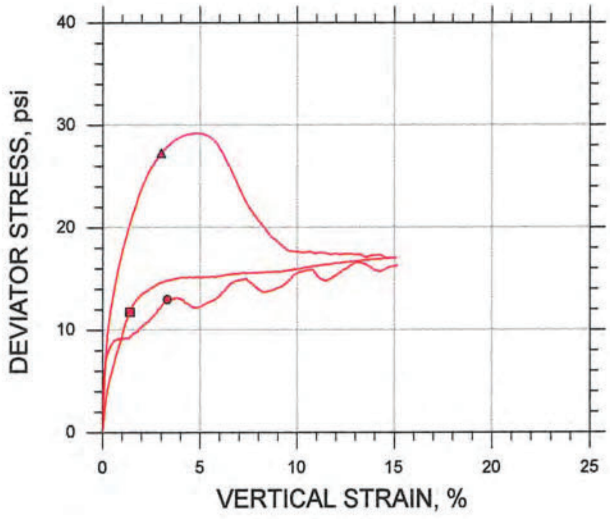
GeoTesting EXPRESS

Client: AECOM	
Project Name: SCS Plant Scherer Ph.2	
Project Location: Monroe County, GA	
Project Number: GTX-304548	
Tested By: jm	Checked By: mcm
Boring ID: B-113	
Preparation: intact	
Description: Moist, yellowish brown sandy silt	
Classification: Sandy Elastic silt	
Group Symbol: MH	
Liquid Limit: 66	Plastic Limit: 37
Plasticity Index: 29	Estimated Specific Gravity: 2.7

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767





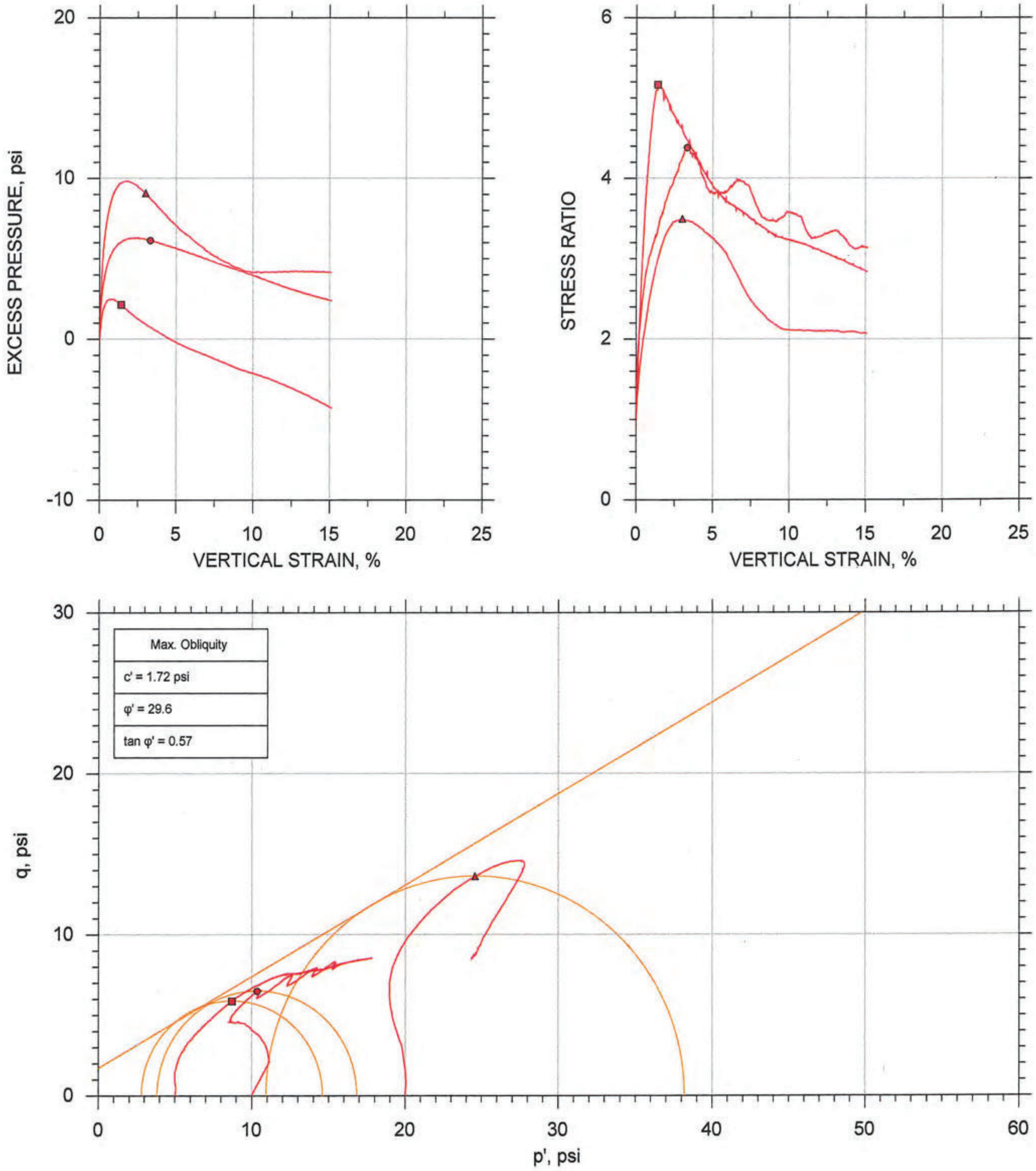
		■	●	▲	
Symbol		■	●	▲	
Sample ID		T-1 (TUBE)	T-1 (TUBE)	T-1 (TUBE)	
Depth, ft		15-17 ft	15-17 ft	15-17 ft	
Test Number		CU-14-1	CU-14-2	CU-14-3	
Initial	Height, in	6.066	6.052	6.202	
	Diameter, in	2.870	2.860	2.860	
	Moisture Content (from Cuttings), %	43.2	54.3	34.2	
	Dry Density, pcf	76.2	68.2	83.3	
	Saturation (Wet Method), %	96.3	99.5	90.0	
	Void Ratio	1.21	1.47	1.02	
Before Shear	Moisture Content, %	44.1	53.3	36.2	
	Dry Density, pcf	77.0	69.1	85.2	
	Cross-sectional Area (Method A), in²	6.427	6.374	6.339	
	Saturation, %	100.0	100.0	100.0	
	Void Ratio	1.19	1.44	0.979	
	Back Pressure, psi	71.00	65.01	74.99	
Vertical Effective Consolidation Stress, psi		5.002	9.970	19.97	
Horizontal Effective Consolidation Stress, psi		5.002	9.992	19.99	
Vertical Strain after Consolidation, %		0.1687	0.4724	0.8707	
Volumetric Strain after Consolidation, %		0.3702	1.101	2.048	
Time to 50% Consolidation, min		2.560	4.000	10.24	
Shear Strength, psi		5.884	6.500	13.63	
Strain at Failure, %		1.40	3.32	3.00	
Strain Rate, %/min		0.01600	0.01600	0.01600	
Deviator Stress at Failure, psi		11.77	13.00	27.26	
Effective Minor Principal Stress at Failure, psi		2.824	3.842	10.93	
Effective Major Principal Stress at Failure, psi		14.59	16.84	38.19	
B-Value		0.96	0.95	0.96	

Notes:
- Before Shear Saturation set to 100% for phase calculation.
- Moisture Content determined by ASTM D2216.
- Atterberg Limits determined by ASTM D4318.
- Deviator Stress includes membrane correction.
- Values for c and φ determined from best-fit straight line for the specific test conditions. Actual strength parameters may vary and should be determined by an engineer for site conditions.

Remarks:

System 1057

CONSOLIDATED UNDRAINED TRIAXIAL TEST by ASTM D4767



	Sample No.	Test No.	Depth	Tested By	Test Date	Checked By	Check Date	Test File
■	T-1 (TUBE)	CU-14-1	15-17 ft	jm	4/21/16	mcm	4/27/16	304548-CU-14-1m.dat
●	T-1 (TUBE)	CU-14-2	15-17 ft	jm	4/22/16	mcm	4/27/16	304548-CU-14-2m.dat
▲	T-1 (TUBE)	CU-14-3	15-17 ft	jm	4/21/16	mcm	4/27/16	304548-CU-14-3m.dat

GeoTesting EXPRESS

Project: SCS Plant Scherer Ph.2	Location: Monroe County, GA	Project No.: GTX-304548
Boring No.: B-113	Sample Type: intact	
Description: Moist, yellowish brown sandy silt		
Remarks: System 1057		

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	---	Sample Type:	---	Tested By:	GA
Sample ID:	---	Test Date:	04/20/16	Checked By:	mcm
Depth :	---	Test Id:	373430		

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-114	SS- 1A	28.5-28.9 ft	Wet, dark grayish brown clayey sand	70.2
B-114	SS- 1B	28.9-30 ft	Moist, brown sandy clay	30.5
B-114	SS- 2	30-31.5 ft	Moist, dark yellowish brown sandy clay	24.7
B-114	SS- 4	35-36.5 ft	Moist, reddish yellow clay	32.4
B-114	T- 1 (TUBE)	37-39 ft	Moist, dark yellowish brown silty sand	29.9
B-114	SS- 6	47-48.5 ft	Moist, grayish brown silty sand	18.1

Notes: Temperature of Drying : 110º Celsius

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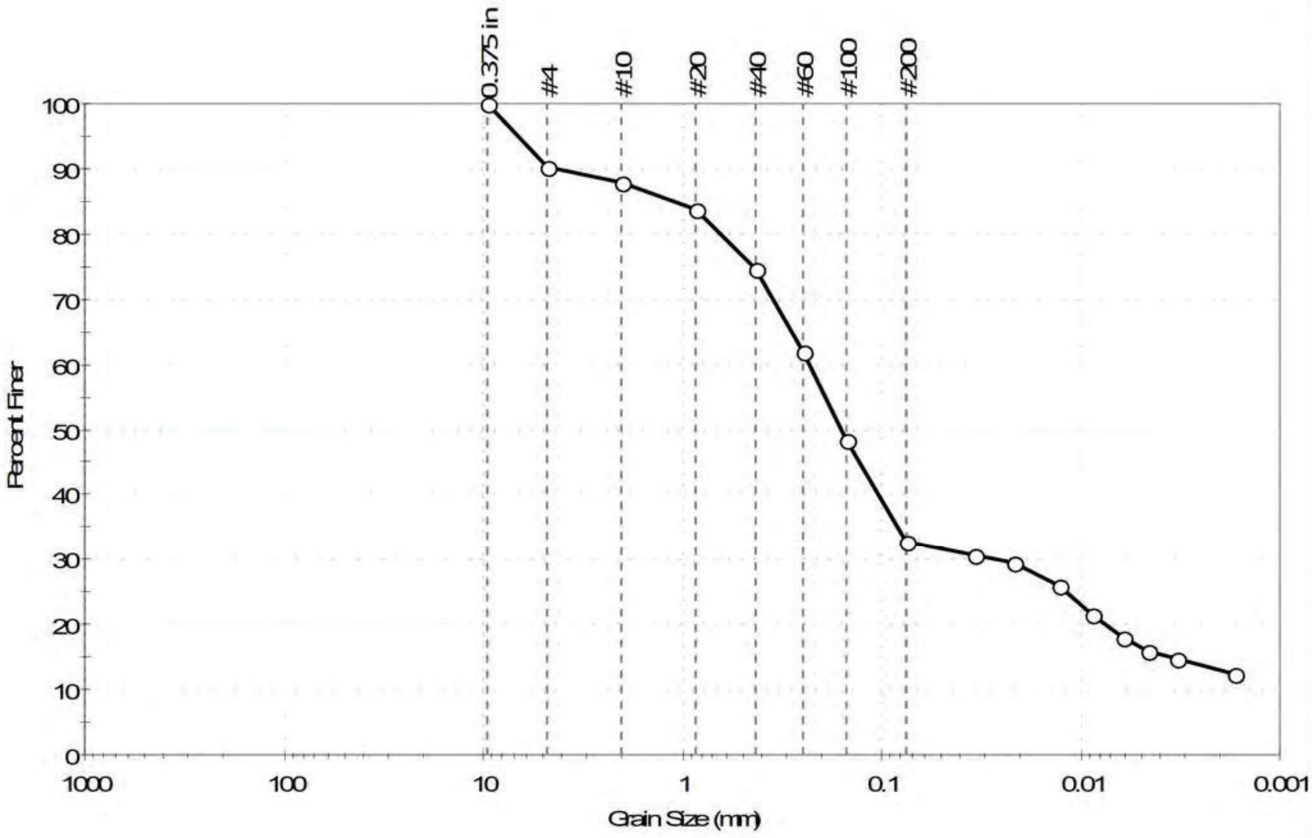
Client: AECOM
Project: SCS Plant Scherer Ph.2
Location: Monroe County, GA
Project No: GTX-304548

Boring ID: B-114
Sample ID: SS-1A
Depth : 28.5-28.9 ft
Sample Type: bag
Test Date: 04/26/16
Test Id: 373431
Tested By: GA
Checked By: mcm

Test Comment: ---
Visual Description: Wet, dark grayish brown clayey sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	9.7	57.6	32.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	90		
#10	2.00	88		
#20	0.85	84		
#40	0.42	75		
#60	0.25	62		
#100	0.15	48		
#200	0.075	33		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0340	31		
---	0.0219	29		
---	0.0128	26		
---	0.0088	22		
---	0.0061	18		
---	0.0046	16		
---	0.0033	15		
---	0.0017	12		

Coefficients

D_{85} = 1.1115 mm
D_{30} = 0.0273 mm
D_{60} = 0.2331 mm
D_{15} = 0.0035 mm
D_{50} = 0.1598 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Specific Gravity : 2.65

Separation of Sample: #200 Sieve

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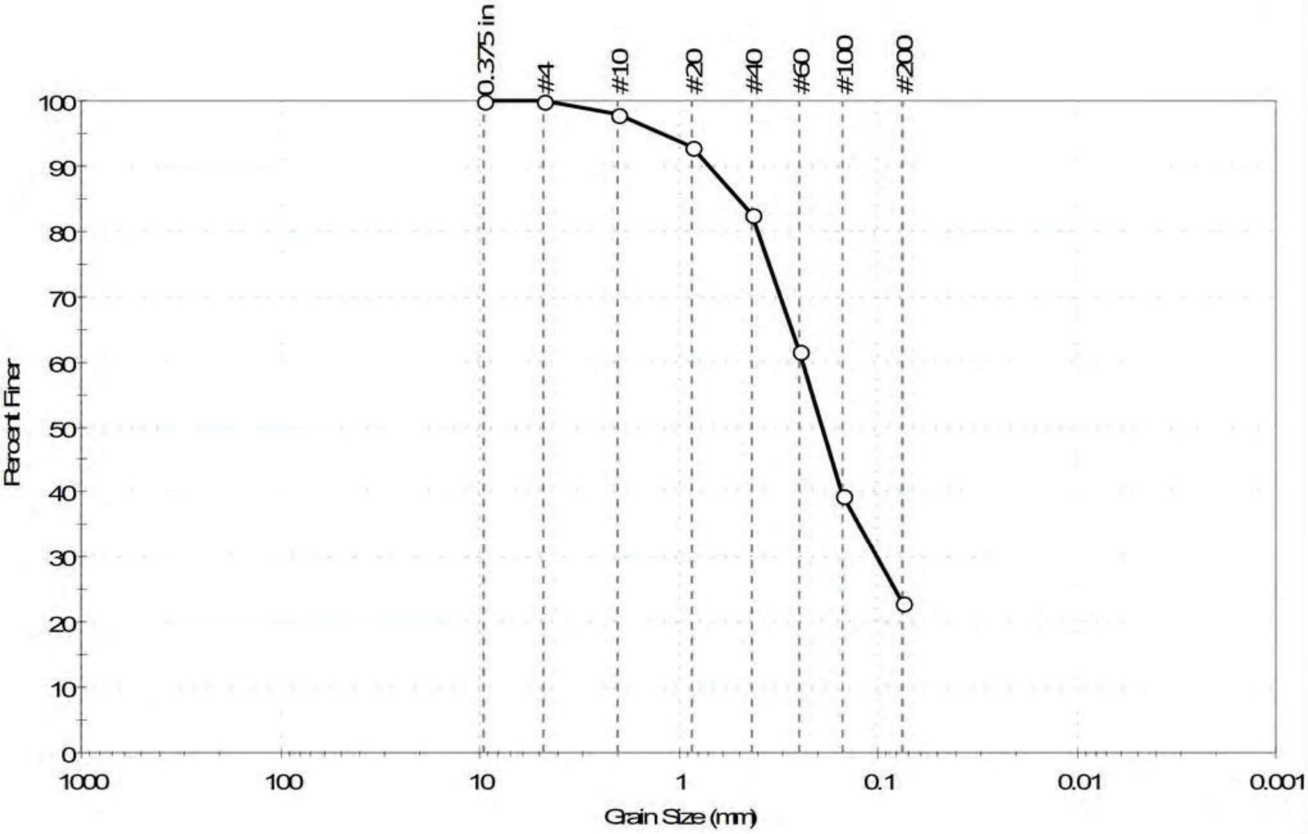
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-114	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/21/16	Checked By:	mcm
Depth :	37-39 ft	Test Id:	373433		

Test Comment: ---
Visual Description: Moist, dark yellowish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.1	76.9	23.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	98		
#20	0.85	93		
#40	0.42	83		
#60	0.25	62		
#100	0.15	39		
#200	0.075	23		

Coefficients

D_{85} =0.4991 mm	D_{30} =0.1009 mm
D_{60} =0.2402 mm	D_{15} =N/A
D_{50} =0.1912 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM Silty sand (SM)

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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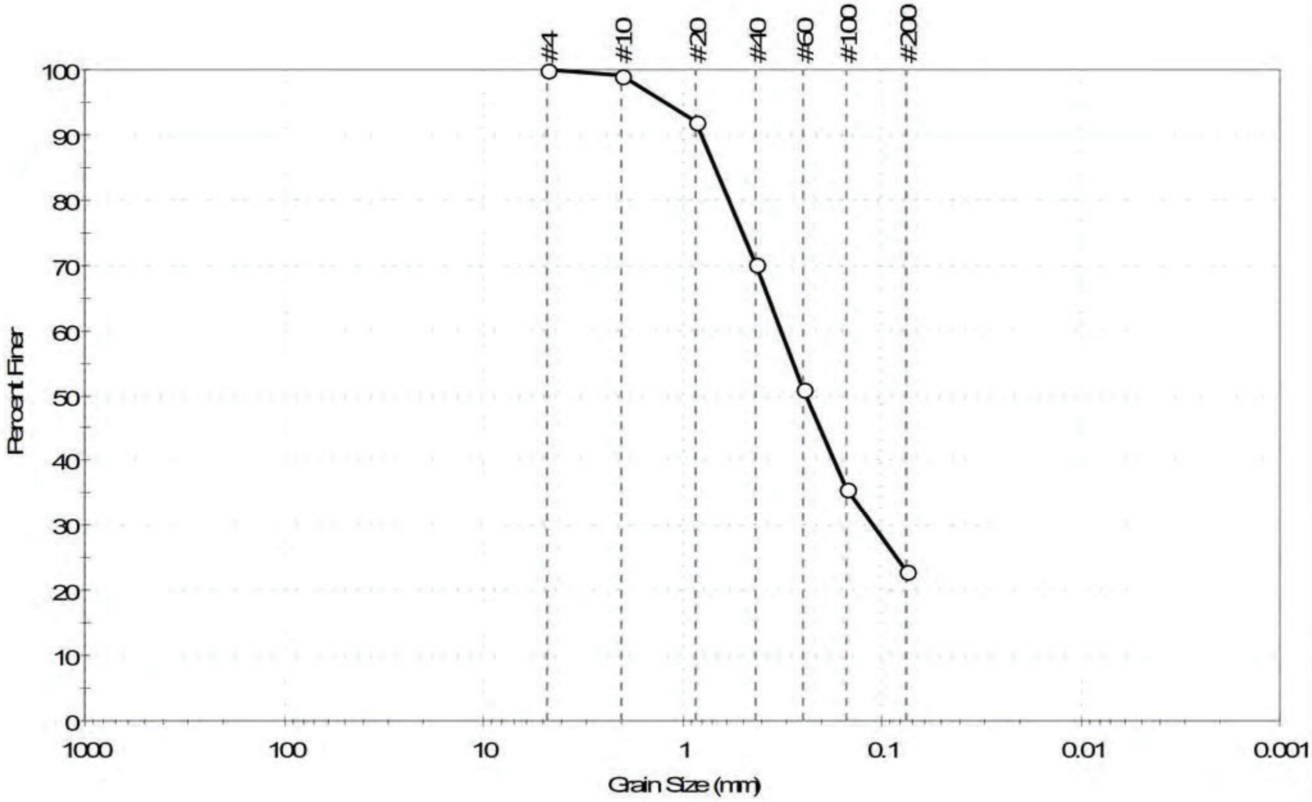
Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-114	Sample Type:	bag	Tested By:	GA
Sample ID:	SS-6	Test Date:	04/20/16	Checked By:	mcm
Depth :	47-48.5 ft	Test Id:	373434		

Test Comment: ---
Visual Description: Moist, grayish brown silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
—	0.0	76.9	23.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	92		
#40	0.42	70		
#60	0.25	51		
#100	0.15	36		
#200	0.075	23		

Coefficients

D_{85} = 0.6803 mm	D_{30} = 0.1099 mm
D_{60} = 0.3204 mm	D_{15} = N/A
D_{50} = 0.2416 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

printed 4/30/2016 11:20:45 AM

Client:	AECOM				
Project:	SCS Plant Scherer Ph.2				
Location:	Monroe County, GA			Project No:	GTX-304548
Boring ID:	B-114	Sample Type:	tube	Tested By:	GA
Sample ID:	T-1 (TUBE)	Test Date:	04/21/16	Checked By:	mcm
Depth :	37-39 ft	Test Id:	373432		

Test Comment: ---
Visual Description: Moist, dark yellowish brown silty sand
Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
◆	T-1 (TUBE)	B-114	37-39 ft	30	n/a	n/a	n/a	n/a	Silty sand (SM)

17% Retained on #40 Sieve

Dry Strength: NONE

Dilatancy: RAPID

Toughness: n/a

The sample was determined to be Non-Plastic

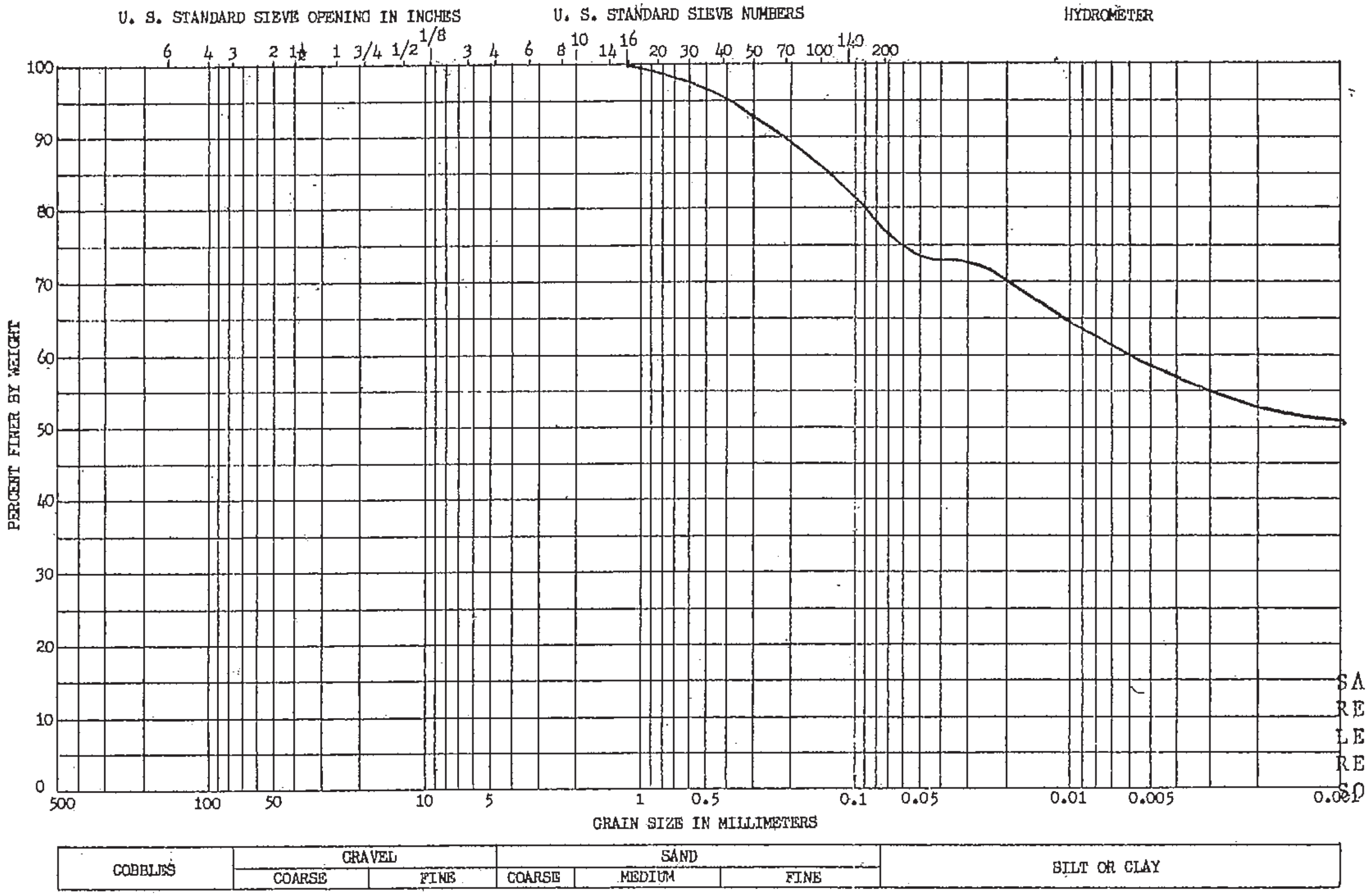
1978 Alabama Power Company Laboratory Testing

Alabama Power
construction department

GRAIN SIZE DISTRIBUTION CURVE

REPORT NO.

PROJECT GEORGIA POWER
LOCATION PLANT SCHERER R4-#2
BORING NO. Q-88 (PROCTOR #)
SAMPLE NO. 183
DATE 4-2-79
DEPTH 8"-2.0'
ELEVATION
LAB CENTRAL
TEST BY JBF,RM,RG
CHECKED BY JBF
SOIL DESCRIPTION REDDISH BROWN SANDY CLAYEY SILT
SOIL CLASS MH USC SYSTEM



LIQUID LIMIT 73
PLASTICITY INDEX 18
SPECIFIC GRAVITY 2.73
FIELD MOISTURE
PERMEABILITY
MAXIMUM DENSITY
OPTIMUM MOISTURE
DENSITY

[redacted]

SAMPLED BY JOEL MILLER
RECEIVED FROM JOEL MIL
LER ON 3-23-79
REPORTED TO MR. J.A. T
SON ON 4-2-79

QC Form 167 May 77

CON – 2938

ALABAMA POWER COMPANY

HYDROMETER TEST DATA SHEET

PROJECT G. P. LABORATORY ________ DATE 3/26/79

SAMPLE NO. 183 SOIL DESCRIPTION Reddish-Brown SANDY Clayey SILT - (MH)

TESTED BY B. E. & R. N. CHECKED BY ________

WT. AIR DRY SAMPLE 66.27 MOISTURE 1.7 % CORR. WT. OF SOIL 65.16

TARE # 96
WEIGHT 14.12

Dispersing Agent:
Kind Used ________
Amount ________
Hydrometer No. ________
Absolute Specific Gravity (G) ________
Starting Time 9:04

% Moisture
WW 80.61
DW 79.50
W_m 1.11

% M = 1.7 %

Time	Elapsed Time Minutes	Hydrometer Reading	Temperature Correction, ΔR	Corr. Hydrometer Reading (R)	Per Cent Soil in Suspension (P)	Temperature, ° ___	Grain Diameter, mm	Correction Coefficients Elev., K_L	G., K_g	Vis., K_n	Corrected Grain Diameter, mm	Per Cent of Total Sample < C. G. D.
	0.5						.111					
9:05	1.0	53.0	-5.0	48.0	73.7		.078				348	73.7
9:06	2.0	52.0	-5.0	47.0	72.1		.055				245	72.1
9:09	5.0	49.0	-5.0	44.0	67.5		.035				156	67.5
9:19	15.0	46.0	-5.0	41.0	62.9		.020				89	62.9
9:34	30.0	44.0	-5.0	39.0	59.9		.014				65	59.9
10:04	60.0	42.0	-5.0	37.0	56.8		.010				47	56.8
1:14	250	39.5	-5.0	34.5	52.9		.005				23	52.9
	1440	38.0	-5.0	33.0	50.6		.002				9.3	50.6

REMARKS:

	% Retained	% Passing
#16 0.0	0	100.0
#30 1.3	2.00	98.0
#50 4.6	7.06	92.94
#100 10.5	16.11	83.89
#200 15.2	23.33	76.67

#10 - 100% PASSING

CON – 3031

ALABAMA POWER COMPANY

ATTERBERG LIMIT WORK SHEET

PROJECT Georgia Power LABORATORY Central DATE 3-28-79
SAMPLE NO. 183 SOIL DESCRIPTION Red-Brown
LOCATION ______ BORING NO. ______ SAMPLE DEPTH ______

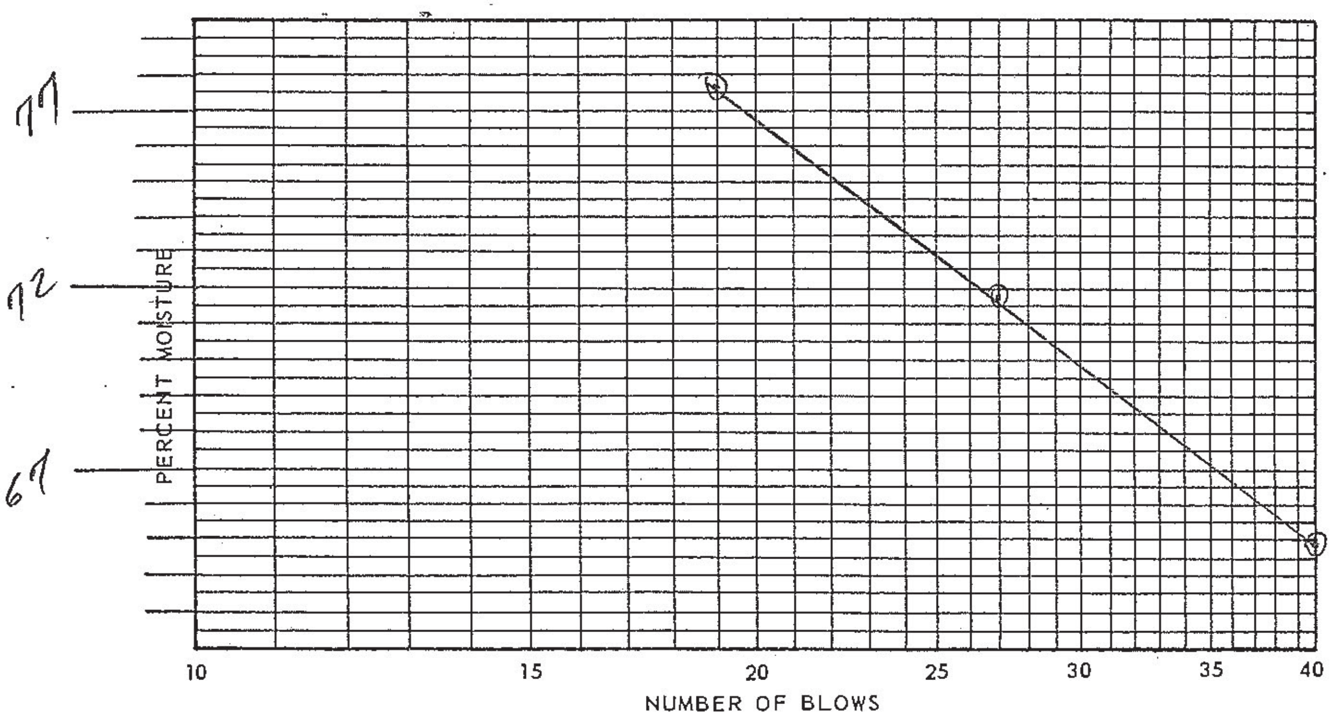
55

PLASTIC LIMIT 18 %

TARE# 4	%M 55.1	TARE# 5	%M 55.3	TARE#	%M
Ww 20.89	Dw 18.64	Ww 20.14	Dw 18.09	Ww	Dw
Dw 18.64	Tw 14.56	Dw 18.09	Tw 14.38	Dw	Tw
2.25	4.08	2.05	3.71		

LIQUID LIMIT 73 %

NO. BLOWS 19		NO. BLOWS 27		NO. BLOWS 40	
TARE# 1	%M 77.6	TARE# 2	%M 71.8	TARE# 3	%M 64.9
Ww 37.49	Dw 27.31	Ww 31.37	Dw 24.13	Ww 35.32	Dw 27.02
Dw 27.31	Tw 14.13	Dw 24.13	Tw 14.04	Dw 27.02	Tw 14.23
10.18	13.18	7.24	10.09	8.30	12.79



SHRINKAGE LIMIT ______ %

SHRINKAGE MOLD NO. ______ VOLUME

Wt SHRINKAGE MOLD EMPTY ______ = Tw
Wt SHRINKAGE MOLD + WET SOIL ______ = Ww
Wt SHRINKAGE MOLD + DRY SOIL ______ = Dw

Wt EMPTY ______
Wt FULL OF Hg ______
______ ÷ 13.6
Vw = ______ cc

SHRINKAGE LIMIT = $\frac{(Ww - Dw) - (Vw - Vd)\ Vw \times 100}{Dw - Tw}$

S. L. = $\frac{(\ -\ ) - (\ -\ )\ \times 100}{-}$

SHRINKAGE PAT VOLUME
Wt DISH FULL ______
Wt DISH FULL – VOL PAT ______
______ ÷ 13.6
Vd = ______ cc

REMARKS ______

TESTED BY RG CHECKED BY JBK

DATE 3-27-79 PROJECT GEORGIA POWER MATERIAL	**ALABAMA POWER COMPANY** LABORATORY AGGREGATE PHYSICAL TESTS	SAMPLE FROM: MATERIAL LAB. NO. 183
To be used for		TESTED BY

SPECIFICATIONS

tare #5
79.5
14.12

Specific Gravity & Absorption of Coarse Aggregate (WEIGHT IN GRAMS)

Wt. Sample Cont. in Air ______

Wt. of Container ______

Wt. Sample* in Air (B) ______

Wt. Sample** & Cont. in Water ______

Wt. Container in Water ______

Wt. Sample** in Water (C) ______

Wt. Oven Dry Sample (A) ______

*Saturated Surface Dry **Saturated

Specific Gravity:

Bulk = $\frac{A}{B-C}$ = $\frac{(\quad)}{(\quad)}$ = ______

Bulk (S. S. D.) = $\frac{B}{B-C}$ = $\frac{(\quad)}{(\quad)}$ = ______

Apparent = $\frac{A}{A-C}$ = $\frac{(\quad)}{(\quad)}$ = ______

Absorption - Percent:

$\frac{B-A}{A} \times 100$ = $\frac{(\quad)}{(\quad)}$ ______ %

Unit Weight: (Wt. in Lbs.)

	Loose	Compact*
Wt. Sample + Container		
Wt. Container		
Wt. Sample (E)		
Vol. of Container (F)		
Unit Wt. $\frac{E}{F}$		
	Pounds per cu. ft.	

Percent Voids = 100 − $\frac{\text{Unit Wt.} \times 100}{62.4 \times \text{Sp. Gr.}}$

Loose = 100 − $\frac{(\quad)}{(\quad)}$ = ______ %

Compact* = 100 − $\frac{(\quad)}{(\quad)}$ = ______ %

*Rodded ☐ or Jigged ☐

Specific Gravity & Absorption of Fine Aggregate (WEIGHT IN GRAMS)

Bottle NO. 4

Wt. Bottle + Water + Soil W_1 in g 712.31

Temperature in °C 21.0

Wt. Bottle + Water W_2 in g 670.81

Wt. Soil W_s in g oven dry A 65.38

Specific Gravity of Water at T, G_T 0.9980

Wt. Sample, Sat. Surface Dry B ______

$G_s = \frac{G_T W_s}{W_s - W_1 + W_2}$

Specific Gravity:

Bulk = $\frac{G_T W_s A}{W_s - W_1 + W_2}$ $\frac{(65.25)}{(23.88)}$ = 2.73

Bulk (S.S.D.) = $\frac{G_T W_s B}{W_s + W_1 + W_2}$ $\frac{(\quad)}{(\quad)}$ = ______

Apparent =

= $\frac{(\quad)}{(\quad)-(\quad)}$ = ______

Absorption = $\frac{B-A}{A} \times 100$ =

= $\frac{(\quad)}{(\quad)} \times 100$ = ______ %

TABLE A-2. SPECIFIC GRAVITY OF WATER*

°C	0	1	2	3	4	5	6	7	8	9
0	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9998
10	0.9997	0.9996	0.9995	0.9994	0.9993	0.9991	0.9990	0.9988	0.9986	0.9984
20	0.9982	0.9980	0.9978	0.9976	0.9973	0.9971	0.9968	0.9965	0.9963	0.9960
30	0.9957	0.9954	0.9951	0.9947	0.9944	0.9941	0.9937	0.9934	0.9930	0.9926
40	0.9922	0.9919	0.9915	0.9911	0.9907	0.9902	0.9898	0.9894	0.9890	0.9885
50	0.9881	0.9876	0.9872	0.9867	0.9862	0.9857	0.9852	0.9848	0.9843	0.9838
60	0.9832	0.9827	0.9822	0.9817	0.9811	0.9806	0.9800	0.9795	0.9789	0.9784
70	0.9778	0.9772	0.9767	0.9761	0.9755	0.9749	0.9743	0.9737	0.9731	0.9724
80	0.9718	0.9712	0.9706	0.9699	0.9693	0.9686	0.9680	0.9673	0.9667	0.9660
90	0.9653	0.9647	0.9640	0.9633	0.9626	0.9619	0.9612	0.9605	0.9598	0.9591

* Also the density or unit weight of water in grams per milliliter.
From *International Critical Tables*, Vol. III, McGraw-Hill Book Co., 1928.
147

REMARKS

Signed by:

NOTE: Method of Test used are latest applicable methods of the ASTM unless otherwise stated.

Form CON-2975
Rev - 4-25-75

CON – 2938

ALABAMA POWER COMPANY

HYDROMETER TEST DATA SHEET

PROJECT G. P. LABORATORY ______ DATE 3/26/79

SAMPLE NO. 182 SOIL DESCRIPTION Reddish Brown Sandy Clayey Silt (MH)

TESTED BY B. F. & R. N. CHECKED BY ______

WT. AIR DRY SAMPLE 67.72 MOISTURE 1.2 % CORR. WT. OF SOIL 66.92

TARE # 108
WEIGHT 14.25

Dispersing Agent:
Kind Used ______
Amount ______
Hydrometer No. ______
Absolute Specific Gravity (G) ______
Starting Time 9:02

% Moisture
WW 81.09
DW 80.32
W_m .77

% M = 1.2 %

Time	Elapsed Time Minutes	Hydrometer Reading	Temperature Correction, ΔR	Corr. Hydrometer Reading (R)	Per Cent Soil in Suspension (P)	Temperature, °	Grain Diameter, mm	Correction Coefficients Elev., K_L	G., K_g	Vis., K_n	Corrected Grain Diameter, mm	Per Cent of Total Sample < C. G. D.
	0.5						.111					
9:05	1.0	51.0	-5.0	46.0	68.7		.078				348	68.7
:04	2.0	48.0	-5.0	43.0	64.3		.055				245	64.3
:07	5.0	44.0	-5.0	39.0	58.3		.035				163	58.3
:17	15.0	40.0	-5.0	35.0	52.3		.020				93	52.3
:32	30.0	37.0	-5.0	32.0	47.8		.014				65	47.8
10:02	60.0	34.5	-5.0	29.5	44.1		.010				49	44.1
1:12	250	30.0	-5.0	25.0	37.4		.005				25	37.4
	1440	28.0	-5.0	23.0	34.4		.002				9.8	34.4

REMARKS:

		% Retained	% Passing
#16	0.0	0	100.0
#30	1.5	2.24	97.26
#50	4.9	7.32	92.68
#100	11.9	17.78	82.22
#200	18.1	27.05	72.95

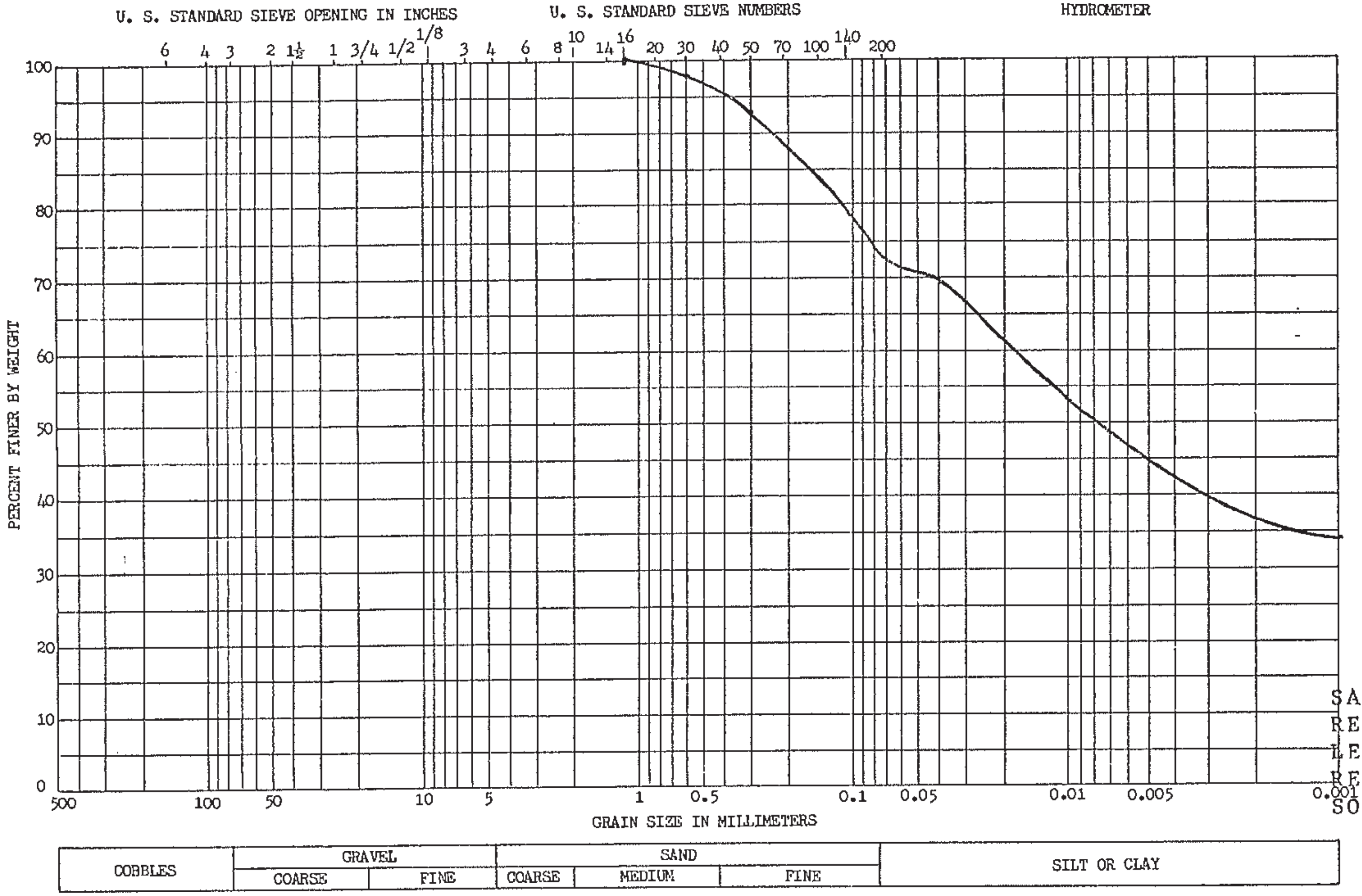
#10 – 100% PASSING

Alabama Power
construction department

GRAIN SIZE DISTRIBUTION CURVE

REPORT NO.

PROJECT GEORGIA POWER
LOCATION PLANT SCHERER R4-#1
BORING NO. Q-90 (PROCTOR #)
SAMPLE NO. 182
DATE 4-2-79
DEPTH 7.0-9.0'
ELEVATION
LAB CENTRAL
TEST BY JBF, RN, RG
CHECKED BY JBF
SOIL DESCRIPTION REDDISH BROWN SANDY CLAYEY SILT
SOIL CLASS MH USC SYSTEM



LIQUID LIMIT 68
PLASTICITY INDEX 11
SPECIFIC GRAVITY 2.77
FIELD MOISTURE
PERMEABILITY
MAXIMUM DENSITY
OPTIMUM MOISTURE
DENSITY

SAMPLED BY JOEL MILLER
RECEIVED FROM JOEL MIL-
LER ON 3-23-79
REPORTED TO MR. J.A. TY
SON ON 4-2-79

QC Form 167 May 77

DATE 3-27-79

PROJECT GEORGIA POWER

MATERIAL

ALABAMA POWER COMPANY

LABORATORY
AGGREGATE PHYSICAL TESTS

SAMPLE FROM:

MATERIAL

LAB. NO. 182

To be used for

TESTED BY

SPECIFICATIONS

Specific Gravity & Absorption of Coarse Aggregate (WEIGHT IN GRAMS)

Wt. Sample Cont. in Air	
Wt. of Container	
Wt. Sample* in Air (B)	
Wt. Sample** & Cont. in Water	
Wt. Container in Water	
Wt. Sample** in Water (C)	
Wt. Oven Dry Sample (A)	

*Saturated Surface Dry **Saturated

Specific Gravity:

Bulk = $\frac{A}{B-C}$ = $\frac{(\quad)}{(\quad)}$ =

Bulk (S. S. D.) = $\frac{B}{B-C}$ = $\frac{(\quad)}{(\quad)}$ =

Apparent = $\frac{A}{A-C}$ = $\frac{(\quad)}{(\quad)}$ =

Absorption - Percent:

$\frac{B-A}{A} \times 100$ = $\frac{(\quad)}{(\quad)}$ = %

Unit Weight: (Wt. in Lbs.)

	Loose	Compact*
Wt. Sample + Container		
Wt. Container		
Wt. Sample (E)		
Vol. of Container (F)		
Unit Wt. $\frac{E}{F}$		

Pounds per cu. ft.

Percent Voids = 100 − $\frac{\text{Unit Wt.} \times 100}{62.4 \times \text{Sp. Gr.}}$

Loose = 100 − $\frac{(\quad)}{(\quad)}$ = %

Compact* = 100 − $\frac{(\quad)}{(\quad)}$ = %

*Rodded ☐ or Jigged ☐

Specific Gravity & Absorption of Fine Aggregate (WEIGHT IN GRAMS)

tare #10
80.32
14.25

Bottle NO.	3
Wt. Bottle + water + Soil W_1 in g	712.03
Temperature in °C	21.0
Wt. Bottle + Water W_2 in g	669.77
Wt. Soil W_s in g oven dry A	66.07
Specific Gravity of Water at T, G_T.	0.9980
Wt. Sample, Sat. Surface Dry B	

$G_s = \frac{G_T W_s}{W_s - W_1 + W_2}$

Specific Gravity:

Bulk = $\frac{G_T W_s A}{W_s - W_1 + W_2}$ = $\frac{(65.94)}{(23.81)}$ = 2.77

Bulk (S.S.D.) = $\frac{G_T W_s B}{W_s - W_1 + W_2}$ = $\frac{(\quad)}{(\quad)}$ =

Apparent = $\frac{(\quad)}{(\quad)-(\quad)}$ =

Absorption = $\frac{B-A}{A} \times 100$ = $\frac{(\quad)}{(\quad)} \times 100$ = %

TABLE A-2. SPECIFIC GRAVITY OF WATER*

°C	0	1	2	3	4	5	6	7	8	9
0	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9998
10	0.9997	0.9996	0.9995	0.9994	0.9993	0.9991	0.9990	0.9988	0.9986	0.9984
20	0.9982	0.9980	0.9978	0.9976	0.9973	0.9971	0.9968	0.9965	0.9963	0.9960
30	0.9957	0.9954	0.9951	0.9947	0.9944	0.9941	0.9937	0.9934	0.9930	0.9926
40	0.9922	0.9919	0.9915	0.9911	0.9907	0.9902	0.9898	0.9894	0.9890	0.9885
50	0.9881	0.9876	0.9872	0.9867	0.9862	0.9857	0.9852	0.9846	0.9842	0.9838
60	0.9832	0.9827	0.9822	0.9817	0.9811	0.9806	0.9800	0.9795	0.9789	0.9784
70	0.9778	0.9772	0.9767	0.9761	0.9755	0.9749	0.9743	0.9737	0.9731	0.9724
80	0.9718	0.9712	0.9706	0.9699	0.9693	0.9686	0.9680	0.9673	0.9667	0.9660
90	0.9653	0.9647	0.9640	0.9633	0.9626	0.9619	0.9612	0.9605	0.9598	0.9591

* Also the density or unit weight of water in grams per milliliter.
From *International Critical Tables*, Vol. III, McGraw-Hill Book Co., 1928.
247

REMARKS

Signed by:

NOTE: Method of Test used are latest applicable methods of the ASTM unless otherwise stated.

Form CON-2975
Rev - 4-25-75

CON – 3031

ALABAMA POWER COMPANY
ATTERBERG LIMIT WORK SHEET

PROJECT Georgia Power LABORATORY Central DATE 3-28-79
SAMPLE NO. 182 SOIL DESCRIPTION Red-Brown
LOCATION ______ BORING NO. ______ SAMPLE DEPTH ______

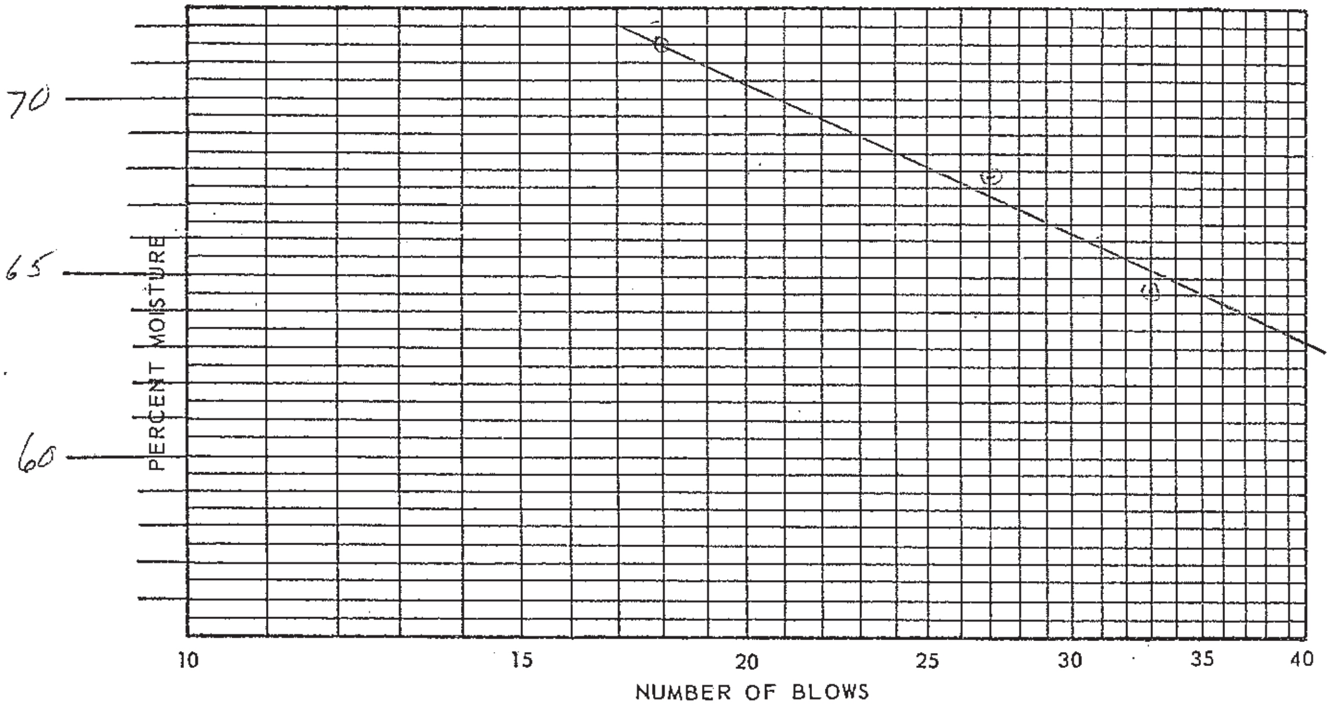
(57)

PLASTIC LIMIT 11 %

TARE #	9	%M	56.1	TARE #	10	%M	57.4	TARE #		%M	
Ww	20.68	Dw	18.35	Ww	22.49	Dw	19.48	Ww		Dw	
Dw	18.35	Tw	14.20	Dw	19.48	Tw	14.24	Dw		Tw	
	2.33		4.15		3.01		5.24				

LIQUID LIMIT 68 %

NO. BLOWS	18			NO. BLOWS	27			NO. BLOWS	33		
TARE #	6	%M	71.5	TARE #	7	%M	67.8	TARE #	8	%M	64.6
Ww	40.43	Dw	29.57	Ww	29.55	Dw	23.45	Ww	34.10	Dw	26.34
Dw	29.57	Tw	14.39	Dw	23.45	Tw	14.45	Dw	26.34	Tw	14.33
	10.86		15.18		6.10		9.00		7.76		12.01



SHRINKAGE LIMIT ______ %

SHRINKAGE MOLD NO. ______ VOLUME

Wt SHRINKAGE MOLD EMPTY ______ = Tw
Wt SHRINKAGE MOLD + WET SOIL ______ = Ww
Wt SHRINKAGE MOLD + DRY SOIL ______ = Dw

Wt EMPTY ______
Wt FULL OF Hg ______
______ ÷ 13.6
Vw = ______ cc

$$\text{SHRINKAGE LIMIT} = \frac{(Ww - Dw) - (Vw - Vd)\ Vw \times 100}{Dw - Tw}$$

S. L. = (–) – (–) × 100

SHRINKAGE PAT VOLUME
Wt DISH FULL ______
Wt DISH FULL – VOL PAT ______
______ ÷ 13.6
Vd = ______ cc

REMARKS ______

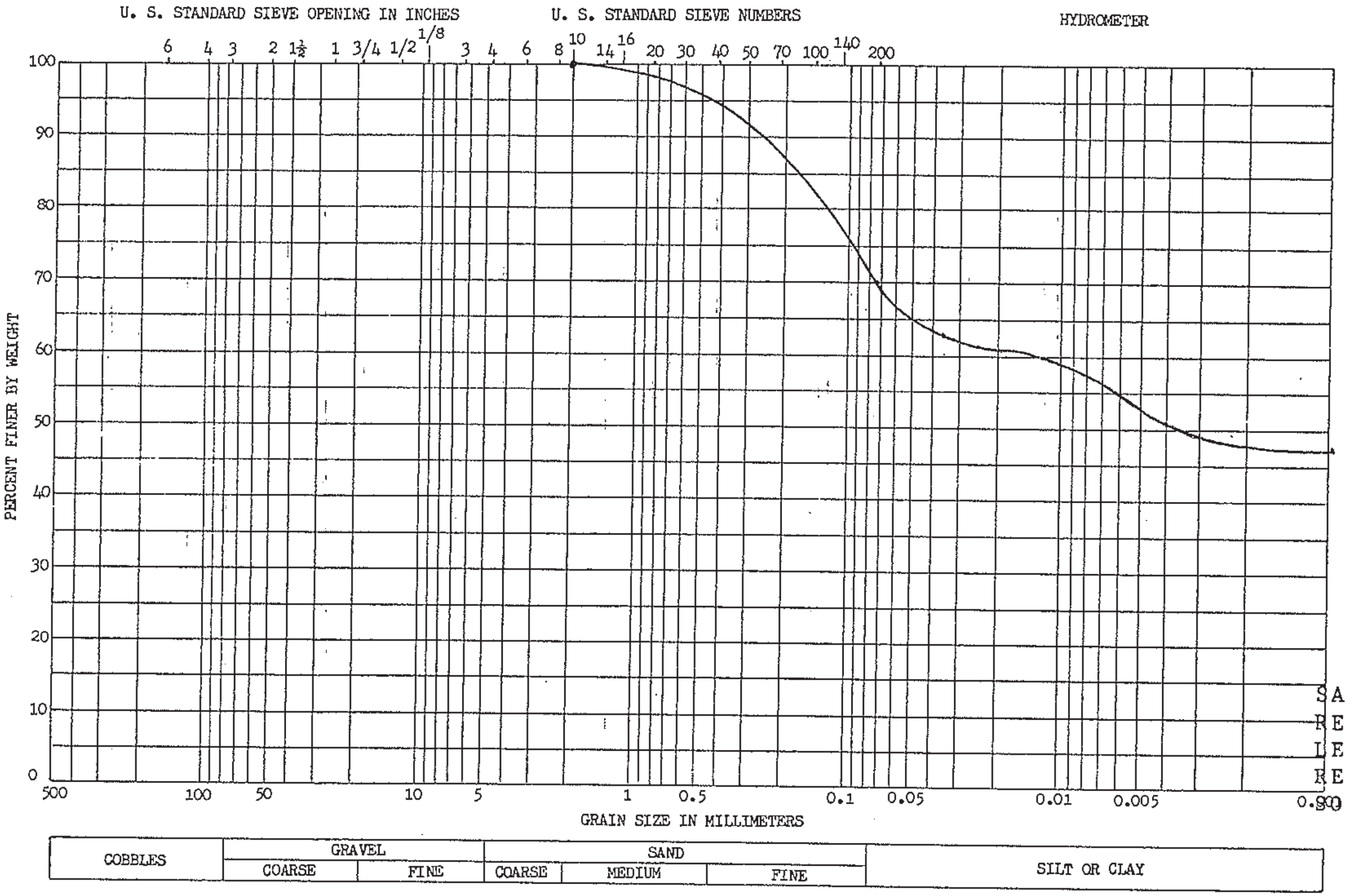
TESTED BY RG CHECKED BY JBP

Alabama Power
construction department

GRAIN SIZE DISTRIBUTION CURVE

REPORT NO.

PROJECT GEORGIA POWER
LOCATION PLANT SCHERER R4-#1
BORING NO. Q-87 (PROCTOR #)
SAMPLE NO. 181
DATE 4-2-79
DEPTH 4.0-7.0'
ELEVATION
LAB CENTRAL
TEST BY JBF, RG, RN
CHECKED BY JBF
SOIL DESCRIPTION REDDISH BROWN SANDY SILTY CLAY
SOIL CLASS CH USC SYSTEM



LIQUID LIMIT 53
PLASTICITY INDEX 25
SPECIFIC GRAVITY 2.77
FIELD MOISTURE
PERMEABILITY
MAXIMUM DENSITY
OPTIMUM MOISTURE
DENSITY

SAMPLED BY JOEL MILLE
RECEIVED FROM JOEL MI
LER ON 3-23-79
REPORTED TO MR. J.A.
SON ON 4-2-79

QC Form 167 May 77

CON – 2938

ALABAMA POWER COMPANY

HYDROMETER TEST DATA SHEET

PROJECT G.P. - LABORATORY ______ DATE 3/26/79

SAMPLE NO. 181 SOIL DESCRIPTION Reddish-Brown Sandy Silty Clay (CH)

TESTED BY B.F. & R.N CHECKED BY ______

WT. AIR DRY SAMPLE 64.64 MOISTURE 2.3 % CORR. WT. OF SOIL 63.19

TARE # 115
WEIGHT 13.89

Dispersing Agent:
Kind Used ______
Amount ______
Hydrometer No. ______
Absolute Specific Gravity (G) ______
Starting Time 9:00

% Moisture
WW 87.54
DW 85.87
W_m 1.67

% M = 2.3 %

Time	Elapsed Time Minutes	Hydrometer Reading	Temperature Correction, ΔR	Corr. Hydrometer Reading (R)	Per Cent Soil in Suspension (P)	Temperature, °	Grain Diameter, mm	Correction Coefficients			Corrected Grain Diameter, mm	Per Cent of Total Sample < C.G.D.
								Elev., K_L	G., K_g	Vis., K_n		
	0.5						.111					
9:01	1.0	45.5	-5.0	40.0	63.3		.078				363	63.3
:02	2.0	44.0	-5.0	39.0	61.7		.055				256	61.7
:05	5.0	43.0	-5.0	38.0	60.1		.035				163	60.1
:15	15.0	42.0	-5.0	37.0	58.6		.020				93	58.6
:30	30.0	40.0	-5.0	35.0	55.4		.014				65	55.4
10:00	60.0	38.0	-5.0	33.0	52.2		.010				47	52.2
1:10	250	36.0	-5.0	31.0	49.1		.005				23	49.1
	1440	35.0	-5.0	30.0	47.5		.002				9.3	47.5

REMARKS:

		% Retained	% Passed
#16	0.4	0.63	99.37
#30	1.9	3.01	96.99
#50	6	9.50	90.5
#100	13.5	21.36	78.64
#200	19.0	30.07	69.93

#10 - 100% Passing

ALABAMA POWER COMPANY

ATTERBERG LIMIT WORK SHEET

PROJECT GEORGIA Power LABORATORY Central DATE 3-20-79

SAMPLE NO. 181 SOIL DESCRIPTION Red-Brown

LOCATION ______ BORING NO. ______ SAMPLE DEPTH ______

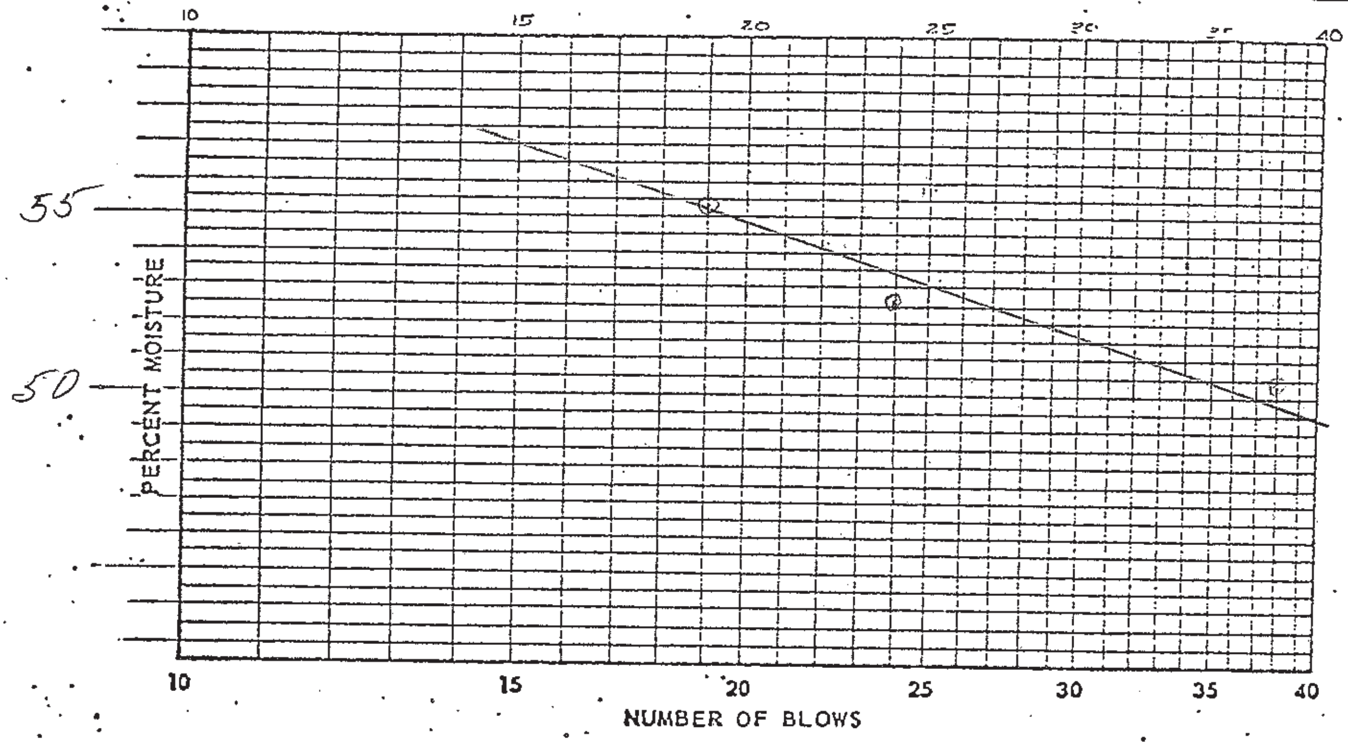
(28)

PLASTIC LIMIT 25 %

TARE#	14	%M	28.0		TARE#	15	%M	27.9	TARE#		%M	
Ww	21.35	Dw	19.83		Ww	19.96	Dw	18.66	Ww		Dw	
Dw	19.83	Tw	14.41		Dw	18.66	Tw	14.00	Dw		Tw	
	1.52		5.42			1.30		4.66				

LIQUID LIMIT 53 %

NO. BLOWS	19			NO. BLOWS	24			NO. BLOWS	38		
TARE#	11	%M	55.3	TARE#	12	%M	52.7	TARE#	16	%M	50.5
Ww	41.92	Dw	32.08	Ww	35.60	Dw	28.30	Ww	32.62	Dw	26.46
Dw	32.08	Tw	14.29	Dw	28.30	Tw	14.44	Dw	26.46	Tw	14.26
	9.84		17.79		7.30		13.86		6.16		12.20



SHRINKAGE LIMIT ______ %

SHRINKAGE MOLD NO. ______ VOLUME

Wt SHRINKAGE MOLD EMPTY ______ = Tw

Wt SHRINKAGE MOLD + WET SOIL ______ = Ww

Wt SHRINKAGE MOLD + DRY SOIL ______ = Dw

Wt EMPTY ______

Wt FULL OF Hg ______

______ ÷ 13.6

Vw = ______ cc

$$\text{SHRINKAGE LIMIT} = \frac{(W_w - D_w) - (V_w - V_d)\ V_w \times 100}{D_w - T_w}$$

$$\text{S. L.} = \frac{(\ -\ ) - (\ -\ )}{\ } \times 100$$

SHRINKAGE PAT VOLUME

Wt DISH FULL ______

Wt DISH FULL – VOL PAT ______

______ ÷ 13.6

Vd = ______ cc

REMARKS ______

TESTED BY RG CHECKED BY ______

DATE 3-27-79
PROJECT GEORGIA POWER
MATERIAL

ALABAMA POWER COMPANY

LABORATORY
AGGREGATE PHYSICAL TESTS

SAMPLE FROM:
MATERIAL
LAB. NO. 181
TESTED BY RG

To be used for

SPECIFICATIONS

tere #
85.87
13.55

Specific Gravity & Absorption of Coarse Aggregate (WEIGHT IN GRAMS)

Wt. Sample Cont. in Air ______
Wt. of Container ______
Wt. Sample* in Air (B) ______
Wt. Sample** & Cont. in Water ______
Wt. Container in Water ______
Wt. Sample** in Water (C) ______
Wt. Oven Dry Sample (A) ______

*Saturated Surface Dry **Saturated

Specific Gravity:

Bulk = $\frac{A}{B-C}$ = ( ) / ( ) = ______

Bulk (S. S. D.) = $\frac{B}{B-C}$ = ( ) / ( ) = ______

Apparent = $\frac{A}{A-C}$ = ( ) / ( ) = ______

Absorption - Percent:

$\frac{B-A}{A} \times 100$ = ( ) / ( ) ______ %

Unit Weight: (Wt. in Lbs.)

	Loose	Compact*
Wt. Sample + Container		
Wt. Container		
Wt. Sample (E)		
Vol. of Container (F)		
Unit Wt. $\frac{E}{F}$		

Pounds per cu. ft.

Percent Voids = 100 − $\frac{\text{Unit Wt.} \times 100}{62.4 \times \text{Sp. Gr.}}$

Loose = 100 − ( ) / ( ) = ______ %

Compact* = 100 − ( ) / ( ) = ______ %

*Rodded ☐ or Jigged ☐

Specific Gravity & Absorption of Fine Aggregate (WEIGHT IN GRAMS)

Bottle NO. 2
Wt. Bottle + Water + Soil W_1 in g 719.51
Temperature in °C 22.5
wt. Bottle + Water W_2 in g 673.50
Wt. Soil W_s in g oven dry A 71.98
Specific Gravity of Water at T, G_T 0.9977
wt. Sample, Sat. Surface Dry B ______

$G_s = \frac{G_T W_s}{W_s - W_1 + W_2}$

Specific Gravity:

Bulk = $\frac{G_T W_s A}{W_s - W_1 + W_2}$ = $\frac{(71.81)}{(25.97)}$ = 2.77

Bulk (S.S.D.) = $\frac{G_T W_s B}{W_s - W_1 + W_2}$ ( ) / ( ) = ______

Apparent =

= ( ) / (( ) − ( )) = ______

Absorption = $\frac{B-A}{A}$ × 100 =

= ( ) / ( ) × 100 = ______ %

TABLE A-2. SPECIFIC GRAVITY OF WATER*

°C	0	1	2	3	4	5	6	7	8	9
0	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9998
10	0.9997	0.9996	0.9995	0.9994	0.9993	0.9991	0.9990	0.9988	0.9986	0.9984
20	0.9982	0.9980	0.9978	0.9976	0.9973	0.9971	0.9968	0.9965	0.9963	0.9960
30	0.9957	0.9954	0.9951	0.9947	0.9944	0.9941	0.9937	0.9934	0.9930	0.9926
40	0.9922	0.9919	0.9915	0.9911	0.9907	0.9902	0.9898	0.9894	0.9890	0.9885
50	0.9881	0.9876	0.9872	0.9867	0.9862	0.9857	0.9852	0.9848	0.9842	0.9838
60	0.9832	0.9827	0.9822	0.9817	0.9811	0.9806	0.9800	0.9795	0.9789	0.9784
70	0.9778	0.9772	0.9767	0.9761	0.9755	0.9749	0.9743	0.9737	0.9731	0.9724
80	0.9719	0.9712	0.9706	0.9699	0.9693	0.9686	0.9680	0.9673	0.9667	0.9660
90	0.9653	0.9647	0.9640	0.9633	0.9626	0.9619	0.9612	0.9605	0.9598	0.9591

---

* Also the density or unit weight of water in grams per milliliter.
From *International Critical Tables*, Vol. III, McGraw-Hill Book Co., 1928.
147

REMARKS

Signed by:

NOTE: Method of Test used are latest applicable methods of the ASTM unless otherwise stated.

Form CON-2975
Rev - 4-25-75

Southern Company Services, Inc.
Post Office Box 2625
Birmingham, Alabama 35202
Telephone 205 870-6011

259

Southern Company Services
the southern electric system

July 7, 1978

James A. Tyson
1017 Daniel Building
Alabama Power Company

REQUEST FOR SOIL TESTS ON THE RANDOM FILL MATERIAL
SCHERER STEAM PLANT, ASH POND DIKE, GEORGIA POWER COMPANY

Please have the following laboratory tests performed on bag samples which were delivered to the Alabama Power Company Central Soils Laboratory, General Services Complex, Alabaster, Alabama.

1. Atterberg Limits (ASTM D-423 and ASTM D-424)
2. Specific Gravity (ASTM D854)
3. Grain Size Analysis (ASTM D-422)
4. Six point Standard Proctor Density (ASTM D-698-A)
5. Six point Modified Proctor Density (ASTM D-1557-A)
6. Swell test in CBR Mold, 10 lb. Surcharge, 92% Modified Proctor Density
7. Swell test in CBR Mold, 10 lb. Surcharge, 95% Standard Proctor Density 2
8. Direct Shear tests (ASTM D-3080) on each sample molded in the Standard and Modified Density tests, three tests per sample to be run immediately after compaction. Normal stress 1, 2, and 4 ksf. 14
9. Direct Shear tests (ASTM D-3080) on the two samples molded in CBR Molds for the Swell tests, three tests per sample to be run at completion of Swell tests. Normal stress 1, 2, and 4 ksf.

Please forward invoice for the above testing to

Georgia Power Company
Plant Scherer Site
Attn: Mr. Larry Wood
P. O. Box 56
Juliette, Georgia 31046

Gary N Durham
Gary N. Durham, Assistant to Manager
Hydro Projects Department

APPROVED:
for G. B. Dougherty, Manager
Hydro Projects Department

RP/hn

cc: Alabama Power Company
J. D. Jones
N. R. McKinney
Georgia Power Company
Whit Kirkland
Major H. Thompson, Jr.

Southern Company Services
H. D. Burnum
S. H. Lawrence
R. D. Prager

July 7, 1978

From: Central Soils Laboratory
General Services Complex
Alabama Power Company

To: Mr. James A. Tyson

Subject: Random Fill, Ash Pond Dike
Georgia Power Company
Sherer Steam Plant
Macon, Georgia

A bag sample (80 lbs.) of the soil to be used in the Subject area was delivered to the Central Soils Laboratory on June 26, 1978, by Dr. T.A. Carlton, SCS Consultant. The following information was requested and is attached:

1. Atterberg Limits (ASTM D-423 and D-424)
2. Specific Gravity (ASTM D-854)
3. Combined Grain Size Analysis (ASTM D-422)
4. Six Point Standard Proctor Density Test (ASTM D-698-A)
5. Six Point Modified Proctor Density Test (ASTM D-1557-A)
6. Swell Test in CBR Mold at 92% of Modified Proctor Density
7. Swell Test in CBR Mold at 95% of Standard Proctor Density
8. Direct Shear Tests (Q Test) on Each of the 12 Compacted Samples From the Two Compaction Tests. These Tests Were Run on the Sample Immediately After Compaction at the Compaction Moisture Content. Three Shear Tests Were Run on Each Mold Using Normal Loads of 1,2, and 4 KSF. (ASTM D-3080)
9. Direct Shear Tests on Two CBR Mold Samples-One Compacted to 93.8% Modified Proctor Density, the Other Compacted to 95.6% Standard Proctor Density. These Samples Were Soaked in the Molds for 70 Hours With a 10 Pound Surcharge. Three Direct Shear Tests Were Run on Each Sample Using Normal Loads of 1,2, and 4 KSF. (ASTM D-3080)

All of the above tests were run under the direct observation of Dr. T.A. Carlton.

BEARING RATIO TEST Data Sheet 22

Project SHERER S.P. GEORGIA POWER CO. Job No. 95% STD. COMP.

Location of Project ASH POND DIKE RANDOM FILL Boring No. ______ Sample No. ______

Description of Soil REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

Tested By RG Date of Testing 6-30-78

Compaction Energy: Hammer 5.5 lb No. of Layers 3 Blows/layer 40

w at compaction 21.6 % Mold diam. 6.0" Ht. of Soil 4.578 Vol. .07491

Wt. wet soil 8.75 Wt. dry soil, W_s 7.20 γ wet 116.81 γ dry 96.06

Swell Data

Starting time and date	Elapsed time	Mold no. 2 Surcharge 10 lb Dial reading × 0.001	$\% = \frac{S}{H}(100)$	Mold no. ____ Surcharge ____ lb Dial reading × 0.001	$\% = \frac{S}{H}(100)$	Mold no. ____ Surcharge ____ lb Dial reading × 0.001	$\% = \frac{S}{H}(100)$
9:55	0 hr	.700					
	1 hr	.640	1.3				
	2 hr	.637	1.4				
	4 hr	.620	1.7				
	5HR 20M	.606	2.1				
7-3-78 7:18AM	70 HR	.570	2.84				

After Soaking

Mold no.			
Surcharge, lb	10		
Initial wt. wet soil + mold + base plate	17.99		
Final wt. wet soil + mold + base plate	18.44		
Wt. of mold + base plate	9.24		
Initial wt. of wet soil, W_i	8.75		
Wt. of water absorbed, W_w	0.49		
% water absorbed = W_w/W_s	6.4%		

FINAL MOISTURE=28.33 FINAL VOL.=.0770

FINAL γ_m =120.0 PCF INITIAL WT. WTR.=1.55

FINAL γ_d =93.51

$$\begin{array}{r} +0.49 \\ \hline 2.04 \end{array}$$

52

95 std

BEARING RATIO TEST Data Sheet 22

Project Georgia Power Job No. ______

Location of Project Sherer Plant Boring No. ______ Sample No. 2

Description of Soil ______

Tested By ______ Date of Testing 6-30-78

Compaction Energy: Hammer 5.5# lb No. of Layers 3 Blows/layer 40

w at compaction 21.6 % Mold diam. 6" Ht. of Soil 4.578 Vol. .07491

Wt. wet soil 8.75 Wt. dry soil, W_s 7.20 γ wet 116.81 γ dry 96.06

Swell Data

MOLDED 21.6

Starting time and date	Elapsed time	Mold no. 2 Surcharge 10 lb		Mold no. ___ Surcharge ___ lb		Mold no. ___ Surcharge ___ lb	
		Dial reading ×0.001	$\% = \frac{S}{H}(100)$	Dial reading ×0.001	$\% = \frac{S}{H}(100)$	Dial reading ×0.001	$\% = \frac{S}{H}(100)$
9:55	0 hr	.700					
	1 hr	.640	1.3				
	2 hr	.637	1.4				
	4 hr	.620	1.7				
	5 Hr. 20 Min	.606	2.1				
7-3-78 7:18 AM	70	.570	2.84				

After Soaking

Mold no.			
Surcharge, lb	10#		
Initial wt. wet soil + mold + base plate	17.99		
Final wt. wet soil + mold + base plate	18.44		
Wt. of mold + base plate	9.24		
Initial wt. of wet soil, W_i	8.75		
Wt. of water absorbed, W_w	0.49		
% water absorbed = W_w/W_s	6.49%		

Final Moisture 28.33

Final γm = 120.0 pcf

Final γd = 93.51

Final Vol .0770

Initial wt water = 1.55#

+ 0.49

2.04

Standard

Swell = .130 = 2.88 Swell
H = 4.708
D = 6"

Area = 28.2744
Vol = 0.0770 Std
orig vol. 0.07491

Orig. Dry unit wt = 96.
After Swell 93.45
95.6% comp.
93% comp.

Modified

Swell = .311 = 6.8% swell

H = 4.889
D = 6" =
Area = 28.2744 sq.in.
Vol = .0800

→ Orig. Dry unit wt = 104.7
After Swell = " " 98.0
93.8% comp.
87.9% comp.

Ga. Power Co. 6-29-78

C.B.R. Molds

Diam. = 6" Volume = .07491 cu. ft.

Height 4.578

Mold #1 weight = 9.21#

Mold #2 weight = 9.24#

Moisture Samples

Tare#	47	14.34	53	13.96
wet wt.	89.41		92.50	
Dry wt.	80.40	66.06	82.98	69.02
	9.01		9.52	
% moist.	13.6			13.8

288.5
250.5

Mod.
M.D. = 111.6
O.M = 16.0

Mold #1 After Soak - 19.10

92% = 102.7 X 1.160 = 119.1 X .07491 = 8.92# + 9.21 = 18.13 18.31

10.00# at 13.7 = 8.795 X 1.160 = 10.202 - 10.00 = .202 X 4536 = 91.6

370.6
305.8

Std.
M.D. 100.5
O.M. 21.6

Mold #2 After Soak 18.44

95% = 95.5 X 1.216 = 116.1 X .07491 = 8.70 + 9.24 = 17.94 17.99

10.00 at 13.7 = 8.795 X 1.216 = 10.695 - 10.00 = .695 X 453.6 = 315.3

Ga. Power Co. 6-30-78

Standard Compaction Test
Points at 95% Comp. on Dry & Wet
Side of Curve.

Dry Side = 18.1% moist. 3810 $\begin{array}{r} 300.6 \\ 265.3 \\ \hline 34.7 \end{array}$ 13.1

5# at 13.7% = 4.398 X 1.181 = 5.194 - 5.00 = .194 x 453.6 = 88.0 ml

Ave. of Direct Shear Samples = 17.7%

Wet Side = 26.3

3886.6 $\begin{array}{r} 300.6 \\ 238.6 \\ \hline \end{array}$ 11.4 25.7%

5.00# at 13.7% = 4.398 X 1.263 = 5.555 - 5.00 = .555 x 453.6 = 251.7 ml.

Georgia Power Co. 6-27-78

Nat. Moisture Content
15.2 - 15.2

Mod. Proctor orig. moist. 9.8
Std. Proctor " " 10.5

No. 1 Air Dry Sample for Modified Proctor

5 - 5 Pound Packages at 9.0%

5.00 at 9.0% = 4.587 X 17.0 = 5.367 - 5.00 = .367 X 453.6 = 166.5

			Mod	Standard
2	11	41.6	✓	
4	13	83.2	✓	
6	15	124.8	✓	
8% =	17	166.5	✓	✓
10	19	208.0	✓	✓
12	21	249.6		✓
14	23	291.3		✓

BEARING RATIO TEST Data Sheet 22

Project PLANT SHERER GEORGIA POWER CO. Job No. 92% MODIFIED COMPACTION

Location of Project ASH POND DIKE RANDOM FILL Boring No. ______ Sample No. 1

Description of Soil REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

Tested By RAH, RG Date of Testing 6-30-78 7-3-78

Compaction Energy: Hammer 10 lb No. of Layers 5 Blows/layer 35

w at compaction 16.0 % Mold diam. 6" Ht. of Soil 4.578 Vol. .07491

Wt. wet soil 9.10 Wt. dry soil, W_s 7.84 γwet 121.48 γdry 104.72

Swell Data

Starting time and date	Elapsed time	Mold no. 1 Surcharge 10 lb		Mold no. ___ Surcharge ___ lb		Mold no. ___ Surcharge ___ lb	
		Dial reading ×0.001	$\% = \frac{S}{H}(100)$	Dial reading ×0.001	$\% = \frac{S}{H}(100)$	Dial reading ×0.001	$\% = \frac{S}{H}(100)$
9:55	0 hr	.600					
	1 hr	.652	1.14				
	2 hr	.730	2.84				
	4 hr	.785	4.04				
	5HR 20M	.828	4.98				
-3-78 7:18 AM	70 HR	.911	6.79				

After Soaking

Mold no.			
Surcharge, lb	10		
Initial wt. wet soil + mold + base plate	18.31		
Final wt. wet soil + mold + base plate	19.10		
Wt. of mold + base plate	9.21		
Initial wt. of wet soil, W_i	9.10		
Wt. of water absorbed, W_w	0.79		
% water absorbed = W_w/W_s	9.9%		

FINAL MOIST.=26.15
FINAL γ_m =123.70
FINAL γ_d =98.06 PCF

FINAL VOLUME=.0800
INITIAL WEIGHT OF WTR.=1.26
ABSORBED = .79
FINAL =2.05#

92 Mod

BEARING RATIO TEST

Data Sheet 22

Project Georgia Power Co   Job No. ______

Location of Project Scherer Plant   Boring No. ______   Sample No. 1

Description of Soil ______

Tested By ______   Date of Testing 6-30-78 7-3-78

Compaction Energy: Hammer 10 lb   No. of Layers 5   Blows/layer 35

w at compaction 16.0 %   Mold diam. 6   Ht. of Soil 4.578   Vol. .07491

Wt. wet soil 9.10#   Wt. dry soil, W_s 7.84 γwet 121.48 γdry 104.72

Swell Data

Molded at 16.0

Starting time and date	Elapsed time	Mold no. 1 Surcharge 10 lb		Mold no. ______ Surcharge ______ lb		Mold no. ______ Surcharge ______ lb	
		Dial reading × 0.001	$\% = \frac{S}{H}(100)$	Dial reading × 0.001	$\% = \frac{S}{H}(100)$	Dial reading × 0.001	$\% = \frac{S}{H}(100)$
9:55	0 hr	.600					
	1 hr	452	1.14				
	2 hr	730	2.84				
	4 hr	.785	4.04				
	5 hr. 20 min	.828	4.98				
7-3-78 7:18 A.M	70	.911	6.79				

After Soaking

Mold no.			
Surcharge, lb	10#		
Initial wt. wet soil + mold + base plate	18.31		
Final wt. wet soil + mold + base plate	19.10		
Wt. of mold + base plate	9.21		
Initial wt. of wet soil, W_i	9.10		
Wt. of water absorbed, W_w	0.79#		
% water absorbed = W_w/W_s	9.9%		

Final Moisture: 26.15
Final γm: 123.70
Final γd: 98.06 pcf

Final Vol = .0800
Initial wgt water - 1.26#
Absorbed + .79
Final 2.05#

DATE & SOURCE

July 6
Thurs

Cover Ltr for lab Report:

July 6, 1978

From: Soils Laboratory
General Services Complex
Alabama Power Co
To: J A Tyson

Subject: Random Fill, Ash Pond Dike
Georgia Power Company
Sherer Steam Plant
Macon, Georgia

A bag sample (80 lbs) of the soil to be used in the Subject area was delivered to the Soils Laboratory on June 26, 1978, by Dr. T. A. Carlton, SCSI Consultant. The following information was requested and is attached. ~~to this~~

1. Atterberg Limits (ASTM D-423 and D-424)
2. Specific Gravity (ASTM D-854
3. Combined Grain Size Analyses (ASTM D-422)
4. Six Point Standard Proctor Density Test (ASTM D-698-A,
5. Six Point Modified Proctor Density Test (ASTM D1557-A,
6. Swell test in C.B.R. Mold at 92% of Modified Proctor Density
7. Swell Test in CBR Mold at 95% Standard Proctor Density
8. Direct shear test (Q test) on each of the 12 Compacted Samples from the two Compaction tests. These tests were run on the Samples immediately after Compaction at the Compaction Moisture Content. Three shear tests were run on each Mold using normal loads of 1, 2, and 4 K.S.F. (ASTM D-3080.

DATE & SOURCE

9. Direct Shear tests on two CBR Mold Samples - one Compacted ~~at~~ to 93.8% Modified Proctor Density, the other Compacted to 95.6% Standard Proctor Density. These Samples were soaked in the Molds for 70 hours with a 10 lb Surcharge. Three direct shear tests were run on each Sample using normal loads of 1, 2 and 4 K.S.F. (ASTM D-3080)

All of the above tests were run under the direct observation of Dr. Carlton.

Alabama Power
construction department

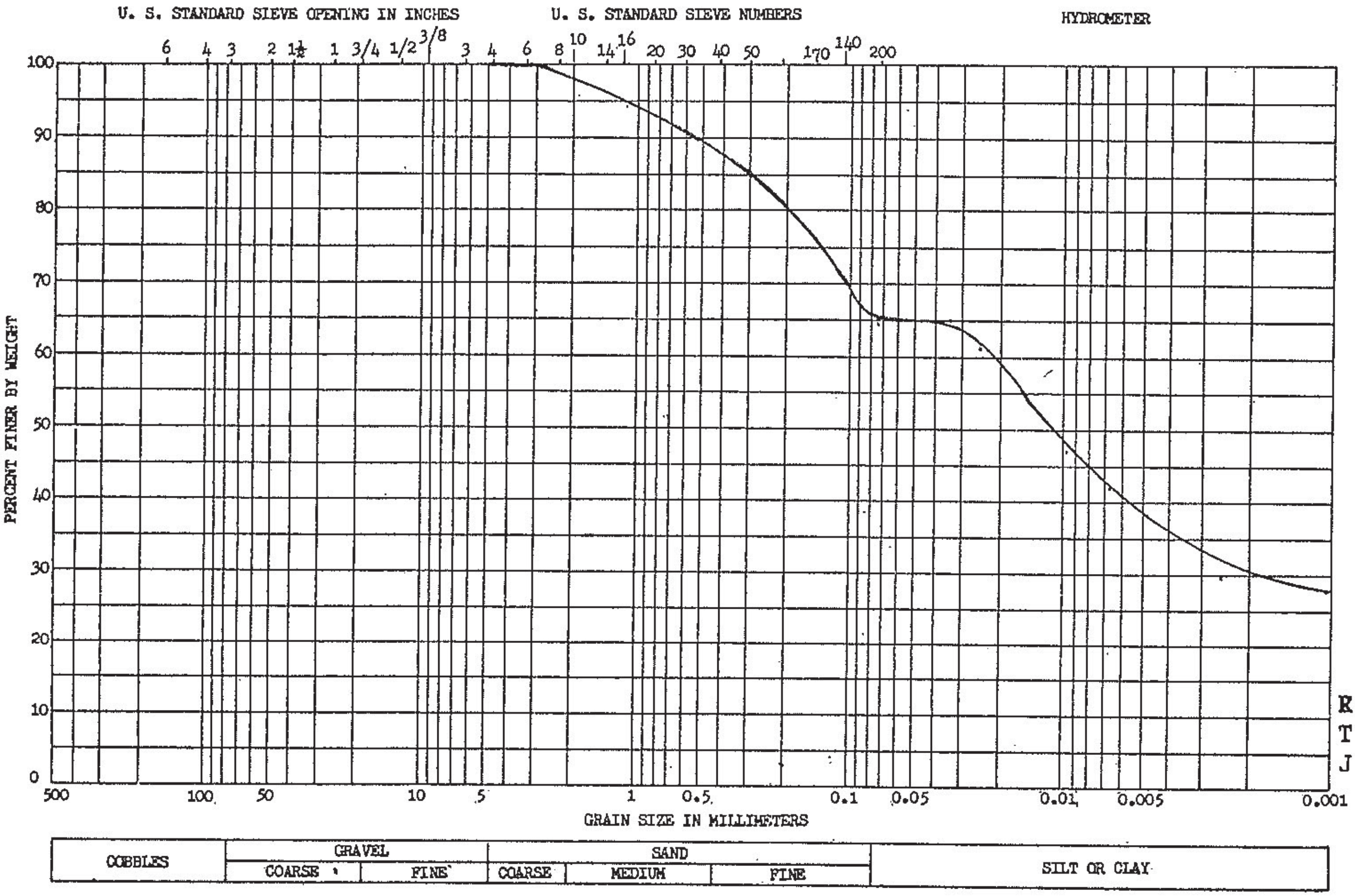
GRAIN SIZE DISTRIBUTION CURVE

REPORT NO.

PROJECT GEORGIA POWER LOCATION SHERER S.P. BORING NO. SAMPLE NO. DATE 7-6-78

DEPTH ASH POND DIKE ELEVATION RANDOM FILL LAB APCO CENTRAL TEST BY RG,HB,ML,RAH CHECKED BY JBF

SOIL DESCRIPTION REDDISH BROWN MICACEOUS SANDY CLAYEY SILT SOIL CLASS MH USC SYSTEM



LIQUID LIMIT 55

PLASTICITY INDEX 12

SPECIFIC GRAVITY 2.75

FIELD MOISTURE

PERMEABILITY
D-698= 100.4

MAXIMUM DENSITY D-1557=111.5
D-698=21.7%

OPTIMUM MOISTURE D-1557=16.2%

DENSITY

REPORTED TO MR. J.A.
TYSON
JULY 7, 1978

QC Form 167 May 77

ALABAMA POWER COMPANY
CENTRAL SOILS LABORATORY
COMPACTION DATA

PROJECT SHERER S.P. GEORGIA POWER DATE 7-6-78

SAMPLE NO. 1 SOIL DESCRIPTION REDDISH BROWN MICACEOUS SANDY CLAYEY S

SPECIFIC GRAVITY 2.75 SOIL CLASS-U.S.C. SYSTEM MH

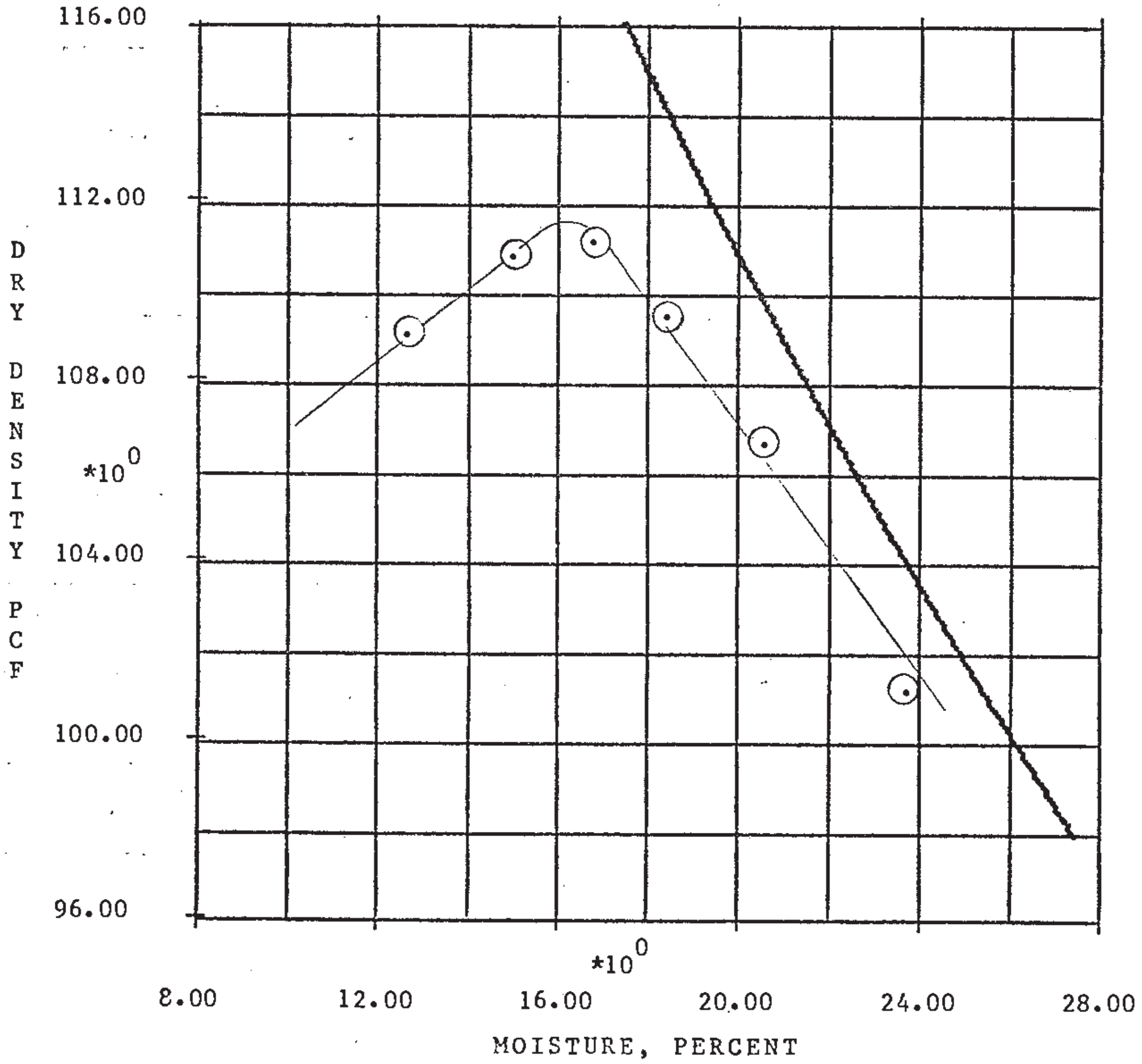
LOCATION ASH POND DIKE RANDOM FILL TYPE TEST D-1557

SUMMARY OF PLOTTING DATA

POINT NO.	MOISTURE %	DRY DENSITY PCF
1	12.7	108.9
2	15.0	110.8
3	16.8	111.2
4	18.4	109.3
5	20.6	106.5
6	23.8	101.0

OPT. MOISTURE= 16.2
MAX. DENSITY = 111.5

REPORTED TO MR. J.A. TYSON
JULY 7, 1978



```
*DONE
SYSTEM ?FORT N
*AUTO
*320 2045.5,300.0,6,2.75
*330 3901.0,266.3
*340 3972.0,260.9
*350 4009.0,256.8
*360 4003.5,253.3
*370 3987.5,0_248.7
*380 3935.0,242.4
*390
*SAVE GP2
DATA SAVED-GP2
*LIST

320 2045.5,300.0,6,2.75
330 3901.0,266.3
340 3972.0,260.9
350 4009.0,256.8
360 4003.5,253.3
370 3987.5,248.7
380 3935.0,242.4


*RUN COMPAC; SSLIB/AJPLOT,R #GP2 "05"
```

FORM CON – 2928

ALABAMA POWER COMPANY
SOIL COMPACTION TEST DATA SHEET

PROJECT Georgia Power Co. LABORATORY Central Lab DATE 6-27-78

Sample No. # 1 Soil Description Red Clay Sp. Gr. ____

Type Test D1557 Soil Class – U.S.C. System ____

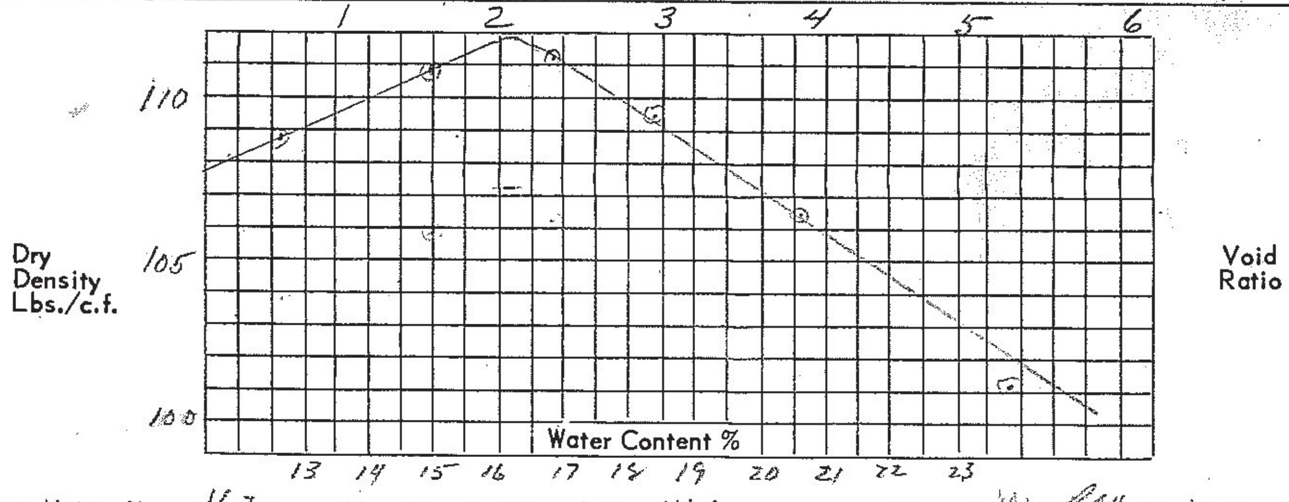
Obtained from Location ____

Placed in Location ____

Mold Diameter 4.0 Mold Height 4.58 Mold Volume 1/30 Cuft Number Layers 5

Tamper Weight 10.0 Drop Height 18" Number of Blows per Layer 25 103.22

		11%	13%	15%	17%	19%		
DETERMINATION NO.		⑤ 1 ✓	④ 2 ✓	② 3 ✓	① 4 ✓	③ ✓ 5	⑥ 6 ✓	7
DENSITY	Wet Wt. Sample +Mold (Lbs.)	3901.0	3972.0	4009.0	4003.5	3987.5	3935.0	
	Wt. Mold (Lbs.)	2045.5						
	Wet Wt. Sample (Lbs.)	4.09	4.25	4.33	4.32	4.28	4.17	
	Wet Unit Wt. Lbs./c.f.	122.7	127.5	129.9	129.6	128.4	125.1	
	Dry Unit Wt. Lbs./c.f.	108.9	110.9	111.2	109.5	106.5	101.1	
	Void Ratio							
WATER CONTENT	Wet Wt. Sample +Con. (gm.)	–		300.0	300.0	300.0	300.0	
	Dry Wt. Sample +Con (gm.)	266.3	260.9	256.8	253.3	248.7	242.4	
	Wt. Water (gm.)				46.7			
	Wt. Con (gm.)							
	Dry Wt. Soil (gm.)							
	Moisture Content %	12.7	15.0	16.8	18.4	20.6	23.8	



Opt. Moist. % 16.2 Max. Density Lbs. /c.f. 111.6 Tested ML-RAH Checked RAH

ALABAMA POWER COMPANY
(NTRAL SOILS LABORATORY
COMPACTION DATA

PROJECT SHERER S.P. GEORGIA POWER CO. DATE 7-6-78

SAMPLE NO. 1 SOIL DESCRIPTION REDDISH BROWN MICACEOUS SANDY CLAYEY SI

SPECIFIC GRAVITY 2.75 SOIL CLASS-U.S.C. SYSTEM MH

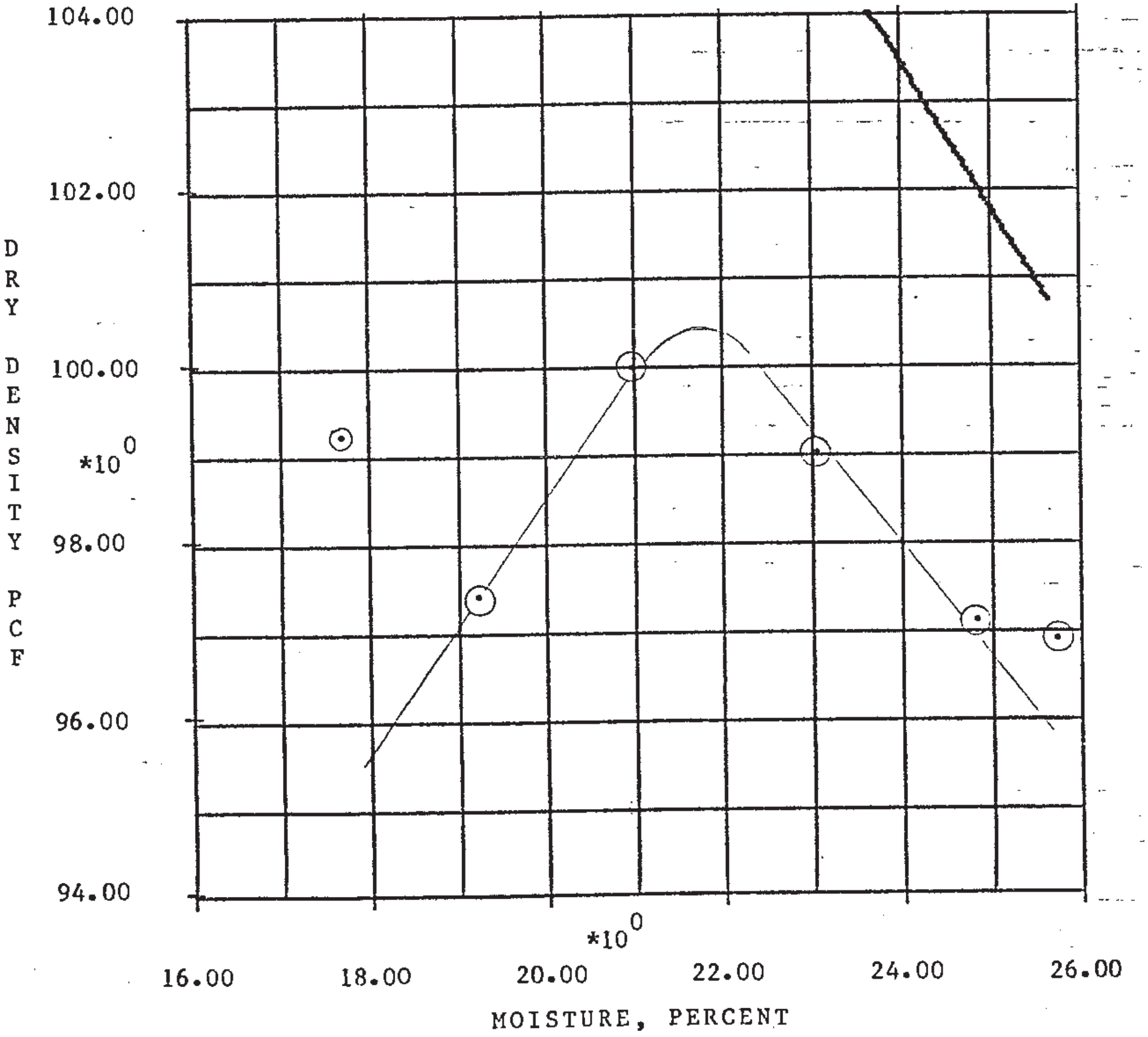
LOCATION ASH POND DIKE RANDOM FILL TYPE TEST D-698 "C"

SUMMARY OF PLOTTING DATA

POINT NO.	MOISTURE %	DRY DENSITY PCF
1	17.7	99.2
2	19.2	97.3
3	21.0	100.0
4	23.1	99.0
5	24.8	97.1
6	25.7	96.8

OPT. MOISTURE=21.7
MAX. DENSITY = 100.4

REPORTED TO MR. J.A. TYSON
JULY 7, 1978



```
 DONE
SYSTEM ?FORT N
*AUTO
*250 2045.5,300.0,6,2.75
*260 3810.0,254.9
*270 3800.5,251.6
*280 3875.5,247.9
*290 3887.0,243.8
*300 3877.5,240.3
*310 3886.0,238.6
*320
*SAVE GP1
DATA SAVED-GP1
*RUN COMPAC; SSLIB/AS_JPLOT,R #GP1 "05"
```

FORM CON – 2928

ALABAMA POWER COMPANY
SOIL COMPACTION TEST DATA SHEET

PROJECT Georgia [illegible] LABORATORY [illegible] DATE 6-28-78

Sample No. 1 Soil Description ______ Sp. Gr. 2.75

Type Test D 698 "C" Soil Class – U.S.C. System ______

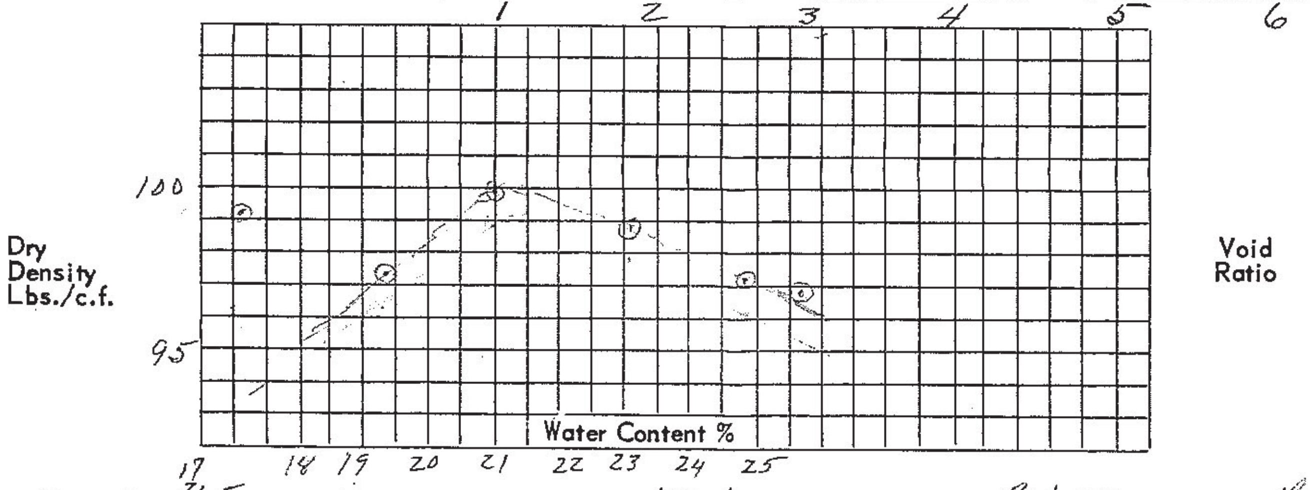
Obtained from Location ______

Placed in Location ______

Mold Diameter 4.0 Mold Height 4.58 Mold Volume 1/30 Cu. ft. Number Layers 3

Tamper Weight 5.5 Drop Height 12" Number of Blows per Layer 25

	DETERMINATION NO.	1	⑤ 2 ✓	17% ② 3 ✓	19% ① 4 ✓	21% ③ ✓ 5	23% ④ 6 ✓	⑥ ✓ 7
DENSITY	Wet Wt. Sample + Mold (Lbs.)		3810.0	3806.5	3875.5	3887.0	3877.5	38.46
	Wt. Mold (Lbs.)	2045.5	[illegible]	③ 2045.5				
	Wet Wt. Sample (Lbs.)		3.89	3.87	4.03	4.06	4.04	4.06
	Wet Unit Wt. Lbs./c.f.		116.7	116.1	120.9	121.8	121.2	121.8
	Dry Unit Wt. Lbs./c.f.		99.2	97.3	99.9	98.9	97.1	96.9
	Void Ratio							
WATER CONTENT	Wet Wt. Sample + Can. (gm.)	300.0	300.0					300.0
	Dry Wt. Sample + Can (gm.)		254.9	251.6	247.9	243.8	240.3	238.6
	Wt. Water (gm.)							61.4
	Wt. Can (gm.)							
	Dry Wt. Soil (gm.)							
	Moisture Content %		17.7	19.3	21.0	23.1	24.8	25.7



Opt. Moist. % 21.5 Max. Density Lbs. /c.f. 100.1 Tested RAH-ML Checked RAH

ALABAMA POWER COMPANY

LABORATORY
AGGREGATE PHYSICAL TESTS

DATE 6-29-78

PROJECT Ga. Power

MATERIAL

(F)ILE FROM:

MATERIAL

LAB. NO. 1

To be used for

TESTED BY KAH

SPECIFICATIONS

Specific Gravity & Absorption of Coarse Aggregate (WEIGHT IN GRAMS)

Wt. Sample Cont. in Air

Wt. of Container

Wt. Sample* in Air (B)

Wt. Sample** & Cont. in Water

Wt. Container in Water

Wt. Sample** in Water (C)

Wt. Oven Dry Sample (A)

*Saturated Surface Dry **Saturated

Specific Gravity:

Bulk = $\frac{A}{B-C}$ = $\frac{(\quad)}{(\quad)}$ =

Bulk = $\frac{B}{B-C}$ = $\frac{(\quad)}{(\quad)}$ =
(S. S. D.)

Apparent = $\frac{A}{A-C}$ = $\frac{(\quad)}{(\quad)}$ =

Absorption - Percent:
$\frac{B-A}{A}$ × 100 = $\frac{(\quad)}{(\quad)}$ = %

Unit Weight: (Wt. in Lbs.) Loose Compact*

Wt. Sample + Container

Wt. Container

Wt. Sample (E)

Vol. of Container (F)

Unit Wt. $\frac{E}{F}$ Pounds per cu. ft.

Percent Voids = 100 − $\frac{\text{Unit Wt.} \times 100}{62.4 \times \text{Sp. Gr.}}$

Loose = 100 − $\frac{(\quad)}{(\quad)}$ = %

Compact* = 100 − $\frac{(\quad)}{(\quad)}$ = %

*Rodded ☐ or Jigged ☐

Specific Gravity & Absorption of Fine Aggregate (WEIGHT IN GRAMS)

Bottle NO. 1

Wt. Bottle+water+Soil W_1 in g 722.15

Temperature in °C 25°

Wt. Bottle + Water W_2 in g 679.59

Wt. Soil W_s in g oven dry A 66.70

Specific Gravity of water at T G_T .9971

Wt. Sample, Sat. Surface Dry B

$G_s = \frac{G_T W_s}{W_s - W_1 + W_2}$

#45
83.96
80.60
13.90

Specific Gravity:

Bulk = $\frac{G_T W_s A}{W_s - W_1 + W_2}$ = $\frac{(66.506)}{(24.14)}$ = 2.75

Bulk = $\frac{G_T W_s B}{W_s + W_1 + W_2}$ = $\frac{(\quad)}{(\quad)}$ =
(S.S.D.)

Apparent =

= $\frac{(\quad)}{(\quad)-(\quad)}$ =

Absorption = $\frac{B-A}{A}$ × 100 =

= $\frac{(\quad)}{(\quad)}$ × 100 = %

TABLE A-2. SPECIFIC GRAVITY OF WATER*

°C	0	1	2	3	4	5	6	7	8	9
0	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9998
10	0.9997	0.9996	0.9995	0.9994	0.9993	0.9991	0.9990	0.9988	0.9986	0.9984
20	0.9982	0.9980	0.9978	0.9976	0.9973	0.9971	0.9968	0.9965	0.9963	0.9960
30	0.9957	0.9954	0.9951	0.9947	0.9944	0.9941	0.9937	0.9934	0.9930	0.9926
40	0.9922	0.9919	0.9915	0.9911	0.9907	0.9902	0.9898	0.9894	0.9890	0.9885
50	0.9881	0.9876	0.9872	0.9867	0.9862	0.9857	0.9852	0.9848	0.9842	0.9838
60	0.9832	0.9827	0.9822	0.9817	0.9811	0.9806	0.9800	0.9795	0.9789	0.9784
70	0.9778	0.9772	0.9767	0.9761	0.9755	0.9749	0.9742	0.9737	0.9731	0.9724
80	0.9718	0.9712	0.9706	0.9699	0.9693	0.9686	0.9680	0.9673	0.9667	0.9660
90	0.9653	0.9647	0.9640	0.9633	0.9626	0.9619	0.9612	0.9605	0.9598	0.9591

* Also the density or unit weight of water in grams per milliliter.
From International Critical Tables, Vol. III, McGraw-Hill Book Co., 1928.
247

REMARKS

Signed by:

NOTE: Method of Test used are latest applicable methods of the ASTM unless otherwise stated.

Form CON-2975
Rev - 4-25-75

CON – 2938

ALABAMA POWER COMPANY

HYDROMETER TEST DATA SHEET

PROJECT Georgia Power LABORATORY ______ DATE ______

SAMPLE NO. #1 SOIL DESCRIPTION Reddish Brown Micaceous Sandy Clayey Silt (MH)

TESTED BY JBF & HB CHECKED BY ______

WT. AIR DRY SAMPLE 64.22 MOISTURE 5.0 % CORR. WT. OF SOIL 61.16

Dispersing Agent:
Kind Used ______
Amount ______
Hydrometer No. ______
Absolute Specific Gravity (G) ______
Starting Time 9:34

% Moisture
WW 83.96
DW 80.60
W_m 3.36
%M = 5.0 %

TARE #45
15.70
66.70

Time	Elapsed Time Minutes	Hydrometer Reading	Temperature Correction, ΔR	Corr. Hydrometer Reading (R)	Per Cent Soil in Suspension (P)	Temperature, °	Grain Diameter, mm	Correction Coefficients Elev., K_L	Correction Coefficients G., K_g	Correction Coefficients Vis., K_n	Corrected Grain Diameter, mm	Per Cent of Total Sample < C. G. D.
	0.5						.111					
9:35	1.0	44.5	-3.0	41.5	67.9		.078				.0348	65.0
36	2.0	42.5	-3.0	39.5	64.6		.055				256	61.9
39	5.0	38.0	-3.0	35.0	57.2		.035				163	54.8
49	15.0	33.0	-3.0	30.0	49.1		.020				93	47.0
10:04	30.0	30.0	-3.0	27.0	44.1		.014				69	42.2
10:34	60.0	27.5	-3.0	24.5	40.1		.010				49	38.4
1:44	250	23.0	-4.0	19.0	31.1		.005				26	29.8
	1440	19.0	-4.0	15.0	24.5		.002				10.3	23.5

TOTAL - 1112.1

REMARKS:

#4 - 0 - 0.0-0.0-100.0
#8 - 3.3 - 0.3 - 99.7
#10 - 4.7 - 4.2 - 95.8
#16 - .7 - 1.1 - 98.9 - 94.7
#30 - 2.9 - 4.7 - 95.3 - 91.3
#50 - 6.8 - 11.1 - 88.9 - 85.2
#100 - 12.9 - 21.1 - 78.9 - 75.6
#200 - 19.8 - 32.4 - 67.6 - 64.8

CON – 3031

ALABAMA POWER COMPANY

ATTERBERG LIMIT WORK SHEET

PROJECT [illegible] LABORATORY [illegible] DATE [illegible]
SAMPLE NO. 1 SOIL DESCRIPTION Micaceous Sandy Clayey Silt (MH)
LOCATION ______ BORING NO. ______ SAMPLE DEPTH ______

(43)

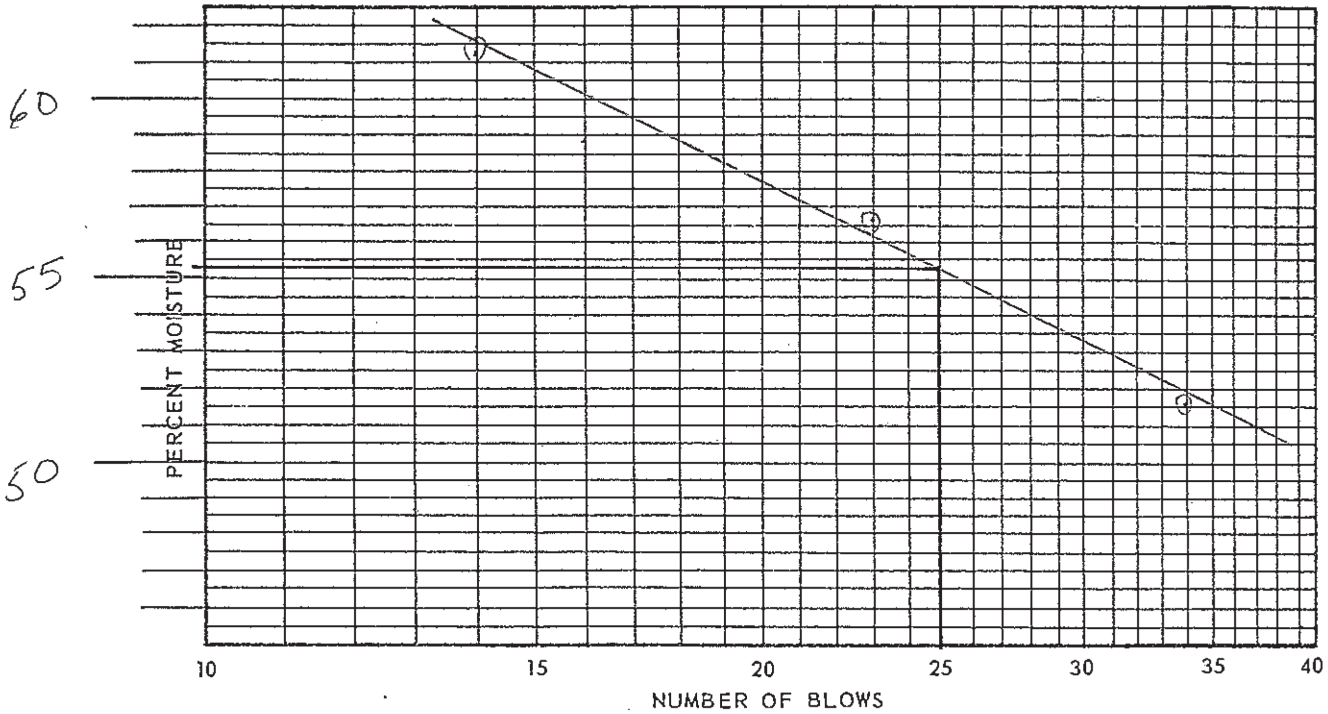
PLASTIC LIMIT 12 %

TARE #	9	%M	43.6	TARE #	10	%M	41.8
Ww	20.02	Dw	18.26	Ww	19.63	Dw	18.04
Dw	18.26	Tw	14.22	Dw	18.04	Tw	14.24
	1.76		4.04		1.59		3.80

TARE # ______ %M ______
Ww ______ Dw ______
Dw ______ Tw ______

LIQUID LIMIT 55 %

NO. BLOWS	14			NO. BLOWS	23			NO. BLOWS	34		
TARE #	6	%M	61.3	TARE #	7	%M	56.6	TARE #	8	%M	51.5
Ww	27.80	Dw	22.71	Ww	31.14	Dw	25.12	Ww	29.31	Dw	24.22
Dw	22.71	Tw	14.41	Dw	25.12	Tw	14.48	Dw	24.22	Tw	14.33
	5.09		8.30		6.02		10.64		5.09		9.89



SHRINKAGE LIMIT ______ %

SHRINKAGE MOLD NO. ______ VOLUME

Wt SHRINKAGE MOLD EMPTY ______ = Tw
Wt SHRINKAGE MOLD + WET SOIL ______ = Ww
Wt SHRINKAGE MOLD + DRY SOIL ______ = Dw

Wt EMPTY ______
Wt FULL OF Hg ______
______ ÷ 13.6
Vw = ______ cc

SHRINKAGE LIMIT = $\frac{(Ww - Dw) - (Vw - Vd)\ Vw \times 100}{Dw - Tw}$

SHRINKAGE PAT VOLUME
Wt DISH FULL ______
Wt DISH FULL – VOL PAT ______
______ ÷ 13.6
Vd = ______ cc

S. L. = (–) – (–) x 100

REMARKS ______

TESTED BY JBF CHECKED BY JBF

CON - 3031

ALABAMA POWER COMPANY

ATTERBERG LIMIT WORK SHEET

PROJECT Georgia [illegible] LABORATORY [illegible] DATE 6-30-78

SAMPLE NO. 1 SOIL DESCRIPTION

LOCATION BORING NO. SAMPLE DEPTH

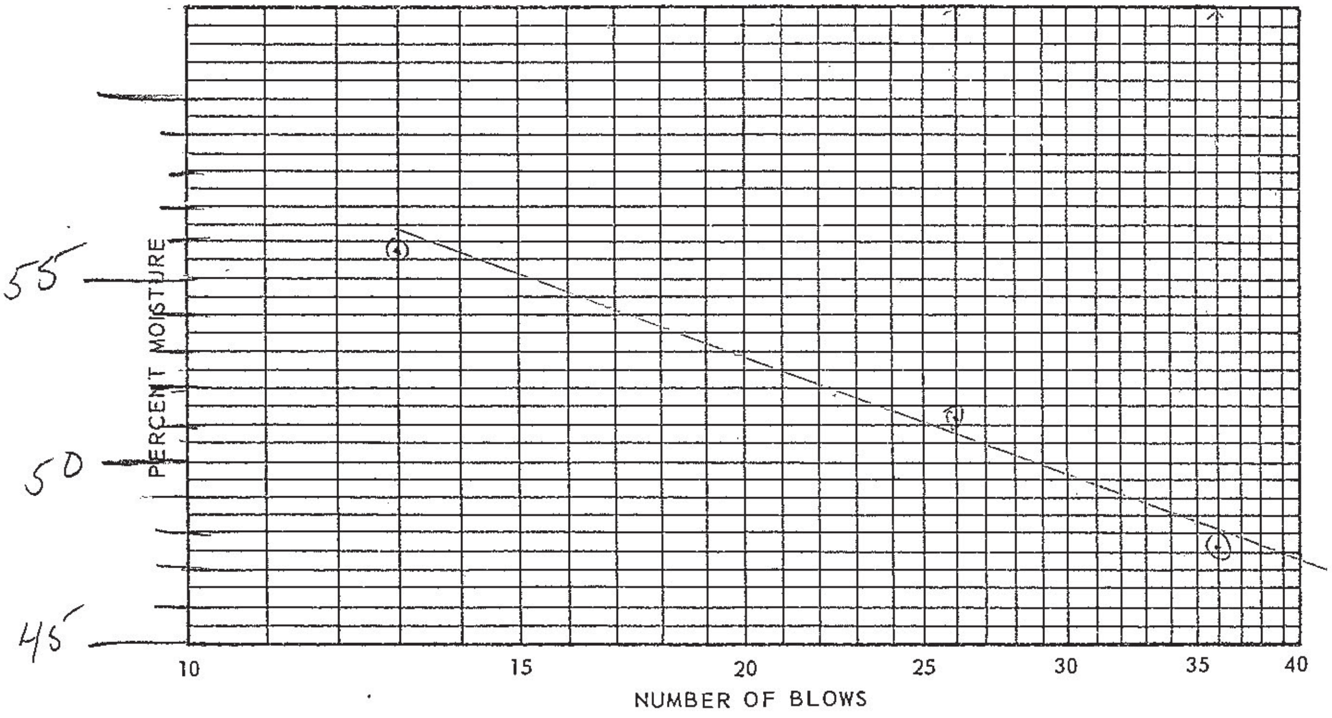
(32)

PLASTIC LIMIT 19 %

TARE#	[illegible]	%M	32.6		TARE#	15	%M	[illegible]	TARE#	%M
Ww	16.36	Dw	15.88		Ww	15.76	Dw	[illegible]	Ww	Dw
Dw	15.88	Tw	14.41		Dw	15.32	Tw	14.01	Dw	Tw
	.48		1.47			.44		1.31		

LIQUID LIMIT 51 %

NO. BLOWS	13			NO. BLOWS	26			NO. BLOWS	36		
TARE#	2	%M	55.7	TARE#	13	%M	51.2	TARE#	[illegible]	%M	47.6
Ww	28.26	Dw	23.31	Ww	25.06	Dw	21.45	Ww	27.34	Dw	23.13
Dw	23.31	Tw	14.43	Dw	21.45	Tw	14.40	Dw	23.13	Tw	14.30
	4.95		8.88		3.61		7.05		4.21		8.83



SHRINKAGE LIMIT %

SHRINKAGE MOLD NO. VOLUME

Wt SHRINKAGE MOLD EMPTY = Tw

Wt SHRINKAGE MOLD + WET SOIL = Ww

Wt SHRINKAGE MOLD + DRY SOIL = Dw

Wt EMPTY

Wt FULL OF Hg

÷ 13.6

Vw = cc

SHRINKAGE LIMIT $= \frac{(Ww - Dw) - (Vw - Vd)\ Vw \times 100}{Dw - Tw}$

S. L. $= \frac{(\quad - \quad) - (\quad - \quad)}{\quad - \quad} \times 100$

SHRINKAGE PAT VOLUME

Wt DISH FULL

Wt DISH FULL - VOL PAT

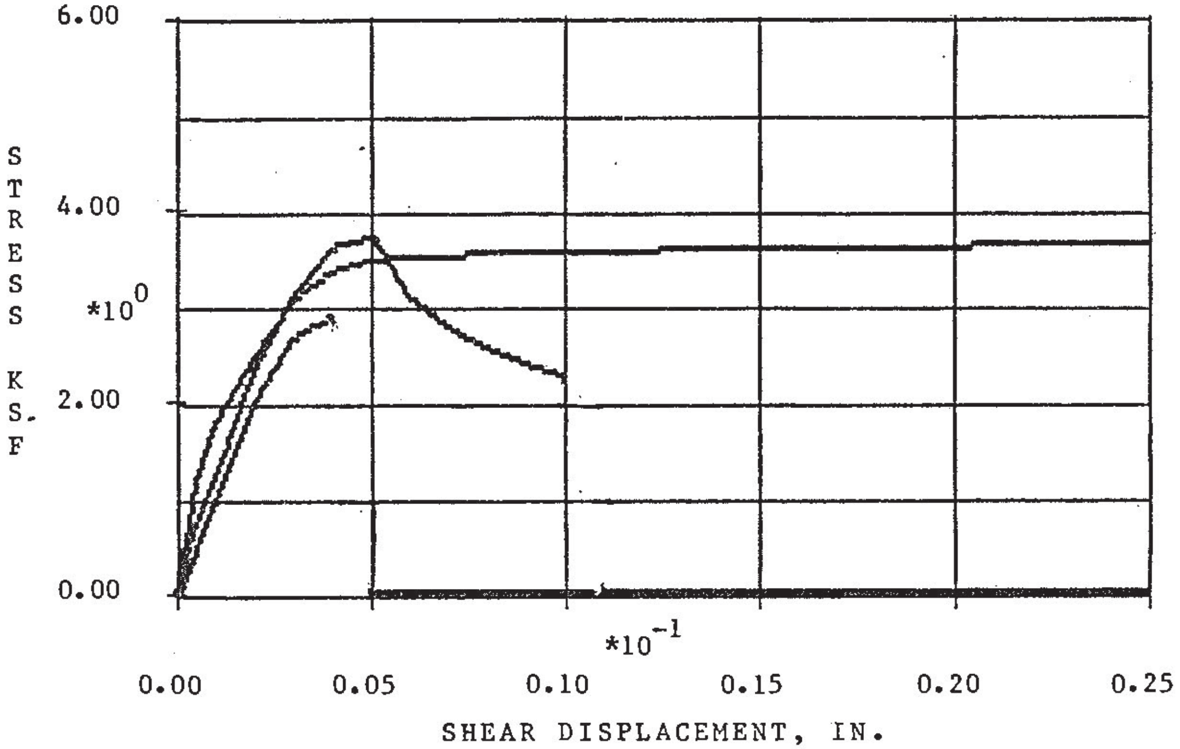
÷ 13.6

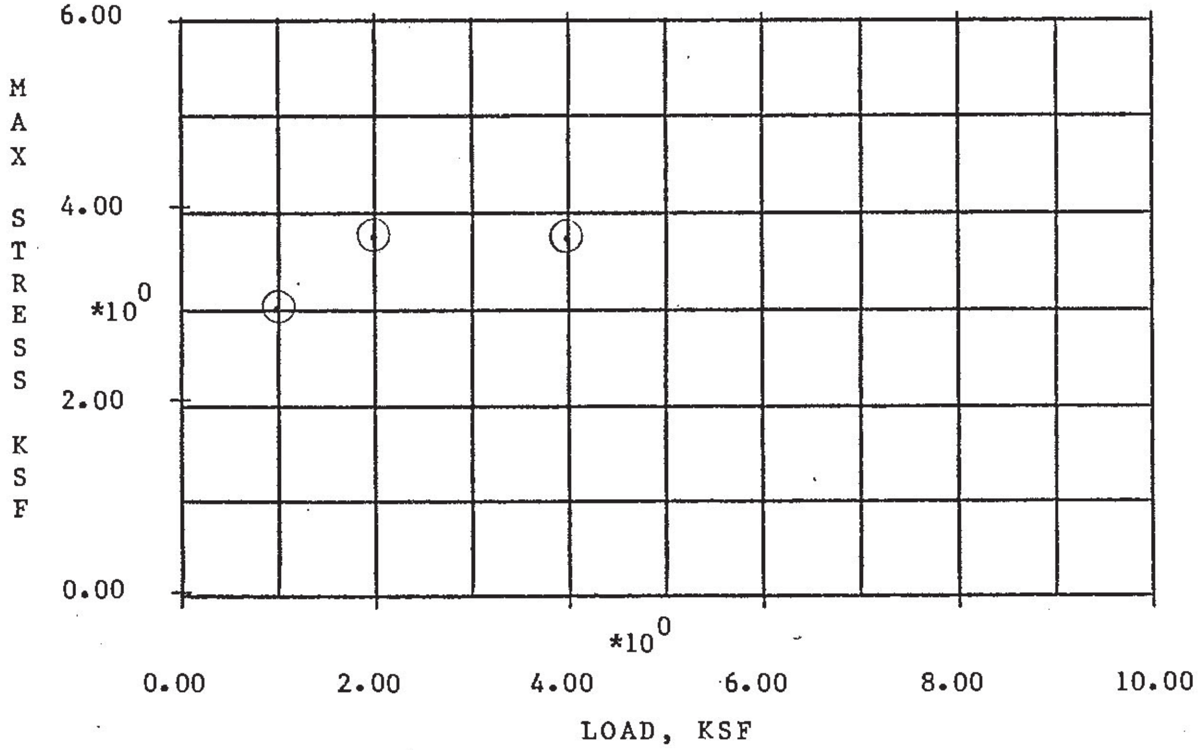
Vd = cc

REMARKS

TESTED BY OBK CHECKED BY OBK

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #1 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	519.2	803.8	1208.6
0.010	1029.6	1255.5	1833.4
0.020	2050.5	2361.4	2502.2
0.030	2710.5	3106.5	3080.1
0.040	2909.9	3616.9	3373.4
0.050	0.	3748.9	3493.7
0.060	0.	3071.3	3543.6
0.070	0.	2739.8	3561.2
0.080	0.	2531.5	3570.0
0.090	0.	2361.4	3570.0
0.100	0.	2267.5	3570.0
0.110	0.	0.	3578.8
0.120	0.	0.	3599.3
0.130	0.	0.	3616.9
0.140	0.	0.	3616.9
0.150	0.	0.	3625.7
0.160	0.	0.	3625.7
0.170	0.	0.	3625.7
0.180	0.	0.	3625.7
0.190	0.	0.	3625.7
0.200	0.	0.	3625.7
0.210	0.	0.	3646.2
0.220	0.	0.	3655.0
0.230	0.	0.	3655.0
0.240	0.	0.	3663.8
0.250	0.	0.	3663.8

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #1 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST ATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	17.7	17.7	17.7
VOID RATIO	-	0.750	0.715	0.775
SATURATION	%	64.9	68.1	62.8
DENSITY	KSF	98.1	100.1	96.7
AFTER CONSOLIDATION				
VOID RATIO	-	0.750	0.716	0.776
FINAL CONDITIONS				
WATER CONTENT	%	17.7	17.7	17.7
VOID RATIO	-	0.750	0.716	0.776
SATURATION	%	64.9	68.0	62.8
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.008	0.010	0.016
MAXIMUM SHEAR STRESS	KSF	2.91	3.75	3.66
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #1 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
*RUN DSHEAR
LOADER DIAGNOSTICS
<W> HLINE  UNDEFIN
<W> VLINE  UNDEFINED
<W> AXIS   UNDEFINED
<W> PLOT   UNDEFINED
<W> PLOTS  UNDEFINED

= DEL
LIST GP9
 LIST GP9
  ^
FILE CODE 05 ILLEGAL CHAR; CORRECTION =
*** warning *** due to interrupt, output files may now be inaccessible
*LIST GP9

010 26,2.75,3
020 .999,17.7,17.7,126.39,.000,.040,5.0,.000,99.2
030 2.002,17.7,17.7,128.95,.000,.050,5.0,.000,127.8
040 4.003,17.7,17.7,124.60,.000,.080,5.0,.000,124.9
050 .005,17.7,27.4,41.2
060 .010,35.1,42.8,62.5
070 .020,69.9,80.5,85.3
080 .030,92.4,105.9,105.0
090 .040,99.2,123.3,115.0
100 .050,0.0,127.8,119.1
110 .060,0.0,104.7,120.8
120 .070,0.0,93.4,121.4
130 .080,0.0,86.3,121.7
140 .090,0.0,80.5,121.7
150 .100,0.0,77.3,121.7
160 .110,0.0,0.0,122.0
170 .120,0.0,0.0,122.7
180 .130,0.0,0.0,123.3
190 .140,0.0,0.0,123.3
200 .150,0.0,0.0,123.6
210 .160,0.0,0.0,s123.6
220 .170,0.0,0.0,123.6
230 .180,0.0,0.0,123.6
240 .190,0.0,0.0,123.6
250 .200,0.0,0.0,123.6
260 .210,0.0,0.0,124.3
270 .220,0.0,0.0,124.6
280 .230,0.0,0.0,124.6
290 .240,0.0,0.0,124.9
300 .250,0.0,0.0,124.9


*210 .160,0.0,0.0,123.6
*RESAVE GP9
DATA SAVED-GP9
*LIST

010 26,2.75,3
020 .999,17.7,17.7,126.39,.000,.040,5.0,.000,99.2
030 2.002,17.7,17.7,128.95,.000,.050,5.0,.000,127.8
040 4.003,17.7,17.7,124.60,.000,.080,5.0,.000,124.9
050 .005,17.7,27.4,41.2
060 .010,35.1,42.8,62.5
070 .020,69.9,80.5,85.3
080 .030,92.4,105.9,105.0
090 .040,99.2,123.3,115.0
100 .050,0.0,127.8,119.1
110 .060,0.0,104.7,120.8
```

OCATION:
AB NO. :
ROJECT : Ga. Power Co.

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	26	2.75	3

689
A1 Standard

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	1.999	17.7	17.7	126.39	.000	.040	5.0	.000	99.2
2	030	2.002	17.7	17.7	128.95	.000	.050	5.0	.000	127.8
3	040	4.003	17.7	17.7	124.60	.000	.080	5.0	.000	124.9

Specimen No. : 1 2 3

Line No.	Shear Displacement In.	Shear Force Lbs. (1)	Shear Force Lbs. (2)	Shear Force Lbs. (3)	
050	.005	17.7	27.4	41.2	1
060	.010	35.1	42.8	62.5	2
070	.020	69.9	80.5	85.3	3
080	.030	92.4	105.9	105.0	4
090	.040	99.2	123.3	115.0	5
100	.050		127.8	119.1	6
110	.060		104.7	120.8	7
120	.070		93.4	121.4	8
130	.080		86.3	121.7	9
140	.090		80.5	121.7	10
150	.100		77.3	121.7	11
160	.110			122.0	12
170	.120			122.7	13
180	.130			123.3	14
190	.140			123.3	15
200	.150			123.6	16
210	.160			123.6	17
220	.170			123.6	18
230	.180			123.6	19
240	.190			123.6	20
250	.200			123.6	21
260	.210			124.3	22
270	.220			124.6	23
280	.230			124.6	24
290	.240			124.9	25
300	.250			124.9	26

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#1 Standard
TOP

SOIL SAMPLE Ga Power Co

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 1

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 95% Dry Side Standard

DATE 6-30-78

TESTED BY

SCALE LOAD

APPLIED LOAD ___ lbs. ___ lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	76				
WT. CONTAINER + WET SOIL, IN g	85.86	148.76			
WT. CONTAINER + DRY SOIL IN g	75.13				
WT. WATER, W_w, IN g	10.73				
WT. CONTAINER IN g	14.34				
WT. DRY SOIL, W_s, IN g	60.79	126.39			
WATER CONTENT, w, IN %	17.7				

221.49
72.73
148.76

900 1032

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	209	.000			
	210	.005	55	17.7	
	210	.010 33'	109	35.1	
	209	.020 70	217	69.9	
	206	.030	287	92.4	
	204	.040	308	99.2	
	197	.050			
		.060			
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

SOIL TEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS, U.S.A.

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#5 middle

SOIL SAMPLE Ga Power C

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. B

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 95% Dry Side Standard

DATE 6/30/78

TESTED BY

SCALE LOAD

APPLIED LOAD lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

224.58

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	47				
WT. CONTAINER + WET SOIL IN g	92.83	151.77			
WT. CONTAINER + DRY SOIL IN g	81.00				
WT. WATER, W_w, IN g	11.83				
WT. CONTAINER IN g	14.34				
WT. DRY SOIL, W_s, IN g	66.66	128.95			
WATER CONTENT, w, IN %	17.7				

200 10:48

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	217	.000			
	217	.005	85	27.4	
	217	.010	133	42.8	
	218	.020	250	80.5	
	217	.030	329	105.9	
	16	.040	383	123.3	
	211	.050	397	127.8	
	206	.060	325	104.7	
	205	.070	290	93.4	
	204	.080	268	86.3	
	203	.090	250	80.5	
	202	.100	240	77.3	
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

LEE STREET • EVANSTON ILLINOIS U.S.A

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#5 Bot.

SOIL SAMPLE Gc Power Co
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 5
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_0, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 95% Dry Side Std
DATE 6/30/78
TESTED BY
SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	28				
WT. CONTAINER + WET SOIL IN g	91.87	146.66			
WT. CONTAINER + DRY SOIL IN g	86.21				
WT. WATER, W_w, IN g	11.68				
WT. CONTAINER IN g	14.20				
WT. DRY SOIL, W_s, IN g	66.01	124.60			
WATER CONTENT, w, IN %	17.7				

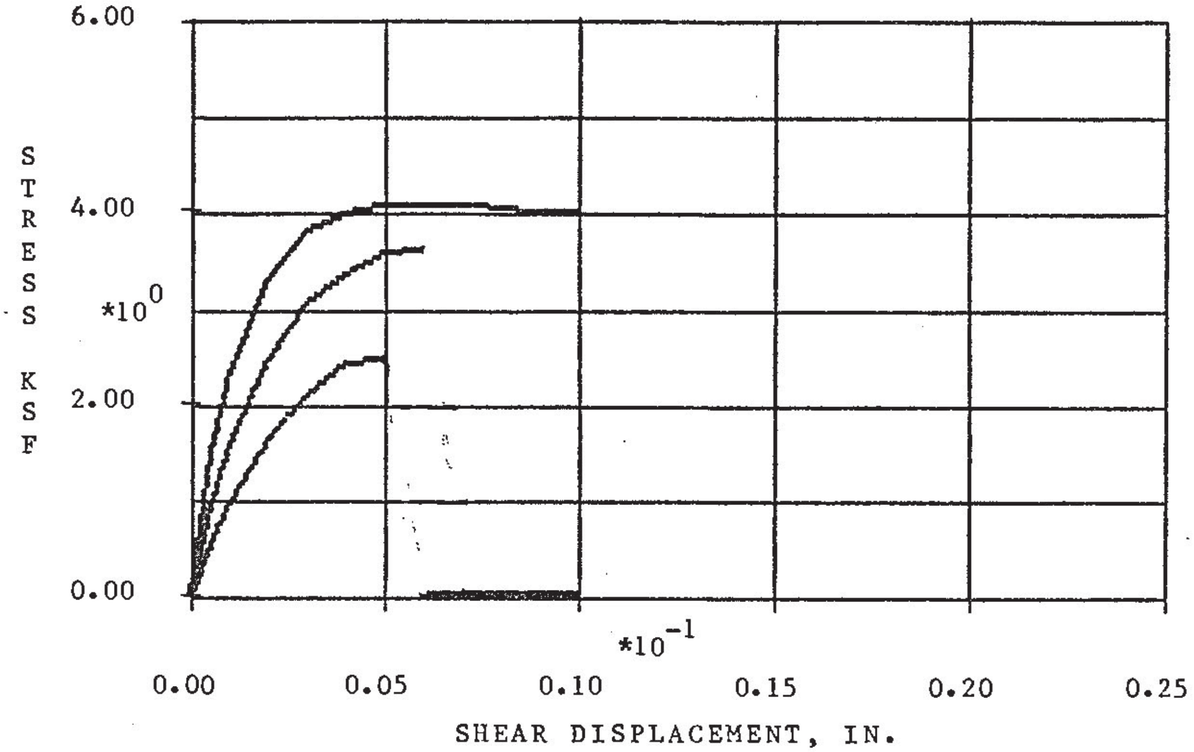
219.37

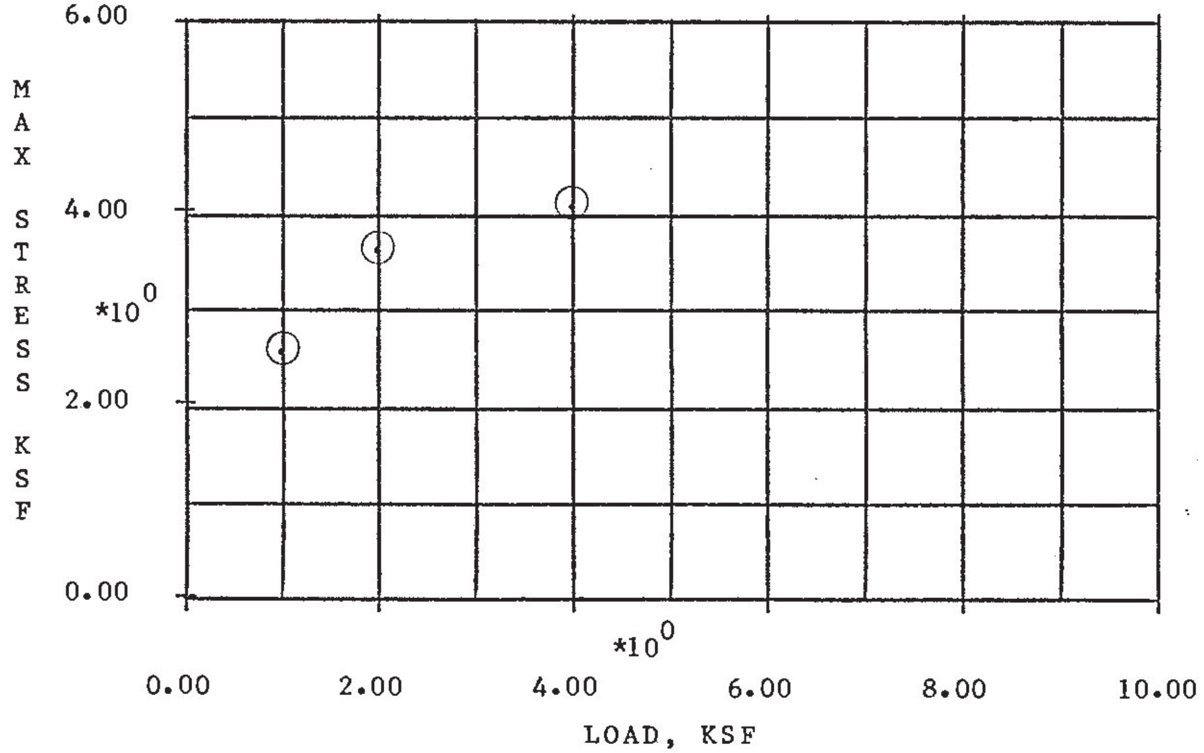
700 11:13

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	229	.000			
	230	.005	128	41.2	
	230	.010	194	62.5	
	230	.020	265	85.3	
	230	.030	326	105.0	
	230	.040	357	115.0	
	231	.050	370	119.1	
	231	.060	375	120.8	
	230	.070	377	121.4	
	230	.080	378	121.7	
	230	.090	378	121.7	
	230	.100	378	121.7	
	229	.110	379	122.0	
	229	.120	381	122.7	
	229	.130	383	123.3	
	228	.140	383	123.3	
	228	.150	384	123.6	
	228	.160	384	123.6	
	228	.170	384	123.6	
	228	.180	384	123.6	
	228	.190	384	123.6	
	227	.200	384	123.6	
	227	.210	386	124.3	
	227	.220	387	124.6	
	227	.230	387	124.6	
	227	.240	388	124.9	
		.250	388	124.9	

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #2 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	595.5	944.6	1531.2
0.010	1000.3	1604.6	2361.4
0.020	1680.8	2502.2	3314.8
0.030	2144.3	3097.7	3834.0
0.040	2437.7	3373.4	4004.1
0.050	2502.2	3599.3	4062.8
0.060	0.	3625.7	4071.6
0.070	0.	0.	4080.4
0.080	0.	0.	4015.8
0.090	0.	0.	3966.0
0.100	0.	0.	3939.6

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. :#2 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	18.8	19.4	18.7
VOID RATIO	-	0.797	0.746	0.726
SATURATION	%	64.8	71.5	70.8
DENSITY	KSF	95.5	98.3	99.5
AFTER CONSOLIDATION				
VOID RATIO	-	0.798	0.747	0.727
FINAL CONDITIONS				
WATER CONTENT	%	18.8	19.4	18.7
VOID RATIO	-	0.798	0.747	0.727
SATURATION	%	64.8	71.4	70.8
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.010	0.012	0.014
MAXIMUM SHEAR STRESS	KSF	2.50	3.63	4.08
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #2 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
PLEASE SELECT SYSTEM:  1=TS, 2=WORD ONE, 3=CMS, B=BOWNE
-  11
0360200  TERMINAL TYPE?S
SOUTHERN COMPANY T/S ON 07/05/78  TIME  08:35:41   CHANNEL  2760

USER ID -ALP5370000
project id-KJIU
PASSWORD--
PKNGKBMVEPSK
SYSTEM ?FORT N
*AUTO
*010 11,2.75,3
*020 .999,18.8,18.8,123.05,.000,.050,.000,85.3
*030 2.003,19.4,19.4,126.64,.000,.060,5.0,.000,123.6
*040 4.002,18.7,18.7,128.12,.000,.070,5.0,.000,139.1
*050 .005,20.3,32.2,52.2
*060 .010,34.1,54.7,80.5
*070 .020,57.3,85.3,113.0
*080 .030,73.1,105.6,130.7
*090 .040,83.1,115.0,136.5
*100 .050,85.3,122.7,138.5
*110 .060,0.0,123.6,138.8
*120 .070,0.0,0.0,139.1
*130 .080,0.0,0.0,136.9
*140 .090,0.0,0.0,135.2
*150 .100,0.0,0.0,134.3
*160
*.
COMMAND UNKNOWN
*020 .999,18.8,18.8,123.05,.000,.050,5.0,.000,85.3
*SAVE GP7
DATA SAVED-GP7
*LIST

010 11,2.75,3
020 .999,18.8,18.8,123.05,.000,.050,5.0,.000,85.3
030 2.003,19.4,19.4,126.64,.000,.060,5.0,.000,123.6
040 4.002,18.7,18.7,128.12,.000,.070,5.0,.000,139.1
050 .005,20.3,32.2,52.2
060 .010,34.1,54.7,80.5
070 .020,57.3,85.3,113.0
080 .030,73.1,105.6,130.7
090 .040,83.1,115.0,136.5
100 .050,85.3,122.7,138.5
110 .060,0.0,123.6,138.8
120 .070,0.0,0.0,139.1
130 .080,0.0,0.0,136.9
140 .090,0.0,0.0,135.2
150 .100,0.0,0.0,134.3


*RUN DSHEAR; SSLIB/AJPLOT,R #GP7 "05"
```

OCATION: ______________________________

AB NO. : ______________________________

ROJECT : ______________________________

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	11	2.75	3

GP7
#2 Standard

pec. o.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	18.8	18.8	123.05	.000	.050	5.0	.000	85.3
2	030	2.003	19.4	19.4	126.64	.000	.060	5.0	.000	123.6
3	040	4.002	18.7	18.7	128.12	.000	.070	5.0	.000	139.1

Specimen No. :		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	20.3	32.2	52.2
060	.010	34.1	54.7	80.5
070	.020	57.3	85.3	113.0
080	.030	73.1	105.6	130.7
090	.040	83.1	115.0	136.5
100	.050	85.3	122.9	138.5
110	.060		123.6	138.8
120	.070			139.1
130	.080			136.9
140	.090			135.2
150	.100			134.3
160	.110			
170	.120			
180	.130			
190	.140			
200	.150			
210	.160			
220	.170			
230	.180			
240	.190			
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
300	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#2 Standard

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 2

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 2 Bot 17% std

DATE 6/28/78

TESTED BY

SCALE LOAD 46

APPLIED LOAD 136 lbs. lbs/sq. ft. 2

TARE IN lbs.

SCALE LOAD IN lbs.

224.82

3
3
2

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	19				
WT. CONTAINER + WET SOIL IN g	73.98	152.09			
WT. CONTAINER + DRY SOIL IN g	64.62				
WT. WATER, W_w, IN g	9.36				
WT. CONTAINER IN g	14.52				
WT. DRY SOIL, W_s, IN g	50.10	128.12			
WATER CONTENT, w, IN %	18.7				

2106

200

1
2
3

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	225	.000			
		.005	.162	52.2	
		.010	250	80.5	
		.020 425a	351	113.0	
	225	.030 30	406	130.7	
		.040 25	424	136.5	
		.050	430	138.5	
	221	.060	431	138.8	
	220	.070	432	139.1	
	219	.080	425	136.9	
	218	.090	420	135.2	
	217	.100	417	134.3	
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 2

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_0, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 2 Top 17% Standard

DATE 6-27-78

TESTED BY

SCALE LOAD

APPLIED LOAD 3406 lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

1/2 TSF

0

3

:

1#

218.9

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	3				
WT. CONTAINER + WET SOIL IN g	87.63	146.19			
WT. CONTAINER + DRY SOIL IN g	76.02				
WT. WATER, W_w, IN g	11.61				
WT. CONTAINER IN g	14.21				
WT. DRY SOIL, W_s, IN g	61.81	123.05			
WATER CONTENT, w, IN %	18.8				

200

1:~~3400~~41 → 1:45

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	206	.000			
	206	.005	63	20.3	
	206	.010 41 sec.	106	34.1	
	204	.020 39 sec.	178	57.3	
	203	.030	227	73.1	
		.040	258	83.1	
	197	.050	265	85.3	
		.060			
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

1

2

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 2
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 2 Mid 17% Std
DATE 6/28/78
TESTED BY
SCALE LOAD 26
APPLIED LOAD 68 lbs. lbs/sq. ft. 1
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION						
CONTAINER NO.	16					
WT. CONTAINER + WET SOIL IN g	89.55	151.21				
WT. CONTAINER + DRY SOIL IN g	77.31					
WT. WATER, W_w, IN g	12.24					
WT. CONTAINER IN g	14.26					
WT. DRY SOIL, W_s, IN g	63.05	126.64				
WATER CONTENT, w, IN %	19.4					

1
3
3
223.94

200 1155

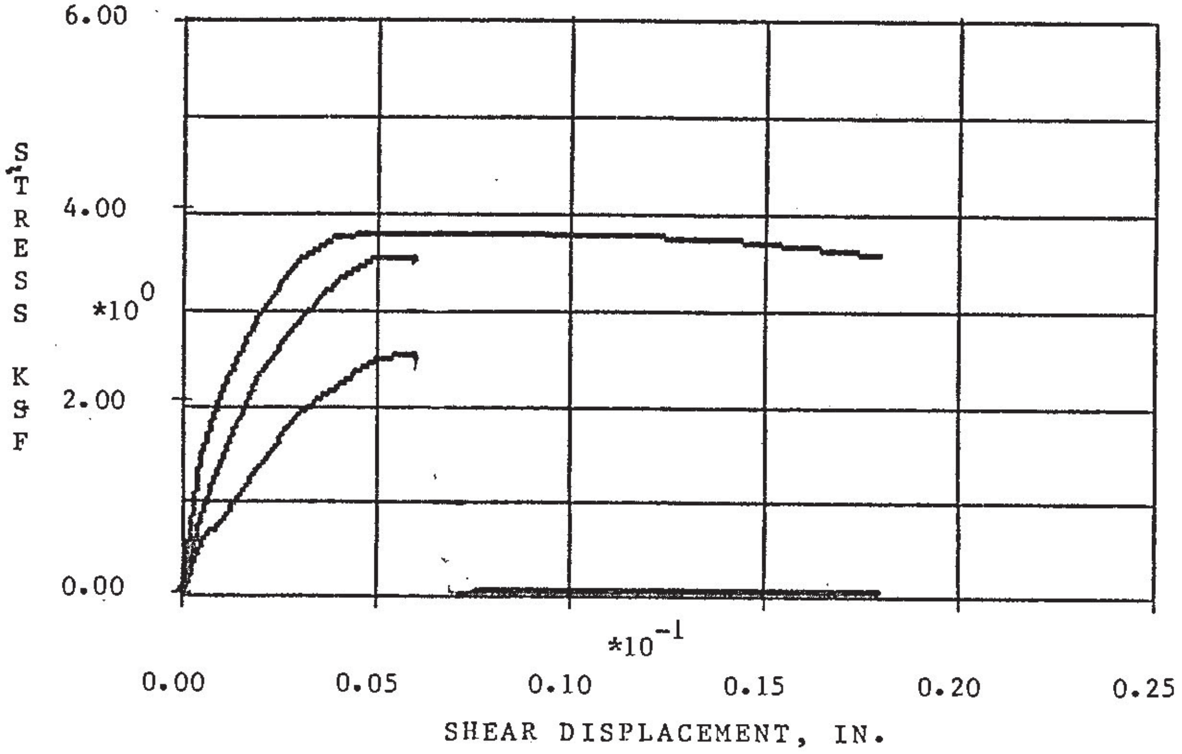
ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	212	.000			
	212	.005	100	32.2	
	212	.010 300	170	54.7	
	212	.020	265	85.3	
		.030 23	328	105.6	
	210	.040	357	115.0	
	208	.050	381	122.7	
	205	.060	384	123.6	
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

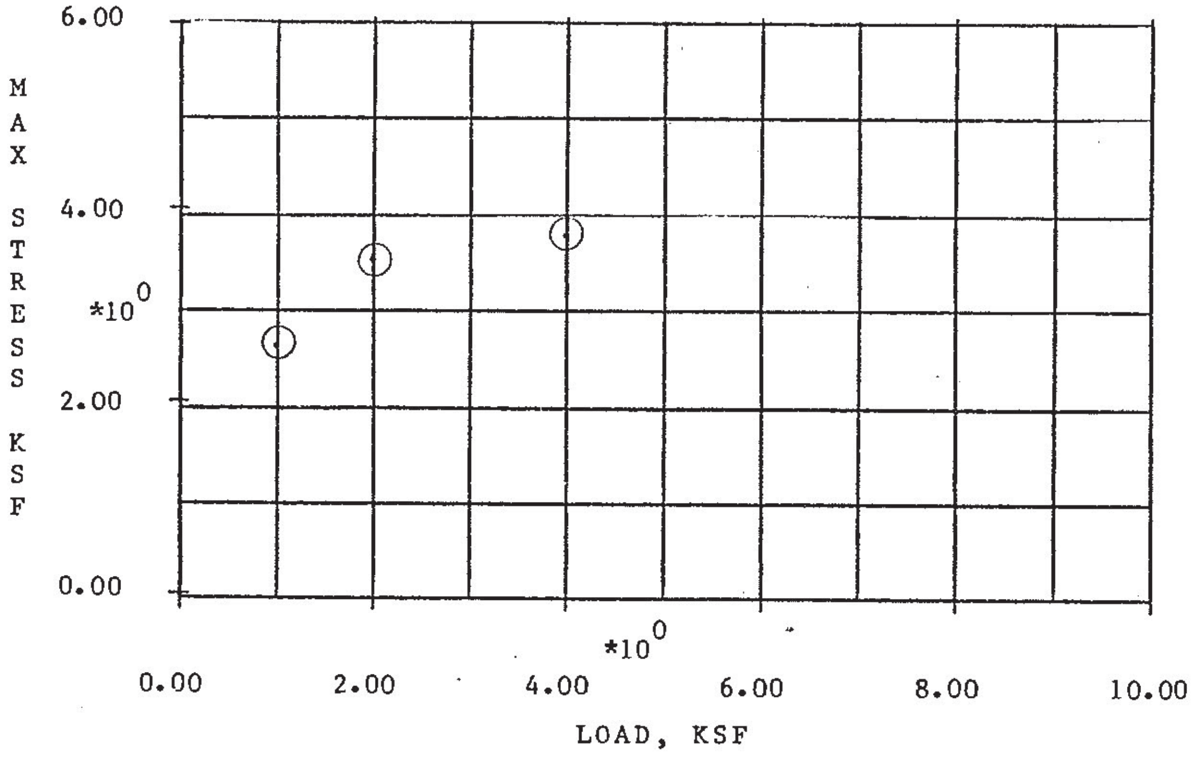
1
2
3

REMARKS

SOIL TEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS, U.S.A.

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #3 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	21.0	20.5	20.8
VOID RATIO	-	0.736	0.711	0.708
SATURATION	%	78.5	79.3	80.8
DENSITY	KSF	98.9	100.3	100.5
AFTER CONSOLIDATION				
VOID RATIO	-	0.737	0.712	0.709
FINAL CONDITIONS				
WATER CONTENT	%	21.0	20.5	20.8
VOID RATIO	-	0.737	0.712	0.709
SATURATION	%	78.4	79.2	80.7
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.012	0.012	0.016
MAXIMUM SHEAR STRESS	KSF	2.54	3.54	3.79
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY_CLAYEY SILT MH

LAB NO. : #3 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	566.1	850.7	1446.2
0.010	774.4	1425.6	2126.7
0.020	1387.5	2332.1	2965.7
0.030	1897.9	2889.4	3505.4
0.040	2208.9	3288.4	3760.6
0.050	2493.4	3531.8	3787.0
0.060	2540.3	3543.6	3787.0
0.070	0.	0.	3769.4
0.080	0.	0.	3748.9
0.090	0.	0.	3731.3
0.100	0.	0.	3710.8
0.110	0.	0.	3702.0
0.120	0.	0.	3693.2
0.130	0.	0.	3675.6
0.140	0.	0.	3655.0
0.150	0.	0.	3637.4
0.160	0.	0.	3590.5
0.170	0.	0.	3561.2
0.180	0.	0.	3505.4

PROJECT: SHERRER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #3 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
 DONE
COMMAND UNKNOWN
*DONE
SYSTEM ?FORT O
OLD FILE? GP00
*LIST

010 19,2.70,3
020 .999,21.0,21.0,127.39,.000,.060,5.0,.000,86.6
030 2.002,20.5,20.5,129.26,.000,.060,5.0,.000,120.8
040 4.003,20.8,20.8,129.47,.000,.080,5.0,.000,129.1
050 .005,19.3,29.0,49.3
060 .010,26.4,48.6,72.5
070 .020,47.3,79.5,101.1
080 .030,64.7,98.5,119.5
090 .040,75.3,112.1,128.2
100 .050,85.0,120.4,129.1
110 .060,86.6,120.8,129.1
120 .070,0.0,0.0,128.5
130 .080,0.0,0.0,127.8
140 .090,0.0,0.0,127.2
150 .100,0.0,0.0,126.5
160 .110,0.0,0.0,126.2
170 .120,0.0,0.0,125.9
180 .130,0.0,0.0,125.3
190 .140,0.0,0.0,124.6
200 .150,0.0,0.0,124.0
210 .160,0.0,0.0,122.4
220 .170,0.0,0.0,121.4
230 .180,0.0,0.0,119.5


*010 19,2.75,3
*E_RESAVE GP00
DATA SAVED-GP00
*LIST

010 19,2.75,3
020 .999,21.0,21.0,127.39,.000,.060,5.0,.000,86.6
030 2.002,20.5,20.5,129.26,.000,.060,5.0,.000,120.8
040 4.003,20.8,20.8,129.47,.000,.080,5.0,.000,129.1
050 .005,19.3,29.0,49.3
060 .010,26.4,48.6,72.5
070 .020,47.3,79.5,101.1
080 .030,64.7,98.5,119.5
090 .040,75.3,112.1,128.2
100 .050,85.0,120.4,129.1
110 .060,86.6,120.8,129.1
120 .070,0.0,0.0,128.5
130 .080,0.0,0.0,127.8
140 .090,0.0,0.0,127.2
150 .100,0.0,0.0,126.5
160 .110,0.0,0.0,126.2
170 .120,0.0,0.0,125.9
180 .130,0.0,0.0,125.3
190 .140,0.0,0.0,124.6
200 .150,0.0,0.0,124.0
210 .160,0.0,0.0,122.4
220 .170,0.0,0.0,121.4
230 .180,0.0,0.0,119.5

 *RUN DSHEAR: SSLIB/AJPLOT.R #GP00 "05"
```

CATION: ______________________
B NO. : ______________________
ROJECT : ______________________

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
CO[illegible]TER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	19	2.70	3

GPCC
#3 standard

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	21.0	21.0	127.39	.000	.060	5.0	.000	86.6
2	030	2.002	20.5	20.5	129.26	.000	.060	5.0	.000	120.8
3	040	4.003	20.8	20.8	129.47	.000	.080	5.0	.000	129.1

Specimen No. :

		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	19.3	29.0	49.3
060	.010	26.4	48.6	72.5
070	.020	47.3	79.5	101.1
080	.030	64.7	98.5	119.5
090	.040	75.3	112.1	128.2
100	.050	85.0	120.4	129.1
110	.060	86.6	120.8	129.1
120	.070			128.5
130	.080			127.8
140	.090			127.2
150	.100			126.5
160	.110			126.2
170	.120			125.9
180	.130			125.3
190	.140			124.6
200	.150			124.0
210	.160			122.4
220	.170			121.4
230	.180			119.5
240	.190			
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
300	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#3 Standard

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 1

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 1 Top 1970 Std

DATE 6/28/78

TESTED BY

SCALE LOAD

APPLIED LOAD 34⁰6 lbs. lbs/sq. ft. 1/2

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	10	154.15			
WT. CONTAINER + WET SOIL IN g	86.08				
WT. CONTAINER + DRY SOIL IN g	73.59				
WT. WATER, W_w, IN g	12.49				
WT. CONTAINER IN g	14.24				
WT. DRY SOIL, W_s, IN g	59.35	127.39			
WATER CONTENT, w, IN %	21.0				

226.88

0
3
3
1st

226.88
72.73
154.15

12.51

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	202	.000			
	2	.005	60	19.3	
	2	.010	82	26.4	
	2	.020	147	47.3	
	200	.030	201	64.7	
	200	.040	234	75.3	
	198	.050	264	85.0	
	190	.060	269	86.6	
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

1
2

REMARKS

SOIL TEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS, U.S.A.

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 1

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_0, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 1 Mid 19% Std

DATE 6/28/78

TESTED BY

SCALE LOAD 26

APPLIED LOAD 68 lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

228.50

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	1				
WT. CONTAINER + WET SOIL IN g	87.32	159.77			
WT. CONTAINER + DRY SOIL IN g	74.88				
WT. WATER, W_w, IN g	12.44				
WT. CONTAINER IN g	14.13				
WT. DRY SOIL, W_s, IN g	60.75				
WATER CONTENT, w, IN %	70.5	129.26			

1:05

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	214	.000			
	216	.005	90	29.0	
	214	.010 6:5[illegible]	151	48.6	
	216	.020	247	79.5	
	214	.030	305	98.2	
	212	.040	348	112.1	
	211	.050	374	120.4	
	211	.060	375	120.8	
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

SOIL TEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS, U.S.A.

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 1

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 1 Bot 19% Std

DATE 6/28/78

TESTED BY

SCALE LOAD

APPLIED LOAD 136 46 lbs. lbs/sq. ft. 2

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

229.13

SPECIMEN LOCATION					
CONTAINER NO.	2	156.40			
WT. CONTAINER + WET SOIL IN g	71.18				
WT. CONTAINER + DRY SOIL IN g	61.33				
WT. WATER, W_w, IN g	9.85				
WT. CONTAINER IN g	14.03				
WT. DRY SOIL, W_s, IN g	47.30	129.47			
WATER CONTENT, w, IN %	20.8				

3

3/2

1:21

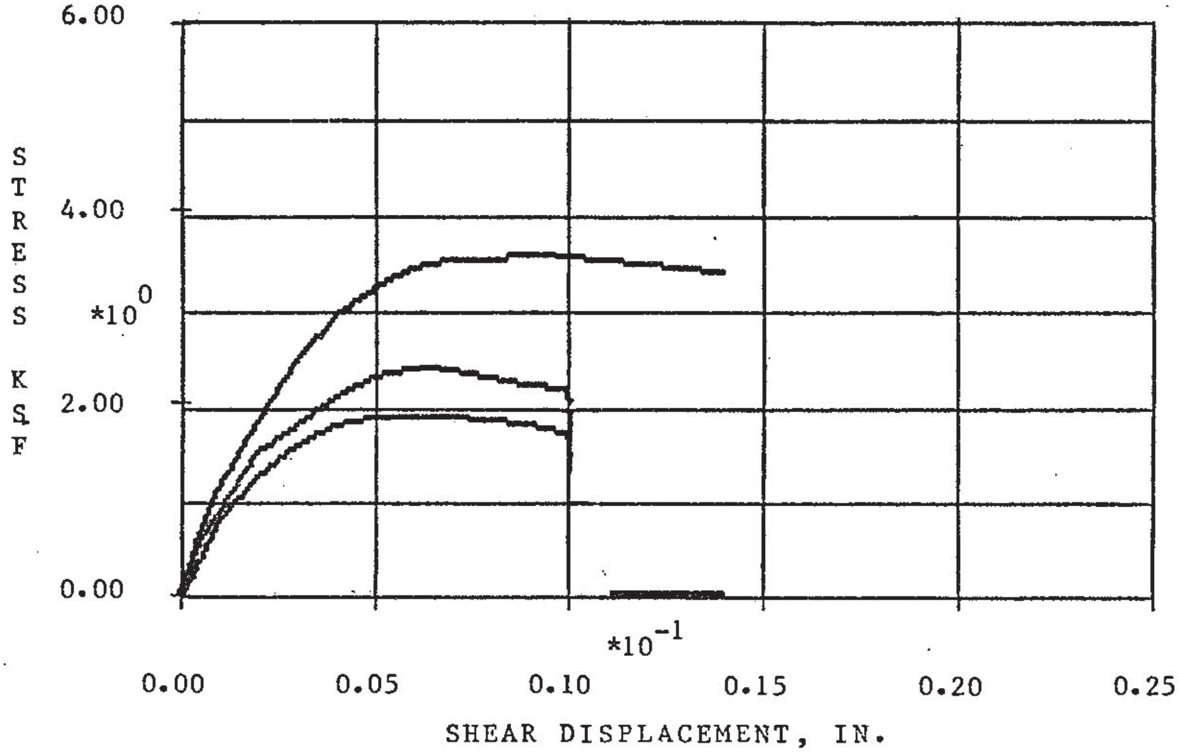
200

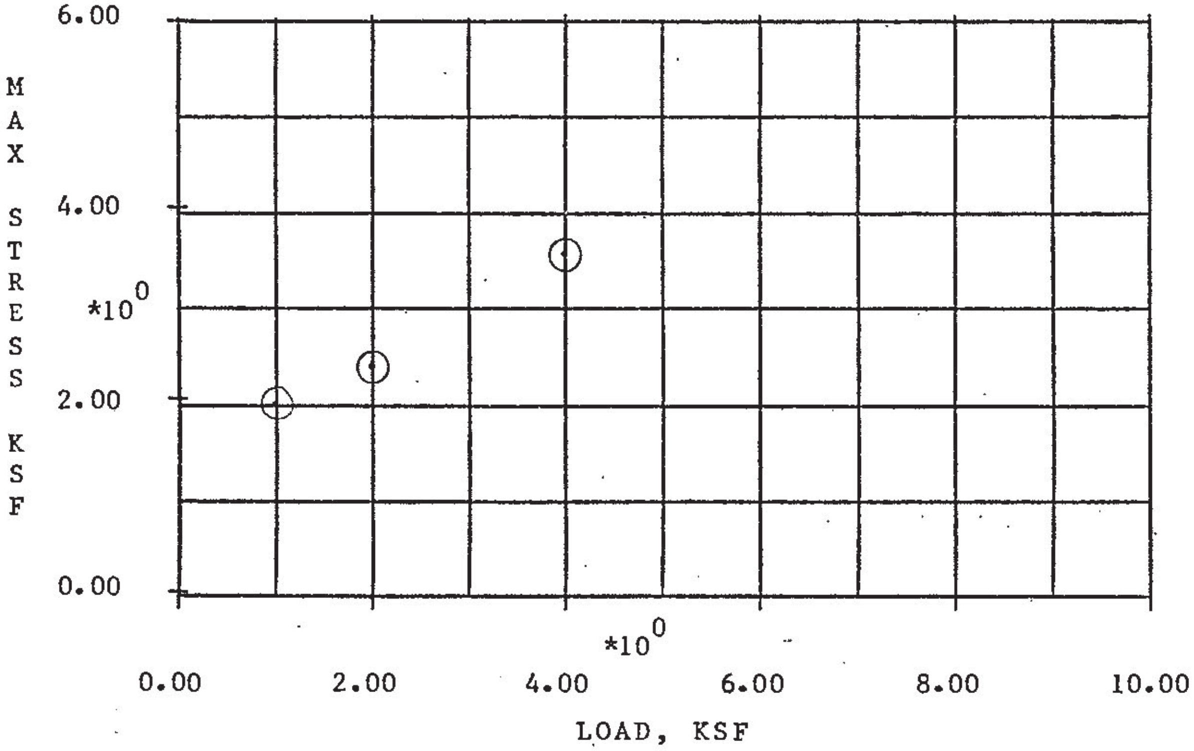
1/2

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	250	.000			
	50	.005	153	49.3	
	50	.010	225	72.5	
	50	.020 36	314	[illegible]	
	50	.030	371	119.5	
	51	.040	398	128.2	
	51	.050	401	129.1	
	50	.060	401	129.1	
	49	.070	399	128.5	
	49	.080	397	127.8	
	48	.090	395	127.2	
	48	.100	393	126.5	
	47	.110	392	126.2	
	47	.120	391	125.9	
	47	.130	389	125.3	
	46	.140	387	124.6	
	246	.150	385	124.0	
	245	.160	380	122.4	
	244	.170	377	121.4	
	244	.180	371	119.5	
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST ATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. :#4 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

	1.00 KSF	2.00 KSF	4.00 KSF
SHEAR DISPLACEMENT IN.	SHEAR STRESS PSF	SHEAR STRESS PSF	SHEAR STRESS PSF
0.005	396.0	613.1	718.7
0.010	812.6	927.0	1161.6
0.020	1276.0	1557.6	1889.1
0.030	1604.6	1842.2	2513.9
0.040	1821.6	2126.7	2965.7
0.050	1906.7	2343.8	3250.2
0.060	1889.1	2408.3	3438.0
0.070	1821.6	2323.3	3523.0
0.080	1774.7	2238.2	3561.2
0.090	1736.6	2161.9	3570.0
0.100	1680.8	2106.2	3505.4
0.110	0.	0.	3458.5
0.120	0.	0.	3408.6
0.130	0.	0.	3361.7
0.140	0.	0.	3323.6

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #4 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	22.8	22.6	22.6
VOID RATIO	-	0.740	0.761	0.737
SATURATION	%	84.7	81.7	84.3
DENSITY	KSF	98.7	97.5	98.8
AFTER CONSOLIDATION				
VOID RATIO	-	0.741	0.761	0.737
FINAL CONDITIONS				
WATER CONTENT	%	22.8	22.6	22.6
VOID RATIO	-	0.741	0.761	0.737
SATURATION	%	84.6	81.6	84.3
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.010	0.012	0.018
MAXIMUM SHEAR STRESS	KSF	1.91	2.41	3.57
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT:SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. :#4 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A.TYSON
JULY 7, 1978

```
*AUTO
*160 15,2.75,3
*170 .999,22.8,22.[illegible]127.09,.000,.050,5.0,.000,[illegible].0
*180 2.002,22.6,22.6,125.60,.000,.060,5.0,.000,82.1
*190 4.003,22.6,22.6,127.33,.000,.090,5.0,.000,121.7
*200 .005,13.5,20.9,24.5
*210 .010,27.7,31.6,39.6
*220 .020,43.5,53.1,64.4
*230 .030,54.7,62.8,85.7
*240 .040,62.1,72.5,101.1
*250 .050,65.0,79.9,110.8
*260 .060,64.4,82.1,117.2
*270 .070,62.1,79.2,120.1
*280 .080,60.5,76.3,121.4
*290 .090,59.2,73.7,121.7
*300 .100,57.3,71.8,119.5
*310 .110,0.0,0.0,117.9
*320 .120,0.0,0.0,116.2
*330 .130,0.0,0.0,114.6
*340 .140,0.0,0.0,113.3
*350
*SAVE GP8
DATA SAVED-GP8
*LIST

160 15,2.75,3
170 .999,22.8,22.8,127.09,.000,.050,5.0,.000,65.0
180 2.002,22.6,22.6,125.60,.000,.060,5.0,.000,82.1
190 4.003,22.6,22.6,127.33,.000,.090,5.0,.000,121.7
200 .005,13.5,20.9,24.5
210 .010,27.7,31.6,39.6
220 .020,43.5,53.1,64.4
230 .030,54.7,62.8,85.7
240 .040,62.1,72.5,101.1
250 .050,65.0,79.9,110.8
260 .060,64.4,82.1,117.2
270 .070,62.1,79.2,120.1
280 .080,60.5,76.3,121.4
290 .090,59.2,73.7,121.7
300 .100,57.3,71.8,119.5
310 .110,0.0,0.0,117.9
320 .120,0.0,0.0,116.2
330 .130,0.0,0.0,114.6
340 .140,0.0,0.0,113.3


*RUN DSHEAR; SSLIB/AJPLOT,R #GP8 "05"
```

CATION:
AB NO. :
ROJECT :

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	15	2.75	3

698
#4 Standard

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	22.8	22.8	127.09	.000	.050	5.0	.000	65.0
2	030	2.002	22.6	22.6	125.60	.000	.060	5.0	.000	82.1
3	040	4.003	22.6	22.6	127.33	.000	.090	5.0	.000	121.7

Specimen No. :		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	13.5	20.9	24.5
060	.010	27.7	31.6	39.6
070	.020	43.5	53.1	64.4
080	.030	54.7	62.8	85.7
090	.040	62.1	72.5	101.1
100	.050	65.0	79.9	110.8
110	.060	64.4	82.1	117.2
120	.070	62.1	79.2	120.1
130	.080	60.5	76.3	121.4
140	.090	59.2	73.7	121.7
150	.100	57.3	71.8	119.5
160	.110			117.9
170	.120			116.2
180	.130			114.6
190	.140			113.3
200	.150			
210	.160			
220	.170			
230	.180			
240	.190			
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
300	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#4 Standard

SOIL SAMPLE

LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 3
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_0, IN sq. ft.
THICKNESS

PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 3 Bot 2110 Std
DATE 6/28/78
TESTED BY

SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft. 2
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

228.84

SPECIMEN LOCATION						
CONTAINER NO.	17					
WT. CONTAINER + WET SOIL IN g	92.47	156.11				
WT. CONTAINER + DRY SOIL IN g	78.14					
WT. WATER, W_w, IN g	14.33					
WT. CONTAINER IN g	14.68					
WT. DRY SOIL, W_s, IN g	63.46	127.33				
WATER CONTENT, w, IN %	22.6					

2.153

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	230	.000			
		.005	76	24.5	
		.010	123	39.6	
		.020 43"	200	64.4	
	235	.030 35"	266	85.7.	
	235	.040 35"	314	101.1	
	235	.050 30"	344	110.8	
	233	.060 27"	364	117.2	
	32	.070 26	373	120.1	
	32	.080	377	121.4	
	231	.090	378	121.7	
	31	.100	371	119.5	
	230	.110	366	117.9	
	229	.120	361	116.2	
	228	.130	356	114.6	
		.140	352	113.3	
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 3
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS

PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 3 Top 21 % Std
DATE 6/28/78
TESTED BY

SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft. 1/2
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

228.8

SPECIMEN LOCATION					
CONTAINER NO.	13	156.07			
WT. CONTAINER + WET SOIL IN g	76.92				
WT. CONTAINER + DRY SOIL IN g	65.32				
WT. WATER, W_w, IN g	11.60				
WT. CONTAINER IN g	14.40				
WT. DRY SOIL, W_s, IN g	50.92	127.04			
WATER CONTENT, w, IN %	22.8				

2:23

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	211	.000			
	211	.005	42	13.5	
	211	.010 37sec	86	27.7	
	211	.020 35"	135	43.5	
	210	.030 30"	170	54.7	
	208	.040 28	193	62.1	
	206	.050	203	65.0	
	204	.060	200	64.4	
	201	.070	193	62.1	
	199	.080	188	60.5	
	196	.090	184	59.2	
	195	.100	178	57.3	
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

1

REMARKS

SOIL TEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS, U.S.A.

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 3
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_c, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 3 Mid 2% Std
DATE 6/28/78
TESTED BY
SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	14				
WT. CONTAINER + WET SOIL IN g	86.83	153.49			
WT. CONTAINER + DRY SOIL IN g	73.49				
WT. WATER, W_w, IN g	13.34				
WT. CONTAINER IN g	14.41				
WT. DRY SOIL, W_s, IN g	59.08	125.60			
WATER CONTENT, w, IN %	22.6				

226.72

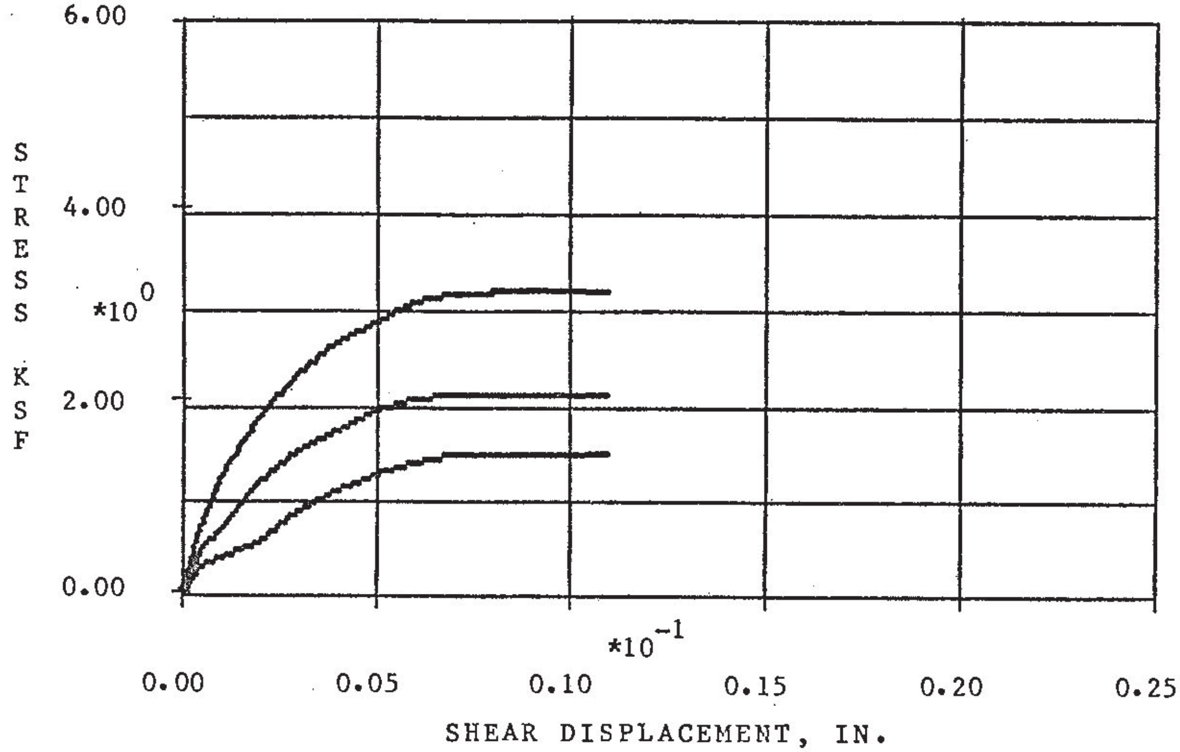
200

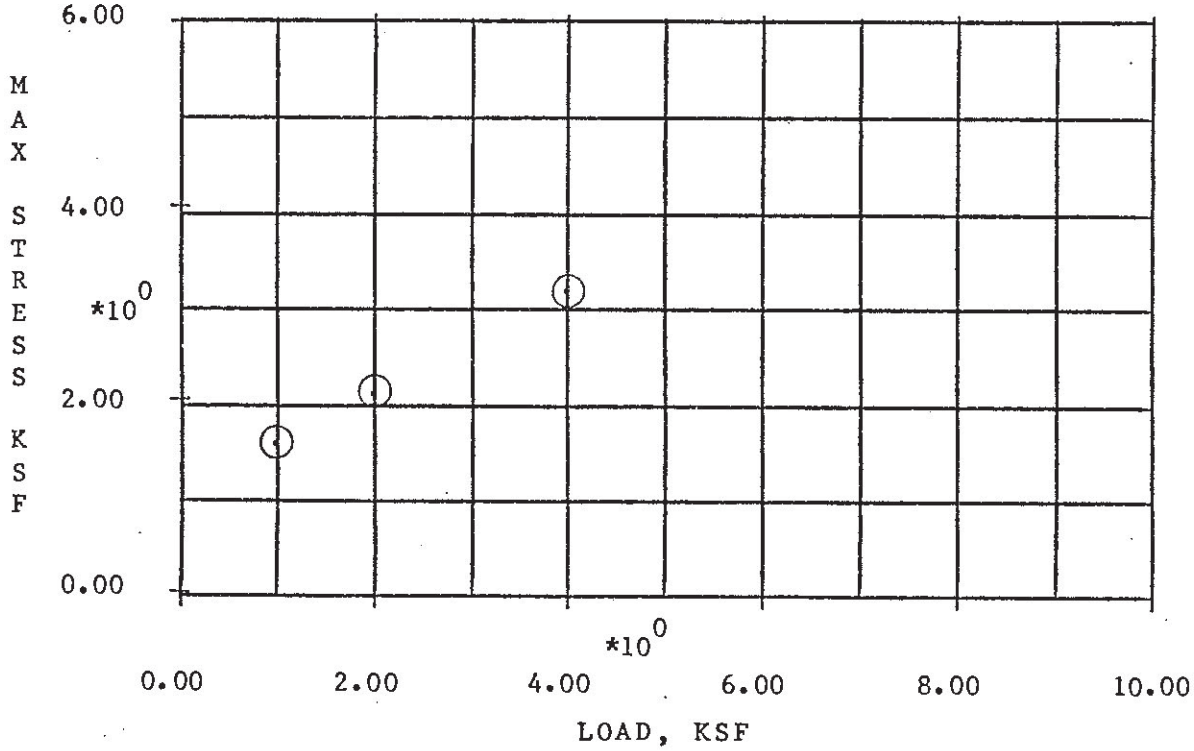
2:23

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	221	.000			
	~~223~~	.005	65	20.9	
		.010	98	31.6	
		.020 35"	165	53.1	
		.030 35	195	62.8	
	223	.040 30	225	72.5	
	222	.050	248	79.9	
	221	.060	255	82.1	
	220	.070	246	79.2	
	218	.080	237	76.3	
	216	.090	229	73.7	
	216	.100	223	71.8	
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #5 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

*REPORTED TO MR. J.A. TYSON
JULY 7.1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	349.1	481.1	765.6
0.010	396.0	709.9	1264.3
0.020	595.5	1191.0	1889.1
0.030	906.4	1531.2	2314.5
0.040	1132.3	1765.9	2654.7
0.050	1302.4	1944.9	2871.8
0.060	1434.4	2088.6	3085.9
0.070	1510.7	2135.5	3182.8
0.080	1519.5	2135.5	3182.8
0.080	1519.5	2135.5	3212.1
0.090	1519.5	2115.0	3203.3
0.100	1484.3	2088.6	3174.0
0.110	1446.2	2059.3	3127.0

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION:REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #5 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A.TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	24.6	24.7	24.1
VOID RATIO	-	0.808	0.816	0.780
SATURATION	%	83.7	83.3	84.9
DENSITY	KSF	95.0	94.6	96.4
AFTER CONSOLIDATION				
VOID RATIO	-	0.808	0.816	0.781
FINAL CONDITIONS				
WATER CONTENT	%	24.6	24.7	24.1
VOID RATIO	-	0.808	0.816	0.781
SATURATION	%	83.7	83.2	84.9
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.018	0.016	0.016
MAXIMUM SHEAR STRESS	KSF	1.52	2.14	3.21
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #5 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
<50>FILE GP30 -- FILE PRESENTLY BUSY
OLD OR NEW-NEW
*DONE
SYSTEM ?FORT O
OLD FILE? GP44
SYSTEM ?FORT O
OLD FILE? GP01
*LIST

010 13,2.70,3
020 .999,24.6,24.6,122.34,.000,.090,5.0,.000,51.8
030 2.002,24.7,24.7,121.82,.000,.080,5.0,.000,72.8
040 4.003,24.1,24.1,124.22,.000,.080,5.0,.000,109.5
050 .005,11.9,16.4,26.1
060 .010,13.5,24.2,43.1
070 .020,20.3,40.6,64.4
080 .030,30.9,52.2,78.9
090 .040,38.6,60.2,90.5
100 .050,44.4,66.3,97.9
110 .060,48.9,71.2,105.2
120 .070,51.5,72.8,108.5
130 .080,51.8,72.8,108.5
140 .080,51.8,72.8,109.5
150 .090,51.8,72.1,109.2
160 .100,50.6,71.2,108.2
170 .110,49.3,70.2,106.6
180 .120,48.0,0.0,105.2


*010 13,2.75,3
*RESAVE GP01
DATA SAVED-GP01
*LIST

010 13,2.75,3
020 .999,24.6,24.6,122.34,.000,.090,5.0,.000,51.8
030 2.002,24.7,24.7,121.82,.000,.080,5.0,.000,72.8
040 4.003,24.1,24.1,124.22,.000,.080,5.0,.000,109.5
050 .005,11.9,16.4,26.1
060 .010,13.5,24.2,43.1
070 .020,20.3,40.6,64.4
080 .030,30.9,52.2,78.9
090 .040,38.6,60.2,90.5
100 .050,44.4,66.3,97.9
110 .060,48.9,71.2,105.2
120 .070,51.5,72.8,108.5
130 .080,51.8,72.8,108.5
140 .080,51.8,72.8,109.5
150 .090,51.8,72.1,109.2
160 .100,50.6,71.2,108.2
170 .110,49.3,70.2,106.6
180 .120,48.0,0.0,105.2


*RUN DSHEAR; SSLIB/AJPLOT,R #GP01 "05"
```

OCATION: ______________________
AB NO. : ______________________
ROJECT : ______________________

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
CO JTER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	13	2.75	3

GP. 01

#5 standard

pec. o.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consol-idation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	24.6	24.6	122.34	.000	.090	5.0	.000	51.8
2	030	2.002	24.7	24.7	121.82	.000	.080	5.0	.000	72.8
3	040	4.003	24.1	24.1	124.22	.000	.080	5.0	.000	109.5

Specimen No. :		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	11.9	16.4	26.1
060	.010	13.5	24.2	43.1
070	.020	20.3	40.6	64.4
080	.030	30.9	52.2	78.9
090	.040	38.6	60.2	90.5
100	.050	44.4	66.3	97.9
110	.060	48.9	71.2	105.2
120	.070	51.5	72.8	108.5
130	.080	51.8	72.8	109.5
140	.090	51.8	72.1	109.2
150	.100	50.6	71.2	108.2
160	.110	49.3	70.2	106.6
170	.120	48.0	0.0	105.2
180	.130			
190	.140			
200	.150			
210	.160			
220	.170			
230	.180			
240	.190			
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
300	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#5 5 Standard

SOIL SAMPLE ______________

LOCATION ______________
BORING NO. ______ SAMPLE DEPTH ______
SAMPLE NO. 4
SPECIFIC GRAVITY, G_s, ______
TYPE OF TEST ______

SOIL SAMPLE MEASUREMENTS
LENGTH ______
AREA, A_o, IN sq. ft. ______
THICKNESS ______

PROVING RING NO. ______
CALIBRATING FACTOR ______

TEST NO. 4 Bot 23% Std
DATE 6/28/78
TESTED BY ______

SCALE LOAD
APPLIED LOAD ______ lbs. ______ lbs/sq. ft. 2
TARE IN lbs. ______
SCALE LOAD IN lbs. ______

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	21	154.16			
WT. CONTAINER + WET SOIL IN g	79.37				
WT. CONTAINER + DRY SOIL IN g	66.72				
WT. WATER, W_w, IN g	12.65				
WT. CONTAINER IN g	14.14				
WT. DRY SOIL, W_s, IN g	52.58				
WATER CONTENT, w, IN %	24.1				

226.89
77.73
154.16

3;35

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	228	.000			
		.005	81	26.1	
		.010 40"	134	43.1	
	231	.020 35"	200	64.4	
	231	.030 28"	245	78.9	
	231	.040	281	90.5	
	231	.050 30"	304	97.9	
	231	.060 28"	327	105.2	
	231	.070	337	108.5	
	231	.080	340	109.5	
	231	.090	339	109.2	
	231	.100	336	108.2	
	231	.110	331	106.6	
	231	.120	327	105.2	
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE

LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 4
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_0, IN sq. ft.
THICKNESS

PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 4 Top 23 % Std
DATE 6/28/72
TESTED BY

SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft. 1/2
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	Z0				
WT. CONTAINER + WET SOIL IN g	90.92		152.44		
WT. CONTAINER + DRY SOIL IN g	75.80	61.5			
WT. WATER, W_w, IN g	15.12				
WT. CONTAINER IN g	14.27				
WT. DRY SOIL, W_s, IN g	61.53		122.34		
WATER CONTENT, w, IN %	24.6				

225.17
72.73

200 3:19

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	212	.000			
	212	.005	37	11.9	
	213	.010	42	13.5	
	214	.020	63	20.3	
	214	.030 30"	96	30.9	
	214	.040 20"	120	38.6	
	213	.050 20"	138	44.4	
	212	.060 24"	152	48.9	
	210	.070	160	51.5	
	209	.080	161	51.8	
	208	.090	161	51.8	
	206	.100	157	50.6	
	205	.110	153	49.3	
	204	.120	149	48.0	
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 4
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS

PROVING RING NO.
CALIBRATING FACTOR

TEST NO. Mid 4 ~~Top~~ 23 % Std
DATE 6/28/78
TESTED BY

SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft. /
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	18				
WT. CONTAINER + WET SOIL IN g	95.92	151.92			
WT. CONTAINER + DRY SOIL IN g	79.80				
WT. WATER, W_w, IN g	16.12				
WT. CONTAINER IN g	14.56				
WT. DRY SOIL, W_s, IN g		121.82			
WATER CONTENT, w, IN %	24.7				

224.65
72.73

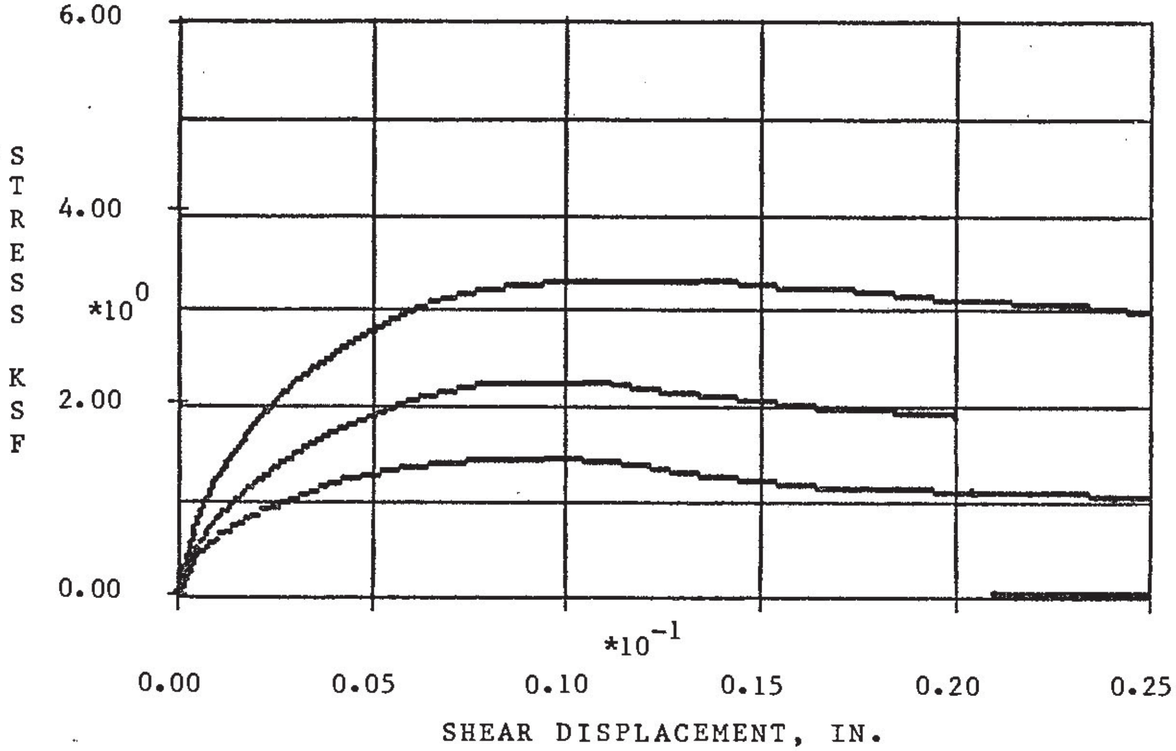
3:22

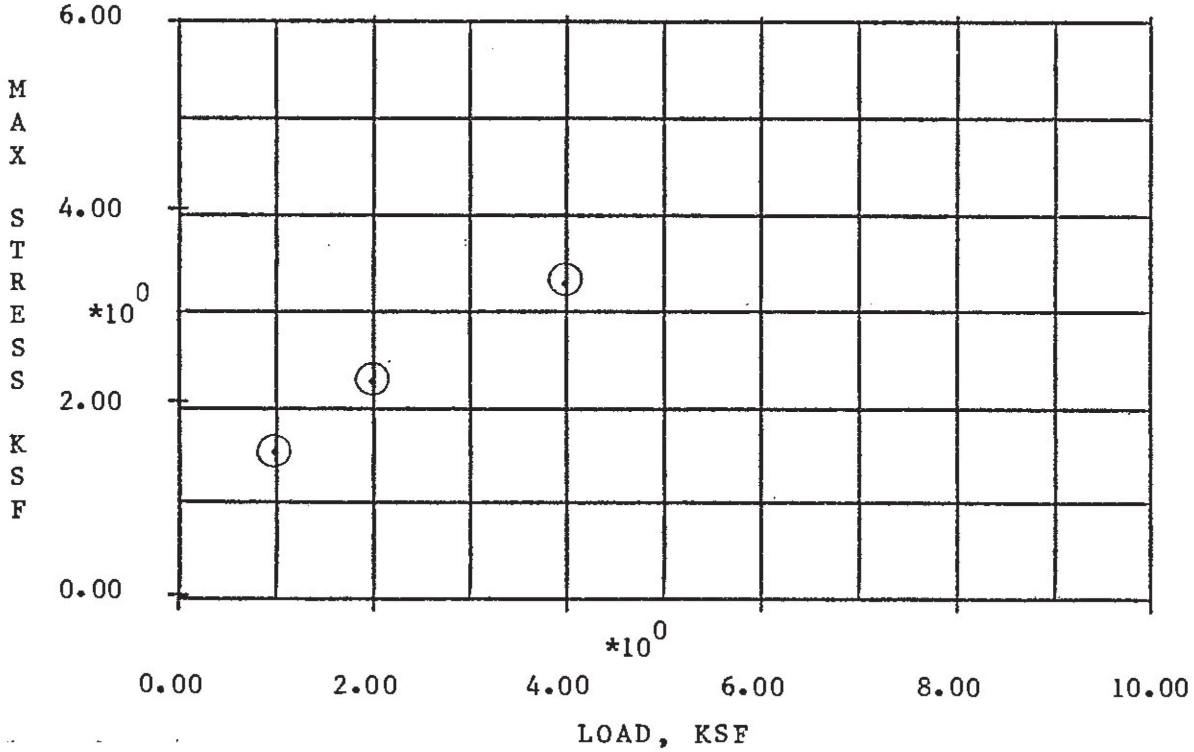
200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	216	.000			
		.005	51	16.4	
		.010 35"	75	24.2	
		.020 33"	126	40.6	
	218	.030 30	162	52.2	
	218	.040	187	60.2	
	218	.050	206	66.3	
	218	.060	221	71.2	
	216	.070	226	72.8	
	215	.080	226	72.8	
	214	.090	224 224	72.1	
	214	.100	221	71.2	
	213	.110	218	70.2	
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #6 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

*DONE REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	442.9	548.5	821.4
0.010	604.3	821.4	1246.7
0.020	859.5	1217.4	1842.2
0.030	1038.4	1519.5	2238.2
0.040	1191.0	1748.3	2549.1
0.050	1284.8	1927.3	2804.3
0.060	1369.9	2076.9	2992.1
0.070	1416.8	2182.5	3135.8
0.080	1446.2	2247.0	3220.9
0.090	1455.0	2247.0	3267.8
0.100	1434.4	2229.4	3288.4
0.110	1387.5	2200.1	3288.4
0.120	1331.8	2144.3	3297.2
0.130	1255.5	2097.4	3276.6
0.140	1191.0	2041.7	3259.0
0.150	1152.8	2003.5	3220.9
0.160	1123.5	1965.4	3182.8
0.170	1097.1	1936.1	3153.4
0.180	1076.6	1906.7	3127.0
0.190	1067.8	1889.1	3085.9
0.200	1047.2	1859.8	3059.5
0.210	1038.4	0.	3027.3
0.220	1029.6	0.	3012.6
0.230	1029.6	0.	2986.2
0.240	1000.3	0.	2956.9
0.250	1000.3	0.	2936.3

PROJECT: SHERER STEAM PLANT GEORGIA POWER DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #6 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A.TYSON
JULY,7 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	25.5	25.0	24.7
VOID RATIO	-	0.833	0.801	0.784
SATURATION	%	84.2	85.8	86.6
DENSITY	KSF	93.7	95.3	96.2
AFTER CONSOLIDATION				
VOID RATIO	-	0.833	0.802	0.785
FINAL CONDITIONS				
WATER CONTENT	%	25.5	25.0	24.7
VOID RATIO	-	0.833	0.802	0.785
SATURATION	%	84.1	85.8	86.5
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.018	0.016	0.024
MAXIMUM SHEAR STRESS	KSF	1.45	2.25	3.30
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #6 STANDARD TESTED BY: RG, ML, RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

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~
PLEASE SELECT SYST. .:  1=TS, 2=WORD ONE, 3=CMS, B=BOWNE
-  11
0360200  TERMINAL TYPE?S
SOUTHERN COMPANY T/S ON 07/05/78  TIME  09:33:02   CHANNEL  3630

USER ID -ALP5370000
project id-FGRE
PASSWORD--
PXNGKDMVEPVK
SYSTEM ?FORT N
*AUTO
*010 26,2.75,3
*020 .999,25.5,25.,_5,120.67,.000,.090,5.0,.000,49.6
*030 2.002,25.0,25.0,122.79,.000,.080,5.0,.000,76.6
*040 4.003,24.7,24.7,123.95,.000,.120,5.0,.000,112.4
*050 .005,15.1,18.7,28.0
*060 .010,20.6,28.0,42.5
*070 .020,29.3,41.5,62.8
*080 .030,35.4,51.8,76.3
*090 .040,40.6,59.6,86.9
*100 .050,43.8,65.7,95.6
*110 .060,46.7,70.8,102.0
*120 .070,48.3,74.4,106.9
*130 .080,49.3,76.6,109.8
*140 .090,49.6,76.6,111.4
*150 .100,48.9,76.0,112.1
*160 .110,473_.3,75.0,112.1
*170 .120,45.4,73.1,112.4
*180 .130,42.8,71.5,111.7
*190 .140,40.6,69.6,111.1
*200 .150,39.3,68.3,109.8
*210 .160,38.3,67.0,108.5
*220 .170,37.4,66.0,107.5
*230 .180,36.7,65.0,106.6
*240 .190,36.4,64.4,105.2
*250 .200,35.7,63.4,104.3
*260 .210,35.4,0.0,103.2
*270 .220,35.1,0.0,102.7
*280 .230,35.1,0.0,101.8
*290 .240,34.1,0.0,100.8
*300 .250,34.1,0.0,100.1
*310
*SAVE GP10
DATA SAVED-GP10
*LIST

010 26,2.75,3
020 .999,25.5,25.5,120.67,.000,.090,5.0,.000,49.6
030 2.002,25.0,25.0,122.79,.000,.080,5.0,.000,76.6
040 4.003,24.7,24.7,123.95,.000,.120,5.0,.000,112.4
050 .005,15.1,18.7,28.0
060 .010,20.6,28.0,42.5
070 .020,29.3,41.5,62.8
080 .030,35.4,51.8,76.3
090 .040,40.6,59.6,86.9
100 .050,43.8,65.7,95.6
110 .060,46.7,70.8,102.0
120 .070,48.3,74.4,106.9
130 .080,49.3,76.6,109.8
140 .090,49.6,76.6,111.4
150 .100,48.9,76.0,112.1
160 .110,47.3,75.0,112.1
```

CATION: #6 Wet Side Standard 66.3%
AB NO. : 1
ROJECT : Ga. Power Co.

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	26	2.75	3

6P10
#6 Standard

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	1.999	25.5	25.5	120.67	.000	.090	5.0	.000	49.6
2	030	2.002	25.0	25.0	122.79	.000	.080	5.0	.000	76.6
3	040	4.003	24.7	24.7	123.95	.000	.120	5.0	.000	112.4

Specimen No. :		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	15.1	18.7	28.0
060	.010	20.6	28.0	42.5
070	.020	29.3	41.5	62.8
080	.030	35.4	51.8	76.3
090	.040	40.6	59.6	86.9
100	.050	43.8	65.7	95.6
110	.060	46.7	70.8	102.0
120	.070	48.3	74.4	106.9
130	.080	49.3	76.6	109.8
140	.090	49.6	76.6	111.4
150	.100	48.9	76.0	112.1
160	.110	47.3	75.0	112.1
170	.120	45.4	73.1	112.4
180	.130	42.8	71.5	111.7
190	.140	40.6	69.6	111.1
200	.150	39.3	68.3	109.8
210	.160	38.3	67.0	108.5
220	.170	37.4	66.0	107.5
230	.180	36.7	65.0	106.6
240	.190	36.4	64.4	105.2
250	.200	35.7	63.4	104.3
260	.210	35.4		103.2
270	.220	35.1		102.7
280	.230	35.1		101.8
290	.240	34.1		100.8
300	.250	34.1		100.1

DS-12

SOIL MECHANICS LABORATORY

#6 Standard

DIRECT SHEAR ON COHESIVE SOIL

26.3% Top

SOIL SAMPLE Ga. Po. Co

LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO.
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS

PROVING RING NO.
CALIBRATING FACTOR

TEST NO. #6 west side sta
DATE 6/30/78
TESTED BY

SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft. 1/2
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

224.17
72.73

SPECIMEN LOCATION						
CONTAINER NO.	53					
WT. CONTAINER + WET SOIL, IN g	90.52	151.44				
WT. CONTAINER + DRY SOIL IN g	74.97					
WT. WATER, W_w, IN g	15.55					
WT. CONTAINER IN g	13.96					
WT. DRY SOIL, W_s, IN g	61.01	120.67				
WATER CONTENT, w, IN %	25.5					

200 12:48

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	210	.000			
	[illegible]	.005	47	15.1	
	211	.010 20"	64	20.6	
	211	.020 20	91	29.3	
	211	.030 20	110	35.4	
	211	.040 22	126	40.6	
	210	.050	136	43.8	
	209	.060 20	145	46.7	
	207	.070 25	151	48.3	
	206	.080 25	153	49.3	
	205	.090	154	49.6	
	203	.100	152	48.9	
	202	.110	147	47.3	
	201	.120	141	45.4	
	200	.130	133	42.8	
	199	.140	126	40.6	
	199	.150	122	39.3	
	199	.160	119	38.3	
	198	.170	116	37.4	
	198	.180	114	36.7	
	198	.190	113	36.4	
	198	.200	111	35.7	
	197	.210 22	110	35.4	
	197	.220	109	35.1	
	196	.230	109	35.1	
	195	.240 25	106	34.1	
	194	.250	106	34.1	

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

Mid 26.3%

SOIL SAMPLE Ga. Po Co

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO.

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. #6 wet side 5'd

DATE 6/30/78

TESTED BY

SCALE LOAD

APPLIED LOAD lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	61				
WT. CONTAINER + WET SOIL IN g	102.35	153.49			
WT. CONTAINER + DRY SOIL IN g	84.71				
WT. WATER, W_w, IN g	17.64				
WT. CONTAINER IN g	14.14				
WT. DRY SOIL, W_s, IN g	70.57	122.79			
WATER CONTENT, w, IN %	25.0				

226.22
72.73

200 1110

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	212	.000 Time			
		.005 Sec.	58	18.7	
	215	.010	87	28.0	
	216	.020	129	41.5	
	216	.030	161	51.8	
	215	.040	185	59.6	
	215	.050	204	65.7	
	216	.060	220	70.8	
	212	.070	231	74.4	
	211	.080	238	76.6	
	211	.090	238	76.6	
	210	.100	232	74.0	
	210	.110	233	75.0	
	209	.120	227	73.1	
	208	.130	222	71.5	
	207	.140	216	69.6	
	207	.150	212	68.3	
	206	.160	208	67.0	
	206	.170	205	66.0	
	206	.180	202	65.0	
	205	.190	200	64.4	
		.200	197	63.4	
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

26.3% Std

SOIL SAMPLE

LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 1
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_s, IN sq. ft.
THICKNESS

PROVING RING NO.
CALIBRATING FACTOR

TEST NO. # 6 wet side Bot
DATE 6/30/75
TESTED BY

SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft. 2
TARE IN lbs.
SCALE LOAD IN lbs.

227.29
72.73

WATER CONTENT

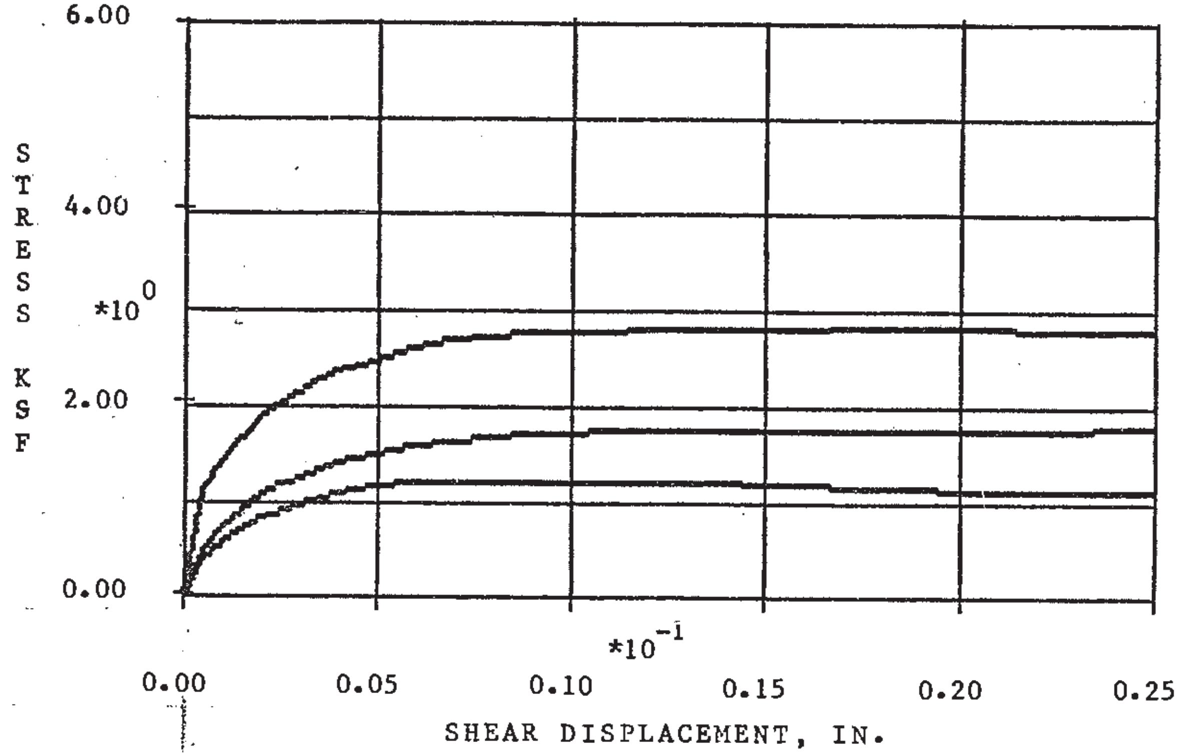
SPECIMEN LOCATION						
CONTAINER NO.	39					
WT. CONTAINER + WET SOIL IN g	103.64	154.56				
WT. CONTAINER + DRY SOIL IN g	86.04					
WT. WATER, W_w, IN g	17.60					
WT. CONTAINER IN g	14.66					
WT. DRY SOIL, W_s, IN g	71.38	123.95				
WATER CONTENT, w, IN %	24.7					

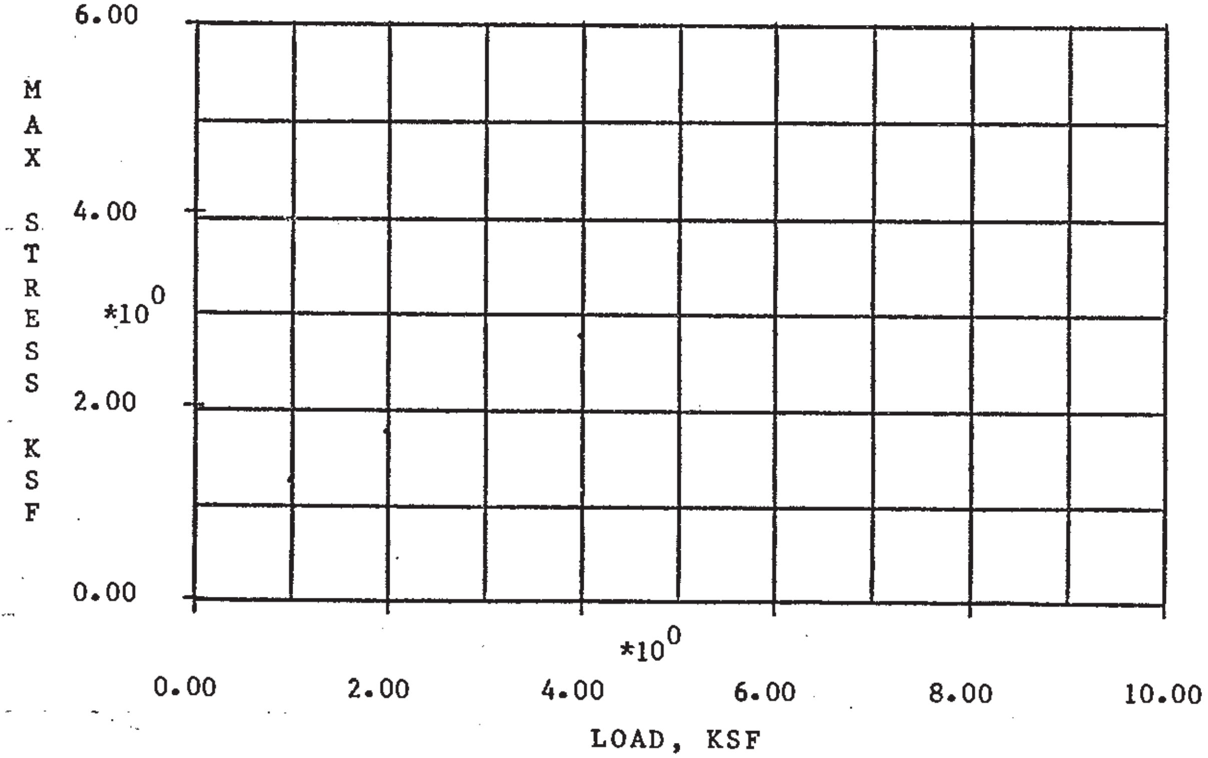
200 130

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	229	.000			
	231	.005	87	28.0	
	232	.010 45	132	42.5	
	234	.020 35	195	62.8	
	235	.030	237	76.3	
	235	.040	270	86.9	
	235	.050	297	95.6	
	235	.060	317	102.0	
	236	.070	332	106.9	
	236	.080	341	109.8	
	236	.090	346	111.4	
	236	.100	348	112.1	
	237	.110	348	112.1	
	237	.120	348	112.4	
	232	.130	347	111.7	
	232	.140	345	111.1	
	231	.150	341	109.8	
	231	.160 18	337	108.5	
	231	.170	334	107.5	
	230	.180	331	106.6	
	230	.190	327	105.2	
	230	.200	324	104.3	
	230	.210 25	321	103.4	
	230	.220	319	102.7	
	230	.230	316	101.8	
	230	.240	313	100.8	
	230	.250	311	100.1	

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PALNT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDON FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #7 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A.TYSON
JULY 7, 1978

*DONE

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	425.3	481.1	1114.7
0.010	595.5	756.8	1437.4
0.020	812.6	1085.4	1859.8
0.030	944.6	1246.7	2135.5
0.040	1076.6	1408.0	2332.1
0.050	1152.8	1501.9	2475.8
0.060	1191.0	1569.4	2587.3
0.070	1199.8	1625.1	2645.9
0.080	1199.8	1663.2	2701.7
0.090	1199.8	1689.6	2731.0
0.100	1199.8	1719.0	2748.6
0.110	1199.8	1736.6	2757.4
0.120	1199.8	1748.3	2777.9
0.130	1199.8	1757.1	2786.7
0.140	1170.4	1757.1	2786.7
0.150	1132.3	1765.9	2786.7
0.164	1114.7	1765.9	2786.7
0.170	1085.4	1765.9	2766.2
0.180	1067.8	1765.9	2748.6
0.190	1067.8	1765.9	2739.8
0.200	1059.0	1765.9	2731.0
0.210	1047.2	1765.9	2731.0
0.220	1047.2	1765.9	2719.3
0.230	1038.4	1765.9	2719.3
0.240	1038.4	1774.7	2710.5
0.250	1038.4	1774.7	2710.5

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #7 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	27.6	26.5	26.5
VOID RATIO	-	0.962	0.922	0.837
SATURATION	%	78.9	79.0	87.0
DENSITY	KSF	87.5	89.3	93.4
AFTER CONSOLIDATION				
VOID RATIO	-	0.943	0.884	0.779
FINAL CONDITIONS				
WATER CONTENT	%	27.6	26.5	26.5
VOID RATIO	-	0.943	0.884	0.779
SATURATION	%	80.5	82.4	93.5
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.014	0.050	0.026
MAXIMUM SHEAR STRESS	KSF	1.20	1.77	2.79
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #7 STANDARD TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
Cpz|t"\
PLEASE SELECT SYSTEM:  1=TS, 2=WORD ONE, 3=CMS. B=BOWNE
-  11
0362400  TERMINAL TYPE?S
SOUTHERN COMPANY T/S ON 07/06/78  TIME  14:00:42   CHANNEL  5000

USER ID -ALP5370000
project id-FDER
PASSWORD--
[illegible]
SYSTEM ?FORT N
*AUTO
*010 26,2.75,3
*020 .999,27.6,27.6,112.7,.010,.070,5.0,.000,40.9
*030 2.002,26.5,26.5,115.07,.020,.250,5.0,.000,60.5
*040 4.003,26.5,26.5,120.37,.032,.130,5.0,.000,95.0
*050 .005,14.5,16.4,38.0
*060 .010,20.3,25.8,49.0
*070 .020,27.7,37.0,63.4
*080 .030,32.2,42.5,72.8
*090 .040,36.7,48.0,79.5
*100 .050,39.3,51.2,84.4
*110 .060,40.6,53.5,88.2
*120 .070,40.9,55.4,90.2
*130 .080,40.9,56.7,92.1
*140 .090,40.9,57.6,93.1
*150 .100,40.9,58.6,93.7
*160 .110,40.9,59.2,94.0
*170 .120,40.9,59.6,94.7
*180 .130,40.9,59.9,95.0
*190 .140,39.9,59.9,95.0
*200 .150,38.6,60.2,95.0
*210 .160,38.0,60.2,95.0
*220 .170,37.0,60.2,94.3
*230 .180,36.4,60.2,93.7
*240 .190,36.4,60.2,93.4
*250 .200,36.1,60.2,93.1
*260 .210,35.7,60.2,93.1
*270 .220,35.7,60.2,92.7
*280 .230,35.4,60.2,92.7
*290 .240,35.4,60.5,92.4
*300 .250,35.4,60.5,92.4
*310
*SAVE GP22
DATA SAVED-GP22
*LIST

010 26,2.75,3
020 .999,27.6,27.6,112.7,.010,.070,5.0,.000,40.9
030 2.002,26.5,26.5,115.07,.020,.250,5.0,.000,60.5
040 4.003,26.5,26.5,120.37,.032,.130,5.0,.000,95.0
050 .005,14.5,16.4,38.0
 060 .010,20.3,25.8,49.0
070 .020,27.7,37.0,63.4
080 .030,32.2,42.5,72.8
090 .040,36.7,48.0,79.5
100 .050,39.3,51.2,84.4
110 .060,40.6,53.5,88.2
120 .070,40.9,55.4,90.2
130 .080,~40.9,56.7,92.1
140 .090,40.9,57.6,93.1
150 .100,40.9,58.6,93.7
160 .110,40.9,59.2,94.0
170 .120,40.9,59.6,94.7
```

OCATION: CBR Standard
AB NO. : 1
ROJECT : Ga. Power Co.

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	26	2.75	3

6P30
#7 Standard

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consol- idation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.799	27.6	27.6	112.7	.000 .010	.070	5.00	.000	40.9
2	030	2.002	26.5	26.5	115.07	.000 .020	.250	5.00	.000	60.5
3	040	4.003	26.5	26.5	120.37	.000 .032	.130	5.00	.000	95.0

Specimen No. :		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	14.5	16.4	38.0
060	.010	20.3	25.8	49.0
070	.020	27.7	37.0	63.4
080	.030	32.2	42.5	72.8
090	.040	36.7	48.0	79.5
100	.050	39.3	51.2	84.4
110	.060	40.6	53.5	88.2
120	.070	40.9	55.4	90.2
130	.080	40.9	56.7	92.1
140	.090	40.9	57.6	93.1
150	.100	40.9	58.6	93.7
160	.110	40.9	59.2	94.0
170	.120	40.9	59.6	94.7
180	.130	40.9	59.9	95.0
190	.140	39.9	59.9	95.0
200	.150	38.6	60.2	95.0
210	.160	38.0	60.2	95.0
220	.170	37.0	60.2	94.3
230	.180	36.4	60.2	93.7
240	.190	36.4	60.2	93.4
250	.200	36.1	60.2	93.1
260	.210	35.7	60.2	93.1
270	.220	35.7	60.2	92.7
280	.230	35.4	60.2	92.7
290	.240	35.4	60.5	92.4
300	.250	35.4	60.5	92.4

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL #7 Standard

SOIL SAMPLE Georgia Power Co.
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO.
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_0, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. CBR Std Top
DATE 7-3-78
TESTED BY
SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					trimmings
CONTAINER NO.	39				47
WT. CONTAINER + WET SOIL IN g	94.50	143.76			82.76
WT. CONTAINER + DRY SOIL IN g	77.22				67.81
WT. WATER, W_w, IN g	17.28				14.95
WT. CONTAINER IN g	14.66				14.34
WT. DRY SOIL, W_s, IN g	62.56	112.7			53.47
WATER CONTENT, w, IN %	22.6				28.0

216.49

9:49 9:59

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	210	.000	000		
	210	.005 38	45	14.5	
	212	.010 20	63	20.3	
	212	.020 32	86	27.7	
	212	.030 30	100	32.2	
	212	.040 28	114	36.7	
	212	.050 29	122	39.3	
	211	.060 27	126	40.6	
	211	.070 26	127	40.9	
	210	.080 26	127	40.9	
	209	.090 25	127	40.9	
	208	.100 26	127	40.9	
	208	.110 27	127	40.9	
	208	.120 26	127	40.9	
	207	.130 27	127	40.9	
	206	.140 25	124	39.9	
	206	.150 25	120	38.6	
	206	.160 24	118	38.0	
	206	.170 25	115	37.0	
	205	.180 26	113	36.4	
	205	.190 26	113	36.4	
	205	.200 27	112	36.1	
	204	.210 25	111	35.7	
	204	.220 26	111	35.7	
	204	.230 25	110	35.4	
	204	.240 25	110	35.4	
	204	.250 26	110	35.4	

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE Ga. Power Co

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO.

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_0, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. CRR Std Mid

DATE 8-3-78

TESTED BY

SCALE LOAD

APPLIED LOAD lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

Trimmings

218.29

SPECIMEN LOCATION					
CONTAINER NO.	37				76
WT. CONTAINER + WET SOIL IN g	87.39	145.56			86.06
WT. CONTAINER + DRY SOIL IN g	72.10				70.68
WT. WATER, W_w, IN g	15.29				15.38
WT. CONTAINER IN g	14.42				14.31
WT. DRY SOIL, W_s, IN g	57.68	115.07			56.37
WATER CONTENT, w, IN %	26.5				27.3

200

10:12

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	220	.000	000		
	222	.005 36	57	16.4	
	223	.010 22	80	25.8	
	224	.020 35	115	37.0	
	225	.030 32	132	42.5	
	225	.040 31	149	48.0	
	225	.050 29	159	51.2	
	225	.060 28	166	53.5	
	225	.070 28	172	55.4	
	225	.080 27	176	56.7	
	225	.090 27	179	57.6	
	225	.100 27	182	58.6	
	225	.110 27	184	59.2	
	225	.120 27	185	59.6	
	225	.130 26	186	59.9	
	224	.140 26	186	59.9	
	224	.150 25	187	60.2	
	224	.160 26	187	60.2	
	223	.170 27	187	60.2	
	223	.180 27	187	60.2	
	223	.190 27	187	60.2	
	223	.200 26	187	60.2	
	223	.210 26	187	60.2	
	222	.220 26	187	60.2	
	222	.230 26	187	60.2	
	222	.240 26	188	60.5	
	222	.250 25	188	60.5	

REMARKS

SOILTEST INCORPORATED • 2205 LEE STREET • EVANSTON ILLINOIS U.S.A.

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE Ga. Power Co.

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO.

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_0, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. CBR Std Bottom

DATE 7-3-78

TESTED BY

SCALE LOAD

APPLIED LOAD lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

225.00

SPECIMEN LOCATION					Trimmings
CONTAINER NO.	41				32
WT. CONTAINER + WET SOIL IN g	83.69	152.27			79.37
WT. CONTAINER + DRY SOIL IN g	69.14				72.96
WT. WATER, W_w, IN g	14.55				16.41
WT. CONTAINER IN g	14.33				14.20
WT. DRY SOIL, W_s, IN g	54.81	120.37			58.76
WATER CONTENT, w, IN %	26.5				27.9

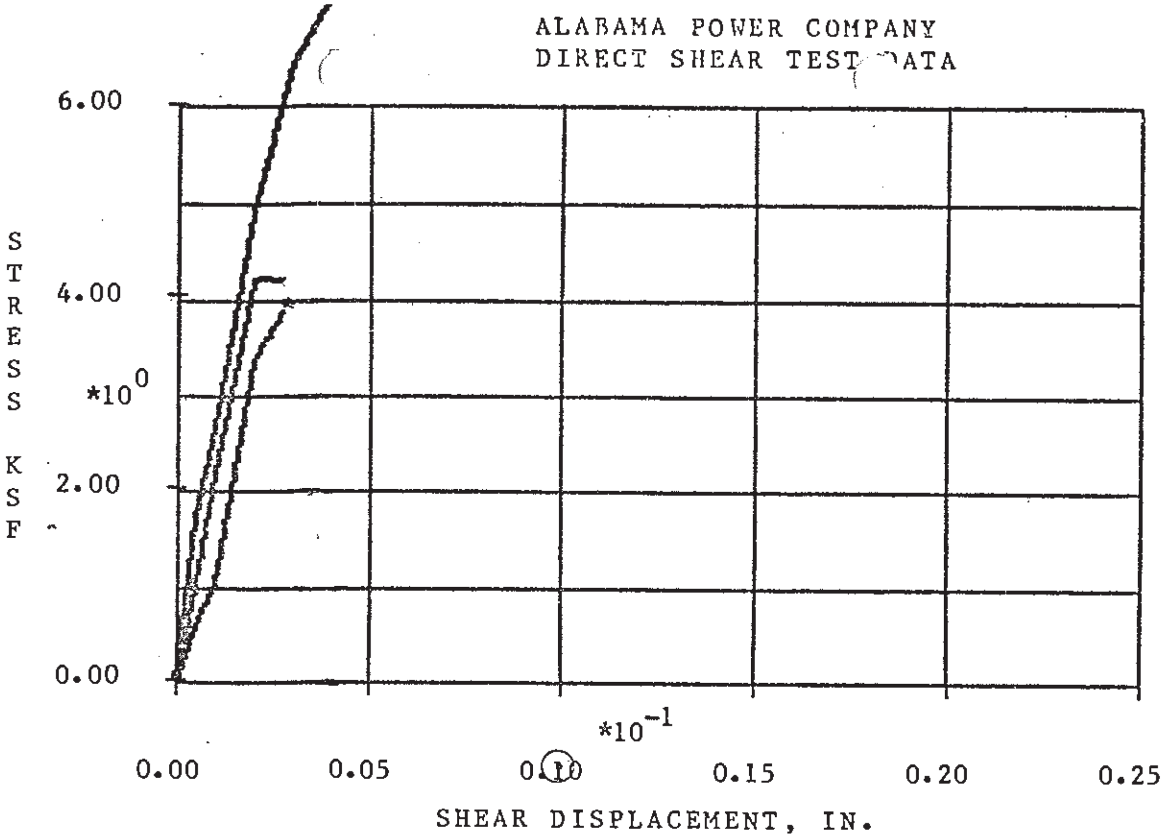
10:46 – 10:50

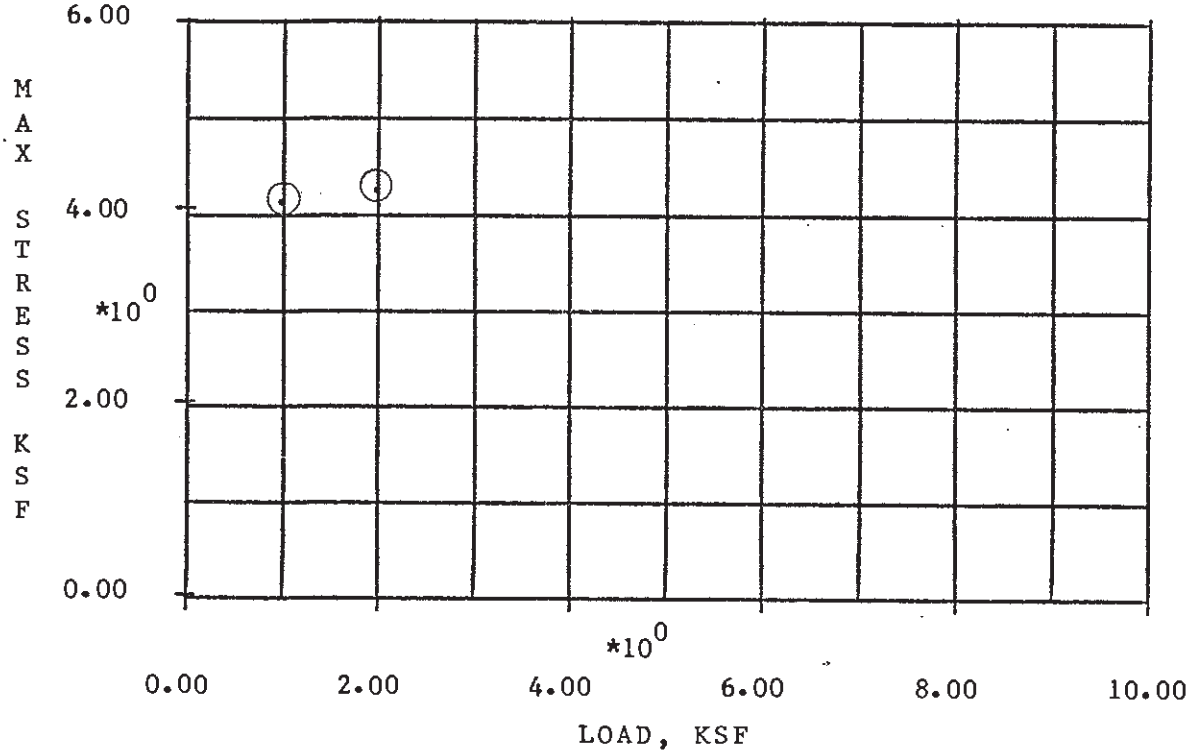
200

ELAPSED TIME IN min.	SHEAR DIAL IN In.	SHEAR DISPLACEMENT IN In.	PROVING RING DIAL IN .0001 In.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	232	.000	0		
	232	.005 58	118	38.0	
	233	.010 24	154	49.0	
	234	.020 38	197 ✓	63.4	
	235	.030 37	226	72.8	
	235	.040 31	247	79.5	
	236	.050 31	262	84.4	
	238	.060 28	274	88.2	
	239	.070 27	280	90.2	
	239	.080 28	286	92.1	
	240	.090 27	289	93.1	
	240	.100 25	291	93.7	
	240	.110 27	292	94.0	
	240	.120 27	294	94.7	
	240	.130 26	295	95.0	
	240	.140 25	295	95.0	
	240	.150 27	295	95.0	
	240	.160 26	295	95.0	
	240	.170 26	293	94.3	
	240	.180 25	291	93.7	
	240	.190 25	290	93.4	
	240	.200 26	289	93.1	
	240	.210 23	289	93.1	
	240	.220 24	288	92.7	
	240	.230 25	288	92.7	
	240	.240 25	287	92.4	
	240	.250 26	287	92.4	

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #1 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST TA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	613.1	1038.4	1748.3
0.010	1038.4	2200.1	2645.9
0.020	3373.4	4212.4	4898.8
0.030	4051.0	4062.8	6465.2
0.040	0.	0.	7154.6

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #1 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	12.6	12.5	12.5
VOID RATIO	-	0.583	0.597	0.592
SATURATION	%	59.5	57.6	58.0
DENSITY	KSF	108.5	107.5	107.8
AFTER CONSOLIDATION				
VOID RATIO	-	0.583	0.597	0.593
FINAL CONDITIONS				
WATER CONTENT	%	12.6	12.5	12.5
VOID RATIO	-	0.583	0.597	0.593
SATURATION	%	59.4	57.5	58.0
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.006	0.004	0.008
MAXIMUM SHEAR STRESS	KSF	4.05	4.21	7.15
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #1 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
PLEASE SELECT SYSTEM:  1=TS, 2=WORD ONE, 3=CMS, B=BOWNE
-  11
0362400  TERMINAL TYPE?S
SOUTHERN COMPANY T/S ON 07/06/78  TIME  09:35:00   CHANNEL  3210

USER ID -ALP5370000
ILLEGAL ID-RETYPE--ALP5370000
project id-LJIO
PASSWORD--
[redacted]
SYSTEM ?FORT N
*CATA


    LIST OF CATALOG ALP5370000 ON 07/06/78 AT 09.598
    CATALOGS
      FILES

      DSHEAR
      QTEST6
      QTEST
      CONSOL
      COMPAC
      QTRIAX
      RTRIAX
      MIXCORR
      CONCRETE
      UCTEST
      TEST5
      GP1
      GP2
      WB1429
      GP11
      GP30


*RELEASE GP1
FILE RELEASED-GP1
*RELEASE GP2
FILE RELEASED-GP2
*RELEASE WB1429
FILE RELEASED-WB1429
*RELEASE GP11
FILE RELEASED-GP11
*RELEASE GP30
FILE RELEASED-GP30
*AUTO
*010 5,2.75,3
*020 .999,12.6,12.6,139.75,.000,.030,5.0,.000,138.1
*030 2.002,12.5,12.5,138.50,.000,.020,5.0,.000,143.6
*040 4.003,12.5,12.5,138.90,.000,.040,5.0,.000,243.9
*050 .005,20.9,35.4,59.6
*060 .010,35.4,75.0,90.2
*070 .020,115.0,143.6,167.0
*080 .030,138.1,138.5,220.4
*090 .1_040,0.0,0.0,243.9
*100 SAVE GP1
*110
*100
*SAVE GP1
DATA SAVED-GP1
*LIST

010 5,2.75,3
```

CATION:
B NO. :
OJECT :

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	5	2.75	3

6P 99
#1 modified

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consol-idation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	12.6	12.6	139.75	.000	.030	5.0	.000	138.1
2	030	2.002	12.5	12.5	138.50	.000	.020	5.0	.000	143.6
3	040	4.003	12.5	12.5	138.90	.000	.040	5.0	.000	243.9

Specimen No. : 1 2 3

Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	20.9	35.4	59.6
060	.010	35.4	75.0	90.2
070	.020	115.0	143.6	167.0
080	.030	138.1	138.5	220.4
090	.040			243.9
100	.050			
110	.060			
120	.070			
130	.080			
140	.090			
150	.100			
160	.110			
170	.120			
180	.130			
190	.140			
200	.150			
210	.160			
220	.170			
230	.180			
240	.190			
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
300	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#1 modified

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 5

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 5 Top 11% Mod

DATE 6/28/78

TESTED BY

SCALE LOAD

APPLIED LOAD 240 lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	9				
WT. CONTAINER + WET SOIL IN g	88.00	157.36			
WT. CONTAINER + DRY SOIL IN g	79.76				
WT. WATER, W_w, IN g	8.24				
WT. CONTAINER IN g	14.22				
WT. DRY SOIL, W_s, IN g	65.54				
WATER CONTENT, w, IN %	12.6	139.75			

0
3
3
15

200

11:26
11:29

230.0

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	240	.000	—		
	40	.005	65	20.9	
	40	.010	110	35.4	
	39	.020	357	115.0	
	22	.030	429 Peak	138.1	
		.040			
		.050			
		.060			
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

1
2
3
4

REMARKS

SOIL TEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS U.S.A.

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 5
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 5 [illegible] 11% [illegible]
DATE 628/78
TESTED BY
SCALE LOAD 62 74
APPLIED LOAD 62 lbs. lbs/sq. ft. /
TARE IN lbs.
SCALE LOAD IN lbs.

228.5
72.73
155.8

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	12				
WT. CONTAINER + WET SOIL IN g	72.40	155.82			
WT. CONTAINER + DRY SOIL IN g	65.97				
WT. WATER, W_w, IN g	6.43				
WT. CONTAINER IN g	14.43				
WT. DRY SOIL, W_s, IN g		138.50			
WATER CONTENT, w, IN %	12.5				

200

11:39
11:42

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	250	.000			
	250	.005	110	35.4	
	250	.010	233	75.0	
	251	.020	446	143.6	
	—	.030	430	138.5	
		.040			
		.050			
		.060	Peak [illegible] 446		
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

1
2
3
4

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 5
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 5 Bot 11% mod
DATE 6/28/78
TESTED BY
SCALE LOAD 46
APPLIED LOAD 136 lbs. lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	11		156.27		
WT. CONTAINER + WET SOIL IN g	72.31				
WT. CONTAINER + DRY SOIL IN g	65.85				
WT. WATER, W_w, IN g	6.46				
WT. CONTAINER IN g	14.30		13890		
WT. DRY SOIL, W_s, IN g					
WATER CONTENT, w, IN %	12.5				

229.x
3
2
2

12.31

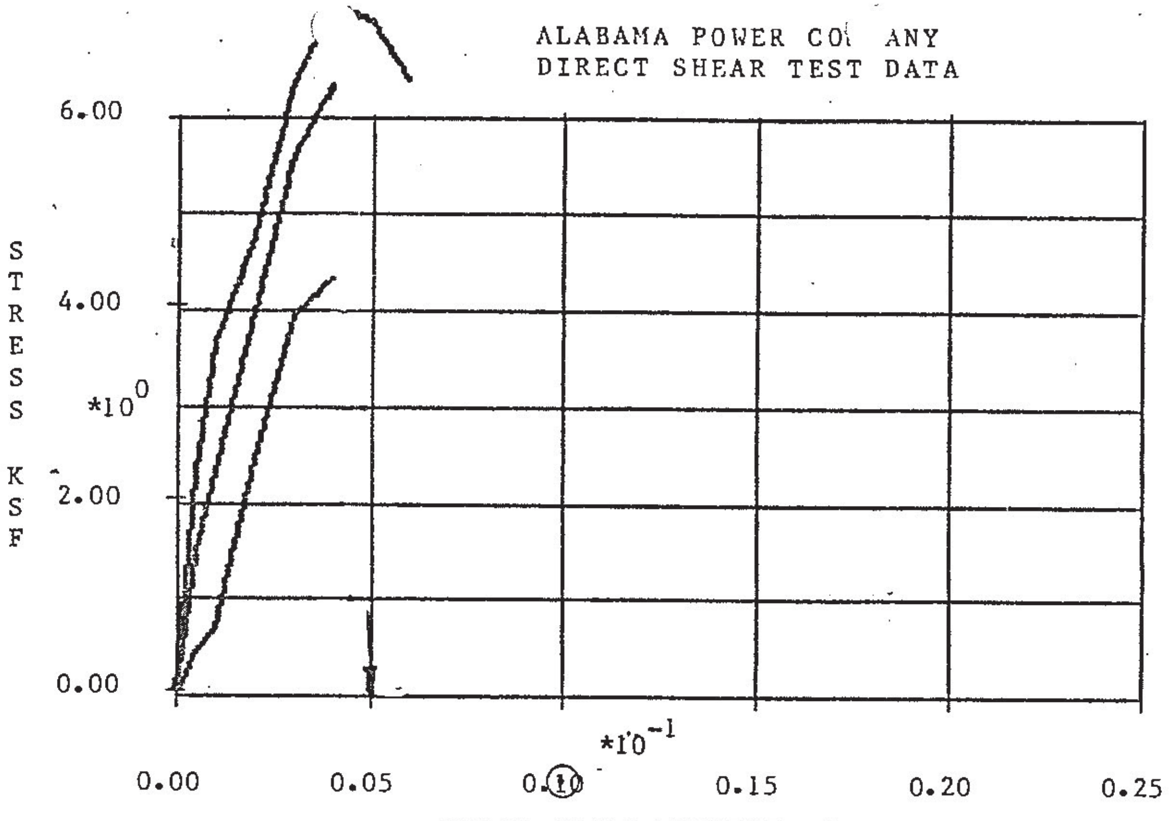
200

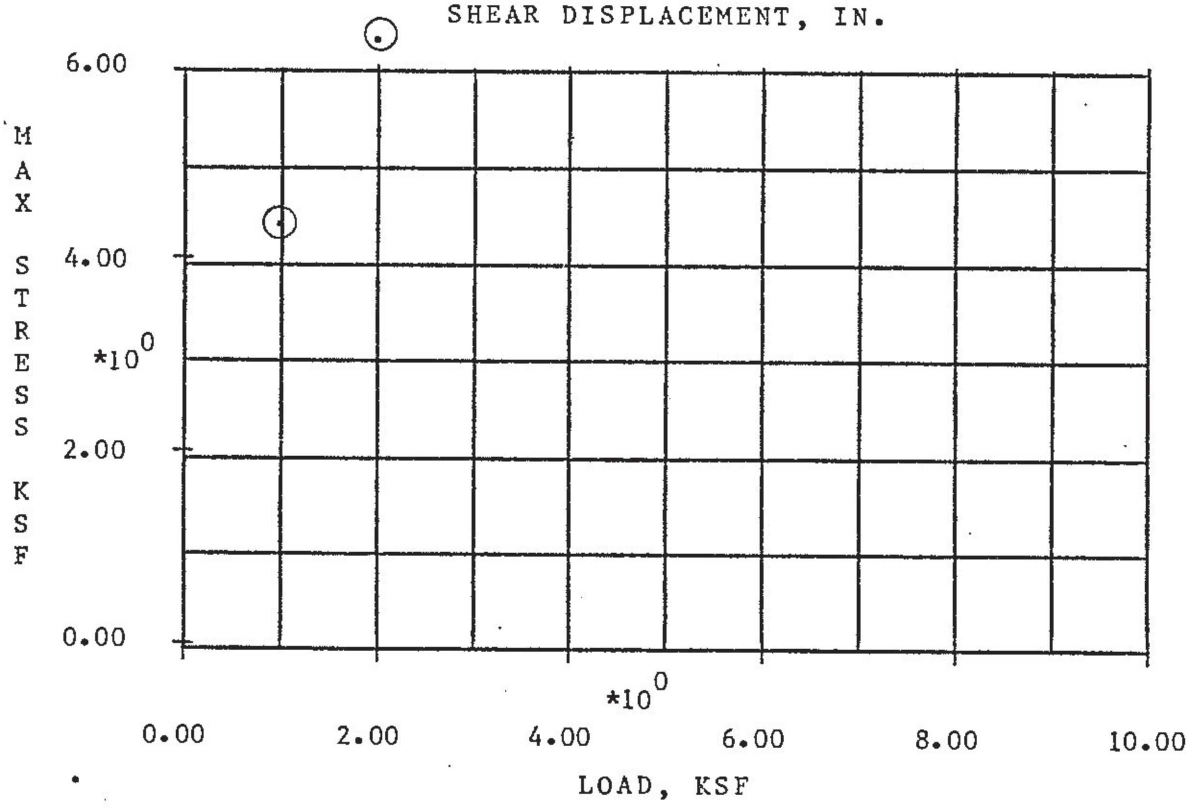
ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	235	.000			
	235	.005	1:85	59.6	
		.010	280	90.2	
		.020	481	167.0	
		.030	556	220.4	
		.040	589 pk	243.9	
		.050			
		.060			
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

1
2
3
4
5

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #2 MODIFIED TESTED BY: RG,ML,JBF CHECKED BY: JBF

REPORTED TO MR. J.A TYSON
JULY 7 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	442.9	1519.5	2332.1
0.010	689.4	2343.8	3675.6
0.020	2464.1	4015.8	4772.7
0.030	3957.2	5608.7	6362.6
0.040	4332.6	6339.1	7113.5
0.050	0.	0.	6966.9
0.060	0.	0.	6339.1

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #2 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	14.7	14.9	14.6
VOID RATIO	-	0.567	0.566	0.562
SATURATION	%	71.3	72.4	71.4
DENSITY	KSF	109.6	109.6	109.9
AFTER CONSOLIDATION				
VOID RATIO	-	0.567	0.567	0.563
FINAL CONDITIONS				
WATER CONTENT	%	14.7	14.9	14.6
VOID RATIO	-	0.567	0.567	0.563
SATURATION	%	71.3	72.3	71.3
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.008	0.008	0.008
MAXIMUM SHEAR STRESS	KSF	4.33	6.34	7.11
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #2 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
680 .030,134.9,191.2,216.9
690 .040,147.7,216.1,242.5
700 .050,0.0,0.0,2[illegible].5
710 .060,0.0,0.0,216.1


*010
*RESAVE GP22
DATA SAVED-GP22
*LIST

610 7,2.75,3
620 .999,14.7,14.7,141.16,.000,.040,5.0,.000,147.7
630 2.002,14.9,14.9,141.22,.000,.040,5.0,.000,216.1
640 4.003,14.6,14.6,141.56,.000,.040,5.0,.000,242.5
650 .005,15.1,51.8,79.5
660 .010,23.5,79.9,125.3
670 .020,84.0,136.9,162.7
680 .030,134.9,191.2,216.9
690 .040,147.7,216.1,242.5
700 .050,0.0,0.0,237.5
710 .060,0.0,0.0,216.1


*RUN DSHEAR; SSLIB/AJPLOT,R #GP22 "05"
```

OCATION: ______________________________
AB NO. : ______________________________
ROJECT : ______________________________

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

GP 22
#2 modified

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	7	2.75	3

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	14.7	14.7	141.16	.000	.040	5.0	.000	147.7
2	030	2.002	14.9	14.9	141.22	.000	.040	5.0	.000	216.1
3	040	4.003	14.6	14.6	141.56	.000	.040	5.0	.000	242.5

Specimen No. :		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	15.1	51.8	79.5
060	.010	23.5	79.9	125.3
070	.020	84.0	136.9	162.7
080	.030	134.9	191.2	216.9
090	.040	147.7	216.1	242.5
100	.050			237.5
110	.060			216.1
120	.070			
130	.080			
140	.090			
150	.100			
160	.110			
170	.120			
180	.130			
190	.140			
200	.150			
210	.160			
220	.170			
230	.180			
240	.190			
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
300	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#2 Modified

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 4
SPECIFIC GRAVITY, G_S,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_0, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 480t 139% Mod
DATE 6/28/78
TESTED BY
SCALE LOAD
APPLIED LOAD 136 lbs. lbs/sq. ft. 2
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

234.96
72.73

SPECIMEN LOCATION					
CONTAINER NO.	8				
WT. CONTAINER + WET SOIL IN g	83.40		162.23		
WT. CONTAINER + DRY SOIL IN g	74.62				
WT. WATER, W_w, IN g	8.78				
WT. CONTAINER IN g	14.33				
WT. DRY SOIL, W_s, IN g	6029		141.56		
WATER CONTENT, w, IN %	14.6				

2

10:59
11:04
200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.	
	247	.000				1
	247	.005	245	79.5		2
	247	.010	389	125.3		3
	248	.020	475	162.7		4
	248	.030	551	216.9		5
	245	.040	587	242.5		
	242	.050	580	237.5		
	236	.060	550	216.1		
		.070				
		.080				
		.090				
		.100				
		.110				
		.120				
		.130				
		.140				
		.150				
		.160				
		.170				
		.180				
		.190				
		.200				
		.210				
		.220				
		.230				
		.240				
		.250				

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE ____
LOCATION ____
BORING NO. ____ SAMPLE DEPTH ____
SAMPLE NO. 4
SPECIFIC GRAVITY, G_s, ____
TYPE OF TEST ____

SOIL SAMPLE MEASUREMENTS
LENGTH ____
AREA, A_s, IN sq. ft. ____
THICKNESS ____
PROVING RING NO. ____
CALIBRATING FACTOR ____

TEST NO. 4 Mid 1390 Mid
DATE 6/28/72
TESTED BY ____
SCALE LOAD
APPLIED LOAD 6066 lbs. ____ lbs/sq. ft.
TARE IN lbs. ____
SCALE LOAD IN lbs. ____

1

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	7				
WT. CONTAINER + WET SOIL IN g	91.51		162.27		
WT. CONTAINER + DRY SOIL IN g	81.53				
WT. WATER, W_w, IN g	9.98				
WT. CONTAINER IN g	14.48				
WT. DRY SOIL, W_s, IN g			141.22		
WATER CONTENT, w, IN %	14.9				

1
3
3

235.0
72.7

200

10:37
10:40

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	214	.000	—		
		.005	.161	51.8	
		.010	248	79.9	
		.020	425	136.9	
	210	.030	515	191.2	
	208	.040	550	216.1	
		.050			
		.060			
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

1
2
3
4
5

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE ________
LOCATION ________
BORING NO. ________ SAMPLE DEPTH ________
SAMPLE NO. 4
SPECIFIC GRAVITY, G_s, ________
TYPE OF TEST ________

SOIL SAMPLE MEASUREMENTS
LENGTH ________
AREA, A_o, IN sq. ft. ________
THICKNESS ________
PROVING RING NO. ________
CALIBRATING FACTOR ________

TEST NO. 4 Top 13 % Mod
DATE 6/28/78
TESTED BY ________
SCALE LOAD
APPLIED LOAD 3 4 oc lbs. ________ lbs/sq. ft. 1/2
TARE IN lbs. ________
SCALE LOAD IN lbs. ________

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	4				
WT. CONTAINER + WET SOIL IN g	91.47		161.92		
WT. CONTAINER + DRY SOIL IN g	81.59				
WT. WATER, W_w, IN g	9.88				
WT. CONTAINER IN g	14.48				
WT. DRY SOIL, W_s, IN g			141.16		
WATER CONTENT, w, IN %	14.7				

200

10:21
10:26

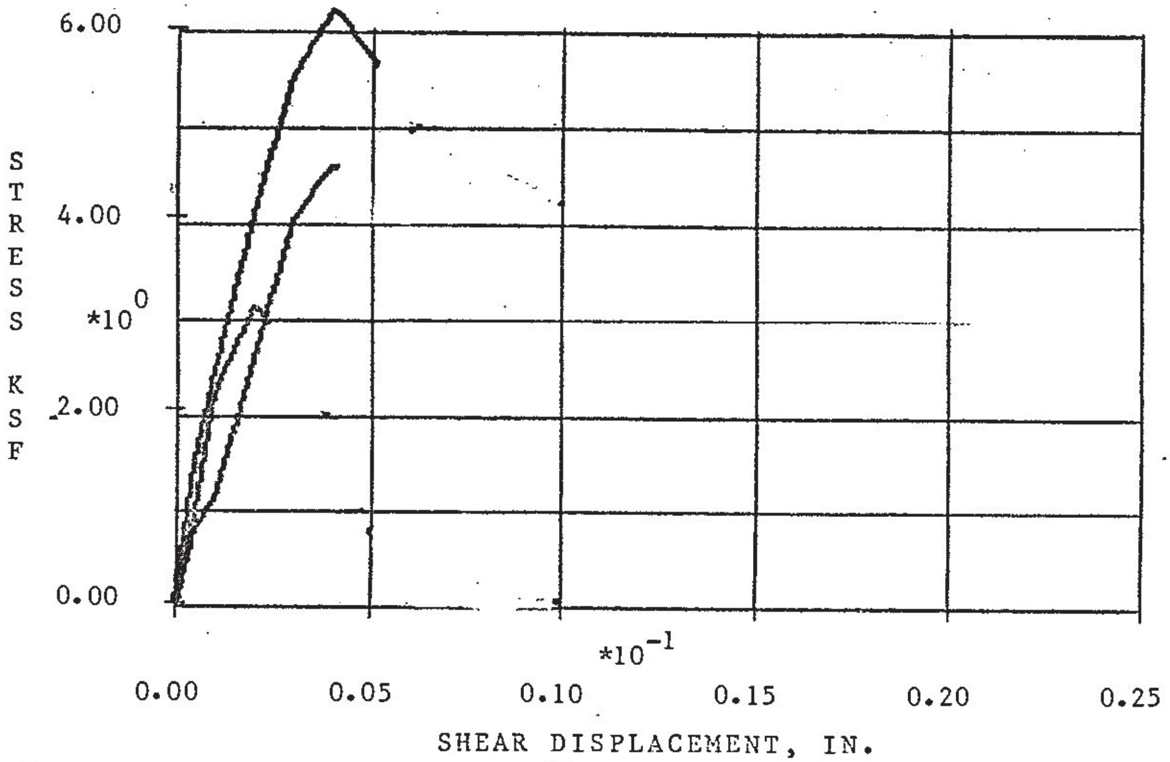
ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	242	.000			
		.005	47	15.1	
		.010	73	23.5	
		.020	261	84.0	
	2 43	.030	419	134.9	
		.040	454	147.7	
		.050			
		.060			
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

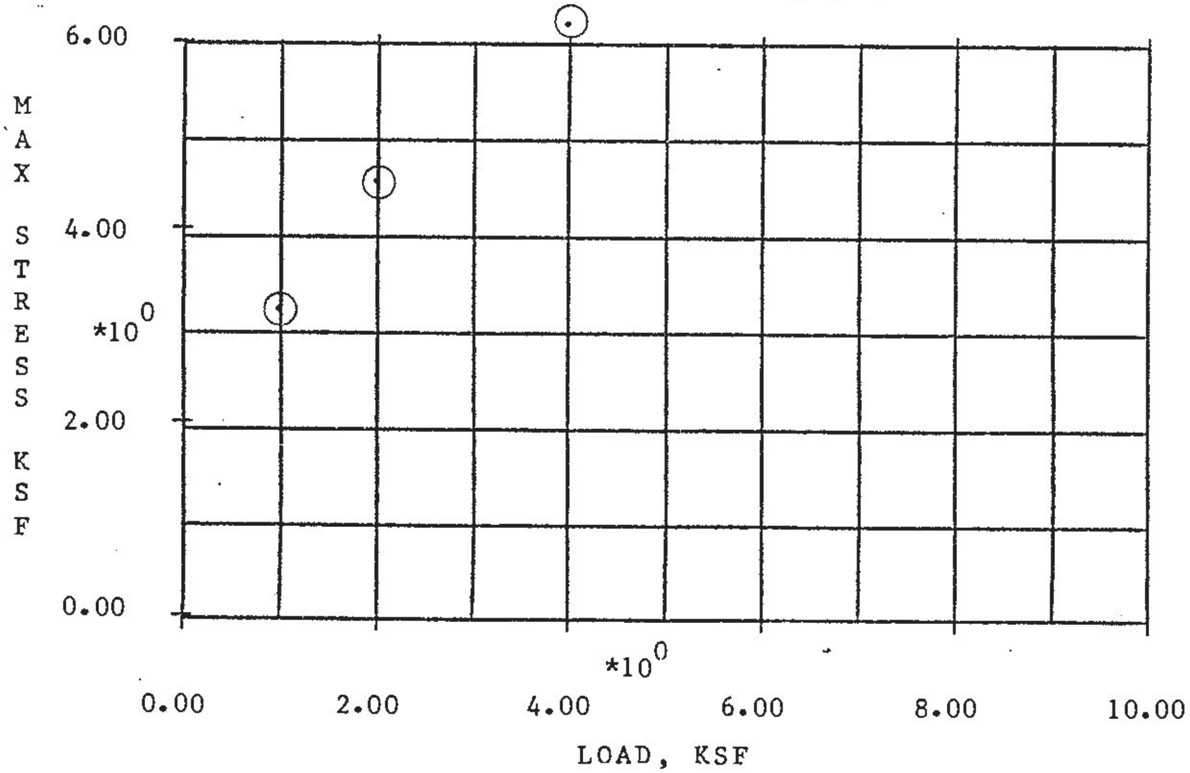
234.65
72.73

1
2
3
4

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #3 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	982.7	841.9	1557.6
0.010	2267.5	1144.0	2464.1
0.020	3118.2	2599.0	4098.0
0.030	2361.4	4024.6	5547.1
0.040	1889.1	4564.4	6195.4
0.050	709.9	4042.2	5670.3
0.060	0.	3590.5	4980.9
0.070	0.	2860.1	4646.5
0.080	0.	0.	4479.3
0.090	0.	0.	4291.6
0.100	0.	0.	4127.3

PROJECT:SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. :#3 MODIFIED TESTED BY:RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	16.8	16.9	16.7
VOID RATIO	-	0.556	0.555	0.555
SATURATION	%	83.2	83.8	82.7
DENSITY	KSF	110.4	110.4	110.4
AFTER CONSOLIDATION				
VOID RATIO	-	0.556	0.555	0.556
FINAL CONDITIONS				
WATER CONTENT	%	16.8	16.9	16.7
VOID RATIO	-	0.556	0.555	0.556
SATURATION	%	83.1	83.7	82.6
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	2.0	4.0	5.0
RATE OF STRAIN	IN/MIN	0.010	0.010	0.008
MAXIMUM SHEAR STRESS	KSF	3.12	4.56	6.20
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #3 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
PLEASE SELECT SYSTEM:  1=TS, 2=WORD ONE, 3=CMS, B=BOWNE
-  11
0361000  TERMINAL  . PE?S
SOUTHERN COMPANY T/S ON 07/05/78  TIME  13:18:47   CHANNEL  6700

USER ID -ALP5370000
project id-LKOI
PASSWORD--
[redacted]
SYSTEM ?FORT N
*AUTO
*010 11,2.75,3
*020 .999,16.8,16.8,142.18,.000,.020,2.0,.000,106.3
*030 2.002,16.9,16.9,142.24,.000,.040,4.0,.000,155.6
*040 4.003,16.7,16.7,142.21,.000,.040,5.0,.000,211.2
*050 .005,33.5,28.7,53.1
*060 .010,77.3,39.0,84.0
*070 .020,106.3,88.6,139.7
*080 .030,80.5,137.2,189.1
*090 .040,64.4,155.6,211.2
*100 .050,24.2,137.8,193.3
*110 .060,0.0,122.4,169.8
*120 .070,0.0,97.5,158.4
*130 .080,0.0,0.0,152.7
*140 .090,0.0,0.0,146.3
*150 .100,0.0,0.0,140.7
*160
*SAVE GP111
DATA SAVED-GP111
*LIST GP111

010 11,2.75,3
020 .999,16.8,16.8,142.18,.000,.020,2.0,.000,106.3
030 2.002,16.9,16.9,142.24,.000,.040,4.0,.000,155.6
040 4.003,16.7,16.7,142.21,.000,.040,5.0,.000,211.2
050 .005,33.5,28.7,53.1
060 .010,77.3,39.0,84.0
070 .020,106.3,88.6,139.7
080 .030,80.5,137.2,189.1
090 .040,64.4,155.6,211.2
100 .050,24.2,137.8,193.3
110 .060,0.0,122.4,169.8
120 .070,0.0,97.5,158.4
130 .080,0.0,0.0,152.7
140 .090,0.0,0.0,146.3
150 .100,0.0,0.0,140.7


*RUN DSHEAR; SSLIB/AJPLOT,R #GP111
file gp111    -- logical file code non-numeric or >43
*RUN DSHEAR; SSLIB/AJPLOT,R #GP111 "05"
```

CATION:
B NO. :
OJECT :

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

GP111

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	11	2.75	3

#3 modified

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	16.8	16.8	142.18	.000	.020	2.0	.000	106.3
2	030	2.002	16.9	16.9	142.24	.000	.040	4.0	.000	155.6
3	040	4.003	16.7	16.7	142.21	.000	.040	5.0	.000	211.2

Specimen No. : 1 2 3

Line No.	Shear Displacement In.	Shear Force Lbs. (1)	Shear Force Lbs. (2)	Shear Force Lbs. (3)
050	.005	33.5	28.7	53.1
060	.010	77.3	39.0	84.0
070	.020	106.3	88.6	139.7
080	.030	80.5	137.2	189.1
090	.040	64.4	155.6	211.2
100	.050	24.2	137.8	193.3
110	.060		122.4	169.8
120	.070		97.5	158.4
130	.080			152.7
140	.090			146.3
150	.100			140.7
160	.110			
170	.120			
180	.130			
190	.140			
200	.150			
210	.160			
220	.170			
230	.180			
240	.190			
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
300	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

\#3 modified

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 2

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 2 Bottom 15% Mod.

DATE 6-28-78

TESTED BY

2TIF

SCALE LOAD 3

APPLIED LOAD 136.46 lbs. lbs/sq. ft. 3

TARE IN lbs. 2

SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	39	39			
WT. CONTAINER + WET SOIL IN g	86.28		165.97		
WT. CONTAINER + DRY SOIL IN g	76.01				
WT. WATER, W_w, IN g	10.27				
WT. CONTAINER IN g	14.66				
WT. DRY SOIL, W_s, IN g			142.21		
WATER CONTENT, w, IN %	16.7				

238.2
72.7

8:59

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	244	.000	—		
	245	.005	165	53.1	
	246	.010	261	84.0	
	246	.020	434	139.7	
	245	.030	512	189.1	
	243	.040	543	211.2	
	239	.050	518	193.3	
	237	.060	485	169.8	
	235	.070	469	158.4	
	234	.080	461	152.7	
	233	.090	452	146.3	
	232	.100	437	140.7	
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

1
2
3
4
5
4

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE

LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 2 15% Mod
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS

PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 2 Top 15% Mod.
DATE 6-28-78
TESTED BY

SCALE LOAD
APPLIED LOAD 34.06 lbs. lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

238.8
72.7

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	43				
WT. CONTAINER + WET SOIL IN g	78.72		166.07		
WT. CONTAINER + DRY SOIL IN g	69.38				
WT. WATER, W_w, IN g	9.34				
WT. CONTAINER IN g	13.80				
WT. DRY SOIL, W_s, IN g			142.18		
WATER CONTENT, w, IN %	16.8				

200 8'15
8'17

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	222	.000	000	0.0	
	222	.005	104	33.5	
	222	.010	240	77.3	
	—	.020	330 239 DK	106.3	
	212	.030	250	80.5	
	210	.040	200	64.4	
	214	.050	75	24.2	
		.060			
		.070			
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

SOIL TEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS, U.S.A.

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 2
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 2 middle 15% Mod.
DATE 6/28/78
TESTED BY
SCALE LOAD
APPLIED LOAD 68.26 lbs. lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	64		166.29		
WT. CONTAINER + WET SOIL IN g	77.71				
WT. CONTAINER + DRY SOIL IN g	68.58				
WT. WATER, W_w, IN g	9.13				
WT. CONTAINER IN g	14.50				
WT. DRY SOIL, W_s, IN g			142.24		
WATER CONTENT, w, IN %	16.9				

239.02
72.73

~~8.34~~ 8.38
8.42

200

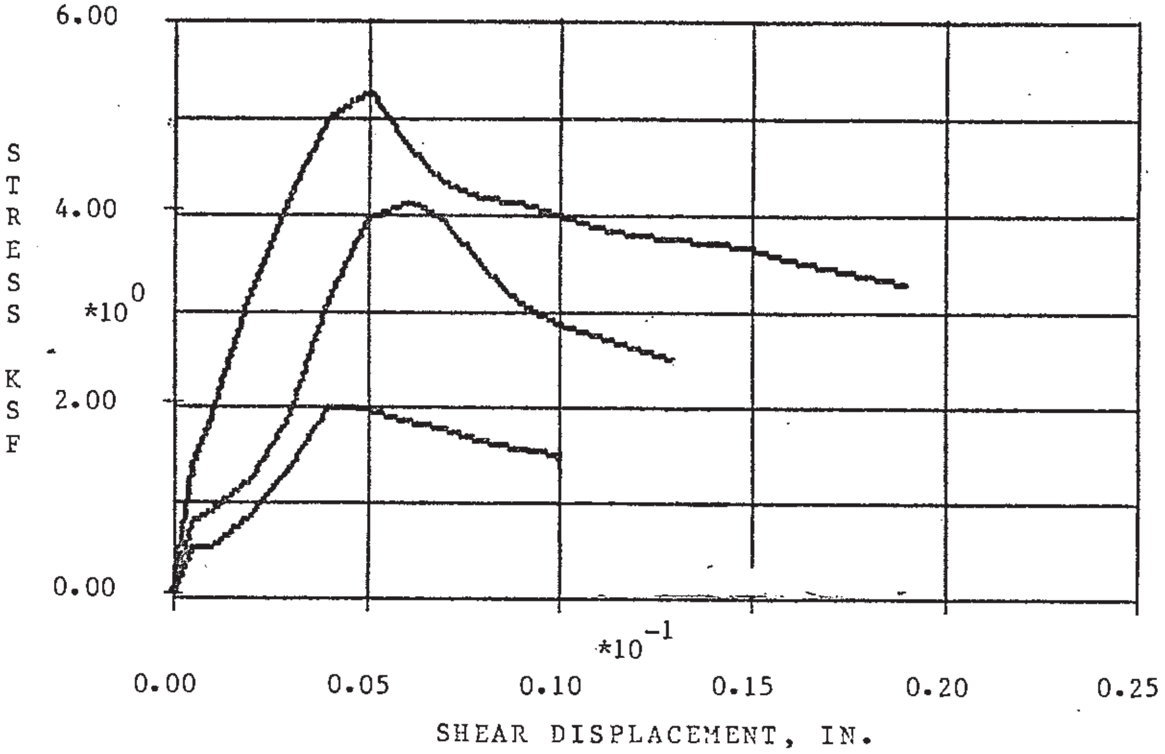
3

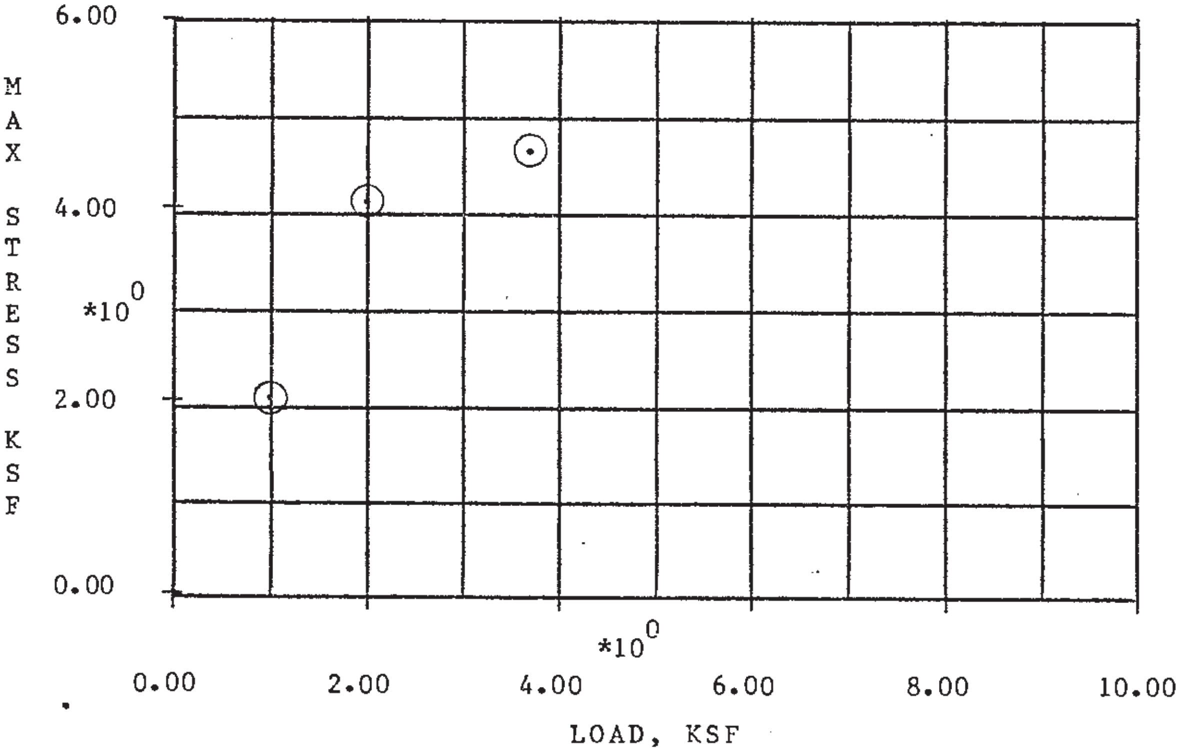
ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	215	.000	—		
	215	.005	89	28.7	
	215	.010	121	39.0	
	215	.020	275	88.6	
	215	.030	426	137.2	
	210	.040	465	155.6	
	208	.050	428	137.8	
	204	.060	380	122.4	
	203	.070	303	97.5	
		.080			
		.090			
		.100			
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

SOILTEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS, U.S.A.

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #4 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	3.71 KSF SHEAR STRESS PSF
0.005	528.0	774.4	1369.9
0.010	548.5	915.2	1936.1
0.020	888.8	1255.5	3212.1
0.030	1369.9	1906.7	4203.6
0.040	1983.0	3144.6	4980.9
0.050	1936.1	3966.0	5233.2
0.060	1795.2	4136.1	4667.1
0.070	1701.4	3880.9	4250.5
0.080	1587.0	3408.6	4098.0
0.090	1484.3	3003.8	4033.4
0.100	1416.8	2804.3	3919.0
0.110	0.	2654.7	3807.6
0.120	0.	2549.1	3722.5
0.130	0.	2408.3	3675.6
0.140	0.	0.	3616.9
0.150	0.	0.	3570.0
0.160	0.	0.	3476.1
0.170	0.	0.	3373.4
0.180	0.	0.	3288.4
0.190	0.	0.	3212.1

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #4 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	18.4	18.1	17.8
VOID RATIO	-	0.586	0.579	0.576
SATURATION	%	86.3	86.0	85.0
DENSITY	KSF	108.2	108.7	109.0
AFTER CONSOLIDATION				
VOID RATIO	-	0.587	0.579	0.576
FINAL CONDITIONS				
WATER CONTENT	%	18.4	18.1	17.8
VOID RATIO	-	0.587	0.579	0.576
SATURATION	%	86.2	85.9	85.0
LOAD	KSF	1.00	2.00	3.71
TIME TO FAILURE	MIN	5.0	9.0	9.0
RATE OF STRAIN	IN/MIN	0.008	0.007	0.007
MAXIMUM SHEAR STRESS	KSF	1.98	4.14	4.67
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #4 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
*010 20,2.75,3
*020 .999,18.4,18.4,139.43,.000,.040,5.0,.000,67.6
*030 2.002,18.1,18.1,140.08,.000,.060,9.0,.000,141.0
*040 3.709,17.8,17.8,140.37,.000,.060,9.0,.000,159.1
*050 .005,18.0,26.4,46.7
*060 .010,18.7,31.2,66.0
*070 .020,30.3,42.8,109.5
*080 .030,46.7,65.0,143.3
*090 .040,67.6,107.2,169.8
*100 .050,66.0,135.2,178.4
*110 .060,61.2,141.0,159.1
*120 .070,58.0,132.3,144.9
*130 .080,54.1,116.2,139.7
*140 .090,50.6,102.4,137.5
*150 .100,48.3,95.6,133.6
*160 .110,0.0,90.5,129.8
*170 .120,0.0,86.9,126.9
*180 .130,0.0,82.1,125.3
*190 .140,0.0,0.0,123.3
*200 .150,0.0,0.0,121.7
*210 .160,0.0,0.0,118.5
*220 .170,0.0,0.0,115.0
*230 .180,0.0,0.0,112.1
*240 .190,0.0._,0.0,109.5
*250
*SAVE GP56
DATA SAVED-GP56
*LIST

010 20,2.75,3
020 .999,18.4,18.4,139.43,.000,.040,5.0,.000,67.6
030 2.002,18.1,18.1,140.08,.000,.060,9.0,.000,141.0
040 3.709,17.8,17.8,140.37,.000,.060,9.0,.000,159.1
050 .005,18.0,26.4,46.7
060 .010,18.7,31.2,66.0
070 .020,30.3,42.8,109.5
080 .030,46.7,65.0,143.3
090 .040,67.6,107.2,169.8
100 .050,66.0,135.2,178.4
110 .060,61.2,141.0,159.1
120 .070,58.0,132.3,144.9
130 .080,54.1,116.2,139.7
140 .090,50.6,102.4,137.5
150 .100,48.3,95.6,133.6
160 .110,0.0,90.5,129.8
170 .120,0.0,86.9,126.9
180 .130,0.0,82.1,125.3
190 .140,0.0,0.0,123.3
200 .150,0.0,0.0,121.7
210 .160,0.0,0.0,118.5
220 .170,0.0,0.0,115.0
230 .180,0.0,0.0,112.1
240 .190,0.0,0.0,109.5


*RUN DSHEAR; SSLIB/AJPLOT,R #GP56 "05"
```

OCATION: GEORGIA POWER PLANT SHERER
AB NO. : #1
ROJECT :

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

6P56

#4 modified

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	20	2.75	3

ec. o.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	18.4	18.4	139.43	0.0	.040	5.0	.000	67.6
2	030	2.002	18.1	18.1	140.08	0.0	.060	9.0	.000	141.0
3	040	3.709	17.8	17.8	140.37	0.0	.060	9.0	.000	159.1

Specimen No. : 1 2 3

Line No.	Shear Displacement In.	Shear Force Lbs. (1)	Shear Force Lbs. (2)	Shear Force Lbs. (3)
050	.005	18.0	26.4	46.7
060	.010	18.7	31.2	66.0
070	.020	30.3	42.8	109.5
080	.030	46.7	65.0	143.3
090	.040	67.6	107.2	169.8
100	.050	66.0	135.2	178.4
110	.060	61.2	141.0	159.1
120	.070	580	132.3	144.9
130	.080	54.1	116.2	139.7
140	.090	50.6	102.4	137.5
150	.100	48.3	95.6	133.6
160	.110		90.5	129.8
170	.120		86.9	126.9
180	.130		82.1	125.3
190	.140			123.3
200	.150			121.7
210	.160			118.5
220	.170			115.0
230	.180			112.1
240	.190			109.5
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
0	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#1 Modified

999 Ks FILTER

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 1 Top 17% mod

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 1 - Top 17% mod.

DATE 6-27-78

TESTED BY RAH

SCALE LOAD

APPLIED LOAD lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

1:22
1:27

1/2 TSF

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.		45			
WT. CONTAINER + WET SOIL IN g	165.09	78.69			
WT. CONTAINER + DRY SOIL IN g		68.64			
WT. WATER, W_w, IN g		10.05			
WT. CONTAINER IN g		13.90			
WT. DRY SOIL, W_s, IN g					
WATER CONTENT, w, IN %		18.4			

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	200	.000	0	0	
	200	.005	56	18.0	
	200	.010	58	18.7	
	200	.020	94	30.3	
	200	.030	145	46.7	
	200	.040	210	67.6	
	195	.050	205	66.0	
	194	.060	190	61.2	
	192	.070	180	58.0	
	190	.080	168	54.1	
	188	.090	157	50.6	
	186	.100	150	48.3	
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 1

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_0, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

1 TSF

TEST NO. 1 - middle 17% Mod.

DATE 6-27-78

TESTED BY RAH

SCALE LOAD

APPLIED LOAD lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

237.16
Tw 72.72
164.44
wt

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.			61		
WT. CONTAINER + WET SOIL IN g	165.44		76.12		
WT. CONTAINER + DRY SOIL IN g			66.66		
WT. WATER, W_w, IN g			9.46		
WT. CONTAINER IN g			14.14		
WT. DRY SOIL, W_s, IN g					
WATER CONTENT, w, IN %			18.1		

1:53 2:02 = 9 min

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	210	.000	0	0	
	210	.005	82	26.4	
	210	.010	97	31.2	
	210	.020	133	42.8	
	211	.030	202	65.0	
		.040	333	107.2	
		.050	420	135.2	
	196	.060	438	141.0	
	[illegible]	.070	411	132.3	
	200	.080	361	116.2	
	196	.090	318	102.4	
	194	.100	297	95.6	
	192	.110	281	90.5	
	189	.120	270	86.9	
	187	.130	255	82.1	
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 1

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

2-TSF

TEST NO. 1 Bottom 17% Mod

DATE 6-27-78

TESTED BY RAH

SCALE LOAD 126.44

APPLIED LOAD lbs. lbs/sq. ft. 2 TSF

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.			64		
WT. CONTAINER + WET SOIL IN g	165.36		73.40		
WT. CONTAINER + DRY SOIL IN g			64.49		
WT. WATER, W_w, IN g			8.91		
WT. CONTAINER IN g			14.50		
WT. DRY SOIL, W_s, IN g	140.37				
WATER CONTENT, w, IN %			17.8		

238.0
72.7
165.3

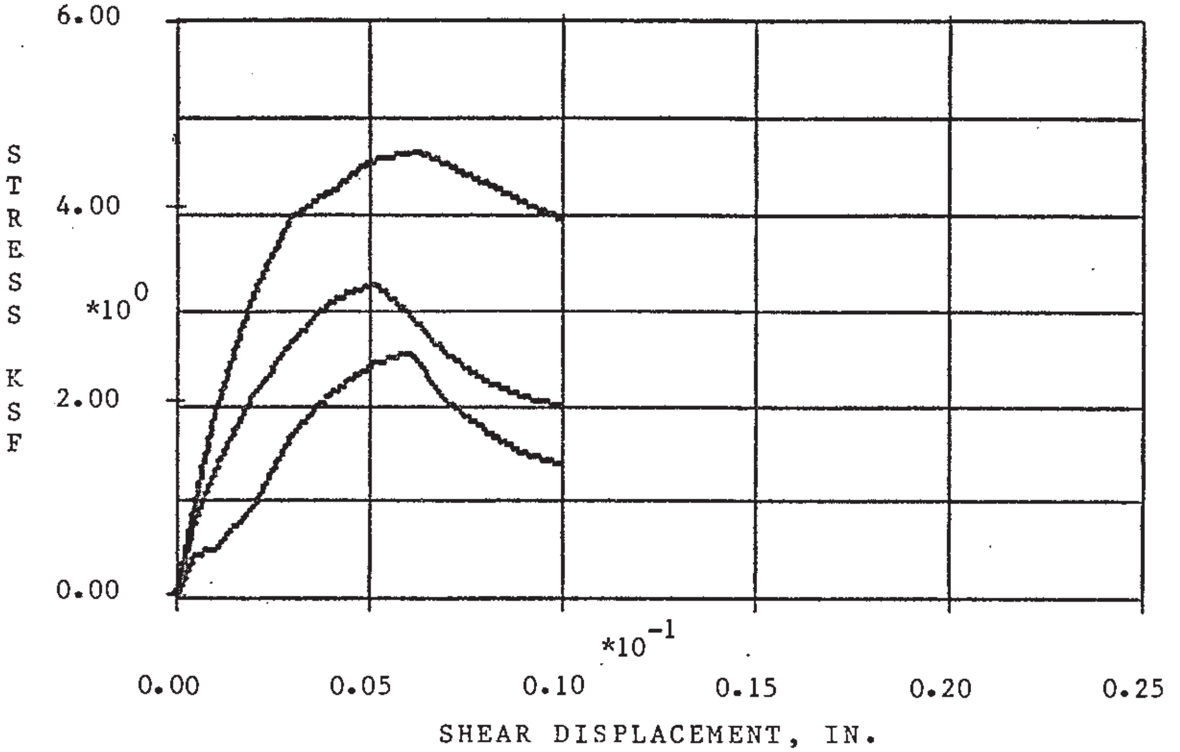
200

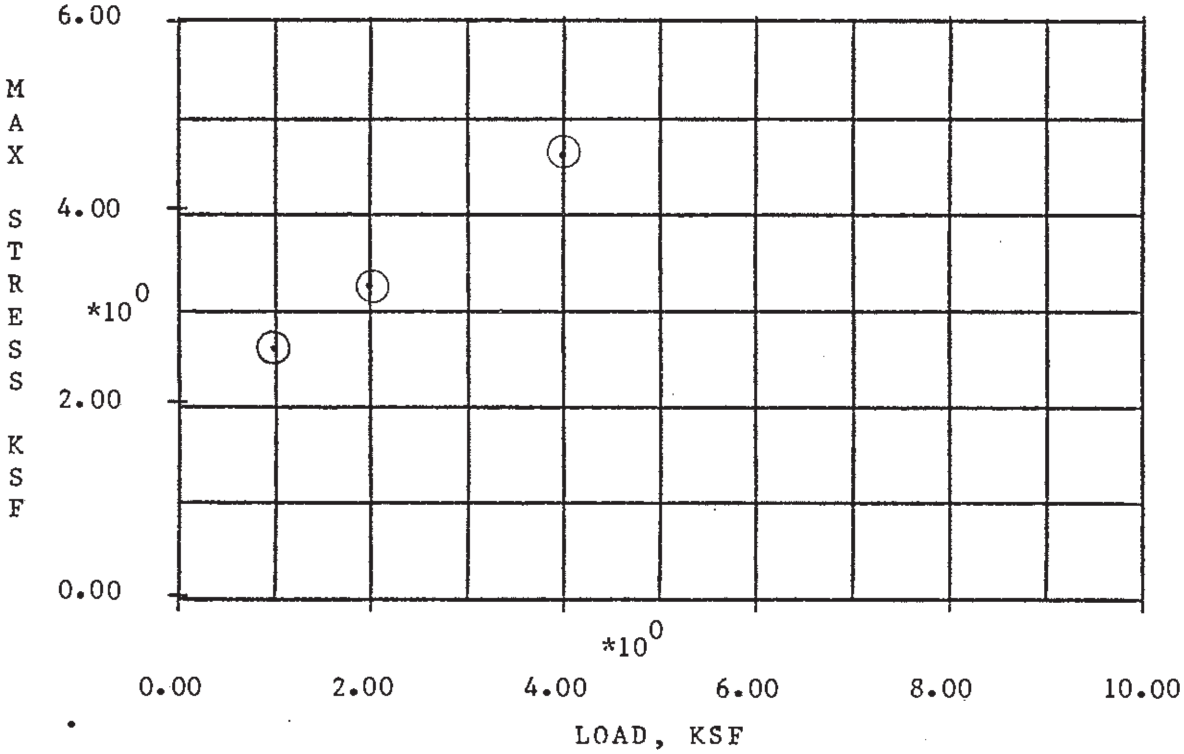
2:35
2:44

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	234	.000	0		
	238	.005	145	46.7	
	238	.010	205	66.0	
	238	.020	340	109.5	
	238	.030	445	143.3	
	236	.040	485	169.8	
	234	.050	497	178.4	
	233	.060	470 →	159.1	
	231	.070	450	144.9	
	230	.080	434	139.7	
	230	.090	427	137.5	
	229	.100	415	133.6	
	228	.110	403	129.8	
	227	.120	394	126.9	
	226	.130	389	125.3	
	225	.140	383	123.3	
	225	.150	378	121.7	
	224	.160	368	118.5	
	224	.170	357	115.0	
	223	.180	348	112.1	
	223	.190	340	109.5	
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #5 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	466.4	812.6	1012.0
0.010	501.6	1323.0	1906.7
0.020	944.6	2106.2	3165.2
0.030	1689.6	2672.3	3948.4
0.040	2144.3	3071.3	4203.6
0.050	2428.9	3229.7	4543.9
0.060	2531.5	2927.5	4605.5
0.070	1983.0	2493.4	4458.8
0.080	1727.8	2220.6	4232.9
0.090	1455.0	2059.3	4042.2
0.100	1340.6	1956.6	3872.1

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #5 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	20.4	20.5	20.2
VOID RATIO	-	0.655	0.653	0.637
SATURATION	%	85.7	86.4	87.3
DENSITY	KSF	103.7	103.9	104.9
AFTER CONSOLIDATION				
VOID RATIO	-	0.655	0.653	0.637
FINAL CONDITIONS				
WATER CONTENT	%	20.4	20.5	20.2
VOID RATIO	-	0.655	0.653	0.637
SATURATION	%	85.6	86.3	87.2
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.012	0.010	0.012
MAXIMUM SHEAR STRESS	KSF	2.53	3.23	4.61
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #5 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
OLD FILE? GP33
*LIST

120 11,2.70,3
130 .999,20.4,20.4,133.65,.000,.060,5.0,.000,86.3
140 2.002,20.5,20.5,133.83,.000,.050,5.0,.000,110.1
150 4.003,20.2,20.2,135.14,.000,.060,5.0,.000,157.0
160 .005,15.9,27.7,34.5
170 .010,17.1,45.1,65.0
180 .020,32.2,71.8,107.9
190 .030,57.6,91.1,134.6
200 .040,73.1,104.7,143.3
210 .050,82.8,110.1,154.9
220 .060,86.3,99.8,157.0
230 .070,67.6,85.0,152.0
240 .080,58.9,75.7,144.3
250 .090,49.6,70.2,137.8
260 .100,45.7,66.7,132.0


*120 11,2.70 DEL
 DEL
120 11,2.75,3
*RESAVE GP33
DATA SAVED-GP33
*LIST

120 11,2.75,3
130 .999,20.4,20.4,133.65,.000,.060,5.0,.000,86.3
140 2.002,20.5,20.5,133.83,.000,.050,5.0,.000,110.1
150 4.003,20.2,20.2,135.14,.000,.060,5.0,.000,157.0
160 .005,15.9,27.7,34.5
170 .010,17.1,45.1,65.0
180 .020,32.2,71.8,107.9
190 .030,57.6,91.1,134.6
200 .040,73.1,104.7,143.3
210 .050,82.8,110.1,154.9
220 .060,86.3,99.8,157.0
230 .070,67.6,85.0,152.0
240 .080,58.9,75.7,144.3
250 .090,49.6,70.2,137.8
260 .100,45.7,66.7,132.0


*RUN DSHEAR; SSLIB/AJPLOT,R #GP33
file gp33     -- logical file code non-numeric or >43
*RUN DSHEAR; SSLIB/AJPLOT,R #GP33 "05"
```

OCATION: #2 Modified
AB NO. :
ROJECT :

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

GP33

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	11	2.75	3.0

ec. .	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	20.4	20.4	133.65	.000	.060	5.0	.000	86.3
2	030	2.002	20.5	20.5	133.83	.000	.050	5.0	.000	110.1
3	040	4.003	20.2	20.2	135.14	.000	.060	5.0	.000	157.0

Specimen No. :		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	15.9	27.7	34.5
060	.010	19.1	45.1	65.0
070	.020	32.2	71.8	107.9
080	.030	57.6	91.1	134.6
090	.040	73.1	104.7	143.3
100	.050	82.8	110.1	154.9
110	.060	86.3	99.8	157.0
120	.070	67.6	85.0	152.0
130	.080	58.9	75.7	144.3
140	.090	49.6	70.2	137.8
150	.100	45.7	66.7	132.0
160	.110			
170	.120			
180	.130			
190	.140			
200	.150			
210	.160			
220	.170			
230	.180			
240	.190			
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
300	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#5 modified

SOIL SAMPLE

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO. 3

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_o, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. 3 Bot 19%Mud

DATE 6/28/78

TESTED BY Z TSR

SCALE LOAD

APPLIED LOAD 136^{46} lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION							
CONTAINER NO.	5						3
WT. CONTAINER + WET SOIL IN g	90.65		162.44				3 2
WT. CONTAINER + DRY SOIL IN g	77.81						
WT. WATER, W_w, IN g	12.84						
WT. CONTAINER IN g	14.33						
WT. DRY SOIL, W_s, IN g			135.14				
WATER CONTENT, w, IN %	20.2						

9:56
10:05

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.	235.1, 72.7,
	248	.000				1
	243	.005	107	34.5		2
	243	.010	2203	65.0		3
	243	.020	3435	107.9		4
	242	.030	4518	134.6.		5
	242	.040	4545	143.3		4
	240	.050	4564	154.9		3
	238	.060	4567	157.0		2
	237	.070	4560	152.0		1
	236	.080	4548	144.3		
	235	.090	4528	137.8		
	234	.100	4510	132.0		
		.110				
		.120				
		.130				
		.140				
		.150				
		.160				
		.170				
		.180				
		.190				
		.200				
		.210				
		.220				
		.230				
		.240				
		.250				

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 3
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 3 Top 19% Mod
DATE 6 28 78
TESTED BY TAC
SCALE LOAD 34#
APPLIED LOAD lbs. lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

1/2 TSF
0
3
3
1#

233.4
72.7

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	41		160.69		
WT. CONTAINER + WET SOIL IN g	85.80				
WT. CONTAINER + DRY SOIL IN g	73.67				
WT. WATER, W_w, IN g	12.13				
WT. CONTAINER IN g	14.33				
WT. DRY SOIL, W_s, IN g			133.65		
WATER CONTENT, w, IN %	20.4				

200

9:20
9:25

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	212	.000			
	212	.005	49	15.9	
	212	.010	53	17.1	
	212	.020	100	32.2	
	212	.030	179	57.6	
	212	.040	227	73.1	
	209	.050	257	82.8	
	205	.060	268	86.3	
	202	.070	210	67.6	
	200	.080	173	58.9	
	199	.090	154	49.6	
	198	.100	142	45.7	
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO. 3
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 3 Mid 19% Mod
DATE 6/28/78
TESTED BY 1 TSF
SCALE LOAD
APPLIED LOAD 68.26 lbs. lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

234
72,

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	6				
WT. CONTAINER + WET SOIL IN g	79.84	161.27			
WT. CONTAINER + DRY SOIL IN g	68.70				
WT. WATER, W_w, IN g	11.14				
WT. CONTAINER IN g	14.41				
WT. DRY SOIL, W_s, IN g					
WATER CONTENT, w, IN %	20.5	133.83			

1
3
3

9.39
7.44

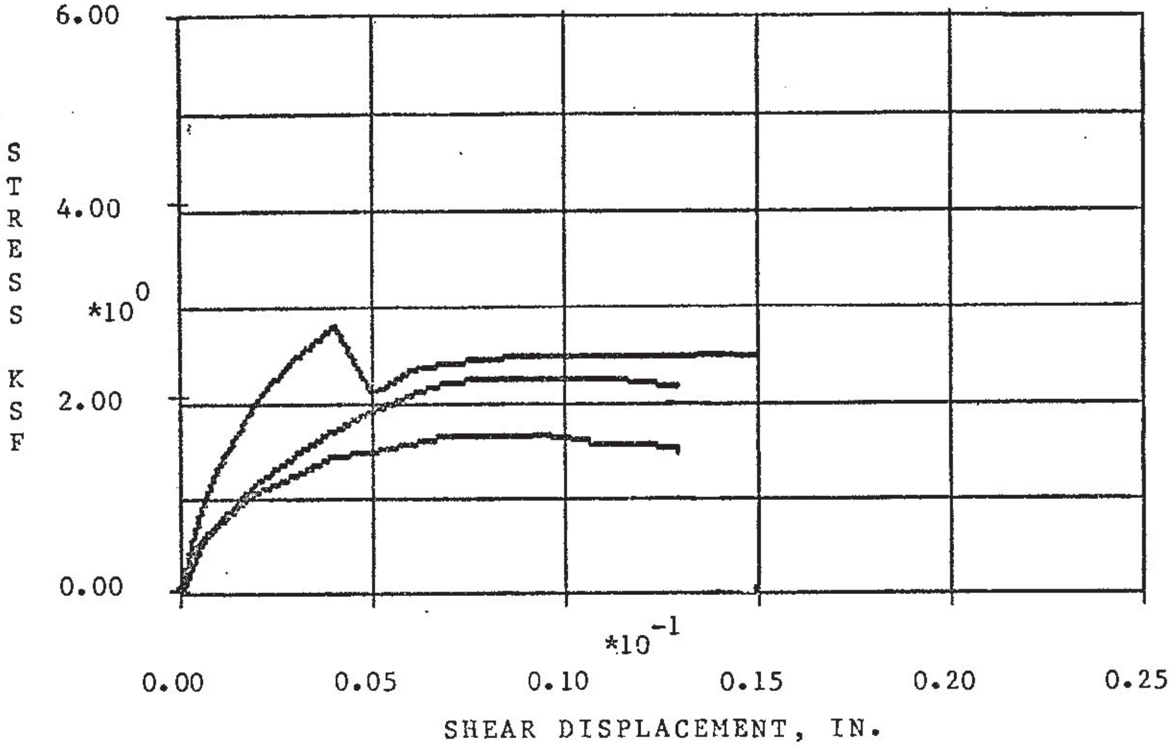
200

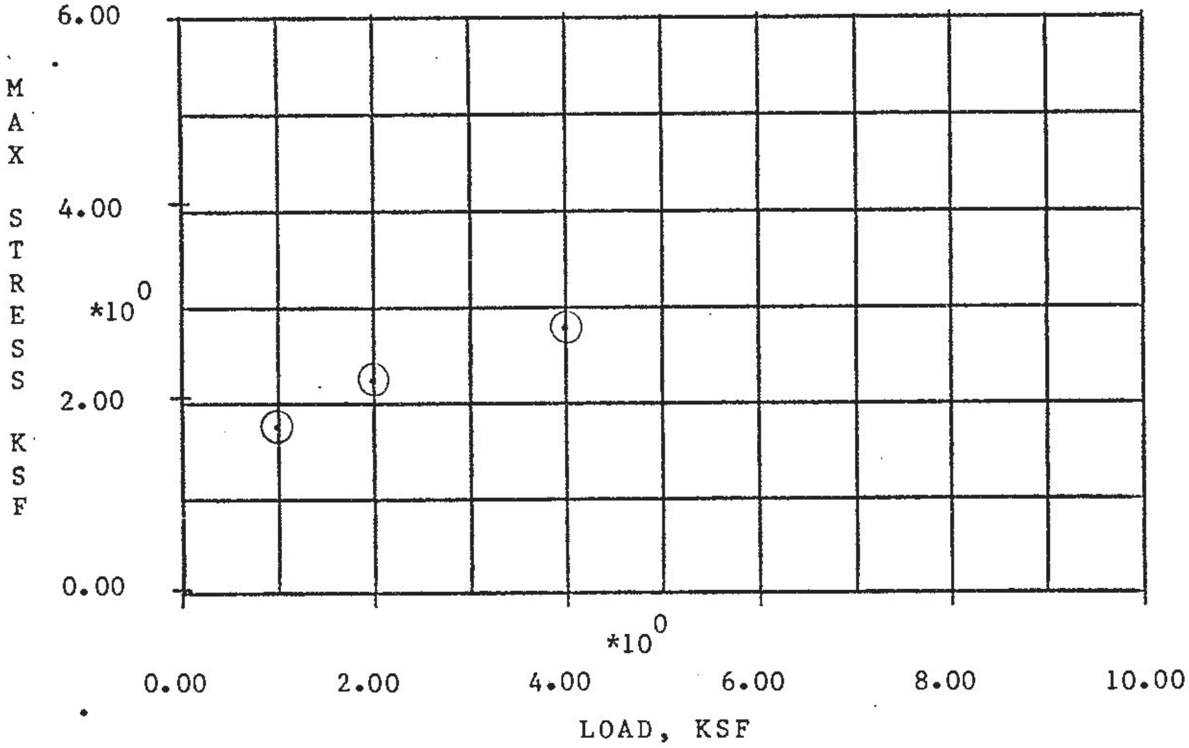
ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	213	.000			
	213	.005	86	27.7	
	213	.010	140	45.1	
	214	.020	223	71.8	
	215	.030	283	91.1	
	213	.040	325	104.7	
	210	.050	342	110.1	
	207	.060	310	99.8	
	206	.070	264	85.0	
	204	.080	235	75.7	
	203	.090	218	70.2	
	202	.100	207	66.7	
		.110			
		.120			
		.130			
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

1
2
3

REMARKS

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #6 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	510.4	557.3	803.8
0.010	756.8	736.3	1331.8
0.020	1067.8	1152.8	2003.5
0.030	1264.3	1472.6	2437.7
0.040	1446.2	1727.8	2795.5
0.050	1510.7	1927.3	2029.9
0.060	1578.2	2088.6	2314.5
0.070	1654.4	2191.3	2428.9
0.080	1672.0	2247.0	2475.8
0.090	1663.2	2247.0	2493.4
0.100	1587.0	2247.0	2502.2
0.110	1519.5	2208.9	2502.2
0.120	1493.1	2144.3	2502.2
0.130	1463.8	2088.6	2502.2
0.140	0.	0.	2455.3
0.150	0.	0.	2399.5

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #6 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	23.5	23.2	23.0
VOID RATIO	-	0.741	0.733	0.714
SATURATION	%	87.2	87.0	88.6
DENSITY	KSF	98.6	99.1	100.2
AFTER CONSOLIDATION				
VOID RATIO	-	0.741	0.734	0.714
FINAL CONDITIONS				
WATER CONTENT	%	23.5	23.2	23.0
VOID RATIO	-	0.741	0.734	0.714
SATURATION	%	87.2	87.0	88.5
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.016	0.018	0.008
MAXIMUM SHEAR STRESS	KSF	1.67	2.25	2.80
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT DATE: 7-7-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: MICACEOUS SANDY CLAYEY SILT MH

LAB NO. :#6 MODIFIED TESTED BY:RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
PLEASE SELECT SYSTEM:  1=TS, 2=WORD ONE, 3=CMS, B=BOWNE
-  11
0360200  TERMINAL __PE?S
SOUTHERN COMPANY T/S ON 07/05/78  TIME  08:15:57   CHANNEL  2650

USER ID -ALP5370000
project id-KJIU
PASSWORD--
[illegible]
SYSTEM ?FORT N
*AUTO
*010 16,2.75,3
*020 .999,23.5,23.5,127.05,.000,.080,5.0,.000,57.0
*030 2.002,23.2,23.2,127.62,.000,.090,5.0,.000,76.6
*040 4.003,23.0,23.0,129.05,.000,.040,5.0,.000,95.3
*050 .005,17.4,19.0,27.4
*060 .010,25.8,25.1,45.4
*070 .020,36.4,39.3,68.3
*080 .030,43.1,50.2,83.1
*090 .040,49.3,58.9,95.3
*100 .050,51.5,65.7,69.2
*110 .060,53.8,71.2,78.9
*120 .070,56.4,74.7,82.8
*130 .080,57.0,76.6,84.4
*140 .090,56.7,76.6,85.0
*150 .100,54.1,76.6,85.0
*160 .110,51.8,75.3,85.3
*170 .120,50.9,73.1,85.3
*180 .130,49.9,71.2,85.3
*190 .140,0.0,0.0,83.7
*200 .150,0.0,0.0,81.8
*210
*150 .100,54.1,76.6,85.3
*SAVE GP6
DATA SAVED-GP6
*LIST

010 16,2.75,3
020 .999,23.5,23.5,127.05,.000,.080,5.0,.000,57.0
030 2.002,23.2,23.2,127.62,.000,.090,5.0,.000,76.6
040 4.003,23.0,23.0,129.05,.000,.040,5.0,.000,95.3
050 .005,17.4,19.0,27.4
060 .010,25.8,25.1,45.4
070 .020,36.4,39.3,68.3
080 .030,43.1,50.2,83.1
090 .040,49.3,58.9,95.3
100 .050,51.5,65.7,69.2
110 .060,53.8,71.2,78.9
120 .070,56.4,74.7,82.8
130 .080,57.0,76.6,84.4
140 .090,56.7,76.6,85.0
150 .100,54.1,76.6,85.3
160 .110,51.8,75.3,85.3
170 .120,50.9,73.1,85.3
180 .130,49.9,71.2,85.3
190 .140,0.0,0.0,83.7
200 .150,0.0,0.0,81.8


*
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Rerun to get last sheet

OCATION: ______________________________
AB NO. : ______________________________
ROJECT : ______________________________

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
COMPUTER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	16	2.75	3

6P4
#6 modified

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	23.5	23.5	127.05	.000	.080	5.0	.000	57.0
2	030	2.002	23.2	23.2	127.62	.000	.090	5.0	.000	76.6
3	040	4.003	23.0	23.0	129.05	.000	.040	5.0	.000	95.3

Specimen No. :		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	17.4	19.0	27.4
060	.010	25.8	25.1	45.4
070	.020	36.4	39.3	68.3
080	.030	43.1	50.2	83.1
090	.040	49.3	58.9	95.3
100	.050	51.5	65.7	69.2
110	.060	53.8	71.2	78.9
120	.070	56.4	74.7	82.8
130	.080	57.0	76.6	84.4
140	.090	56.7	76.6	85.0
150	.100	54.1	76.6	85.3
160	.110	51.8	75.3	85.3
170	.120	50.9	73.1	85.3
180	.130	49.9	71.2	85.3
190	.140			83.7
200	.150			81.8
210	.160			
220	.170			
230	.180			
240	.190			
250	.200			
260	.210			
270	.220			
280	.230			
290	.240			
300	.250			

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#6 Modified

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO.
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_o, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 6 Mid 23.2% Mod
DATE 6/29/78
TESTED BY
SCALE LOAD
APPLIED LOAD ___ lbs. ___ lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	37				
WT. CONTAINER + WET SOIL IN g	96.88	157.23			
WT. CONTAINER + DRY SOIL IN g	81.33				
WT. WATER, W_w, IN g	15.55				
WT. CONTAINER IN g	14.42				
WT. DRY SOIL, W_s, IN g	66.91	127.66			
WATER CONTENT, w, IN %	23.2%				

229.96
92.73
3
3

2139

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	212	.000			
	213	.005	59	19.0	
	212	.010 35"	78	25.1	
	214	.020 33"	122	39.3	
	214	.030 [illegible]	156	50.2	
	212	.040 [illegible]	183	58.9	
	214	.050	206	65.9	
	213	.060	221	71.2	
	212	.070	232	74.7	
	211	.080	238	76.6	
	210	.090	238	76.6	
	209	.100	238	76.6	
	208	.110	234	75.3	
	207	.120	227	73.1	
	207	.130	221	71.2	
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE ____

LOCATION ____
BORING NO. ____ SAMPLE DEPTH ____
SAMPLE NO. 6
SPECIFIC GRAVITY, G_s, ____
TYPE OF TEST ____

SOIL SAMPLE MEASUREMENTS
LENGTH ____
AREA, A_0, IN sq. ft. ____
THICKNESS ____

PROVING RING NO. ____
CALIBRATING FACTOR ____

TEST NO. 6 Mod 23.7% Top
DATE 6/29/78
TESTED BY ____

SCALE LOAD
APPLIED LOAD ____ lbs. ____ lbs/sq. ft. 1/2
TARE IN lbs. ____
SCALE LOAD IN lbs. ____

229.64

WATER CONTENT

SPECIMEN LOCATION						
CONTAINER NO.	57	156.91				
WT. CONTAINER + WET SOIL IN g	92.85					
WT. CONTAINER + DRY SOIL IN g	77.84					
WT. WATER, W_w, IN g	15.01					
WT. CONTAINER IN g	14.07					
WT. DRY SOIL, W_s, IN g	63.77	127.05				
WATER CONTENT, w, IN %	23.5%					

200 2:20

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	209	.000			
	|	.005	54	17.4	
	|	.010 30"	80	25.8	
		.020 30"	113	36.4	
		.030 30"	134	43.1	
	208	.040 25	153	49.3	
	208	.050 25	160	51.5	
	206	.060	167	53.8	
	204	.070	175	56.4	
	203	.080	177	57.0	
	201	.090	176	56.7	
	200	.100	168	54.1	
	199	.110	161	51.8	
	198	.120	158	50.9	
	196	.130	155	49.9	
		.140			
		.150			
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

SOIL TEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS, U.S.A.

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO.
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_0, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. 6 Bot 23.29% Mod
DATE 6/29/78
TESTED BY
SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft. 2
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

231.45

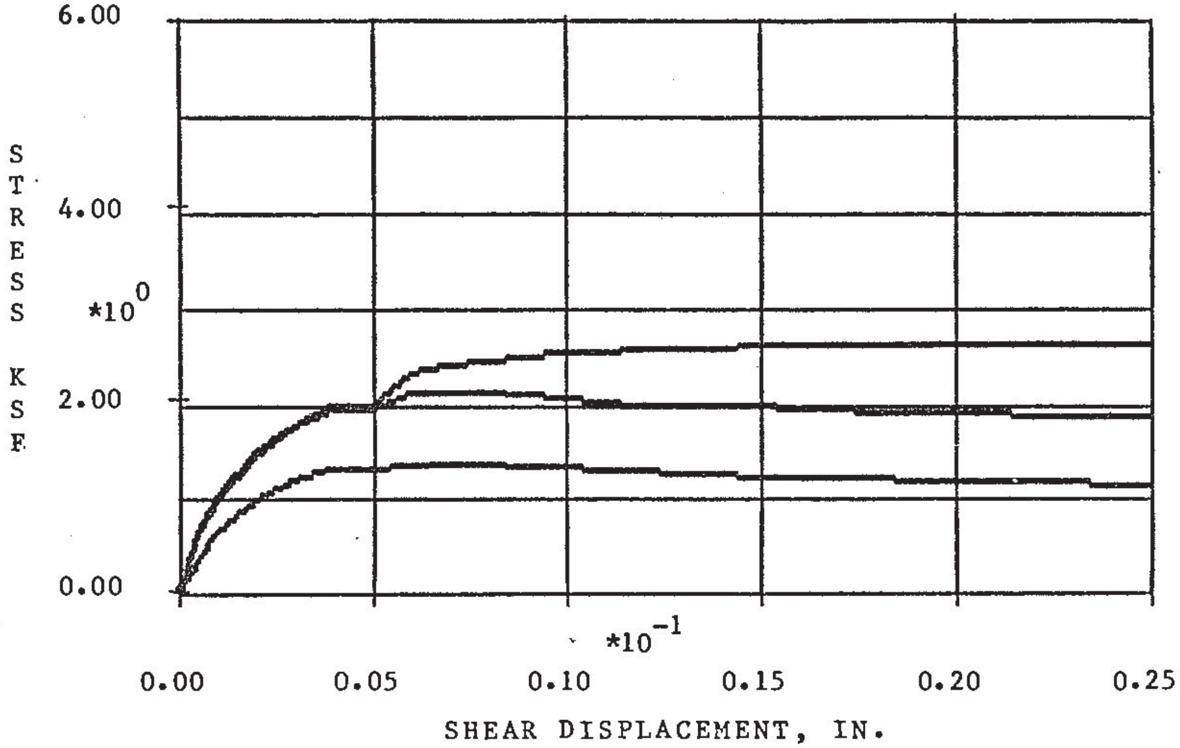
SPECIMEN LOCATION						
CONTAINER NO.	76					3
WT. CONTAINER + WET SOIL IN g	94.94	158.72				3
WT. CONTAINER + DRY SOIL IN g	79.87					2
WT. WATER, W_w, IN g	15.07					
WT. CONTAINER IN g	14.34					
WT. DRY SOIL, W_s, IN g	65.53					
WATER CONTENT, w, IN %	23.0%	129.04				

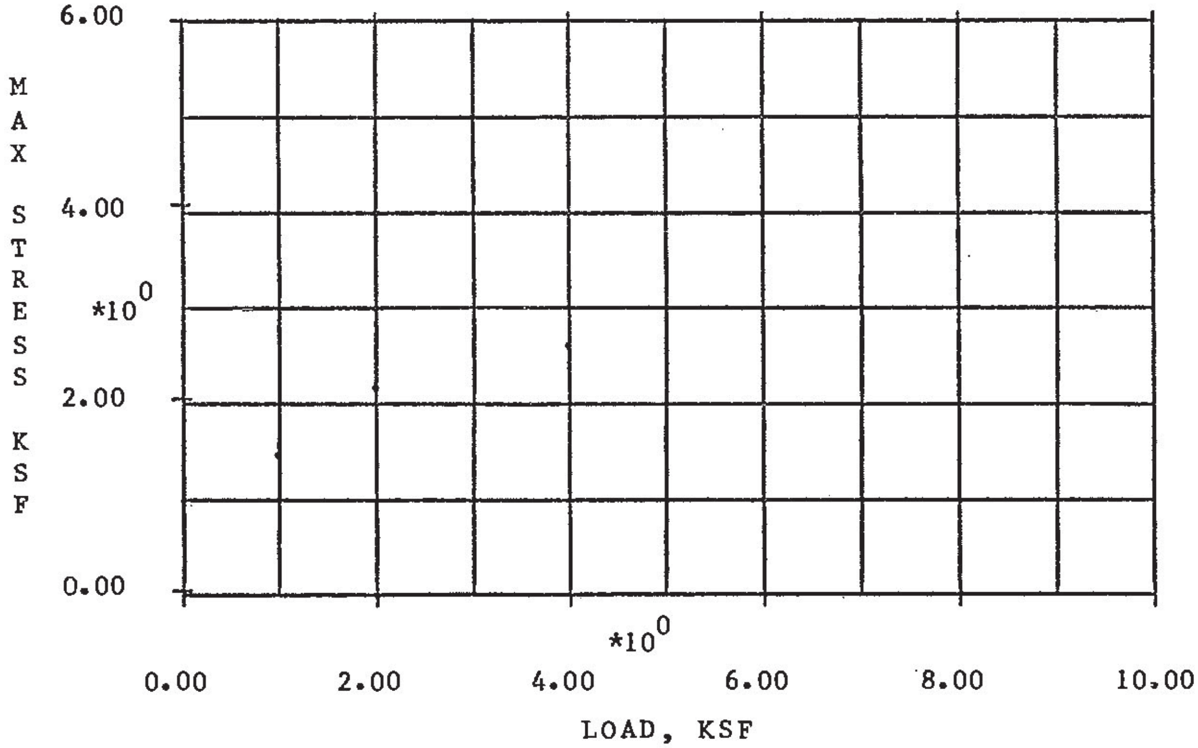
230 2:55

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	[illegible]	.000			
		.005	85	27.4	
		.010 35	141	45.4	
	229	.020 35	212	68.3	
	230	.030 35	258	83.1	
	230	.040 30	296	95.3	
	230	.050 30	215	69.2	
	230	.060 30	245	78.9	
	229	.070 33	257	82.8	
	229	.080 33	262	84.4	
	229	.090 33	264	85.0	
	228	.100 33	265	85.3	
	228	.110	265	85.3	
	227	.120	265	85.3	
	226	.130	265	85.3	
	227	.140	260	83.7	
	226	.150	254	81.8	
		.160			
		.170			
		.180			
		.190			
		.200			
		.210			
		.220			
		.230			
		.240			
		.250			

REMARKS

ALABAMA POWER COM(NY
DIRECT SHEAR TEST DATA





PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. : #7 MODIFIED TESTED BY: RG,ML,RAH CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
* JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST ATA

SHEAR DISPLACEMENT IN.	1.00 KSF SHEAR STRESS PSF	2.00 KSF SHEAR STRESS PSF	4.00 KSF SHEAR STRESS PSF
0.005	369.6	680.6	671.8
0.010	651.2	1059.0	1000.3
0.020	1012.0	1510.7	1472.6
0.030	1217.4	1774.7	1774.7
0.040	1340.6	1965.4	2003.5
0.050	1340.6	1965.4	2003.5
0.060	1361.1	2135.5	2314.5
0.070	1340.6	2126.7	2399.5
0.080	1323.0	2076.9	2464.1
0.090	1302.4	2021.1	2513.9
0.100	1276.0	1983.0	2540.3
0.110	1255.5	1956.6	2560.9
0.120	1246.7	1936.1	2569.7
0.130	1217.4	1915.5	2599.0
0.140	1191.0	1897.9	2599.0
0.150	1182.2	1897.9	2607.8
0.160	1170.4	1871.5	2607.8
0.170	1161.6	1859.8	2607.8
0.180	1152.8	1851.0	2607.8
0.190	1144.0	1833.4	2607.8
0.200	1132.3	1821.6	2599.0
0.210	1123.5	1812.8	2587.3
0.220	1114.7	1804.0	2587.3
0.230	1105.9	1795.2	2578.5
0.240	1097.1	1786.4	2578.5
0.250	1097.1	1774.7	2569.7

PROJECT: SHERER STEAM PLANT GEORGIA POWER CO. DATE: 7-6-78

LOCATION: ASH POND DIKE RANDOM FILL

BORING NO. : DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT MH

LAB NO. :#7 MODIFIED TESTED BY: RG, ML, RAH CHECKED BY: JBF

REPORTED TO MR, J.A. TYSON
JULY 7, 1978

ALABAMA POWER COMPANY
DIRECT SHEAR TEST DATA

SPECIMEN NO.	UNITS	1	2	3
INITIAL CONDITIONS				
WATER CONTENT	%	24.8	24.6	27.6
VOID RATIO	-	0.840	0.792	0.865
SATURATION	%	81.2	85.4	87.8
DENSITY	KSF	93.3	95.8	92.1
AFTER CONSOLIDATION				
VOID RATIO	-	0.818	0.760	0.787
FINAL CONDITIONS				
WATER CONTENT	%	24.8	24.6	27.6
VOID RATIO	-	0.818	0.760	0.787
SATURATION	%	83.3	89.0	96.4
LOAD	KSF	1.00	2.00	4.00
TIME TO FAILURE	MIN	5.0	5.0	5.0
RATE OF STRAIN	IN/MIN	0.010	0.012	0.030
MAXIMUM SHEAR STRESS	KSF	1.36	2.14	2.61
TIME FOR 50% CONSOL.	MIN			
MAXIMUM STRESS	KSF			
ULTIMATE SHEAR STRESS	KSF			

PROJECT: SHERER STEAM PLANT   GEORGIA POWER CO>   DATE: 7-6-78

LOCATION: ASH POND DIKE   RANDOM FILL

BORING NO. :   DEPTH/ELEV

SOIL DESCRIPTION: REDDISH BROWN MICACEOUS SANDY CLAYEY SILT   MH

LAB NO. : #7 MODIFIED   TESTED BY: RG,ML,RAH   CHECKED BY: JBF

REPORTED TO MR. J.A. TYSON
JULY 7, 1978

```
PLEASE SELECT SYSTEM :  1=TS, 2=WORD ONE, 3=CMS, B=BOWNE
-  11
0360200  TERMINAL TYPE?s
SOUTHERN COMPANY T/S ON 07/06/78  TIME  11:38:09   CHANNEL  2170

USER ID -alp5370000
project id-kjiu
PASSWORD--
PXRGWBMUEPVR
SYSTEM ?fort n
*AUTO
*010 26,2.75,3
*020 .999,24.8,24.8,120.20,.012,.050,5.0,.000,46.4
*030 2.002,24.6,24.6,123.43,.018,.060,5.0,.000,72.8
*040 4.003,27.6,27.6,118.6,.042,.150,5.0,.000,88.9
*050 .005,12.6,23.2,22.9
*060 .010,22.2,36.1,34.1
*070 .020,34.5,51.5,50.2
*080 .030,41.5,60.5,60.5
*090 .040,45.7,67.0,68.3
*100 .050,45.7,67.0,68.3
*110 .060,46.4,72.8,78.9
*120 .070,45.7,72.5,81.8
*130 .080,45.1,70.8,84.0
*140 .090,44.4,68.9,85.7
*150 .100,43.5,67.6,86.6
*160 .110,42.8,66.7,87.3
*170 .120,42.5,66.0,87.6
*180 .130,41.5,65.3,88.6
*190 .140,40.6,64.7,88.6
*200 .150,40.3,64.7,88.9
*210 .160,39.9,63.8,88.9
*220 .170,39.6,63.4,88.9
*230 .180,39.3,63.1,88.9
*240 .190,39.0,62.5,88.9
*250 .200,38.6,62.1,88.6
*260 .210,38.3,61.8,88.2
*270 .220,38.0,61.5,88.2
*280 .230,37.7,61.2,87.9
*290 .240,37.4,60.9,9_87.9
*300 .250,37.4,60.5,87.6
*310
*SAVE GP12
DATA SAVED-GP12
*LIST

010 26,2.75,3
020 .999,24.8,24.8,120.20,.012,.050,5.0,.000,46.4
030 2.002,24.6,24.6,123.43,.018,.060,5.0,.000,72.8
040 4.003,27.6,27.6,118.6,.042,.150,5.0,.000,88.9
050 .005,12.6,23.2,22.9
060 .010,22.2,36.1,34.1
070 .020,34.5,51.5,50.2
080 .030,41.5,60.5,60.5
090 .040,45.7,67.0,68.3
100 .050,45.7,67.0,68.3
110 .060,46.4,72.8,78.9
120 .070,45.7,72.5,81.8
130 .080,45.1,70.8,84.0
140 .090,44.4,68.9,85.7
150 .100,43.5,67.6,86.6
160 .110,42.8,66.7,87.3
170 .120,42.5,66.0,87.6
```

CATION: C&R Modified mp
B NO. : 1
ROJECT : B. Power Co.

ALABAMA POWER COMPANY
DIRECT SHEAR TEST
CO[illegible]TER DATA SHEET

Line No.	No. of Readings	Specific Gravity	No. of Specimens
010	26	2.75	3

GP 11
#7 Modified

ec.	LINE NO.	Load KSF	Initial Water Content, Percent	Final Water Content, Percent	Wt. of Solids Grams	Consolidation In.	Hor. Defl. @Max Shear Force In.	Time to Failure Min.	Vert. Defl. During Shear In.	Max Shear Force Lbs.
1	020	.999	24.8	24.8	120.20	.000 .012	.050	5.0	.000	46.4
2	030	2.002	24.6	24.6	123.43	.000 .018	.060	5.0	.000	72.8
3	040	4.003	27.6	27.6	118.6	.000 .042	.150	5.0	.010	88.9

Specimen No. :		1	2	3
Line No.	Shear Displacement In.	Shear Force Lbs.	Shear Force Lbs.	Shear Force Lbs.
050	.005	12.6	23.2	22.9
060	.010	22.2	36.1	34.1
070	.020	34.5	51.5	50.2
080	.030	41.5	60.5	60.5
090	.040	45.7	67.0	68.3
100	.050	46.9	71.2	74.4
110	.060	46.4	72.8	78.9
120	.070	45.7	72.5	81.8
130	.080	45.1	70.8	84.0
140	.090	44.4	68.9	85.7
150	.100	43.5	67.6	86.6
160	.110	42.8	66.7	87.3
170	.120	42.5	66.0	87.6
180	.130	41.5	65.3	88.6
190	.140	40.6	64.7	88.6
200	.150	40.3	64.7	88.9
210	.160	39.9	63.8	88.9
220	.170	39.6	63.4	88.9
230	.180	39.3	63.1	88.9
240	.190	39.0	62.5	88.9
250	.200	38.6	62.1	88.6
260	.210	38.3	61.8	88.2
270	.220	38.0	61.5	88.2
280	.230	37.7	61.2	87.9
290	.240	37.4	60.9	87.9
300	.250	37.4	60.5	87.6

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

#7 Modified

SOIL SAMPLE So. Power Co.

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO.

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_0, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. CBP Mod [illegible]

DATE 7-3-78

TESTED BY

SCALE LOAD

APPLIED LOAD lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	66	1			57
WT. CONTAINER + WET SOIL IN g	81.17	150.01			88.55
WT. CONTAINER + DRY SOIL IN g	67.86				74.69
WT. WATER, W_w, IN g	13.31				13.86
WT. CONTAINER IN g	14.25				14.07
WT. DRY SOIL, W_s, IN g	53.61	120.20			60.62
WATER CONTENT, w, IN %	24.8				22.9

222.74
72.73

200

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	212	.000	0	0	
	212	.005 27	39	12.6	
	212	.010 24	69	22.2	
	213	.020 38	107	34.5	
	212	.030 32	129	41.5	
	211	.040 30	142	45.7	
	210	.050 28	144	46.4	
	209	.060 27	144	46.4	
	208	.070 25	142	45.7	
	207	.080 26	140	45.1	
	207	.090 25	138	44.4	
	208	.100 25	135	43.5	
	208	.110 27	133	42.8	
	208	.120 26	132	42.5	
	208	.130 26	129	41.5	
	207	.140 25	126	40.6	
	206	.150 26	125	40.3	
	206	.160 25	124	39.9	
	205	.170 25	123	39.6	
	205	.180 27	122	39.3	
	204	.190 27	121	39.0	
	204	.200 25	120	38.6	
	203	.210 27	119	38.3	
	203	.220 25	118	38.0	
	202	.230 26	117	37.7	
	202	.240 25	116	37.4	
	201	.250 28	116	37.4	

REMARKS

SOIL TEST INCORPORATED • 2205 LEE STREET • EVANSTON, ILLINOIS, U.S.A.

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE Ga Power Co
LOCATION
BORING NO. SAMPLE DEPTH
SAMPLE NO.
SPECIFIC GRAVITY, G_s,
TYPE OF TEST

SOIL SAMPLE MEASUREMENTS
LENGTH
AREA, A_s, IN sq. ft.
THICKNESS
PROVING RING NO.
CALIBRATING FACTOR

TEST NO. CBR Mod Mid
DATE 7-3-78
TESTED BY
SCALE LOAD
APPLIED LOAD lbs. lbs/sq. ft.
TARE IN lbs.
SCALE LOAD IN lbs.

WATER CONTENT

226.52

SPECIMEN LOCATION					
CONTAINER NO.	18				54
WT. CONTAINER + WET SOIL IN g	87.43	153.79			105.34
WT. CONTAINER + DRY SOIL IN g	73.01				89.15
WT. WATER, W_w, IN g	14.42				17.19
WT. CONTAINER IN g	14.42				14.50
WT. DRY SOIL, W_s, IN g	58.59	123.43			74.65
WATER CONTENT, w, IN %	24.6				23.0

200 11:30 11:41

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	218	.000	0		
	219	.005 47	72	23.2	
	220	.010 26	112	36.1	
	220	.020 40	160	51.5	
	220	.030 33	188	60.5	
	220	.040 33	208	67.0	
	219	.050 31	221	71.2	
	218	.060 28	226	72.8	
	218	.070 27	225	72.5	
	218	.080 25	220	70.8	
	219	.090 26	214	68.9	
	219	.100 26	210	67.6	
	219	.110 26	207	66.7	
	219	.120 26	205	66.0	
	219	.130 26	203	65.3	
	219	.140 26	201	64.7	
	219	.150 26	201	64.7	
	219	.160 26	198	63.8	
	219	.170 27	197	63.4	
	218	.180 27	196	63.1	
	218	.190 26	194	62.5	
	218	.200 26	193	62.1	
	217	.210 26	192	61.8	
	217	.220 25	191	61.5	
	217	.230 26	190	61.2	
	217	.240 26	189	60.9	
	217	.250 26	188	60.5	

REMARKS

DS-12

SOIL MECHANICS LABORATORY

DIRECT SHEAR ON COHESIVE SOIL

SOIL SAMPLE Ga Power Co

LOCATION

BORING NO. SAMPLE DEPTH

SAMPLE NO.

SPECIFIC GRAVITY, G_s,

TYPE OF TEST

SOIL SAMPLE MEASUREMENTS

LENGTH

AREA, A_c, IN sq. ft.

THICKNESS

PROVING RING NO.

CALIBRATING FACTOR

TEST NO. CBR Mod Bottom

DATE

TESTED BY

SCALE LOAD

APPLIED LOAD lbs. lbs/sq. ft.

TARE IN lbs.

SCALE LOAD IN lbs.

WATER CONTENT

SPECIMEN LOCATION					
CONTAINER NO.	68				45
WT. CONTAINER + WET SOIL IN g	98.21	151.40			76.43
WT. CONTAINER + DRY SOIL IN g	80.12				62.94
WT. WATER, W_w, IN g	18.09				13.49
WT. CONTAINER IN g	14.52				13.90
WT. DRY SOIL, W_s, IN g	65.60	118.6			49.04
WATER CONTENT, w, IN %	27.6				27.5

224.13

200 12:25

ELAPSED TIME IN min.	SHEAR DIAL IN in.	SHEAR DISPLACEMENT IN in.	PROVING RING DIAL IN .0001 in.	SHEAR FORCE IN lbs.	SHEAR STRESS, τ, IN lbs./sq. ft.
	242	.000	0		
	243	.005	71	22.9	
	245	.010 23	106	34.1	
	246	.020 40	156	50.2	
	247	.030 35	188	60.5	
	248	.040 32	212	68.3	
	249	.050 32	231	74.4	
	250	.060 30	245	78.9	
	252	.070 29	254	81.8	
	253	.080 28	261	84.0	
	255	.090 27	266	85.7	
	256	.100 27	269	86.6	
	256	.110 27	271	87.3	
	257	.120 26	272	87.6	
	257	.130 27	275	88.6	
	257	.140 26	275	88.6	
	257	.150 27	276	88.9	
	257	.160 25	276	88.9	
	257	.170 27	276	88.9	
	257	.180 26	276	88.9	
	257	.190 27	276	88.9	
	257	.200 26	275	88.6	
	257	.210 25	274	88.2	
	257	.220 25	274	88.2	
	257	.230 26	273	87.9	
	257	.240 25	273	87.9	
	257	.250 25	272	87.6	

REMARKS

Appendix A2

Final Cover Settlement Analysis

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Appendix A2

AECOM

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**1** of **17**
Description	**Geotechnical Calculations**	Computed by	**LL**	Date	**10/30/18**
	Settlement Analysis	Checked by	**VKG**	Date	**11/8/18**

This calculation package summarizes the settlement analyses of the final cover system subgrade in support of the Ash Pond Closure at Georgia Power's Plant Scherer. Figures, calculations and computer program outputs are provided as attachments and are referenced herein.

I. Objective

The proposed closure plan of the Plant Scherer ash pond will require reshaping and relocating materials to a consolidated footprint. To do this, materials from the closure by removal area will be relocated within the consolidated footprint and Sluiced Ash material will be graded to improve drainage and receive a final cover system.

The objective of this analysis is to evaluate the potential for settlement of the proposed final cover system in support of the closure plan for the Ash Pond at Georgia Power's Plant Scherer in Monroe County, Georgia. The intent is to evaluate the potential for settlement and verify that positive drainage will likely remain after settlement occurs.

The following sections summarize the methodology, assumptions, and results of the one-dimensional settlement analysis. For further detail on the specific calculations performed, refer to the corresponding data provided in the attachments.

II. Site Background

Plant Scherer is located in Juliette, Georgia which is situated at the northeast edge of Monroe County and approximately 30 miles north of Macon and 70 miles south of Atlanta. Plant Scherer occupies approximately 12,000 acres and is situated on the north banks of the 3,600-acre Lake Juliette, a manmade lake constructed in conjunction with the plant in the early 1980s. Plant Scherer is a four-unit, coal-fired power generation facility that is one of the nation's largest power plants, with a capacity of 3,600 megawatts. Plant Scherer has been in service since 1982 and is capable of supplying energy to 1.5 million homes.

The existing ash pond at Plant Scherer was commissioned in 1980 and has received and stored wet sluiced Sluiced Ash since the plant became commercially operational in 1982. The ash pond has two discharge structures; one is a "morning-glory" standpipe that normally passes decanted flows to the recycling pond, and a second emergency spillway that also discharges to the recycling pond during elevated (storm related) pool levels. In addition to receiving wet sluiced Sluiced Ash, the ash pond also received wastewater influent from the Plant.

The Plant Scherer ash pond was constructed directly over Berry Creek, with the tallest dike section built just east of a major branch in the creek. Additional branches or drainage tributaries to Berry Creek have developed as a result of site drainage features being modified from the ash pond construction.

The ash pond includes two embankments functioning as cross-valley dams. These include the ash pond dike, situated on the north and east sides of the ash pond and the ash pond south dike, situated on the south side of the ash pond and bordering Plant Scherer. The ash pond dike has a maximum height of approximately 100 feet and the ash pond south dike has a maximum height of approximately 30 feet. The minimum crest elevation of both dikes is El. 504.1 ft, and the upstream slopes are covered with a grout-filled erosion protection blanket. The crests of both dikes are surfaced with grass and a gravel access drive. Downstream slopes are covered with grass, and both upstream and downstream slopes are at a 3H:1V (horizontal to vertical) orientation. Both ash pond dikes are regulated by the Georgia Department of Natural

Resources Safe Dams Program, and are categorized as "High Hazard Category 1", and have been assigned State ID 102-032-04236 (AECOM, 2016).

An Initial Written Closure Plan authored by Georgia Power Company dated October 17, 2016 indicates the Plant Scherer ash pond will be closed by consolidating the Sluiced Ash within the 553 acre ash pond to a smaller footprint in accordance with 257.102(b)(1)(iii). Based on this document and guidance from GPC, AECOM has proceeded with implementing design support for a consolidated closure footprint. The proposed closure footprint will consist of two primary regions within the existing ash pond footprint; a closure by removal region located in the northern area and the consolidated in-place closure area. The two proposed regions will be separated by a new northern embankment berm that will buttress the consolidated ash materials within the consolidated closure footprint.

III. Summary of Subsurface Conditions

The settlement calculations are based on the results of the historic subsurface explorations performed at the facility. Based on AECOM's review of the historic subsurface explorations, six stratigraphic materials were identified at the site. These include:

- **Embankment fill** consisting of compacted onsite fill materials, which are assumed to originate from residual soils excavated from in and around the current ash pond. Fill depths vary based on location. Highest fills are up to 100 ft at the maximum height of the ash pond dike to a nominal thickness near the toe of the ash pond dike. Fill materials generally consist of stiff to very stiff elastic silt (MH) with a trace of sand and mica. Some isolated zones of fat clay (CH) and lean clay (CL) were identified as well. Both SPT and CPT penetration resistances indicate that the embankment fill is relatively uniform across the site, with typical SPT N-values of around 15 blows per foot and CPT tip resistances of around 30 tons per square foot. This is indicative of a well-compacted material with good compaction control during construction.
- **Sluiced Ash** consisting primarily of sluiced ash, with a mixture of fly ash and bottom ash present in the uppermost 5 to 10 ft of the pond. Maximum Sluiced Ash thickness encountered outside the ash delta at the bottom of the ash pond was 1.6 feet while the Sluiced Ash was found to be 1 foot or less in nearly all areas of free water. Within the ash delta, the Sluiced Ash ranged from 68 to 83.5 feet thick. Sluiced Ash was not encountered in the ash pond embankment dike borings. Based on field and laboratory testing, the Sluiced Ash generally consists of a very loose nonplastic silt (ML), with some isolated zones of medium dense material or silty sand (SM). SPT values were typically weight-of-hammer or weight-of-rods, and CPT tip resistances were on the order of 10 to 20 tsf. Both the CPTs and the SPTs identified a higher-strength crust over the top of the Sluiced Ash, extending to approximately 10 feet below grade. The crust likely corresponds to desiccated or mechanically-stacked Sluiced Ash, relative to the saturated sluiced Sluiced Ash present at depth.
- **Alluvium** consisting of residual soils that were eroded and redeposited along historic creek channels that originally flowed beneath the current footprint of the ash pond. Where encountered, alluvium thicknesses were typically around 5 ft. Based on field and laboratory testing, the alluvium materials are variable in nature but generally consist of very soft to medium stiff lean clay (CL) and fat clay (CH) and very loose to medium dense, silty sand (SM) and clayey sand (SC). SPT and CPT penetration resistances are highly variable due to the variations in soil type, location, and the depositional environment where the soil was formed.

- **Residuum** consisting of residual soils developed by the in-place weathering of the parent metamorphic bedrock exhibiting a reddish brown soil with a trace of sand and mica content. This material was not encountered in the ash delta borings, where it had likely been eroded away. Where encountered, the residuum thickness varied significantly from 18.2 feet to 3 feet. Based on field and laboratory testing, the residuum generally consists of sandy medium stiff to very stiff elastic silt (MH) with trace mica although in some of the ash pond borings, the residuum encountered was sometimes soft to very soft, rather than stiff. CPT tip resistances were typically on the order of 30 to 50 tsf while a zone of approximately 20 tsf material was noted in the sounding near the north end of the dike between approximately 55 and 70 feet below grade.
- **Saprolite** consisting of very loose to very dense silty sand (SM) with mica or soft to stiff sandy silt (ML) with mica although some zones of sandy clay (CL) were also identified. Saprolite was encountered in nearly all the borings/soundings but the depth is difficult to assess accurately due to the difficulty in distinguishing between it and the residuum material. Where encountered and classified, the saprolite thickness varied significantly from 27 to 6 feet.
- **Partially Weathered Rock (PWR)** consisting of slightly or moderately weathered parent bedrock (gneiss). The material is distinguished from saprolite by SPT N-values that are 50 blows per foot or higher partially weathered rock was encountered in nearly all the borings/soundings where the drilling went reasonably deep. Many historical penetrations considered encountered PWR as refusal though in some areas, auger drilling was successfully able to penetrate the partially weathered rock for up to 15.7 feet prior to auger refusal. Based on field and laboratory testing, the partially weathered rock generally classified as very dense silty sand (SM) with mica, feldspar, and gravel. SPT N-values were 50 blows per foot or higher, and CPT tip resistances were on the order of 200 tsf or higher.
- **Groundwater** table was anticipated to be lowered prior to construction. A 15-ft dewatering based on the current pool level (i.e. EL. 494.5ft) was assumed before any construction work. However, based on the previous engineering experience, groundwater will not dissipate quickly in Ash right after dewatering. Therefore, one third of the total dewatering height, i.e. 5ft, was conservatively assumed as the initial groundwater table in the current settlement analysis.

For a description and additional information pertaining to the historic subsurface explorations and the laboratory testing performed, refer to **Appendix A1** of the Engineering Report.

IV. Methodology

The proposed ash fill and capping materials will introduce a surcharge load to the Sluiced Ash and underlying alluvial foundation soils following placement. The Sluiced Ash and alluvial soils are anticipated to have moderate to high compressibility. Induced post-closure settlement due to placement of ash fill for grading and cap construction can alter the as-constructed cap grades. Settlement calculations were conducted to evaluate the degree of differential settlement expected along the surface water drainage features designed for final cover.

Traditional settlement calculations consist of three parts: immediate or elastic compression, primary consolidation, and secondary compression.

Immediate Settlement

Immediate (aka elastic) settlement generally takes place as the load is applied or within a time period of about 7 days and predominates in cohesionless soils and unsaturated clay. Immediate settlement occurs through reduction of void space by expulsion of air. Immediate settlement usually isn't calculated for fine grain materials that have a degree of saturation of approximately 90% or more.

Foundation materials soil materials at the site are generally close to saturation and for purposes of this analysis are assumed to be saturated; therefore, immediate settlement is neglected for this analysis for those materials.

Because stacked Sluiced Ash materials are generally much less than 90% saturated, the majority of settlement within the unsaturated Sluiced Ash materials will occur during placement and construction during closure and will not affect settlement of the cover system. However, it may be necessary to add small amounts of material in areas with deep fills prior to the installation of the final closure system to account for this short-term settlement.

Although there is not a lot of research associated with settlement of saturated coal combustion residuals, it has been shown that settlement of saturated sluiced ash can be accurately modeled with traditional one-dimension consolidation theory (Reeves and Rowland, 2013). Settlement potential in saturated ash was therefore evaluated assuming consolidation settlement methods.

Primary Consolidation

Of the three contributors, primary consolidation accounts for the majority of settlement in most foundation situations. For fine grained soils, primary consolidation involves the expulsion of water from the pore spaces resulting in a volume reduction as the soil particles rearrange themselves to form a denser configuration. This process is controlled by the hydraulic conductivity of the material and can therefore take a long period of time for fine grained materials.

During closure, by applying the final cover surcharge load to the surface of the stacked ash, the load is initially supported by a combination of the material structure and pore water of the underlying materials, and no consolidation or settlement takes place. In saturated or nearly saturated conditions, the load creates excess pore water pressure which dissipates over time as the water is expelled from the material matrix resulting in settlement at the surface. The amount of settlement and the time rate to remove the porewater and to decrease the volume of the sluiced ash depends on the stress applied by the surcharge load, the permeability of the sluiced ash, and the drainage conditions beneath and near the surcharge load. Consolidation settlement is responsible for nearly all the total settlement, and it is the focus of this preliminary analysis. Evaluating this kind of settlement is performed using one-dimensional consolidation theory summarized in the next section.

Secondary Compression

Secondary compression occurs through volume changes as in primary consolidation except that it occurs at a much slower rate and occurs via creep through crushing of inter-granular particles. This type of settlement occurs at a constant effective stress (i.e. once the excess pore water is dispersed). Secondary compression is unlikely to contribute significantly (less than 5%) to the overall total settlement for inorganic soils under small surcharges such as a cover system. Because primary settlement can be estimated only within 10 to 20 percent accuracy and because the foundation and engineered components are somewhat tolerant of differential settlement, secondary settlement is neglected for this analysis.

The following sections summarize the theory considered while performing the settlement analysis:

- The following equation was used to estimate the primary consolidation settlement of Sluiced Ash materials and fine-grained native soils:

$$s_i = \frac{H_i C_c}{1+e_0} \log \frac{\sigma_0' + \Delta\sigma}{\sigma_p'}$$

  where,

  s_i = Computed settlement
  H_i = Layer Thickness
  C_c = Compression Index
  e_0 = Initial void ratio
  σ_0' = Effective overburden pressure at center of layer
  σ_p' = Effective pre-consolidation pressure
  $\Delta\sigma'$ = Additional stress at center of layer

- For native granular (sand) materials, Hough's Method was employed, as shown in the following equation.

$$\Delta H = H\left(\frac{1}{C'}\right)\log_{10}\frac{p_0 + \Delta p}{p_0}$$

  where,

  C' = Bearing Capacity Index
  H = Layer Thickness
  p_0 = Existing Effective Vertical Stress at Center of Layer
  Δp = Distributed Pressure from Load at Center of Layer

The relation between Bearing Capacity Index C' and Corrected SPT Value (N')* under Hough's Method is shown in **Figure 1.**

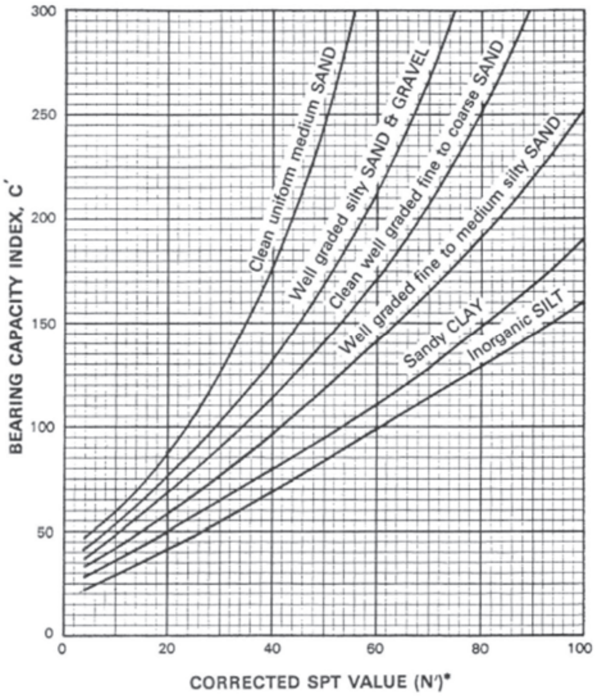


Figure - 1 Hough (1959) Bearing Capacity Index

Classical 1D (vertical) consolidation theory was used in the computations herein. For a vertically consolidating deposit, the proportion of consolidation that has taken place at a specific time after load application is given by the following equations:

$$t = \frac{T_v H_{dr}{}^2}{c_v} \qquad (1)$$

where,

t= time, T_v = time factor, H_{dr} =length of drainage path, c_v = coefficient of consolidation

The length of drainage path is taken as the full layer thickness herein.

The time factor is related to the percent of vertical consolidation by:

$$T_v = \frac{\pi}{4}\left(\frac{U_v\%}{100}\right)^2 \qquad U_v < 60\% \qquad (2)$$

$$T_v = 1.781 - 0.933\ \log(100 - U_v\%) \qquad 60\% < U_v < 100\%$$

where,

U_v% is the percent of vertical consolidation at time *t*

Combining (1) and (2), the percent consolidation of a given layer at time *t* is:

$$U_v\%(t) = 200\sqrt{\frac{c_v t}{\pi H_{dr}^2}} \qquad U_v < 60\% \qquad (3)$$

$$U_v\%(t) = 100 - 10^\wedge(1.9089 - 1.07\frac{c_v t}{H_{dr}^2}) \qquad 60\% < U_v < 100\%$$

V. Material Parameters

Soil properties for the settlement analyses were based on conservative values for the in-situ materials and laboratory and field testing where available.

Material properties and settlement parameters associated with each of the soil layers are shown below in **Table 1**.

Table 1. Material Properties for the Sluiced Ash Pond

Layer	*Unit Weight* *γ*(pcf)	*Initial Void Ratio* e_0	*Pc (psf)*	Recompression Index C_r	Compression Index C_c	Coefficient of consolidation C_v *(ft²/day)*
Sluiced Ash Materials	105	0.8	Normally Consolidated	0.02	0.2	1.079
Residuum	114	0.57	7800	0.05	0.25	--
Saprolite	105	0.57	7800	0.05	0.25	--

For purposes of this analysis, the Sluiced Ash material was assumed to be saturated and consolidated under its own weight and overburden stress applied by subsequent sluiced ash layers. It can therefore be assumed to be normally consolidated meaning the material has not been compressed to a higher degree in the past (the preconsolidation pressure) which would result in a lower settlement evaluation.

Compressibility parameters for the native alluvial clay and lower clay were established from available consolidation test data in these materials, interpreted using the classical Cassagrande construction. Coefficient of consolidation, c_v, was determined based on the laboratory consolidation testing data. Tests performed on undisturbed ash samples indicated an average value for the coefficient of consolidation of about 1.079 ft²/day. Other compressibility parameters C_c, C_r and P_c were estimated based on the results of laboratory consolidation tests and our engineering judgement.

For purposes of this analysis, the interface of residuum and saprolite was assumed to be consistent throughout the ash pond. The top of residuum and top of Sluiced Ash were determined by comparing historic ground surfaces to the existing grades. The layers used in the analyses were developed based on the borings and CPT's performed in 2015 and 2016 by SCS and in 2016 by AECOM. This includes borings B-100 through B-113 drilled inside and surrounding the Ash Pond.

The uppermost materials within the pond consist of coal combustion residuals. The Sluiced Ash materials were underlain by residuum to a depth of 426.6 ft-msl. Saprolite was present below the residuum and extended to an elevation of 404.9 ft-msl. Partially weathered rock was encountered below the saprolite and the bedrock is considered to have little to no compressibility by inspection. The initial groundwater level was set to 489.5 ft-msl, i.e. 5 ft below current pond level, to account for anticipated construction dewatering activities. Each point analyzed utilized these soil layers up to the current grade.

VI. Analysis Procedure

Significant long-term settlement can lead to grade reversals and ponding on the final cover system. Since the section grades are relatively flat (i.e. 0.5% for Section D-D' and Section S3-S3', and 3.0% for Section S2-S2'), an understanding of the magnitude of post-construction differential settlement and their effect on post-construction slopes of the ditches is necessary.

Three separate surface water drainage paths along the cap were analyzed as depicted in **Figure 1**. Settlement analyses were performed at a number of discrete point locations along each section, which collectively form a settlement profile of the section. Section D-D' runs from the west side to the east side of the pond. Twenty-four (24) points S1-1 through S1-24 were analyzed along this section. Cross Section S2-S2' represents sheet flow traveling north toward the proposed berm. Ten points S2-1 through S2-10 were analyzed along this section. Section S3-S3' begins near the initial point of S2-1 and extends from west to east of the pond. Seven points S3-1 through S3-7 were analyzed along this section.

Settlement points along each section were initially chosen at 200 to 300-foot intervals, and additional points were added where the elevation of the existing ground changes dramatically, resulting in a large variation of future surcharge loads over a shorter distance.

Surcharge loading from the closure fill and cap system was calculated for each settlement point for each section analyzed. At any settlement point location, if the existing grade is below the top of the proposed cover system, ash from outside of the closure cap area will be used as a fill material and applied as a surcharge load. The surcharge was calculated as the difference between the proposed and existing grades, multiplied by an assumed unit weight of the closure fill of 105pcf. Separate calculations were performed for settlement that could occur due to changes in effective stress associated with a lowering of the phreatic surface in the pond, over the long term after closure. The settlement analyses for phreatic surface lowering were performed assuming the following:

- The existing pool level (and phreatic surface) in the pond is El. 494.5 ft.
- Construction of the closure-in-place area will require some construction dewatering, in order to provide equipment access and to improve subgrades for filling activities. It is assumed that the phreatic surface will be initially lowered by 15 ft (to El. 479.5 ft) during construction. As the closure fill is placed and the separation of the ground surface and the phreatic surface becomes substantial, construction dewatering is likely to be reduced and eventually completely stopped. Since the phreatic surface (initially lowered to El. 479.5 ft) could be recharged to some degree in the period between the completion of dewatering activities and the completion of cap construction, for settlement analysis purposes it is conservatively assumed that the subsurface Sluiced Ash deposits will only consolidate to an effective phreatic surface at El. 489.5 ft, as a result of construction dewatering.
- The long term phreatic surface has been estimated using hydrogeologic analyses (see separate presentation within this permit submittal). Contours of this long-term surface are provided in **Figure A-2** of **Attachment A**. The long-term settlement due to the phreatic surface drop was calculated

assuming a lowering of the phreatic surface from El. 489.5 (as described above), to the long-term lowered surface. The magnitude of the drop was estimated for each settlement analysis point, based on the contours in **Figure A-2**.

It is noted that only Long Term Settlement will contribute to permanent slope changes of the cap system. Therefore, it is necessary to calculate and differentiate short-term settlement (settlement that occurs as the project is being constructed) and long-term settlement (settlement that occurs after the cap is completed). These components are further defined as follows:

1. *Short-Term Settlement (During Construction):* This is the estimated settlement anticipated to occur in the ash and residual soils upon completion of grading activities and prior to completion of the 2-ft cap system. For analysis purposes, these activities are assumed to have a duration of 12 months (1 year), so short-term settlement is movement that occurs within this timeframe. Short term settlements will not influence the final slopes of the cap system, as it is assumed that fill materials will be placed to make up any of this settlement, prior to constructing the cap system.

   Short term settlement was defined as:

   - Consolidation settlement of the Sluiced Ash deposits, which occur within the 12 month period. The short-term settlement magnitude for Sluiced Ash was based on the classical time rate of settlement analysis, using the coefficient of consolidation values from lab testing data. It was conservatively assumed that no settlement of the native soils below the Sluiced Ash deposits would occur in the short term.

2. *Long-Term Settlement (Post-Construction):* This is the long-term settlement of the cap system that occurs after closure construction is complete. Long-term settlement will influence the final slopes of the cap system. Long-Term Settlement includes:

   - Consolidation settlement in the Sluiced Ash deposits which occur after the initial 12 month period.
   - All the settlement predicted in the native soils below the Sluiced Ash.
   - Settlement that occurs due to the long term drop in the pond's phreatic surface, as defined previously.

In some locations, the proposed cover system grade is lower than the existing grade – i.e., there will be a net unload rather than a surcharge. In these locations, the ash was assumed to be normally consolidated to the existing grade conditions. The short term settlement for these cases was zero, and for subsequent long term settlement calculations, the stress increases contributing to settlement were reduced by the amount of the "unload" pressures.

All settlement calculations were performed using in-house spreadsheets developed by AECOM that were programmed to utilize the settlement analysis methodology presented above.

Finally, the results of the settlement analyses were used to estimate changes in the slopes of the cover system, as follows:

- The point-to-point change in slope of the sectional profile was determined at each settlement point as follows:

%Change = ($\Delta_{PC,\ n+1}$ - $\Delta_{PC,\ n}$) / L *100

where,

$\Delta_{PC,\ n+1}$ = Long Term Settlement at point n+1

$\Delta_{PC,\ n}$ = Long Term Settlement at point n

L = Distance between point n and point n+1

VII. Results of Analysis

Spreadsheet outputs showing the points analyzed, the differential settlement between points, and post-closure grades calculated along each ditch profile are provided in **Table B-1** through **B-3** of **Attachment B.** Example calculations of settlement and time rate of settlement are provided for one settlement point (Point S3-4 for Section S3-S3') in **Attachment C.**

Time Rate of Settlement

Table 2a through 2c below summarizes the anticipated consolidation rate of the Ash and Native Clay during construction, in which 2-yr construction period was conservatively assumed. Ash is underlain by native clay. Therefore, single drainage condition was assumed to the Sluiced Ash.

Appendix A2

AECOM

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**11** of **17**
Description	**Geotechnical Calculations**	Computed by	**LL**	Date	**10/30/18**
	Settlement Analysis	Checked by	**VKG**	Date	**11/8/18**

Table 2a: Time Rate of Consolidation During Construction – Section D-D'

Settlement Points	Station (ft)	Thickness of Sluiced Ash (ft)	% Consolidation at 365 days	% Consolidation at 730 days
			Sluiced Ash (%)	Sluiced Ash (%)
S1-1	3+40	0	--	--
S1-2	4+00	0	--	--
S1-3	6+00	0	--	--
S1-4	8+00	0	--	--
S1-5	10+00	0	--	--
S1-6	12+00	0	--	--
S1-7	13+45	0	--	--
S1-8	16+00	0	--	--
S1-9	16+60	4.7	100	100
S1-10	18+00	2.3	100	100
S1-11	20+00	0	--	--
S1-12	22+00	7.3	100	100
S1-13	24+30	19.5	94	100
S1-14	26+00	26.6	79	95
S1-15	28+00	34.6	64	84
S1-16	30+00	42.6	53	72
S1-17	32+00	52.6	43	60
S1-18	33+60	63.8	35	50
S1-19	35+10	63	36	50
S1-20	38+00	16.6	98	100
S1-21	40+00	33.6	66	86
S1-22	41+10	42	53	73
S1-23	44+00	19	95	100
S1-24	45+60	24.9	83	96

Table 2b: Time Rate of Consolidation During Construction – Section S2-S2'

Settlement Points	Station (ft)	Thickness of Sluiced Ash (ft)	% Consolidation at 365 days	% Consolidation at 730 days
			Sluiced Ash (%)	Sluiced Ash (%)
S2-1	0+00	16.1	98	100
S2-2	2+00	9.11	100	100
S2-3	4+00	9.01	100	100
S2-4	4+90	13.01	100	100
S2-5	6+00	0.6	100	100
S2-6	8+00	0	--	--
S2-7	10+00	0	--	--
S2-8	11+35	6.42	100	100
S2-9	12+45	5.87	100	100
S2-10	13+00	1	100	100

Table 2c: Time Rate of Consolidation During Construction – Section S3-S3'

Settlement Points	Station (ft)	Thickness of Sluiced Ash (ft)	% Consolidation at 365 days	% Consolidation at 730 days
			Sluiced Ash (%)	Sluiced Ash (%)
S3-1	0+00	33.21	66	86
S3-2	2+00	35.08	63	83
S3-3	4+00	46.92	48	66
S3-4	7+00	77	29	41
S3-5	10+00	76.94	29	41
S3-6	12+00	64.14	35	49
S3-7	15+13	59.31	38	53

The percent of consolidation occurring during construction is greatest at Sections S2-S2’, because the thickness of the Sluiced Ash deposits is relatively small at these sections. At Section D-D and S3-S3’, where the Sluiced Ash thickness is substantial (ranging from 2.3 to 77 ft), a far greater proportion of consolidation is predicted to take place after construction.

Estimated Settlements (Short-Term and Long-Term)

Total settlement calculation results are provided in **Table 3a through 3c** below and in **Attachment B**.

The columns in the tables portray the following:

- Column (1) represents the total settlement predicted due to the surcharge load of the closure fill and cap.

- Column (2) is the total settlement in the Sluiced Ash deposit due to the surcharge load of the closure fill and cap.
- Column (3) is the percent of consolidation in the Sluiced Ash deposit that is expected during the assumed 12-month construction period
- Column (4) is the short term settlement in the Sluiced Ash deposit – i.e., Column (2) multiplied by Column (3).
- Column (5) is the total predicted long term settlement due to the surcharge load of the closure fill and cap – i.e., Column (1) – Column (4)
- Column (6) is the total predicted settlement due to long-term drop in the phreatic surface.
- Column (7) is the total predicted long term settlement due to both surcharge from the closure fill and long-term drop in the phreatic surface – i.e. Column (5) + Column (6).

Table 3a. Results for Settlement for Cross Section D-D’

		Computed Settlement										
Settlement Points	**Station (ft)**	**(1) Calculated Total Settlement (in)**	**(2) Calculated Ash Settlement (in)**	**(3) Percent of Consolidation in the Sluiced Ash at 1-yr period**	**(4) Short-Term Settlement During Construction (within 1 year) (in)**	**(5) = (1) - (4) Long Term Settlement after 1 year (in)**	**(6) Settlement Due to Groundwater Drawdown (in)**	**(7) = (5) + (6) Total Long-Term Settlement (in)**	**Differential Settlement (in)**	**Slope Change (%)**	**Design Slope Grade (%)**	**Post-Construction Slope Grade (%)**
S1-1	3+40	6.8	0.0	100%	0.0	6.8	1.5	8.3	-	-	-	-
S1-2	4+00	7.5	0.0	100%	0.0	7.5	0.8	8.3	0.0	0.00	-0.5	-0.50
S1-3	6+00	5.8	0.0	100%	0.0	5.8	3.1	8.9	0.6	0.03	-0.5	-0.48
S1-4	8+00	1.4	0.0	100%	0.0	1.4	2.4	3.8	-5.1	-0.21	-0.5	-0.71
S1-5	10+00	0.0	0.0	100%	0.0	0.0	2.6	2.6	-1.2	-0.05	-0.5	-0.55
S1-6	12+00	0.0	0.0	100%	0.0	0.0	2.9	2.9	0.3	0.01	-0.5	-0.49
S1-7	13+45	2.1	0.0	100%	0.0	2.1	3.3	5.4	2.5	0.14	-0.5	-0.36
S1-8	16+00	2.0	0.0	100%	0.0	2.0	3.6	5.6	0.2	0.01	-0.5	-0.49
S1-9	16+60	4.0	2.3	100%	2.3	1.7	3.6	5.3	-0.3	-0.04	-0.5	-0.54
S1-10	18+00	3.5	1.7	100%	1.7	1.8	3.8	5.6	0.3	0.02	-0.5	-0.48
S1-11	20+00	1.9	0.0	100%	0.0	1.9	3.8	5.7	0.1	0.00	-0.5	-0.50
S1-12	22+00	4.1	2.7	100%	2.7	1.4	3.9	5.3	-0.4	-0.02	-0.5	-0.52
S1-13	24+30	1.4	0.4	94%	0.4	1.0	4.1	5.1	-0.2	-0.01	-0.5	-0.51
S1-14	26+00	1.3	0.4	79%	0.3	1.0	4.3	5.3	0.2	0.01	0.5	0.51
S1-15	28+00	1.2	0.5	64%	0.3	0.9	4.2	5.1	-0.2	-0.01	0.5	0.49
S1-16	30+00	1.2	0.6	53%	0.3	0.9	4.7	5.6	0.5	0.02	0.5	0.52
S1-17	32+00	1.1	0.6	43%	0.3	0.8	8.2	9.0	3.5	0.14	0.5	0.64
S1-18	33+60	1.0	0.7	35%	0.2	0.8	9.5	10.3	1.2	0.06	0.5	0.56
S1-19	35+10	1.9	0.7	36%	0.3	1.6	9.4	11.0	0.8	0.04	0.5	0.54
S1-20	38+00	1.7	0.5	98%	0.5	1.2	6.0	7.2	-3.8	-0.11	0.5	0.39
S1-21	40+00	1.5	0.7	66%	0.5	1.0	5.7	6.7	-0.5	-0.02	0.5	0.48
S1-22	41+10	1.5	0.9	53%	0.5	1.0	6.1	7.1	0.4	0.03	0.5	0.53
S1-23	44+00	1.9	0.7	95%	0.7	1.2	6.4	7.6	0.5	0.01	0.5	0.51
S1-24	45+60	1.8	0.8	83%	0.7	1.1	7.3	8.4	0.8	0.04	0.5	0.54

Table 3b. Results for Settlement for Cross Section S2-S2'

		Computed Settlement										
Settlement Points	Station (ft)	(1) Calculated Total Settlement (in)	(2) Calculated Ash Settlement (in)	(3) Percent of Consolidation in the Sluiced Ash at 1-yr period	(4) Short-Term Settlement During Construction (within 1 year) (in)	(5) = (1) - (4) Long Term Settlement after 1 year (in)	(6) Settlement Due to Groundwater Drawdown (in)	(7) = (5) + (6) Total Long-Term Settlement (in)	Differential Settlement (in)	Slope Change (%)	Design Slope Grade (%)	Post-Construction Slope Grade (%)
S2-1	0+00	16.2	11.2	98%	11.0	5.2	7.6	12.8	-	-	-	-
S2-2	2+00	9.6	5.9	100%	5.9	3.7	7.0	10.7	-2.1	-0.09	3.0	2.91
S2-3	4+00	4.0	2.7	100%	2.7	1.3	7.3	8.6	-2.1	-0.09	3.0	2.91
S2-4	4+90	2.2	1.6	100%	1.6	0.6	8.6	9.2	0.6	0.06	3.0	3.06
S2-5	6+00	13.2	1.8	100%	1.8	11.4	3.7	15.1	5.9	0.45	3.0	3.45
S2-6	8+00	12.1	0.0	100%	0.0	12.1	2.4	14.5	-0.6	-0.02	3.0	2.98
S2-7	10+00	11.3	0.0	100%	0.0	11.3	2.2	13.5	-1.0	-0.04	3.0	2.96
S2-8	11+35	18.3	10.8	100%	10.8	7.5	2.9	10.4	-3.1	-0.19	3.0	2.81
S2-9	12+45	15.2	9.3	100%	9.3	5.9	2.5	8.4	-2.0	-0.15	3.0	2.85
S2-10	13+00	7.8	2.4	100%	2.4	5.4	1.5	6.9	-1.5	-0.23	3.0	2.77

Table 3c. Results for Settlement for Cross Section S3-S3'

		Computed Settlement										
Settlement Points	Station (ft)	(1) Calculated Total Settlement (in)	(2) Calculated Ash Settlement (in)	(3) Percent of Consolidation in the Sluiced Ash at 1-yr period	(4) Short-Term Settlement During Construction (within 1 year) (in)	(5) = (1) - (4) Long Term Settlement after 1 year (in)	(6) Settlement Due to Groundwater Drawdown (in)	(7) = (5) + (6) Total Long-Term Settlement (in)	Differential Settlement (in)	Slope Change (%)	Design Slope Grade (%)	Post-Construction Slope Grade (%)
S3-1	0+00	12.2	10.4	66%	8.1	4.1	9.5	13.6	-	-	-	-
S3-2	2+00	11.4	9.8	63%	6.2	5.2	10.3	15.5	1.9	0.08	0.5	0.58
S3-3	4+00	10.3	9.3	48%	4.5	5.8	13.5	19.3	3.8	0.16	0.5	0.66
S3-4	7+00	10.0	9.7	29%	2.8	7.2	24.8	32.0	12.7	0.35	0.5	0.85
S3-5	10+00	6.6	6.4	29%	1.9	4.7	26.2	30.9	-1.0	-0.03	0.5	0.47
S3-6	12+00	4.9	4.7	35%	1.6	3.3	21.2	24.5	-6.5	-0.27	0.5	0.23
S3-7	15+13	0.7	0.7	38%	0.3	0.4	21.3	21.7	-2.7	-0.07	0.5	0.43

- _Section D-D’:_ The maximum short-term settlement at Section D-D’ upon completion of grading is anticipated to be about 2.7 inches (at Sta. 22+00 ft) as indicated in the figure of **Attachment B**. The maximum long-term settlement is about 11 inches at Sta. 35+10 ft), as shown in **Attachment B**.

- _Section S2-S2’:_ The estimated short-term and long-term settlement magnitudes for the Section S2-S2 are shown in **Attachment B**. The maximum short-term settlement is about 11.0 inches (at Sta. 0+00 ft) due to the 12.7 ft fill surcharge and the maximum long-term settlement is about 15 inches (at Sta. 6+00 ft).

- _Section S3-S3’:_ The maximum short-term settlement at Section S3-S3’ upon completion of grading is anticipated to be about 8.1 inches (at Sta. 0+00 ft) due to 6 ft fill surcharge as indicated in the figure of **Attachment B**. The maximum long-term settlement is about 32 inches at Sta. 7+00 ft, as shown in **Attachment B**.

Estimated Change in Slope Grade

The estimated change in slope along the design sections due to long-term settlement is summarized in **Tables B-1 through B-3** of **Attachment B**. A negative change in slope indicates that the settled grade will have a shallower slope than the as-deigned slope.

Table B-1 shows the estimated point-to-point change in slope at Section D-D’. The data indicates that much of the settled ditch will see an increase in slope rather than a decrease. Loss of slope occurs only in a few locations, with maximum slope loss of +0.14% (at Sta. 13+45 ft, east portion of Section D-D’ with a design slope of -0.5%) or -0.11% (at Sta. 38+00 ft, west portion of Section D-D’ with a design slope of 0.5%). The post-construction slope of the ditch ranges from -0.36% to -0.71% on the design slope of -0.5% side and from 0.39% to 0.64% on the design slope of 0.5% side, indicating that no grade reversals are expected and positive drainage will be maintained.

Results for Section S2-S2’ and S3-S3’ are similar, with maximum slope loss of -0.23% (at Sta. 13+00 ft of Section S2-S2’) and -0.27% (at Sta. 12+00 ft of Section S3-S3’). The post-construction slope of the two sections ranges from 2.77% to 3.45% and from 0.23% to 0.85% for Section S2-S2’ and Section S3-S3’, respectively. Again, these results indicate that no grade reversals are expected and positive drainage will be maintained.

VIII. Interpretation and recommendations

The results and conclusions of the settlement analysis are summarized as follows:

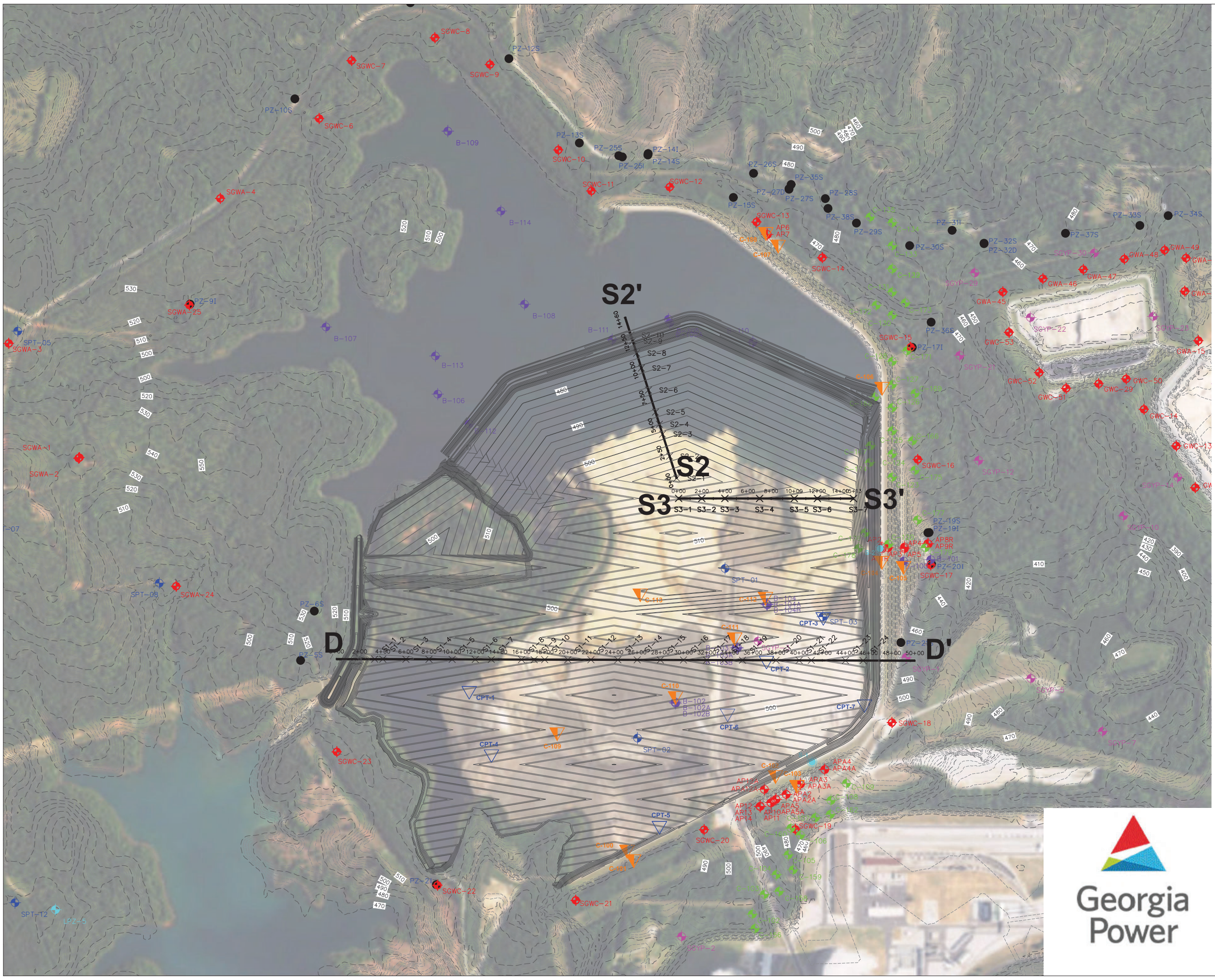
- The maximum negative change in slope (i.e. reduction in slope) is +0.14%, -0.23% and -0.27% for Section D-D’, S2-S2’ and S3-S3’, respectively. The majority of the lengths of both ditches are actually estimated to see increases in slope, rather than decreases. The design slopes are about 0.5% for both Section D-D’ and S3-S3’ and 3.0% for Section S2-S2’. Based on this result, the estimated negative change in slope indicated above is not expected to adversely impact the performance of the final cover.

- Given the results of the analysis, a formal preloading program or other settlement mitigation technique is not considered to be necessary. However, it is recommended that settlements be

ATTACHMENT A

Cross-Section Plan & Long-Term Phreatic Contour

C:\Lin\1 Project\61. Georgia Power\CAD\Cross Sections of Settlement and Slope Stability - Geotech - Final.dwg User:Lin.Li02 Oct 29, 2018 - 11:12am



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0 400 800
SCALE IN FEET

LEGEND

SGYP-7	EASTERN LANDFILL MONITORING WELL
SGWC-18	CCR MONITORING WELLS
C-156	1974 LAW ENGINEERING TESTING COMPANY BORINGS
AP9R	1985 GEORGIA POWER BORING
S-1	2010 SCS BORING LOCATION
LPZ-5	2015 GOLDER ASSOCIATES PIEZOMETER LOCATION
SPT-01	2015 SCS AS-BUILT SPT LOCATION
● PZ-29S	2015-2016 SCS PIEZOMETER LOCATION
C-113	2016 SCS CPT LOCATION
▽ CPT-7	2016 AECOM AS-BUILT CPT LOCATION
B-103	2016 AECOM AS-BUILD BORING LOCATION
——450——	PROPOSED MAJOR TOPO LINE
————	PROPOSED MINOR TOPO LINE
— — 450 — —	EXISTING MAJOR TOPO LINE
- - - - - -	EXISTING MINOR TOPO LINE

Georgia Power

CCR CLOSURE
FOR
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PLANT SHERER ASH POND 1
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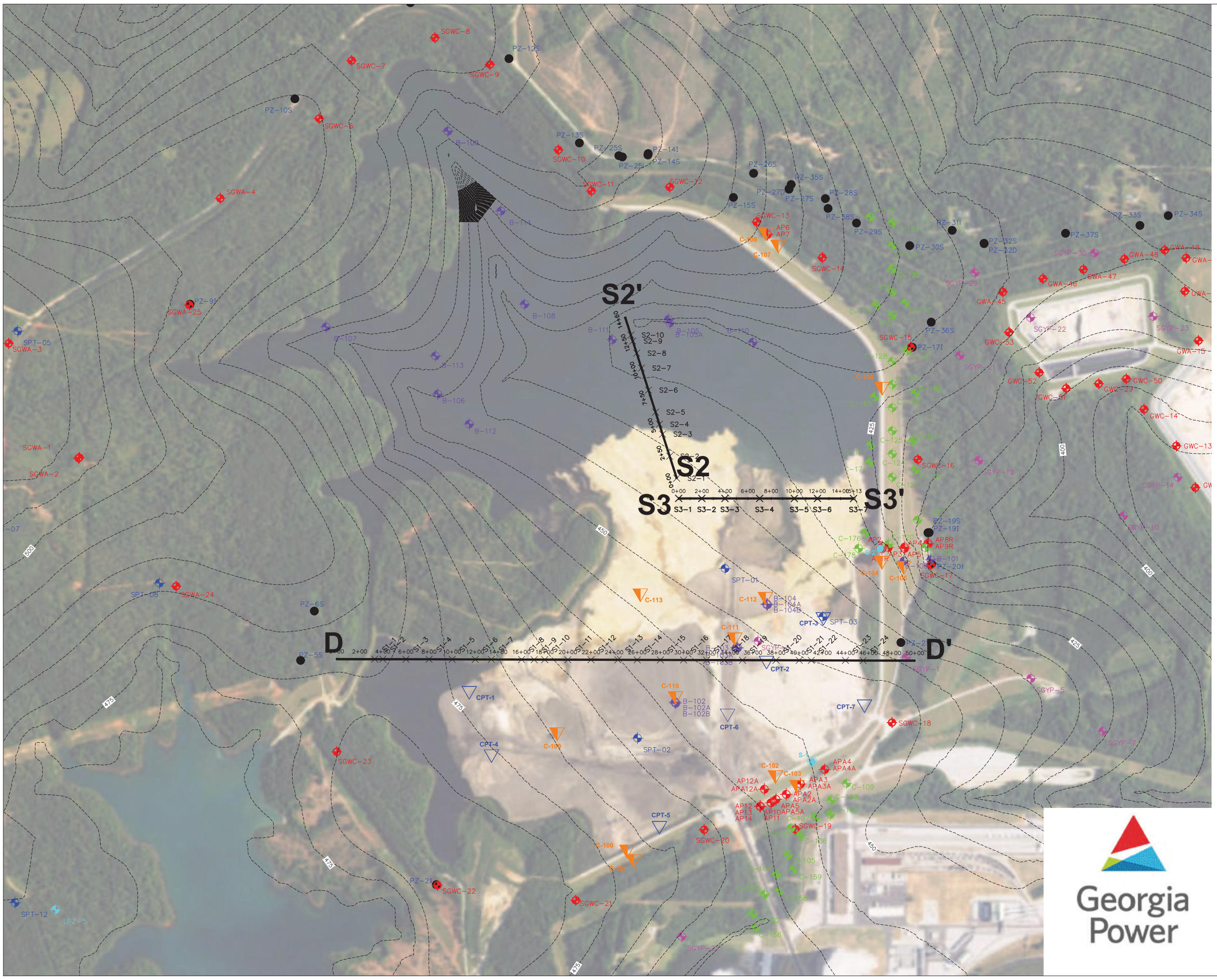
1600 PERIMETER PARK DRIVE
SUITE 400
MORRISVILLE, NC 27560

PROJ. NO.: 60563110	DWG. NA	EDIT Revision 0	
SCALE: 1" = 400'	SETTLEMENT FIGURE A-1		
DATE: JUNE 5, 2018			



LEGEND

⊕	SGYP−7	EASTERN LANDFILL MONITORING WELL
⊕	SGWC−18	CCR MONITORING WELLS
⊕	C−156	1974 LAW ENGINEERING TESTING COMPANY BORINGS
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●	PZ−29S	2015−2016 SCS PIEZOMETER LOCATION
▼	C-113	2016 SCS CPT LOCATION
▽	CPT-7	2016 AECOM AS−BUILT CPT LOCATION
⊕	B−103	2016 AECOM AS−BUILD BORING LOCATION
----------		CONTOURS OF LONG TERM PHREATIC SURFACE

N

0 400 800
SCALE IN FEET

CCR CLOSURE
FOR
GEORGIA POWER
PLANT SHERER ASH POND 1
MONROE COUNTY, GEORGIA

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SUITE 400
MORRISVILLE, NC 27560

PROJ. NO.: 60563110	DWG. NA	EDIT Revision 0	
SCALE: 1" = 400'	SETTLEMENT FIGURE A−2		
DATE: JUNE 5, 2018			

ATTACHMENT B

Settlement Calculations Results

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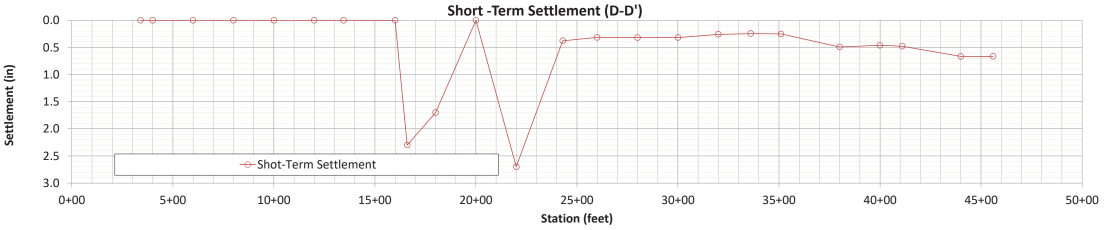
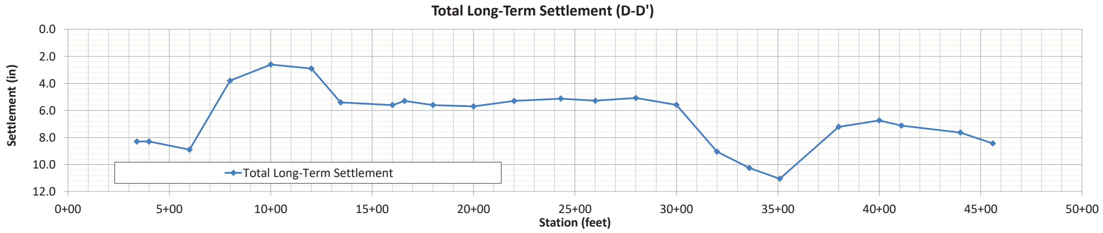
SETTLEMENT CALCULATIONS - Plant Scherer Pond Closure

Table B-1 : Short-Term and Long-Term Settlement Results at Section D-D'

		Computed Settlement										
Settlement Points	Station (ft)	(1) Calculated Total Settlement (in)	(2) Calculated Ash Settlement (in)	(3) Percent of Consolidation in the Sluiced Ash at 1-yr period	(4) Short-Term Settlement During Construction (within 1 year) (in)	(5) = (1) - (4) Long Term Settlement after 1 year (in)	(6) Settlement Due to Groundwater Drawdown (in)	(7) = (5) + (6) Total Long-Term Settlement (in)	Differential Settlement (in)	Slope Change (%)	Design Slope Grade (%)	Post-Construction Slope Grade (%)
S1-1	3+40	6.8	0.0	100%	0.0	6.8	1.5	8.3	-	-	-	-
S1-2	4+00	7.5	0.0	100%	0.0	7.5	0.8	8.3	0.0	0.00	-0.5	-0.50
S1-3	6+00	5.8	0.0	100%	0.0	5.8	3.1	8.9	0.6	0.03	-0.5	-0.48
S1-4	8+00	1.4	0.0	100%	0.0	1.4	2.4	3.8	-5.1	-0.21	-0.5	-0.71
S1-5	10+00	0.0	0.0	100%	0.0	0.0	2.6	2.6	-1.2	-0.05	-0.5	-0.55
S1-6	12+00	0.0	0.0	100%	0.0	0.0	2.9	2.9	0.3	0.01	-0.5	-0.49
S1-7	13+45	2.1	0.0	100%	0.0	2.1	3.3	5.4	2.5	0.14	-0.5	-0.36
S1-8	16+00	2.0	0.0	100%	0.0	2.0	3.6	5.6	0.2	0.01	-0.5	-0.49
S1-9	16+60	4.0	2.3	100%	2.3	1.7	3.6	5.3	-0.3	-0.04	-0.5	-0.54
S1-10	18+00	3.5	1.7	100%	1.7	1.8	3.8	5.6	0.3	0.02	-0.5	-0.48
S1-11	20+00	1.9	0.0	100%	0.0	1.9	3.8	5.7	0.1	0.00	-0.5	-0.50
S1-12	22+00	4.1	2.7	100%	2.7	1.4	3.9	5.3	-0.4	-0.02	-0.5	-0.52
S1-13	24+30	1.4	0.4	94%	0.4	1.0	4.1	5.1	-0.2	-0.01	-0.5	-0.51
S1-14	26+00	1.3	0.4	79%	0.3	1.0	4.3	5.3	0.2	0.01	0.5	0.51
S1-15	28+00	1.2	0.5	64%	0.3	0.9	4.2	5.1	-0.2	-0.01	0.5	0.49
S1-16	30+00	1.2	0.6	53%	0.3	0.9	4.7	5.6	0.5	0.02	0.5	0.52
S1-17	32+00	1.1	0.6	43%	0.3	0.8	8.2	9.0	3.5	0.14	0.5	0.64
S1-18	33+60	1.0	0.7	35%	0.2	0.8	9.5	10.3	1.2	0.06	0.5	0.56
S1-19	35+10	1.9	0.7	36%	0.3	1.6	9.4	11.0	0.8	0.04	0.5	0.54
S1-20	38+00	1.7	0.5	98%	0.5	1.2	6.0	7.2	-3.8	-0.11	0.5	0.39
S1-21	40+00	1.5	0.7	66%	0.5	1.0	5.7	6.7	-0.5	-0.02	0.5	0.48
S1-22	41+10	1.5	0.9	53%	0.5	1.0	6.1	7.1	0.4	0.03	0.5	0.53
S1-23	44+00	1.9	0.7	95%	0.7	1.2	6.4	7.6	0.5	0.01	0.5	0.51
S1-24	45+60	1.8	0.8	83%	0.7	1.1	7.3	8.4	0.8	0.04	0.5	0.54

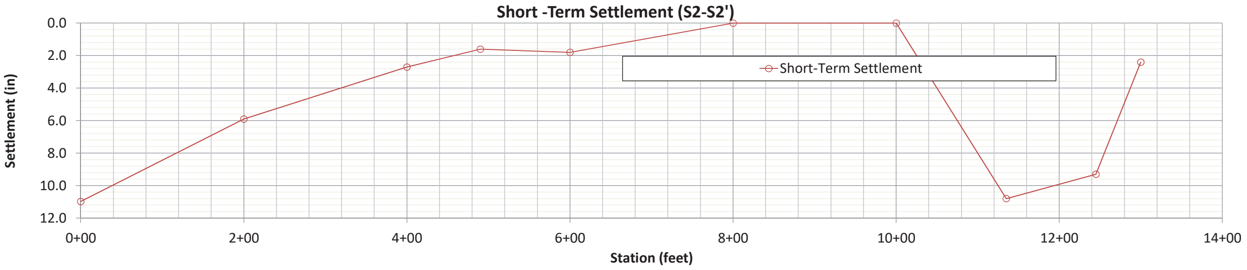


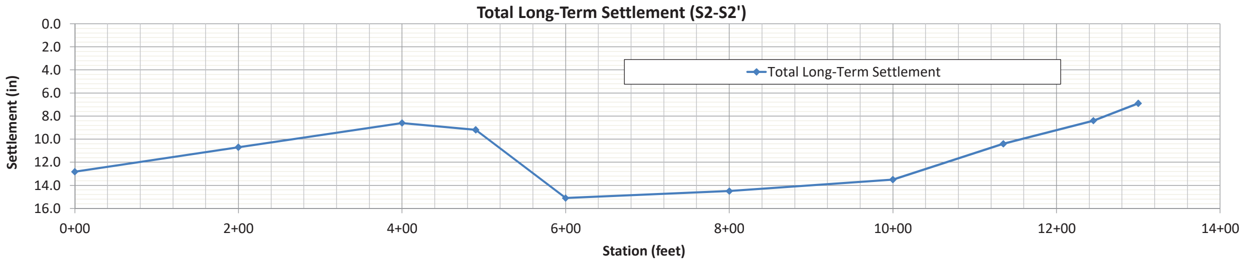


SETTLEMENT CALCULATIONS - Plant Scherer Pond Closure

Table B-2 : Short-Term and Long-Term Settlement Results at Section S2-S2'

Settlement Points	Station (ft)	Computed Settlement (1) Calculated Total Settlement (in)	(2) Calculated Ash Settlement (in)	(3) Percent of Consolidation in the Sluiced Ash at 1-yr period	(4) Short-Term Settlement During Construction (within 1 year) (in)	(5) = (1) - (4) Long Term Settlement after 1 year (in)	(6) Settlement Due to Groundwater Drawdown (in)	(7) = (5) + (6) Total Long-Term Settlement (in)	Differential Settlement (in)	Slope Change (%)	Design Slope Grade (%)	Post-Construction Slope Grade (%)
S2-1	0+00	16.2	11.2	98%	11.0	5.2	7.6	12.8	-	-	-	-
S2-2	2+00	9.6	5.9	100%	5.9	3.7	7.0	10.7	-2.1	-0.09	3.0	2.91
S2-3	4+00	4.0	2.7	100%	2.7	1.3	7.3	8.6	-2.1	-0.09	3.0	2.91
S2-4	4+90	2.2	1.6	100%	1.6	0.6	8.6	9.2	0.6	0.06	3.0	3.06
S2-5	6+00	13.2	1.8	100%	1.8	11.4	3.7	15.1	5.9	0.45	3.0	3.45
S2-6	8+00	12.1	0.0	100%	0.0	12.1	2.4	14.5	-0.6	-0.02	3.0	2.98
S2-7	10+00	11.3	0.0	100%	0.0	11.3	2.2	13.5	-1.0	-0.04	3.0	2.96
S2-8	11+35	18.3	10.8	100%	10.8	7.5	2.9	10.4	-3.1	-0.19	3.0	2.81
S2-9	12+45	15.2	9.3	100%	9.3	5.9	2.5	8.4	-2.0	-0.15	3.0	2.85
S2-10	13+00	7.8	2.4	100%	2.4	5.4	1.5	6.9	-1.5	-0.23	3.0	2.77

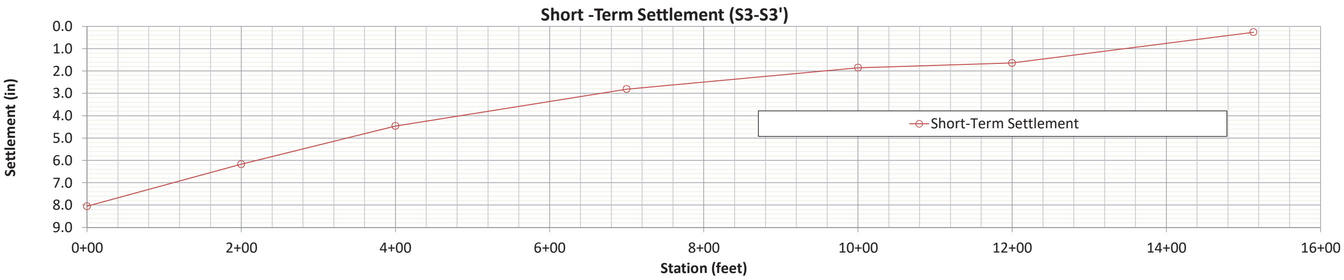

Short -Term Settlement (S2-S2')

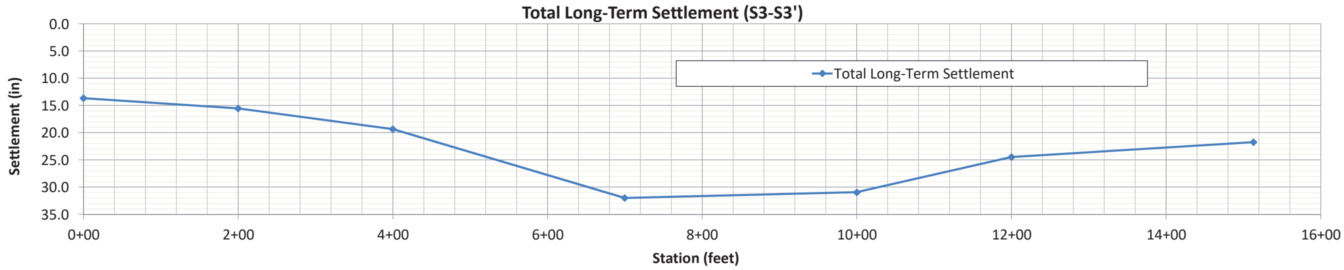

Total Long-Term Settlement (S2-S2')

SETTLEMENT CALCULATIONS - Plant Scherer Pond Closure

Table B-3 : Short-Term and Long-Term Settlement Results at Section S3-S3'

Settlement Points	Station (ft)	Computed Settlement (1) Calculated Total Settlement (in)	(2) Calculated Ash Settlement (in)	(3) Percent of Consolidation in the Sluiced Ash at 1-yr period	(4) Short-Term Settlement During Construction (within 1 year) (in)	(5) = (1) - (4) Long Term Settlement after 1 year (in)	(6) Settlement Due to Groundwater Drawdown (in)	(7) = (5) + (6) Total Long-Term Settlement (in)	Differential Settlement (in)	Slope Change (%)	Design Slope Grade (%)	Post-Construction Slope Grade (%)
S3-1	0+00	12.2	10.4	66%	8.1	4.1	9.5	13.6	-	-	-	-
S3-2	2+00	11.4	9.8	63%	6.2	5.2	10.3	15.5	1.9	0.08	0.5	0.58
S3-3	4+00	10.3	9.3	48%	4.5	5.8	13.5	19.3	3.8	0.16	0.5	0.66
S3-4	7+00	10.0	9.7	29%	2.8	7.2	24.8	32.0	12.7	0.35	0.5	0.85
S3-5	10+00	6.6	6.4	29%	1.9	4.7	26.2	30.9	-1.0	-0.03	0.5	0.47
S3-6	12+00	4.9	4.7	35%	1.6	3.3	21.2	24.5	-6.5	-0.27	0.5	0.23
S3-7	15+13	0.7	0.7	38%	0.3	0.4	21.3	21.7	-2.7	-0.07	0.5	0.43


Short -Term Settlement (S3-S3')


Total Long-Term Settlement (S3-S3')

ATTACHMENT C

Examples of Total Settlement & Time-Rate Calculations

Example Total Settlement Calculations

One-Dimensional Settlement Analysis

Project Name: Plant Scherer Pond Closure
Date: 7/26/18
Description: Settlement Analysis for Pond Closure
Settlement Point S3-4
Computed By: SAL/LL

INPUT DATA

Soil Profile Input

Water Table Depth: 7.5 ft

Enter up to 20 layers

Layer Number	Layer Description	Upper Elevation (ft)	Lower Elevation (ft)	Layer Thickness (ft)	Unit Wt (pcf)	e_0 at layer	P_c* (psf)	C_r	C_c
1	Sluiced Ash	497.0	489.5	7.5	105	0.8	393.75	0.020	0.20
2	Sluiced Ash	489.5	480.8	8.7	105	0.8	972.81	0.020	0.20
3	Sluiced Ash	480.8	472.1	8.7	105	0.8	1343.43	0.020	0.20
4	Sluiced Ash	472.1	463.4	8.7	105	0.8	1714.05	0.020	0.20
5	Sluiced Ash	463.4	454.7	8.7	105	0.8	2084.67	0.020	0.20
6	Sluiced Ash	454.7	446.0	8.7	105	0.8	2455.29	0.020	0.20
7	Sluiced Ash	446.0	437.3	8.7	105	0.8	2825.91	0.020	0.20
8	Sluiced Ash	437.3	428.6	8.7	105	0.8	3196.53	0.020	0.20
9	Sluiced Ash	428.6	420.0	8.6	105	0.8	3565.02	0.020	0.20
10	Alluvium	420.0	412.5	7.5	110	0.57	7800	0.03	0.25
11	Alluvium	412.5	405.0	7.5	110	0.57	7800	0.03	0.25
12	Saprolite	405.0	397.7	7.3	105	0.57	7800	0.05	0.25
13	Saprolite	397.7	390.4	7.3	105	0.57	7800	0.05	0.25
14	Saprolite	390.4	383.1	7.3	105	0.57	7800	0.05	0.25
15									
16									
17									
18									
19									
20									

Surcharge Input

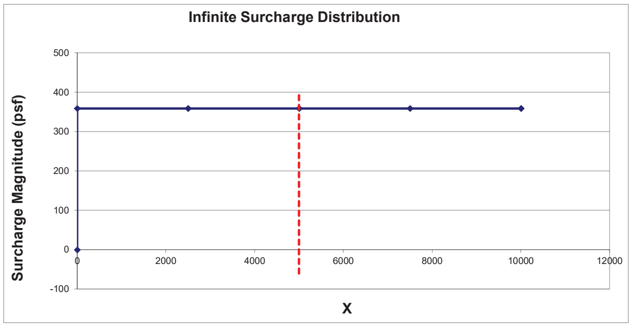
Layer Number	Layer Description	Unit Wt (pcf)	Upper Elev. (ft)	Lower Elev. (ft)	Thick (ft)	Vert. O. B. Stress (psf)
1	Final Cover	125.0	500.4	500.3	0.1	12.5
2	Fly Ash - Fill	105.0	500.3	497.0	3.3	346.5
					Total	359.0

Total Settlement =	10.03	in

Infinite Surcharge Geometry (Up to 10 Points)

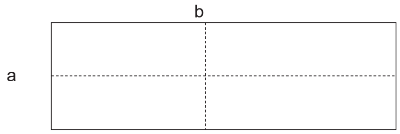
x-Coordinate of Settlement Pc 5000

Point Number	x coordinate	surcharge value (psf)
1	0	0
2	0.001	359.0
3	2500	359.0
4	5000	359.0
5	7500	359.0
6	10000	359.0
7		
8		
9		
10		



Rectangular Loading

	Load 1	Load 2	Load 3
Include Recta	n		
or Center (CO or CE) -	CE	CE	CE
Enter magnitu	1552	1552	1552
Enter Width,	18	18	18
Enter Length,	22	22	22



Whole width = a; Whole length = b (for both CE and CO)

One-Dimensional Settlement Analysis

Project Name:	**Plant Scherer Pond Closure**
Date:	**7/26/2018**
Description:	**Settlement Analysis for Pond Closure** **Settlement Point S3-4**
Computed By:	**SAL/LL**

Settlement Anaysis Summary

Water Table Depth: 7.5 ft

Enter up to 20 layers

Layer Number	Layer Description	Layer Thickness (ft)	unit wt (pcf)	e_0 at layer	Overcons? (Y or N)	P_c* (psf)	C_r	C_c	Layer Center Depth (ft)	P_0 at layer Center (psf)	Layer* Surcharge (psf)	P_f at layer center (psf)	Layer Settlement (in)
1	Sluiced Ash	7.5	105	0.8	N	393.75	0.02	0.2	3.75	393.75	359.0	752.8	2.814
2	Sluiced Ash	8.7	105	0.8	N	972.81	0.02	0.2	11.85	972.81	359.0	1331.8	1.582
3	Sluiced Ash	8.7	105	0.8	N	1343.4	0.02	0.2	20.55	1343.43	359.0	1702.4	1.193
4	Sluiced Ash	8.7	105	0.8	N	1714.1	0.02	0.2	29.25	1714.05	359.0	2073.1	0.958
5	Sluiced Ash	8.7	105	0.8	N	2084.7	0.02	0.2	37.95	2084.67	359.0	2443.7	0.800
6	Sluiced Ash	8.7	105	0.8	N	2455.3	0.02	0.2	46.65	2455.29	359.0	2814.3	0.687
7	Sluiced Ash	8.7	105	0.8	N	2825.9	0.02	0.2	55.35	2825.91	359.0	3184.9	0.602
8	Sluiced Ash	8.7	105	0.8	N	3196.5	0.02	0.2	64.05	3196.53	359.0	3555.5	0.536
9	Sluiced Ash	8.6	105	0.8	N	3565	0.02	0.2	72.7	3565.02	359.0	3924.0	0.478
10	Alluvium	7.5	110	0.57	Y	7800	0.03	0.25	80.75	3926.7	359.0	4285.7	0.065
11	Alluvium	7.5	110	0.57	Y	7800	0.03	0.25	88.25	4283.7	359.0	4642.7	0.060
12	Saprolite	7.3	105	0.57	Y	7800	0.05	0.25	95.65	4617.69	359.0	4976.7	0.091
13	Saprolite	7.3	105	0.57	Y	7800	0.05	0.25	102.95	4928.67	359.0	5287.7	0.085
14	Saprolite	7.3	105	0.57	Y	7800	0.05	0.25	110.25	5239.65	359.0	5598.6	0.080

TOTAL COMPUTED SETTLEMENT: 10.0 in

One-Dimensional Settlement Analysis

Project Name: 7/26/2018
Date: Settlement Analysis for Pond Closure
Description: SAL/LL

Surcharge Load Summary

All Loadings in pounds per square foot

Layer Number	Layer Description	Center Depth	Rectangular Loading (psf)		
			Load 1	*Load 2*	*Load 3*
1	Sluiced Ash	3.75			
2	Sluiced Ash	11.85			
3	Sluiced Ash	20.55			
4	Sluiced Ash	29.25			
5	Sluiced Ash	37.95			
6	Sluiced Ash	46.65			
7	Sluiced Ash	55.35			
8	Sluiced Ash	64.05			
9	Sluiced Ash	72.7			
10	Alluvium	80.75			
11	Alluvium	88.25			
12	Saprolite	95.65			
13	Saprolite	102.95			
14	Saprolite	110.25			

Example Settlement Due to Groundwater Drawdown

One-Dimensional Settlement Analysis

Project Name: Plant Scherer Pond Closure
Date: 7/26/18
Description: Settlement Analysis for Pond Closure
Settlement Point S3-4
Computed By: SAL/LL

INPUT DATA

Soil Profile Input

Water Table Depth: 7.5 ft

Enter up to 20 layers

Layer Number	Layer Description	Upper Elevation (ft)	Lower Elevation (ft)	Layer Thickness (ft)	Unit Wt (pcf)	e_0 at layer	P_c* (psf)	C_r	C_c
1	Sluiced Ash	497.0	489.5	7.5	105	0.8	752.750303	0.020	0.20
2	Sluiced Ash	489.5	480.8	8.7	105	0.8	1331.8103	0.020	0.20
3	Sluiced Ash	480.8	472.1	8.7	105	0.8	1702.43029	0.020	0.20
4	Sluiced Ash	472.1	463.4	8.7	105	0.8	2073.05027	0.020	0.20
5	Sluiced Ash	463.4	454.7	8.7	105	0.8	2443.67024	0.020	0.20
6	Sluiced Ash	454.7	446.0	8.7	105	0.8	2814.29018	0.020	0.20
7	Sluiced Ash	446.0	437.3	8.7	105	0.8	3184.9101	0.020	0.20
8	Sluiced Ash	437.3	428.6	8.7	105	0.8	3555.52998	0.020	0.20
9	Sluiced Ash	428.6	420.0	8.6	105	0.8	3924.01984	0.020	0.20
10	Alluvium	420.0	412.5	7.5	110	0.57	7800	0.03	0.25
11	Alluvium	412.5	405.0	7.5	110	0.57	7800	0.03	0.25
12	Saprolite	405.0	397.7	7.3	105	0.57	7800	0.05	0.25
13	Saprolite	397.7	390.4	7.3	105	0.57	7800	0.05	0.25
14	Saprolite	390.4	383.1	7.3	105	0.57	7800	0.05	0.25
15									
16									
17									
18									
19									
20									

Surcharge Input

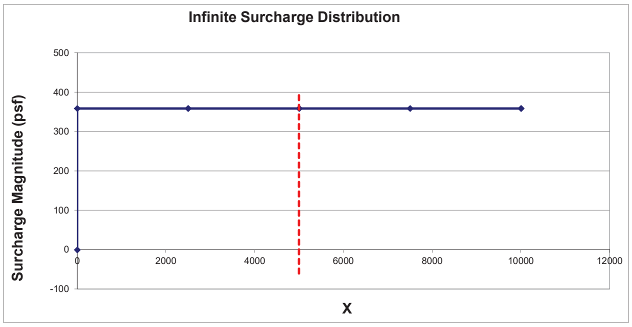
Layer Number	Layer Description	Unit Wt (pcf)	Upper Elev. (ft)	Lower Elev. (ft)	Thick (ft)	Vert. O. B. Stress (psf)
1	Final Cover	125.0	500.4	500.3	0.1	12.5
2	Fly Ash - Fill	105.0	500.3	497.0	3.3	346.5
					Total	359.0

Total Settlement =	24.81	in

Infinite Surcharge Geometry (Up to 10 Points)

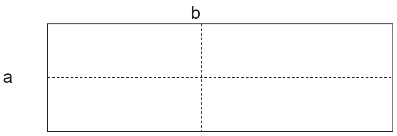
x-Coordinate of Settlement Pc 5000

Point Number	x coordinate	surcharge value (psf)
1	0	0
2	0.001	359.0
3	2500	359.0
4	5000	359.0
5	7500	359.0
6	10000	359.0
7		
8		
9		
10		



Rectangular Loading

Include Recta	n		
	Load 1	Load 2	Load 3
or Center (CO or CE) -	CE	CE	CE
Enter magnitu	1552	1552	1552
Enter Width,	18	18	18
Enter Length,	22	22	22



Whole width = a; Whole length = b (for both CE and CO)

One-Dimensional Settlement Analysis

Project Name: **Plant Scherer Pond Closure**
Date: **7/26/2018**
Description: **Settlement Analysis for Pond Closure**
Settlement Point S3-4
Computed By: **SAL/LL**

Settlement Anaysis Summary

Water Table Depth: 7.5 ft

Enter up to 20 layers

Layer Number	Layer Description	Layer Thickness (ft)	unit wt (pcf)	e_0 at layer	Overcons? (Y or N)	P_c* (psf)	C_r	C_c	Layer Center Depth (ft)	P_0 at layer Center (psf)	Layer* Surcharge (psf)	P_f at layer center (psf)	Layer Settlement (in)
1	Sluiced Ash	7.5	105	0.8	N	752.75	0.02	0.2	3.75	752.7503032	0.0	752.8	0.000
2	Sluiced Ash	8.7	105	0.8	N	1331.8	0.02	0.2	11.85	1331.810301	271.4	1603.3	0.934
3	Sluiced Ash	8.7	105	0.8	N	1702.4	0.02	0.2	20.55	1702.430293	814.3	2516.8	1.969
4	Sluiced Ash	8.7	105	0.8	N	2073.1	0.02	0.2	29.25	2073.050273	1357.2	3430.3	2.537
5	Sluiced Ash	8.7	105	0.8	N	2443.7	0.02	0.2	37.95	2443.670237	1900.1	4343.8	2.898
6	Sluiced Ash	8.7	105	0.8	N	2814.3	0.02	0.2	46.65	2814.290179	2443.0	5257.3	3.148
7	Sluiced Ash	8.7	105	0.8	N	3184.9	0.02	0.2	55.35	3184.910097	2985.8	6170.8	3.332
8	Sluiced Ash	8.7	105	0.8	N	3555.5	0.02	0.2	64.05	3555.529983	3201.1	6756.6	3.234
9	Sluiced Ash	8.6	105	0.8	N	3924	0.02	0.2	72.7	3924.019835	3201.1	7125.1	2.971
10	Alluvium	7.5	110	0.57	Y	7800	0.03	0.25	80.75	4285.699662	3201.1	7486.8	0.417
11	Alluvium	7.5	110	0.57	Y	7800	0.03	0.25	88.25	4642.699466	3201.1	7843.8	0.422
12	Saprolite	7.3	105	0.57	Y	7800	0.05	0.25	95.65	4976.689237	3201.1	8177.8	0.831
13	Saprolite	7.3	105	0.57	Y	7800	0.05	0.25	102.95	5287.668974	3201.1	8488.8	0.984
14	Saprolite	7.3	105	0.57	Y	7800	0.05	0.25	110.25	5598.648671	3201.1	8799.8	1.132

TOTAL COMPUTED SETTLEMENT: 24.8 in

One-Dimensional Settlement Analysis

Project Name: **7/26/2018**
Date: **Settlement Analysis for Pond Closure**
Description: **SAL/LL**

Surcharge Load Summary

All Loadings in pounds per square foot

Layer Number	Layer Description	Center Depth	Rectangular Loading (psf) *Load 1*	*Load 2*	*Load 3*
1	Sluiced Ash	3.75			
2	Sluiced Ash	11.85			
3	Sluiced Ash	20.55			
4	Sluiced Ash	29.25			
5	Sluiced Ash	37.95			
6	Sluiced Ash	46.65			
7	Sluiced Ash	55.35			
8	Sluiced Ash	64.05			
9	Sluiced Ash	72.7			
10	Alluvium	80.75			
11	Alluvium	88.25			
12	Saprolite	95.65			
13	Saprolite	102.95			
14	Saprolite	110.25			

Example Time Rate Settlement Estimate

Time of Consolidation Analysis

Project Name and Number:	Plant Scherer – Ash Pond Closure
Date:	8/16/2018
Computed By:	LL
Description of Analysis:	**Time Rate of Settlement Estimate: S3-4**

ANALYSIS INPUT

Problem Bounds

Enter maximum time (in days) for which consolidation is required:	730	days
Enter a particular time for which computation is required:	365	days

Radial Drain Information

Include Radial Drainage in the analysis? (Y or N)	n	
Radial Drain Spacing (ft)		ft
Radial Drain Radius (ft)		ft

Notes:

1. Ash is underlain by native clay. Therefore assume single drainage, with H = full thickness of ash.

Consolidating Layer Information (5 layers maximum)

Layer Number	Layer Description	Ult. Layer Settlement (ft)	cv (ft2/day)	H (ft)	cr (ft2/day)
1	Sluiced Ash	0.81	1.079	77	
2					
3					
4					
5					
		0.81	ft		

Elastic Layer Information (5 layers maximum)

Layer Number	Layer Description	Ult. Layer Settlement (ft)	Time to Ultimate Settlement (days)
1			
2			
3			
4			
5			
		0	ft

Time of Consolidation Analysis

Project Name and Number: Plant Scherer – Ash Pond Closure
Date: 08/16/18
Computed By: LL

Description of Analysis: **Time Rate of Settlement Estimate:**

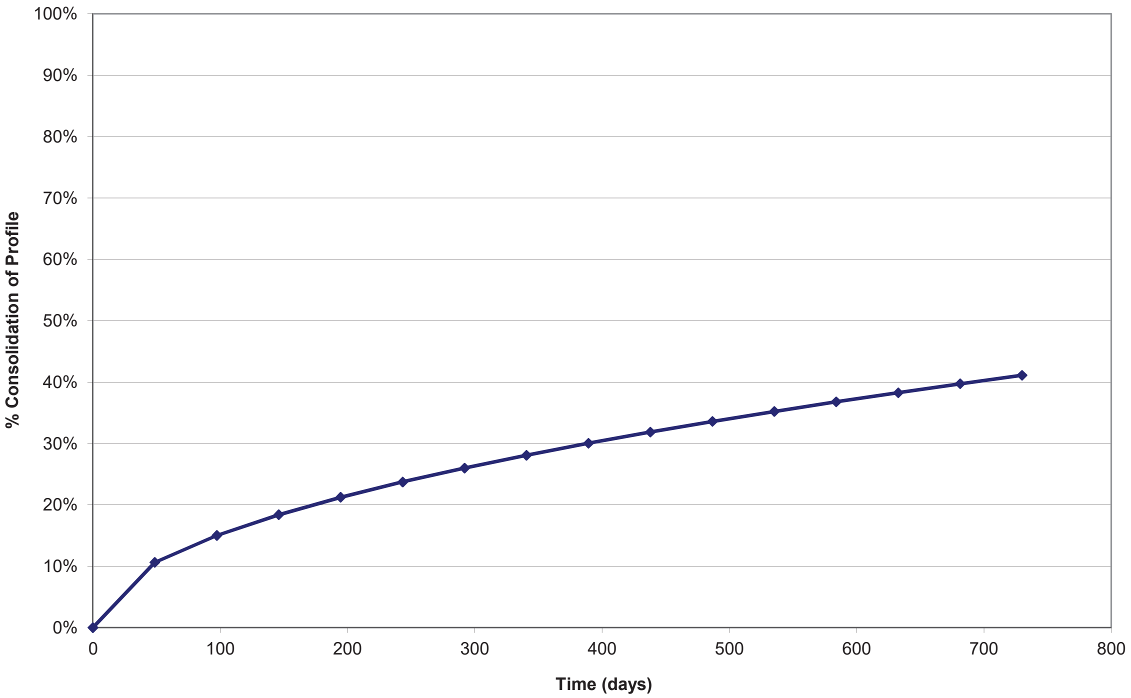
RESULTS OF ANALYSIS

Consolidation vs. Time

time (days)	Layer 1	Layer 2	Settlement at time (ft) Layer 3	Layer 4	Layer 5	ΣElastic	Total Settlement at time (ft)	% of Ultimate at Time	Remaining Settlement (in)
0	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	**0%**	9.70
49	0.09	0.00	0.00	0.00	0.00	0.00	**0.09**	**11%**	8.67
97	0.12	0.00	0.00	0.00	0.00	0.00	**0.12**	**15%**	8.24
146	0.15	0.00	0.00	0.00	0.00	0.00	**0.15**	**18%**	7.92
195	0.17	0.00	0.00	0.00	0.00	0.00	**0.17**	**21%**	7.64
243	0.19	0.00	0.00	0.00	0.00	0.00	**0.19**	**24%**	7.40
292	0.21	0.00	0.00	0.00	0.00	0.00	**0.21**	**26%**	7.18
341	0.23	0.00	0.00	0.00	0.00	0.00	**0.23**	**28%**	6.97
389	0.24	0.00	0.00	0.00	0.00	0.00	**0.24**	**30%**	6.79
438	0.26	0.00	0.00	0.00	0.00	0.00	**0.26**	**32%**	6.61
487	0.27	0.00	0.00	0.00	0.00	0.00	**0.27**	**34%**	6.44
535	0.28	0.00	0.00	0.00	0.00	0.00	**0.28**	**35%**	6.28
584	0.30	0.00	0.00	0.00	0.00	0.00	**0.30**	**37%**	6.13
633	0.31	0.00	0.00	0.00	0.00	0.00	**0.31**	**38%**	5.99
681	0.32	0.00	0.00	0.00	0.00	0.00	**0.32**	**40%**	5.85
730	0.33	0.00	0.00	0.00	0.00	0.00	**0.33**	**41%**	5.71
365	0.24	0.00	0.00	0.00	0.00	0.00	**0.24**	**29%**	6.88

% Total Profile Consolidation Vs. Time

Time Rate of Settlement Estimate:



Appendix A3

Liquefaction Screening and Triggering Analysis

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Appendix A3

AECOM

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	1 of 7
Description	**Geotechnical Calculations**	Computed by	**SAL / ZAA**	Date	**05/03/2016**
	Liquefaction Potential Evaluation	Checked by		Date	

This calculation package summarizes the liquefaction potential analyses of the impounded CCR material and the pond's subgrade in support of the Ash Pond Closure at Georgia Power's Plant Scherer. Figures, calculations and computer program outputs are provided as attachments and are referenced herein.

I. Objective

One of the first analyses that need to be considered for stability is to determine if the site is susceptible to liquefaction. Liquefaction is defined as the sudden loss of soil strength due to the increase of pore water pressure during dynamic loading. The increased pore water pressure is due to volumetric strains caused by cyclic stresses commonly associated with earthquake shaking. Liquefaction occurs primarily in clean sands, non-plastic silty sands, non-plastic silt, and gravels. It has reportedly also been observed in sensitive clays and non-plastic silts.

The objective of this analysis is to evaluate the potential for liquefaction within the impounded materials and the subgrade below the ash pond in support of the closure plan for the Ash Pond at Georgia Power's Plant Scherer in Monroe County, Georgia. The intent is to evaluate the potential for liquefaction and subsequently determine post-liquefaction strengths to utilize in the slope stability analysis where liquefaction is likely to occur.

This analysis is being performed in conjunction with dike slope stability analyses for the ash pond, in accordance with the requirements of the Rules and Regulations of the State of Georgia section 391-3-4-.10(4), which conforms with Section 257.73 of the CCR Rule. Liquefaction triggering analyses of the various soil units comprising and underlying the ash pond closure are required in order to establish the shear strength of subsurface materials for use in the post-liquefaction slope stability condition. The basis for selection of these parameters is provided in **Appendix A1**, and the post-liquefaction slope stability analyses are developed and presented in **Appendix A4**.

II. Site Background

Plant Scherer is located in Juliette, Georgia which is situated at the northeast edge of Monroe County and approximately 30 miles north of Macon and 70 miles south of Atlanta. Plant Scherer occupies approximately 12,000 acres and is situated on the north banks of the 3,600-acre Lake Juliette, a manmade lake constructed in conjunction with the plant in the early 1980s. Plant Scherer is a four-unit, coal-fired power generation facility that is one of the nation's largest power plants, with a capacity of 3,600 megawatts. Plant Scherer has been in service since 1982 and is capable of supplying energy to 1.5 million homes.

The existing ash pond at Plant Scherer was commissioned in 1980 and has received and stored wet sluiced CCRs since the plant became commercially operational in 1982. The ash pond has two discharge structures; one is a "morning-glory" standpipe that normally passes decanted flows to the recycling pond, and a second emergency spillway that also discharges to the recycling pond during elevated (storm related) pool levels. In addition to receiving wet sluiced CCRs, the ash pond also received wastewater influent from the Plant.

The Plant Scherer ash pond was constructed directly over Berry Creek, with the tallest dike section built just east of a major branch in the creek. Additional branches or drainage tributaries to Berry Creek have developed as a result of site drainage features being modified from the ash pond construction.

The ash pond includes two embankments functioning as cross-valley dams. These include the ash pond dike, situated on the north and east sides of the ash pond and the ash pond south dike, situated on the south side of the ash pond and bordering Plant Scherer. The ash pond dike has a maximum height of approximately 100 feet and the ash pond south dike has a maximum height of approximately 30 feet. The minimum crest elevation of both dikes is El. 504.1 ft, and the upstream slopes are covered with a grout-filled erosion protection blanket. The crests of both dikes are surfaced with grass and a gravel access drive. Downstream slopes are covered with grass, and both upstream and downstream slopes are at a 3H:1V (horizontal to vertical) orientation. Both ash pond dikes are regulated by the Georgia Department of Natural Resources Safe Dams Program, and are categorized as “High Hazard Category 1”, and have been assigned State ID 102-032-04236 (AECOM, 2016).

An Initial Written Closure Plan authored by Georgia Power Company dated October 17, 2016 indicates the Plant Scherer ash pond will be closed by consolidating the CCR ash within the 553 acre ash pond to a smaller footprint in accordance with 257.102(b)(1)(iii). Based on this document and guidance from GPC, AECOM has proceeded with implementing design support for a consolidated closure footprint. The proposed closure footprint will consist of two primary regions within the existing ash pond footprint; a closure by removal region located in the northern area and the consolidated in-place closure area. The two proposed regions will be separated by a new northern embankment berm that will buttress the consolidated ash materials within the consolidated closure footprint.

III. Preliminary Liquefaction Screening

AECOM performed a preliminary screening procedure to determine if the in-situ soil and CCR material characteristics are susceptible to liquefaction. This method is usually recommended to determine if a more rigorous and in-depth analysis is necessary. A commonly used screening procedure is included in the USEPA document RCRA Subtitle D (258) Seismic Design Guidance for Municipal Solid Waste Landfill Facilities among other sources. This method suggests performing a more in-depth analysis if the soil material meets three or more of the following five criteria each of which are considered in detail below:

- **Geologic Age and Origin**. If a soil layer is a fluvial (river), lacustrine (lake), or aeolian (wind) deposit of Holocene age, a greater potential for liquefaction exists than residual deposits or older deposits.

- **Fines Content and Plasticity.** Liquefaction potential in a soil layer increases with decreasing fines content and plasticity of the soil. Soils having less than 15% (by weight) finer than 0.005 mm, a liquid limit less than 35%, and an in-situ water content greater than 0.9 times the liquid limit may be susceptible to liquefaction (Seed and Idriss, 1982).

  Seed et al. (1983) stated that based on both laboratory testing and field performance, the great majority of cohesive soils will not liquefy during earthquakes. Using these criteria originally stated by Seed and Idriss (1982) and subsequently confirmed by Youd and Gilstrap (1999) in order for a cohesive soil to liquefy, it must meet all three criteria. If the cohesive soil does not meet all three criteria, then it is generally considered not to be susceptible to liquefaction (Day, 2002).

- **Saturation.** Although low water content soils have been reported to liquefy, at least 80% to 85% saturation is generally deemed to be a necessary condition for soil liquefaction.
- **Depth below Ground Surface.** Liquefaction is generally not likely to occur more than 50 feet below the ground surface due to overburden confinement of the soils.
- **Soil Penetration Resistance.** Seed et al. (1985) state that soil layers with a normalized SPT blow count less than 22 have been known to liquefy. Marcuson et al. (1990) suggest an SPT N-value of less than 30 as the threshold to use for suspecting liquefaction potential.

  Raw SPT N-values (uncorrected) obtained during historic subsurface exploration programs were variable. Based on the shallow depth, it is anticipated that the normalized N-values would be approximately in the same range.

The results of the preliminary screening criteria are summarized in **Table A4-1** as follows:

Table A4-1: Preliminary Liquefaction Screening

Material	Meets Screening Criteria				
	Geologic Age & Origin	Fines Content & Plasticity*	Saturation	Depth below Ground Surface	SPT Resistance
CCR Materials	X	✓	✓	✓	✓
Embankment Materials	X	X	X	✓	X
Alluvium	✓	X	X	X	✓
Residuum	X	X	X	X	X
Saprolite	X	X	✓	X	X
Partially Weathered Rock	X	X	X	X	X

(*) - This criterion must be met in order for the material to be liquefiable.

Based on the results of the liquefaction screening analysis, only the CCR materials indicate a possibility for liquefaction potential. Therefore, AECOM performed a liquefaction triggering analysis for the CCR materials by using SPT and SCPTu data obtained from historic site explorations with particular focus on the data collected from the 2016 AECOM subsurface exploration.

IV. Basis and Methodology of Liquefaction Analysis

The SPT and CPT-based liquefaction triggering analyses were performed using the procedure proposed by Idriss and Boulanger (2008, 2014). The procedure considers a stress-based approach to evaluate the potential for liquefaction triggering, and compares calculated earthquake-induced cyclic stress ratios (CSRs) with the estimated cyclic resistance ratios (CRRs) of the soil to establish the factor of safety against liquefaction triggering.

- Based on the subsurface exploration and the liquefaction screening describe in the previous section, the materials that may have potential for liquefaction include the sluiced fly ash deposit within the ash pond. The liquefaction analyses presented herein focus on this material.

- The stacked fly ash fill materials that will be placed in the northern section of the proposed cap closure area are considered to be non-liquefiable, as the material will be detwatered, compacted into place, and remain unsaturated.
- All liquefaction analyses reference a design earthquake event with 2% probability of exceedance in 50 years (recurrence interval of approximately 2500 years). This event is as stipulated by the CCR Rule. The United States Geological Survey (USGS) online Unified Hazard Tool was used to determine the design earthquake. The modal earthquake of magnitude M 4.9 was used in this analysis.
- The pseudostatic coefficient, k_h, was estimated as 0.15g for these analyses based on the method described in **Appendix A4**.

V. SPT and CPT-Based Liquefaction Potential Evaluations

Based on the results of the liquefaction screening analysis, only the CCR materials indicate a possibility for liquefaction potential. Therefore, AECOM performed a liquefaction triggering analysis for the CCR materials by using SPT and SCPTu data obtained from historic site explorations with particular focus on the data collected from the 2016 AECOM subsurface exploration. The SPT-based liquefaction procedure followed the revised methodology by Youd et al. (2001) updated by Idriss and Boulanger (2008, 2014). The SCPTu-based liquefaction procedure is based on Youd et al. (2001) and Idriss and Boulanger (2008). The procedure considers a stress-based approach to evaluate the potential for liquefaction triggering, and compares calculated earthquake-induced cyclic stress ratios (CSR) with the estimated cyclic resistance ratios (CRR) of the soil to establish the factor of safety against liquefaction triggering. The liquefaction triggering analysis was performed on the following locations:

- Borings: B-102, B-103, B-104, B-105, B-106, B-107, B-108, B-109, B-110, B-111, B-112, B-113, and B-114
- CPT Soundings: CP-100, CP-102, , CP-109, CP-110, CP-111, CP-112, and CP-113

For these borings, the automatic hammer efficiency was equal to 87.2% The borehole diameter was considered to be 4 inches, and the rod stickup was considered to be 5 ft. during drilling. The values of the soil's fines content were determined based on the results of the sieve and hydrometer analyses performed as part of the laboratory testing program. Spreadsheets developed by AECOM utilizing the SPT and CPT-based procedures given in Idriss and Boulanger (2008, 2014) and in conjunction with SPT and CPT data from the available borings and CPT soundings (new data obtained during the 2016 AECOM investigation) were used for the analyses. The spreadsheets were used calculate a Factor of Safety against liquefaction, which is defined as the quotient of the soil's cyclic resistance ratio (CRR) and the cyclic stress ratio (CSR) induced by the earthquake:

$$FS_{liq} = \frac{CRR}{CSR}$$

The CSR at any location is defined as follows:

$$CSR = \frac{0.65 * \tau_{cyc}}{\sigma_{vc}{}'}$$

where:

τ_{cyc} = cyclic shear stress
$\sigma_{vc}{}'$ = effective vertical stress

The maximum cyclic shear stress is estimated using the Seed-Idriss Simplified Liquefaction Procedure, which incorporates the Peak Horizontal Ground Acceleration coefficient (PGA), total overburden stress (σ_v), and shear stress reduction factor that accounts for dynamic soil response (r_d). The value of CSR is customarily adjusted to a reference σ'_v = 1 atm for an earthquake with mean moment Magnitude (M) = 7.5.

The CRR is the cyclic resistance ratio at which liquefaction occurs during an earthquake. It is obtained from case history-based semi-empirical correlations with SPT or CPT values recorded at sites with level ground conditions. Within the Simplified Procedure, the CRR is a function of a soil's fines content (FC), relative density and effective stress, and penetration resistance (SPT or CPT). The CRR is also dependent on the duration of shaking, and is adjusted to the site-specific design earthquake using a Magnitude Scaling Factor (MSF). Other correction factors to adjust for confinement stress (K_σ) and sloping ground (K_α) may also be applied.

A factor of safety is calculated for each interval within the exploration (each depth at which SPT N-value or CPT resistance data is available). The spreadsheet limits liquefaction factors of safety to 2.0, even if the computed factor of safety is higher than 2.0. Adverse results from the screening procedure are generally considered to be grounds for more rigorous evaluation to be performed at a later phase of the project.

The liquefaction potential analyses were based on the following assumptions and input parameters:

- The operating level of the ash pond is El. 494.5. The phreatic surface within the ash delta, as revealed by the various borings drilled as part of the 2016 AECOM exploration and 2015 Southern Company exploration, varied from about El. 498 to about El. 506. The elevation of the groundwater used in the analyses was determined based on the water encountered during drilling at each boring or CPT sounding.
- The cyclic resistance ratio (CRR) is a function of the fines content of any given layer. Where available, laboratory grain size data were used directly to establish the fines content input to the analysis at a given interval. Where specific laboratory data were not available, the material descriptions and classifications and/or lab data from other intervals within the same boring were utilized to select the fines content.
- The cyclic resistance ratio (CRR) is also a function of the earthquake moment magnitude. As stated above, ground motions from USGS online Unified Hazard Tool were utilized in the liquefaction evaluation. The design earthquake has a magnitude of M 4.9. This value was used in all spreadsheet analyses.

VI. Results

Spreadsheet outputs are provided in Attachment J-1. The analyses are broadly summarized in **Table A4-2** below.

Table A4-2: Summary SPT and CPT-Based Liquefaction Potential Evaluation

Exploration	Type	Location	Significant Liquefaction In Sluiced Ash	Depth of Liquefaction
B-102	Soil Boring	Ash Delta	Yes	19.25, 29.25
B-103	Soil Boring	Ash Delta	No	-
B-104	Soil Boring	Ash Delta	No	-
B-105	Soil Boring	Pond Free Water	Yes	1
B-106	Soil Boring	Pond Free Water	Yes	0.75
B-107	Soil Boring	Pond Free Water	Yes	0.5
B-108	Soil Boring	Pond Free Water	No	-
B-109	Soil Boring	Pond Free Water	Yes	1
B-110	Soil Boring	Pond Free Water	No	-
B-111	Soil Boring	Pond Free Water	No	-
B-112	Soil Boring	Pond Free Water	Yes	9.75, 14.75
B-113	Soil Boring	Pond Free Water	No	-
B-114	Soil Boring	Pond Free Water	Yes	0.75
CP-100	CPT Sounding		No	
CP-102	CPT Sounding		No	
CP-109	CPT Sounding	Ash Delta	Yes	
CP-110	CPT Sounding	Ash Delta	Yes	
CP-111	CPT Sounding	Ash Delta	Yes	
CP-112	CPT Sounding	Ash Delta	Yes	
CP-113	CPT Sounding	Ash Delta	Yes	

VII. Conclusions

The following conclusions are made from the analyses:

- Factors of safety against liquefaction in the sluiced ash range between 0.87 and 2.0 among all the explorations analyzed (SPT and CPT). It is concluded that liquefaction of the ash (specifically those zones of the ash that lie below the pond phreatic surface) is likely at these locations given the design earthquake.

Based on the collective results of the SPT and CPT-based triggering analyses, it is concluded that sluiced ash materials within the ash pond may experience liquefaction as a result of the design earthquake. Liquefaction and accompanying strength loss in these materials is expected to impact the factor of safety against dike stability in the post-liquefaction stability condition that is stipulated by the CCR Rule. As such, there is a need to establish the shear strength of the ash deposit in a liquefied state.

VIII. References

- Idriss, I.M., and Boulanger, R. W. (2008). "SPT-Based Liquefaction Triggering Procedures", Report No. UCD/CGM-10-02, Center for Geotechnical Modeling, Department of Civil and Environmental Engineering, University of California, Davis, CA.

- Idriss, I.M. and Boulanger, R.W. (2014). "CPT and SPT Based Liquefaction Triggering Procedures", Center of Geotechnical Modeling, Department of Civil and Environmental Engineering, University of California, Davis, California.

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

B-102

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	2.5
GWT (ft) FOR ANALYSIS =	2.5
γ above GWT (pcf) =	95
γ below GWT (pcf) =	115
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2		
C_E =	1.45	$C_E = \frac{ER}{60}$	
Borehole Diameter (in) =	4	102 mm	
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*	
Rod Length (ft) =	5	1.5 m	**+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*	

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF = 1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2) **Overburden Correction**	(3)	(4) **Fines Content Correction**	(5)	(6) **Shear Stress Reduction**	(7)	(8)	(9)		(10) **Overburden Correction**	(11)	(12)	(13)	(14)		
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF*Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'_{vc} (psf) WITH GWT AT ANALYSIS**
B-102	1.75	0.53	9	SM ash	Unsaturated		0.75	9.81	166.25	0	166.25	7.96	1.7	16.7	0.000	16.68	-0.006	0.001	1.00	0.097	0.05	0.12	1.10	0.171	0.338	**N/A**	0	166.25
	4.25	1.30	10	SM ash	Saturated	21.4	0.75	10.9	438.75	109.2	329.55	15.78	1.7	18.5	4.690	23.22	-0.041	0.005	0.98	0.128	0.06	0.15	1.10	0.253	0.501	**2.00**	109.2	329.55
	9.25	2.82	3	ML ash	Saturated	53.0	0.85	3.706	1013.75	421.2	592.55	28.37	1.7	6.3	5.614	11.91	-0.123	0.014	0.95	0.158	0.08	0.10	1.10	0.132	0.261	**1.65**	421.2	592.55
	19.25	5.87	0	ML ash	Saturated	97.2	0.95	0	2163.75	1045.2	1118.55	53.56	1.4	0.0	5.494	5.49	-0.331	0.037	0.86	0.163	0.09	0.08	1.05	0.089	0.168	**1.03**	1045.2	1118.55
	29.25	8.92	0	ML ash	Saturated	85.3	1.00	0	3313.75	1669.2	1644.55	78.74	1.1	0.0	5.528	5.53	-0.584	0.065	0.77	0.151	0.08	0.08	1.02	0.089	0.164	**1.08**	1669.2	1644.55
	39.25	11.97	0	ML ash	Saturated	90.0	1.00	0	4463.75	2293.2	2170.55	103.93	1.0	0.0	5.514	5.51	-0.866	0.097	0.68	0.135	0.08	0.08	1.00	0.09	0.16	**2.00**	2293.2	2170.55
	44.25	13.49	0	ML ash	Saturated	84.5	1.00	0	5038.75	2605.2	2433.55	116.52	0.9	0.0	5.530	5.53	-1.012	0.112	0.63	0.127	0.07	0.08	0.99	0.089	0.159	**1.25**	2605.2	2433.55
	59.25	18.06	0	ML ash	Saturated	87.7	1.00	0	6763.75	3541.2	3222.55	154.30	0.8	0.0	5.521	5.52	-1.440	0.158	0.51	0.105	0.06	0.08	0.97	0.089	0.155	**1.47**	3541.2	3222.55
	70.25	21.42	7	CL-ML	Clay	55.7	1.00	10.17333	8028.75	4227.6	3801.15	182.00	0.7	7.6	5.611	13.20	-1.716	0.187	Site Response	#VALUE!	#VALUE!	0.10	0.94	0.142	0.239	**2.00**	4227.6	3801.15
	74.25	22.64	4	ML	Saturated	35.0	1.00	5.813333	8488.75	4477.2	4011.55	192.07	0.7	4.2	5.507	9.73	-1.804	0.196	Site Response	#VALUE!	#VALUE!	0.09	0.94	0.116	0.197	**#VALUE!**	4477.2	4011.55
	79.25	24.16	6	SM	Saturated	21.6	1.00	8.72	9063.75	4789.2	4274.55	204.67	0.7	6.1	4.716	10.85	-1.901	0.205	Site Response	#VALUE!	#VALUE!	0.10	0.93	0.124	0.208	**#VALUE!**	4789.2	4274.55
	83.7	25.52	50	50/5"	Saturated	0.0	1.00	72.66667	9575.5	5066.88	4508.62	215.87	0.7	49.8	0.000	49.78	-1.975	0.212	Site Response	#VALUE!	#VALUE!	0.30	0.77	522.070	726.492	**#VALUE!**	5066.88	4508.62

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
σ_{vc} = Total Vertical Stress
u = Pore Water Pressure
σ'_{vc} = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
C_σ = Overburden Correction Coefficient
K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $$N_{60} = C_E C_B C_R C_S N$$

(2) $$C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7$$

(3) $$(N_1)_{60} = C_N N_{60}$$

(4) $$\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$$ -- FC in %

(5) $$(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$$

(6) $$\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$ -- z in m

(7) $$\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$ -- z in m

(8) $$r_d = exp(\alpha + \beta \cdot M)$$

(9) $$CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$$

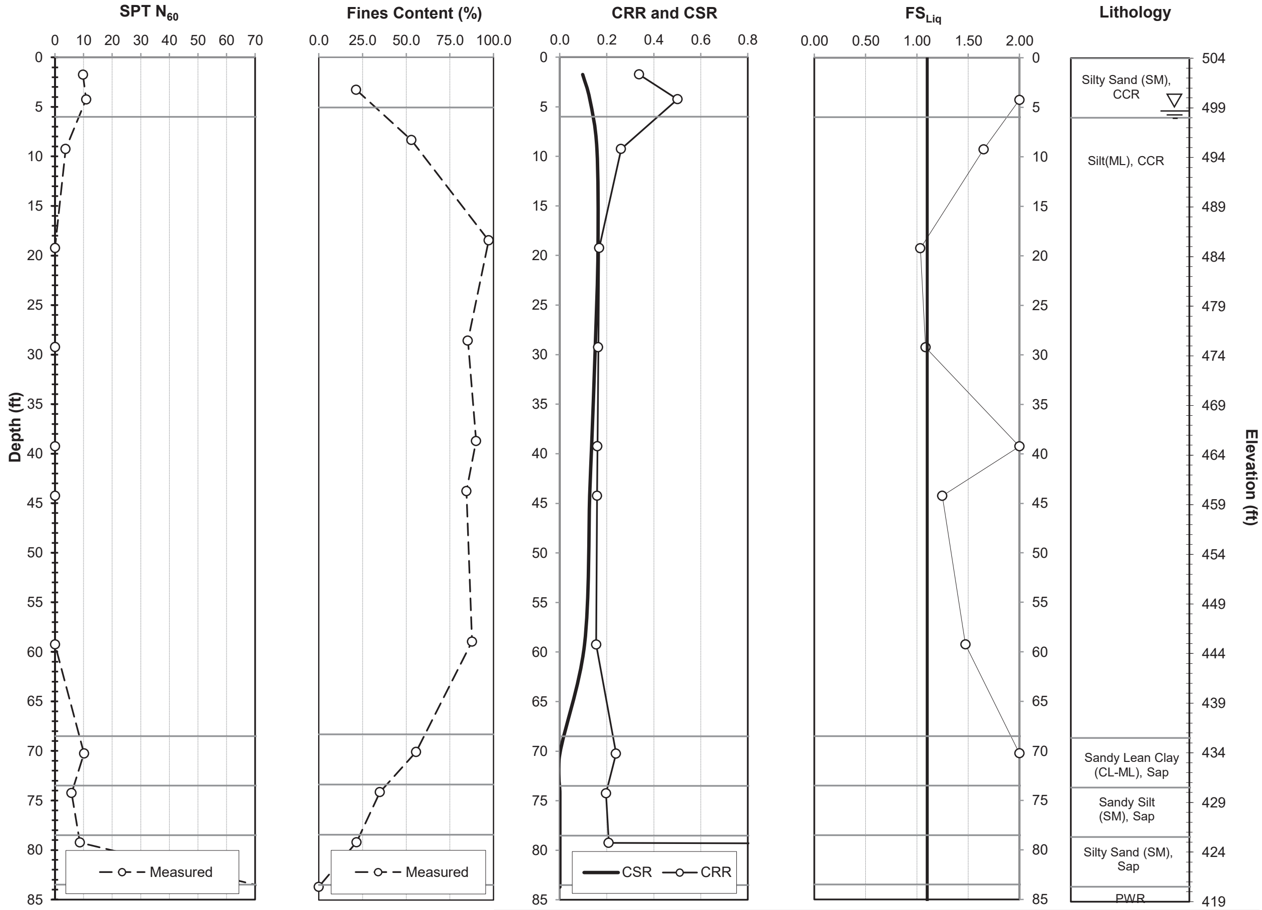
(10) $$C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3$$

(11) $$K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1$$

(12) $$CRR_{M=7.5,\sigma' vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$$

(13) $$CRR = CRR_{M=7.5,\sigma' vc=1atm}(MSF)(K_\sigma)$$

(14) $$FS_{liq} = \frac{CRR}{CSR}$$



Peak Ground Acceleration, PGA = 0.15g

Earthquake Magnitude, M = 4.9

Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-102		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

B-103

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	1.5
GWT (ft) FOR ANALYSIS =	4
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	
C_E =	1.45	
Borehole Diameter (in) =	4	102 mm
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*
Rod Length (ft) =	5	1.5 m **+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*

$$C_E = \frac{ER}{60}$$

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF =	1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2) **Overburden Correction**	(3)	(4) **Fines Content Correction**	(5)	(6) **Shear Stress Reduction**	(7)	(8)	(9)		(10) **Overburden Correction**	(11)	(12)	(13)	(14)		
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF *Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'$_{vc}$ (psf) WITH GWT AT ANALYSIS**
B-103	1.75	0.53	3	ML	Unsaturated	78.2	0.75	3.27	204	15.6	188.4	9.02	1.7	5.6	5.549	11.11	-0.006	0.001	1.00	0.097	0.05	0.10	1.10	0.126	0.249	**N/A**	0	204
	4.25	1.30	3	ML	Saturated	65.3	0.75	3.27	504	171.6	332.4	15.92	1.7	5.6	5.589	11.15	-0.041	0.005	0.98	0.099	0.05	0.10	1.10	0.126	0.250	**2.00**	15.6	488.4
	6.75	2.06	8	ML	Saturated	78.2	0.80	9.301333	804	327.6	476.4	22.81	1.7	15.8	5.549	21.36	-0.080	0.009	0.97	0.120	0.06	0.14	1.10	0.224	0.443	**2.00**	171.6	632.4
	14.25	4.34	1	ML	Saturated	78.2	0.85	1.235333	1704	795.6	908.4	43.49	1.5	1.9	5.549	7.43	-0.220	0.025	0.91	0.142	0.07	0.08	1.07	0.101	0.195	**1.37**	639.6	1064.4
	24	7.32	2	ML	Saturated	81.7	0.95	2.761333	2874	1404	1470	70.38	1.2	3.3	5.539	8.85	-0.446	0.050	0.82	0.141	0.08	0.09	1.03	0.110	0.205	**1.45**	1248	1626
	29	8.84	2	ML	Saturated	78.2	1.00	2.906667	3474	1716	1758	84.17	1.1	3.2	5.549	8.74	-0.577	0.065	0.77	0.136	0.07	0.09	1.02	0.11	0.20	**1.47**	1560	1914
	34	10.37	0	ML	Saturated	78.2	1.00	0	4074	2028	2046	97.96	1.0	0.0	5.549	5.55	-0.715	0.080	0.72	0.131	0.07	0.08	1.00	0.089	0.161	**1.24**	1872	2202
	64.25	19.59	0	ML	Saturated	78.2	1.00	0	7704	3915.6	3788.4	181.39	0.7	0.0	5.549	5.55	-1.571	0.172	0.48	0.092	0.05	0.08	0.95	0.089	0.154	**1.67**	3759.6	3944.4
	69.5	21.19	0	ML	Saturated	66.6	1.00	0	8334	4243.2	4090.8	195.87	0.7	0.0	5.585	5.58	-1.699	0.185	Site Response	#VALUE!	#VALUE!	0.08	0.95	0.090	0.153	**#VALUE!**	4087.2	4246.8
	74.5	22.71	0	ML	Saturated	78.2	1.00	0	8934	4555.2	4378.8	209.66	0.7	0.0	5.549	5.55	-1.809	0.196	Site Response	#VALUE!	#VALUE!	0.08	0.94	0.089	0.152	**#VALUE!**	4399.2	4534.8
	79.5	24.24	0	ML	Saturated	75.0	1.00	0	9534	4867.2	4666.8	223.45	0.7	0.0	5.559	5.56	-1.905	0.206	Site Response	#VALUE!	#VALUE!	0.08	0.94	0.089	0.151	**#VALUE!**	4711.2	4822.8
	84.5	25.76	0	SM alluv	Saturated	11.7	1.00	0	10134	5179.2	4954.8	237.24	0.7	0.0	1.936	1.94	-1.987	0.213	Site Response	#VALUE!	#VALUE!	0.07	0.94	0.070	0.119	**#VALUE!**	5023.2	5110.8
	89.25	27.21	25	SM sap	Saturated	7.1	1.00	36.33333	10704	5475.6	5228.4	250.34	0.6	23.1	0.157	23.27	-2.049	0.219	Site Response	#VALUE!	#VALUE!	0.15	0.86	0.254	0.395	**#VALUE!**	5319.6	5384.4
	94.25	28.73	55	SM sap	Saturated	34.2	1.00	79.93333	11304	5787.6	5516.4	264.13	0.6	49.5	5.490	55.00	-2.097	0.222	Site Response	#VALUE!	#VALUE!	-90.75	1.10	40800.413	80784.819	**#VALUE!**	5631.6	5672.4

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
σ_{vc} = Total Vertical Stress
u = Pore Water Pressure
σ'_{vc} = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
C_σ = Overburden Correction Coefficient
K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $$N_{60} = C_E C_B C_R C_S N$$

(2) $$C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7$$

(3) $$(N_1)_{60} = C_N N_{60}$$

(4) $$\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$$ -- FC in %

(5) $$(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$$

(6) $$\alpha = -1.012 - 1.126\sin\left(\frac{z}{11.73} + 5.133\right)$$ -- z in m

(7) $$\beta = 0.106 + 0.118\sin\left(\frac{z}{11.28} + 5.142\right)$$ -- z in m

(8) $$r_d = exp(\alpha + \beta \cdot M)$$

(9) $$CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$$

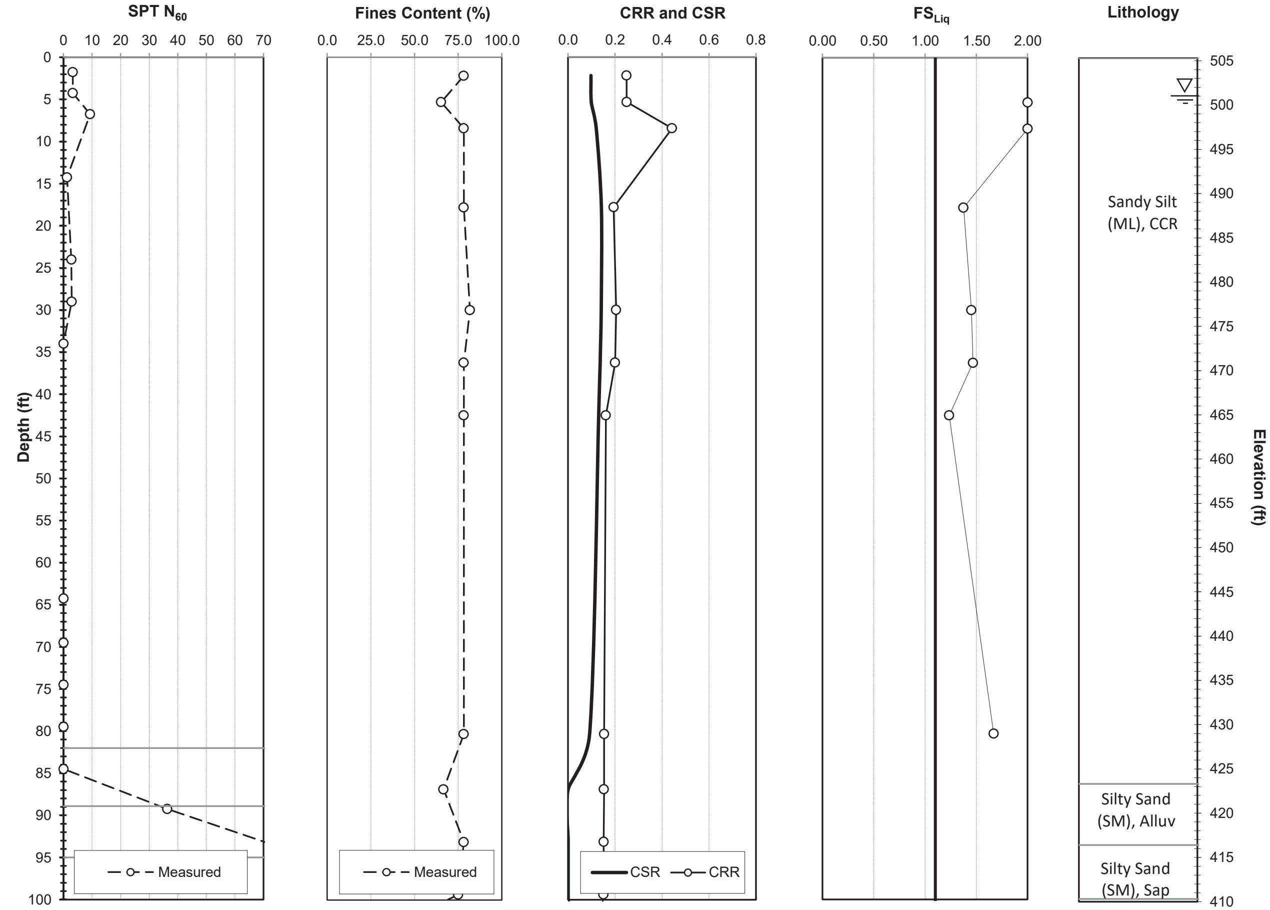
(10) $$C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3$$

(11) $$K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1$$

(12) $$CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$$

(13) $$CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma)$$

(14) $$FS_{liq} = \frac{CRR}{CSR}$$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-103		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

B-104

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	4
GWT (ft) FOR ANALYSIS =	4
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$	
C_E =	1.45		
Borehole Diameter (in) =	4	102 mm	
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*	
Rod Length (ft) =	5	1.5 m	**+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*	

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF =	1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2) **Overburden Correction**	(3)	(4) **Fines Content Correction**	(5)	(6) **Shear Stress Reduction**	(7)	(8)	(9)		(10) **Overburden Correction**	(11)	(12)	(13)	(14)		
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF *Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'$_{vc}$ (psf) WITH GWT AT ANALYSIS**
B-104	1.75	0.53	9	SP ash	Unsaturated	22.9	0.75	9.81	203	0	203	9.72	1.7	16.7	4.868	21.54	-0.006	0.001	1.00	0.097	0.05	0.14	1.10	0.226	0.448	**N/A**	0	203
	4.25	1.30	4	SP ash	Saturated	9.8	0.75	4.36	494	15.6	478.4	22.91	1.7	7.4	1.059	8.47	-0.041	0.005	0.98	0.099	0.05	0.09	1.10	0.108	0.213	**2.00**	15.6	478.4
	9.25	2.82	2	SP ash	Saturated	22.9	0.85	2.470667	1094	327.6	766.4	36.70	1.7	4.1	4.868	8.97	-0.123	0.014	0.95	0.132	0.07	0.09	1.09	0.111	0.218	**1.65**	327.6	766.4
	19.25	5.87	4	SM	Saturated	22.9	0.95	5.522667	2294	951.6	1342.4	64.27	1.3	6.9	4.868	11.80	-0.331	0.037	0.86	0.144	0.08	0.10	1.04	0.131	0.246	**1.71**	951.6	1342.4
	24.25	7.39	5	ML	Saturated	74.8	0.95	6.903333	2894	1263.6	1630.4	78.06	1.1	7.9	5.560	13.42	-0.453	0.051	0.82	0.141	0.08	0.10	1.03	0.143	0.265	**1.88**	1263.6	1630.4
	39.5	12.04	2	ML	Saturated	74.8	1.00	2.906667	4724	2215.2	2508.8	120.12	0.9	2.7	5.560	8.23	-0.873	0.097	0.67	0.124	0.07	0.09	0.99	0.11	0.19	**1.52**	2215.2	2508.8
	44.25	13.49	1	ML	Saturated	81.6	1.00	1.453333	5294	2511.6	2782.4	133.22	0.9	1.3	5.539	6.81	-1.012	0.112	0.63	0.117	0.07	0.08	0.98	0.097	0.171	**1.46**	2511.6	2782.4
	54.25	16.54	0	ML	Saturated	74.8	1.00	0	6494	3135.6	3358.4	160.80	0.8	0.0	5.560	5.56	-1.301	0.144	0.55	0.104	0.06	0.08	0.96	0.089	0.155	**1.50**	3135.6	3358.4
	64.25	19.59	0	ML	Saturated	74.8	1.00	0	7694	3759.6	3934.4	188.38	0.7	0.0	5.560	5.56	-1.571	0.172	0.48	0.092	0.05	0.08	0.95	0.089	0.153	**1.66**	3759.6	3934.4
	69.25	21.11	0	ML	Saturated	84.3	1.00	0	8294	4071.6	4222.4	202.17	0.7	0.0	5.531	5.53	-1.693	0.185	Site Response	#VALUE!	#VALUE!	0.08	0.95	0.089	0.152	**#VALUE!**	4071.6	4222.4
	74.25	22.64	0	ML	Saturated	74.8	1.00	0	8894	4383.6	4510.4	215.96	0.7	0.0	5.560	5.56	-1.804	0.196	Site Response	#VALUE!	#VALUE!	0.08	0.94	0.089	0.151	**#VALUE!**	4383.6	4510.4
	79.25	24.16	0	ML	Saturated	79.2	1.00	0	9494	4695.6	4798.4	229.75	0.7	0.0	5.547	5.55	-1.901	0.205	Site Response	#VALUE!	#VALUE!	0.08	0.94	0.089	0.151	**#VALUE!**	4695.6	4798.4
	84.25	25.69	0	ML	Saturated	74.8	1.00	0	10094	5007.6	5086.4	243.54	0.6	0.0	5.560	5.56	-1.983	0.213	Site Response	#VALUE!	#VALUE!	0.08	0.93	0.089	0.150	**#VALUE!**	5007.6	5086.4
	89.25	27.21	8	ML	Saturated	46.1	1.00	11.62667	10694	5319.6	5374.4	257.33	0.6	7.3	5.609	12.91	-2.049	0.219	Site Response	#VALUE!	#VALUE!	0.10	0.90	0.139	0.227	**#VALUE!**	5319.6	5374.4
	93.8	28.60	100	100/5"	Saturated	20.8	1.00	145.3333	11240	5603.52	5636.48	269.88	0.6	89.1	4.604	93.66	-2.093	0.222	Site Response	#VALUE!	#VALUE!	-0.17	1.10	##############	##############	**#VALUE!**	5603.52	5636.48
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
σ_{vc} = Total Vertical Stress
u = Pore Water Pressure
σ'_{vc} = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
C_σ = Overburden Correction Coefficient
K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

$$N_{60} = C_E C_B C_R C_S N \quad (1)$$

$$C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7 \quad (2)$$

$$(N_1)_{60} = C_N N_{60} \quad (3)$$

$$\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right) \quad (4)$$

-- FC in %

$$(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60} \quad (5)$$

$$\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right) \quad (6)$$

-- z in m

$$\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right) \quad (7)$$

-- z in m

$$r_d = exp(\alpha + \beta \cdot M) \quad (8)$$

$$CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d \quad (9)$$

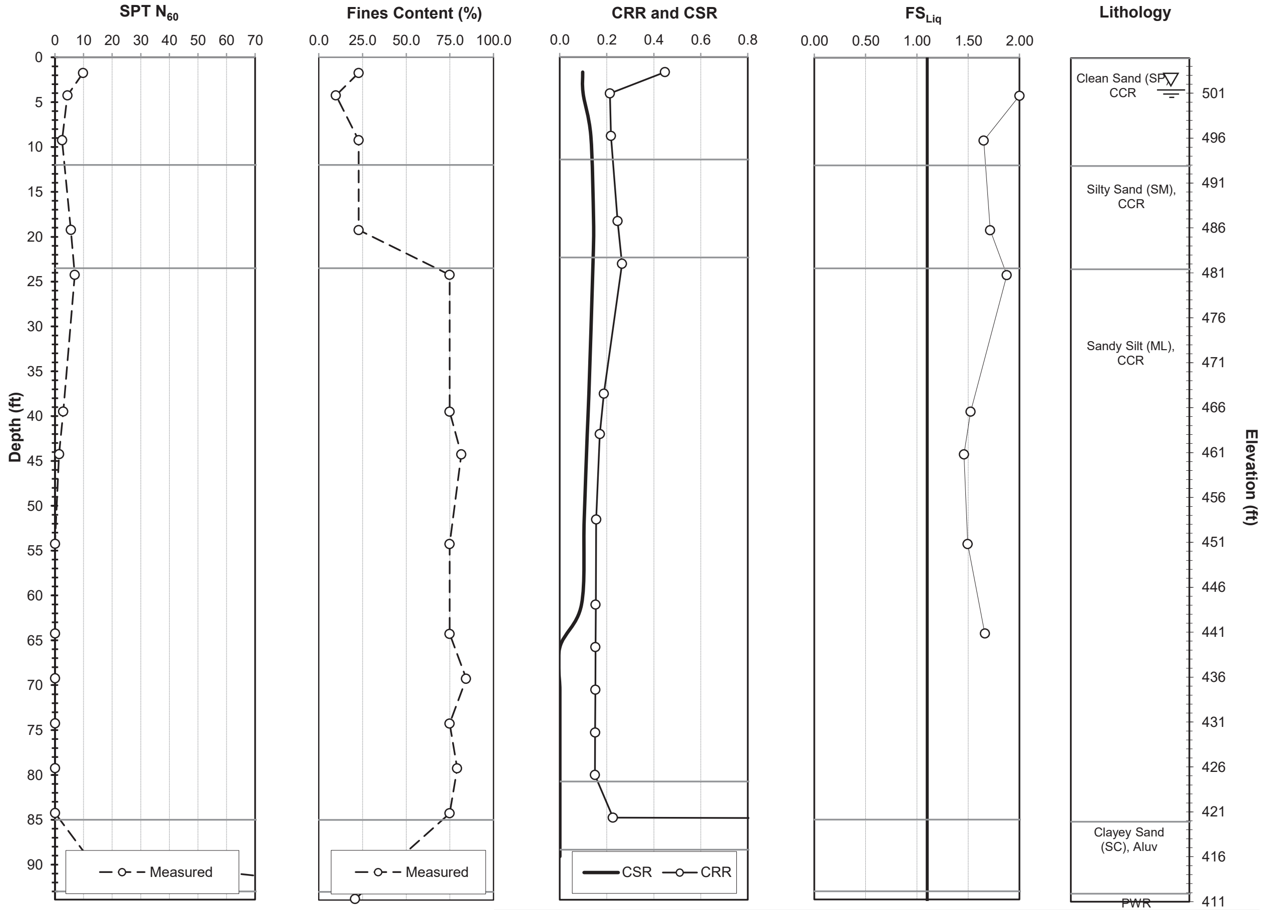
$$C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3 \quad (10)$$

$$K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1 \quad (11)$$

$$CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right) \quad (12)$$

$$CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma) \quad (13)$$

$$FS_{liq} = \frac{CRR}{CSR} \quad (14)$$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-104		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

B-105

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$
C_E =	1.45	
Borehole Diameter (in) =	4	102 mm
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*
Rod Length (ft) =	5	1.5 m **+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF = 1.8

					Define for Analysis GWT:								**Overburden Correction**		**Fines Content Correction**		**Shear Stress Reduction**					**Overburden Correction**						
							(Table 3)	(1)					(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)	(11)	(12)	(13)	(14)		
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF *Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'_{vc} (psf) WITH GWT AT ANALYSIS**
B-105	1	0.30	0	ML	Saturated	77.9	0.75	0	120	62.4	57.6	2.76	1.7	0.0	5.551	5.55	0.004	0.000	1.00	0.204	0.10	0.08	1.10	0.089	0.177	**0.87**	62.4	57.6
	2.75	0.84	10	MH resid	Saturated	77.9	0.75	10.9	330	171.6	158.4	7.58	1.7	18.5	5.551	24.08	-0.020	0.003	0.99	0.202	0.10	0.16	1.10	0.270	0.534	**2.00**	171.6	158.4
	5.25	1.60	17	MH resid	Saturated	77.9	0.80	19.76533	630	327.6	302.4	14.48	1.7	33.6	5.551	39.15	-0.056	0.007	0.98	0.198	0.10	0.30	1.10	3.166	6.269	**2.00**	327.6	302.4
	6.75	2.06	10	MH resid	Saturated	77.9	0.80	11.62667	810	421.2	388.8	18.62	1.7	19.8	5.551	25.32	-0.080	0.009	0.97	0.196	0.10	0.16	1.10	0.298	0.589	**2.00**	421.2	388.8
	8.25	2.52	15	MH resid	Saturated	77.9	0.85	18.53	990	514.8	475.2	22.75	1.7	31.5	5.551	37.05	-0.106	0.012	0.96	0.194	0.10	0.30	1.10	1.772	3.509	**2.00**	514.8	475.2
	9.75	2.97	13	MH resid	Saturated	77.9	0.85	16.05933	1170	608.4	561.6	26.89	1.7	27.3	5.551	32.85	-0.132	0.015	0.94	0.192	0.10	0.23	1.10	0.74	1.47	**2.00**	608.4	561.6
	11.25	3.43	7	MH resid	Saturated	77.9	0.85	8.647333	1350	702	648	31.03	1.7	14.7	5.551	20.25	-0.160	0.018	0.93	0.189	0.10	0.13	1.10	0.209	0.414	**2.00**	702	648
	12.75	3.89	5	MH resid	Saturated	75.8	0.85	6.176667	1530	795.6	734.4	35.16	1.7	10.5	5.557	16.04	-0.190	0.022	0.92	0.187	0.09	0.12	1.10	0.165	0.327	**1.75**	795.6	734.4
	14.25	4.34	2	MH resid	Saturated	77.9	0.85	2.470667	1710	889.2	820.8	39.30	1.6	4.0	5.551	9.52	-0.220	0.025	0.91	0.184	0.09	0.09	1.09	0.115	0.224	**1.22**	889.2	820.8
	15.75	4.80	4	MH resid	Saturated	77.9	0.95	5.522667	1890	982.8	907.2	43.44	1.5	8.4	5.551	13.99	-0.252	0.029	0.89	0.182	0.09	0.11	1.09	0.148	0.290	**1.60**	982.8	907.2
	16.25	4.95	10	MH resid	Saturated	77.9	0.95	13.80667	1950	1014	936	44.82	1.5	20.8	5.551	26.31	-0.263	0.030	0.89	0.181	0.09	0.17	1.10	0.325	0.643	**2.00**	1014	936
	18.75	5.72	5	ML sap	Saturated	48.6	0.95	6.903333	2250	1170	1080	51.71	1.4	9.7	5.614	15.28	-0.319	0.036	0.87	0.176	0.09	0.11	1.08	0.158	0.307	**1.74**	1170	1080
	24.75	7.55	4	ML sap	Saturated	48.6	0.95	5.522667	2970	1544.4	1425.6	68.26	1.2	6.7	5.614	12.34	-0.465	0.052	0.81	0.165	0.09	0.10	1.04	0.135	0.253	**1.53**	1544.4	1425.6
	29.75	9.07	3	ML sap	Saturated	48.6	1.00	4.36	3570	1856.4	1713.6	82.05	1.1	4.8	5.614	10.46	-0.598	0.067	0.76	0.155	0.08	0.09	1.02	0.121	0.223	**1.43**	1856.4	1713.6
	34.75	10.59	3	ML sap	Saturated	48.6	1.00	4.36	4170	2168.4	2001.6	95.84	1.0	4.5	5.614	10.10	-0.737	0.082	0.72	0.146	0.08	0.09	1.01	0.119	0.215	**1.48**	2168.4	2001.6
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
σ_{vc} = Total Vertical Stress
u = Pore Water Pressure
σ'_{vc} = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
C_σ = Overburden Correction Coefficient
K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

$$N_{60} = C_E C_B C_R C_S N \tag{1}$$

$$C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7 \tag{2}$$

$$(N_1)_{60} = C_N N_{60} \tag{3}$$

$$\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right) \tag{4}$$

-- FC in %

$$(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60} \tag{5}$$

$$\alpha = -1.012 - 1.126\sin\left(\frac{z}{11.73} + 5.133\right) \tag{6}$$

-- z in m

$$\beta = 0.106 + 0.118\sin\left(\frac{z}{11.28} + 5.142\right) \tag{7}$$

-- z in m

$$r_d = exp(\alpha + \beta \cdot M) \tag{8}$$

$$CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d \tag{9}$$

$$C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3 \tag{10}$$

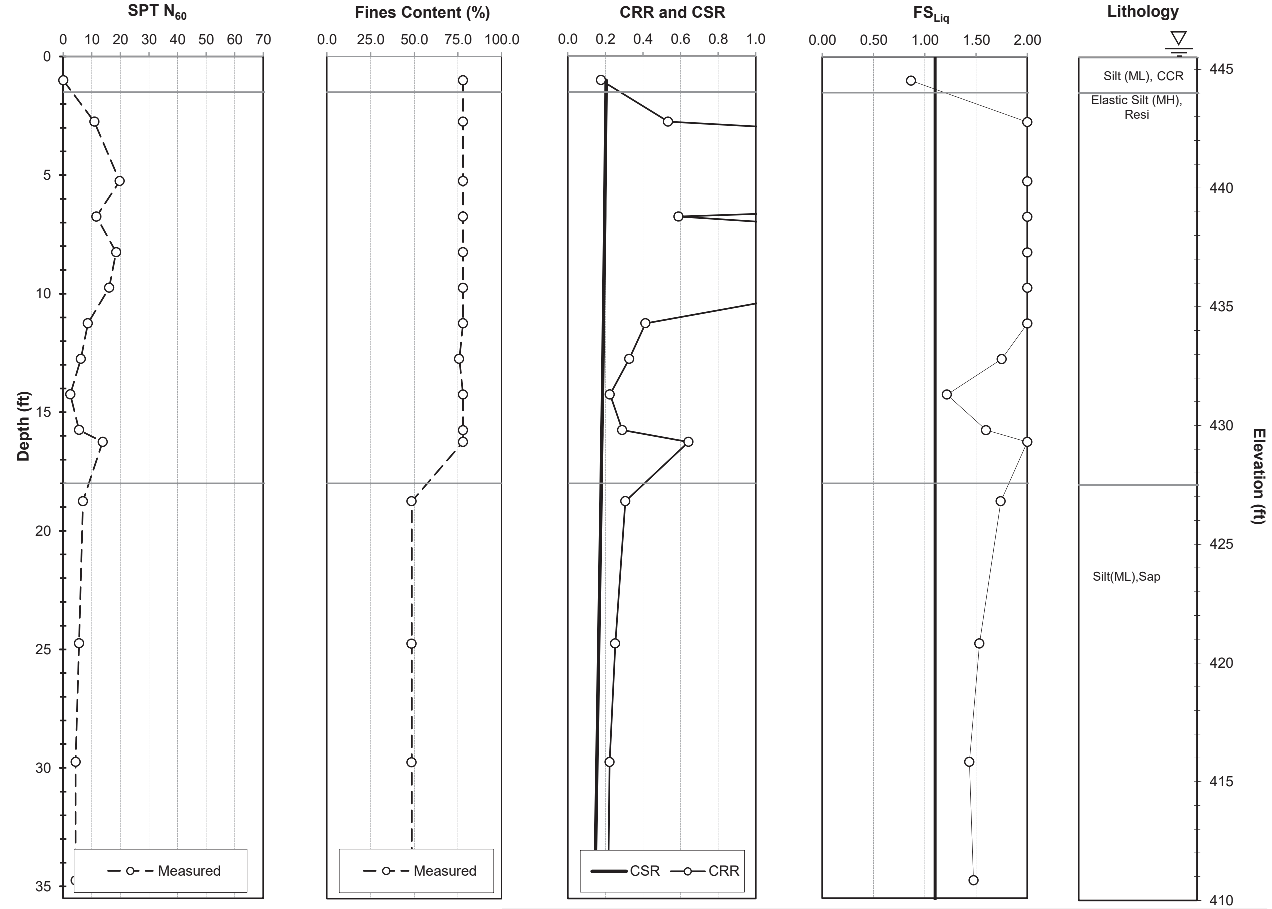
$$K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1 \tag{11}$$

$$CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right) \tag{12}$$

$$CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma) \tag{13}$$

$$FS_{liq} = \frac{CRR}{CSR} \tag{14}$$

Q:\DCS\Projects\L-URS\Jobs4_Projects\SCS CCP\Scherer GA_EPD_CCR Permitting (60563110)\9.0 Calculations\Liquefaction\Zahra's analysis\SPT\Magnitude 4.9\B-105 AECOM-SPT Triggering (Idriss and Boulanger 2008)



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-105		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

B-106

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$	
C_E =	1.45		
Borehole Diameter (in) =	4	102 mm	
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*	
Rod Length (ft) =	5	1.5 m	**+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*	

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'_{vc} (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF =	1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)	(11)	(12)	(13)	(14)		
													Overburden Correction		**Fines Content Correction**		**Shear Stress Reduction**					**Overburden Correction**						
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF *Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'_{vc} (psf) WITH GWT AT ANALYSIS**
B-106	0.75	0.23	0	ML ash	Saturated	41.2	0.75	0	90	46.8	43.2	2.07	1.7	0.0	5.586	5.59	0.007	0.000	1.01	0.204	0.10	0.08	1.10	0.090	0.177	**0.87**	46.8	43.2
	3.25	0.99	5	SM res	Saturated	41.2	0.75	5.45	390	202.8	187.2	8.96	1.7	9.3	5.586	14.85	-0.027	0.003	0.99	0.201	0.10	0.11	1.10	0.155	0.307	**1.52**	202.8	187.2
	6.75	2.06	4	SM sap	Saturated	41.2	0.80	4.650667	810	421.2	388.8	18.62	1.7	7.9	5.586	13.49	-0.080	0.009	0.97	0.196	0.10	0.10	1.10	0.144	0.285	**1.45**	421.2	388.8
	8.25	2.52	5	SM sap	Saturated	26.3	0.85	6.176667	990	514.8	475.2	22.75	1.7	10.5	5.169	15.67	-0.106	0.012	0.96	0.194	0.10	0.11	1.10	0.162	0.320	**1.65**	514.8	475.2
	13	3.96	50	50/0	Saturated	0.0	0.85	61.76667	1560	811.2	748.8	35.85	1.7	103.8	0.000	103.84	-0.195	0.022	0.92	0.186	0.12	-0.14	0.85	##############	##############	**2.00**	811.2	748.8
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
σ_{vc} = Total Vertical Stress
u = Pore Water Pressure
σ'_{vc} = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
C_σ = Overburden Correction Coefficient
K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $$N_{60} = C_E C_B C_R C_S N$$

(2) $$C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7$$

(3) $$(N_1)_{60} = C_N N_{60}$$

(4) $$\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$$ -- FC in %

(5) $$(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$$

(6) $$\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$ -- z in m

(7) $$\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$ -- z in m

(8) $$r_d = exp(\alpha + \beta \cdot M)$$

(9) $$CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$$

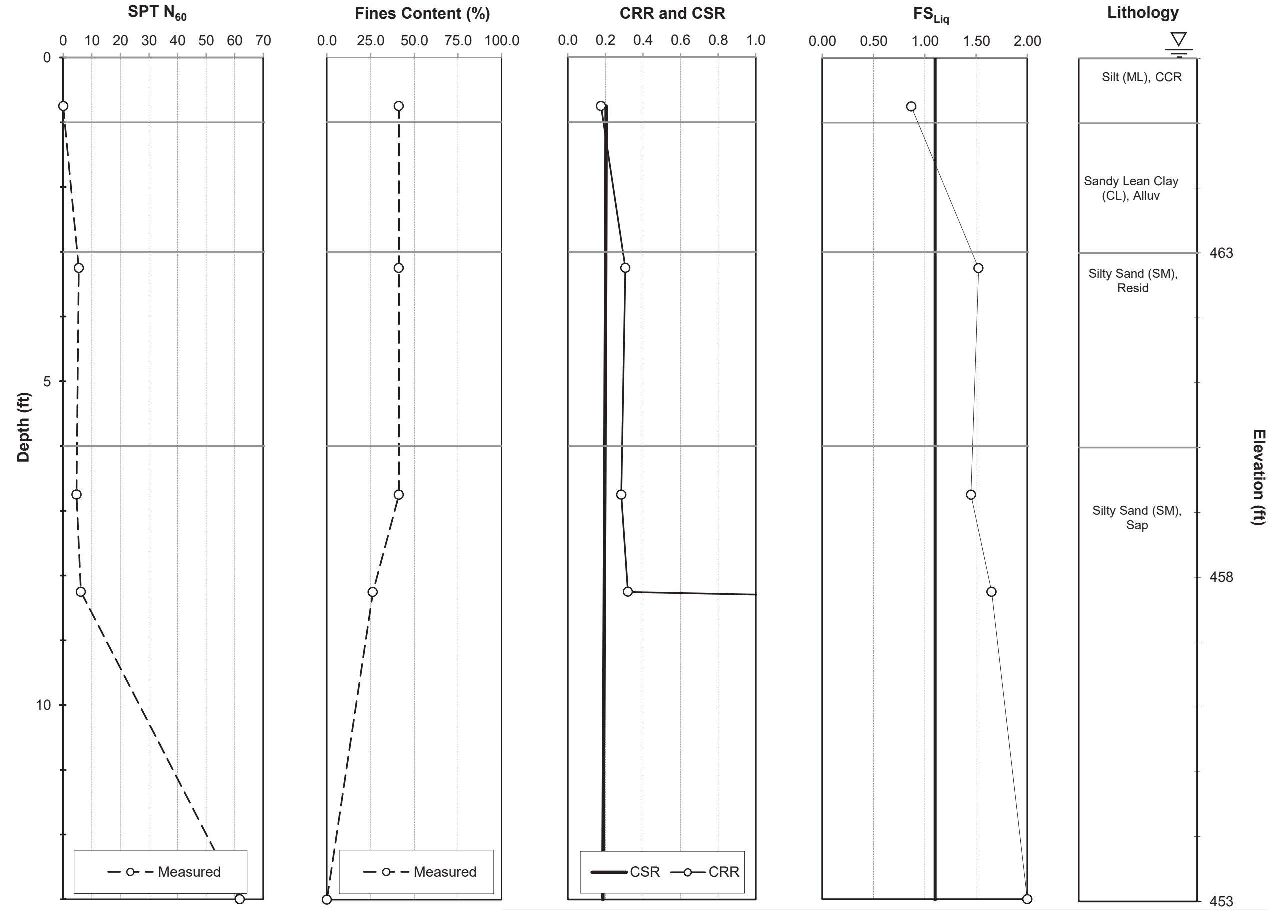
(10) $$C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3$$

(11) $$K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1$$

(12) $$CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$$

(13) $$CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma)$$

(14) $$FS_{liq} = \frac{CRR}{CSR}$$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-106		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

B-107

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
$γ_w$ (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$
C_E =	1.45	
Borehole Diameter (in) =	4	102 mm
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*
Rod Length (ft) =	5	1.5 m **+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF =	1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2) **Overburden Correction**	(3)	(4) **Fines Content Correction**	(5)	(6) **Shear Stress Reduction**	(7)	(8)	(9)		(10) **Overburden Correction**	(11)	(12)	(13)	(14)		
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**$σ_{vc}$ (psf)**	**u (psf)**	**σ'$_{vc}$ (psf)**	**σ'$_{vc}$ (kPa)**	**C_N**	**$(N_1)_{60}$**	**$Δ(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF *Kσ)**	**$C_σ$**	**$K_σ$**	**$CRR_{M=7.5,σ'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'$_{vc}$ (psf) WITH GWT AT ANALYSIS**
B-107	0.5	0.15	0	ML ash	Saturated	53.0	0.75	0	60	31.2	28.8	1.38	1.7	0.0	5.614	5.61	0.010	-0.001	1.01	0.205	0.10	0.08	1.10	0.090	0.178	**0.87**	31.2	28.8
	2	0.61	2	CL-CH	Clay	53.0	0.75	2.18	240	124.8	115.2	5.52	1.7	3.7	5.614	9.32	-0.009	0.002	1.00	0.203	0.10	0.09	1.10	0.113	0.224	**2.00**	124.8	115.2
	7.25	2.21	18	CL-CH	Clay	53.0	0.80	20.928	870	452.4	417.6	19.99	1.7	35.6	5.614	41.19	-0.088	0.010	0.96	0.196	0.10	0.30	1.10	6.220	12.315	**2.00**	452.4	417.6
	8.75	2.67	23	CL	Clay	53.0	0.85	28.41267	1050	546	504	24.13	1.7	48.3	5.614	53.92	-0.114	0.013	0.95	0.193	0.10	0.30	1.10	14537.952	28785.145	**2.00**	546	504
	9.05	2.76	50	50/3.25	Saturated	0.0	0.85	61.76667	1086	564.72	521.28	24.96	1.7	105.0	0.000	105.00	-0.120	0.014	0.95	0.193	0.13	-0.14	0.81	##############	##############	**2.00**	564.72	521.28
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
$γ_w$ = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
$σ_{vc}$ = Total Vertical Stress
u = Pore Water Pressure
σ'$_{vc}$ = Effective Vertical Stress = $σ_{vc}$ - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
$C_σ$ = Overburden Correction Coefficient
$K_σ$ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $N_{60} = C_E C_B C_R C_S N$

(2) $C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7$

(3) $(N_1)_{60} = C_N N_{60}$

(4) $\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$ -- FC in %

(5) $(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$

(6) $\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$ -- z in m

(7) $\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$ -- z in m

(8) $r_d = exp(\alpha + \beta \cdot M)$

(9) $CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$

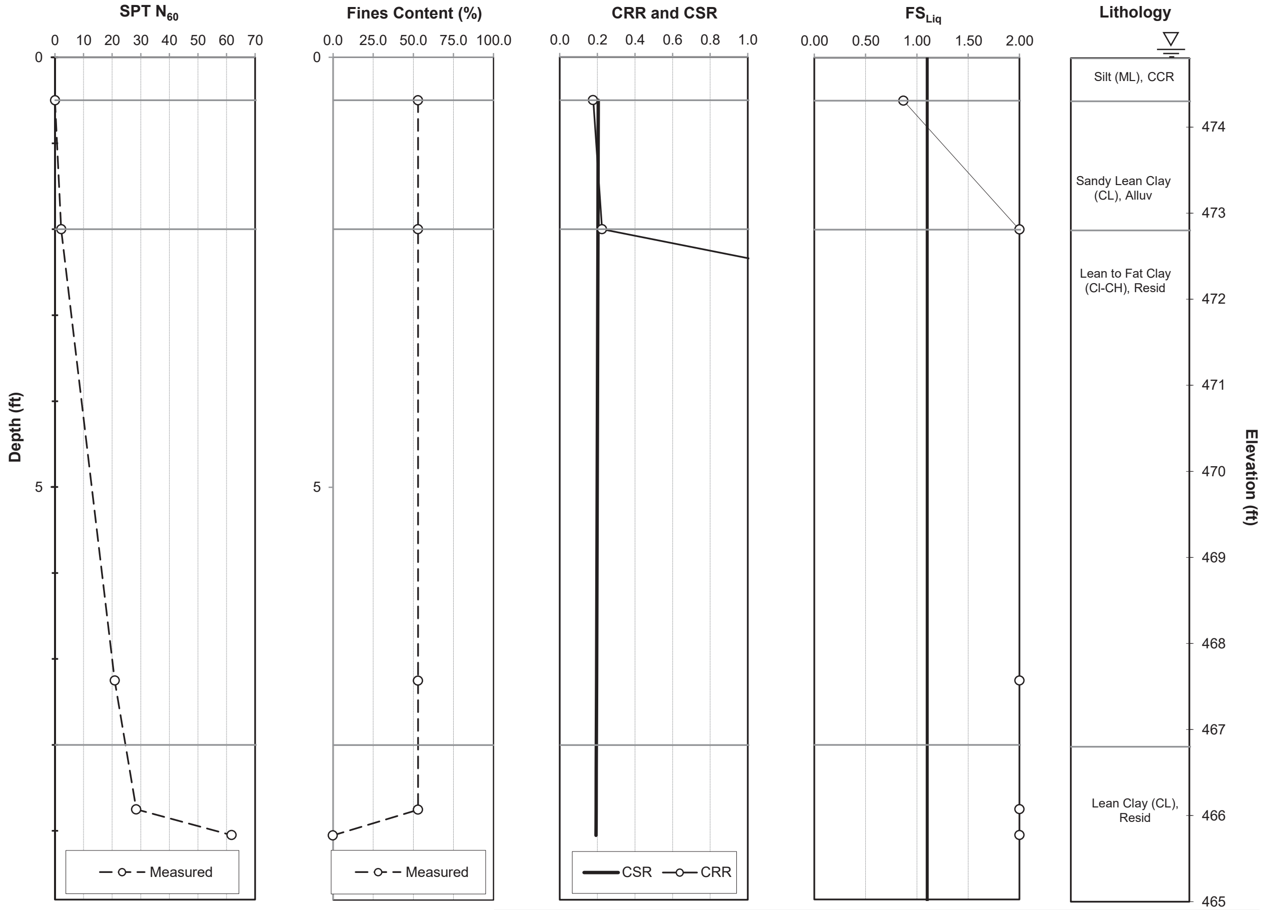
(10) $C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3$

(11) $K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1$

(12) $CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$

(13) $CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma)$

(14) $FS_{liq} = \frac{CRR}{CSR}$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-107		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

B-108

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$	
C_E =	1.45		
Borehole Diameter (in) =	4	102 mm	
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*	
Rod Length (ft) =	5	1.5 m	**+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*	

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \le 1.8$$

MSF = 1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)	(11)	(12)	(13)	(14)		
													Overburden Correction		**Fines Content Correction**		**Shear Stress Reduction**					**Overburden Correction**						
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF *Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'_{vc} (psf) WITH GWT AT ANALYSIS**
B-108	0.95	0.29	3	CL Tops	Clay		0.75	3.27	114	59.28	54.72	2.62	1.7	5.6	0.000	5.56	0.004	0.000	1.00	0.204	0.10	0.08	1.10	0.089	0.177	**2.00**	59.28	54.72
	3.45	1.05	0	CL alluv	Clay		0.75	0	414	215.28	198.72	9.51	1.7	0.0	0.000	0.00	-0.029	0.004	0.99	0.201	0.10	0.05	1.10	0.061	0.120	**2.00**	215.28	198.72
	5.95	1.81	6	CL res	Clay		0.80	6.976	714	371.28	342.72	16.41	1.7	11.9	0.000	11.86	-0.067	0.008	0.97	0.197	0.10	0.10	1.10	0.131	0.260	**2.00**	371.28	342.72
	9.45	2.88	13	CL res	Clay		0.85	16.05933	1134	589.68	544.32	26.06	1.7	27.3	0.000	27.30	-0.127	0.015	0.95	0.192	0.10	0.18	1.10	0.357	0.707	**2.00**	589.68	544.32
	12.95	3.95	3	SM sap	Saturated	27.7	0.85	3.706	1554	808.08	745.92	35.71	1.7	6.2	5.254	11.50	-0.194	0.022	0.92	0.186	0.09	0.10	1.10	0.129	0.255	**1.37**	808.08	745.92
	14.95	4.56	3	SM sap	Saturated	29.9	0.95	4.142	1794	932.88	861.12	41.23	1.6	6.5	5.359	11.85	-0.235	0.027	0.90	0.183	0.09	0.10	1.09	0.13	0.26	**1.41**	932.88	861.12
	19.45	5.93	12	SM sap	Saturated	27.7	0.95	16.568	2334	1213.68	1120.32	53.64	1.4	22.8	5.254	28.03	-0.335	0.038	0.86	0.175	0.09	0.19	1.10	0.385	0.762	**2.00**	1213.68	1120.32
	24.45	7.45	11	SM sap	Saturated	25.5	0.95	15.18733	2934	1525.68	1408.32	67.43	1.2	18.6	5.111	23.73	-0.458	0.051	0.81	0.165	0.09	0.15	1.06	0.263	0.503	**2.00**	1525.68	1408.32
	29.45	8.98	28	SM sap	Saturated	27.7	1.00	40.69333	3534	1837.68	1696.32	81.22	1.1	45.5	5.254	50.71	-0.589	0.066	0.77	0.156	0.08	0.30	1.07	1013.731	1945.782	**2.00**	1837.68	1696.32
	34.45	10.50	25	SM sap	Saturated	27.7	1.00	36.33333	4134	2149.68	1984.32	95.01	1.0	37.5	5.254	42.78	-0.728	0.081	0.72	0.146	0.08	0.30	1.02	11.450	21.007	**2.00**	2149.68	1984.32
	39	11.89	50	50/5.5	Saturated	0.0	1.00	72.66667	4680	2433.6	2246.4	107.56	1.0	70.5	0.000	70.53	-0.859	0.096	0.68	0.138	0.07	-0.40	1.02	##############	##############	**2.00**	2433.6	2246.4
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
σ_{vc} = Total Vertical Stress
u = Pore Water Pressure
σ'_{vc} = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
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K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $N_{60} = C_E C_B C_R C_S N$

(2) $C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \le 1.7$

(3) $(N_1)_{60} = C_N N_{60}$

(4) $\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$ -- FC in %

(5) $(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$

(6) $\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$ -- z in m

(7) $\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$ -- z in m

(8) $r_d = exp(\alpha + \beta \cdot M)$

(9) $CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$

(10) $C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \le 0.3$

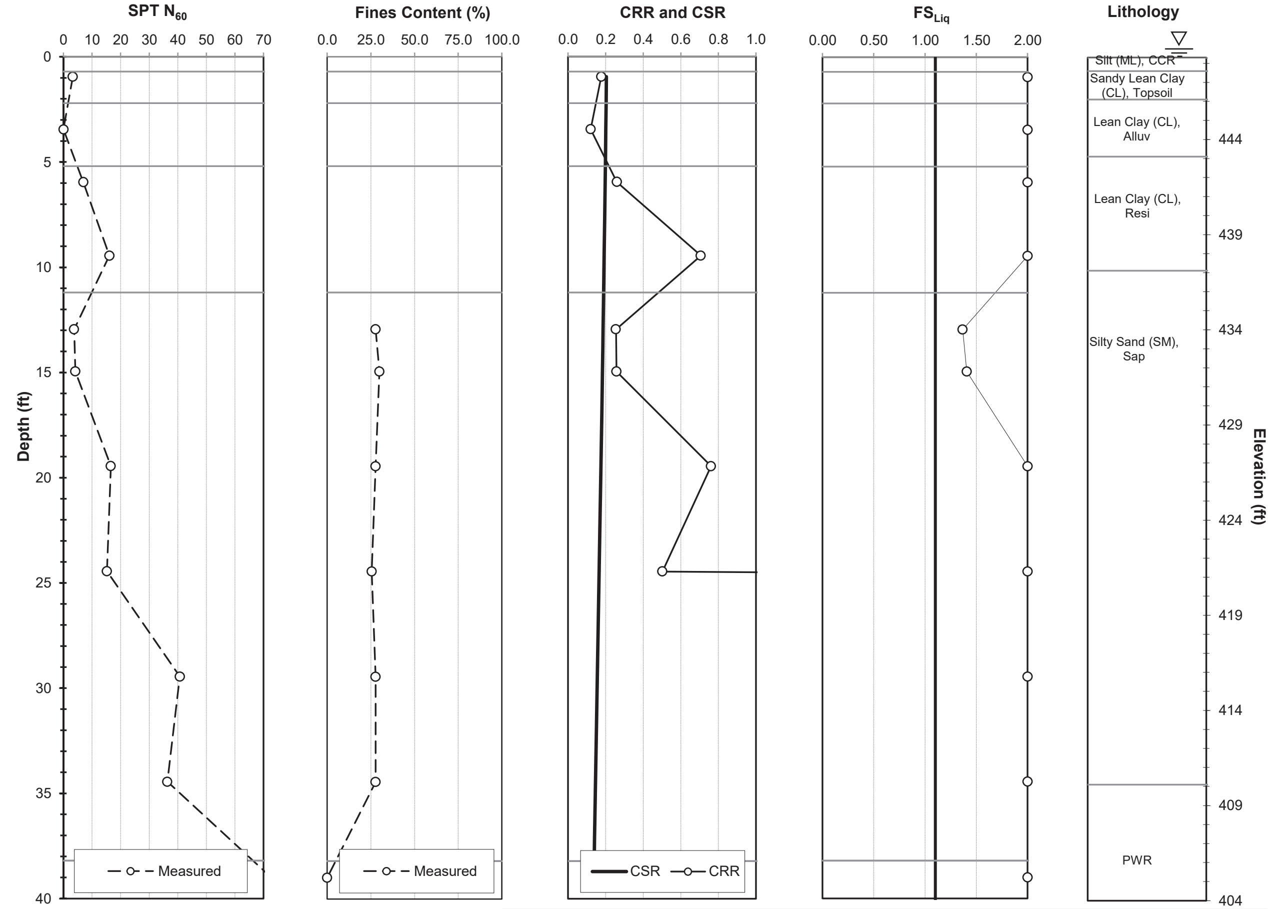
(11) $K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \le 1.1$

(12) $CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$

(13) $CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma)$

(14) $FS_{liq} = \frac{CRR}{CSR}$

Notes:
1. Fines Content of sand was calculated by the formula FC=10.472(z-z_{ts})^-0.485 where z is the depth and z_{ts} is depth to top of sand.
2. Fines Content of clay is based on laboratory testing within the boring or assumed conservatively in borings where no lab testing is available.
3. CSR values in sand were calculated based on the QUAD4 analysis and manually entered into spreadsheet.



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-108		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

B-109

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
$γ_w$ (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$
C_E =	1.45	
Borehole Diameter (in) =	4	102 mm
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*
Rod Length (ft) =	5	1.5 m **+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF = 1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2)	(3)	(4)	(5)	(6)	(7)	(8)			(10)	(11)					
													Overburden Correction		**Fines Content Correction**		**Shear Stress Reduction**			(9)		**Overburden Correction**		(12)	(13)	(14)		
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**$σ_{vc}$ (psf)**	**u (psf)**	**σ'$_{vc}$ (psf)**	**σ'$_{vc}$ (kPa)**	**C_N**	**$(N_1)_{60}$**	**$Δ(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF *Kσ)**	**$C_σ$**	**$K_σ$**	**$CRR_{M=7.5,σ'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'$_{vc}$ (psf) WITH GWT AT ANALYSIS**
B-109	1	0.30	0	SC alluv	Saturated	18.6	0.75	0	120	62.4	57.6	2.76	1.7	0.0	4.225	4.22	0.004	0.000	1.00	0.204	0.10	0.07	1.10	0.082	0.162	0.79	62.4	57.6
	6.75	2.06	9	CL res	Clay	60.0	0.80	10.464	810	421.2	388.8	18.62	1.7	17.8	5.602	23.39	-0.080	0.009	0.97	0.196	0.10	0.15	1.10	0.256	0.508	**2.00**	421.2	388.8
	9.75	2.97	65	PWR	Saturated	0.0	0.85	80.29667	1170	608.4	561.6	26.89	1.7	136.5	0.000	136.50	-0.132	0.015	0.94	0.192	0.12	-0.09	0.88	##############	##############	**2.00**	608.4	561.6
	12.5	3.81	50	PWR			0.85	61.76667	1500	780	720	34.47	1.7	105.0	0.000	105.00	-0.185	0.021	0.92	0.187	0.12	-0.14	0.85	##############	##############	**2.00**	780	720
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
$γ_w$ = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
$σ_{vc}$ = Total Vertical Stress
u = Pore Water Pressure
σ'$_{vc}$ = Effective Vertical Stress = $σ_{vc}$ - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
$C_σ$ = Overburden Correction Coefficient
$K_σ$ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $N_{60} = C_E C_B C_R C_S N$

(2) $C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7$

(3) $(N_1)_{60} = C_N N_{60}$

(4) $\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$ -- FC in %

(5) $(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$

(6) $\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$ -- z in m

(7) $\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$ -- z in m

(8) $r_d = exp(\alpha + \beta \cdot M)$

(9) $CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$

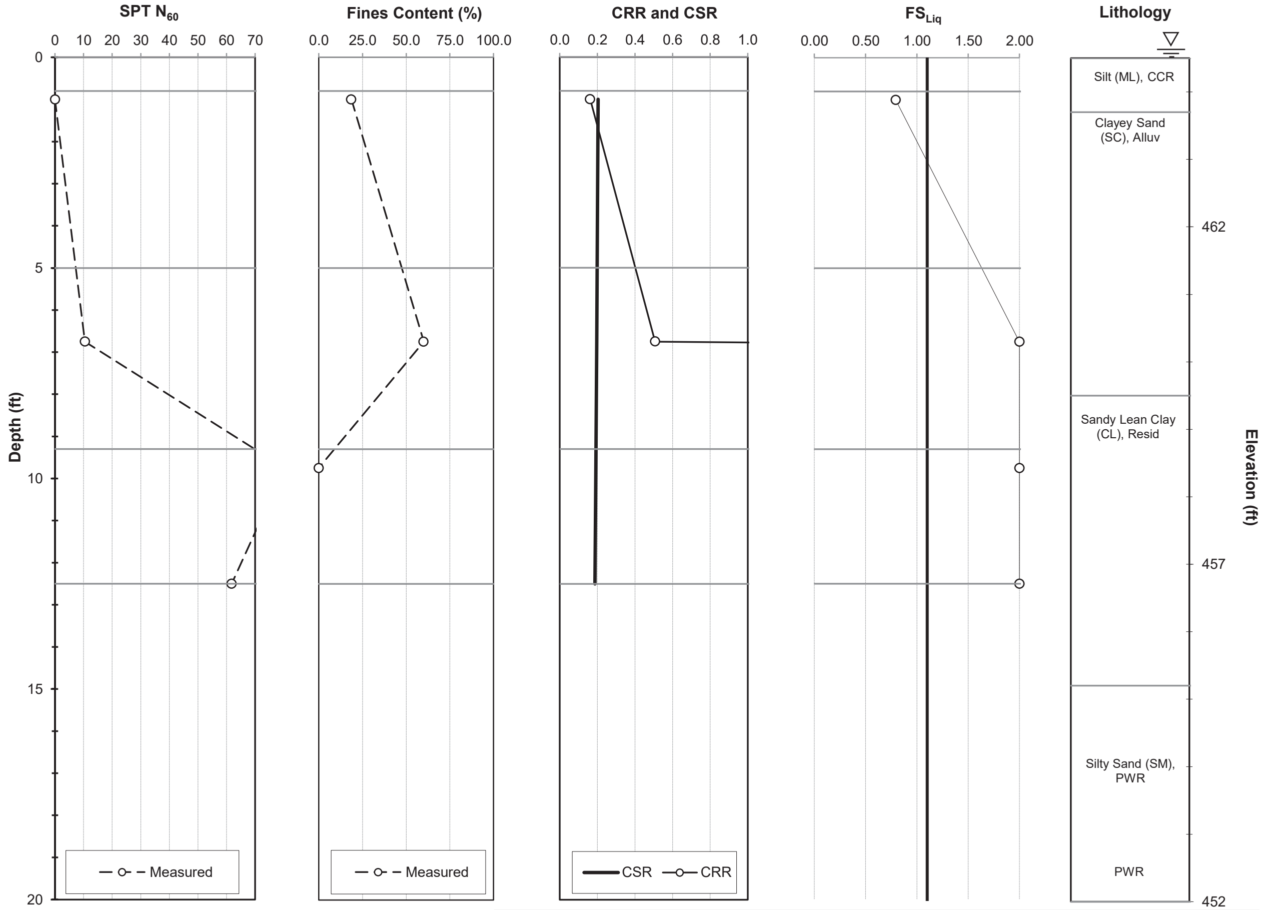
(10) $C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3$

(11) $K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1$

(12) $CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$

(13) $CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma)$

(14) $FS_{liq} = \frac{CRR}{CSR}$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-109		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

B-110

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$	
C_E =	1.45		
Borehole Diameter (in) =	4	102 mm	
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*	
Rod Length (ft) =	5	1.5 m	**+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*	

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF =	1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)	(11)	(12)	(13)	(14)		
													Overburden Correction		**Fines Content Correction**		**Shear Stress Reduction**					**Overburden Correction**						
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF *Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'$_{vc}$ (psf) WITH GWT AT ANALYSIS**
B-110	0.95	0.29	18	CL Tops	Saturated	73.9	0.75	19.62	114	59.28	54.72	2.62	1.7	33.4	5.563	38.92	0.004	0.000	1.00	0.204	0.10	0.30	1.10	2.951	5.843	**2.00**	59.28	54.72
	2.95	0.90	17	MH resid	Clay	75.4	0.75	18.53	354	184.08	169.92	8.14	1.7	31.5	5.558	37.06	-0.022	0.003	0.99	0.202	0.10	0.30	1.10	1.776	3.516	**2.00**	184.08	169.92
	6.95	2.12	24	MH resid	Saturated	75.4	0.80	27.904	834	433.68	400.32	19.17	1.7	47.4	5.558	53.00	-0.083	0.010	0.97	0.196	0.10	0.30	1.10	6388.233	12648.700	**2.00**	433.68	400.32
	8.45	2.58	23	MH resid	Saturated	75.4	0.85	28.41267	1014	527.28	486.72	23.30	1.7	48.3	5.558	53.86	-0.109	0.013	0.95	0.194	0.10	0.30	1.10	13813.857	27351.436	**2.00**	527.28	486.72
	9.95	3.03	20	MH resid	Saturated	75.4	0.85	24.70667	1194	620.88	573.12	27.44	1.7	42.0	5.558	47.56	-0.136	0.016	0.94	0.191	0.10	0.30	1.10	124.363	246.239	**2.00**	620.88	573.12
	11.45	3.49	14	MH resid	Saturated	75.4	0.85	17.29467	1374	714.48	659.52	31.58	1.7	29.4	5.558	34.96	-0.164	0.019	0.93	0.189	0.10	0.26	1.10	1.10	2.18	**2.00**	714.48	659.52
	16.45	5.02	7	MH resid	Saturated	76.8	0.95	9.664667	1974	1026.48	947.52	45.37	1.5	14.4	5.554	20.00	-0.267	0.030	0.89	0.180	0.09	0.13	1.10	0.206	0.408	**2.00**	1026.48	947.52
	21.45	6.54	8	SM sap	Saturated	21.4	0.95	11.04533	2574	1338.48	1235.52	59.16	1.3	14.5	4.692	19.15	-0.383	0.043	0.84	0.171	0.09	0.13	1.07	0.196	0.377	**2.00**	1338.48	1235.52
	26.45	8.06	25	SM sap	Saturated	8.0	0.95	34.51667	3174	1650.48	1523.52	72.95	1.2	40.7	0.361	41.04	-0.509	0.057	0.80	0.162	0.08	0.30	1.10	5.892	11.652	**2.00**	1650.48	1523.52
	31	9.45	50	50/5"	Saturated	0.0	1.00	72.66667	3720	1934.4	1785.6	85.49	1.1	79.1	0.000	79.11	-0.632	0.071	0.75	0.153	0.09	-0.26	0.96	##############	##############	**2.00**	1934.4	1785.6
	36.2	11.04	70				1.00	101.7333	4344	2258.88	2085.12	99.84	1.0	102.5	0.000	102.49	-0.778	0.087	0.70	0.143	0.08	-0.14	1.00	##############	##############	**2.00**	2258.88	2085.12
	39.2	11.95	50				1.00	72.66667	4704	2446.08	2257.92	108.11	1.0	70.3	0.000	70.35	-0.865	0.096	0.68	0.137	0.07	-0.40	1.03	##############	##############	**2.00**	2446.08	2257.92
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
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γ = Total Unit Weight of Soil
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CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $$N_{60} = C_E C_B C_R C_S N$$

(2) $$C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7$$

(3) $$(N_1)_{60} = C_N N_{60}$$

(4) $$\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$$ -- FC in %

(5) $$(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$$

(6) $$\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$ -- z in m

(7) $$\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$ -- z in m

(8) $$r_d = exp(\alpha + \beta \cdot M)$$

(9) $$CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$$

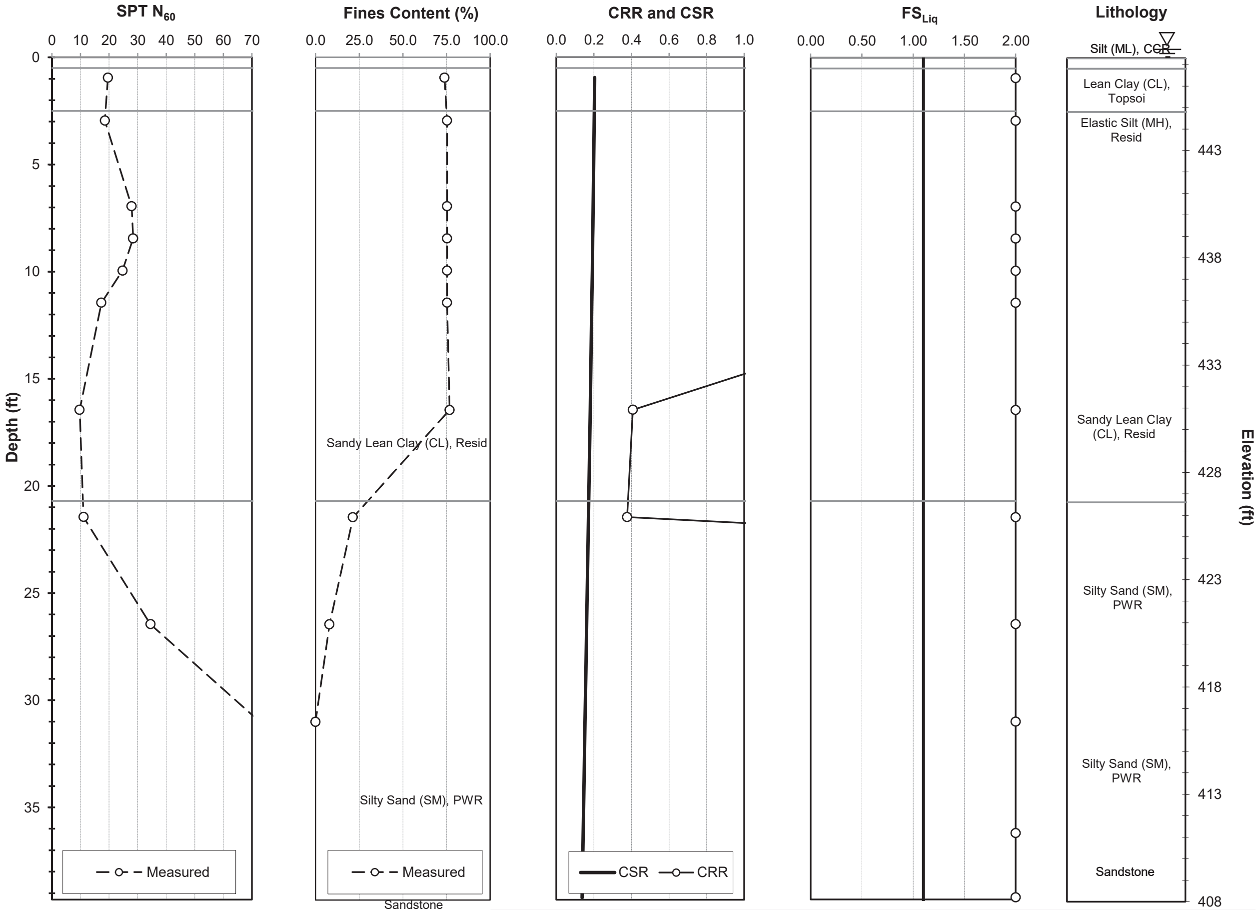
(10) $$C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3$$

(11) $$K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1$$

(12) $$CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$$

(13) $$CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma)$$

(14) $$FS_{liq} = \frac{CRR}{CSR}$$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-110		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

B-110

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$
C_E =	1.45	
Borehole Diameter (in) =	4	102 mm
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*
Rod Length (ft) =	5	1.5 m **+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description	Evaluated for final conditions at piezometer location			

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF =	1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)	(11)	(12)	(13)	(14)		
													Overburden Correction		**Fines Content Correction**		**Shear Stress Reduction**					**Overburden Correction**						
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF*Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'_{vc} (psf) WITH GWT AT ANALYSIS**
B-110	1.6	0.49	5	CH res	Clay	13.1	0.75	5.45	192	99.84	92.16	4.41	1.7	9.3	2.549	11.81	-0.004	0.001	1.00	0.203	0.10	0.10	1.10	0.131	0.260	**2.00**	99.84	92.16
	4.35	1.33	10	SC sap	Saturated	11.4	0.75	10.9	522	271.44	250.56	12.00	1.7	18.5	1.801	20.33	-0.043	0.005	0.98	0.200	0.10	0.14	1.10	0.210	0.416	**2.00**	271.44	250.56
	7.35	2.24	35	SC sap	Saturated	8.0	0.80	40.69333	882	458.64	423.36	20.27	1.7	69.2	0.361	69.54	-0.090	0.011	0.96	0.195	0.34	-0.42	0.32	################	##############	**2.00**	458.64	423.36
	8.85	2.70	63	SC sap	Saturated	7.1	0.85	77.826	1062	552.24	509.76	24.41	1.7	132.3	0.157	132.46	-0.116	0.013	0.95	0.193	0.12	-0.10	0.86	################	##############	**2.00**	552.24	509.76
	10.35	3.16	83	SC sap	Saturated	6.5	0.85	102.5327	1242	645.84	596.16	28.54	1.7	174.3	0.068	174.37	-0.143	0.016	0.94	0.191	0.12	-0.07	0.91	#NUM!	#NUM!	**#NUM!**	645.84	596.16
	15.35	4.68	51	pw rock	Saturated	0.0	0.95	70.414	1842	957.84	884.16	42.33	1.5	108.9	0.000	108.94	-0.243	0.028	0.90	0.182	0.11	-0.13	0.89	################	##############	**2.00**	957.84	884.16
	20.1	6.13	80	50/4.75	Saturated	0.0	0.95	110.4533	2412	1254.24	1157.76	55.43	1.4	149.3	0.000	149.33	-0.351	0.040	0.85	0.174	0.10	-0.08	0.95	#NUM!	#NUM!	**#NUM!**	1254.24	1157.76
	25.35	7.73	75		Saturated	0.0	0.95	103.55	3042	1581.84	1460.16	69.91	1.2	124.7	0.000	124.66	-0.481	0.054	0.81	0.164	0.09	-0.10	0.96	################	##############	**2.00**	1581.84	1460.16
	30.35	9.25	88	50/2.5	Saturated	0.0	1.00	127.8933	3642	1893.84	1748.16	83.70	1.1	140.7	0.000	140.71	-0.614	0.069	0.76	0.154	0.09	-0.09	0.98	#NUM!	#NUM!	**#NUM!**	1893.84	1748.16
		0.00	50	50/0	Saturated	0.0	0.75	54.5	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
σ_{vc} = Total Vertical Stress
u = Pore Water Pressure
σ'_{vc} = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
C_σ = Overburden Correction Coefficient
K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $N_{60} = C_E C_B C_R C_S N$

(2) $C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7$

(3) $(N_1)_{60} = C_N N_{60}$

(4) $\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$ -- FC in %

(5) $(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$

(6) $\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$ -- z in m

(7) $\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$ -- z in m

(8) $r_d = exp(\alpha + \beta \cdot M)$

(9) $CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$

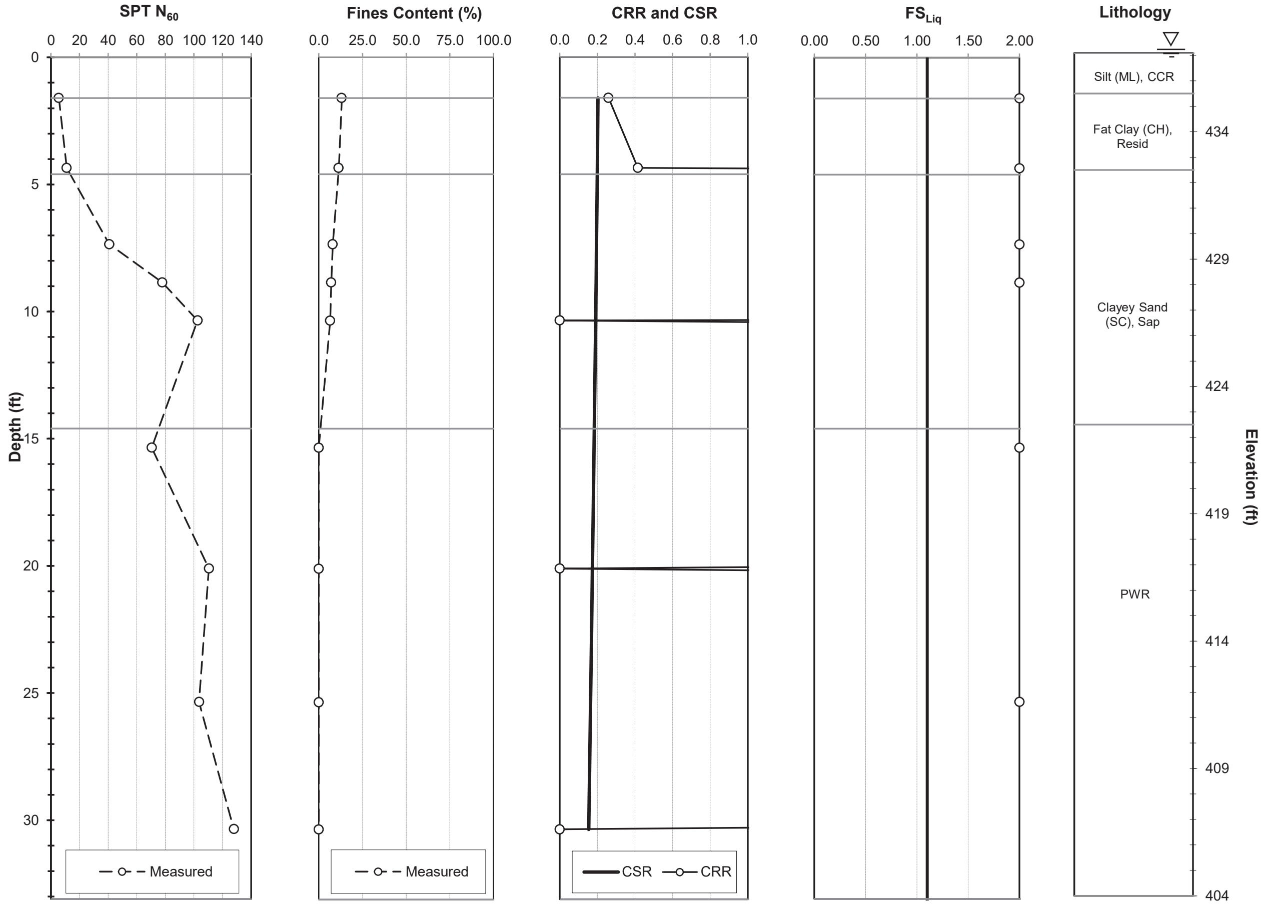
(10) $C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3$

(11) $K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1$

(12) $CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$

(13) $CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma)$

(14) $FS_{liq} = \frac{CRR}{CSR}$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-110		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

B-112

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$
C_E =	1.45	
Borehole Diameter (in) =	4	102 mm
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*
Rod Length (ft) =	5	1.5 m **+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description	Evaluated for final conditions at piezometer location			

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF =	1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2) **Overburden Correction**	(3)	(4) **Fines Content Correction**	(5)	(6) **Shear Stress Reduction**	(7)	(8)	(9)		(10) **Overburden Correction**	(11)	(12)	(13)	(14)		
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'$_{vc}$ (psf)**	**σ'$_{vc}$ (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF* Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'$_{vc}$ (psf) WITH GWT AT ANALYSIS**
B-112	2.25	0.69	0	CH res	Clay		0.75	0	270	140.4	129.6	6.21	1.7	0.0	0.000	0.00	-0.013	0.002	1.00	0.202	0.10	0.05	1.10	0.061	0.120	**2.00**	140.4	129.6
	3.25	0.99	8	CL res	Clay		0.75	8.72	390	202.8	187.2	8.96	1.7	14.8	0.000	14.82	-0.027	0.003	0.99	0.201	0.10	0.11	1.10	0.155	0.306	**2.00**	202.8	187.2
	4.75	1.45	16	CL res	Clay		0.75	17.44	570	296.4	273.6	13.10	1.7	29.6	0.000	29.65	-0.049	0.006	0.98	0.199	0.10	0.20	1.10	0.464	0.918	**2.00**	296.4	273.6
	7.25	2.21	3	SM alluv	Saturated	19.1	0.80	3.488	870	452.4	417.6	19.99	1.7	5.9	4.317	10.25	-0.088	0.010	0.96	0.196	0.10	0.09	1.10	0.120	0.237	**1.21**	452.4	417.6
	9.75	2.97	3	SM alluv	Saturated	10.2	0.85	3.706	1170	608.4	561.6	26.89	1.7	6.3	1.249	7.55	-0.132	0.015	0.94	0.192	0.10	0.08	1.10	0.102	0.201	**1.05**	608.4	561.6
	11.25	3.43	4	SM alluv	Saturated	8.6	0.85	4.941333	1350	702	648	31.03	1.7	8.4	0.558	8.96	-0.160	0.018	0.93	0.189	0.10	0.09	1.10	0.111	0.220	**1.16**	702	648
	14.75	4.50	2	ML sap	Saturated	6.6	0.95	2.761333	1770	920.4	849.6	40.68	1.6	4.4	0.081	4.44	-0.231	0.026	0.90	0.183	0.10	0.07	1.07	0.083	0.159	**0.87**	920.4	849.6
	19.75	6.02	8	SM sap	Saturated	5.3	0.95	11.04533	2370	1232.4	1137.6	54.47	1.4	15.1	0.005	15.07	-0.342	0.039	0.86	0.174	0.09	0.11	1.07	0.157	0.302	**1.73**	1232.4	1137.6
	24.75	7.55	24	SM sap	Saturated	4.5	0.95	33.136	2970	1544.4	1425.6	68.26	1.2	40.4	0.000	40.37	-0.465	0.052	0.81	0.165	0.08	0.30	1.10	4.675	9.257	**2.00**	1544.4	1425.6
	29.75	9.07	32	SM sap	Saturated	4.0	1.00	46.50667	3570	1856.4	1713.6	82.05	1.1	51.7	0.000	51.68	-0.598	0.067	0.76	0.155	0.08	0.30	1.06	2146.981	4109.223	**2.00**	1856.4	1713.6
	34.75	10.59	17	SM sap	Saturated	3.7	1.00	24.70667	4170	2168.4	2001.6	95.84	1.0	25.4	0.000	25.40	-0.737	0.082	0.72	0.146	0.08	0.17	1.01	0.300	0.545	**2.00**	2168.4	2001.6
	39	11.89	50				1.00	72.66667	4680	2433.6	2246.4	107.56	1.0	70.5	0.000	70.53	-0.859	0.096	0.68	0.138	0.07	-0.40	1.02	################	##############	**2.00**	2433.6	2246.4
	40.1	12.23	50				1.00	72.66667	4812	2502.24	2309.76	110.59	1.0	69.6	0.000	69.56	-0.891	0.099	0.67	0.136	0.07	-0.42	1.04	################	##############	**2.00**	2502.24	2309.76
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
N = Measured Standard Penetration Number
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ER = Energy Ratio
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u = Pore Water Pressure
σ'$_{vc}$ = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
C_σ = Overburden Correction Coefficient
K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $N_{60} = C_E C_B C_R C_S N$

(2) $C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7$

(3) $(N_1)_{60} = C_N N_{60}$

(4) $\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$ -- FC in %

(5) $(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$

(6) $\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$ -- z in m

(7) $\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$ -- z in m

(8) $r_d = exp(\alpha + \beta \cdot M)$

(9) $CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$

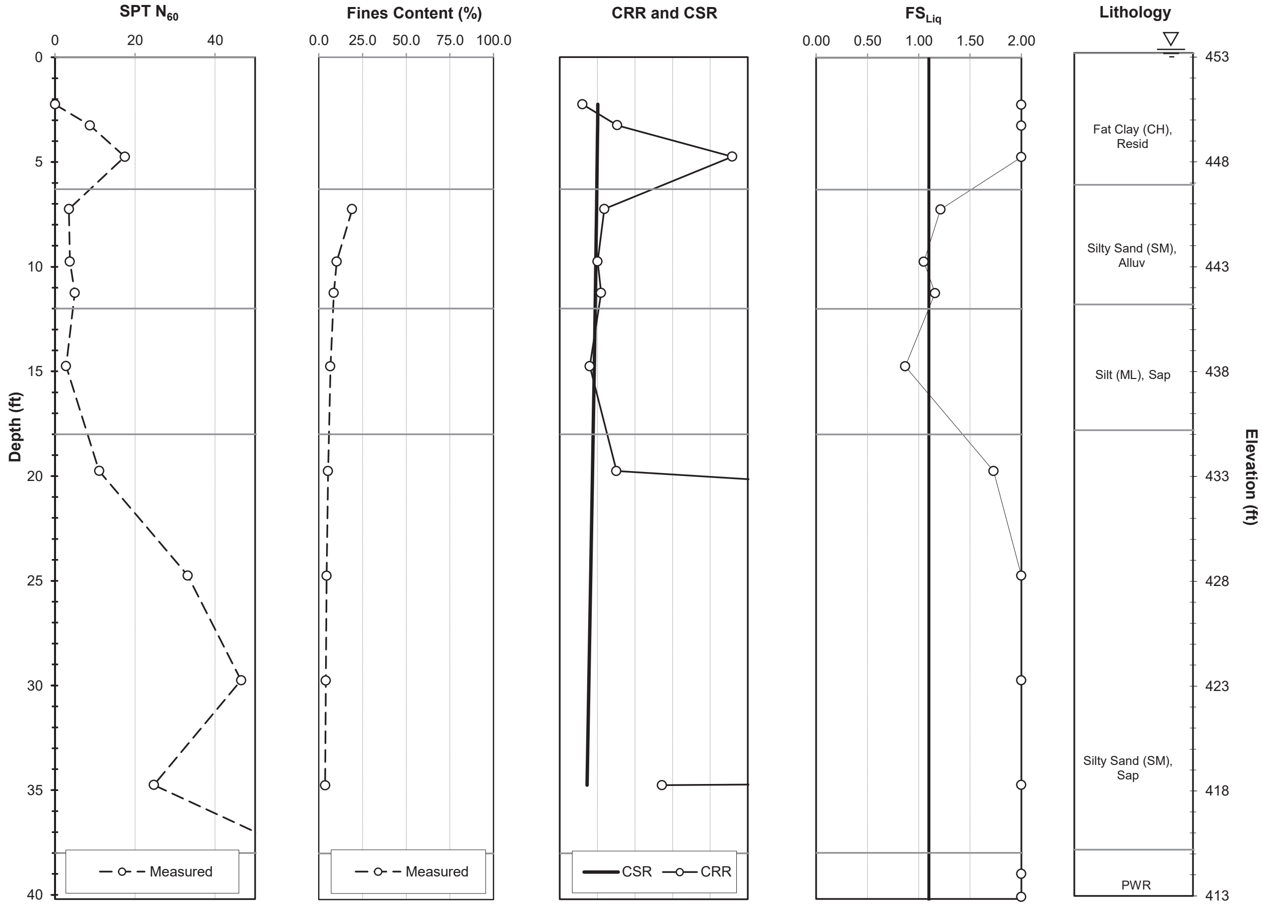
(10) $C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3$

(11) $K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1$

(12) $CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$

(13) $CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma)$

(14) $FS_{liq} = \frac{CRR}{CSR}$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-112		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

B-113

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$
C_E =	1.45	
Borehole Diameter (in) =	4	102 mm
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*
Rod Length (ft) =	5	1.5 m **+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*

Surcharge	**Thickness (ft)**	**Thickness (m)**	**γ (pcf)**	**σ'$_{vc}$ (psf)**
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF = 1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2)	(3)	(4)	(5)	(6)	(7)	(8)			(10)	(11)					
													Overburden Correction		**Fines Content Correction**		**Shear Stress Reduction**			(9)		**Overburden Correction**		(12)	(13)	(14)		
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF* Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'_{vc} (psf) WITH GWT AT ANALYSIS**
B-113	2.25	0.69	6	MH resid	Saturated	46.9	0.75	6.54	270	140.4	129.6	6.21	1.7	11.1	5.611	16.73	-0.013	0.002	1.00	0.202	0.10	0.12	1.10	0.171	0.339	**1.68**	140.4	129.6
	5.75	1.75	7	MH resid	Saturated	52.2	0.80	8.138667	690	358.8	331.2	15.86	1.7	13.8	5.615	19.45	-0.064	0.008	0.97	0.198	0.10	0.13	1.10	0.199	0.395	**2.00**	358.8	331.2
	7.25	2.21	9	MH resid	Saturated	52.2	0.80	10.464	870	452.4	417.6	19.99	1.7	17.8	5.615	23.40	-0.088	0.010	0.96	0.196	0.10	0.15	1.10	0.257	0.508	**2.00**	452.4	417.6
	8.75	2.67	7	SM res	Saturated	52.2	0.85	8.647333	1050	546	504	24.13	1.7	14.7	5.615	20.32	-0.114	0.013	0.95	0.193	0.10	0.14	1.10	0.210	0.415	**2.00**	546	504
	10.25	3.13	8	SM res	Saturated	52.2	0.85	9.882667	1230	639.6	590.4	28.27	1.7	16.8	5.615	22.42	-0.141	0.016	0.94	0.191	0.10	0.15	1.10	0.240	0.474	**2.00**	639.6	590.4
	12.75	3.89	10	SM res	Saturated	52.2	0.85	12.35333	1530	795.6	734.4	35.16	1.7	21.0	5.615	26.58	-0.190	0.022	0.92	0.187	0.09	0.17	1.10	0.333	0.659	**2.00**	795.6	734.4
	15.75	4.80	26	SM sap	Saturated	52.2	0.95	35.89733	1890	982.8	907.2	43.44	1.5	54.8	5.615	60.44	-0.252	0.029	0.89	0.182	1.20	-1.08	0.08	23689549.560	3580231.459	**2.00**	982.8	907.2
	20.6	6.28	85	PWR	Saturated	5.1	0.95	117.3567	2472	1285.44	1186.56	56.81	1.3	156.7	0.003	156.73	-0.363	0.041	0.85	0.173	0.10	-0.08	0.96	#NUM!	#NUM!	**#NUM!**	1285.44	1186.56
					Saturated	#NUM!	0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	#NUM!	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
					Saturated	#NUM!	0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	#NUM!	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
					Saturated	#NUM!	0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	#NUM!	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
N = Measured Standard Penetration Number
FC = Fines Content
ER = Energy Ratio
C_E = Energy Ratio Correction Factor
C_B = Borehole Diameter Correction Factor
C_R = Rod Length Correction Factor
C_S = Sampling Correction Factor
N_{60} = Corrected Standard Penetration Number
σ_{vc} = Total Vertical Stress
u = Pore Water Pressure
σ'_{vc} = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
C_σ = Overburden Correction Coefficient
K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

(1) $N_{60} = C_E C_B C_R C_S N$

(2) $C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7$

(3) $(N_1)_{60} = C_N N_{60}$

(4) $\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right)$ -- FC in %

(5) $(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60}$

(6) $\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$ -- z in m

(7) $\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$ -- z in m

(8) $r_d = exp(\alpha + \beta \cdot M)$

(9) $CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d$

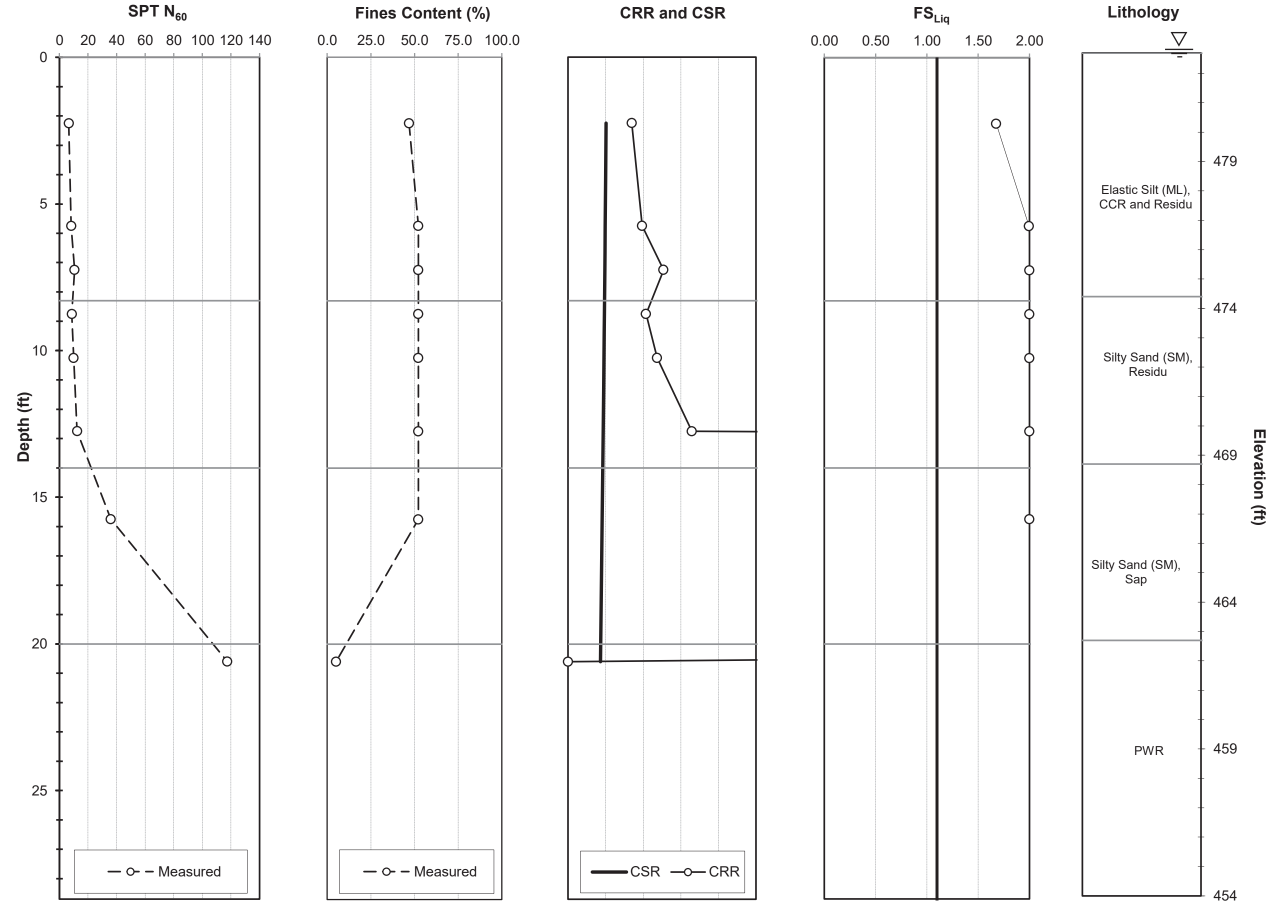
(10) $C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3$

(11) $K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1$

(12) $CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right)$

(13) $CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma)$

(14) $FS_{liq} = \frac{CRR}{CSR}$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-113		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

Evaluation of Liquefaction Potential Using SPT-Based Procedure (Idriss and Boulanger, 2008)

B-114

General Information:

PGA (g) =	0.15
M_w =	4.9
GWT (ft) DURING DRILL =	0
GWT (ft) FOR ANALYSIS =	0
γ above GWT (pcf) =	116
γ below GWT (pcf) =	120
γ_w (pcf) =	62.4
P_a (psf) =	2116.2

SPT Information:

ER (%) =	87.2	$C_E = \frac{ER}{60}$	
C_E =	1.45		
Borehole Diameter (in) =	4	102 mm	
C_B =	1	*(Table 3, Idriss and Boulanger, 2008)*	
Rod Length (ft) =	5	1.5 m	**+ Sample Depth**
C_S =	1	*(Table 3, Idriss and Boulanger, 2008)*	

Surcharge	Thickness (ft)	Thickness (m)	γ (pcf)	σ'$_{vc}$ (psf)
Embankment		0.00		0
CCR fill		0.00		0
Description				

$$MSF = 6.9exp\left(\frac{-M}{4}\right) - 0.058 \leq 1.8$$

MSF = 1.8

					Define for Analysis GWT:		*(Table 3)*	(1)					(2) Overburden Correction	(3) Overburden Correction	(4) Fines Content Correction	(5) Fines Content Correction	(6) Shear Stress Reduction	(7) Shear Stress Reduction	(8) Shear Stress Reduction	(9)		(10) Overburden Correction	(11) Overburden Correction	(12)	(13)	(14)		
Test Hole No.	**Sample Depth (ft)**	**Sample Depth, z (m)**	**N (blows/ft)**	**USCS Classification**	**"Unsaturated" "Saturated" or "Clay"**	**FC (%)**	**C_R**	**N_{60}**	**σ_{vc} (psf)**	**u (psf)**	**σ'_{vc} (psf)**	**σ'_{vc} (kPa)**	**C_N**	**$(N_1)_{60}$**	**$\Delta(N_1)_{60}$**	**$(N_1)_{60cs}$**	**α**	**β**	**r_d**	**CSR**	**CSR/(MSF*Kσ)**	**C_σ**	**K_σ**	**$CRR_{M=7.5,\sigma'vc=1atm}$**	**CRR**	**FS_{liq}**	**u (psf) WITH GWT AT ANALYSIS**	**σ'$_{vc}$ (psf) WITH GWT AT ANALYSIS**
B-114	0.75	0.23	0	SC Tops	Saturated	21.4	0.75	0	90	46.8	43.2	2.07	1.7	0.0	4.692	4.69	0.007	0.000	1.01	0.204	0.10	0.07	1.10	0.084	0.167	**0.82**	46.8	43.2
	4.75	1.45	20	CL-CH	Clay	60.0	0.75	21.8	570	296.4	273.6	13.10	1.7	37.1	5.602	42.66	-0.049	0.006	0.98	0.199	0.10	0.30	1.10	10.932	21.645	**2.00**	296.4	273.6
	7.25	2.21	15	CL-CH	Clay	60.0	0.80	17.44	870	452.4	417.6	19.99	1.7	29.6	5.602	35.25	-0.088	0.010	0.96	0.196	0.10	0.27	1.10	1.168	2.313	**2.00**	452.4	417.6
	14.25	4.34	9	SM res	Saturated	5.1	0.85	11.118	1710	889.2	820.8	39.30	1.6	17.9	0.003	17.86	-0.220	0.025	0.91	0.184	0.09	0.12	1.10	0.182	0.361	**1.96**	889.2	820.8
	19.25	5.87	55		Saturated		0.95	75.93667	2310	1201.2	1108.8	53.09	1.4	104.9	0.000	104.91	-0.331	0.037	0.86	0.175	0.11	-0.14	0.91	################	##############	**2.00**	1201.2	1108.8
					Saturated		0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
					Saturated	52.2	0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	5.615	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
					Saturated	#NUM!	0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	#NUM!	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
					Saturated	#NUM!	0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	#NUM!	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
					Saturated	#NUM!	0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	#NUM!	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
					Saturated	#NUM!	0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	#NUM!	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0
							0.75	0	0	0	0	0.00	#DIV/0!	#DIV/0!	0.000	#DIV/0!	0.016	-0.001	1.01	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	**#DIV/0!**	0	0

PGA = Peak Ground Acceleration
M_w = Earthquake Magnitude
GWT = Ground Water Table
γ = Total Unit Weight of Soil
P_a = Atmospheric Pressure
γ_w = Unit Weight of Water
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C_R = Rod Length Correction Factor
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N_{60} = Corrected Standard Penetration Number
σ_{vc} = Total Vertical Stress
u = Pore Water Pressure
σ'_{vc} = Effective Vertical Stress = σ_{vc} - u
C_N = Overburden Correction Factor
$(N_1)_{60}$ = Overburden Corrected Penetration Resistance
$(N_1)_{60cs}$ = Equivalent Clean-Sand Penetration Resistance
r_d = Stress Reduction Coefficient
MSF = Magnitude Scaling Factor
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K_σ = Overburden Correction Factor

CSR = Cyclic Stress Ratio (Liquefaction Triggering)
CRR = Cyclic Resistance Ratio (Resistance to Liquefaction)
FS_{liq} = Factor of Safety Against Liquefaction

$$N_{60} = C_E C_B C_R C_S N \tag{1}$$

$$C_N = \left(\frac{P_a}{\sigma'_{vc}}\right)^{0.5} \leq 1.7 \tag{2}$$

$$(N_1)_{60} = C_N N_{60} \tag{3}$$

$$\Delta(N_1)_{60} = exp\left(1.63 + \frac{9.7}{FC + 0.01} - \left(\frac{15.7}{FC + 0.01}\right)^2\right) \tag{4}$$

-- FC in %

$$(N_1)_{60cs} = (N_1)_{60} + \Delta(N_1)_{60} \tag{5}$$

$$\alpha = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right) \tag{6}$$

-- z in m

$$\beta = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right) \tag{7}$$

-- z in m

$$r_d = exp(\alpha + \beta \cdot M) \tag{8}$$

$$CSR = 0.65\left(\frac{\sigma_{vc}}{\sigma'_{vc}}\right)\left(\frac{PGA}{g}\right) r_d \tag{9}$$

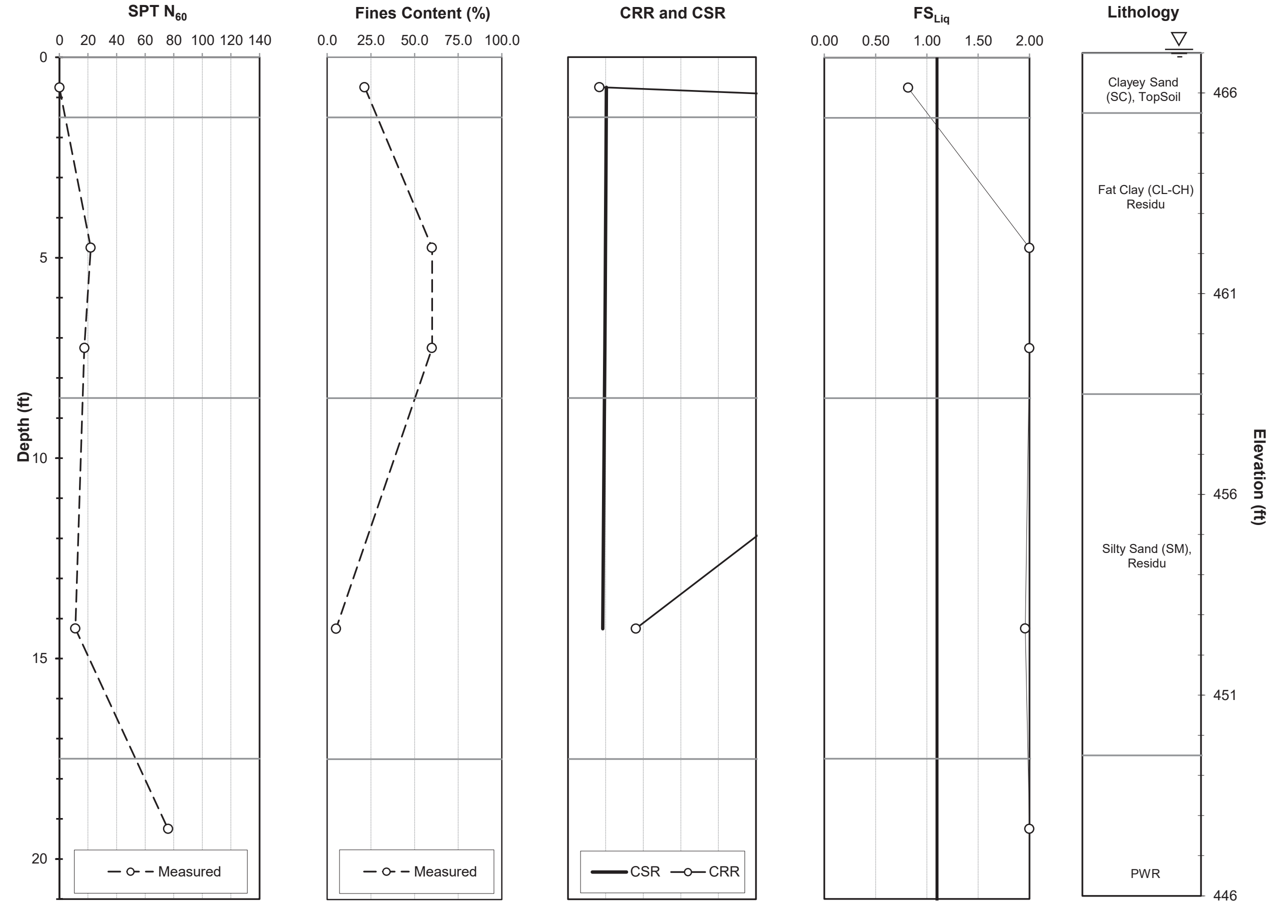
$$C_\sigma = \frac{1}{18.9 - 2.55\sqrt{(N_1)_{60cs}}} \leq 0.3 \tag{10}$$

$$K_\sigma = 1 - C_\sigma ln\left(\frac{\sigma'_{vc}}{P_a}\right) \leq 1.1 \tag{11}$$

$$CRR_{M=7.5,\sigma'vc=1atm} = exp\left(\frac{(N_1)_{60cs}}{14.1} + \left(\frac{(N_1)_{60cs}}{126}\right)^2 - \left(\frac{(N_1)_{60cs}}{23.6}\right)^3 + \left(\frac{(N_1)_{60cs}}{25.4}\right)^4 - 2.8\right) \tag{12}$$

$$CRR = CRR_{M=7.5,\sigma'vc=1atm}(MSF)(K_\sigma) \tag{13}$$

$$FS_{liq} = \frac{CRR}{CSR} \tag{14}$$



Peak Ground Acceleration, PGA = 0.15g
Earthquake Magnitude, M = 4.9
Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2008), *Soil Liquefaction during Earthquakes*, EERI MNO-12

Title: Plant Scherer: B-114		Project No.: 60563110
Project: Georgia Power Plant Scherer	Date: January 2018	AECOM

CPT Liquefaction Analysis

Method: Idriss and Boulanger (2014), CPT and SPT Based Liquefaction Triggering Procedures

Title: Liquefaction Analysis
Project: Plant Scherer
Project No.: 60563110

Date: 3/21/2016
Boring No. CP-100

Input Parameters:
Peak ground acceleration, pga (g): 0.15
Earthquake Magnitude (M): 4.9
Water Table Depth at the time of drilling 19 ft
Water Table Depth at the time of earthquake 19 ft
Ground Surface Elevation 0 ft

Notes:
1. Sand-like behavior = "Yes", Clay-like behavior = "No" (See Idriss and Boulanger, 2014).
2. Make sure to turn on iterative calculations.
3. User to confirm highlighted values are reasonable.

												At the time of earthquake				At the time of drilling																			
Depth	Qt	Fs	Unit Weight	Liquefiable?[1]	FC	α (From static stress analysis)	Fs/Qt	Below Water Table?	Liquefaction Calculation Needed?	Sample Elev.	Total stress	Pore Pressure	Effective stress	Stress reduction coeff, r_d	CSR	Pore Pressure	Effective stress	qc1n	m	Cn	qc1	Delta qc1ncs	qc1ncs	CRR_{cpt}[3]	C_σ	K_σ	Assg. α	State Para	Para a	Para b	Para c	Kα	MSF_{max}	MSF	IB FSL
(ft)	(TSF)	(TSF)	(pcf)	(Yes/No)			(%)			(ft)	(psf)	(psf)	(psf)			(psf)	(psf)				(TSF)														
0.164	62.311	0.255	122	No	5	0	0.409238	No	No	-0.16	0.00		0.00				0.00																		
0.328	144.672	0.288	125.3	No	0	0	0.199071	No	No	-0.33	20.55		20.55				20.55																		
0.492	119.218	0.748	125.3	No	4	0	0.627422	No	No	-0.49	41.10		41.10				41.10																		
0.656	74.409	0.974	118.8	No	11	0	1.308981	No	No	-0.66	60.58		60.58				60.58																		
0.82	50.439	1.282	115.6	No	21	0	2.541684	No	No	-0.82	79.54		79.54				79.54																		
0.984	35.906	1.362	115.6	No	30	0	3.793238	No	No	-0.98	98.50		98.50				98.50																		
1.148	31.541	1.376	115.6	No	33	0	4.362576	No	No	-1.15	117.46		117.46				117.46																		
1.312	42.748	1.379	115.6	No	25	0	3.225882	No	No	-1.31	136.42		136.42				136.42																		
1.476	45.106	1.605	115.6	No	26	0	3.558285	No	No	-1.48	155.37		155.37				155.37																		
1.64	40.093	1.82	115.6	No	31	0	4.539446	No	No	-1.64	174.33		174.33				174.33																		
1.804	37.228	1.932	112.4	No	34	0	5.189642	No	No	-1.80	192.77		192.77				192.77																		
1.968	46.32	1.975	115.6	No	28	0	4.263817	No	No	-1.97	211.72		211.72				211.72																		
2.133	45.575	2.044	115.6	No	29	0	4.484915	No	No	-2.13	230.80		230.80				230.80																		
2.297	39.109	1.981	112.4	No	33	0	5.06533	No	No	-2.30	249.23		249.23				249.23																		
2.461	28.775	1.532	112.4	No	38	0	5.324066	No	No	-2.46	267.67		267.67				267.67																		
2.625	20.063	1.099	112.4	No	44	0	5.477745	No	No	-2.63	286.10		286.10				286.10																		
2.789	16.711	0.816	112.4	No	46	0	4.883011	No	No	-2.79	304.53		304.53				304.53																		
2.953	15.121	0.738	112.4	No	47	0	4.88063	No	No	-2.95	322.97		322.97				322.97																		
3.117	15.484	0.755	112.4	No	47	0	4.876001	No	No	-3.12	341.40		341.40				341.40																		
3.281	18.192	0.868	112.4	No	44	0	4.771328	No	No	-3.28	359.83		359.83				359.83																		
3.445	22.007	1.079	112.4	No	41	0	4.902985	No	No	-3.45	378.27		378.27				378.27																		
3.609	25.037	1.247	112.4	No	39	0	4.980629	No	No	-3.61	396.70		396.70				396.70																		
3.773	25.583	1.334	112.4	No	39	0	5.2144	No	No	-3.77	415.13		415.13				415.13																		
3.937	22.39	1.294	112.4	No	43	0	5.779366	No	No	-3.94	433.57		433.57				433.57																		
4.101	23.3	1.242	112.4	No	41	0	5.330472	No	No	-4.10	452.00		452.00				452.00																		
4.265	33.046	1.256	115.6	No	31	0	3.800763	No	No	-4.27	470.96		470.96				470.96																		
4.429	35.772	1.423	115.6	No	30	0	3.977972	No	No	-4.43	489.92		489.92				489.92																		
4.593	36.026	1.572	115.6	No	32	0	4.363515	No	No	-4.59	508.88		508.88				508.88																		
4.757	36.774	1.565	115.6	No	31	0	4.255724	No	No	-4.76	527.83		527.83				527.83																		
4.921	39.035	1.68	115.6	No	30	0	4.30383	No	No	-4.92	546.79		546.79				546.79																		
5.085	32.83	1.675	112.4	No	35	0	5.102041	No	No	-5.09	565.23		565.23				565.23																		
5.249	26.008	1.562	112.4	No	42	0	6.005844	No	No	-5.25	583.66		583.66				583.66																		
5.413	22.326	1.36	112.4	No	44	0	6.091552	No	No	-5.41	602.09		602.09				602.09																		
5.577	24.865	1.386	112.4	No	41	0	5.5741	No	No	-5.58	620.53		620.53				620.53																		
5.741	26.984	1.423	112.4	No	39	0	5.273495	No	No	-5.74	638.96		638.96				638.96																		
5.905	28.516	1.502	112.4	No	38	0	5.267218	No	No	-5.91	657.39		657.39				657.39																		
6.069	30.299	1.608	112.4	No	37	0	5.307106	No	No	-6.07	675.83		675.83				675.83																		
6.234	31.508	1.62	112.4	No	36	0	5.141551	No	No	-6.23	694.37		694.37				694.37																		
6.398	25.848	1.625	112.4	No	43	0	6.286753	No	No	-6.40	712.81		712.81				712.81																		
6.562	20.482	1.502	112.4	No	42	0	7.333268	No	No	-6.56	731.24		731.24				731.24																		
6.726	19.026	1.21	112.4	No	41	0	6.359718	No	No	-6.73	749.68		749.68				749.68																		
6.89	17.271	0.994	112.4	No	41	0	5.755312	No	No	-6.89	768.11		768.11				768.11																		
7.054	15.801	0.959	112.4	No	44	0	6.069236	No	No	-7.05	786.54		786.54				786.54																		
7.218	15.782	1.004	112.4	No	45	0	6.361678	No	No	-7.22	804.98		804.98				804.98																		
7.382	16.444	0.94	112.4	No	43	0	5.716371	No	No	-7.38	823.41		823.41				823.41																		
7.546	15.932	0.947	112.4	No	44	0	5.944012	No	No	-7.55	841.84		841.84				841.84																		
7.71	15.967	0.933	112.4	No	44	0	5.843302	No	No	-7.71	860.28		860.28				860.28																		
7.874	15.421	0.957	112.4	No	46	0	6.205823	No	No	-7.87	878.71		878.71				878.71																		
8.038	15.396	0.969	112.4	No	47	0	6.293843	No	No	-8.04	897.14		897.14				897.14																		
8.202	15.205	0.997	112.4	No	48	0	6.557054	No	No	-8.20	915.58		915.58				915.58																		
8.366	15.364	0.98	112.4	No	48	0	6.378547	No	No	-8.37	934.01		934.01				934.01																		
8.53	15.478	1.004	112.4	No	49	0	6.486626	No	No	-8.53	952.44		952.44				952.44																		
8.694	15.91	1.026	112.4	No	48	0	6.448774	No	No	-8.69	970.88		970.88				970.88																		
8.858	17.713	1.089	112.4	No	46	0	6.148027	No	No	-8.86	989.31		989.31				989.31																		
9.022	18.718	1.19	112.4	No	46	0	6.357517	No	No	-9.02	1007.75		1007.75				1007.75																		
9.186	19.356	1.275	112.4	No	46	0	6.587105	No	No	-9.19	1026.18		1026.18				1026.18																		
9.35	24.401	1.299	112.4	No	39	0	5.323552	No	No	-9.35	1044.61		1044.61				1044.61																		
9.514	21.143	1.318	112.4	No	44	0	6.233742	No	No	-9.51	1063.05		1063.05				1063.05																		
9.678	16.649	1.252	112.4	No	52	0	7.519971	No	No	-9.68	1081.48		1081.48				1081.48																		
9.842	15.081	0.82	112.4	No	49	0	5.437305	No	No	-9.84	1099.91		1099.91				1099.91																		
10.006	14.764	0.878	112.4	No	51	0	5.946898	No	No	-10.01	1118.35		1118.35				1118.35																		
10.17	26.04	1.006	115.6	No	36	0	3.863287	No	No	-10.17	1137.31		1137.31				1137.31																		
10.335	21.012	0.983	112.4	No	41	0	4.678279	No	No	-10.34	1155.85		1155.85				1155.85																		
10.499	16.681	0.99	112.4	No	50	0	5.934896	No	No	-10.50	1174.29		1174.29				1174.29																		
10.663	16.517	0.803	112.4	No	46	0	4.861658	No	No	-10.66	1192.72		1192.72				1192.72																		
10.827	15.182	0.812	112.4	No	50	0	5.348439	No	No	-10.83	1211.15		1211.15				1211.15																		
10.991	14.308	0.87	112.4	No	54	0	6.080514	No	No	-10.99	1229.59		1229.59				1229.59																		
11.155	15.54	1.135	112.4	No	56	0	7.303732	No	No	-11.16	1248.02		1248.02				1248.02																		
11.319	24.719	1.551	112.4	No	45	0	6.274526	No	No	-11.32	1266.45		1266.45				1266.45																		
11.483	35.031	1.679	115.6	No	36	0	4.792898	No	No	-11.48	1285.41		1285.41				1285.41																		
11.647	27.317	1.786	112.4	No	44	0	6.538053	No	No	-11.65	1303.85		1303.85				1303.85																		
11.811	19.206	1.444	112.4	No	54	0	7.518484	No	No	-11.81	1322.28		1322.28				1322.28																		
11.975	16.008	1.161	112.4	No	57	0	7.252624	No	No	-11.98	1340.71		1340.71				1340.71																		
12.139	19.993	1.151	112.4	No	48	0	5.757015	No	No	-12.14	1359.15		1359.15				1359.15																		
12.303	21.681	1.236	112.4	No	47	0	5.700844	No	No	-12.30	1377.58		1377.58				1377.58																		
12.467	22.703	1.609	112.4	No	50	0	7.087169	No	No	-12.47	1396.01		1396.01				1396.01																		
12.631	30.557	1.955	112.4	No	43	0	6.397879	No	No	-12.63	1414.45		1414.45				1414.45																		
12.795	43.626	2.119	115.6	No	35	0	4.857195	No	No	-12.80	1433.41		1433.41				1433.41																		
12.959	31.112	2.126	112.4	No	44	0	6.833376	No	No	-12.96	1451.84		1451.84				1451.84																		
13.123	24.712	1.77	112.4	No	50	0	7.162512	No	No	-13.12	1470.27		1470.27				1470.27																		
13.287	24.879	1.284	112.4	No	44	0	5.160979	No	No	-13.29	1488.71		1488.71				1488.71																		
13.451	22.775	1.271	112.4	No	47	0	5.580681	No	No	-13.45	1507.14		1507.14				1507.14																		
13.615	20.131	1.261	112.4	No	52	0	6.263971	No	No	-13.62	1525.57		1525.57				1525.57																		
13.779	20.829	1.215	112.4	No	50	0	5.833213	No	No	-13.78	1544.01		1544.01				1544.01																		
13.943	19.36	1.181	112.4	No	53	0	6.100207	No	No	-13.94	1562.44		1562.44				1562.44																		
14.107	21.953	1.448	112.4	No	52	0	6.595909	No	No	-14.11	1580.87		1580.87				1580.87																		
14.271	47.348	1.982	115.6	No	33	0	4.186027	No	No	-14.27	1599.83		1599.83				1599.83																		
14.436	41.537	2.243	112.4	No	37	0	5.400005	No	No	-14.44	1618.38		1618.38				1618.38																		
14.6	28.405	2.175	112.4	No	50	0	7.657103	No	No	-14.60	1636.81		1636.81				1636.81																		
14.764	23.489	1.615	112.4	No	52	0	6.875559	No	No	-14.76	1655.25		1655.25				1655.25																		
14.928	20.03	1.374	112.4	No	56	0	6.85971	No	No	-14.93	1673.68		1673.68				1673.68																		
15.092	18.887	1.247	112.4	No	57	0	6.602425	No	No	-15.09	1692.11		1692.11				1692.11																		
15.256	21.057	1.332	112.4	No	54	0	6.325687	No	No	-15.26	1710.55		1710.55				1710.55																		
15.42	30.762	1.652	112.4	No	43	0	5.370262	No	No	-15.42	1728.98		1728.98				1728.98																		
15.584	25.917	1.778	112.4	No	51	0	6.860362	No	No	-15.58	1747.41		1747.41				1747.41																		
15.748	23.107	1.76	112.4	No	56	0	7.61674	No	No	-15.75	1765.85		1765.85				1765.85																		
15.912	20.718	1.598	112.4	No	59	0	7.7131	No	No	-15.91	1784.28		1784.28				1784.28																		
16.076	20.721	1.605	112.4	No	59	0	7.745765	No	No	-16.08	1802.71		1802.71				1802.71																		
16.24	30.629	2.028	112.4	No	48	0	6.621176	No	No	-16.24	1821.15		1821.15				1821.15																		
16.404	44.871	3.303	112.4	No	44	0	7.361102	No	No	-16.40	1839.58		1839.58				1839.58																		
16.568	37.08	3.118	119.7	No		0	8.408846	No	No	-16.57	1859.21		1859.21				1859.21																		
16.732	30.035	2.438	119.7	No		0	8.117197	No	No	-16.73	1878.84		1878.84				1878.84																		

CPT Liquefaction Analysis

16.896	24.615	1.923	112.4	No	57	0	7.81231	No	No	-16.90	1897.28		1897.28				1897.28
17.06	28.528	1.762	112.4	No	49	0	6.176388	No	No	-17.06	1915.71		1915.71				1915.71
17.224	27.646	1.692	112.4	No	50	0	6.120234	No	No	-17.22	1934.14		1934.14				1934.14
17.388	23.45	1.441	112.4	No	54	0	6.144989	No	No	-17.39	1952.58		1952.58				1952.58
17.552	21.319	1.243	112.4	No	55	0	5.83048	No	No	-17.55	1971.01		1971.01				1971.01
17.716	30.53	1.434	115.6	No	44	0	4.697019	No	No	-17.72	1989.97		1989.97				1989.97
17.88	37.347	1.777	115.6	No	41	0	4.75808	No	No	-17.88	2008.93		2008.93				2008.93
18.044	37.442	2.042	112.4	No	43	0	5.453768	No	No	-18.04	2027.36		2027.36				2027.36
18.208	35.399	2	112.4	No	45	0	5.649877	No	No	-18.21	2045.80		2045.80				2045.80
18.372	32.13	1.84	112.4	No	47	0	5.726735	No	No	-18.37	2064.23		2064.23				2064.23
18.537	28.2	1.725	112.4	No	51	0	6.117021	No	No	-18.54	2082.77		2082.77				2082.77
18.701	26.073	1.593	112.4	No	53	0	6.109769	No	No	-18.70	2101.21		2101.21				2101.21
18.865	29.224	1.676	112.4	No	49	0	5.735012	No	No	-18.87	2119.64		2119.64				2119.64
19.029	28.734	1.833	112.4	No	52	0	6.379202	Yes	No	-19.03	2138.08	1.81	2136.27			1.81	2136.27
19.193	28.793	1.751	112.4	No	51	0	6.081339	Yes	No	-19.19	2156.51	12.04	2144.47			12.04	2144.47
19.357	28.896	1.608	112.4	No	49	0	5.564784	Yes	No	-19.36	2174.94	22.28	2152.67			22.28	2152.67
19.521	27.803	1.442	112.4	No	49	0	5.186491	Yes	No	-19.52	2193.38	32.51	2160.87			32.51	2160.87
19.685	31.35	1.668	112.4	No	47	0	5.320574	Yes	No	-19.69	2211.81	42.74	2169.07			42.74	2169.07
19.849	34.469	1.857	112.4	No	46	0	5.38745	Yes	No	-19.85	2230.24	52.98	2177.27			52.98	2177.27
20.013	28.642	1.985	112.4	No	54	0	6.930382	Yes	No	-20.01	2248.68	63.21	2185.47			63.21	2185.47
20.177	23.786	1.718	112.4	No	59	0	7.222736	Yes	No	-20.18	2267.11	73.44	2193.67			73.44	2193.67
20.341	19.483	1.484	112.4	No	65	0	7.616897	Yes	No	-20.34	2285.54	83.68	2201.87			83.68	2201.87
20.505	19.541	1.284	112.4	No	62	0	6.5708	Yes	No	-20.51	2303.98	93.91	2210.07			93.91	2210.07
20.669	24.654	1.337	112.4	No	53	0	5.423055	Yes	No	-20.67	2322.41	104.15	2218.27			104.15	2218.27
20.833	28.073	1.495	112.4	No	50	0	5.325402	Yes	No	-20.83	2340.85	114.38	2226.47			114.38	2226.47
20.997	38.649	1.95	112.4	No	43	0	5.045409	Yes	No	-21.00	2359.28	124.61	2234.67			124.61	2234.67
21.161	36.867	2.283	112.4	No	47	0	6.19253	Yes	No	-21.16	2377.71	134.85	2242.87			134.85	2242.87
21.325	37.274	2.278	112.4	No	47	0	6.111499	Yes	No	-21.33	2396.15	145.08	2251.07			145.08	2251.07
21.489	42.578	2.241	112.4	No	42	0	5.263282	Yes	No	-21.49	2414.58	155.31	2259.27			155.31	2259.27
21.653	41.245	2.254	112.4	No	43	0	5.464905	Yes	No	-21.65	2433.01	165.55	2267.47			165.55	2267.47
21.817	33.118	2.459	112.4	No	53	0	7.424965	Yes	No	-21.82	2451.45	175.78	2275.67			175.78	2275.67
21.981	25.76	2.383	119.7	No		0	9.250776	Yes	No	-21.98	2471.08	186.01	2285.06			186.01	2285.06
22.145	24.608	2.087	119.7	No		0	8.480982	Yes	No	-22.15	2490.71	196.25	2294.46			196.25	2294.46
22.309	33.278	1.966	112.4	No	49	0	5.907807	Yes	No	-22.31	2509.14	206.48	2302.66			206.48	2302.66
22.473	37.437	2.111	112.4	No	46	0	5.638807	Yes	No	-22.47	2527.58	216.72	2310.86			216.72	2310.86
22.638	38.032	2.199	112.4	No	46	0	5.781973	Yes	No	-22.64	2546.12	227.01	2319.11			227.01	2319.11
22.802	37.631	2.237	112.4	No	47	0	5.944567	Yes	No	-22.80	2564.56	237.24	2327.31			237.24	2327.31
22.966	35.819	2.144	112.4	No	48	0	5.98565	Yes	No	-22.97	2582.99	247.48	2335.51			247.48	2335.51
23.13	31.731	2.055	112.4	No	52	0	6.476317	Yes	No	-23.13	2601.42	257.71	2343.71			257.71	2343.71
23.294	28.575	1.923	112.4	No	55	0	6.729659	Yes	No	-23.29	2619.86	267.95	2351.91			267.95	2351.91
23.458	27.497	1.559	112.4	No	53	0	5.669709	Yes	No	-23.46	2638.29	278.18	2360.11			278.18	2360.11
23.622	28.259	1.589	112.4	No	52	0	5.622987	Yes	No	-23.62	2656.72	288.41	2368.31			288.41	2368.31
23.786	25.217	1.602	112.4	No	57	0	6.352857	Yes	No	-23.79	2675.16	298.65	2376.51			298.65	2376.51
23.95	23.628	1.676	112.4	No	61	0	7.093279	Yes	No	-23.95	2693.59	308.88	2384.71			308.88	2384.71
24.114	23.221	1.558	112.4	No	60	0	6.709444	Yes	No	-24.11	2712.02	319.11	2392.91			319.11	2392.91
24.278	24.262	1.42	112.4	No	57	0	5.852774	Yes	No	-24.28	2730.46	329.35	2401.11			329.35	2401.11
24.442	22.187	1.442	112.4	No	61	0	6.499301	Yes	No	-24.44	2748.89	339.58	2409.31			339.58	2409.31
24.606	21.768	1.371	112.4	No	61	0	6.298236	Yes	No	-24.61	2767.32	349.81	2417.51			349.81	2417.51
24.77	25.2	1.467	112.4	No	56	0	5.821429	Yes	No	-24.77	2785.76	360.05	2425.71			360.05	2425.71
24.934	25.333	1.508	112.4	No	56	0	5.95271	Yes	No	-24.93	2804.19	370.28	2433.91			370.28	2433.91
25.098	21.959	1.529	112.4	No	63	0	6.962976	Yes	No	-25.10	2822.63	380.52	2442.11			380.52	2442.11
25.262	20.122	1.399	112.4	No	65	0	6.952589	Yes	No	-25.26	2841.06	390.75	2450.31			390.75	2450.31
25.426	20.64	1.389	112.4	No	64	0	6.729651	Yes	No	-25.43	2859.49	400.98	2458.51			400.98	2458.51
25.59	19.986	1.332	112.4	No	65	0	6.664665	Yes	No	-25.59	2877.93	411.22	2466.71			411.22	2466.71
25.754	18.308	1.343	112.4	No	69	0	7.335591	Yes	No	-25.75	2896.36	421.45	2474.91			421.45	2474.91
25.918	16.093	1.251	112.4	No	75	0	7.773566	Yes	No	-25.92	2914.79	431.68	2483.11			431.68	2483.11
26.082	15.21	0.951	112.4	No	72	0	6.252465	Yes	No	-26.08	2933.23	441.92	2491.31			441.92	2491.31
26.246	16.026	0.97	112.4	No	69	0	6.052664	Yes	No	-26.25	2951.66	452.15	2499.51			452.15	2499.51
26.41	19.796	1.159	112.4	No	63	0	5.854718	Yes	No	-26.41	2970.09	462.38	2507.71			462.38	2507.71
26.574	18.338	1.331	112.4	No	70	0	7.258152	Yes	No	-26.57	2988.53	472.62	2515.91			472.62	2515.91
26.739	16.621	1.411	119.7	No		0	8.489261	Yes	No	-26.74	3008.28	482.91	2525.36			482.91	2525.36
26.903	16.216	1.17	112.4	No	73	0	7.215096	Yes	No	-26.90	3026.71	493.15	2533.56			493.15	2533.56
27.067	16.374	1.074	112.4	No	71	0	6.559179	Yes	No	-27.07	3045.15	503.38	2541.76			503.38	2541.76
27.231	19.483	1.203	112.4	No	65	0	6.174614	Yes	No	-27.23	3063.58	513.61	2549.96			513.61	2549.96
27.395	21.237	1.437	112.4	No	65	0	6.766492	Yes	No	-27.40	3082.01	523.85	2558.16			523.85	2558.16
27.559	25.774	1.617	112.4	No	58	0	6.273764	Yes	No	-27.56	3100.45	534.08	2566.36			534.08	2566.36
27.723	24.025	1.729	112.4	No	63	0	7.19667	Yes	No	-27.72	3118.88	544.32	2574.56			544.32	2574.56
27.887	21.544	1.268	112.4	No	62	0	5.885629	Yes	No	-27.89	3137.31	554.55	2582.76			554.55	2582.76
28.051	39.711	1.739	115.6	No	43	0	4.379139	Yes	No	-28.05	3156.27	564.78	2591.49			564.78	2591.49
28.215	41.57	1.898	115.6	No	43	0	4.565793	Yes	No	-28.22	3175.23	575.02	2600.21			575.02	2600.21
28.379	30.862	2.089	112.4	No	56	0	6.768842	Yes	No	-28.38	3193.66	585.25	2608.41			585.25	2608.41
28.543	31.822	2.046	112.4	No	54	0	6.429514	Yes	No	-28.54	3212.10	595.48	2616.61			595.48	2616.61
28.707	28.083	2.075	112.4	No	60	0	7.388812	Yes	No	-28.71	3230.53	605.72	2624.81			605.72	2624.81
28.871	25.656	1.887	112.4	No	62	0	7.355005	Yes	No	-28.87	3248.96	615.95	2633.01			615.95	2633.01
29.035	21.073	1.639	112.4	No	69	0	7.777725	Yes	No	-29.04	3267.40	626.18	2641.21			626.18	2641.21
29.199	19.021	1.468	112.4	No	72	0	7.717786	Yes	No	-29.20	3285.83	636.42	2649.41			636.42	2649.41
29.363	17.103	1.11	112.4	No	71	0	6.490089	Yes	No	-29.36	3304.27	646.65	2657.61			646.65	2657.61
29.527	15.448	1.185	112.4	No	78	0	7.670896	Yes	No	-29.53	3322.70	656.88	2665.81			656.88	2665.81
29.691	15.361	1.215	112.4	No	79	0	7.909641	Yes	No	-29.69	3341.13	667.12	2674.01			667.12	2674.01
29.855	28.22	1.446	112.4	No	53	0	5.124026	Yes	No	-29.86	3359.57	677.35	2682.21			677.35	2682.21
30.019	33.697	1.869	112.4	No	51	0	5.546488	Yes	No	-30.02	3378.00	687.59	2690.41			687.59	2690.41
30.183	28.318	2.128	112.4	No	61	0	7.514655	Yes	No	-30.18	3396.43	697.82	2698.61			697.82	2698.61
30.347	22.829	1.915	119.7	No		0	8.388453	Yes	No	-30.35	3416.06	708.05	2708.01			708.05	2708.01
30.511	20.203	1.675	119.7	No		0	8.290848	Yes	No	-30.51	3435.70	718.29	2717.41			718.29	2717.41
30.675	17.657	1.569	119.7	No		0	8.885994	Yes	No	-30.68	3455.33	728.52	2726.81			728.52	2726.81
30.84	20.825	1.466	112.4	No	68	0	7.039616	Yes	No	-30.84	3473.87	738.82	2735.06			738.82	2735.06
31.004	23.132	1.546	112.4	No	64	0	6.683382	Yes	No	-31.00	3492.31	749.05	2743.26			749.05	2743.26
31.168	21.325	1.536	112.4	No	68	0	7.202814	Yes	No	-31.17	3510.74	759.28	2751.46			759.28	2751.46
31.332	20.379	1.598	112.4	No	71	0	7.841405	Yes	No	-31.33	3529.17	769.52	2759.66			769.52	2759.66
31.496	21.909	1.549	112.4	No	67	0	7.070154	Yes	No	-31.50	3547.61	779.75	2767.86			779.75	2767.86
31.66	27.318	1.702	112.4	No	59	0	6.230324	Yes	No	-31.66	3566.04	789.98	2776.06			789.98	2776.06
31.824	25.068	1.674	112.4	No	62	0	6.677836	Yes	No	-31.82	3584.47	800.22	2784.26			800.22	2784.26
31.988	22.35	1.569	112.4	No	67	0	7.020134	Yes	No	-31.99	3602.91	810.45	2792.46			810.45	2792.46
32.152	20.514	1.335	112.4	No	68	0	6.507751	Yes	No	-32.15	3621.34	820.68	2800.66			820.68	2800.66
32.316	18.294	1.192	112.4	No	71	0	6.515798	Yes	No	-32.32	3639.77	830.92	2808.86			830.92	2808.86
32.48	16.787	1.154	112.4	No	75	0	6.874367	Yes	No	-32.48	3658.21	841.15	2817.06			841.15	2817.06
32.644	19.183	1.263	112.4	No	70	0	6.583955	Yes	No	-32.64	3676.64	851.39	2825.26			851.39	2825.26
32.808	22.235	1.384	112.4	No	65	0	6.224421	Yes	No	-32.81	3695.08	861.62	2833.46			861.62	2833.46
32.972	26.303	1.788	112.4	No	62	0	6.797704	Yes	No	-32.97	3713.51	871.85	2841.66			871.85	2841.66
33.136	30.257	2.082	112.4	No	59	0	6.881052	Yes	No	-33.14	3731.94	882.09	2849.86			882.09	2849.86
33.3	33.198	2.156	112.4	No	56	0	6.494367	Yes	No	-33.30	3750.38	892.32	2858.06			892.32	2858.06
33.464	34.747	2.064	112.4	No	53	0	5.940081	Yes	No	-33.46	3768.81	902.55	2866.26			902.55	2866.26
33.628	35.805	1.932	112.4	No	51	0	5.395894	Yes	No	-33.63	3787.24	912.79	2874.46			912.79	2874.46
33.792	34.19	2.167	112.4	No	55	0	6.338111	Yes	No	-33.79	3805.68	923.02	2882.66			923.02	2882.66
33.956	33.772	2.099	112.4	No	55	0	6.215208	Yes	No	-33.96	3824.11	933.25	2890.86			933.25	2890.86
34.12	36.486	2.167	112.4	No	52	0	5.939264	Yes	No	-34.12	3842.54	943.49	2899.06			943.49	2899.06
34.284	33.242	2.073	112.4	No	55	0	6.236087	Yes	No	-34.28	3860.98	953.72	2907.26			953.72	2907.26
34.448	37.018	2.225	112.4	No	52	0	6.010589	Yes	No	-34.45	3879.41	963.96	2915.46			963.96	2915.46
34.612	37.743	2.197	112.4	No	51	0	5.820947	Yes	No	-34.61	3897.84	974.19	2923.66			974.19	2923.66
34.776	44.657	2.365	112.4	No	46	0	5.295922	Yes	No	-34.78	3916.28	984.42	2931.86			984.42	2931.86
34.941	43.599	2.343	112.4	No	47	0	5.373976	Yes	No	-34.94	3934.82	994.72	2940.11			994.72	2940.11
35.105	34.158	2.439	112.4	No	58	0	7.140348	Yes	No	-35.11	3953.26	1004.95	2948.31			1004.95	2948.31
35.269	31.8	2.107	112.4	No	58	0	6.625786	Yes	No	-35.27	3971.69	1015.19	2956.51			1015.19	2956.51
35.433	32.873	1.936	112.4	No	55	0	5.889332	Yes	No	-35.43	3990.13	1025.42	2964.71			1025.42	2964.71
35.597	29.72	1.615	112.4	No	56	0	5.434051	Yes	No	-35.60	4008.56	1035.65	2972.91			1035.65	2972.91
35.761	31.982	1.751	112.4	No	54	0	5.474955	Yes	No	-35.76	4026.99	1045.89	2981.11			1045.89	2981.11

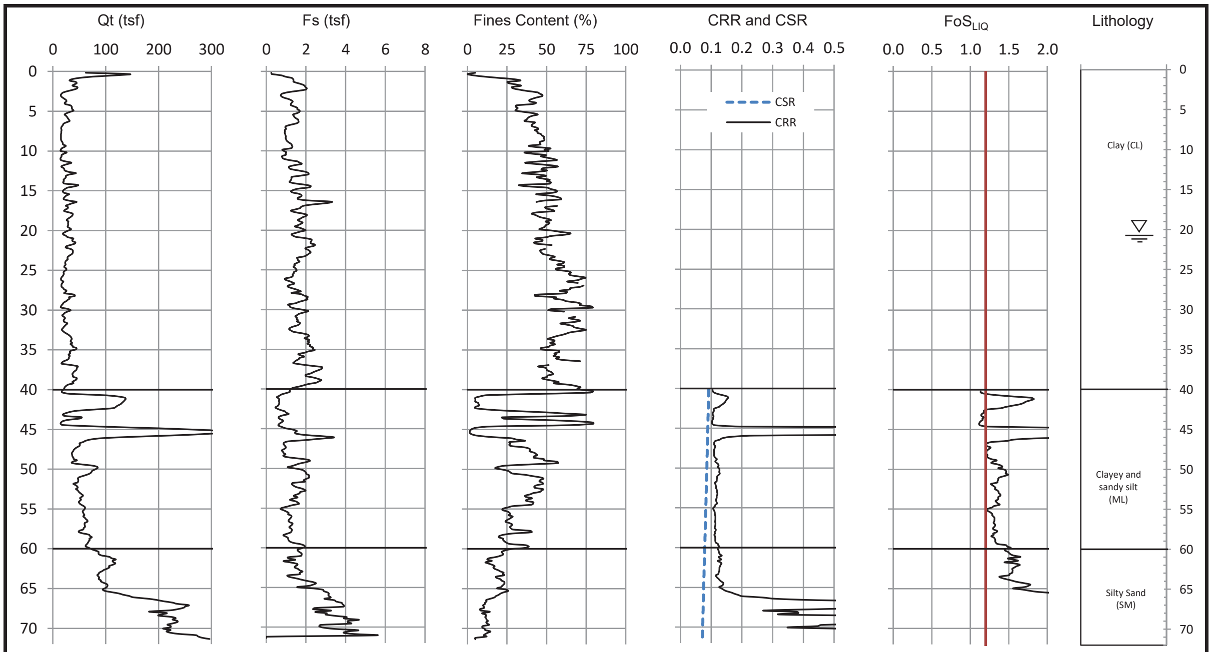
CPT Liquefaction Analysis

35.925	30.541	1.912	112.4	No	58	0	6.260437	Yes	No	-35.93	4045.43	1056.12	2989.31			1056.12	2989.31																		
36.089	30.281	1.679	112.4	No	56	0	5.544731	Yes	No	-36.09	4063.86	1066.35	2997.51			1066.35	2997.51																		
36.253	27.391	1.637	112.4	No	60	0	5.976416	Yes	No	-36.25	4082.29	1076.59	3005.71			1076.59	3005.71																		
36.417	21.042	1.507	112.4	No	71	0	7.161867	Yes	No	-36.42	4100.73	1086.82	3013.91			1086.82	3013.91																		
36.581	17.533	1.425	119.7	No		0	8.127531	Yes	No	-36.58	4120.36	1097.05	3023.30			1097.05	3023.30																		
36.745	16.49	1.369	119.7	No		0	8.302001	Yes	No	-36.75	4139.99	1107.29	3032.70			1107.29	3032.70																		
36.909	34.944	1.768	112.4	No	51	0	5.059524	Yes	No	-36.91	4158.42	1117.52	3040.90			1117.52	3040.90																		
37.073	47.194	2.31	115.6	No	45	0	4.89469	Yes	No	-37.07	4177.38	1127.76	3049.63			1127.76	3049.63																		
37.237	45.685	2.803	112.4	No	49	0	6.135493	Yes	No	-37.24	4195.81	1137.99	3057.83			1137.99	3057.83																		
37.401	45.072	2.815	112.4	No	50	0	6.245563	Yes	No	-37.40	4214.25	1148.22	3066.03			1148.22	3066.03																		
37.565	43.828	2.703	112.4	No	50	0	6.16729	Yes	No	-37.57	4232.68	1158.46	3074.23			1158.46	3074.23																		
37.729	40.261	2.521	112.4	No	53	0	6.261643	Yes	No	-37.73	4251.11	1168.69	3082.43			1168.69	3082.43																		
37.893	38.212	2.36	112.4	No	54	0	6.17607	Yes	No	-37.89	4269.55	1178.92	3090.63			1178.92	3090.63																		
38.057	36.847	2.23	112.4	No	54	0	6.052053	Yes	No	-38.06	4287.98	1189.16	3098.83			1189.16	3098.83																		
38.221	37.945	1.985	112.4	No	51	0	5.231256	Yes	No	-38.22	4306.42	1199.39	3107.03			1199.39	3107.03																		
38.385	38.473	2.011	112.4	No	50	0	5.227042	Yes	No	-38.39	4324.85	1209.62	3115.23			1209.62	3115.23																		
38.549	45.076	2.363	112.4	No	47	0	5.242258	Yes	No	-38.55	4343.28	1219.86	3123.43			1219.86	3123.43																		
38.713	44.553	2.61	112.4	No	50	0	5.858191	Yes	No	-38.71	4361.72	1230.09	3131.63			1230.09	3131.63																		
38.877	41.071	2.784	112.4	No	54	0	6.778506	Yes	No	-38.88	4380.15	1240.32	3139.83			1240.32	3139.83																		
39.042	36.908	2.652	112.4	No	58	0	7.185434	Yes	No	-39.04	4398.70	1250.62	3148.08			1250.62	3148.08																		
39.206	38.738	2.506	112.4	No	55	0	6.4691	Yes	No	-39.21	4417.13	1260.85	3156.28			1260.85	3156.28																		
39.37	29.283	2.146	112.4	No	64	0	7.328484	Yes	No	-39.37	4435.56	1271.09	3164.48			1271.09	3164.48																		
39.534	25.138	1.889	112.4	No	69	0	7.51452	Yes	No	-39.53	4454.00	1281.32	3172.68			1281.32	3172.68																		
39.698	22.405	1.632	112.4	No	71	0	7.284088	Yes	No	-39.70	4472.43	1291.56	3180.88			1291.56	3180.88																		
39.862	21.493	1.348	112.4	No	70	0	6.271809	Yes	No	-39.86	4490.86	1301.79	3189.08			1301.79	3189.08																		
40.026	19.391	1.23	112.4	No	73	0	6.343149	Yes	No	-40.03	4509.30	1312.02	3197.28			1312.02	3197.28																		
40.19	17.094	1.192	112.4	Yes	80	0	6.973207	Yes	Yes	-40.19	4527.73	1322.26	3205.48	0.67	0.092	1322.26	3205.48	11.28	0.866	0.70	11.93	55.3	67.3	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	1.13
40.354	17.699	1.195	112.4	Yes	78	0	6.751794	Yes	Yes	-40.35	4546.16	1332.49	3213.68	0.67	0.092	1332.49	3213.68	11.67	0.862	0.70	12.35	55.2	67.5	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.102	1.14
40.518	30.745	0.995	115.6	Yes	48	0	3.236299	Yes	Yes	-40.52	4565.12	1342.72	3222.40	0.66	0.092	1342.72	3222.40	20.91	0.782	0.72	22.12	50.8	72.9	0.110	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	1.19
40.682	91.968	0.78	122	Yes	13	0	0.848121	Yes	Yes	-40.68	4585.13	1352.96	3232.17	0.66	0.092	1352.96	3232.17	68.01	0.579	0.78	71.95	14.0	85.9	0.121	0.08	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.199	1.142	1.34
40.846	121.117	0.665	125.3	Yes	8	0	0.549056	Yes	Yes	-40.85	4605.68	1363.19	3242.49	0.66	0.092	1363.19	3242.49	91.81	0.517	0.80	97.14	2.6	99.8	0.137	0.10	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.260	1.187	1.56
41.01	135.956	0.538	125.3	Yes	5	0	0.395716	Yes	Yes	-41.01	4626.23	1373.42	3252.81	0.66	0.091	1373.42	3252.81	104.13	0.489	0.81	110.17	0.2	110.3	0.153	0.11	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.320	1.230	1.79
41.174	137.754	0.618	125.3	Yes	5	0	0.448626	Yes	Yes	-41.17	4646.78	1383.66	3263.12	0.66	0.091	1383.66	3263.12	105.47	0.486	0.81	111.59	0.2	111.8	0.155	0.11	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.329	1.236	1.83
41.338	135.919	0.66	125.3	Yes	5	0	0.485583	Yes	Yes	-41.34	4667.33	1393.89	3273.44	0.66	0.091	1393.89	3273.44	103.74	0.490	0.81	109.76	0.2	109.9	0.152	0.11	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.318	1.228	1.78
41.502	133.585	0.642	125.3	Yes	5	0	0.480593	Yes	Yes	-41.50	4687.88	1404.12	3283.75	0.65	0.091	1404.12	3283.75	101.59	0.495	0.80	107.49	0.2	107.6	0.148	0.11	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.304	1.218	1.72
41.666	130.941	0.655	125.3	Yes	7	0	0.500225	Yes	Yes	-41.67	4708.43	1414.36	3294.07	0.65	0.091	1414.36	3294.07	99.20	0.500	0.80	104.95	1.3	106.3	0.146	0.11	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.296	1.212	1.69
41.83	128.166	0.648	125.3	Yes	7	0	0.505594	Yes	Yes	-41.83	4728.98	1424.59	3304.38	0.65	0.091	1424.59	3304.38	96.70	0.506	0.80	102.31	1.6	103.9	0.143	0.10	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.282	1.202	1.64
41.994	122.92	0.631	125.3	Yes	7	0	0.513342	Yes	Yes	-41.99	4749.52	1434.83	3314.70	0.65	0.091	1434.83	3314.70	92.16	0.516	0.79	97.51	2.1	99.6	0.137	0.10	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.259	1.186	1.56
42.158	119.433	0.564	125.3	Yes	5	0	0.472231	Yes	Yes	-42.16	4770.07	1445.06	3325.01	0.65	0.091	1445.06	3325.01	89.11	0.523	0.79	94.28	0.2	94.4	0.130	0.10	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.234	1.168	1.46
42.322	114.524	0.461	125.3	Yes	5	0	0.402536	Yes	Yes	-42.32	4790.62	1455.29	3335.33	0.65	0.091	1455.29	3335.33	84.91	0.534	0.78	89.83	0.1	90.0	0.126	0.09	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.215	1.154	1.39
42.486	84.555	0.558	122	Yes	12	0	0.659925	Yes	Yes	-42.49	4810.63	1465.53	3345.10	0.65	0.091	1465.53	3345.10	60.66	0.602	0.76	64.18	11.9	76.0	0.112	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.119	1.22
42.65	46.447	0.736	118.8	Yes	27	0	1.584602	Yes	Yes	-42.65	4830.11	1475.76	3354.35	0.64	0.091	1475.76	3354.35	31.52	0.719	0.72	33.35	37.8	71.1	0.108	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.152	1.109	1.17
42.814	31.575	0.941	115.6	Yes	47	0	2.980206	Yes	Yes	-42.81	4849.07	1485.99	3363.08	0.64	0.090	1485.99	3363.08	20.76	0.783	0.70	21.96	50.4	72.4	0.109	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	1.19
42.978	23.824	0.999	115.6	Yes	60	0	4.193251	Yes	Yes	-42.98	4868.03	1496.23	3371.80	0.64	0.090	1496.23	3371.80	15.32	0.826	0.68	16.21	53.1	69.3	0.107	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	1.16
43.143	18.797	1.132	112.4	Yes	75	0	6.022238	Yes	Yes	-43.14	4886.58	1506.52	3380.05	0.64	0.090	1506.52	3380.05	11.88	0.859	0.67	12.57	54.9	67.4	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.102	1.14
43.307	22.08	0.864	115.6	Yes	61	0	3.913043	Yes	Yes	-43.31	4905.54	1516.76	3388.78	0.64	0.090	1516.76	3388.78	14.07	0.838	0.67	14.88	53.0	67.8	0.106	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	1.15
43.471	54.29	0.662	118.8	Yes	22	0	1.219377	Yes	Yes	-43.47	4925.02	1526.99	3398.03	0.64	0.090	1526.99	3398.03	36.97	0.692	0.72	39.11	31.9	71.0	0.108	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.151	1.108	1.17
43.635	50.688	0.625	118.8	Yes	23	0	1.233033	Yes	Yes	-43.64	4944.50	1537.22	3407.28	0.64	0.090	1537.22	3407.28	34.24	0.705	0.71	36.23	33.2	69.4	0.107	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.106	1.16
43.799	28.669	0.701	115.6	Yes	47	0	2.44515	Yes	Yes	-43.80	4963.46	1547.46	3416.00	0.63	0.090	1547.46	3416.00	18.47	0.800	0.68	19.54	49.7	69.2	0.107	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	1.16
43.963	19.087	0.851	112.4	Yes	69	0	4.458532	Yes	Yes	-43.96	4981.89	1557.69	3424.20	0.63	0.090	1557.69	3424.20	11.93	0.859	0.66	12.62	53.8	66.5	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	1.14
44.127	15.485	0.817	112.4	Yes	80	0	5.276074	Yes	Yes	-44.13	5000.33	1567.92	3432.40	0.63	0.090	1567.92	3432.40	9.53	0.886	0.65	10.09	54.8	64.9	0.103	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	1.12
44.291	14.756	0.708	112.4	Yes	79	0	4.798048	Yes	Yes	-44.29	5018.76	1578.16	3440.60	0.63	0.090	1578.16	3440.60	9.04	0.893	0.65	9.56	54.6	64.2	0.103	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	1.11
44.455	18.509	0.627	115.6	Yes	65	0	3.387541	Yes	Yes	-44.46	5037.72	1588.39	3449.33	0.63	0.090	1588.39	3449.33	11.47	0.864	0.66	12.14	52.9	65.1	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	1.12
44.619	79.425	0.624	122	Yes	14	0	0.785647	Yes	Yes	-44.62	5057.73	1598.63	3459.10	0.63	0.089	1598.63	3459.10	55.37	0.620	0.74	58.58	16.7	75.3	0.112	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.163	1.117	1.22
44.783	160.695	0.797	125.3	Yes	6	0	0.495971	Yes	Yes	-44.78	5078.28	1608.86	3469.42	0.63	0.089	1608.86	3469.42	121.34	0.454	0.80	128.37	0.4	128.8	0.194	0.13	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.456	1.327	2.44
44.947	234.322	0.984	125.3	Yes	3	0	0.419935	Yes	Yes	-44.95	5098.83	1619.09	3479.73	0.62	0.089	1619.09	3479.73	186.24	0.348	0.84	197.05	0.0	197.0	1.606278	0.23	0.89	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	26.89
45.111	296.811	1.33	128.5	Yes	2	0	0.448097	Yes	Yes	-45.11	5119.90	1629.33	3490.57	0.62	0.089	1629.33	3490.57	244.52	0.275	0.87	258.70	0.0	258.7	3.724576	0.30	0.85	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	59.75
45.275	333.2	1.541	128.5	Yes	1	0	0.462485	Yes	Yes	-45.28	5140.97	1639.56	3501.41	0.62	0.089	1639.56	3501.41	279.61	0.236	0.89	295.82	0.0	295.8	3.724576	0.30	0.85	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	59.73
45.439	319.599	1.459	128.5	Yes	2	0	0.45651	Yes	Yes	-45.44	5162.05	1649.79	3512.25	0.62	0.089	1649.79	3512.25	266.06	0.251	0.88	281.49	0.0	281.5	3.724576	0.30	0.85	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	59.71
45.603	279.067	1.474	128.5	Yes	3	0	0.528189	Yes	Yes	-45.60	5183.12	1660.03	3523.09	0.62	0.089	1660.03	3523.09	226.90	0.295	0.86	240.06	0.0	240.1	3.724576	0.30	0.85	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	59.69
45.767	225.772	1.893	125.3	Yes	6	0	0.838456	Yes	Yes	-45.77	5203.67	1670.26	3533.41	0.62	0.089	1670.26	3533.41	177.33	0.361	0.83	187.62	0.8	188.4	1.044202	0.21	0.89	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	17.68
45.931	151.729	2.736	122	Yes	14	0	1.803215	Yes	Yes	-45.93	5223.68	1680.49	3543.18	0.62	0.089	1680.49	3543.18	112.45	0.472	0.78	118.98	22.3	141.3	0.240	0.12	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.574	1.411	3.25
46.095	94.227	3.425	115.6	Yes	27	0	3.634839	Yes	Yes	-46.10	5242.64	1690.73	3551.91	0.62	0.089	1690.73	3551.91	65.74	0.586	0.74	69.55	45.1	114.7	0.160	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.349	1.250	1.96
46.259	72.82	2.703	115.6	Yes	31	0	3.711892	Yes	Yes	-46.26	5261.60	1700.96	3560.63	0.61	0.088	1700.96	3560.63	49.30	0.641	0.72	52.16	46.4	98.5	0.135	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.254	1.182	1.57
46.423	62.296	2.061	115.6	Yes	36	0	3.308399	Yes	Yes	-46.42	5280.55	1711.20	3569.36	0.61	0.088	1711.20	3569.36	41.43	0.672	0.70	43.83	49.4	93.2	0.129	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.229	1.164	1.48
46.587	57.08	1.124	118.8	Yes	26	0	1.969166	Yes	Yes	-46.59	5300.04	1721.43	3578.61	0.61	0.088	1721.43	3578.61	37.55	0.690	0.70	39.73	38.8	78.5	0.114	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	1.27
46.751	50.655	0.912	118.8	Yes	27	0	1.800415	Yes	Yes	-46.75	5319.52	1731.66	3587.86	0.61	0.088	1731.66	3587.86	32.88	0.712	0.69	34.78	38.8	73.6	0.110	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.114	1.21
46.915	51.2	0.869	118.8	Yes	26	0	1.697266	Yes	Yes	-46.92	5339.00	1741.90	3597.11	0.61	0.088	1741.90	3597.11	33.20	0.710	0.69	35.12	37.9	73.0	0.110	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.157	1.112	1.21
47.079	50.33	0.916	118.8	Yes	27	0	1.819988	Yes	Yes	-47.08	5358.49	1752.13	3606.36	0.61	0.088	1752.13	3606.36	32.51	0.714	0.68	34.40	39.1	73.5	0.110	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.113	1.21
47.244	45.853	0.973	115.6	Yes	36	0	2.121999	Yes	Yes	-47.24	5377.56	1762.43	3615.14	0.61	0.088	1762.43	3615.14	29.30	0.731	0.68	31.00	46.4	77.4	0.113	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	1.26
47.408	42.085	0.987	115.6	Yes	39	0	2.345254	Yes	Yes	-47.41	5396.52	1772.66	3623.86	0.60	0.088	1772.66	3623.86	26.63	0.746	0.67	28.18	47.8	76.0	0.112	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.118	1.25
47.572	39.796	0.893	115.6	Yes	40	0	2.243944	Yes	Yes	-47.57	5415.48	1782.89	3632.59	0.60	0.088	1782.89	3632.59	25.01	0.756	0.66	26.46	47.8	74.2	0.111	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.160	1.115	1.23
47.736	38.369	0.787	115.6	Yes	39	0	2.051135	Yes	Yes	-47.74	5434.44	1793.13	3641.31	0.60	0.088	1793.13	3641.31	23.98	0.762	0.66	25.37	47.3	72.7	0.109	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	1.21
47.9	36.438	0.841	115.6	Yes	42	0	2.30803	Yes	Yes	-47.90	5453.39	1803.36	3650.03	0.60	0.087	1803.36	3650.03	22.62	0.771	0.66	23.94	48.5	72.5	0.109	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	1.21
48.064	35.976	0.883	115.6	Yes	43	0	2.454414	Yes	Yes	-48.06	5472.35	1813.59	3658.76	0.60	0.087	1813.59	3658.76	22.27	0.773	0.65	23.56	49.0	72.6	0.109	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	1.21
48.228	36.618	0.971	115.6	Yes	44	0	2.651701	Yes	Yes	-48.23	5491.31	1823.83	3667.48	0.60	0.087	1823.83	3667.48	22.66	0.771	0.65	23.97	49.5	73.5	0.110	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.113	1.22
48.392	36.962	0.856	115.6	Yes	42	0	2.315892	Yes	Yes	-48.39	5510.27	1834.06	3676.21	0.60	0.087	1834.06	3676.21	22.84	0.769	0.65	24.17	48.5	72.7	0.109	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	1.21
48.556	38.883	0.975	115.6	Yes	42	0	2.507523	Yes	Yes	-48.56	5529.23	1844.29	3684.93	0.59	0.087	1844.29	3684.93	24.09	0.761	0.66	25.49	48.9	74.4	0.111	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.115	1.23
48.72	39.451	1.514	115.6	Yes	48	0	3.837672	Yes	Yes	-48.72	5548.19	1854.53	3693.66	0.59	0.087	1854.53	3693.66	24.43	0.759	0.66	25.85	51.9	77.7	0.114	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	1.27
48.884	45.524	2.076	115.6	Yes	48	0	4.560232	Yes	Yes	-48.88	5567.15	1864.76	3702.38	0.59	0.087	1864.76	3702.38	28.52	0.735	0.66	30.18	52.9	83.0	0.119	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.188	1.135	1.34
49.048	38.137	2.207	112.4	Yes	57	0	5.787031	Yes	Yes	-49.05	5585.58	1875.00	3710.58	0.59	0.087	1875.00	3710.58	23.45	0.765	0.65	24.81	54.4	79.2	0.115	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.175	1.126	1.30
49.212	36.003	1.997	112.4	Yes	57	0	5.54676	Yes	Yes	-49.21	5604.01	1885.23	3718.78	0.59	0.087	1885.23	3718.78	21.98	0.775	0.65	23.26	54.2	77.4	0.114	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	1.28
49.376	49.592	1.684	115.6	Yes	42	0	3.395709	Yes	Yes	-49.38	5622.97	1895.46	3727.51	0.59	0.087	1895.46	3727.51	31.17	0.721	0.66	32.98	50.5	83.4	0.119	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.190	1.136	1.35
49.54	73.296	1.5	118.8	Yes	24	0	2.046496	Yes	Yes	-49.54	5642.45	1905.70	3736.76	0.59	0.086	1905.70	3736.76	47.97	0.646	0.69	50.76	36.8	87.6	0.123	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.205	1.147	1.40
49.704	84.089	1.294	118.8	Yes	19	0	1.538846	Yes	Yes	-49.70	5661.94	1915.93	3746.01	0.59	0.086	1915.93	3746.01	55.85	0.618	0.70	59.08	29.5	88.6	0.124	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.209	1.150	1.41
49.868	84.483	1.087	122	Yes	18	0	1.286649	Yes	Yes	-49.87	5681.95	1926.16	3755.78	0.58	0.086	1926.16	3755.78	56.04	0.617	0.70	59.29	25.8	85.1	0.121	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.196	1.140	1.36
50.032	79.852	1.528	118.8	Yes	22	0	1.91354	Yes	Yes	-50.03	5701.43	1936.40	3765.03	0.58	0.086	1936.40	3765.03	52.51	0.629	0.70	55.56	34.6	90.1	0.126	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.216	1.155	1.44
50.196	74.68	1.836	115.6	Yes	26	0	2.45849	Yes	Yes	-50.20	5720.39	1946.63	3773.76	0.58	0.086	1946.63	3773.76	48.64	0.644	0.69	51.46	39.8	91.3	0.127	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.220	1.158	1.46
50.36	73.001	1.929	115.6	Yes	27	0	2.64243	Yes	Yes	-50.36	5739.35	1956.86	3782.48	0.58	0.086	1956.86	3782.48	47.34	0.649	0.69	50.08	41.2	91.3	0.127	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.220	1.158	1.47
50.524	70.542	2.009	115.6	Yes	28	0	2.847949	Yes	Yes	-50.52	5758.30	1967.10	3791.21	0.58	0.086	1967.10	3791.21	45.48	0.656	0.68	48.12	42.6	90.8	0.126	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.218	1.156	1.46
50.688	64.503	2.022	115.6	Yes	36	0	3.134738	Yes	Yes	-50.69	5777.26	1977.33	3799.93	0.58	0.086	1977.33	3799.93	41.09	0.674	0.67	43.47	49.1	92.6	0.128	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.226	1.162	1.49
50.852	57.324	2.151	115.6	Yes	41	0	3.752355	Yes	Yes	-50.85	5796.22	1987.56	3808.66	0.58	0.086	1987.56	3808.66	35.97	0.697	0.66	38.06	51.2	89.2	0.125	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.212	1.152	1.44
51.016	49.573	2.156	115.6	Yes	46	0	4.349142	Yes	Yes	-51.02	5815.18	1997.80	3817.38	0.58	0.085	1997.80	3817.38	30.57	0.724	0.65	32.34	52.6	84.9	0.120	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	1.38
51.18	47.282	2.153	115.6	Yes	48	0	4.55353	Yes	Yes	-51.18	5834.14	2008.03	3826.11	0.57	0.085	2008.03	3826.11	28.96	0.733	0.65	30.64	52.9	83.6	0.119	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.190	1.136	1.36
51.345	48.159	1.988	115.6	Yes	46	0	4.127993	Yes	Yes	-51.35	5853.21	2018.33	3834.88	0.57	0.085	2018.33	3834.88	29.50	0.730	0.65	31.21	52.2	83.4	0.119	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.190	1.136	1.36
51.509	47.816	1.883	115.6	Yes	46	0	3.938012	Yes	Yes	-51.51	5872.17	2028.56	3843.61	0.57	0.085	2028.56	3843.61	29.21	0.731	0.65	30.91	51.9	82.8	0.118	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.187	1.134	1.35
51.673	46.604	1.958	115.6	Yes	47	0	4.201356	Yes	Yes	-51.67	5891.13	2038.80	3852.33	0.57	0.085	2038.80	3852.33	28.34	0.736	0.64	29.99	52.4	82.4	0.118	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.186	1.133	1.35
51.837	38.93	1.325	115.6	Yes	48	0	3.403545	Yes	Yes	-51.84	5910.09	2049.03	3861.06	0.57	0.085	2049.03	3861.06	23.20	0.767	0.63	24.55	51.3	75.8	0.112	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.118	1.27
52.001	43.019	1.301	115.6	Yes	44	0	3.024245	Yes	Yes	-52.00	5929.04	2059.26	3869.78	0.57	0.085	2059.26	3869.78	25.85	0.750	0.64	27.35	50.2	77.5	0.114	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	1.29
52.165	45.928	1.376	115.6	Yes	42	0	2.995994	Yes	Yes	-52.17	5948.00	2069.50	3878.51	0.57	0.085	2069.50	3878.51	27.73	0.739	0.64	29.34	49.9	79.2	0.115	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.175	1.126	1.31
52.329	47.102	1.492	115.6	Yes	43	0	3.167594	Yes	Yes	-52.33	5966.96	2079.73	3887.23	0.56	0.085	2079.73	3887.23	28.47	0.735	0.64	30.12	50.3	80.4	0.116	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.179	1.128	1.33
52.493	43.587	1.723	115.6	Yes	48	0	3.953014	Yes	Yes	-52.49	5985.92	2089.96	3895.96	0.56	0.084	2089.96	3895.96	26.08	0.749	0.63	27.59	52.1	79.7	0.116	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.177	1.127	1.32
52.657	46.957	1.913	115.6	Yes	47	0	4.07394	Yes	Yes	-52.66	6004.88	2100.20	3904.68	0.56	0.084	2100.20	3904.68	28.27	0.736	0.64	29.91	52.2	82.1	0.118	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.185	1.133	1.35
52.821	48.675	1.974	115.6	Yes	46	0	4.05547	Yes	Yes	-52.82	6023.84	2110.43	3913.41	0.56	0.084	2110.43	3913.41	29.36	0.730	0.64	31.07	52.1	83.2	0.119	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.189	1.135	1.37
52.985	51.284	1.708	115.6	Yes	42	0	3.330473	Yes	Yes	-52.99	6042.80	2120.66	3922.13	0.56	0.084	2120.66	3922.13	31.06	0.721	0.64	32.86	50.5	83.4	0.119	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.189	1.136	1.37
53.149	54.363	1.678	115.6	Yes	40	0	3.086658	Yes	Yes	-53.15	6061.75	2130.90	3930.86	0.56	0.084	2130.90	3930.86	33.08	0.711	0.64	35.00	49.7	84.7	0.120	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.194	1.139	1.39
53.313	57.105	1.499	115.6	Yes	36	0	2.624989	Yes	Yes	-53.31	6080.71	2141.13	3939.58	0.56	0.084	2141.13	3939.58	34.89	0.702	0.65	36.91	48.0	84.9	0.120	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	1.39
53.477	54.467	1.391	115.6	Yes	37	0	2.55384	Yes	Yes	-53.48	6099.67	2151.36	3948.31	0.56	0.084	2151.36	3948.31	33.04	0.711	0.64	34.95	47.9	82.9	0.118	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.188	1.135	1.36
53.641	51.339	1.58	115.6	Yes	41	0	3.077582	Yes	Yes	-53.64	6118.63	2161.60	3957.03	0.55	0.084	2161.60	3957.03	30.88	0.722	0.64	32.67	49.9	82.5	0.118	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.186	1.134	1.36
53.805	53.331	1.368	115.6	Yes	38	0	2.565112	Yes	Yes	-53.81	6137.59	2171.83	3965.76	0.55	0.084	2171.83	3965.76	32.16	0.716	0.64	34.02	48.1	82.1	0.118	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.185	1.133	1.36
53.969	51.13	1.197	115.6	Yes	37	0	2.341091	Yes	Yes	-53.97	6156.55	2182.07	3974.48	0.55	0.083	2182.07	3974.48	30.63	0.723	0.63	32.41	47.5	79.9	0.116	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.177	1.127	1.33
54.133	48.961	1.473	115.6	Yes	42	0	3.008517	Yes	Yes	-54.13	6175.50	2192.30	3983.20	0.55	0.083	2192.30	3983.20	29.13	0.732	0.63	30.82	49.9	80.7	0.116	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	1.34
54.297	50.633	1.588	115.6	Yes	42	0	3.136295	Yes	Yes	-54.30	6194.46	2202.53	3991.93	0.55	0.083	2202.53	3991.93	30.19	0.726	0.63	31.94	50.1	82.1	0.118	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.185	1.132	1.36
54.461	53.254	1.645	115.6	Yes	40	0	3.08897	Yes	Yes	-54.46	6213.42	2212.77	4000.65	0.55	0.083	2212.77	4000.65	31.88	0.717	0.63	33.73	49.8	83.6	0.119	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.190	1.136	1.38
54.625	57.903	1.311	115.6	Yes	29	0	2.264131	Yes	Yes	-54.63	6232.38	2223.00	4009.38	0.55	0.083	2223.00	4009.38	34.95	0.702	0.64	36.98	41.1	78.0	0.114	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	1.31
54.789	60.722	1.101	118.8	Yes	26	0	1.813181	Yes	Yes	-54.79	6251.86	2233.23	4018.63	0.55	0.083	2233.23	4018.63	36.80	0.693	0.64	38.93	37.4	76.4	0.113	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	1.29

CPT Liquefaction Analysis

54.953	60.7	0.815	118.8	Yes	22	0	1.342669	Yes	Yes	-54.95	6271.35	2243.47	4027.88	0.55	0.083	2243.47	4027.88	36.72	0.693	0.64	38.85	32.8	71.7	0.109	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.110	1.23
55.117	58.699	0.719	118.8	Yes	22	0	1.224893	Yes	Yes	-55.12	6290.83	2253.70	4037.13	0.54	0.083	2253.70	4037.13	35.30	0.700	0.64	37.35	32.0	69.3	0.107	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	1.21
55.281	56.618	0.89	118.8	Yes	25	0	1.571938	Yes	Yes	-55.28	6310.31	2263.93	4046.38	0.54	0.083	2263.93	4046.38	33.84	0.707	0.63	35.80	36.2	72.0	0.109	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.154	1.110	1.24
55.446	57.125	1.03	118.8	Yes	26	0	1.803063	Yes	Yes	-55.45	6329.91	2274.23	4055.68	0.54	0.082	2274.23	4055.68	34.11	0.706	0.63	36.09	38.1	74.2	0.111	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.160	1.115	1.26
55.61	58.265	1.133	118.8	Yes	27	0	1.944564	Yes	Yes	-55.61	6349.40	2284.46	4064.93	0.54	0.082	2284.46	4064.93	34.82	0.702	0.63	36.84	38.9	75.8	0.112	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.118	1.28
55.774	59.727	1.102	118.8	Yes	26	0	1.845062	Yes	Yes	-55.77	6368.88	2294.70	4074.18	0.54	0.082	2294.70	4074.18	35.74	0.698	0.63	37.81	37.9	75.7	0.112	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.118	1.28
55.938	57.527	1.257	115.6	Yes	29	0	2.185061	Yes	Yes	-55.94	6387.84	2304.93	4082.91	0.54	0.082	2304.93	4082.91	34.20	0.705	0.63	36.19	40.7	76.9	0.113	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.120	1.30
56.102	60.41	1.271	118.8	Yes	27	0	2.103956	Yes	Yes	-56.10	6407.32	2315.16	4092.16	0.54	0.082	2315.16	4092.16	36.07	0.696	0.63	38.16	39.7	77.9	0.114	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	1.31
56.266	62.218	1.223	118.8	Yes	26	0	1.965669	Yes	Yes	-56.27	6426.81	2325.40	4101.41	0.54	0.082	2325.40	4101.41	37.22	0.691	0.63	39.38	38.4	77.8	0.114	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.122	1.31
56.43	65.07	1.164	118.8	Yes	25	0	1.788843	Yes	Yes	-56.43	6446.29	2335.63	4110.66	0.53	0.082	2335.63	4110.66	39.09	0.683	0.64	41.35	36.5	77.9	0.114	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	1.31
56.594	65.31	1.124	118.8	Yes	24	0	1.721023	Yes	Yes	-56.59	6465.77	2345.87	4119.91	0.53	0.082	2345.87	4119.91	39.18	0.682	0.63	41.45	35.9	77.3	0.113	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.169	1.121	1.31
56.758	60.68	1.177	118.8	Yes	27	0	1.939684	Yes	Yes	-56.76	6485.25	2356.10	4129.16	0.53	0.082	2356.10	4129.16	36.00	0.697	0.63	38.09	38.5	76.6	0.113	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.167	1.120	1.30
56.922	59.86	1.324	115.6	Yes	28	0	2.211828	Yes	Yes	-56.92	6504.21	2366.33	4137.88	0.53	0.081	2366.33	4137.88	35.39	0.700	0.63	37.44	40.5	78.0	0.114	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	1.32
57.086	60.5	1.304	118.8	Yes	28	0	2.155372	Yes	Yes	-57.09	6523.70	2376.57	4147.13	0.53	0.081	2376.57	4147.13	35.75	0.698	0.63	37.83	40.1	77.9	0.114	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	1.32
57.25	60.921	1.222	118.8	Yes	27	0	2.005876	Yes	Yes	-57.25	6543.18	2386.80	4156.38	0.53	0.081	2386.80	4156.38	35.97	0.697	0.62	38.06	39.0	77.1	0.113	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.169	1.121	1.31
57.414	58.298	1.164	118.8	Yes	28	0	1.996638	Yes	Yes	-57.41	6562.66	2397.03	4165.63	0.53	0.081	2397.03	4165.63	34.17	0.705	0.62	36.15	39.4	75.6	0.112	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.164	1.118	1.29
57.578	57.389	1.251	115.6	Yes	29	0	2.17986	Yes	Yes	-57.58	6581.62	2407.27	4174.35	0.53	0.081	2407.27	4174.35	33.51	0.709	0.62	35.46	40.8	76.2	0.112	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	1.30
57.742	50.268	1.301	115.6	Yes	40	0	2.588128	Yes	Yes	-57.74	6600.58	2417.50	4183.08	0.53	0.081	2417.50	4183.08	28.83	0.733	0.61	30.50	48.8	79.3	0.115	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.176	1.126	1.35
57.906	49.079	1.278	115.6	Yes	41	0	2.603965	Yes	Yes	-57.91	6619.54	2427.73	4191.80	0.52	0.081	2427.73	4191.80	28.01	0.738	0.60	29.64	49.0	78.6	0.115	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	1.34
58.07	56.791	1.218	115.6	Yes	29	0	2.144706	Yes	Yes	-58.07	6638.50	2437.97	4200.53	0.52	0.081	2437.97	4200.53	32.96	0.711	0.61	34.87	40.7	75.5	0.112	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.164	1.118	1.30
58.234	67.922	1.046	118.8	Yes	23	0	1.540002	Yes	Yes	-58.23	6657.98	2448.20	4209.78	0.52	0.080	2448.20	4209.78	40.29	0.677	0.63	42.62	33.7	76.3	0.113	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	1.31
58.398	70.392	0.865	122	Yes	20	0	1.228833	Yes	Yes	-58.40	6677.99	2458.44	4219.55	0.52	0.080	2458.44	4219.55	41.88	0.671	0.63	44.31	29.3	73.6	0.110	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.114	1.27
58.562	73.763	0.959	118.8	Yes	20	0	1.30011	Yes	Yes	-58.56	6697.47	2468.67	4228.80	0.52	0.080	2468.67	4228.80	44.10	0.661	0.63	46.66	29.5	76.1	0.112	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	1.30
58.726	69.239	1.084	118.8	Yes	23	0	1.565592	Yes	Yes	-58.73	6716.95	2478.90	4238.05	0.52	0.080	2478.90	4238.05	40.97	0.674	0.63	43.34	33.7	77.0	0.113	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.121	1.32
58.89	69.824	1.105	118.8	Yes	23	0	1.58255	Yes	Yes	-58.89	6736.44	2489.14	4247.30	0.52	0.080	2489.14	4247.30	41.29	0.673	0.63	43.69	33.8	77.5	0.114	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	1.32
59.054	68.092	1.129	118.8	Yes	23	0	1.658051	Yes	Yes	-59.05	6755.92	2499.37	4256.55	0.52	0.080	2499.37	4256.55	40.06	0.678	0.62	42.38	34.9	77.3	0.113	0.06	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.169	1.121	1.32
59.218	66.527	1.197	118.8	Yes	25	0	1.799269	Yes	Yes	-59.22	6775.40	2509.60	4265.80	0.52	0.080	2509.60	4265.80	38.95	0.683	0.62	41.21	36.5	77.7	0.114	0.06	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.122	1.33
59.382	64.904	1.389	118.8	Yes	27	0	2.140084	Yes	Yes	-59.38	6794.89	2519.84	4275.05	0.51	0.080	2519.84	4275.05	37.80	0.688	0.62	40.00	39.4	79.4	0.115	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.176	1.126	1.36
59.547	62.602	1.726	115.6	Yes	37	0	2.7571	Yes	Yes	-59.55	6813.96	2530.13	4283.83	0.51	0.080	2530.13	4283.83	36.23	0.696	0.61	38.33	48.7	87.0	0.122	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.203	1.145	1.47
59.711	62.13	1.916	115.6	Yes	39	0	3.083856	Yes	Yes	-59.71	6832.92	2540.37	4292.55	0.51	0.079	2540.37	4292.55	35.86	0.697	0.61	37.94	49.8	87.7	0.123	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.206	1.148	1.48
59.875	67.68	1.945	115.6	Yes	36	0	2.873818	Yes	Yes	-59.88	6851.88	2550.60	4301.28	0.51	0.079	2550.60	4301.28	39.46	0.681	0.62	41.75	48.9	90.6	0.126	0.06	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.218	1.156	1.53
60.039	72.389	1.821	115.6	Yes	27	0	2.515576	Yes	Yes	-60.04	6870.84	2560.83	4310.00	0.51	0.079	2560.83	4310.00	42.55	0.668	0.62	45.01	40.9	85.9	0.121	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.199	1.142	1.45
60.203	79.099	1.596	118.8	Yes	24	0	2.017725	Yes	Yes	-60.20	6890.32	2571.07	4319.25	0.51	0.079	2571.07	4319.25	47.02	0.650	0.63	49.75	36.4	86.2	0.122	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.200	1.143	1.45
60.367	86.249	1.592	118.8	Yes	22	0	1.845819	Yes	Yes	-60.37	6909.80	2581.30	4328.50	0.51	0.079	2581.30	4328.50	51.87	0.632	0.64	54.88	33.7	88.6	0.124	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.209	1.150	1.49
60.531	86.418	1.675	118.8	Yes	22	0	1.938254	Yes	Yes	-60.53	6929.29	2591.53	4337.75	0.51	0.079	2591.53	4337.75	51.90	0.632	0.64	54.91	34.6	89.5	0.125	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.213	1.153	1.50
60.695	87.05	1.774	118.8	Yes	23	0	2.037909	Yes	Yes	-60.70	6948.77	2601.77	4347.00	0.51	0.079	2601.77	4347.00	52.26	0.630	0.64	55.29	35.5	90.8	0.126	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.218	1.156	1.53
60.859	93.522	1.787	118.8	Yes	21	0	1.91078	Yes	Yes	-60.86	6968.25	2612.00	4356.25	0.50	0.079	2612.00	4356.25	56.70	0.615	0.64	59.99	33.3	93.3	0.129	0.08	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.229	1.164	1.57
61.023	106.703	1.749	122	Yes	18	0	1.639129	Yes	Yes	-61.02	6988.26	2622.24	4366.02	0.50	0.079	2622.24	4366.02	66.00	0.585	0.65	69.83	28.0	97.9	0.135	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.251	1.180	1.65
61.187	110.862	1.089	122	Yes	13	0	0.982302	Yes	Yes	-61.19	7008.27	2632.47	4375.80	0.50	0.078	2632.47	4375.80	68.91	0.577	0.66	72.91	16.1	89.0	0.124	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.211	1.151	1.49
61.351	119.141	1.143	122	Yes	13	0	0.959367	Yes	Yes	-61.35	7028.28	2642.70	4385.57	0.50	0.078	2642.70	4385.57	74.88	0.560	0.66	79.22	14.0	93.2	0.129	0.09	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.229	1.164	1.56
61.515	113.138	1.467	122	Yes	15	0	1.296647	Yes	Yes	-61.52	7048.28	2652.94	4395.35	0.50	0.078	2652.94	4395.35	70.36	0.573	0.66	74.44	21.7	96.1	0.132	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.242	1.174	1.62
61.679	114.524	0.874	125.3	Yes	11	0	0.763159	Yes	Yes	-61.68	7068.83	2663.17	4405.66	0.50	0.078	2663.17	4405.66	71.26	0.570	0.66	75.40	10.6	86.0	0.121	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.199	1.143	1.44
61.843	118.32	1.223	122	Yes	13	0	1.033638	Yes	Yes	-61.84	7088.84	2673.40	4415.44	0.50	0.078	2673.40	4415.44	73.94	0.562	0.66	78.23	15.8	94.0	0.130	0.09	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.233	1.167	1.58
62.007	113.758	1.547	122	Yes	16	0	1.359904	Yes	Yes	-62.01	7108.85	2683.64	4425.21	0.50	0.078	2683.64	4425.21	70.49	0.572	0.66	74.58	22.7	97.3	0.134	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.248	1.178	1.64
62.171	106.375	1.576	122	Yes	17	0	1.481551	Yes	Yes	-62.17	7128.86	2693.87	4434.99	0.50	0.078	2693.87	4434.99	65.06	0.588	0.65	68.83	26.0	94.8	0.131	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.236	1.169	1.60
62.335	107.289	1.456	122	Yes	16	0	1.357082	Yes	Yes	-62.34	7148.87	2704.10	4444.76	0.49	0.078	2704.10	4444.76	65.61	0.587	0.65	69.42	23.9	93.3	0.129	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.229	1.164	1.58
62.499	102.916	1.445	122	Yes	17	0	1.404058	Yes	Yes	-62.50	7168.87	2714.34	4454.54	0.49	0.078	2714.34	4454.54	62.40	0.596	0.64	66.02	25.4	91.5	0.127	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.221	1.159	1.55
62.663	96.963	1.6	118.8	Yes	19	0	1.650114	Yes	Yes	-62.66	7188.36	2724.57	4463.79	0.49	0.077	2724.57	4463.79	58.11	0.610	0.63	61.48	29.9	91.4	0.127	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.221	1.158	1.55
62.827	93.175	1.689	118.8	Yes	21	0	1.812718	Yes	Yes	-62.83	7207.84	2734.80	4473.03	0.49	0.077	2734.80	4473.03	55.39	0.619	0.63	58.60	32.5	91.1	0.127	0.07	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.220	1.157	1.55
62.991	88.058	1.833	118.8	Yes	23	0	2.081583	Yes	Yes	-62.99	7227.32	2745.04	4482.28	0.49	0.077	2745.04	4482.28	51.79	0.632	0.62	54.79	35.9	90.7	0.126	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.218	1.156	1.55
63.155	86.73	1.688	118.8	Yes	22	0	1.94627	Yes	Yes	-63.16	7246.81	2755.27	4491.53	0.49	0.077	2755.27	4491.53	50.80	0.636	0.62	53.75	34.8	88.6	0.124	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.209	1.150	1.51
63.319	84.111	1.697	118.8	Yes	23	0	2.017572	Yes	Yes	-63.32	7266.29	2765.51	4500.78	0.49	0.077	2765.51	4500.78	48.95	0.642	0.62	51.79	35.9	87.7	0.123	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.206	1.147	1.50
63.483	86.334	1.071	122	Yes	18	0	1.240531	Yes	Yes	-63.48	7286.30	2775.74	4510.56	0.49	0.077	2775.74	4510.56	50.38	0.637	0.62	53.30	26.3	79.6	0.115	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.177	1.127	1.38
63.648	87.733	1.145	122	Yes	18	0	1.305096	Yes	Yes	-63.65	7306.43	2786.04	4520.39	0.49	0.077	2786.04	4520.39	51.25	0.634	0.62	54.22	27.0	81.2	0.117	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.182	1.130	1.40
63.812	86.718	1.451	118.8	Yes	21	0	1.67324	Yes	Yes	-63.81	7325.91	2796.27	4529.64	0.49	0.077	2796.27	4529.64	50.48	0.637	0.62	53.41	32.0	85.4	0.121	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.197	1.141	1.47
63.976	90.719	1.709	118.8	Yes	22	0	1.883839	Yes	Yes	-63.98	7345.39	2806.50	4538.89	0.48	0.076	2806.50	4538.89	53.13	0.627	0.62	56.21	33.7	89.9	0.125	0.07	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.215	1.154	1.54
64.14	91.268	2.009	118.8	Yes	23	0	2.20121	Yes	Yes	-64.14	7364.88	2816.74	4548.14	0.48	0.076	2816.74	4548.14	53.42	0.626	0.62	56.52	36.6	93.1	0.129	0.07	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.229	1.164	1.60
64.304	96.899	2.33	118.8	Yes	23	0	2.404566	Yes	Yes	-64.30	7384.36	2826.97	4557.39	0.48	0.076	2826.97	4557.39	57.21	0.613	0.62	60.53	37.7	98.2	0.135	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.252	1.181	1.70
64.468	102.468	2.509	118.8	Yes	23	0	2.448569	Yes	Yes	-64.47	7403.84	2837.20	4566.64	0.48	0.076	2837.20	4566.64	61.00	0.601	0.63	64.54	37.5	102.1	0.140	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.272	1.195	1.78
64.632	103.524	2.356	118.8	Yes	22	0	2.275801	Yes	Yes	-64.63	7423.33	2847.44	4575.89	0.48	0.076	2847.44	4575.89	61.66	0.599	0.63	65.23	35.9	101.1	0.139	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.267	1.192	1.76
64.796	102.381	2.153	118.8	Yes	21	0	2.102929	Yes	Yes	-64.80	7442.81	2857.67	4585.14	0.48	0.076	2857.67	4585.14	60.77	0.602	0.63	64.29	34.4	98.7	0.136	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.255	1.183	1.71
64.96	99.02	1.554	122	Yes	19	0	1.56938	Yes	Yes	-64.96	7462.82	2867.90	4594.91	0.48	0.076	2867.90	4594.91	58.34	0.610	0.62	61.72	28.8	90.5	0.126	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.217	1.156	1.55
65.124	94.29	2.386	118.8	Yes	24	0	2.530491	Yes	Yes	-65.12	7482.30	2878.14	4604.16	0.48	0.076	2878.14	4604.16	55.00	0.621	0.62	58.19	39.0	97.2	0.134	0.07	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.247	1.177	1.68
65.288	97.727	2.859	115.6	Yes	26	0	2.925497	Yes	Yes	-65.29	7501.26	2888.37	4612.89	0.48	0.076	2888.37	4612.89	57.29	0.613	0.62	60.61	41.4	102.0	0.140	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.272	1.195	1.79
65.452	109.378	2.899	118.8	Yes	23	0	2.650442	Yes	Yes	-65.45	7520.74	2898.60	4622.14	0.48	0.076	2898.60	4622.14	65.33	0.587	0.63	69.12	38.6	107.7	0.148	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.304	1.218	1.92
65.616	124.46	3.082	118.8	Yes	21	0	2.476298	Yes	Yes	-65.62	7540.23	2908.84	4631.39	0.48	0.075	2908.84	4631.39	76.06	0.557	0.65	80.47	35.9	116.3	0.164	0.09	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.360	1.258	2.18
65.78	133.056	3.155	118.8	Yes	20	0	2.371182	Yes	Yes	-65.78	7559.71	2919.07	4640.64	0.47	0.075	2919.07	4640.64	82.27	0.540	0.65	87.05	34.1	121.1	0.174	0.09	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.395	1.283	2.36
65.944	144.239	3.128	118.8	Yes	18	0	2.168623	Yes	Yes	-65.94	7579.19	2929.31	4649.89	0.47	0.075	2929.31	4649.89	90.54	0.520	0.66	95.79	30.8	126.5	0.187	0.10	0.92	0.00	0.100	1.000	0.000	0.138	1.000	1.437	1.314	2.59
66.108	152.288	3.173	118.8	Yes	17	0	2.083552	Yes	Yes	-66.11	7598.68	2939.54	4659.14	0.47	0.075	2939.54	4659.14	96.55	0.506	0.67	102.15	28.9	131.1	0.201	0.10	0.92	0.00	0.100	1.000	0.000	0.138	1.000	1.476	1.341	2.82
66.272	178.945	3.241	122	Yes	14	0	1.811171	Yes	Yes	-66.27	7618.68	2949.77	4668.91	0.47	0.075	2949.77	4668.91	117.35	0.462	0.69	124.15	22.2	146.3	0.266	0.12	0.90	0.00	0.100	1.000	0.000	0.138	1.000	1.627	1.450	3.98
66.436	195.735	2.926	122	Yes	12	0	1.494878	Yes	Yes	-66.44	7638.69	2960.01	4678.68	0.47	0.075	2960.01	4678.68	130.86	0.436	0.71	138.45	14.8	153.3	0.312	0.14	0.89	0.00	0.100	1.000	0.000	0.138	1.000	1.708	1.507	4.80
66.6	209.036	3.423	122	Yes	12	0	1.637517	Yes	Yes	-66.60	7658.70	2970.24	4688.46	0.47	0.075	2970.24	4688.46	141.79	0.417	0.72	150.01	16.2	166.2	0.446	0.15	0.88	0.00	0.100	1.000	0.000	0.138	1.000	1.877	1.629	7.33
66.764	226.328	3.522	122	Yes	11	0	1.556149	Yes	Yes	-66.76	7678.71	2980.47	4698.23	0.47	0.075	2980.47	4698.23	156.36	0.393	0.73	165.43	13.2	178.6	0.687305	0.17	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.067	1.765	12.03
66.928	234.698	3.795	122	Yes	11	0	1.616972	Yes	Yes	-66.93	7698.72	2990.71	4708.01	0.47	0.075	2990.71	4708.01	163.46	0.382	0.74	172.94	13.6	186.6	0.959604	0.18	0.86	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	17.54
67.092	257.018	3.84	122	Yes	10	0	1.494059	Yes	Yes	-67.09	7718.72	3000.94	4717.78	0.47	0.074	3000.94	4717.78	183.08	0.353	0.75	193.70	9.7	203.4	2.302562	0.22	0.82	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	40.61
67.256	250.919	3.913	122	Yes	10	0	1.559467	Yes	Yes	-67.26	7738.73	3011.17	4727.56	0.47	0.074	3011.17	4727.56	177.44	0.361	0.75	187.73	11.4	199.1	1.795933	0.21	0.83	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	32.06
67.42	247.427	3.895	122	Yes	11	0	1.574202	Yes	Yes	-67.42	7758.74	3021.41	4737.33	0.46	0.074	3021.41	4737.33	174.17	0.366	0.74	184.27	11.9	196.2	1.533777	0.20	0.84	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	27.57
67.584	236.989	2.459	125.3	Yes	8	0	1.037601	Yes	Yes	-67.58	7779.29	3031.64	4747.65	0.46	0.074	3031.64	4747.65	164.80	0.380	0.74	174.36	3.7	178.0	0.672203	0.18	0.85	0.00	0.100	1.000	0.000	0.138	1.000	2.058	1.758	11.62
67.749	222.54	2.365	125.3	Yes	9	0	1.06273	Yes	Yes	-67.75	7799.96	3041.94	4758.03	0.46	0.074	3041.94	4758.03	152.14	0.400	0.72	160.96	4.9	165.9	0.441	0.16	0.87	0.00	0.100	1.000	0.000	0.138	1.000	1.873	1.626	7.18
67.913	181.832	3.271	122	Yes	14	0	1.798913	Yes	Yes	-67.91	7819.97	3052.17	4767.80	0.46	0.074	3052.17	4767.80	118.26	0.460	0.69	125.12	21.9	147.0	0.270	0.12	0.90	0.00	0.100	1.000	0.000	0.138	1.000	1.635	1.455	4.08
68.077	214.981	2.47	125.3	Yes	9	0	1.148939	Yes	Yes	-68.08	7840.52	3062.40	4778.12	0.46	0.074	3062.40	4778.12	145.40	0.411	0.72	153.83	6.9	160.7	0.379	0.15	0.87	0.00	0.100	1.000	0.000	0.138	1.000	1.802	1.575	6.04
68.241	208.565	3.048	122	Yes	11	0	1.461415	Yes	Yes	-68.24	7860.53	3072.64	4787.89	0.46	0.074	3072.64	4787.89	139.85	0.420	0.71	147.96	13.2	161.2	0.384	0.15	0.88	0.00	0.100	1.000	0.000	0.138	1.000	1.808	1.579	6.18
68.405	199.552	2.991	122	Yes	12	0	1.498857	Yes	Yes	-68.41	7880.54	3082.87	4797.66	0.46	0.074	3082.87	4797.66	132.23	0.434	0.70	139.90	14.8	154.7	0.323	0.14	0.89	0.00	0.100	1.000	0.000	0.138	1.000	1.725	1.520	5.05
68.569	224.579	3.493	122	Yes	11	0	1.555355	Yes	Yes	-68.57	7900.54	3093.11	4807.44	0.46	0.073	3093.11	4807.44	153.09	0.398	0.72	161.97	13.6	175.5	0.611611	0.16	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.017	1.729	10.62
68.733	232.494	4.053	122	Yes	12	0	1.743271	Yes	Yes	-68.73	7920.55	3103.34	4817.21	0.46	0.073	3103.34	4817.21	159.75	0.388	0.73	169.02	16.4	185.4	0.911247	0.17	0.86	0.00	0.100	1.000	0.000	0.138	1.000	2.183	1.848	16.76
68.897	226.413	3.923	122	Yes	12	0	1.732674	Yes	Yes	-68.90	7940.56	3113.57	4826.99	0.46	0.073	3113.57	4826.99	154.35	0.396	0.72	163.31	16.7	180.0	0.727054	0.17	0.86	0.00	0.100	1.000	0.000	0.138	1.000	2.091	1.782	13.01
69.061	235.26	4.669	122	Yes	13	0	1.984613	Yes	Yes	-69.06	7960.57	3123.81	4836.76	0.46	0.073	3123.81	4836.76	161.83	0.384	0.73	171.22	20.6	191.8	1.225638	0.18	0.85	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	22.65
69.225	235.723	4.112	122	Yes	12	0	1.74442	Yes	Yes	-69.23	7980.58	3134.04	4846.54	0.45	0.073	3134.04	4846.54	162.08	0.384	0.73	171.48	16.2	187.7	1.009854	0.18	0.85	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	18.67
69.389	226.443	4.116	122	Yes	13	0	1.817676	Yes	Yes	-69.39	8000.58	3144.27	4856.31	0.45	0.073	3144.27	4856.31	153.91	0.397	0.72	162.84	18.3	181.2	0.761273	0.17	0.86	0.00	0.100	1.000	0.000	0.138	1.000	2.110	1.796	13.76
69.553	216.803	4.276	122	Yes	14	0	1.972297	Yes	Yes	-69.55	8020.59	3154.51	4866.09	0.45	0.073	3154.51	4866.09	145.57	0.411	0.71	154.01	21.9	175.9	0.618965	0.15	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.023	1.733	10.93
69.717	222.887	2.736	125.3	Yes	10	0	1.227528	Yes	Yes	-69.72	8041.14	3164.74	4876.40	0.45	0.073	3164.74	4876.40	150.56	0.402	0.71	159.29	7.8	167.1	0.459	0.16	0.87	0.00	0.100	1.000	0.000	0.138	1.000	1.891	1.639	7.61
69.881	222.529	2.669	125.3	Yes	9	0	1.199394	Yes	Yes	-69.88	8061.69	3174.97	4886.72	0.45	0.073	3174.97	4886.72	150.10	0.403	0.71	158.80	7.4	166.2	0.445	0.16	0.87	0.00	0.100	1.000	0.000	0.138	1.000	1.877	1.629	7.36
70.045	208.394	2.851	122	Yes	11	0	1.368082	Yes	Yes	-70.05	8081.70	3185.21	4896.49	0.45	0.073	3185.21	4896.49	138.07	0.424	0.70	146.07	11.7	157.8	0.350	0.14	0.88	0.00	0.100	1.000	0.000	0.138	1.000	1.764	1.547	5.57
70.209	222.79	3.414	122	Yes	11	0	1.532385	Yes	Yes	-70.21	8101.71	3195.44	4906.27	0.45	0.072	3195.44	4906.27	150.01	0.403	0.71	158.71	13.5	172.2	0.543	0.16	0.87	0.00	0.100	1.000	0.000	0.138	1.000	1.966	1.693	9.34
70.373	214.987	4.629	118.8	Yes	15	0	2.153153	Yes	Yes	-70.37	8121.19	3205.68	4915.51	0.45	0.072	3205.68	4915.51	143.28	0.415	0.71	151.59	25.1	176.7	0.637908	0.15	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.035	1.742	11.40
70.537	220.325	4.108	122	Yes	13	0	1.864518	Yes	Yes	-70.54	8141.20	3215.91	4925.29	0.45	0.072	3215.91	4925.29	147.63	0.407	0.71	156.19	19.8	176.0	0.622476	0.16	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.025	1.735	11.02
70.701	237.164	3.902	122	Yes	11	0	1.645275	Yes	Yes	-70.70	8161.21	3226.14	4935.06	0.45	0.072	3226.14	4935.06	161.90	0.384	0.72	171.29	14.5	185.8	0.925435	0.18	0.85	0.00	0.100	1.000	0.000	0.138	1.000	2.189	1.853	17.14
70.865	271.026	4.425	122	Yes	10	0	1.632685	Yes	Yes	-70.87	8181.21	3236.38	4944.84	0.45	0.072	3236.38	4944.84	191.87	0.341	0.75	203.00	11.8	214.7	3.724576	0.24	0.80	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	65.04
71.029	274.701	5.502	122	Yes	12	0	2.002905	Yes	Yes	-71.03	8201.22	3246.61	4954.61	0.45	0.072	3246.61	4954.61	195.06	0.336	0.75	206.37	18.4	224.8	3.724576	0.25	0.79	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	64.47
71.193	282.614	0.01	128.5	Yes	5	0	0.003538	Yes	Yes	-71.19	8222.30	3256.84	4965.45	0.44	0.072	3256.84	4965.45	202.17	0.327	0.76	213.89	0.2	214.1	3.724576	0.27	0.77	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	63.02
71.357	296.655	0.01	128.5	Yes	5	0	0.003371	Yes	Yes	-71.36	8243.37	3267.08	4976.29	0.44	0.072	3267.08	4976.29	215.11	0.310	0.77	227.59	0.2	227.8	3.724576	0.30	0.74	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	60.91

CPT Liquefaction Analysis



Earthquake Magnitude, M = 5.77

Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2014),
CPT and SPT Based Liquefaction
Triggering Procedures,
UCD/CGM-14/01

Project: Plant Scherer GA EPD Closure		Sounding ECP05A Avg.
Project Number: 60563110	Date: 1/23/2018	AECOM

CPT Liquefaction Analysis

Method: Idriss and Boulanger (2014), CPT and SPT Based Liquefaction Triggering Procedures

Title: Liquefaction Analysis
Project: Plant Scherer
Project No.: 60563110

Date: 3/18/2016
Boring No. CP-102

Input Parameters:
Peak ground acceleration, pga (g): 0.15
Earthquake Magnitude (M): 4.9
Water Table Depth at the time of drilling 35 ft
Water Table Depth at the time of earthquake 35 ft
Ground Surface Elevation 0 ft

Notes:
1. Sand-like behavior = "Yes", Clay-like behavior = "No" (See Idriss and Boulanger, 2014).
2. Make sure to turn on iterative calculations.
3. User to confirm highlighted values are reasonable.

												At the time of earthquake				At the time of drilling																			
Depth	Qt	Fs	Unit Weight	Liquefiable?[1]	FC	α (From static stress analysis)	Fs/Qt	Below Water Table?	Liquefaction Calculation Needed?	Sample Elev.	Total stress	Pore Pressure	Effective stress	Stress reduction coeff, r_d	CSR	Pore Pressure	Effective stress	qc1n	m	Cn	qc1	Delta qc1ncs	qc1ncs	CRR_{cpt}[3]	C_σ	K_σ	Assg. α	State Para	Para a	Para b	Para c	Kα	MSF_{max}	MSF	IB FSL
(ft)	(TSF)	(TSF)	(pcf)	(Yes/No)			(%)			(ft)	(psf)	(psf)	(psf)			(psf)	(psf)				(TSF)														
0.164	30.612	0.1	118.828	No	5	0	0.326669	No	No	-0.16	0.00		0.00				0.00																		
0.328	98.23	0.275	125.251	No	2	0	0.279955	No	No	-0.33	20.54		20.54				20.54																		
0.492	83.761	0.759	122.039	No	8	0	0.90615	No	No	-0.49	40.56		40.56				40.56																		
0.656	52.41	1.019	118.828	No	18	0	1.944285	No	No	-0.66	60.04		60.04				60.04																		
0.82	35.147	1.199	115.616	No	29	0	3.411386	No	No	-0.82	79.00		79.00				79.00																		
0.984	32.244	1.287	115.616	No	32	0	3.99144	No	No	-0.98	97.97		97.97				97.97																		
1.148	33.379	1.209	115.616	No	30	0	3.622038	No	No	-1.15	116.93		116.93				116.93																		
1.312	37.034	1.235	115.616	No	28	0	3.334773	No	No	-1.31	135.89		135.89				135.89																		
1.476	36.868	1.261	115.616	No	28	0	3.42031	No	No	-1.48	154.85		154.85				154.85																		
1.64	35.391	1.318	115.616	No	30	0	3.724111	No	No	-1.64	173.81		173.81				173.81																		
1.804	33.106	1.261	115.616	No	31	0	3.808977	No	No	-1.80	192.77		192.77				192.77																		
1.968	32.999	1.212	115.616	No	30	0	3.672839	No	No	-1.97	211.73		211.73				211.73																		
2.133	26.223	1.192	115.616	No	37	0	4.545628	No	No	-2.13	230.81		230.81				230.81																		
2.297	24.818	1.183	112.404	No	38	0	4.766702	No	No	-2.30	249.24		249.24				249.24																		
2.461	28.489	1.168	115.616	No	34	0	4.099828	No	No	-2.46	268.20		268.20				268.20																		
2.625	32.092	1.24	115.616	No	32	0	3.863891	No	No	-2.63	287.16		287.16				287.16																		
2.789	29.784	1.313	115.616	No	34	0	4.408407	No	No	-2.79	306.13		306.13				306.13																		
2.953	27.17	1.294	112.404	No	37	0	4.762606	No	No	-2.95	324.56		324.56				324.56																		
3.117	24.137	1.09	115.616	No	38	0	4.515888	No	No	-3.12	343.52		343.52				343.52																		
3.281	23.187	1.017	115.616	No	38	0	4.386078	No	No	-3.28	362.48		362.48				362.48																		
3.445	24.83	1.009	115.616	No	36	0	4.063633	No	No	-3.45	381.44		381.44				381.44																		
3.609	25.123	0.995	115.616	No	35	0	3.960514	No	No	-3.61	400.40		400.40				400.40																		
3.773	21.625	0.979	112.404	No	40	0	4.527168	No	No	-3.77	418.84		418.84				418.84																		
3.937	21.115	0.878	115.616	No	39	0	4.158181	No	No	-3.94	437.80		437.80				437.80																		
4.101	18.694	0.849	112.404	No	42	0	4.541564	No	No	-4.10	456.23		456.23				456.23																		
4.265	16.373	0.909	112.404	No	48	0	5.551823	No	No	-4.27	474.67		474.67				474.67																		
4.429	16.752	0.933	112.404	No	48	0	5.569484	No	No	-4.43	493.10		493.10				493.10																		
4.593	18.992	0.865	112.404	No	42	0	4.554549	No	No	-4.59	511.54		511.54				511.54																		
4.757	18.439	0.889	112.404	No	44	0	4.821303	No	No	-4.76	529.97		529.97				529.97																		
4.921	17.867	0.92	112.404	No	45	0	5.149158	No	No	-4.92	548.40		548.40				548.40																		
5.085	22.114	0.993	112.404	No	39	0	4.490368	No	No	-5.09	566.84		566.84				566.84																		
5.249	24.612	1.081	115.616	No	37	0	4.392166	No	No	-5.25	585.80		585.80				585.80																		
5.413	23.639	1.214	112.404	No	41	0	5.135581	No	No	-5.41	604.23		604.23				604.23																		
5.577	25.258	1.233	112.404	No	39	0	4.881622	No	No	-5.58	622.67		622.67				622.67																		
5.741	27.751	1.155	115.616	No	35	0	4.162012	No	No	-5.74	641.63		641.63				641.63																		
5.905	28.128	1.113	115.616	No	34	0	3.956911	No	No	-5.91	660.59		660.59				660.59																		
6.069	26.89	1.159	115.616	No	36	0	4.310152	No	No	-6.07	679.55		679.55				679.55																		
6.234	25.553	1.255	112.404	No	39	0	4.911361	No	No	-6.23	698.10		698.10				698.10																		
6.398	26.845	1.175	115.616	No	36	0	4.376979	No	No	-6.40	717.06		717.06				717.06																		
6.562	32.794	1.221	115.616	No	31	0	3.723242	No	No	-6.56	736.02		736.02				736.02																		
6.726	30.716	1.24	115.616	No	33	0	4.036984	No	No	-6.73	754.98		754.98				754.98																		
6.89	28.084	1.22	115.616	No	35	0	4.344111	No	No	-6.89	773.94		773.94				773.94																		
7.054	28.097	1.238	115.616	No	35	0	4.406164	No	No	-7.05	792.90		792.90				792.90																		
7.218	35.255	1.251	115.616	No	30	0	3.548433	No	No	-7.22	811.86		811.86				811.86																		
7.382	36.709	1.321	115.616	No	30	0	3.598573	No	No	-7.38	830.83		830.83				830.83																		
7.546	33.487	1.394	115.616	No	33	0	4.162809	No	No	-7.55	849.79		849.79				849.79																		
7.71	30.293	1.368	115.616	No	35	0	4.515895	No	No	-7.71	868.75		868.75				868.75																		
7.874	26.917	1.314	112.404	No	38	0	4.881673	No	No	-7.87	887.18		887.18				887.18																		
8.038	22.316	1.234	112.404	No	39	0	5.529665	No	No	-8.04	905.62		905.62				905.62																		
8.202	19.321	1.146	112.404	No	42	0	5.93137	No	No	-8.20	924.05		924.05				924.05																		
8.366	17.513	1.026	112.404	No	44	0	5.858505	No	No	-8.37	942.48		942.48				942.48																		
8.53	17.01	0.861	112.404	No	43	0	5.061728	No	No	-8.53	960.92		960.92				960.92																		
8.694	14.651	0.767	112.404	No	46	0	5.235138	No	No	-8.69	979.35		979.35				979.35																		
8.858	12.211	0.709	112.404	No	52	0	5.80624	No	No	-8.86	997.79		997.79				997.79																		
9.022	11.738	0.664	112.404	No	53	0	5.656841	No	No	-9.02	1016.22		1016.22				1016.22																		
9.186	12.735	0.652	112.404	No	50	0	5.119749	No	No	-9.19	1034.66		1034.66				1034.66																		
9.35	13.204	0.657	112.404	No	49	0	4.975765	No	No	-9.35	1053.09		1053.09				1053.09																		
9.514	13.868	0.697	112.404	No	48	0	5.025959	No	No	-9.51	1071.52		1071.52				1071.52																		
9.678	13.971	0.655	112.404	No	47	0	4.688283	No	No	-9.68	1089.96		1089.96				1089.96																		
9.842	12.684	0.689	112.404	No	52	0	5.43204	No	No	-9.84	1108.39		1108.39				1108.39																		
10.006	13.499	0.659	112.404	No	50	0	4.881843	No	No	-10.01	1126.83		1126.83				1126.83																		
10.17	16.282	0.876	112.404	No	48	0	5.380174	No	No	-10.17	1145.26		1145.26				1145.26																		
10.335	30.287	1.152	115.616	No	34	0	3.803612	No	No	-10.34	1164.34		1164.34				1164.34																		
10.499	29.312	1.307	115.616	No	37	0	4.458925	No	No	-10.50	1183.30		1183.30				1183.30																		
10.663	24.452	1.311	112.404	No	41	0	5.361525	No	No	-10.66	1201.73		1201.73				1201.73																		
10.827	20.511	1.094	112.404	No	44	0	5.333723	No	No	-10.83	1220.17		1220.17				1220.17																		
10.991	17.423	0.945	112.404	No	48	0	5.423865	No	No	-10.99	1238.60		1238.60				1238.60																		
11.155	13.986	0.87	112.404	No	56	0	6.220506	No	No	-11.16	1257.04		1257.04				1257.04																		
11.319	12.827	0.838	112.404	No	59	0	6.533094	No	No	-11.32	1275.47		1275.47				1275.47																		
11.483	13.981	0.83	112.404	No	55	0	5.936628	No	No	-11.48	1293.90		1293.90				1293.90																		
11.647	18.705	0.925	112.404	No	46	0	4.945202	No	No	-11.65	1312.34		1312.34				1312.34																		
11.811	18.441	1.18	112.404	No	51	0	6.398785	No	No	-11.81	1330.77		1330.77				1330.77																		
11.975	34.571	1.542	115.616	No	36	0	4.460386	No	No	-11.98	1349.73		1349.73				1349.73																		
12.139	42.912	1.953	115.616	No	35	0	4.551174	No	No	-12.14	1368.70		1368.70				1368.70																		
12.303	42.153	2.237	112.404	No	36	0	5.306858	No	No	-12.30	1387.13		1387.13				1387.13																		
12.467	43.006	2.214	112.404	No	35	0	5.148119	No	No	-12.47	1405.56		1405.56				1405.56																		
12.631	46.883	2.232	115.616	No	34	0	4.760787	No	No	-12.63	1424.52		1424.52				1424.52																		
12.795	43.663	2.192	112.404	No	35	0	5.020269	No	No	-12.80	1442.96		1442.96				1442.96																		
12.959	39.528	2.059	112.404	No	36	0	5.208966	No	No	-12.96	1461.39		1461.39				1461.39																		
13.123	35.578	1.821	112.404	No	38	0	5.118332	No	No	-13.12	1479.83		1479.83				1479.83																		
13.287	33.312	1.716	112.404	No	39	0	5.151297	No	No	-13.29	1498.26		1498.26				1498.26																		
13.451	30.805	1.612	112.404	No	41	0	5.232917	No	No	-13.45	1516.70		1516.70				1516.70																		
13.615	33.896	1.471	115.616	No	36	0	4.339745	No	No	-13.62	1535.66		1535.66				1535.66																		
13.779	32.809	1.431	115.616	No	37	0	4.361608	No	No	-13.78	1554.62		1554.62				1554.62																		
13.943	24.651	1.433	112.404	No	47	0	5.813152	No	No	-13.94	1573.05		1573.05				1573.05																		
14.107	20.688	1.309	112.404	No	52	0	6.32734	No	No	-14.11	1591.49		1591.49				1591.49																		
14.271	23.589	1.237	112.404	No	47	0	5.24397	No	No	-14.27	1609.92		1609.92				1609.92																		
14.436	22.923	1.54	112.404	No	52	0	6.718143	No	No	-14.44	1628.47		1628.47				1628.47																		
14.6	43.159	1.887	115.616	No	35	0	4.372205	No	No	-14.60	1647.43		1647.43				1647.43																		
14.764	35.224	2.017	112.404	No	41	0	5.726209	No	No	-14.76	1665.86		1665.86				1665.86																		
14.928	31.613	1.942	112.404	No	45	0	6.143042	No	No	-14.93	1684.30		1684.30				1684.30																		
15.092	26.781	1.608	112.404	No	48	0	6.004257	No	No	-15.09	1702.73		1702.73				1702.73																		
15.256	23.279	1.399	112.404	No	51	0	6.009708	No	No	-15.26	1721.17		1721.17				1721.17																		
15.42	21.96	1.307	112.404	No	52	0	5.95173	No	No	-15.42	1739.60		1739.60				1739.60																		
15.584	23.169	1.293	112.404	No	50	0	5.580733	No	No	-15.58	1758.03		1758.03				1758.03																		
15.748	25.12	1.329	112.404	No	47	0	5.290605	No	No	-15.75	1776.47		1776.47				1776.47																		
15.912	26.202	1.513	112.404	No	48	0	5.774368	No	No	-15.91	1794.90		1794.90				1794.90																		
16.076	25.621	1.685	112.404	No	51	0	6.576636	No	No	-16.08	1813.34		1813.34				1813.34																		
16.24	30.057	1.757	112.404	No	46	0	5.84556	No	No	-16.24	1831.77		1831.77				1831.77																		
16.404	41.116	2.124	112.404	No	39	0	5.165872	No	No	-16.40	1850.21		1850.21				1850.21																		
16.568	38.558	2.437	112.404	No	44	0	6.320349	No	No	-16.57	1868.64		1868.64				1868.64																		
16.732	32.54	2.21	112.404	No	48	0	6.791641	No	No	-16.73	1887.07		1887.07				1887.07																		

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16.896	26.69	1.641	112.404	No	50	0	6.14837	No	No	-16.90	1905.51		1905.51				1905.51
17.06	22.452	1.297	112.404	No	53	0	5.776768	No	No	-17.06	1923.94		1923.94				1923.94
17.224	18.432	1.1	112.404	No	58	0	5.967882	No	No	-17.22	1942.38		1942.38				1942.38
17.388	16.02	0.947	112.404	No	62	0	5.911361	No	No	-17.39	1960.81		1960.81				1960.81
17.552	13.183	0.838	112.404	No	69	0	6.356671	No	No	-17.55	1979.24		1979.24				1979.24
17.716	12.099	0.762	112.404	No	71	0	6.298041	No	No	-17.72	1997.68		1997.68				1997.68
17.88	12.113	0.711	112.404	No	70	0	5.869727	No	No	-17.88	2016.11		2016.11				2016.11
18.044	13.313	0.663	112.404	No	64	0	4.980095	No	No	-18.04	2034.55		2034.55				2034.55
18.208	15.646	1.223	112.404	No	70	0	7.816694	No	No	-18.21	2052.98		2052.98				2052.98
18.372	44.001	1.295	115.616	No	31	0	2.943115	No	No	-18.37	2071.94		2071.94				2071.94
18.537	13.73	1.25	119.727	No		0	9.104151	No	No	-18.54	2091.70		2091.70				2091.70
18.701	14.631	1.142	112.404	No	72	0	7.805345	No	No	-18.70	2110.13		2110.13				2110.13
18.865	14.666	0.788	112.404	No	64	0	5.372971	No	No	-18.87	2128.57		2128.57				2128.57
19.029	19.049	0.942	112.404	No	56	0	4.945141	No	No	-19.03	2147.00		2147.00				2147.00
19.193	26.001	1.315	112.404	No	50	0	5.057498	No	No	-19.19	2165.43		2165.43				2165.43
19.357	30.946	1.648	112.404	No	47	0	5.325406	No	No	-19.36	2183.87		2183.87				2183.87
19.521	32.805	1.902	112.404	No	48	0	5.797897	No	No	-19.52	2202.30		2202.30				2202.30
19.685	28.018	1.949	112.404	No	55	0	6.956242	No	No	-19.69	2220.74		2220.74				2220.74
19.849	29.913	1.93	112.404	No	52	0	6.452044	No	No	-19.85	2239.17		2239.17				2239.17
20.013	37.579	2.238	112.404	No	46	0	5.955454	No	No	-20.01	2257.61		2257.61				2257.61
20.177	57.428	2.692	115.616	No	35	0	4.687609	No	No	-20.18	2276.57		2276.57				2276.57
20.341	51.423	2.989	112.404	No	41	0	5.812574	No	No	-20.34	2295.00		2295.00				2295.00
20.505	41.823	3.11	112.404	No	49	0	7.4361	No	No	-20.51	2313.44		2313.44				2313.44
20.669	45.631	2.679	112.404	No	43	0	5.871009	No	No	-20.67	2331.87		2331.87				2331.87
20.833	57.769	2.708	115.616	No	36	0	4.687635	No	No	-20.83	2350.83		2350.83				2350.83
20.997	49.054	2.797	112.404	No	42	0	5.70188	No	No	-21.00	2369.27		2369.27				2369.27
21.161	39.794	2.627	112.404	No	48	0	6.601498	No	No	-21.16	2387.70		2387.70				2387.70
21.325	31.859	2.26	112.404	No	54	0	7.093757	No	No	-21.33	2406.13		2406.13				2406.13
21.489	28.3	1.844	112.404	No	55	0	6.515901	No	No	-21.49	2424.57		2424.57				2424.57
21.653	33.681	1.973	112.404	No	50	0	5.857902	No	No	-21.65	2443.00		2443.00				2443.00
21.817	47.102	2.232	115.616	No	40	0	4.738652	No	No	-21.82	2461.96		2461.96				2461.96
21.981	42.992	2.533	112.404	No	45	0	5.891794	No	No	-21.98	2480.40		2480.40				2480.40
22.145	40.554	2.578	112.404	No	48	0	6.356956	No	No	-22.15	2498.83		2498.83				2498.83
22.309	38.302	2.228	112.404	No	48	0	5.816929	No	No	-22.31	2517.27		2517.27				2517.27
22.473	32.544	1.972	112.404	No	52	0	6.059489	No	No	-22.47	2535.70		2535.70				2535.70
22.638	30.396	1.724	112.404	No	52	0	5.671799	No	No	-22.64	2554.25		2554.25				2554.25
22.802	35.087	1.699	115.616	No	47	0	4.842249	No	No	-22.80	2573.21		2573.21				2573.21
22.966	35.265	1.973	112.404	No	49	0	5.594782	No	No	-22.97	2591.64		2591.64				2591.64
23.13	38.198	2.074	112.404	No	47	0	5.429604	No	No	-23.13	2610.08		2610.08				2610.08
23.294	37.511	2.056	112.404	No	48	0	5.481059	No	No	-23.29	2628.51		2628.51				2628.51
23.458	35.586	1.855	112.404	No	48	0	5.212724	No	No	-23.46	2646.95		2646.95				2646.95
23.622	38.25	1.757	115.616	No	45	0	4.593464	No	No	-23.62	2665.91		2665.91				2665.91
23.786	35.895	1.764	112.404	No	47	0	4.914333	No	No	-23.79	2684.34		2684.34				2684.34
23.95	32.765	1.836	112.404	No	52	0	5.60354	No	No	-23.95	2702.77		2702.77				2702.77
24.114	31.318	1.617	112.404	No	51	0	5.163165	No	No	-24.11	2721.21		2721.21				2721.21
24.278	29.5	1.53	112.404	No	53	0	5.186441	No	No	-24.28	2739.64		2739.64				2739.64
24.442	31.334	1.485	115.616	No	50	0	4.739261	No	No	-24.44	2758.60		2758.60				2758.60
24.606	29.114	1.612	112.404	No	55	0	5.536855	No	No	-24.61	2777.04		2777.04				2777.04
24.77	30.546	1.58	112.404	No	52	0	5.172527	No	No	-24.77	2795.47		2795.47				2795.47
24.934	29.241	1.645	112.404	No	55	0	5.625663	No	No	-24.93	2813.91		2813.91				2813.91
25.098	27.922	1.601	112.404	No	57	0	5.73383	No	No	-25.10	2832.34		2832.34				2832.34
25.262	27.606	1.568	112.404	No	57	0	5.679925	No	No	-25.26	2850.78		2850.78				2850.78
25.426	28.775	1.54	112.404	No	55	0	5.351868	No	No	-25.43	2869.21		2869.21				2869.21
25.59	26.255	1.584	112.404	No	60	0	6.033137	No	No	-25.59	2887.64		2887.64				2887.64
25.754	25.279	1.47	112.404	No	60	0	5.815103	No	No	-25.75	2906.08		2906.08				2906.08
25.918	24.304	1.339	112.404	No	60	0	5.509381	No	No	-25.92	2924.51		2924.51				2924.51
26.082	24.254	1.227	112.404	No	58	0	5.058959	No	No	-26.08	2942.95		2942.95				2942.95
26.246	24.917	1.331	112.404	No	59	0	5.341735	No	No	-26.25	2961.38		2961.38				2961.38
26.41	25.093	1.353	112.404	No	59	0	5.391942	No	No	-26.41	2979.82		2979.82				2979.82
26.574	25.25	1.304	112.404	No	58	0	5.164356	No	No	-26.57	2998.25		2998.25				2998.25
26.739	25.207	1.405	112.404	No	60	0	5.573849	No	No	-26.74	3016.80		3016.80				3016.80
26.903	22.021	1.455	112.404	No	67	0	6.607329	No	No	-26.90	3035.23		3035.23				3035.23
27.067	23.393	1.471	112.404	No	65	0	6.288206	No	No	-27.07	3053.66		3053.66				3053.66
27.231	23.057	1.451	112.404	No	65	0	6.2931	No	No	-27.23	3072.10		3072.10				3072.10
27.395	23.775	1.441	112.404	No	64	0	6.060988	No	No	-27.40	3090.53		3090.53				3090.53
27.559	23.346	1.386	112.404	No	64	0	5.936777	No	No	-27.56	3108.97		3108.97				3108.97
27.723	28.136	1.541	112.404	No	58	0	5.476969	No	No	-27.72	3127.40		3127.40				3127.40
27.887	29.991	1.683	112.404	No	57	0	5.611684	No	No	-27.89	3145.84		3145.84				3145.84
28.051	28.027	1.795	112.404	No	61	0	6.404538	No	No	-28.05	3164.27		3164.27				3164.27
28.215	28.814	1.739	112.404	No	60	0	6.035261	No	No	-28.22	3182.70		3182.70				3182.70
28.379	28.935	1.843	112.404	No	61	0	6.369449	No	No	-28.38	3201.14		3201.14				3201.14
28.543	31.516	1.647	112.404	No	55	0	5.225917	No	No	-28.54	3219.57		3219.57				3219.57
28.707	29.555	1.56	112.404	No	57	0	5.278295	No	No	-28.71	3238.01		3238.01				3238.01
28.871	19.918	1.345	112.404	No	73	0	6.752686	No	No	-28.87	3256.44		3256.44				3256.44
29.035	18.716	1.233	112.404	No	74	0	6.587946	No	No	-29.04	3274.88		3274.88				3274.88
29.199	19.057	1.142	112.404	No	72	0	5.992549	No	No	-29.20	3293.31		3293.31				3293.31
29.363	20.028	0.957	112.404	No	66	0	4.77831	No	No	-29.36	3311.74		3311.74				3311.74
29.527	19.526	1.099	112.404	No	70	0	5.628393	No	No	-29.53	3330.18		3330.18				3330.18
29.691	19.654	1.142	112.404	No	70	0	5.810522	No	No	-29.69	3348.61		3348.61				3348.61
29.855	19.462	1.163	112.404	No	72	0	5.975748	No	No	-29.86	3367.05		3367.05				3367.05
30.019	18.614	1.113	112.404	No	73	0	5.97937	No	No	-30.02	3385.48		3385.48				3385.48
30.183	18.764	1.146	112.404	No	73	0	6.10744	No	No	-30.18	3403.92		3403.92				3403.92
30.347	19.631	1.065	112.404	No	70	0	5.425093	No	No	-30.35	3422.35		3422.35				3422.35
30.511	20.482	1.155	112.404	No	69	0	5.639098	No	No	-30.51	3440.78		3440.78				3440.78
30.675	18.762	1.213	112.404	No	75	0	6.465196	No	No	-30.68	3459.22		3459.22				3459.22
30.84	19.657	1.305	112.404	No	75	0	6.638856	No	No	-30.84	3477.76		3477.76				3477.76
31.004	23.042	1.317	112.404	No	67	0	5.71565	No	No	-31.00	3496.20		3496.20				3496.20
31.168	23.704	1.405	112.404	No	67	0	5.92727	No	No	-31.17	3514.63		3514.63				3514.63
31.332	30.008	1.6	112.404	No	59	0	5.331911	No	No	-31.33	3533.07		3533.07				3533.07
31.496	32.871	1.797	112.404	No	57	0	5.466825	No	No	-31.50	3551.50		3551.50				3551.50
31.66	28.738	1.891	112.404	No	64	0	6.580138	No	No	-31.66	3569.94		3569.94				3569.94
31.824	24.33	1.761	112.404	No	71	0	7.237978	No	No	-31.82	3588.37		3588.37				3588.37
31.988	21.072	1.503	112.404	No	75	0	7.132688	No	No	-31.99	3606.80		3606.80				3606.80
32.152	20.926	1.268	112.404	No	72	0	6.059448	No	No	-32.15	3625.24		3625.24				3625.24
32.316	19.781	1.209	112.404	No	74	0	6.111926	No	No	-32.32	3643.67		3643.67				3643.67
32.48	21.718	1.31	112.404	No	71	0	6.031863	No	No	-32.48	3662.11		3662.11				3662.11
32.644	23.212	1.252	112.404	No	67	0	5.393762	No	No	-32.64	3680.54		3680.54				3680.54
32.808	20.891	1.374	112.404	No	74	0	6.576995	No	No	-32.81	3698.98		3698.98				3698.98
32.972	19.147	1.234	112.404	No	77	0	6.444874	No	No	-32.97	3717.41		3717.41				3717.41
33.136	19.103	1.188	112.404	No	76	0	6.218918	No	No	-33.14	3735.84		3735.84				3735.84
33.3	18.47	1.132	112.404	No	77	0	6.128858	No	No	-33.30	3754.28		3754.28				3754.28
33.464	21.631	1.265	112.404	No	71	0	5.848088	No	No	-33.46	3772.71		3772.71				3772.71
33.628	21.633	1.431	112.404	No	74	0	6.614894	No	No	-33.63	3791.15		3791.15				3791.15
33.792	22.328	1.447	112.404	No	73	0	6.480652	No	No	-33.79	3809.58		3809.58				3809.58
33.956	27.625	1.418	112.404	No	62	0	5.133032	No	No	-33.96	3828.02		3828.02				3828.02
34.12	24.973	1.393	112.404	No	67	0	5.578024	No	No	-34.12	3846.45		3846.45				3846.45
34.284	21.859	1.499	112.404	No	75	0	6.857587	No	No	-34.28	3864.88		3864.88				3864.88
34.448	18.713	1.355	112.404	No	82	0	7.240955	No	No	-34.45	3883.32		3883.32				3883.32
34.612	18.886	1.244	112.404	No	79	0	6.58689	No	No	-34.61	3901.75		3901.75				3901.75
34.776	19.455	1.163	112.404	No	76	0	5.977898	No	No	-34.78	3920.19		3920.19				3920.19
34.941	22.53	1.243	112.404	No	70	0	5.517088	No	No	-34.94	3938.73		3938.73				3938.73
35.105	27.907	1.355	112.404	No	62	0	4.855413	Yes	No	-35.11	3957.17	6.55	3950.62			6.55	3950.62
35.269	20.8	1.267	112.404	No	75	0	6.091346	Yes	No	-35.27	3975.60	16.79	3958.82			16.79	3958.82
35.433	17.9	1.225	112.404	No	83	0	6.843575	Yes	No	-35.43	3994.04	27.02	3967.02			27.02	3967.02
35.597	18.981	1.083	112.404	No	77	0	5.705706	Yes	No	-35.60	4012.47	37.25	3975.22			37.25	3975.22
35.761	21.05	1.29	112.404	No	75	0	6.128266	Yes	No	-35.76	4030.91	47.49	3983.42			47.49	3983.42

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35.925	35.402	1.62	115.616	No	55	0	4.576013	Yes	No	-35.93	4049.87	57.72	3992.15			57.72	3992.15																		
36.089	35.921	2.018	112.404	No	58	0	5.617884	Yes	No	-36.09	4068.30	67.95	4000.35			67.95	4000.35																		
36.253	34.041	2.286	112.404	No	63	0	6.715431	Yes	No	-36.25	4086.73	78.19	4008.55			78.19	4008.55																		
36.417	31.16	2.086	112.404	No	66	0	6.69448	Yes	No	-36.42	4105.17	88.42	4016.75			88.42	4016.75																		
36.581	34.186	1.888	112.404	No	59	0	5.522729	Yes	No	-36.58	4123.60	98.65	4024.95			98.65	4024.95																		
36.745	37.659	1.857	112.404	No	55	0	4.931092	Yes	No	-36.75	4142.04	108.89	4033.15			108.89	4033.15																		
36.909	32.517	1.939	112.404	No	62	0	5.963035	Yes	No	-36.91	4160.47	119.12	4041.35			119.12	4041.35																		
37.073	28.923	1.808	112.404	No	67	0	6.25108	Yes	No	-37.07	4178.91	129.36	4049.55			129.36	4049.55																		
37.237	28.807	1.637	112.404	No	65	0	5.682647	Yes	No	-37.24	4197.34	139.59	4057.75			139.59	4057.75																		
37.401	26.118	1.505	112.404	No	68	0	5.76231	Yes	No	-37.40	4215.77	149.82	4065.95			149.82	4065.95																		
37.565	31.516	1.655	112.404	No	61	0	5.251301	Yes	No	-37.57	4234.21	160.06	4074.15			160.06	4074.15																		
37.729	26.178	1.736	112.404	No	71	0	6.631523	Yes	No	-37.73	4252.64	170.29	4082.35			170.29	4082.35																		
37.893	26.182	1.616	112.404	No	69	0	6.172179	Yes	No	-37.89	4271.08	180.52	4090.55			180.52	4090.55																		
38.057	27.928	1.412	112.404	No	64	0	5.055858	Yes	No	-38.06	4289.51	190.76	4098.75			190.76	4098.75																		
38.221	23.571	1.361	112.404	No	71	0	5.774044	Yes	No	-38.22	4307.95	200.99	4106.96			200.99	4106.96																		
38.385	20.994	1.325	112.404	No	77	0	6.311327	Yes	No	-38.39	4326.38	211.22	4115.16			211.22	4115.16																		
38.549	21.24	1.258	112.404	No	75	0	5.922787	Yes	No	-38.55	4344.81	221.46	4123.36			221.46	4123.36																		
38.713	21.393	1.375	112.404	No	77	0	6.427336	Yes	No	-38.71	4363.25	231.69	4131.56			231.69	4131.56																		
38.877	27.699	1.622	112.404	No	67	0	5.855807	Yes	No	-38.88	4381.68	241.92	4139.76			241.92	4139.76																		
39.042	38.708	1.92	112.404	No	55	0	4.960215	Yes	No	-39.04	4400.23	252.22	4148.01			252.22	4148.01																		
39.206	40.266	2.213	112.404	No	56	0	5.495952	Yes	No	-39.21	4418.66	262.45	4156.21			262.45	4156.21																		
39.37	35.087	2.381	112.404	No	64	0	6.785989	Yes	No	-39.37	4437.10	272.69	4164.41			272.69	4164.41																		
39.534	33.406	2.107	112.404	No	64	0	6.30725	Yes	No	-39.53	4455.53	282.92	4172.61			282.92	4172.61																		
39.698	31.314	1.944	112.404	No	65	0	6.208086	Yes	No	-39.70	4473.97	293.16	4180.81			293.16	4180.81																		
39.862	28.061	1.859	112.404	No	70	0	6.624853	Yes	No	-39.86	4492.40	303.39	4189.01			303.39	4189.01																		
40.026	24.507	1.456	112.404	No	71	0	5.94116	Yes	No	-40.03	4510.83	313.62	4197.21			313.62	4197.21																		
40.19	24.328	1.505	112.404	No	73	0	6.186287	Yes	No	-40.19	4529.27	323.86	4205.41			323.86	4205.41																		
40.354	26.847	1.526	112.404	No	68	0	5.684062	Yes	No	-40.35	4547.70	334.09	4213.61			334.09	4213.61																		
40.518	33.33	1.667	112.404	No	60	0	5.0015	Yes	No	-40.52	4566.14	344.32	4221.81			344.32	4221.81																		
40.682	37.069	1.79	115.616	No	56	0	4.828833	Yes	No	-40.68	4585.10	354.56	4230.54			354.56	4230.54																		
40.846	36.375	1.866	112.404	No	58	0	5.129897	Yes	No	-40.85	4603.53	364.79	4238.74			364.79	4238.74																		
41.01	34.616	1.861	112.404	No	60	0	5.376127	Yes	No	-41.01	4621.97	375.02	4246.94			375.02	4246.94																		
41.174	30.807	1.748	112.404	No	64	0	5.674035	Yes	No	-41.17	4640.40	385.26	4255.14			385.26	4255.14																		
41.338	28.802	1.552	112.404	No	65	0	5.388515	Yes	No	-41.34	4658.84	395.49	4263.34			395.49	4263.34																		
41.502	26.778	1.378	112.404	No	66	0	5.146015	Yes	No	-41.50	4677.27	405.72	4271.55			405.72	4271.55																		
41.666	26.329	1.316	112.404	No	66	0	4.998291	Yes	No	-41.67	4695.70	415.96	4279.75			415.96	4279.75																		
41.83	24.659	1.294	112.404	No	69	0	5.247577	Yes	No	-41.83	4714.14	426.19	4287.95			426.19	4287.95																		
41.994	30.508	1.479	112.404	No	62	0	4.847909	Yes	No	-41.99	4732.57	436.43	4296.15			436.43	4296.15																		
42.158	60.531	1.513	115.616	Yes	36	0	2.499546	Yes	Yes	-42.16	4751.53	446.66	4304.87	0.65	0.070	446.66	4304.87	34.73	0.703	0.61	36.75	47.5	84.3	0.120	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.193	1.138	1.70
42.322	116.071	1.317	122.039	Yes	14	0	1.13465	Yes	Yes	-42.32	4771.55	456.89	4314.66	0.65	0.070	456.89	4314.66	73.40	0.564	0.67	77.66	17.8	95.5	0.132	0.09	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.239	1.172	1.89
42.486	159.415	0.932	125.251	Yes	7	0	0.584638	Yes	Yes	-42.49	4792.09	467.13	4324.96	0.65	0.070	467.13	4324.96	106.62	0.484	0.71	112.80	1.8	114.6	0.160	0.11	0.92	0.00	0.100	1.000	0.000	0.138	1.000	1.348	1.249	2.40
42.65	173.852	0.708	125.251	Yes	5	0	0.407243	Yes	Yes	-42.65	4812.63	477.36	4335.27	0.64	0.070	477.36	4335.27	118.10	0.460	0.72	124.95	0.2	125.1	0.184	0.12	0.91	0.00	0.100	1.000	0.000	0.138	1.000	1.426	1.305	2.85
42.814	169.405	0.724	125.251	Yes	5	0	0.427378	Yes	Yes	-42.81	4833.17	487.59	4345.58	0.64	0.070	487.59	4345.58	114.34	0.468	0.71	120.97	0.2	121.1	0.174	0.12	0.91	0.00	0.100	1.000	0.000	0.138	1.000	1.395	1.283	2.66
42.978	171.71	0.736	125.251	Yes	5	0	0.42863	Yes	Yes	-42.98	4853.71	497.83	4355.89	0.64	0.070	497.83	4355.89	116.06	0.464	0.72	122.79	0.2	123.0	0.178	0.12	0.91	0.00	0.100	1.000	0.000	0.138	1.000	1.409	1.293	2.74
43.143	162.985	0.752	125.251	Yes	5	0	0.461392	Yes	Yes	-43.14	4874.38	508.12	4366.26	0.64	0.070	508.12	4366.26	108.88	0.479	0.71	115.19	0.2	115.4	0.162	0.11	0.92	0.00	0.100	1.000	0.000	0.138	1.000	1.353	1.253	2.42
43.307	148.749	0.756	125.251	Yes	7	0	0.508239	Yes	Yes	-43.31	4894.92	518.36	4376.56	0.64	0.070	518.36	4376.56	97.49	0.504	0.69	103.15	1.5	104.7	0.144	0.10	0.92	0.00	0.100	1.000	0.000	0.138	1.000	1.287	1.206	2.09
43.471	125.24	0.995	125.251	Yes	11	0	0.794475	Yes	Yes	-43.47	4915.46	528.59	4386.87	0.64	0.070	528.59	4386.87	79.40	0.548	0.67	84.00	9.3	93.3	0.129	0.09	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.229	1.164	1.83
43.635	89.966	1.232	122.039	Yes	18	0	1.369406	Yes	Yes	-43.64	4935.48	538.82	4396.65	0.64	0.070	538.82	4396.65	53.85	0.625	0.63	56.97	27.1	84.1	0.120	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.192	1.138	1.68
43.799	51.112	1.631	115.616	Yes	43	0	3.191031	Yes	Yes	-43.80	4954.44	549.06	4405.38	0.63	0.070	549.06	4405.38	28.14	0.737	0.58	29.77	50.4	80.2	0.116	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.178	1.128	1.63
43.963	37.517	1.377	115.616	Yes	52	0	3.670336	Yes	Yes	-43.96	4973.40	559.29	4414.11	0.63	0.070	559.29	4414.11	19.84	0.790	0.56	20.99	52.0	73.0	0.110	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.157	1.112	1.53
44.127	81.101	1.176	118.828	Yes	20	0	1.450044	Yes	Yes	-44.13	4992.89	569.52	4423.36	0.63	0.070	569.52	4423.36	47.54	0.648	0.62	50.30	30.0	80.3	0.116	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.179	1.128	1.62
44.291	118.261	1.084	122.039	Yes	12	0	0.916617	Yes	Yes	-44.29	5012.90	579.76	4433.14	0.63	0.070	579.76	4433.14	73.70	0.563	0.66	77.98	13.3	91.2	0.127	0.09	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.220	1.158	1.79
44.455	135.855	0.994	125.251	Yes	10	0	0.731662	Yes	Yes	-44.46	5033.44	589.99	4443.45	0.63	0.069	589.99	4443.45	86.71	0.529	0.68	91.74	6.5	98.3	0.135	0.10	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.253	1.181	1.93
44.619	178.005	0.992	125.251	Yes	6	0	0.557288	Yes	Yes	-44.62	5053.98	600.23	4453.76	0.63	0.069	600.23	4453.76	119.71	0.457	0.71	126.66	0.8	127.5	0.190	0.12	0.91	0.00	0.100	1.000	0.000	0.138	1.000	1.445	1.319	2.97
44.783	253.537	1.171	128.462	Yes	3	0	0.461866	Yes	Yes	-44.78	5075.05	610.46	4464.59	0.63	0.069	610.46	4464.59	184.40	0.351	0.77	195.10	0.0	195.1	1.449628	0.22	0.83	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	29.36
44.947	302.18	1.389	128.462	Yes	2	0	0.45966	Yes	Yes	-44.95	5096.12	620.69	4475.43	0.62	0.069	620.69	4475.43	229.46	0.292	0.80	242.77	0.0	242.8	3.724576	0.30	0.78	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	70.08
45.111	311.877	1.599	128.462	Yes	3	0	0.512702	Yes	Yes	-45.11	5117.19	630.93	4486.26	0.62	0.069	630.93	4486.26	238.59	0.281	0.81	252.43	0.0	252.4	3.724576	0.30	0.77	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	70.02
45.275	306.335	1.923	128.462	Yes	4	0	0.627744	Yes	Yes	-45.28	5138.25	641.16	4497.09	0.62	0.069	641.16	4497.09	233.04	0.288	0.80	246.55	0.0	246.6	3.724576	0.30	0.77	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	69.96
45.439	316.985	1.808	128.462	Yes	3	0	0.570374	Yes	Yes	-45.44	5159.32	651.39	4507.93	0.62	0.069	651.39	4507.93	243.14	0.276	0.81	257.24	0.0	257.2	3.724576	0.30	0.77	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	69.91
45.603	363.245	1.94	128.462	Yes	2	0	0.534075	Yes	Yes	-45.60	5180.39	661.63	4518.76	0.62	0.069	661.63	4518.76	289.13	0.226	0.84	305.90	0.0	305.9	3.724576	0.30	0.77	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	69.85
45.767	429.469	1.629	128.462	Yes	0	0	0.379306	Yes	Yes	-45.77	5201.46	671.86	4529.60	0.62	0.069	671.86	4529.60	359.11	0.161	0.88	379.94	0.0	379.9	3.724576	0.30	0.77	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	69.79
45.931	369.27	2.268	128.462	Yes	3	0	0.614185	Yes	Yes	-45.93	5222.52	682.09	4540.43	0.62	0.069	682.09	4540.43	294.92	0.221	0.84	312.03	0.0	312.0	3.724576	0.30	0.77	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	69.74
46.095	227.622	2.805	125.251	Yes	9	0	1.232306	Yes	Yes	-46.10	5243.07	692.33	4550.74	0.62	0.069	692.33	4550.74	159.93	0.387	0.74	169.20	6.9	176.1	0.62404	0.17	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.026	1.736	12.25
46.259	115.539	3.103	118.828	Yes	23	0	2.685673	Yes	Yes	-46.26	5262.55	702.56	4559.99	0.61	0.069	702.56	4559.99	70.36	0.573	0.64	74.44	38.2	112.6	0.157	0.08	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.335	1.240	2.37
46.423	73.176	2.971	115.616	Yes	41	0	4.060074	Yes	Yes	-46.42	5281.51	712.80	4568.72	0.61	0.069	712.80	4568.72	41.19	0.674	0.60	43.57	52.3	95.9	0.132	0.07	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.241	1.173	1.92
46.587	51.571	2.684	112.404	Yes	52	0	5.204475	Yes	Yes	-46.59	5299.95	723.03	4576.92	0.61	0.069	723.03	4576.92	27.53	0.741	0.56	29.13	54.0	83.1	0.119	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.189	1.135	1.68
46.751	46.915	2.367	115.616	Yes	54	0	5.045295	Yes	Yes	-46.75	5318.91	733.26	4585.65	0.61	0.069	733.26	4585.65	24.68	0.758	0.56	26.11	53.8	79.9	0.116	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.177	1.127	1.63
46.915	44.743	1.861	115.616	Yes	51	0	4.15931	Yes	Yes	-46.92	5337.87	743.50	4594.37	0.61	0.069	743.50	4594.37	23.35	0.766	0.55	24.71	52.6	77.3	0.113	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.169	1.121	1.59
47.079	43.404	1.74	115.616	Yes	51	0	4.008847	Yes	Yes	-47.08	5356.83	753.73	4603.10	0.61	0.069	753.73	4603.10	22.53	0.771	0.55	23.83	52.5	76.3	0.113	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	1.58
47.244	41.716	1.695	115.616	Yes	53	0	4.063189	Yes	Yes	-47.24	5375.91	764.03	4611.88	0.61	0.069	764.03	4611.88	21.50	0.778	0.55	22.75	52.6	75.3	0.112	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.163	1.117	1.56
47.408	40.371	1.669	115.616	Yes	54	0	4.134156	Yes	Yes	-47.41	5394.87	774.26	4620.61	0.60	0.069	774.26	4620.61	20.69	0.784	0.54	21.89	52.7	74.6	0.111	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.116	1.55
47.572	37.032	1.587	115.616	Yes	57	0	4.285483	Yes	Yes	-47.57	5413.83	784.49	4629.34	0.60	0.069	784.49	4629.34	18.74	0.798	0.54	19.82	53.0	72.9	0.110	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	1.53
47.736	35.051	1.471	115.616	Yes	58	0	4.196742	Yes	Yes	-47.74	5432.79	794.73	4638.07	0.60	0.069	794.73	4638.07	17.58	0.807	0.53	18.60	53.0	71.6	0.109	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.110	1.51
47.9	35.919	1.388	115.616	Yes	56	0	3.86425	Yes	Yes	-47.90	5451.75	804.96	4646.79	0.60	0.069	804.96	4646.79	18.04	0.804	0.53	19.09	52.6	71.7	0.109	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.110	1.51
48.064	37.349	1.312	115.616	Yes	53	0	3.512812	Yes	Yes	-48.06	5470.71	815.19	4655.52	0.60	0.069	815.19	4655.52	18.82	0.798	0.53	19.91	52.0	71.9	0.109	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.154	1.110	1.52
48.228	39.345	1.323	115.616	Yes	51	0	3.362562	Yes	Yes	-48.23	5489.67	825.43	4664.25	0.60	0.069	825.43	4664.25	19.93	0.789	0.54	21.08	51.6	72.7	0.109	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	1.53
48.392	38.751	1.355	115.616	Yes	52	0	3.496684	Yes	Yes	-48.39	5508.64	835.66	4672.97	0.60	0.069	835.66	4672.97	19.55	0.792	0.53	20.69	51.9	72.6	0.109	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	1.53
48.556	37.899	1.419	115.616	Yes	54	0	3.744162	Yes	Yes	-48.56	5527.60	845.89	4681.70	0.59	0.068	845.89	4681.70	19.04	0.796	0.53	20.14	52.3	72.5	0.109	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	1.52
48.72	40.567	1.509	115.616	Yes	52	0	3.719772	Yes	Yes	-48.72	5546.56	856.13	4690.43	0.59	0.068	856.13	4690.43	20.52	0.785	0.54	21.72	52.2	73.9	0.110	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.159	1.114	1.54
48.884	49.967	1.553	115.616	Yes	45	0	3.108051	Yes	Yes	-48.88	5565.52	866.36	4699.16	0.59	0.068	866.36	4699.16	25.97	0.750	0.55	27.47	50.6	78.1	0.114	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.172	1.123	1.60
49.048	54.783	1.297	115.616	Yes	39	0	2.367523	Yes	Yes	-49.05	5584.48	876.60	4707.88	0.59	0.068	876.60	4707.88	28.80	0.733	0.56	30.47	48.1	78.6	0.115	0.06	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	1.61
49.212	54.857	1.644	115.616	Yes	42	0	2.996883	Yes	Yes	-49.21	5603.44	886.83	4716.61	0.59	0.068	886.83	4716.61	28.80	0.733	0.56	30.47	50.1	80.6	0.116	0.06	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	1.64
49.376	46.984	1.93	115.616	Yes	51	0	4.107781	Yes	Yes	-49.38	5622.40	897.06	4725.34	0.59	0.068	897.06	4725.34	24.09	0.761	0.54	25.49	52.6	78.1	0.114	0.06	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.172	1.123	1.60
49.54	41.18	1.945	115.616	Yes	56	0	4.723167	Yes	Yes	-49.54	5641.36	907.30	4734.07	0.59	0.068	907.30	4734.07	20.71	0.784	0.53	21.91	53.5	75.4	0.112	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.164	1.117	1.57
49.704	38.222	1.683	115.616	Yes	57	0	4.403223	Yes	Yes	-49.70	5660.32	917.53	4742.79	0.59	0.068	917.53	4742.79	19.00	0.796	0.53	20.10	53.2	73.3	0.110	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.113	1.54
49.868	37.502	1.395	115.616	Yes	54	0	3.719802	Yes	Yes	-49.87	5679.28	927.76	4751.52	0.58	0.068	927.76	4751.52	18.56	0.800	0.52	19.64	52.4	72.0	0.109	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.154	1.110	1.52
50.032	37.177	1.354	115.616	Yes	54	0	3.642037	Yes	Yes	-50.03	5698.25	938.00	4760.25	0.58	0.068	938.00	4760.25	18.35	0.801	0.52	19.42	52.3	71.7	0.109	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.110	1.52
50.196	33.552	1.453	115.616	Yes	60	0	4.330591	Yes	Yes	-50.20	5717.21	948.23	4768.98	0.58	0.068	948.23	4768.98	16.32	0.818	0.51	17.27	53.3	70.6	0.108	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.108	1.50
50.36	30.763	1.396	115.616	Yes	63	0	4.537919	Yes	Yes	-50.36	5736.17	958.46	4777.70	0.58	0.068	958.46	4777.70	14.78	0.831	0.51	15.63	53.7	69.3	0.107	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	1.49
50.524	28.628	1.227	115.616	Yes	65	0	4.286014	Yes	Yes	-50.52	5755.13	968.70	4786.43	0.58	0.068	968.70	4786.43	13.61	0.842	0.50	14.40	53.5	67.9	0.106	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	1.47
50.688	29.3	1.074	115.616	Yes	61	0	3.665529	Yes	Yes	-50.69	5774.09	978.93	4795.16	0.58	0.068	978.93	4795.16	13.94	0.839	0.50	14.75	52.9	67.6	0.105	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.103	1.47
50.852	31.337	1.113	115.616	Yes	59	0	3.551712	Yes	Yes	-50.85	5793.05	989.16	4803.89	0.58	0.068	989.16	4803.89	15.01	0.829	0.51	15.88	52.6	68.5	0.106	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	1.48
51.016	33.172	1.216	115.616	Yes	58	0	3.665742	Yes	Yes	-51.02	5812.01	999.40	4812.61	0.58	0.068	999.40	4812.61	15.98	0.820	0.51	16.90	52.6	69.5	0.107	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	1.49
51.18	30.004	1.28	115.616	Yes	63	0	4.266098	Yes	Yes	-51.18	5830.97	1009.63	4821.34	0.57	0.068	1009.63	4821.34	14.25	0.836	0.50	15.07	53.5	68.5	0.106	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	1.48
51.345	27.787	1.307	112.404	Yes	68	0	4.703638	Yes	Yes	-51.35	5849.52	1019.93	4829.59	0.57	0.068	1019.93	4829.59	13.05	0.847	0.50	13.81	54.0	67.8	0.105	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.103	1.47
51.509	26.679	1.285	112.404	Yes	69	0	4.816522	Yes	Yes	-51.51	5867.95	1030.16	4837.79	0.57	0.068	1030.16	4837.79	12.45	0.853	0.49	13.17	54.1	67.3	0.105	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	1.46
51.673	27.182	1.22	115.616	Yes	67	0	4.488264	Yes	Yes	-51.67	5886.92	1040.40	4846.52	0.57	0.068	1040.40	4846.52	12.69	0.851	0.49	13.43	53.8	67.3	0.105	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	1.46
51.837	26.406	1.182	115.616	Yes	68	0	4.476255	Yes	Yes	-51.84	5905.88	1050.63	4855.25	0.57	0.067	1050.63	4855.25	12.27	0.855	0.49	12.98	53.9	66.9	0.105	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	1.46
52.001	25.823	1.155	115.616	Yes	69	0	4.472757	Yes	Yes	-52.00	5924.84	1060.86	4863.97	0.57	0.067	1060.86	4863.97	11.94	0.859	0.49	12.64	53.9	66.6	0.105	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	1.46
52.165	26.696	1.185	115.616	Yes	68	0	4.438867	Yes	Yes	-52.17	5943.80	1071.10	4872.70	0.57	0.067	1071.10	4872.70	12.37	0.854	0.49	13.09	53.9	66.9	0.105	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	1.46
52.329	26.073	0.865	115.616	Yes	63	0	3.317608	Yes	Yes	-52.33	5962.76	1081.33	4881.43	0.56	0.067	1081.33	4881.43	12.03	0.858	0.49	12.73	52.8	65.6	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	1.44
52.493	26.199	0.856	115.616	Yes	63	0	3.2673	Yes	Yes	-52.49	5981.72	1091.56	4890.16	0.56	0.067	1091.56	4890.16	12.07	0.857	0.49	12.78	52.8	65.5	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	1.44
52.657	29.424	0.914	115.616	Yes	59	0	3.106308	Yes	Yes	-52.66	6000.68	1101.80	4898.88	0.56	0.067	1101.80	4898.88	13.73	0.841	0.49	14.53	52.2	66.8	0.105	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	1.46
52.821	27.155	0.964	115.616	Yes	63	0	3.549991	Yes	Yes	-52.82	6019.64	1112.03	4907.61	0.56	0.067	1112.03	4907.61	12.53	0.853	0.49	13.25	53.0	66.3	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	1.45
52.985	23.97	0.796	115.616	Yes	66	0	3.320818	Yes	Yes	-52.99	6038.60	1122.26	4916.34	0.56	0.067	1122.26	4916.34	10.88	0.870	0.48	11.51	53.1	64.6	0.103	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	1.44
53.149	21.08	0.53	115.616	Yes	66	0	2.514231	Yes	Yes	-53.15	6057.56	1132.50	4925.07	0.56	0.067	1132.50	4925.07	9.41	0.888	0.47	9.96	52.5	62.5	0.101	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	1.41
53.313	18.878	0.396	115.616	Yes	66	0	2.09768	Yes	Yes	-53.31	6076.53	1142.73	4933.79	0.56	0.067	1142.73	4933.79	8.31	0.903	0.47	8.79	52.4	61.2	0.100	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.40
53.477	18.376	0.342	115.616	Yes	65	0	1.861123	Yes	Yes	-53.48	6095.49	1152.96	4942.52	0.56	0.067	1152.96	4942.52	8.05	0.906	0.46	8.52	52.1	60.7	0.100	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.39
53.641	18.49	0.347	115.616	Yes	65	0	1.87669	Yes	Yes	-53.64	6114.45	1163.20	4951.25	0.55	0.067	1163.20	4951.25	8.09	0.906	0.46	8.56	52.1	60.7	0.100	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.39
53.805	17.851	0.361	115.616	Yes	68	0	2.022296	Yes	Yes	-53.81	6133.41	1173.43	4959.98	0.55	0.067	1173.43	4959.98	7.77	0.910	0.46	8.22	52.5	60.8	0.100	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.39
53.969	17.806	0.352	115.616	Yes	68	0	1.976862	Yes	Yes	-53.97	6152.37	1183.67	4968.70	0.55	0.067	1183.67	4968.70	7.74	0.911	0.46	8.18	52.5	60.7	0.100	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.39
54.133	17.219	0.329	115.616	Yes	69	0	1.91068	Yes	Yes	-54.13	6171.33	1193.90	4977.43	0.55	0.067	1193.90	4977.43	7.44	0.915	0.46	7.87	52.5	60.4	0.100	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.39
54.297	15.971	0.257	115.616	Yes	69	0	1.609167	Yes	Yes	-54.30	6190.29	1204.13	4986.16	0.55	0.067	1204.13	4986.16	6.83	0.924	0.45	7.23	52.4	59.6	0.099	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	1.38
54.461	15.115	0.246	115.616	Yes	71	0	1.627522	Yes	Yes	-54.46	6209.25	1214.37	4994.89	0.55	0.067	1214.37	4994.89	6.42	0.931	0.45	6.79	52.7	59.5	0.099	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	1.38
54.625	16.526	0.225	115.616	Yes	65	0	1.361491	Yes	Yes	-54.63	6228.21	1224.60	5003.61	0.55	0.066	1224.60	5003.61	7.07	0.921	0.45	7.48	51.8	59.3	0.099	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	1.38
54.789	16.995	0.196	115.616	Yes	62	0	1.15328	Yes	Yes	-54.79	6247.17	1234.83	5012.34	0.55	0.066	1234.83	5012.34	7.28	0.917	0.45	7.70	51.2	58.9	0.099	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	1.37

CPT Liquefaction Analysis

54.953	22.22	0.307	115.616	Yes	55	0	1.381638	Yes	Yes	-54.95	6266.14	1245.07	5021.07	0.55	0.066	1245.07	5021.07	9.79	0.883	0.47	10.36	50.3	60.6	0.100	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.39
55.117	24.924	0.42	115.616	Yes	55	0	1.685123	Yes	Yes	-55.12	6285.10	1255.30	5029.80	0.54	0.066	1255.30	5029.80	11.11	0.868	0.47	11.76	50.4	62.2	0.101	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.41
55.281	24.348	0.58	115.616	Yes	61	0	2.382126	Yes	Yes	-55.28	6304.06	1265.53	5038.52	0.54	0.066	1265.53	5038.52	10.81	0.871	0.47	11.43	51.9	63.4	0.102	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	1.43
55.446	26.469	0.612	115.616	Yes	58	0	2.312139	Yes	Yes	-55.45	6323.13	1275.83	5047.30	0.54	0.066	1275.83	5047.30	11.85	0.860	0.47	12.54	51.5	64.0	0.103	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	1.44
55.61	27.309	0.923	115.616	Yes	63	0	3.379838	Yes	Yes	-55.61	6342.10	1286.06	5056.03	0.54	0.066	1286.06	5056.03	12.25	0.856	0.47	12.96	52.9	65.9	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	1.46
55.774	26.361	0.973	115.616	Yes	66	0	3.691059	Yes	Yes	-55.77	6361.06	1296.30	5064.76	0.54	0.066	1296.30	5064.76	11.75	0.861	0.47	12.44	53.3	65.8	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	1.46
55.938	30.089	1.023	115.616	Yes	61	0	3.399914	Yes	Yes	-55.94	6380.02	1306.53	5073.49	0.54	0.066	1306.53	5073.49	13.62	0.842	0.48	14.41	52.7	67.1	0.105	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	1.48
56.102	25.245	0.928	115.616	Yes	68	0	3.675975	Yes	Yes	-56.10	6398.98	1316.76	5082.21	0.54	0.066	1316.76	5082.21	11.16	0.867	0.47	11.81	53.4	65.2	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	1.45
56.266	21.986	0.798	115.616	Yes	72	0	3.629582	Yes	Yes	-56.27	6417.94	1327.00	5090.94	0.54	0.066	1327.00	5090.94	9.54	0.886	0.46	10.10	53.7	63.8	0.102	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	1.44
56.43	20.615	0.631	115.616	Yes	71	0	3.060878	Yes	Yes	-56.43	6436.90	1337.23	5099.67	0.53	0.066	1337.23	5099.67	8.87	0.895	0.46	9.38	53.4	62.8	0.102	0.04	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	1.43
56.594	24.048	0.627	115.616	Yes	63	0	2.607285	Yes	Yes	-56.59	6455.86	1347.47	5108.40	0.53	0.066	1347.47	5108.40	10.52	0.875	0.46	11.13	52.4	63.5	0.102	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	1.43
56.758	25.681	0.715	115.616	Yes	62	0	2.784159	Yes	Yes	-56.76	6474.82	1357.70	5117.12	0.53	0.066	1357.70	5117.12	11.30	0.866	0.47	11.96	52.4	64.4	0.103	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	1.44
56.922	26.249	0.898	115.616	Yes	65	0	3.421083	Yes	Yes	-56.92	6493.78	1367.93	5125.85	0.53	0.066	1367.93	5125.85	11.56	0.863	0.47	12.23	53.1	65.3	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	1.46
57.086	26.994	0.959	115.616	Yes	65	0	3.552641	Yes	Yes	-57.09	6512.74	1378.17	5134.58	0.53	0.066	1378.17	5134.58	11.91	0.859	0.47	12.60	53.2	65.8	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	1.46
57.25	27.508	1.001	115.616	Yes	65	0	3.638941	Yes	Yes	-57.25	6531.71	1388.40	5143.31	0.53	0.065	1388.40	5143.31	12.15	0.857	0.47	12.85	53.2	66.1	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	1.47
57.414	25.431	0.997	115.616	Yes	69	0	3.920412	Yes	Yes	-57.41	6550.67	1398.63	5152.03	0.53	0.065	1398.63	5152.03	11.10	0.868	0.46	11.75	53.7	65.4	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	1.46
57.578	24.32	0.872	115.616	Yes	69	0	3.585526	Yes	Yes	-57.58	6569.63	1408.87	5160.76	0.53	0.065	1408.87	5160.76	10.54	0.874	0.46	11.15	53.5	64.7	0.103	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	1.45
57.742	23.572	0.797	115.616	Yes	69	0	3.38113	Yes	Yes	-57.74	6588.59	1419.10	5169.49	0.53	0.065	1419.10	5169.49	10.16	0.879	0.46	10.75	53.4	64.1	0.103	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	1.45
57.906	25.42	0.774	115.616	Yes	65	0	3.044847	Yes	Yes	-57.91	6607.55	1429.33	5178.22	0.52	0.065	1429.33	5178.22	11.04	0.869	0.46	11.68	52.8	64.5	0.103	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	1.45
58.07	24.073	0.795	115.616	Yes	68	0	3.302455	Yes	Yes	-58.07	6626.51	1439.57	5186.94	0.52	0.065	1439.57	5186.94	10.37	0.876	0.46	10.97	53.3	64.2	0.103	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	1.45
58.234	24.59	0.816	115.616	Yes	67	0	3.318422	Yes	Yes	-58.23	6645.47	1449.80	5195.67	0.52	0.065	1449.80	5195.67	10.60	0.874	0.46	11.22	53.2	64.5	0.103	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	1.45
58.398	26.703	0.798	115.616	Yes	63	0	2.988428	Yes	Yes	-58.40	6664.43	1460.04	5204.40	0.52	0.065	1460.04	5204.40	11.62	0.862	0.46	12.29	52.6	64.9	0.103	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	1.46
58.562	29.412	0.887	115.616	Yes	60	0	3.015776	Yes	Yes	-58.56	6683.39	1470.27	5213.12	0.52	0.065	1470.27	5213.12	12.93	0.849	0.47	13.69	52.4	66.1	0.104	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	1.47
58.726	43.017	1.368	115.616	Yes	51	0	3.180138	Yes	Yes	-58.73	6702.35	1480.50	5221.85	0.52	0.065	1480.50	5221.85	19.93	0.789	0.49	21.08	51.6	72.7	0.109	0.05	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	1.56
58.89	108.827	2.569	118.828	Yes	23	0	2.360627	Yes	Yes	-58.89	6721.84	1490.74	5231.11	0.52	0.065	1490.74	5231.11	59.44	0.606	0.58	62.89	36.6	99.5	0.137	0.08	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.259	1.186	2.03
59.054	130.268	3.996	115.616	Yes	24	0	3.067522	Yes	Yes	-59.05	6740.80	1500.97	5239.83	0.52	0.065	1500.97	5239.83	73.93	0.563	0.60	78.22	40.7	118.9	0.169	0.09	0.92	0.00	0.100	1.000	0.000	0.138	1.000	1.378	1.271	2.66
59.218	148.986	5.859	122.039	Yes	24	0	3.932584	Yes	Yes	-59.22	6760.82	1511.20	5249.61	0.52	0.065	1511.20	5249.61	87.15	0.528	0.62	92.20	42.9	135.1	0.214	0.10	0.91	0.00	0.100	1.000	0.000	0.138	1.000	1.512	1.367	3.60
59.382	135.202	6.441	131.674	Yes	24	0	4.763983	Yes	Yes	-59.38	6782.41	1521.44	5260.98	0.51	0.065	1521.44	5260.98	77.18	0.554	0.60	81.65	41.2	122.9	0.178	0.09	0.92	0.00	0.100	1.000	0.000	0.138	1.000	1.408	1.293	2.85
59.547	119.343	6.676	131.674	Yes	24	0	5.59396	Yes	Yes	-59.55	6804.14	1531.73	5272.41	0.51	0.065	1531.73	5272.41	66.12	0.585	0.59	69.96	39.4	109.4	0.151	0.08	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.314	1.225	2.31
59.711	149.704	6.821	131.674	Yes	24	0	4.556324	Yes	Yes	-59.71	6825.73	1541.97	5283.77	0.51	0.064	1541.97	5283.77	87.30	0.528	0.62	92.36	42.9	135.2	0.215	0.10	0.91	0.00	0.100	1.000	0.000	0.138	1.000	1.514	1.369	3.62
59.875	208.097	7.212	122.039	Yes	24	0	3.465691	Yes	Yes	-59.88	6845.75	1552.20	5293.55	0.51	0.064	1552.20	5293.55	132.10	0.434	0.67	139.76	50.2	190.0	1.124701	0.14	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	24.70
60.039	243.165	8.579	122.039	Yes	24	0	3.528057	Yes	Yes	-60.04	6865.76	1562.43	5303.33	0.51	0.064	1562.43	5303.33	161.34	0.385	0.70	170.70	55.0	225.7	3.724576	0.18	0.84	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	78.41
60.203	216.769	8.336	122.039	Yes	24	0	3.845568	Yes	Yes	-60.20	6885.78	1572.67	5313.11	0.51	0.064	1572.67	5313.11	138.92	0.422	0.68	146.98	51.4	198.3	1.723524	0.15	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	37.55
60.367	221.933	8.694	122.039	Yes	24	0	3.917398	Yes	Yes	-60.37	6905.79	1582.90	5322.89	0.51	0.064	1582.90	5322.89	143.06	0.415	0.68	151.36	52.0	203.4	2.301233	0.15	0.86	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	49.88
60.531	222.291	8.369	122.039	Yes	24	0	3.764885	Yes	Yes	-60.53	6925.81	1593.13	5332.67	0.51	0.064	1593.13	5332.67	143.22	0.415	0.68	151.52	52.1	203.6	2.327748	0.15	0.86	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	50.46
60.695	187.32	9.436	131.674	Yes	24	0	5.037369	Yes	Yes	-60.70	6947.40	1603.37	5344.03	0.51	0.064	1603.37	5344.03	114.89	0.467	0.65	121.55	47.4	169.0	0.487	0.12	0.89	0.00	0.100	1.000	0.000	0.138	1.000	1.917	1.658	9.72
60.859	166.029	0.01	125.251	Yes	5	0	0.006023	Yes	Yes	-60.86	6967.94	1613.60	5354.34	0.50	0.064	1613.60	5354.34	98.52	0.501	0.63	104.23	0.2	104.4	0.143	0.11	0.90	0.00	0.100	1.000	0.000	0.138	1.000	1.285	1.204	2.11
61.023	274.121	0.01	128.462	Yes	5	0	0.003648	Yes	Yes	-61.02	6989.01	1623.84	5365.17	0.50	0.064	1623.84	5365.17	187.74	0.346	0.72	198.63	0.2	198.8	1.771041	0.23	0.79	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	35.17
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
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						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
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						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
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						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
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						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
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						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
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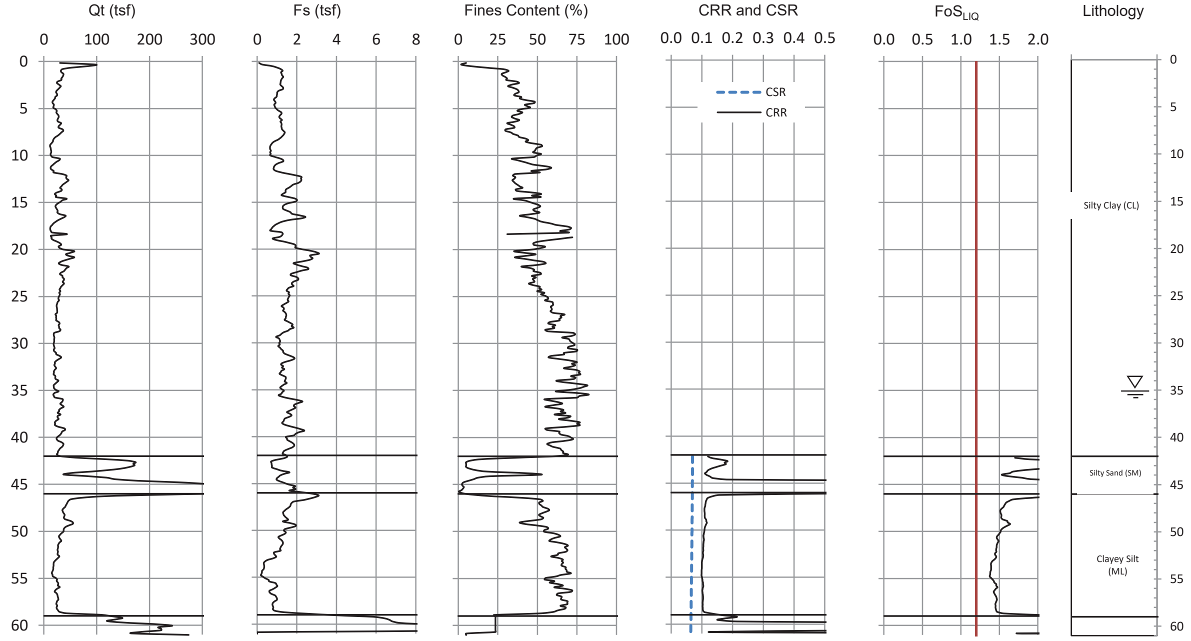
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		
						0	#DIV/0!	No	No	0.00	6989.01		6989.01				6989.01																		

CPT Liquefaction Analysis



Earthquake Magnitude, M = 5.77

Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2014),
CPT and SPT Based Liquefaction
Triggering Procedures,
UCD/CGM-14/01

Project: Plant Scherer GA EPD Closure		Sounding ECP05A Avg.
Project Number: 60563110	Date: 1/24/2018	AECOM

CPT Liquefaction Analysis

Method: Idriss and Boulanger (2014), CPT and SPT Based Liquefaction Triggering Procedures

Title: Liquefaction Analysis
Project: Plant Scherer
Project No.: 60563110

Date: 1/24/2018
Boring No. CP-109

Input Parameters:
Peak ground acceleration, pga (g): 0.15
Earthquake Magnitude (M): 4.9
Water Table Depth at the time of drilling 6 ft
Water Table Depth at the time of earthquake 6 ft
Ground Surface Elevation 0 ft

Notes:
1. Sand-like behavior = "Yes", Clay-like behavior = "No" (See Idriss and Boulanger, 2014).
2. Make sure to turn on iterative calculations.
3. User to confirm highlighted values are reasonable.

												At the time of earthquake				At the time of drilling																			
Depth	Qt	Fs	Unit Weight	Liquefiable?[1]	FC	α (From static stress analysis)	Fs/Qt	Below Water Table?	Liquefaction Calculation Needed?	Sample Elev.	Total stress	Pore Pressure	Effective stress	Stress reduction coeff, r_d	CSR	Pore Pressure	Effective stress	qc1n	m	Cn	qc1	Delta qc1ncs	qc1ncs	CRR_{cpt}[3]	C_σ	K_σ	Assg. α	State Para	Para a	Para b	Para c	Kα	MSF_{max}	MSF	IB FSL
(ft)	(TSF)	(TSF)	(pcf)	(Yes/No)			(%)			(ft)	(psf)	(psf)	(psf)			(psf)	(psf)				(TSF)														
0.164	60.465	0.069	121.98	Yes	3	0	0.114116	No	No	-0.16	0.00		0.00				0.00																		
0.328	110.744	0.16	125.19	Yes	0	0	0.144477	No	No	-0.33	20.53		20.53				20.53																		
0.492	143.794	0.203	125.19	Yes	0	0	0.141174	No	No	-0.49	41.06		41.06				41.06																		
0.656	159.277	0.343	125.19	Yes	0	0	0.215348	No	No	-0.66	61.59		61.59				61.59																		
0.82	183.675	0.325	125.19	Yes	0	0	0.176943	No	No	-0.82	82.12		82.12				82.12																		
0.984	194.774	0.384	125.19	Yes	0	0	0.197152	No	No	-0.98	102.66		102.66				102.66																		
1.148	203.572	0.458	125.19	Yes	0	0	0.224982	No	No	-1.15	123.19		123.19				123.19																		
1.312	210.836	0.475	128.4	Yes	0	0	0.225294	No	No	-1.31	144.24		144.24				144.24																		
1.476	210.305	0.506	128.4	Yes	0	0	0.240603	No	No	-1.48	165.30		165.30				165.30																		
1.64	210.356	0.537	128.4	Yes	0	0	0.255282	No	No	-1.64	186.36		186.36				186.36																		
1.804	213.868	0.511	128.4	Yes	0	0	0.238932	No	No	-1.80	207.42		207.42				207.42																		
1.968	198.518	0.556	125.19	Yes	0	0	0.280075	No	No	-1.97	227.95		227.95				227.95																		
2.133	189.02	0.487	125.19	Yes	0	0	0.257645	No	No	-2.13	248.60		248.60				248.60																		
2.297	194.906	0.46	125.19	Yes	0	0	0.236011	No	No	-2.30	269.14		269.14				269.14																		
2.461	196.862	0.405	125.19	Yes	0	0	0.205728	No	No	-2.46	289.67		289.67				289.67																		
2.625	191.595	0.402	125.19	Yes	0	0	0.209818	No	No	-2.63	310.20		310.20				310.20																		
2.789	176.771	0.379	125.19	Yes	0	0	0.214402	No	No	-2.79	330.73		330.73				330.73																		
2.953	161.593	0.262	125.19	Yes	0	0	0.162136	No	No	-2.95	351.26		351.26				351.26																		
3.117	133.896	0.346	125.19	Yes	0	0	0.25841	No	No	-3.12	371.79		371.79				371.79																		
3.281	118.122	0.454	125.19	Yes	2	0	0.384348	No	No	-3.28	392.32		392.32				392.32																		
3.445	120.81	0.383	125.19	Yes	1	0	0.317027	No	No	-3.45	412.85		412.85				412.85																		
3.609	120.09	0.464	125.19	Yes	2	0	0.386377	No	No	-3.61	433.39		433.39				433.39																		
3.773	129.374	0.521	125.19	Yes	2	0	0.402708	No	No	-3.77	453.92		453.92				453.92																		
3.937	139.809	0.588	125.19	Yes	1	0	0.420574	No	No	-3.94	474.45		474.45				474.45																		
4.101	165.362	0.605	125.19	Yes	0	0	0.365864	No	No	-4.10	494.98		494.98				494.98																		
4.265	185.406	0.664	125.19	Yes	0	0	0.358133	No	No	-4.27	515.51		515.51				515.51																		
4.429	188.713	0.78	125.19	Yes	0	0	0.413326	No	No	-4.43	536.04		536.04				536.04																		
4.593	197.553	0.808	125.19	Yes	0	0	0.409004	No	No	-4.59	556.57		556.57				556.57																		
4.757	220.263	0.952	125.19	Yes	0	0	0.432211	No	No	-4.76	577.10		577.10				577.10																		
4.921	225.955	0.917	125.19	Yes	0	0	0.405833	No	No	-4.92	597.63		597.63				597.63																		
5.085	236.643	0.914	128.4	Yes	0	0	0.386236	No	No	-5.09	618.69		618.69				618.69																		
5.249	229.544	1.036	125.19	Yes	0	0	0.45133	No	No	-5.25	639.22		639.22				639.22																		
5.413	204.763	1.006	125.19	Yes	1	0	0.4913	No	No	-5.41	659.75		659.75				659.75																		
5.577	184.539	0.735	125.19	Yes	0	0	0.39829	No	No	-5.58	680.29		680.29				680.29																		
5.741	163.509	0.544	125.19	Yes	0	0	0.332703	No	No	-5.74	700.82		700.82				700.82																		
5.905	160.667	0.403	125.19	Yes	0	0	0.250829	No	No	-5.91	721.35		721.35				721.35																		
6.069	131.442	0.299	125.19	Yes	0	0	0.227477	Yes	Yes	-6.07	741.88	4.31	737.57	0.97	0.095	4.31	737.57	180.80	0.356	1.46	191.29	0.0	191.3	1.19647	0.21	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	25.52
6.234	85.186	0.248	125.19	Yes	3	0	0.291128	Yes	Yes	-6.23	762.54	14.60	747.93	0.97	0.096	14.60	747.93	127.56	0.442	1.58	134.95	0.0	135.0	0.214	0.13	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.511	1.367	3.31
6.398	53.296	0.182	121.98	Yes	5	0	0.341489	Yes	Yes	-6.40	782.54	24.84	757.71	0.97	0.098	24.84	757.71	85.64	0.532	1.70	90.60	0.1	90.8	0.126	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.218	1.156	1.63
6.562	40.775	0.135	121.98	Yes	5	0	0.331085	Yes	Yes	-6.56	802.54	35.07	767.48	0.97	0.099	35.07	767.48	65.52	0.587	1.70	69.32	0.1	69.5	0.107	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.106	1.28
6.726	58.385	0.117	121.98	Yes	4	0	0.200394	Yes	Yes	-6.73	822.55	45.30	777.25	0.97	0.100	45.30	777.25	92.46	0.515	1.68	97.83	0.0	97.9	0.135	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.251	1.180	1.74
6.89	64.316	0.092	121.98	Yes	3	0	0.143044	Yes	Yes	-6.89	842.55	55.54	787.02	0.97	0.101	55.54	787.02	99.59	0.499	1.64	105.36	0.0	105.4	0.145	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.291	1.208	1.89
7.054	45.362	0.078	121.98	Yes	5	0	0.17195	Yes	Yes	-7.05	862.56	65.77	796.79	0.96	0.102	65.77	796.79	72.89	0.565	1.70	77.12	0.1	77.3	0.113	0.09	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.169	1.121	1.34
7.218	34.356	0.088	118.77	Yes	5	0	0.256142	Yes	Yes	-7.22	882.04	76.00	806.03	0.96	0.103	76.00	806.03	55.20	0.620	1.70	58.41	0.1	58.5	0.098	0.07	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	1.11
7.382	23.503	0.08	118.77	Yes	5	0	0.340382	Yes	Yes	-7.38	901.52	86.24	815.28	0.96	0.104	86.24	815.28	37.76	0.689	1.70	39.96	0.1	40.1	0.085	0.06	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.101	1.072	0.93
7.546	24.187	0.08	118.77	Yes	5	0	0.330756	Yes	Yes	-7.55	920.99	96.47	824.52	0.96	0.105	96.47	824.52	38.86	0.684	1.70	41.12	0.1	41.2	0.086	0.06	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.102	1.073	0.93
7.71	24.786	0.077	118.77	Yes	5	0	0.310659	Yes	Yes	-7.71	940.47	106.70	833.77	0.96	0.106	106.70	833.77	39.83	0.679	1.70	42.14	0.1	42.3	0.087	0.06	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.103	1.074	0.93
7.874	22.228	0.113	118.77	Yes	18	0	0.508368	Yes	Yes	-7.87	959.95	116.94	843.01	0.96	0.106	116.94	843.01	35.72	0.698	1.70	37.79	23.7	61.5	0.101	0.06	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.08
8.038	20.353	0.166	115.56	Yes	22	0	0.815605	Yes	Yes	-8.04	978.90	127.17	851.73	0.96	0.107	127.17	851.73	32.70	0.713	1.70	34.60	31.8	66.4	0.104	0.06	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	1.12
8.202	18.049	0.116	115.56	Yes	22	0	0.642695	Yes	Yes	-8.20	997.85	137.40	860.45	0.96	0.108	137.40	860.45	29.00	0.732	1.70	30.68	31.2	61.9	0.101	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.06
8.366	36.943	0.068	121.98	Yes	5	0	0.184067	Yes	Yes	-8.37	1017.86	147.64	870.22	0.95	0.109	147.64	870.22	59.36	0.606	1.70	62.80	0.1	62.9	0.102	0.08	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	1.08
8.53	99.601	0.115	125.19	Yes	1	0	0.115461	Yes	Yes	-8.53	1038.39	157.87	880.52	0.95	0.110	157.87	880.52	136.75	0.426	1.45	144.68	0.0	144.7	0.257	0.14	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.609	1.437	3.66
8.694	122.119	0.113	125.19	Yes	0	0	0.092533	Yes	Yes	-8.69	1058.92	168.11	890.82	0.95	0.110	168.11	890.82	161.11	0.385	1.40	170.46	0.0	170.5	0.511	0.18	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.939	1.673	8.43
8.858	104.468	0.088	125.19	Yes	0	0	0.084236	Yes	Yes	-8.86	1079.45	178.34	901.11	0.95	0.111	178.34	901.11	141.11	0.418	1.43	149.29	0.0	149.3	0.284	0.15	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.661	1.474	4.10
9.022	86.246	0.121	125.19	Yes	2	0	0.140296	Yes	Yes	-9.02	1099.98	188.57	911.41	0.95	0.112	188.57	911.41	119.80	0.457	1.47	126.75	0.0	126.8	0.188	0.12	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.439	1.315	2.40
9.186	67.388	0.074	121.98	Yes	3	0	0.109812	Yes	Yes	-9.19	1119.99	198.81	921.18	0.95	0.112	198.81	921.18	96.94	0.505	1.52	102.56	0.0	102.6	0.141	0.10	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.275	1.197	1.61
9.35	46.488	0.062	121.98	Yes	5	0	0.133368	Yes	Yes	-9.35	1139.99	209.04	930.95	0.95	0.113	209.04	930.95	70.32	0.573	1.60	74.40	0.1	74.5	0.111	0.08	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.115	1.16
9.514	39.838	0.099	121.98	Yes	5	0	0.248506	Yes	Yes	-9.51	1160.00	219.27	940.72	0.95	0.114	219.27	940.72	61.25	0.600	1.63	64.80	0.1	64.9	0.103	0.08	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	1.05
9.678	29.449	0.088	118.77	Yes	5	0	0.298822	Yes	Yes	-9.68	1179.48	229.51	949.97	0.94	0.114	229.51	949.97	46.86	0.650	1.68	49.58	0.1	49.7	0.092	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.111	1.080	0.91
9.842	22.169	0.057	118.77	Yes	5	0	0.257116	Yes	Yes	-9.84	1198.95	239.74	959.21	0.94	0.115	239.74	959.21	35.62	0.698	1.70	37.69	0.1	37.8	0.084	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.099	1.071	0.81
10.006	30.619	0.067	118.77	Yes	5	0	0.218818	Yes	Yes	-10.01	1218.43	249.97	968.46	0.94	0.116	249.97	968.46	47.96	0.646	1.66	50.74	0.1	50.9	0.093	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.113	1.081	0.90
10.17	23.231	0.089	118.77	Yes	5	0	0.383109	Yes	Yes	-10.17	1237.91	260.21	977.70	0.94	0.116	260.21	977.70	37.33	0.691	1.70	39.49	0.1	39.6	0.085	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.101	1.072	0.81
10.335	19.911	0.137	118.77	Yes	22	0	0.688062	Yes	Yes	-10.34	1257.51	270.50	987.00	0.94	0.117	270.50	987.00	31.99	0.716	1.70	33.85	31.8	65.7	0.104	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	1.01
10.499	18.091	0.173	115.56	Yes	27	0	0.956277	Yes	Yes	-10.50	1276.46	280.74	995.72	0.94	0.117	280.74	995.72	29.07	0.732	1.70	30.75	37.3	68.0	0.106	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	1.02
10.663	27.577	0.205	118.77	Yes	19	0	0.743373	Yes	Yes	-10.66	1295.94	290.97	1004.97	0.94	0.118	290.97	1004.97	42.82	0.667	1.64	45.30	26.5	71.8	0.109	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.110	1.06
10.827	47.309	0.088	121.98	Yes	5	0	0.186011	Yes	Yes	-10.83	1315.94	301.20	1014.74	0.94	0.118	301.20	1014.74	68.40	0.578	1.53	72.36	0.1	72.5	0.109	0.08	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	1.07
10.991	44.425	0.048	121.98	Yes	5	0	0.108047	Yes	Yes	-10.99	1335.95	311.44	1024.51	0.93	0.119	311.44	1024.51	64.42	0.590	1.53	68.16	0.1	68.3	0.106	0.08	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	1.03
11.155	30.577	0.055	118.77	Yes	5	0	0.179874	Yes	Yes	-11.16	1355.43	321.67	1033.75	0.93	0.119	321.67	1033.75	46.15	0.653	1.60	48.82	0.1	48.9	0.092	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.110	1.079	0.86
11.319	21.654	0.049	118.77	Yes	5	0	0.226286	Yes	Yes	-11.32	1374.90	331.91	1043.00	0.93	0.120	331.91	1043.00	33.76	0.707	1.65	35.72	0.1	35.8	0.083	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.098	1.070	0.76
11.483	22.47	0.053	118.77	Yes	5	0	0.23587	Yes	Yes	-11.48	1394.38	342.14	1052.24	0.93	0.120	342.14	1052.24	34.70	0.703	1.63	36.72	0.1	36.8	0.083	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.099	1.071	0.76
11.647	21.026	0.061	118.77	Yes	5	0	0.290117	Yes	Yes	-11.65	1413.86	352.37	1061.49	0.93	0.121	352.37	1061.49	32.52	0.714	1.64	34.40	0.1	34.5	0.082	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.097	1.070	0.74
11.811	21.381	0.078	118.77	Yes	5	0	0.36481	Yes	Yes	-11.81	1433.34	362.61	1070.73	0.93	0.121	362.61	1070.73	32.83	0.712	1.62	34.73	0.1	34.8	0.082	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.097	1.070	0.74
11.975	20.272	0.085	118.77	Yes	5	0	0.419298	Yes	Yes	-11.98	1452.82	372.84	1079.98	0.93	0.121	372.84	1079.98	31.12	0.721	1.62	32.92	0.1	33.0	0.081	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.73
12.139	17.487	0.071	118.77	Yes	5	0	0.406016	Yes	Yes	-12.14	1472.30	383.07	1089.22	0.92	0.122	383.07	1089.22	27.07	0.743	1.64	28.64	0.1	28.8	0.078	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.067	0.70
12.303	15.365	0.045	115.56	Yes	5	0	0.292873	Yes	Yes	-12.30	1491.25	393.31	1097.94	0.92	0.122	393.31	1097.94	23.94	0.762	1.65	25.33	0.1	25.4	0.076	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.67
12.467	14.017	0.032	115.56	Yes	5	0	0.228294	Yes	Yes	-12.47	1510.20	403.54	1106.66	0.92	0.123	403.54	1106.66	21.90	0.776	1.65	23.17	0.1	23.3	0.074	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.66
12.631	12.146	0.037	115.56	Yes	26	0	0.304627	Yes	Yes	-12.63	1529.15	413.77	1115.38	0.92	0.123	413.77	1115.38	19.11	0.795	1.66	20.21	34.6	54.8	0.096	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.86
12.795	8.193	0.045	112.35	Yes	26	0	0.549249	Yes	Yes	-12.80	1547.58	424.01	1123.57	0.92	0.123	424.01	1123.57	13.16	0.846	1.70	13.93	33.5	47.4	0.090	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.108	1.078	0.80
12.959	6.174	0.043	112.35	Yes	26	0	0.696469	Yes	Yes	-12.96	1566.00	434.24	1131.76	0.92	0.124	434.24	1131.76	9.92	0.882	1.70	10.50	32.9	43.4	0.088	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.104	1.075	0.77
13.123	5.146	0.03	112.35	Yes	26	0	0.582977	Yes	Yes	-13.12	1584.43	444.48	1139.95	0.92	0.124	444.48	1139.95	8.27	0.903	1.70	8.75	32.6	41.4	0.086	0.04	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.102	1.073	0.75
13.287	10.054	0.038	115.56	Yes	31	0	0.377959	Yes	Yes	-13.29	1603.38	454.71	1148.67	0.92	0.125	454.71	1148.67	15.71	0.823	1.65	16.62	39.1	55.7	0.096	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.85
13.451	13.079	0.037	115.56	Yes	5	0	0.282896	Yes	Yes	-13.45	1622.33	464.94	1157.39	0.91	0.125	464.94	1157.39	19.91	0.790	1.61	21.06	0.1	21.2	0.073	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.63
13.615	14.227	0.031	115.56	Yes	5	0	0.217896	Yes	Yes	-13.62	1641.28	475.18	1166.11	0.91	0.125	475.18	1166.11	21.39	0.779	1.59	22.63	0.1	22.7	0.074	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.64
13.779	15.357	0.018	115.56	Yes	5	0	0.11721	Yes	Yes	-13.78	1660.23	485.41	1174.82	0.91	0.126	485.41	1174.82	22.83	0.769	1.57	24.15	0.1	24.3	0.075	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.64
13.943	16.188	0.014	118.77	Yes	5	0	0.086484	Yes	Yes	-13.94	1679.71	495.64	1184.07	0.91	0.126	495.64	1184.07	23.83	0.763	1.56	25.21	0.1	25.3	0.076	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.65
14.107	15.519	0.021	115.56	Yes	5	0	0.135318	Yes	Yes	-14.11	1698.66	505.88	1192.79	0.91	0.126	505.88	1192.79	22.80	0.770	1.55	24.12	0.1	24.2	0.075	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.64
14.271	14.989	0.02	115.56	Yes	5	0	0.133431	Yes	Yes	-14.27	1717.62	516.11	1201.51	0.91	0.126	516.11	1201.51	21.97	0.775	1.55	23.24	0.1	23.4	0.075	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.63
14.436	13.305	0.021	115.56	Yes	5	0	0.157835	Yes	Yes	-14.44	1736.68	526.41	1210.28	0.91	0.127	526.41	1210.28	19.57	0.792	1.56	20.71	0.1	20.8	0.073	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.62
14.6	13.028	0.029	115.56	Yes	5	0	0.222597	Yes	Yes	-14.60	1755.64	536.64	1219.00	0.90	0.127	536.64	1219.00	19.10	0.796	1.55	20.20	0.1	20.3	0.073	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.066	0.61
14.764	13.507	0.012	115.56	Yes	5	0	0.088843	Yes	Yes	-14.76	1774.59	546.87	1227.71	0.90	0.127	546.87	1227.71	19.64	0.791	1.54	20.78	0.1	20.9	0.073	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.61
14.928	14.008	0.013	115.56	Yes	5	0	0.092804	Yes	Yes	-14.93	1793.54	557.11	1236.43	0.90	0.127	557.11	1236.43	20.21	0.787	1.53	21.38	0.1	21.5	0.073	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.62
15.092	14.76	0.014	115.56	Yes	5	0	0.094851	Yes	Yes	-15.09	1812.49	567.34	1245.15	0.90	0.128	567.34	1245.15	21.11	0.781	1.51	22.33	0.1	22.4	0.074	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.62
15.256	15.6	0.02	115.56	Yes	5	0	0.128205	Yes	Yes	-15.26	1831.44	577.57	1253.87	0.90	0.128	577.57	1253.87	22.11	0.774	1.50	23.39	0.1	23.5	0.075	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.62
15.42	15.534	0.038	115.56	Yes	5	0	0.244625	Yes	Yes	-15.42	1850.39	587.81	1262.59	0.90	0.128	587.81	1262.59	21.91	0.775	1.49	23.18	0.1	23.3	0.074	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.62
15.584	15.896	0.054	115.56	Yes	5	0	0.339708	Yes	Yes	-15.58	1869.35	598.04	1271.31	0.90	0.128	598.04	1271.31	22.28	0.773	1.48	23.57	0.1	23.7	0.075	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.62
15.748	17.643	0.032	118.77	Yes	5	0	0.181375	Yes	Yes	-15.75	1888.82	608.28	1280.55	0.89	0.129	608.28	1280.55	24.42	0.759	1.46	25.83	0.1	25.9	0.076	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.63
15.912	18.936	0.026	118.77	Yes	5	0	0.137305	Yes	Yes	-15.91	1908.30	618.51	1289.79	0.89	0.129	618.51	1289.79	25.94	0.750	1.45	27.45	0.1	27.6	0.077	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.067	0.64
16.076	17.866	0.026	118.77	Yes	5	0	0.145528	Yes	Yes	-16.08	1927.78	628.74	1299.04	0.89	0.129	628.74	1299.04	24.45	0.759	1.45	25.87	0.1	26.0	0.076	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.63
16.24	16.839	0.021	118.77	Yes	5	0	0.12471	Yes	Yes	-16.24	1947.26	638.98	1308.28	0.89	0.129	638.98	1308.28	23.03	0.768	1.45	24.36	0.1	24.5	0.075	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.066	0.62
16.404	13.578	0.045	115.56	Yes	26	0	0.331418	Yes	Yes	-16.40	1966.21	649.21	1317.00	0.89	0.129	649.21	1317.00	18.74	0.798	1.46	19.83	34.5	54.3	0.095	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.80
16.568	11.433	0.043	115.56	Yes	30	0	0.376104	Yes	Yes	-16.57	1985.16	659.44	1325.72	0.89	0.129	659.44	1325.72	15.87	0.821	1.47	16.79	38.2	55.0	0.096	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.80
16.732	12.152	0.023	115.56	Yes	25	0	0.189269	Yes	Yes	-16.73	2004.12	669.68	1334.44	0.89	0.130	669.68	1334.44	16.72	0.814	1.46	17.69	33.3	51.0	0.093	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.113	1.081	0.77

CPT Liquefaction Analysis

16.896	17.236	0.022	118.77	Yes	5	0	0.12764	Yes	Yes	-16.90	2023.59	679.91	1343.68	0.88	0.130	679.91	1343.68	23.09	0.768	1.42	24.43	0.1	24.5	0.075	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.066	0.62
17.06	19.799	0.028	118.77	Yes	5	0	0.141421	Yes	Yes	-17.06	2043.07	690.14	1352.93	0.88	0.130	690.14	1352.93	26.16	0.749	1.40	27.67	0.1	27.8	0.077	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.067	0.63
17.224	20.1	0.036	118.77	Yes	5	0	0.179104	Yes	Yes	-17.22	2062.55	700.38	1362.17	0.88	0.130	700.38	1362.17	26.40	0.747	1.39	27.93	0.1	28.0	0.078	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.067	0.63
17.388	20.057	0.03	118.77	Yes	5	0	0.149574	Yes	Yes	-17.39	2082.03	710.61	1371.42	0.88	0.130	710.61	1371.42	26.22	0.748	1.38	27.74	0.1	27.9	0.077	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.067	0.63
17.552	19.708	0.025	118.77	Yes	5	0	0.126852	Yes	Yes	-17.55	2101.51	720.84	1380.66	0.88	0.130	720.84	1380.66	25.67	0.751	1.38	27.16	0.1	27.3	0.077	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.63
17.716	19.04	0.018	118.77	Yes	5	0	0.094538	Yes	Yes	-17.72	2120.99	731.08	1389.91	0.88	0.130	731.08	1389.91	24.74	0.757	1.37	26.17	0.1	26.3	0.076	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.62
17.88	18.559	0.016	118.77	Yes	5	0	0.086212	Yes	Yes	-17.88	2140.46	741.31	1399.15	0.88	0.131	741.31	1399.15	24.04	0.762	1.37	25.43	0.1	25.5	0.076	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.62
18.044	17.389	0.013	118.77	Yes	5	0	0.07476	Yes	Yes	-18.04	2159.94	751.55	1408.40	0.87	0.131	751.55	1408.40	22.50	0.772	1.37	23.81	0.1	23.9	0.075	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.61
18.208	17.092	0.011	118.77	Yes	5	0	0.064358	Yes	Yes	-18.21	2179.42	761.78	1417.64	0.87	0.131	761.78	1417.64	22.03	0.775	1.36	23.31	0.1	23.4	0.075	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.60
18.372	16.53	0.019	118.77	Yes	5	0	0.114943	Yes	Yes	-18.37	2198.90	772.01	1426.89	0.87	0.131	772.01	1426.89	21.25	0.780	1.36	22.48	0.1	22.6	0.074	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.60
18.537	16.382	0.026	118.77	Yes	5	0	0.158711	Yes	Yes	-18.54	2218.50	782.31	1436.19	0.87	0.131	782.31	1436.19	20.97	0.782	1.35	22.18	0.1	22.3	0.074	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.60
18.701	16.897	0.029	118.77	Yes	5	0	0.171628	Yes	Yes	-18.70	2237.97	792.54	1445.43	0.87	0.131	792.54	1445.43	21.49	0.778	1.35	22.73	0.1	22.8	0.074	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.60
18.865	17.347	0.026	118.77	Yes	5	0	0.149882	Yes	Yes	-18.87	2257.45	802.78	1454.68	0.87	0.131	802.78	1454.68	21.92	0.775	1.34	23.20	0.1	23.3	0.074	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.60
19.029	17.486	0.025	118.77	Yes	5	0	0.142972	Yes	Yes	-19.03	2276.93	813.01	1463.92	0.86	0.131	813.01	1463.92	21.99	0.775	1.33	23.26	0.1	23.4	0.075	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.60
19.193	16.901	0.023	118.77	Yes	5	0	0.136087	Yes	Yes	-19.19	2296.41	823.24	1473.17	0.86	0.131	823.24	1473.17	21.19	0.780	1.33	22.42	0.1	22.5	0.074	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.59
19.357	15.92	0.018	118.77	Yes	5	0	0.113065	Yes	Yes	-19.36	2315.89	833.48	1482.41	0.86	0.131	833.48	1482.41	19.93	0.789	1.32	21.08	0.1	21.2	0.073	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.59
19.521	14.637	0.01	115.56	Yes	5	0	0.06832	Yes	Yes	-19.52	2334.84	843.71	1491.13	0.86	0.131	843.71	1491.13	18.31	0.801	1.32	19.38	0.1	19.5	0.072	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.58
19.685	13.359	0.014	115.56	Yes	5	0	0.104798	Yes	Yes	-19.69	2353.79	853.94	1499.85	0.86	0.131	853.94	1499.85	16.71	0.814	1.32	17.68	0.1	17.8	0.071	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.57
19.849	13.197	0.01	115.56	Yes	5	0	0.075775	Yes	Yes	-19.85	2372.74	864.18	1508.56	0.86	0.131	864.18	1508.56	16.44	0.817	1.32	17.40	0.1	17.5	0.071	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.56
20.013	10.4	0.049	115.56	Yes	34	0	0.471154	Yes	Yes	-20.01	2391.69	874.41	1517.28	0.86	0.132	874.41	1517.28	13.03	0.848	1.33	13.79	41.6	55.4	0.096	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.78
20.177	10.586	0.034	115.56	Yes	32	0	0.321179	Yes	Yes	-20.18	2410.65	884.64	1526.00	0.85	0.132	884.64	1526.00	13.19	0.846	1.32	13.96	39.3	53.3	0.095	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.116	1.083	0.76
20.341	12.846	0.037	115.56	Yes	27	0	0.288027	Yes	Yes	-20.34	2429.60	894.88	1534.72	0.85	0.132	894.88	1534.72	15.81	0.822	1.30	16.73	35.8	52.5	0.094	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.115	1.082	0.76
20.505	12.165	0.049	115.56	Yes	30	0	0.402795	Yes	Yes	-20.51	2448.55	905.11	1543.44	0.85	0.132	905.11	1543.44	14.94	0.830	1.30	15.80	38.7	54.5	0.096	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.77
20.669	10.455	0.07	115.56	Yes	37	0	0.669536	Yes	Yes	-20.67	2467.50	915.35	1552.16	0.85	0.132	915.35	1552.16	12.86	0.849	1.30	13.60	43.3	56.9	0.097	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.79
20.833	10.18	0.096	115.56	Yes	41	0	0.943026	Yes	Yes	-20.83	2486.45	925.58	1560.87	0.85	0.132	925.58	1560.87	12.47	0.853	1.30	13.20	45.6	58.8	0.099	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.80
20.997	8.379	0.083	115.56	Yes	47	0	0.990572	Yes	Yes	-21.00	2505.41	935.81	1569.59	0.85	0.132	935.81	1569.59	10.29	0.877	1.30	10.89	47.7	58.6	0.098	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.80
21.161	6.294	0.135	115.56	Yes	68	0	2.1449	Yes	Yes	-21.16	2524.36	946.05	1578.31	0.85	0.132	946.05	1578.31	7.77	0.910	1.31	8.22	52.5	60.7	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.81
21.325	4.555	0.191	112.35	Yes	97	0	4.193194	Yes	Yes	-21.33	2542.78	956.28	1586.50	0.84	0.132	956.28	1586.50	5.65	0.945	1.31	5.98	55.4	61.4	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.81
21.489	4.828	0.064	112.35	Yes	97	0	1.325601	Yes	Yes	-21.49	2561.21	966.51	1594.69	0.84	0.132	966.51	1594.69	5.95	0.939	1.30	6.30	55.5	61.8	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	0.82
21.653	26.507	0.056	118.77	Yes	5	0	0.211265	Yes	Yes	-21.65	2580.69	976.75	1603.94	0.84	0.132	976.75	1603.94	30.62	0.724	1.22	32.39	0.1	32.5	0.080	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.64
21.817	17.409	0.063	118.77	Yes	5	0	0.361882	Yes	Yes	-21.82	2600.16	986.98	1613.18	0.84	0.132	986.98	1613.18	20.37	0.786	1.24	21.55	0.1	21.7	0.073	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.58
21.981	11.955	0.037	115.56	Yes	30	0	0.309494	Yes	Yes	-21.98	2619.12	997.21	1621.90	0.84	0.132	997.21	1621.90	14.12	0.837	1.25	14.94	37.8	52.7	0.094	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.115	1.083	0.75
22.145	11.818	0.031	115.56	Yes	29	0	0.262312	Yes	Yes	-22.15	2638.07	1007.45	1630.62	0.84	0.132	1007.45	1630.62	13.90	0.839	1.24	14.71	37.1	51.8	0.094	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.114	1.082	0.75
22.309	12.178	0.051	115.56	Yes	31	0	0.418788	Yes	Yes	-22.31	2657.02	1017.68	1639.34	0.83	0.132	1017.68	1639.34	14.25	0.836	1.24	15.07	39.3	54.4	0.095	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.76
22.473	9.47	0.09	115.56	Yes	45	0	0.95037	Yes	Yes	-22.47	2675.97	1027.92	1648.06	0.83	0.132	1027.92	1648.06	11.12	0.868	1.24	11.76	46.9	58.7	0.099	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.79
22.638	5.922	0.109	115.56	Yes	70	0	1.840594	Yes	Yes	-22.64	2695.04	1038.21	1656.83	0.83	0.132	1038.21	1656.83	7.01	0.922	1.25	7.42	52.6	60.1	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.80
22.802	3.994	0.08	112.35	Yes	92	0	2.003005	Yes	Yes	-22.80	2713.46	1048.44	1665.02	0.83	0.132	1048.44	1665.02	4.75	0.962	1.26	5.03	54.7	59.7	0.099	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.80
22.966	5.828	0.054	112.35	Yes	92	0	0.926561	Yes	Yes	-22.97	2731.89	1058.68	1673.21	0.83	0.132	1058.68	1673.21	6.84	0.924	1.24	7.24	55.3	62.6	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.82
23.13	7.693	0.039	112.35	Yes	92	0	0.506954	Yes	Yes	-23.13	2750.32	1068.91	1681.40	0.83	0.132	1068.91	1681.40	8.93	0.894	1.23	9.45	56.0	65.4	0.104	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.84
23.294	10.368	0.031	115.56	Yes	33	0	0.298997	Yes	Yes	-23.29	2769.27	1079.15	1690.12	0.83	0.132	1079.15	1690.12	11.89	0.859	1.21	12.58	39.9	52.5	0.094	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.115	1.082	0.75
23.458	12.321	0.033	115.56	Yes	29	0	0.267835	Yes	Yes	-23.46	2788.22	1089.38	1698.84	0.82	0.132	1089.38	1698.84	14.00	0.838	1.20	14.81	36.8	51.6	0.093	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.114	1.081	0.74
23.622	12.095	0.058	115.56	Yes	33	0	0.479537	Yes	Yes	-23.62	2807.17	1099.61	1707.56	0.82	0.132	1099.61	1707.56	13.69	0.841	1.20	14.49	40.5	55.0	0.096	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.76
23.786	9.709	0.075	115.56	Yes	43	0	0.772479	Yes	Yes	-23.79	2826.12	1109.85	1716.28	0.82	0.132	1109.85	1716.28	11.01	0.869	1.20	11.65	46.1	57.8	0.098	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.78
23.95	7.152	0.059	112.35	Yes	43	0	0.824944	Yes	Yes	-23.95	2844.55	1120.08	1724.47	0.82	0.132	1120.08	1724.47	8.13	0.905	1.20	8.61	45.4	54.0	0.095	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.76
24.114	9.657	0.043	115.56	Yes	38	0	0.445273	Yes	Yes	-24.11	2863.50	1130.31	1733.19	0.82	0.132	1130.31	1733.19	10.86	0.871	1.19	11.49	43.7	55.2	0.096	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.76
24.278	9.792	0.045	115.56	Yes	38	0	0.459559	Yes	Yes	-24.28	2882.45	1140.55	1741.90	0.82	0.132	1140.55	1741.90	10.96	0.869	1.18	11.60	43.7	55.3	0.096	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.76
24.442	9.339	0.056	115.56	Yes	42	0	0.599636	Yes	Yes	-24.44	2901.40	1150.78	1750.62	0.81	0.132	1150.78	1750.62	10.42	0.876	1.18	11.03	45.6	56.6	0.097	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.77
24.606	11.299	0.052	115.56	Yes	34	0	0.460218	Yes	Yes	-24.61	2920.36	1161.01	1759.34	0.81	0.132	1161.01	1759.34	12.50	0.853	1.17	13.23	41.3	54.5	0.095	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.76
24.77	9.878	0.043	115.56	Yes	38	0	0.435311	Yes	Yes	-24.77	2939.31	1171.25	1768.06	0.81	0.132	1171.25	1768.06	10.92	0.870	1.17	11.55	43.6	55.1	0.096	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.76
24.934	8.774	0.029	112.35	Yes	38	0	0.330522	Yes	Yes	-24.93	2957.73	1181.48	1776.25	0.81	0.131	1181.48	1776.25	9.68	0.885	1.17	10.24	43.3	53.5	0.095	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.116	1.083	0.75
25.098	7.562	0.038	112.35	Yes	38	0	0.502513	Yes	Yes	-25.10	2976.16	1191.72	1784.44	0.81	0.131	1191.72	1784.44	8.34	0.902	1.17	8.82	43.0	51.8	0.094	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.114	1.082	0.74
25.262	6.483	0.034	112.35	Yes	38	0	0.524449	Yes	Yes	-25.26	2994.58	1201.95	1792.63	0.81	0.131	1201.95	1792.63	7.14	0.920	1.16	7.55	42.7	50.2	0.092	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.112	1.080	0.73
25.426	8.383	0.034	112.35	Yes	38	0	0.405583	Yes	Yes	-25.43	3013.01	1212.18	1800.83	0.81	0.131	1212.18	1800.83	9.15	0.891	1.15	9.68	43.1	52.8	0.094	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.115	1.083	0.75
25.59	9.125	0.04	112.35	Yes	38	0	0.438356	Yes	Yes	-25.59	3031.43	1222.42	1809.02	0.80	0.131	1222.42	1809.02	9.90	0.882	1.15	10.48	43.3	53.8	0.095	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.75
25.754	11.814	0.045	115.56	Yes	32	0	0.380904	Yes	Yes	-25.75	3050.39	1232.65	1817.74	0.80	0.131	1232.65	1817.74	12.71	0.851	1.14	13.44	39.8	53.3	0.095	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.116	1.083	0.75
25.918	12.92	0.057	115.56	Yes	32	0	0.441176	Yes	Yes	-25.92	3069.34	1242.88	1826.45	0.80	0.131	1242.88	1826.45	13.82	0.840	1.13	14.62	39.5	54.1	0.095	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.76
26.082	10.602	0.037	115.56	Yes	36	0	0.348991	Yes	Yes	-26.08	3088.29	1253.12	1835.17	0.80	0.131	1253.12	1835.17	11.33	0.865	1.13	11.99	42.1	54.1	0.095	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.76
26.246	9.755	0.044	115.56	Yes	40	0	0.451051	Yes	Yes	-26.25	3107.24	1263.35	1843.89	0.80	0.131	1263.35	1843.89	10.40	0.876	1.13	11.01	44.4	55.4	0.096	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.76
26.41	10.736	0.058	115.56	Yes	39	0	0.540238	Yes	Yes	-26.41	3126.19	1273.58	1852.61	0.80	0.131	1273.58	1852.61	11.38	0.865	1.12	12.04	44.2	56.2	0.097	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.77
26.574	10.971	0.077	115.56	Yes	41	0	0.70185	Yes	Yes	-26.57	3145.15	1283.82	1861.33	0.79	0.131	1283.82	1861.33	11.58	0.863	1.12	12.25	45.3	57.5	0.098	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.78
26.739	10.698	0.084	115.56	Yes	43	0	0.785193	Yes	Yes	-26.74	3164.21	1294.11	1870.10	0.79	0.131	1294.11	1870.10	11.25	0.866	1.11	11.91	46.2	58.1	0.098	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.78
26.903	13.022	0.085	115.56	Yes	36	0	0.652742	Yes	Yes	-26.90	3183.16	1304.35	1878.82	0.79	0.131	1304.35	1878.82	13.60	0.842	1.11	14.39	43.0	57.4	0.098	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.088	0.78
27.067	15.551	0.087	115.56	Yes	30	0	0.55945	Yes	Yes	-27.07	3202.12	1314.58	1887.54	0.79	0.131	1314.58	1887.54	16.14	0.819	1.10	17.08	38.8	55.8	0.096	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.77
27.231	16.454	0.084	115.56	Yes	29	0	0.510514	Yes	Yes	-27.23	3221.07	1324.81	1896.25	0.79	0.130	1324.81	1896.25	17.00	0.812	1.09	17.99	37.3	55.3	0.096	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.76
27.395	15.89	0.1	115.56	Yes	31	0	0.629327	Yes	Yes	-27.40	3240.02	1335.05	1904.97	0.79	0.130	1335.05	1904.97	16.37	0.817	1.09	17.31	39.4	56.7	0.097	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.77
27.559	15.143	0.091	115.56	Yes	31	0	0.600938	Yes	Yes	-27.56	3258.97	1345.28	1913.69	0.78	0.130	1345.28	1913.69	15.55	0.824	1.09	16.45	39.7	56.2	0.097	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.77
27.723	17.495	0.111	115.56	Yes	29	0	0.634467	Yes	Yes	-27.72	3277.92	1355.52	1922.41	0.78	0.130	1355.52	1922.41	17.86	0.805	1.08	18.90	38.2	57.1	0.097	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.78
27.887	19.801	0.13	118.77	Yes	27	0	0.656532	Yes	Yes	-27.89	3297.40	1365.75	1931.65	0.78	0.130	1365.75	1931.65	20.11	0.788	1.07	21.28	36.7	58.0	0.098	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.78
28.051	19.315	0.122	118.77	Yes	28	0	0.631633	Yes	Yes	-28.05	3316.88	1375.98	1940.90	0.78	0.130	1375.98	1940.90	19.55	0.792	1.07	20.68	36.8	57.4	0.098	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.78
28.215	19.288	0.13	115.56	Yes	28	0	0.673994	Yes	Yes	-28.22	3335.83	1386.22	1949.62	0.78	0.130	1386.22	1949.62	19.45	0.793	1.07	20.58	37.4	58.0	0.098	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.78
28.379	20.065	0.125	118.77	Yes	27	0	0.622975	Yes	Yes	-28.38	3355.31	1396.45	1958.86	0.78	0.130	1396.45	1958.86	20.15	0.788	1.06	21.32	36.1	57.4	0.098	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.088	0.78
28.543	22.216	0.138	118.77	Yes	25	0	0.621174	Yes	Yes	-28.54	3374.79	1406.68	1968.11	0.78	0.130	1406.68	1968.11	22.21	0.773	1.06	23.50	34.5	58.0	0.098	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.78
28.707	20.473	0.162	115.56	Yes	29	0	0.791286	Yes	Yes	-28.71	3393.74	1416.92	1976.82	0.77	0.130	1416.92	1976.82	20.41	0.786	1.05	21.60	38.1	59.7	0.099	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.79
28.871	18.223	0.145	115.56	Yes	31	0	0.795698	Yes	Yes	-28.87	3412.69	1427.15	1985.54	0.77	0.129	1427.15	1985.54	18.13	0.803	1.05	19.18	39.7	58.9	0.099	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.79
29.035	19.473	0.126	118.77	Yes	28	0	0.64705	Yes	Yes	-29.04	3432.17	1437.38	1994.79	0.77	0.129	1437.38	1994.79	19.29	0.794	1.05	20.41	37.0	57.4	0.098	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.78
29.199	18.377	0.116	115.56	Yes	29	0	0.631224	Yes	Yes	-29.20	3451.12	1447.62	2003.50	0.77	0.129	1447.62	2003.50	18.15	0.803	1.04	19.20	37.7	56.9	0.097	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.78
29.363	10.558	0.089	115.56	Yes	46	0	0.842963	Yes	Yes	-29.36	3470.07	1457.85	2012.22	0.77	0.129	1457.85	2012.22	10.43	0.876	1.05	11.03	47.4	58.4	0.098	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.79
29.527	6.675	0.099	115.56	Yes	71	0	1.483146	Yes	Yes	-29.53	3489.03	1468.08	2020.94	0.77	0.129	1468.08	2020.94	6.58	0.928	1.04	6.97	52.6	59.6	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.79
29.691	4.917	0.113	115.56	Yes	95	0	2.298149	Yes	Yes	-29.69	3507.98	1478.32	2029.66	0.76	0.129	1478.32	2029.66	4.84	0.960	1.04	5.12	55.1	60.2	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.80
29.855	3.839	0.144	112.35	Yes	100	0	3.750977	Yes	Yes	-29.86	3526.40	1488.55	2037.85	0.76	0.129	1488.55	2037.85	3.77	0.985	1.04	3.98	55.1	59.1	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.79
30.019	5.606	0.146	112.35	Yes	90	0	2.604352	Yes	Yes	-30.02	3544.83	1498.79	2046.04	0.76	0.129	1498.79	2046.04	5.47	0.948	1.03	5.79	54.8	60.6	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.80
30.183	7.627	0.135	115.56	Yes	68	0	1.770028	Yes	Yes	-30.18	3563.78	1509.02	2054.76	0.76	0.128	1509.02	2054.76	7.41	0.916	1.03	7.83	52.5	60.3	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.80
30.347	9.367	0.109	115.56	Yes	55	0	1.16366	Yes	Yes	-30.35	3582.73	1519.25	2063.48	0.76	0.128	1519.25	2063.48	9.05	0.893	1.02	9.58	49.9	59.5	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.79
30.511	11.68	0.098	115.56	Yes	44	0	0.839041	Yes	Yes	-30.51	3601.68	1529.49	2072.20	0.76	0.128	1529.49	2072.20	11.24	0.866	1.02	11.89	46.7	58.6	0.098	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.79
30.675	13.107	0.125	115.56	Yes	43	0	0.953689	Yes	Yes	-30.68	3620.64	1539.72	2080.92	0.76	0.128	1539.72	2080.92	12.57	0.852	1.01	13.30	46.3	59.6	0.099	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.80
30.84	13.353	0.139	115.56	Yes	43	0	1.040965	Yes	Yes	-30.84	3639.70	1550.02	2089.69	0.75	0.128	1550.02	2089.69	12.76	0.850	1.01	13.50	46.6	60.1	0.100	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.80
31.004	13.229	0.14	115.56	Yes	44	0	1.058281	Yes	Yes	-31.00	3658.66	1560.25	2098.41	0.75	0.128	1560.25	2098.41	12.59	0.852	1.01	13.32	46.9	60.2	0.100	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.80
31.168	13.563	0.159	115.56	Yes	44	0	1.172307	Yes	Yes	-31.17	3677.61	1570.48	2107.12	0.75	0.128	1570.48	2107.12	12.87	0.849	1.00	13.61	47.2	60.8	0.100	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.81
31.332	12.166	0.154	115.56	Yes	49	0	1.265823	Yes	Yes	-31.33	3696.56	1580.72	2115.84	0.75	0.128	1580.72	2115.84	11.50	0.864	1.00	12.17	48.5	60.7	0.100	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.80
31.496	10.359	0.147	115.56	Yes	55	0	1.419056	Yes	Yes	-31.50	3715.51	1590.95	2124.56	0.75	0.127	1590.95	2124.56	9.76	0.884	1.00	10.32	50.2	60.5	0.100	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.80
31.66	10.157	0.145	115.56	Yes	56	0	1.427587	Yes	Yes	-31.66	3734.46	1601.18	2133.28	0.75	0.127	1601.18	2133.28	9.53	0.886	0.99	10.08	50.4	60.5	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.80
31.824	7.235	0.147	115.56	Yes	75	0	2.03179	Yes	Yes	-31.82	3753.41	1611.42	2142.00	0.74	0.127	1611.42	2142.00	6.76	0.926	0.99	7.15	53.4	60.5	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.80
31.988	6.246	0.158	115.56	Yes	87	0	2.529619	Yes	Yes	-31.99	3772.37	1621.65	2150.72	0.74	0.127	1621.65	2150.72	5.81	0.942	0.98	6.15	54.5	60.7	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.81
32.152	6.84	0.152	115.56	Yes	80	0	2.222222	Yes	Yes	-32.15	3791.32	1631.88	2159.43	0.74	0.127	1631.88	2159.43	6.34	0.932	0.98	6.71	53.9	60.6	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.81
32.316	7.943	0.149	115.56	Yes	70	0	1.875866	Yes	Yes	-32.32	3810.27	1642.12	2168.15	0.74	0.127	1642.12	2168.15	7.34	0.917	0.98	7.77	52.8	60.5	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.81
32.48	6.593	0.155	115.56	Yes	83	0	2.350978	Yes	Yes	-32.48	3829.22	1652.35	2176.87	0.74	0.127	1652.35	2176.87	6.07	0.937	0.97	6.42	54.2	60.6	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.81
32.644	7.641	0.12	115.56	Yes	69	0	1.570475	Yes	Yes	-32.64	3848.17	1662.59	2185.59	0.74	0.126	1662.59	2185.59	7.01	0.922	0.97	7.42	52.5	59.9	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.80
32.808	6.824	0.145	115.56	Yes	80	0	2.124853	Yes	Yes	-32.81	3867.13	1672.82	2194.31	0.73	0.126	1672.82	2194.31	6.23	0.934	0.97	6.60	53.9	60.5	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.81
32.972	8.859	0.129	115.56	Yes	62	0	1.456146	Yes	Yes	-32.97	3886.08	1683.05	2203.02	0.73	0.126	1683.05	2203.02	8.07	0.906	0.96	8.54	51.5	60.1	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.80
33.136	9.544	0.135	115.56	Yes	59	0	1.414501	Yes	Yes	-33.14	3905.03	1693.29	2211.74	0.73	0.126	1693.29	2211.74	8.67	0.898	0.96	9.17	51.0	60.2	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.81
33.3	8.699	0.151	115.56	Yes	66	0	1.735832	Yes	Yes	-33.30	3923.98	1703.52	2220.46	0.73	0.126	1703.52	2220.46	7.87	0.909	0.96	8.33	52.2	60.5	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.81
33.464	9.624	0.168	115.56	Yes	63	0	1.745636	Yes	Yes	-33.46	3942.93	1713.75	2229.18	0.73	0.126	1713.75	2229.18	8.68	0.897	0.95	9.18	51.7	60.9	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.81
33.628	18.034	0.196	115.56	Yes	38	0	1.086836	Yes	Yes	-33.63	3961.88	1723.99	2237.90	0.73	0.126	1723.99	2237.90	16.28	0.818	0.96	17.23	44.7	61.9	0.101	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.82
33.792	18.822	0.196	115.56	Yes	37	0	1.041335	Yes	Yes	-33.79	3980.84	1734.22	2246.62	0.73	0.125	1734.22	2246.62	16.95	0.812	0.95	17.93	44.0	61.9	0.101	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.82
33.956	14.924	0.208	115.56	Yes	46	0	1.393728	Yes	Yes	-33.96	3999.79	1744.45	2255.33	0.72	0.125	1744.45	2255.33	13.37	0.844	0.95	14.14	48.0	62.1	0.101	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.82
34.12	12.057	0.197	115.56	Yes	54	0	1.633906	Yes	Yes	-34.12	4018.74	1754.69	2264.05	0.72	0.125	1754.69	2264.05	10.74	0.872	0.94	11.37	50.2	61.6	0.101	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.82
34.284	11.173	0.214	115.56	Yes	59	0	1.915332	Yes	Yes	-34.28	4037.69	1764.92	2272.77	0.72	0.125	1764.92	2272.77	9.92	0.882	0.94	10.49	51.3	61.8	0.101	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.82
34.448	9.118	0.234	115.56	Yes	72	0	2.566352	Yes	Yes	-34.45	4056.64	1775.16	2281.49	0.72	0.125	1775.16	2281.49	8.05	0.906	0.93	8.52	53.3	61.8	0.101	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.82
34.612	9.82	0.264	115.56	Yes	70	0	2.688391	Yes	Yes	-34.61	4075.60	1785.39	2290.21	0.72	0.125	1785.39	2290.21	8.65	0.898	0.93	9.15	53.2	62.3	0.101	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.83
34.776	10.081	0.305	115.56	Yes	71	0	3.025494	Yes	Yes	-34.78	4094.55	1795.62	2298.93	0.72	0.124	1795.62	2298.93	8.85	0.895	0.93	9.36	53.4	62.8	0.102	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.83
34.941	9.434	0.347	112.35	Yes	78	0	3.678185	Yes	Yes	-34.94	4113.09	1805.92	2307.17	0.71	0.124	1805.92	2307.17	8.25	0.903	0.92	8.72	54.2	63.0	0.102	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.83
35.105	5.843	0.282	112.35	Yes	100	0	4.826288	Yes	Yes	-35.11	4131.51	1816.15	2315.36	0.71	0.124	1816.15	2315.36	5.07	0.956	0.92	5.36	55.5	60.9	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.82
35.269	5.054	0.231	112.35	Yes	100	0	4.570637	Yes	Yes	-35.27	4149.94	1826.39	2323.55	0.71	0.124	1826.39	2323.55	4.36	0.971	0.91	4.62	55.3	59.9	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.81
35.433	4.999	0.195	112.35	Yes	100	0	3.90078	Yes	Yes	-35.43	4168.36	1836.62	2331.74	0.71	0.124	1836.62	2331.74	4.30	0.972	0.91	4.55	55.3	59.8	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.81
35.597	4.874	0.215	112.35	Yes	100	0	4.411161	Yes	Yes	-35.60	4186.79	1846.85	2339.93	0.71	0.124	1846.85	2339.93	4.18	0.975	0.91	4.42	55.2	59.6	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.81
35.761	3.85	0.198	112.35	Yes	100	0	5.142857	Yes	Yes	-35.76	4205.21	1857.09	2348.13	0.71	0.123	1857.09	2348.13	3.28	0.997	0.90	3.47	55.0	58.4	0.098	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.80

CPT Liquefaction Analysis

35.925	4.5	0.16	112.35	Yes	100	0	3.555556	Yes	Yes	-35.93	4223.64	1867.32	2356.32	0.71	0.123	1867.32	2356.32	3.83	0.983	0.90	4.05	55.1	59.2	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.81
36.089	3.929	0.157	112.35	Yes	100	0	3.995928	Yes	Yes	-36.09	4242.06	1877.55	2364.51	0.70	0.123	1877.55	2364.51	3.32	0.996	0.90	3.52	55.0	58.5	0.098	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.80
36.253	3.593	0.164	112.35	Yes	100	0	4.564431	Yes	Yes	-36.25	4260.49	1887.79	2372.70	0.70	0.123	1887.79	2372.70	3.03	1.004	0.89	3.20	54.9	58.1	0.098	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.80
36.417	4.439	0.164	112.35	Yes	100	0	3.694526	Yes	Yes	-36.42	4278.91	1898.02	2380.89	0.70	0.123	1898.02	2380.89	3.74	0.985	0.89	3.95	55.1	59.0	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.81
36.581	5.624	0.173	112.35	Yes	100	0	3.076102	Yes	Yes	-36.58	4297.34	1908.25	2389.08	0.70	0.123	1908.25	2389.08	4.73	0.963	0.89	5.00	55.4	60.4	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.82
36.745	5.052	0.171	112.35	Yes	100	0	3.384798	Yes	Yes	-36.75	4315.76	1918.49	2397.28	0.70	0.123	1918.49	2397.28	4.23	0.974	0.89	4.47	55.2	59.7	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.81
36.909	4.024	0.083	112.35	Yes	100	0	2.062624	Yes	Yes	-36.91	4334.19	1928.72	2405.47	0.70	0.122	1928.72	2405.47	3.35	0.995	0.88	3.54	55.0	58.5	0.098	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.81
37.073	3.485	0.054	112.35	Yes	80	0	1.549498	Yes	Yes	-37.07	4352.62	1938.96	2413.66	0.70	0.122	1938.96	2413.66	2.88	1.009	0.88	3.05	52.9	55.9	0.097	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.79
37.237	3.416	0.037	112.35	Yes	80	0	1.083138	Yes	Yes	-37.24	4371.04	1949.19	2421.85	0.69	0.122	1949.19	2421.85	2.82	1.011	0.87	2.98	52.9	55.8	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.79
37.401	2.78	0.039	112.35	Yes	80	0	1.402878	Yes	Yes	-37.40	4389.47	1959.42	2430.04	0.69	0.122	1959.42	2430.04	2.28	1.029	0.87	2.41	52.7	55.1	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.79
37.565	2.014	0.029	112.35	Yes	80	0	1.439921	Yes	Yes	-37.57	4407.89	1969.66	2438.24	0.69	0.122	1969.66	2438.24	1.64	1.054	0.86	1.73	52.5	54.2	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.78
37.729	2.316	0.02	112.35	Yes	80	0	0.863558	Yes	Yes	-37.73	4426.32	1979.89	2446.43	0.69	0.122	1979.89	2446.43	1.88	1.044	0.86	1.99	52.6	54.6	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.78
37.893	1.902	0.01	112.35	Yes	80	0	0.525762	Yes	Yes	-37.89	4444.74	1990.12	2454.62	0.69	0.121	1990.12	2454.62	1.54	1.059	0.85	1.63	52.5	54.1	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.78
38.057	2.146	0.01	112.35	Yes	80	0	0.465983	Yes	Yes	-38.06	4463.17	2000.36	2462.81	0.69	0.121	2000.36	2462.81	1.73	1.050	0.85	1.83	52.5	54.4	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.78
38.221	2.204	0.01	112.35	Yes	80	0	0.453721	Yes	Yes	-38.22	4481.59	2010.59	2471.00	0.68	0.121	2010.59	2471.00	1.77	1.048	0.85	1.87	52.5	54.4	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.78
38.385	1.901	0.01	112.35	Yes	80	0	0.526039	Yes	Yes	-38.39	4500.02	2020.82	2479.19	0.68	0.121	2020.82	2479.19	1.52	1.060	0.85	1.61	52.5	54.1	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.78
38.549	1.725	0.01	112.35	Yes	80	0	0.57971	Yes	Yes	-38.55	4518.44	2031.06	2487.39	0.68	0.121	2031.06	2487.39	1.37	1.067	0.84	1.45	52.4	53.9	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.78
38.713	1.943	0.01	112.35	Yes	80	0	0.514668	Yes	Yes	-38.71	4536.87	2041.29	2495.58	0.68	0.121	2041.29	2495.58	1.54	1.059	0.84	1.63	52.5	54.1	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.78
38.877	1.885	0.01	112.35	Yes	80	0	0.530504	Yes	Yes	-38.88	4555.29	2051.52	2503.77	0.68	0.120	2051.52	2503.77	1.49	1.061	0.84	1.58	52.5	54.0	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.78
39.042	1.959	0.01	112.35	Yes	80	0	0.510465	Yes	Yes	-39.04	4573.83	2061.82	2512.01	0.68	0.120	2061.82	2512.01	1.54	1.059	0.83	1.63	52.5	54.1	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.79
39.206	1.955	0.01	112.35	Yes	80	0	0.511509	Yes	Yes	-39.21	4592.26	2072.05	2520.20	0.68	0.120	2072.05	2520.20	1.54	1.059	0.83	1.62	52.5	54.1	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.79
39.37	2.368	0.01	112.35	Yes	80	0	0.422297	Yes	Yes	-39.37	4610.68	2082.29	2528.40	0.67	0.120	2082.29	2528.40	1.86	1.045	0.83	1.97	52.6	54.5	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.79
39.534	2.24	0.01	112.35	Yes	80	0	0.446429	Yes	Yes	-39.53	4629.11	2092.52	2536.59	0.67	0.120	2092.52	2536.59	1.75	1.049	0.83	1.85	52.5	54.4	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.79
39.698	2.604	0.01	112.35	Yes	80	0	0.384025	Yes	Yes	-39.70	4647.53	2102.76	2544.78	0.67	0.119	2102.76	2544.78	2.03	1.038	0.83	2.15	52.6	54.8	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.79
39.862	3.208	0.019	112.35	Yes	80	0	0.592269	Yes	Yes	-39.86	4665.96	2112.99	2552.97	0.67	0.119	2112.99	2552.97	2.50	1.021	0.83	2.65	52.8	55.4	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.80
40.026	3.238	0.04	112.35	Yes	80	0	1.23533	Yes	Yes	-40.03	4684.39	2123.22	2561.16	0.67	0.119	2123.22	2561.16	2.52	1.020	0.82	2.66	52.8	55.4	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.80
40.19	2.441	0.025	112.35	Yes	80	0	1.02417	Yes	Yes	-40.19	4702.81	2133.46	2569.35	0.67	0.119	2133.46	2569.35	1.88	1.044	0.82	1.99	52.6	54.6	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.79
40.354	2.454	0.012	112.35	Yes	80	0	0.488998	Yes	Yes	-40.35	4721.24	2143.69	2577.55	0.67	0.119	2143.69	2577.55	1.89	1.044	0.81	2.00	52.6	54.6	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.79
40.518	1.857	0.01	112.35	Yes	80	0	0.538503	Yes	Yes	-40.52	4739.66	2153.92	2585.74	0.66	0.119	2153.92	2585.74	1.42	1.065	0.81	1.50	52.4	53.9	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.79
40.682	2.51	0.01	112.35	Yes	80	0	0.398406	Yes	Yes	-40.68	4758.09	2164.16	2593.93	0.66	0.118	2164.16	2593.93	1.92	1.042	0.81	2.03	52.6	54.6	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.80
40.846	2.175	0.01	112.35	Yes	80	0	0.45977	Yes	Yes	-40.85	4776.51	2174.39	2602.12	0.66	0.118	2174.39	2602.12	1.65	1.054	0.80	1.75	52.5	54.3	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.79
41.01	1.89	0.031	112.35	Yes	80	0	1.640212	Yes	Yes	-41.01	4794.94	2184.62	2610.31	0.66	0.118	2184.62	2610.31	1.43	1.064	0.80	1.51	52.4	54.0	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.79
41.174	2.364	0.031	112.35	Yes	80	0	1.311337	Yes	Yes	-41.17	4813.36	2194.86	2618.51	0.66	0.118	2194.86	2618.51	1.79	1.048	0.80	1.89	52.6	54.4	0.095	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.80
41.338	2.821	0.023	112.35	Yes	80	0	0.815314	Yes	Yes	-41.34	4831.79	2205.09	2626.70	0.66	0.118	2205.09	2626.70	2.13	1.034	0.80	2.26	52.7	54.9	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.80
41.502	3.169	0.01	112.35	Yes	80	0	0.315557	Yes	Yes	-41.50	4850.21	2215.32	2634.89	0.65	0.118	2215.32	2634.89	2.39	1.025	0.80	2.53	52.7	55.3	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.80
41.666	3.014	0.039	112.35	Yes	80	0	1.293962	Yes	Yes	-41.67	4868.64	2225.56	2643.08	0.65	0.117	2225.56	2643.08	2.27	1.029	0.80	2.40	52.7	55.1	0.096	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.80
41.83	5.516	0.078	112.35	Yes	80	0	1.414068	Yes	Yes	-41.83	4887.06	2235.79	2651.27	0.65	0.117	2235.79	2651.27	4.18	0.975	0.80	4.43	53.3	57.7	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.82
41.994	10.642	0.144	115.56	Yes	62	0	1.353129	Yes	Yes	-41.99	4906.02	2246.03	2659.99	0.65	0.117	2246.03	2659.99	8.18	0.904	0.81	8.65	51.5	60.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.84
42.158	10.183	0.182	115.56	Yes	68	0	1.787293	Yes	Yes	-42.16	4924.97	2256.26	2668.71	0.65	0.117	2256.26	2668.71	7.79	0.910	0.81	8.24	52.6	60.8	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.85
42.322	8.998	0.187	115.56	Yes	76	0	2.07824	Yes	Yes	-42.32	4943.92	2266.49	2677.43	0.65	0.117	2266.49	2677.43	6.84	0.924	0.80	7.24	53.6	60.8	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.85
42.486	8.923	0.181	115.56	Yes	77	0	2.028466	Yes	Yes	-42.49	4962.87	2276.73	2686.15	0.65	0.116	2276.73	2686.15	6.76	0.926	0.80	7.15	53.6	60.7	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.85
42.65	9.375	0.174	115.56	Yes	73	0	1.856	Yes	Yes	-42.65	4981.82	2286.96	2694.86	0.64	0.116	2286.96	2694.86	7.09	0.920	0.80	7.50	53.1	60.7	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.85
42.814	12.343	0.186	115.56	Yes	59	0	1.506927	Yes	Yes	-42.81	5000.78	2297.19	2703.58	0.64	0.116	2297.19	2703.58	9.38	0.888	0.80	9.93	51.0	60.9	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.85
42.978	12.902	0.173	115.56	Yes	56	0	1.340877	Yes	Yes	-42.98	5019.73	2307.43	2712.30	0.64	0.116	2307.43	2712.30	9.79	0.883	0.80	10.36	50.3	60.7	0.100	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.85
43.143	11.947	0.175	115.56	Yes	60	0	1.464803	Yes	Yes	-43.14	5038.79	2317.72	2721.07	0.64	0.116	2317.72	2721.07	9.02	0.893	0.80	9.54	51.2	60.7	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.85
43.307	9.335	0.178	115.56	Yes	74	0	1.906802	Yes	Yes	-43.31	5057.75	2327.96	2729.79	0.64	0.115	2327.96	2729.79	6.98	0.922	0.79	7.38	53.3	60.7	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.85
43.471	7.425	0.162	115.56	Yes	89	0	2.181818	Yes	Yes	-43.47	5076.70	2338.19	2738.51	0.64	0.115	2338.19	2738.51	5.50	0.948	0.78	5.82	54.7	60.5	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.85
43.635	6.298	0.157	115.56	Yes	100	0	2.492855	Yes	Yes	-43.64	5095.65	2348.42	2747.23	0.64	0.115	2348.42	2747.23	4.63	0.965	0.78	4.90	55.4	60.3	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.85
43.799	5.214	0.142	112.35	Yes	100	0	2.723437	Yes	Yes	-43.80	5114.08	2358.66	2755.42	0.63	0.115	2358.66	2755.42	3.80	0.984	0.77	4.02	55.1	59.1	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.84
43.963	4	0.116	112.35	Yes	100	0	2.9	Yes	Yes	-43.96	5132.50	2368.89	2763.61	0.63	0.115	2368.89	2763.61	2.89	1.009	0.76	3.06	54.8	57.9	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.84
44.127	3.602	0.081	112.35	Yes	100	0	2.248751	Yes	Yes	-44.13	5150.93	2379.12	2771.80	0.63	0.114	2379.12	2771.80	2.59	1.018	0.76	2.74	54.7	57.5	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.83
44.291	3.218	0.05	112.35	Yes	100	0	1.55376	Yes	Yes	-44.29	5169.35	2389.36	2779.99	0.63	0.114	2389.36	2779.99	2.30	1.028	0.76	2.43	54.6	57.1	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.83
44.455	3.78	0.039	112.35	Yes	100	0	1.031746	Yes	Yes	-44.46	5187.78	2399.59	2788.19	0.63	0.114	2399.59	2788.19	2.70	1.014	0.76	2.86	54.8	57.6	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.84
44.619	5.229	0.096	115.56	Yes	100	0	1.835915	Yes	Yes	-44.62	5206.73	2409.83	2796.90	0.63	0.114	2409.83	2796.90	3.75	0.985	0.76	3.97	55.1	59.1	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.85
44.783	4.771	0.125	112.35	Yes	100	0	2.619996	Yes	Yes	-44.78	5225.15	2420.06	2805.10	0.63	0.114	2420.06	2805.10	3.41	0.994	0.76	3.61	55.0	58.6	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.84
44.947	3.999	0.112	112.35	Yes	100	0	2.8007	Yes	Yes	-44.95	5243.58	2430.29	2813.29	0.62	0.114	2430.29	2813.29	2.83	1.010	0.75	3.00	54.8	57.8	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.84
45.111	3.646	0.077	112.35	Yes	100	0	2.111903	Yes	Yes	-45.11	5262.01	2440.53	2821.48	0.62	0.113	2440.53	2821.48	2.57	1.019	0.75	2.72	54.7	57.5	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.84
45.275	3.527	0.046	112.35	Yes	100	0	1.304225	Yes	Yes	-45.28	5280.43	2450.76	2829.67	0.62	0.113	2450.76	2829.67	2.48	1.022	0.74	2.62	54.7	57.3	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.088	0.84
45.439	2.531	0.023	112.35	Yes	100	0	0.908732	Yes	Yes	-45.44	5298.86	2460.99	2837.86	0.62	0.113	2460.99	2837.86	1.76	1.049	0.73	1.86	54.5	56.3	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.83
45.603	3.147	0.042	112.35	Yes	100	0	1.334604	Yes	Yes	-45.60	5317.28	2471.23	2846.05	0.62	0.113	2471.23	2846.05	2.19	1.032	0.74	2.32	54.6	56.9	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.84
45.767	3.417	0.063	112.35	Yes	100	0	1.843723	Yes	Yes	-45.77	5335.71	2481.46	2854.25	0.62	0.113	2481.46	2854.25	2.38	1.025	0.74	2.51	54.7	57.2	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.088	0.84
45.931	5.003	0.065	112.35	Yes	100	0	1.29922	Yes	Yes	-45.93	5354.13	2491.69	2862.44	0.62	0.112	2491.69	2862.44	3.50	0.991	0.74	3.71	55.0	58.7	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.85
46.095	3.815	0.052	112.35	Yes	100	0	1.363041	Yes	Yes	-46.10	5372.56	2501.93	2870.63	0.62	0.112	2501.93	2870.63	2.64	1.016	0.73	2.80	54.8	57.6	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.84
46.259	2.946	0.039	112.35	Yes	100	0	1.323829	Yes	Yes	-46.26	5390.98	2512.16	2878.82	0.61	0.112	2512.16	2878.82	2.02	1.038	0.73	2.14	54.6	56.7	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.84
46.423	2.958	0.028	112.35	Yes	100	0	0.946586	Yes	Yes	-46.42	5409.41	2522.40	2887.01	0.61	0.112	2522.40	2887.01	2.03	1.038	0.72	2.14	54.6	56.7	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.84
46.587	3.246	0.024	112.35	Yes	100	0	0.739372	Yes	Yes	-46.59	5427.83	2532.63	2895.21	0.61	0.112	2532.63	2895.21	2.22	1.031	0.72	2.35	54.6	57.0	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.84
46.751	3.178	0.026	112.35	Yes	100	0	0.818125	Yes	Yes	-46.75	5446.26	2542.86	2903.40	0.61	0.111	2542.86	2903.40	2.17	1.033	0.72	2.29	54.6	56.9	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.84
46.915	2.844	0.023	112.35	Yes	100	0	0.80872	Yes	Yes	-46.92	5464.68	2553.10	2911.59	0.61	0.111	2553.10	2911.59	1.93	1.042	0.72	2.04	54.5	56.6	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.84
47.079	2.935	0.022	112.35	Yes	100	0	0.749574	Yes	Yes	-47.08	5483.11	2563.33	2919.78	0.61	0.111	2563.33	2919.78	1.98	1.040	0.72	2.10	54.5	56.6	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.84
47.244	2.849	0.093	112.35	Yes	100	0	3.264303	Yes	Yes	-47.24	5501.65	2573.63	2928.02	0.61	0.111	2573.63	2928.02	1.92	1.042	0.71	2.03	54.5	56.6	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.84
47.408	2.898	0.062	112.35	Yes	100	0	2.139406	Yes	Yes	-47.41	5520.07	2583.86	2936.21	0.60	0.111	2583.86	2936.21	1.95	1.041	0.71	2.06	54.5	56.6	0.097	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.85
47.572	5.526	0.09	112.35	Yes	100	0	1.628664	Yes	Yes	-47.57	5538.50	2594.09	2944.41	0.60	0.111	2594.09	2944.41	3.77	0.984	0.72	3.99	55.1	59.1	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.86
47.736	4.242	0.116	112.35	Yes	100	0	2.734559	Yes	Yes	-47.74	5556.92	2604.33	2952.60	0.60	0.110	2604.33	2952.60	2.86	1.009	0.71	3.03	54.8	57.9	0.098	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.86
47.9	6.689	0.147	115.56	Yes	100	0	2.197638	Yes	Yes	-47.90	5575.88	2614.56	2961.32	0.60	0.110	2614.56	2961.32	4.57	0.966	0.72	4.83	55.4	60.2	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.87
48.064	10.208	0.177	115.56	Yes	73	0	1.733934	Yes	Yes	-48.06	5594.83	2624.79	2970.03	0.60	0.110	2624.79	2970.03	7.06	0.921	0.73	7.47	53.1	60.6	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.88
48.228	10.012	0.185	115.56	Yes	75	0	1.847783	Yes	Yes	-48.23	5613.78	2635.03	2978.75	0.60	0.110	2635.03	2978.75	6.90	0.923	0.73	7.30	53.4	60.7	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.88
48.392	10.485	0.192	115.56	Yes	73	0	1.831187	Yes	Yes	-48.39	5632.73	2645.26	2987.47	0.60	0.110	2645.26	2987.47	7.22	0.918	0.73	7.64	53.1	60.8	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.88
48.556	13.315	0.199	115.56	Yes	60	0	1.494555	Yes	Yes	-48.56	5651.68	2655.49	2996.19	0.59	0.109	2655.49	2996.19	9.23	0.890	0.73	9.77	51.2	61.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.88
48.72	15.382	0.211	115.56	Yes	54	0	1.371733	Yes	Yes	-48.72	5670.64	2665.73	3004.91	0.59	0.109	2665.73	3004.91	10.71	0.872	0.74	11.33	50.0	61.3	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.89
48.884	17.32	0.196	115.56	Yes	48	0	1.13164	Yes	Yes	-48.88	5689.59	2675.96	3013.63	0.59	0.109	2675.96	3013.63	12.09	0.857	0.74	12.79	48.3	61.1	0.100	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.89
49.048	18.368	0.179	115.56	Yes	44	0	0.974521	Yes	Yes	-49.05	5708.54	2686.20	3022.34	0.59	0.109	2686.20	3022.34	12.82	0.850	0.74	13.57	47.1	60.7	0.100	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.88
49.212	17.889	0.162	115.56	Yes	44	0	0.905584	Yes	Yes	-49.21	5727.49	2696.43	3031.06	0.59	0.109	2696.43	3031.06	12.44	0.854	0.74	13.16	47.0	60.2	0.100	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.88
49.376	17.73	0.167	115.56	Yes	45	0	0.941906	Yes	Yes	-49.38	5746.44	2706.66	3039.78	0.59	0.108	2706.66	3039.78	12.29	0.855	0.73	13.01	47.3	60.3	0.100	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.88
49.54	15.15	0.174	115.56	Yes	52	0	1.148515	Yes	Yes	-49.54	5765.39	2716.90	3048.50	0.59	0.108	2716.90	3048.50	10.40	0.876	0.73	11.00	49.5	60.5	0.100	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.89
49.704	14.406	0.182	115.56	Yes	55	0	1.263362	Yes	Yes	-49.70	5784.35	2727.13	3057.22	0.59	0.108	2727.13	3057.22	9.84	0.883	0.72	10.41	50.2	60.7	0.100	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.89
49.868	13.859	0.198	115.56	Yes	58	0	1.428675	Yes	Yes	-49.87	5803.30	2737.36	3065.93	0.58	0.108	2737.36	3065.93	9.42	0.888	0.72	9.97	51.0	60.9	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.89
50.032	12.953	0.202	115.56	Yes	62	0	1.559484	Yes	Yes	-50.03	5822.25	2747.60	3074.65	0.58	0.108	2747.60	3074.65	8.76	0.896	0.72	9.27	51.7	61.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.89
50.196	11.714	0.206	115.56	Yes	68	0	1.758579	Yes	Yes	-50.20	5841.20	2757.83	3083.37	0.58	0.107	2757.83	3083.37	7.86	0.909	0.71	8.32	52.6	61.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.89
50.36	12.331	0.208	115.56	Yes	66	0	1.686806	Yes	Yes	-50.36	5860.15	2768.06	3092.09	0.58	0.107	2768.06	3092.09	8.27	0.903	0.71	8.75	52.3	61.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.90
50.524	12.686	0.21	115.56	Yes	64	0	1.655368	Yes	Yes	-50.52	5879.11	2778.30	3100.81	0.58	0.107	2778.30	3100.81	8.50	0.900	0.71	8.99	52.1	61.1	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.90
50.688	13.113	0.211	115.56	Yes	63	0	1.60909	Yes	Yes	-50.69	5898.06	2788.53	3109.53	0.58	0.107	2788.53	3109.53	8.78	0.896	0.71	9.29	51.8	61.1	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.90
50.852	13.604	0.207	115.56	Yes	61	0	1.521611	Yes	Yes	-50.85	5917.01	2798.76	3118.24	0.58	0.107	2798.76	3118.24	9.10	0.892	0.71	9.63	51.4	61.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.90
51.016	13.181	0.202	115.56	Yes	62	0	1.532509	Yes	Yes	-51.02	5935.96	2809.00	3126.96	0.58	0.106	2809.00	3126.96	8.78	0.896	0.70	9.29	51.6	60.9	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.90
51.18	12.614	0.187	115.56	Yes	63	0	1.48248	Yes	Yes	-51.18	5954.91	2819.23	3135.68	0.57	0.106	2819.23	3135.68	8.36	0.902	0.70	8.85	51.8	60.7	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.90
51.345	12.622	0.184	115.56	Yes	63	0	1.457772	Yes	Yes	-51.35	5973.98	2829.53	3144.45	0.57	0.106	2829.53	3144.45	8.35	0.902	0.70	8.83	51.8	60.6	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.90
51.509	12.493	0.185	115.56	Yes	64	0	1.480829	Yes	Yes	-51.51	5992.93	2839.76	3153.17	0.57	0.106	2839.76	3153.17	8.23	0.904	0.70	8.71	51.9	60.6	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.90
51.673	13.089	0.185	115.56	Yes	62	0	1.413401	Yes	Yes	-51.67	6011.88	2850.00	3161.89	0.57	0.106	2850.00	3161.89	8.62	0.898	0.70	9.12	51.5	60.6	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.90
51.837	14.1	0.186	115.56	Yes	58	0	1.319149	Yes	Yes	-51.84	6030.84	2860.23	3170.61	0.57	0.105	2860.23	3170.61	9.30	0.889	0.70	9.84	50.8	60.7	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.90
52.001	13.576	0.177	115.56	Yes	59	0	1.303771	Yes	Yes	-52.00	6049.79	2870.46	3179.33	0.57	0.105	2870.46	3179.33	8.92	0.894	0.69	9.43	51.0	60.5	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.90
52.165	12.254	0.19	115.56	Yes	66	0	1.550514	Yes	Yes	-52.17	6068.74	2880.70	3188.04	0.57	0.105	2880.70	3188.04	7.99	0.907	0.69	8.45	52.2	60.7	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.91
52.329	11.393	0.164	115.56	Yes	68	0	1.43948	Yes	Yes	-52.33	6087.69	2890.93	3196.76	0.56	0.105	2890.93	3196.76	7.38	0.916	0.69	7.81	52.4	60.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.90
52.493	8.59	0.146	115.56	Yes	86	0	1.699651	Yes	Yes	-52.49	6106.64	2901.16	3205.48	0.56	0.105	2901.16	3205.48	5.48	0.948	0.67	5.79	54.3	60.1	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.90
52.657	6.293	0.14	115.56	Yes	100	0	2.224694	Yes	Yes	-52.66	6125.59	2911.40	3214.20	0.56	0.105	2911.40	3214.20	3.95	0.980	0.66	4.18	55.2	59.3	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.90
52.821	4.343	0.12	112.35	Yes	100	0	2.763067	Yes	Yes	-52.82	6144.02	2921.63	3222.39	0.56	0.104	2921.63	3222.39	2.68	1.015	0.65	2.83	54.8	57.6	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.89
52.985	3.335	0.097	112.35	Yes	100	0	2.908546	Yes	Yes	-52.99	6162.45	2931.86	3230.58	0.56	0.104	2931.86	3230.58	2.03	1.038	0.64	2.15	54.6	56.7	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.88
53.149	3.442	0.069	112.35	Yes	100	0	2.004648	Yes	Yes	-53.15	6180.87	2942.10	3238.77	0.56	0.104	2942.10	3238.77	2.09	1.035	0.64	2.22	54.6	56.8	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.89
53.313	6.887	0.085	112.35	Yes	100	0	1.234209	Yes	Yes	-53.31	6199.30	2952.33	3246.97	0.56	0.104	2952.33	3246.97	4.29	0.972	0.66	4.54	55.3	59.8	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.91
53.477	8.118	0.104	115.56	Yes	85	0	1.281104	Yes	Yes	-53.48	6218.25	2962.56	3255.68	0.56	0.104	2962.56	3255.68	5.08	0.956	0.66	5.38	54.1	59.5	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.91
53.641	7.535	0.096	115.56	Yes	90	0	1.274054	Yes	Yes	-53.64	6237.20	2972.80	3264.40	0.55	0.103	2972.80	3264.40	4.69	0.964	0.66	4.96	54.6	59.5	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.91
53.805	7.239	0.112	115.56	Yes	97	0	1.547175	Yes	Yes	-53.81	6256.15	2983.03	3273.12	0.55	0.103	2983.03	3273.12	4.49	0.968	0.66	4.75	55.1	59.8	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.91
53.969	6.746	0.113	115.56	Yes	100	0	1.675067	Yes	Yes	-53.97	6275.10	2993.27	3281.84	0.55	0.103	2993.27	3281.84	4.16	0.975	0.65	4.40	55.2	59.6	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.91
54.133	5.587	0.093	115.56	Yes	100	0	1.664578	Yes	Yes	-54.13	6294.06	3003.50	3290.56	0.55	0.103	3003.50	3290.56	3.40	0.994	0.64	3.60	55.0	58.6	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.91
54.297	3.957	0.068	112.35	Yes	100	0	1.718474	Yes	Yes	-54.30	6312.48	3013.73	3298.75	0.55	0.103	3013.73	3298.75	2.37	1.025	0.63	2.51	54.7	57.2	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.088	0.90
54.461	3.929	0.053	112.35	Yes	100	0	1.348944	Yes	Yes	-54.46	6330.91	3023.97	3306.94	0.55	0.102	3023.97	3306.94	2.35	1.026	0.63	2.48	54.7	57.1	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.90
54.625	4.254	0.032	112.35	Yes	100	0	0.752233	Yes	Yes	-54.63	6349.33	3034.20	3315.13	0.55	0.102	3034.20	3315.13	2.54	1.019	0.63	2.69	54.7	57.4	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.088	0.90
54.789	4.914	0.028	112.35	Yes	100	0	0.569801	Yes	Yes	-54.79	6367.76	3044.43	3323.32	0.55	0.102	3044.43	3323.32	2.95	1.007	0.63	3.12	54.8	58.0	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.91

CPT Liquefaction Analysis

54.953	4.127	0.04	112.35	Yes	100	0	0.969227	Yes	Yes	-54.95	6386.18	3054.67	3331.52	0.55	0.102	3054.67	3331.52	2.45	1.022	0.63	2.59	54.7	57.3	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.088	0.90
55.117	3.034	0.036	112.35	Yes	100	0	1.186552	Yes	Yes	-55.12	6404.61	3064.90	3339.71	0.54	0.102	3064.90	3339.71	1.78	1.048	0.62	1.88	54.5	56.4	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.90
55.281	2.899	0.018	112.35	Yes	100	0	0.620904	Yes	Yes	-55.28	6423.03	3075.13	3347.90	0.54	0.102	3075.13	3347.90	1.69	1.052	0.62	1.79	54.5	56.2	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.086	0.90
55.446	3.304	0.01	112.35	Yes	100	0	0.302663	Yes	Yes	-55.45	6441.57	3085.43	3356.14	0.54	0.101	3085.43	3356.14	1.93	1.042	0.62	2.04	54.5	56.6	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.90
55.61	4.372	0.031	112.35	Yes	100	0	0.709058	Yes	Yes	-55.61	6460.00	3095.66	3364.33	0.54	0.101	3095.66	3364.33	2.58	1.018	0.62	2.73	54.7	57.5	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.91
55.774	5.175	0.069	112.35	Yes	100	0	1.333333	Yes	Yes	-55.77	6478.42	3105.90	3372.52	0.54	0.101	3105.90	3372.52	3.06	1.003	0.63	3.24	54.9	58.1	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.91
55.938	6.251	0.094	115.56	Yes	100	0	1.503759	Yes	Yes	-55.94	6497.37	3116.13	3381.24	0.54	0.101	3116.13	3381.24	3.72	0.986	0.63	3.94	55.1	59.0	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.92
56.102	4.718	0.098	115.56	Yes	100	0	2.077151	Yes	Yes	-56.10	6516.33	3126.36	3389.96	0.54	0.101	3126.36	3389.96	2.77	1.012	0.62	2.93	54.8	57.7	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.91
56.266	5.223	0.113	115.56	Yes	100	0	2.163508	Yes	Yes	-56.27	6535.28	3136.60	3398.68	0.54	0.100	3136.60	3398.68	3.07	1.003	0.62	3.25	54.9	58.1	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.92
56.43	5.418	0.142	112.35	Yes	100	0	2.620893	Yes	Yes	-56.43	6553.70	3146.83	3406.87	0.53	0.100	3146.83	3406.87	3.18	1.000	0.62	3.37	54.9	58.3	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.92
56.594	6.293	0.167	115.56	Yes	100	0	2.653742	Yes	Yes	-56.59	6572.65	3157.07	3415.59	0.53	0.100	3157.07	3415.59	3.71	0.986	0.62	3.92	55.1	59.0	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.93
56.758	6.801	0.168	115.56	Yes	100	0	2.470225	Yes	Yes	-56.76	6591.61	3167.30	3424.31	0.53	0.100	3167.30	3424.31	4.01	0.979	0.62	4.25	55.2	59.4	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.93
56.922	6.038	0.145	115.56	Yes	100	0	2.401457	Yes	Yes	-56.92	6610.56	3177.53	3433.03	0.53	0.100	3177.53	3433.03	3.53	0.991	0.62	3.74	55.0	58.8	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.93
57.086	5.362	0.12	115.56	Yes	100	0	2.237971	Yes	Yes	-57.09	6629.51	3187.77	3441.74	0.53	0.100	3187.77	3441.74	3.11	1.002	0.61	3.29	54.9	58.2	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.92
57.25	5.142	0.104	115.56	Yes	100	0	2.022559	Yes	Yes	-57.25	6648.46	3198.00	3450.46	0.53	0.099	3198.00	3450.46	2.97	1.006	0.61	3.14	54.9	58.0	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.089	0.92
57.414	6.167	0.119	115.56	Yes	100	0	1.929625	Yes	Yes	-57.41	6667.41	3208.23	3459.18	0.53	0.099	3208.23	3459.18	3.58	0.989	0.61	3.79	55.0	58.8	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.93
57.578	7.084	0.134	115.56	Yes	100	0	1.891587	Yes	Yes	-57.58	6686.37	3218.47	3467.90	0.53	0.099	3218.47	3467.90	4.13	0.976	0.62	4.37	55.2	59.6	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.94
57.742	9.001	0.145	115.56	Yes	87	0	1.610932	Yes	Yes	-57.74	6705.32	3228.70	3476.62	0.53	0.099	3228.70	3476.62	5.31	0.951	0.62	5.61	54.4	60.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.94
57.906	8.05	0.145	115.56	Yes	97	0	1.801242	Yes	Yes	-57.91	6724.27	3238.93	3485.34	0.52	0.099	3238.93	3485.34	4.70	0.963	0.62	4.98	55.2	60.1	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.94
58.07	6.608	0.146	115.56	Yes	100	0	2.209443	Yes	Yes	-58.07	6743.22	3249.17	3494.05	0.52	0.098	3249.17	3494.05	3.81	0.983	0.61	4.04	55.1	59.2	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.94
58.234	6.761	0.144	115.56	Yes	100	0	2.129862	Yes	Yes	-58.23	6762.17	3259.40	3502.77	0.52	0.098	3259.40	3502.77	3.90	0.981	0.61	4.12	55.1	59.3	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.94
58.398	7.423	0.164	115.56	Yes	100	0	2.209349	Yes	Yes	-58.40	6781.12	3269.64	3511.49	0.52	0.098	3269.64	3511.49	4.29	0.972	0.61	4.54	55.3	59.8	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.95
58.562	7.101	0.145	115.56	Yes	100	0	2.041966	Yes	Yes	-58.56	6800.08	3279.87	3520.21	0.52	0.098	3279.87	3520.21	4.08	0.977	0.61	4.32	55.2	59.5	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.94
58.726	6.633	0.142	115.56	Yes	100	0	2.140811	Yes	Yes	-58.73	6819.03	3290.10	3528.93	0.52	0.098	3290.10	3528.93	3.79	0.984	0.60	4.01	55.1	59.1	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.94
58.89	6.174	0.162	115.56	Yes	100	0	2.623907	Yes	Yes	-58.89	6837.98	3300.34	3537.64	0.52	0.098	3300.34	3537.64	3.51	0.991	0.60	3.71	55.0	58.7	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.94
59.054	4.734	0.141	112.35	Yes	100	0	2.978454	Yes	Yes	-59.05	6856.41	3310.57	3545.84	0.52	0.097	3310.57	3545.84	2.65	1.016	0.59	2.80	54.8	57.6	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.93
59.218	6.27	0.12	115.56	Yes	100	0	1.913876	Yes	Yes	-59.22	6875.36	3320.80	3554.55	0.52	0.097	3320.80	3554.55	3.55	0.990	0.60	3.75	55.0	58.8	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.94
59.382	5.731	0.11	115.56	Yes	100	0	1.919386	Yes	Yes	-59.38	6894.31	3331.04	3563.27	0.51	0.097	3331.04	3563.27	3.22	0.999	0.59	3.41	54.9	58.3	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.94
59.547	5.133	0.089	112.35	Yes	100	0	1.733879	Yes	Yes	-59.55	6912.85	3341.33	3571.51	0.51	0.097	3341.33	3571.51	2.86	1.009	0.59	3.03	54.8	57.8	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.94
59.711	4.727	0.078	112.35	Yes	100	0	1.650095	Yes	Yes	-59.71	6931.27	3351.57	3579.71	0.51	0.097	3351.57	3579.71	2.62	1.017	0.59	2.77	54.7	57.5	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.94
59.875	5.173	0.093	115.56	Yes	100	0	1.797796	Yes	Yes	-59.88	6950.22	3361.80	3588.42	0.51	0.096	3361.80	3588.42	2.87	1.009	0.59	3.04	54.8	57.9	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.94
60.039	5.125	0.092	115.56	Yes	100	0	1.795122	Yes	Yes	-60.04	6969.18	3372.03	3597.14	0.51	0.096	3372.03	3597.14	2.83	1.010	0.59	3.00	54.8	57.8	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.94
60.203	5.729	0.116	115.56	Yes	100	0	2.024786	Yes	Yes	-60.20	6988.13	3382.27	3605.86	0.51	0.096	3382.27	3605.86	3.18	1.000	0.59	3.36	54.9	58.3	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.95
60.367	5.826	0.119	115.56	Yes	100	0	2.042568	Yes	Yes	-60.37	7007.08	3392.50	3614.58	0.51	0.096	3392.50	3614.58	3.23	0.999	0.59	3.41	54.9	58.3	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.95
60.531	6.394	0.146	115.56	Yes	100	0	2.283391	Yes	Yes	-60.53	7026.03	3402.73	3623.30	0.51	0.096	3402.73	3623.30	3.55	0.990	0.59	3.75	55.0	58.8	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.95
60.695	5.658	0.131	115.56	Yes	100	0	2.315306	Yes	Yes	-60.70	7044.98	3412.97	3632.02	0.51	0.096	3412.97	3632.02	3.11	1.002	0.58	3.29	54.9	58.2	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.95
60.859	5.746	0.238	112.35	Yes	100	0	4.142012	Yes	Yes	-60.86	7063.41	3423.20	3640.21	0.50	0.095	3423.20	3640.21	3.16	1.001	0.58	3.34	54.9	58.3	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.95
61.023	6.153	0.276	112.35	Yes	100	0	4.485617	Yes	Yes	-61.02	7081.83	3433.44	3648.40	0.50	0.095	3433.44	3648.40	3.38	0.994	0.58	3.58	55.0	58.6	0.098	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.96
61.187	10.22	0.33	115.56	Yes	97	0	3.228963	Yes	Yes	-61.19	7100.79	3443.67	3657.12	0.50	0.095	3443.67	3657.12	5.77	0.943	0.60	6.10	55.4	61.6	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.98
61.351	9.635	0.276	115.56	Yes	98	0	2.864556	Yes	Yes	-61.35	7119.74	3453.90	3665.84	0.50	0.095	3453.90	3665.84	5.41	0.949	0.59	5.72	55.4	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.98
61.515	8.25	0.23	115.56	Yes	100	0	2.787879	Yes	Yes	-61.52	7138.69	3464.14	3674.55	0.50	0.095	3464.14	3674.55	4.58	0.966	0.59	4.84	55.4	60.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.97
61.679	8.428	0.154	115.56	Yes	98	0	1.827243	Yes	Yes	-61.68	7157.64	3474.37	3683.27	0.50	0.095	3474.37	3683.27	4.67	0.964	0.59	4.94	55.3	60.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.97
61.843	9.354	0.144	115.56	Yes	88	0	1.539448	Yes	Yes	-61.84	7176.59	3484.60	3691.99	0.50	0.094	3484.60	3691.99	5.20	0.953	0.59	5.50	54.5	60.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.97
62.007	10.021	0.137	115.56	Yes	82	0	1.367129	Yes	Yes	-62.01	7195.55	3494.84	3700.71	0.50	0.094	3494.84	3700.71	5.58	0.946	0.59	5.91	53.9	59.8	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.97
62.171	9.116	0.107	115.56	Yes	85	0	1.17376	Yes	Yes	-62.17	7214.50	3505.07	3709.43	0.50	0.094	3505.07	3709.43	5.04	0.956	0.58	5.33	54.1	59.5	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.97
62.335	8.443	0.105	115.56	Yes	92	0	1.243634	Yes	Yes	-62.34	7233.45	3515.30	3718.15	0.49	0.094	3515.30	3718.15	4.63	0.965	0.58	4.90	54.7	59.6	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.97
62.499	8.602	0.107	115.56	Yes	91	0	1.243897	Yes	Yes	-62.50	7252.40	3525.54	3726.86	0.49	0.094	3525.54	3726.86	4.71	0.963	0.58	4.99	54.6	59.6	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.98
62.663	9.036	0.086	115.56	Yes	83	0	0.951749	Yes	Yes	-62.66	7271.35	3535.77	3735.58	0.49	0.094	3535.77	3735.58	4.95	0.958	0.58	5.24	53.8	59.1	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.97
62.827	8.789	0.079	115.56	Yes	84	0	0.898851	Yes	Yes	-62.83	7290.30	3546.00	3744.30	0.49	0.093	3546.00	3744.30	4.80	0.961	0.58	5.08	53.9	59.0	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.97
62.991	8.854	0.04	112.35	Yes	84	0	0.451773	Yes	Yes	-62.99	7308.73	3556.24	3752.49	0.49	0.093	3556.24	3752.49	4.83	0.961	0.58	5.11	53.9	59.0	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.97
63.155	19.127	0.203	115.56	Yes	51	0	1.061327	Yes	Yes	-63.16	7327.68	3566.47	3761.21	0.49	0.093	3566.47	3761.21	10.96	0.869	0.61	11.60	49.1	60.7	0.100	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.99
63.319	23.973	0.224	118.77	Yes	43	0	0.934385	Yes	Yes	-63.32	7347.16	3576.71	3770.45	0.49	0.093	3576.71	3770.45	13.96	0.839	0.62	14.77	46.6	61.4	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.99
63.483	77.246	0.537	121.98	Yes	14	0	0.695182	Yes	Yes	-63.48	7367.17	3586.94	3780.23	0.49	0.093	3586.94	3780.23	50.45	0.637	0.69	53.38	16.4	69.7	0.107	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	1.06
63.648	92.056	0	119.669	Yes	14	0	0	Yes	Yes	-63.65	7386.91	3597.24	3789.68	0.49	0.093	3597.24	3789.68	61.34	0.600	0.71	64.90	17.2	82.1	0.118	0.08	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.185	1.132	1.19
63.812	169.438	0	119.669	Yes	14	0	0	Yes	Yes	-63.81	7406.54	3607.47	3799.07	0.49	0.092	3607.47	3799.07	123.00	0.451	0.77	130.13	21.7	151.8	0.301	0.13	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.690	1.494	3.88
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
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							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
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							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
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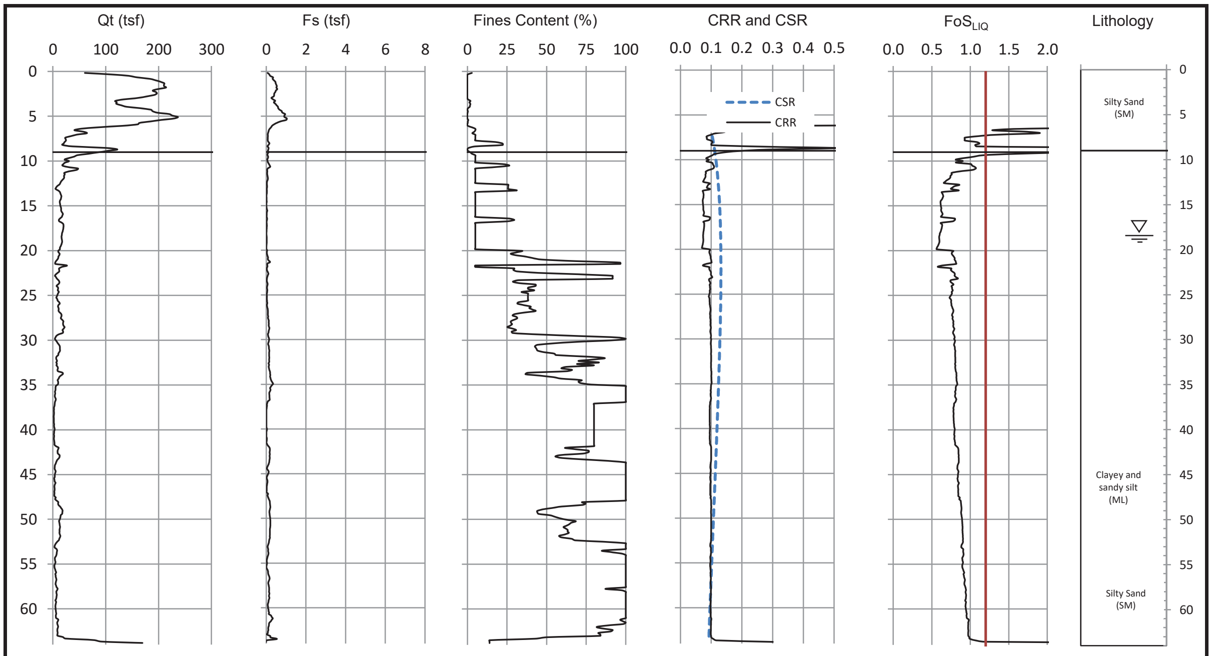
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		
							#DIV/0!	No	No	0.00	7406.54		7406.54				7406.54																		

CPT Liquefaction Analysis



Earthquake Magnitude, M = 5.77

Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2014),
CPT and SPT Based Liquefaction
Triggering Procedures,
UCD/CGM-14/01

Project: Plant Scherer GA EPD Closure	Sounding ECP05A Avg.
Project Number: 60563110	Date: 1/23/2018
	AECOM

CPT Liquefaction Analysis

Method: Idriss and Boulanger (2014), CPT and SPT Based Liquefaction Triggering Procedures

Title: Liquefaction Analysis
Project: Plant Scherer
Project No.: 60563110

Date: 1/24/2018
Boring No. CP-110

Input Parameters:
Peak ground acceleration, pga (g): 0.15
Earthquake Magnitude (M): 4.9
Water Table Depth at the time of drilling 3 ft
Water Table Depth at the time of earthquake 3 ft
Ground Surface Elevation 0 ft

Notes:
1. Sand-like behavior = "Yes", Clay-like behavior = "No" (See Idriss and Boulanger, 2014).
2. Make sure to turn on iterative calculations.
3. User to confirm highlighted values are reasonable.

												At the time of earthquake				At the time of drilling																			
Depth	Qt	Fs	Unit Weight	Liquefiable?[1]	FC	α (From static stress analysis)	Fs/Qt	Below Water Table?	Liquefaction Calculation Needed?	Sample Elev.	Total stress	Pore Pressure	Effective stress	Stress reduction coeff, r_d	CSR	Pore Pressure	Effective stress	qc1n	m	Cn	qc1	Delta qc1ncs	qc1ncs	CRR_{cpt}[3]	C_σ	K_σ	Assg. α	State Para	Para a	Para b	Para c	Kα	MSF_{max}	MSF	IB FSL
(ft)	(TSF)	(TSF)	(pcf)	(Yes/No)			(%)			(ft)	(psf)	(psf)	(psf)			(psf)	(psf)				(TSF)														
0.164	3.044	0.01	112.35	Yes	5	0	0.328515	No	No	-0.16	0.00		0.00				0.00																		
0.328	13.437	0.028	115.56	Yes	5	0	0.20838	No	No	-0.33	18.95		18.95				18.95																		
0.492	43.97	0.036	121.98	Yes	5	0	0.081874	No	No	-0.49	38.96		38.96				38.96																		
0.656	79.569	0.081	125.19	Yes	1	0	0.101798	No	No	-0.66	59.49		59.49				59.49																		
0.82	94.817	0.136	125.19	Yes	1	0	0.143434	No	No	-0.82	80.02		80.02				80.02																		
0.984	111.187	0.154	125.19	Yes	0	0	0.138505	No	No	-0.98	100.55		100.55				100.55																		
1.148	117.484	0.18	125.19	Yes	0	0	0.153212	No	No	-1.15	121.08		121.08				121.08																		
1.312	122.877	0.361	125.19	Yes	1	0	0.29379	No	No	-1.31	141.61		141.61				141.61																		
1.476	135.139	0.339	125.19	Yes	0	0	0.250853	No	No	-1.48	162.14		162.14				162.14																		
1.64	142.23	0.328	125.19	Yes	0	0	0.230612	No	No	-1.64	182.67		182.67				182.67																		
1.804	148.413	0.351	125.19	Yes	0	0	0.236502	No	No	-1.80	203.21		203.21				203.21																		
1.968	123.038	0.255	125.19	Yes	0	0	0.207253	No	No	-1.97	223.74		223.74				223.74																		
2.133	122.828	0.258	125.19	Yes	0	0	0.21005	No	No	-2.13	244.39		244.39				244.39																		
2.297	111.836	0.223	125.19	Yes	1	0	0.199399	No	No	-2.30	264.92		264.92				264.92																		
2.461	88.819	0.258	125.19	Yes	3	0	0.290478	No	No	-2.46	285.46		285.46				285.46																		
2.625	91.975	0.207	125.19	Yes	2	0	0.225061	No	No	-2.63	305.99		305.99				305.99																		
2.789	120.207	0.24	125.19	Yes	0	0	0.199656	No	No	-2.79	326.52		326.52				326.52																		
2.953	142.004	0.335	125.19	Yes	0	0	0.235909	No	No	-2.95	347.05		347.05				347.05																		
3.117	135.338	0.157	125.19	Yes	0	0	0.116006	Yes	Yes	-3.12	367.58	7.30	360.28	0.99	0.099	7.30	360.28	217.46	0.307	1.70	230.07	0.0	230.1	3.724576	0.30	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	77.08
3.281	143.282	0.448	125.19	Yes	1	0	0.31267	Yes	Yes	-3.28	388.11	17.53	370.58	0.99	0.101	17.53	370.58	226.67	0.296	1.67	239.81	0.0	239.8	3.724576	0.30	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	75.15
3.445	139.02	0.231	125.19	Yes	0	0	0.166163	Yes	Yes	-3.45	408.64	27.77	380.87	0.99	0.103	27.77	380.87	220.84	0.303	1.68	233.65	0.0	233.6	3.724576	0.30	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	73.42
3.609	193.113	0.224	125.19	Yes	0	0	0.115994	Yes	Yes	-3.61	429.17	38.00	391.17	0.99	0.106	38.00	391.17	274.46	0.242	1.50	290.38	0.0	290.4	3.724576	0.30	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	71.86
3.773	226.467	0.289	128.4	Yes	0	0	0.127612	Yes	Yes	-3.77	450.23	48.24	402.00	0.99	0.108	48.24	402.00	304.14	0.212	1.42	321.78	0.0	321.8	3.724576	0.30	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	70.46
3.937	230.42	0.406	128.4	Yes	0	0	0.1762	Yes	Yes	-3.94	471.29	58.47	412.82	0.99	0.110	58.47	412.82	306.54	0.209	1.41	324.32	0.0	324.3	3.724576	0.30	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	69.18
4.101	194.981	0.322	125.19	Yes	0	0	0.165144	Yes	Yes	-4.10	491.82	68.70	423.12	0.98	0.112	68.70	423.12	272.71	0.243	1.48	288.53	0.0	288.5	3.724576	0.30	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	68.00
4.265	153.827	0.149	125.19	Yes	0	0	0.096862	Yes	Yes	-4.27	512.35	78.94	433.42	0.98	0.113	78.94	433.42	230.60	0.291	1.59	243.97	0.0	244.0	3.724576	0.30	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	66.92
4.429	106.297	0.131	125.19	Yes	0	0	0.12324	Yes	Yes	-4.43	532.88	89.17	443.71	0.98	0.115	89.17	443.71	170.80	0.371	1.70	180.70	0.0	180.7	0.746975	0.19	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.102	1.790	12.72
4.593	93.473	0.123	125.19	Yes	1	0	0.131589	Yes	Yes	-4.59	553.41	99.40	454.01	0.98	0.117	99.40	454.01	150.19	0.403	1.70	158.90	0.0	158.9	0.360	0.16	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.778	1.558	5.27
4.757	89.25	0.188	125.19	Yes	2	0	0.210644	Yes	Yes	-4.76	573.94	109.64	464.31	0.98	0.118	109.64	464.31	143.41	0.414	1.70	151.73	0.0	151.7	0.300	0.15	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.689	1.494	4.16
4.921	86.941	0.135	125.19	Yes	1	0	0.155278	Yes	Yes	-4.92	594.48	119.87	474.61	0.98	0.120	119.87	474.61	139.70	0.421	1.70	147.80	0.0	147.8	0.275	0.15	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.644	1.461	3.67
5.085	81.937	0.157	125.19	Yes	2	0	0.191611	Yes	Yes	-5.09	615.01	130.10	484.90	0.98	0.121	130.10	484.90	131.66	0.435	1.70	139.29	0.0	139.3	0.231	0.14	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.553	1.397	2.92
5.249	75.253	0.135	121.98	Yes	2	0	0.179395	Yes	Yes	-5.25	635.01	140.34	494.67	0.98	0.122	140.34	494.67	120.92	0.455	1.70	127.93	0.0	127.9	0.191	0.13	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.449	1.322	2.26
5.413	61.301	0.118	121.98	Yes	4	0	0.192493	Yes	Yes	-5.41	655.02	150.57	504.45	0.98	0.124	150.57	504.45	98.50	0.502	1.70	104.21	0.0	104.2	0.143	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.284	1.204	1.52
5.577	58.136	0.034	121.98	Yes	3	0	0.058484	Yes	Yes	-5.58	675.02	160.80	514.22	0.97	0.125	160.80	514.22	93.41	0.513	1.70	98.83	0.0	98.8	0.136	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.256	1.183	1.41
5.741	75.486	0.018	125.19	Yes	2	0	0.023845	Yes	Yes	-5.74	695.55	171.04	524.51	0.97	0.126	171.04	524.51	121.29	0.454	1.70	128.33	0.0	128.3	0.192	0.13	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.452	1.324	2.21
5.905	78.282	0.039	125.19	Yes	1	0	0.04982	Yes	Yes	-5.91	716.08	181.27	534.81	0.97	0.127	181.27	534.81	125.78	0.446	1.70	133.08	0.0	133.1	0.207	0.13	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.494	1.354	2.42
6.069	47.646	0.073	121.98	Yes	5	0	0.153213	Yes	Yes	-6.07	736.09	191.51	544.58	0.97	0.128	191.51	544.58	76.56	0.555	1.70	81.00	0.1	81.1	0.117	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.182	1.130	1.13
6.234	52.04	0.136	121.98	Yes	5	0	0.261337	Yes	Yes	-6.23	756.22	201.80	554.41	0.97	0.129	201.80	554.41	83.62	0.537	1.70	88.47	0.1	88.6	0.124	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.209	1.150	1.21
6.398	41.287	0.097	121.98	Yes	5	0	0.234941	Yes	Yes	-6.40	776.22	212.04	564.18	0.97	0.130	212.04	564.18	66.34	0.584	1.70	70.19	0.1	70.3	0.108	0.08	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.107	1.00
6.562	39.432	0.221	118.77	Yes	11	0	0.560459	Yes	Yes	-6.56	795.70	222.27	573.43	0.97	0.131	222.27	573.43	63.36	0.593	1.70	67.03	9.2	76.3	0.112	0.08	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	1.05
6.726	35.807	0.245	118.77	Yes	13	0	0.684224	Yes	Yes	-6.73	815.18	232.50	582.67	0.97	0.132	232.50	582.67	57.53	0.612	1.70	60.87	14.5	75.4	0.112	0.08	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.164	1.117	1.03
6.89	31.552	0.344	118.77	Yes	18	0	1.090264	Yes	Yes	-6.89	834.65	242.74	591.92	0.97	0.133	242.74	591.92	50.70	0.636	1.70	53.64	25.8	79.4	0.115	0.07	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.176	1.126	1.06
7.054	39.595	0.167	121.98	Yes	5	0	0.42177	Yes	Yes	-7.05	854.66	252.97	601.69	0.96	0.134	252.97	601.69	63.62	0.593	1.70	67.31	0.1	67.4	0.105	0.08	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.102	0.95
7.218	55.913	0.083	121.98	Yes	4	0	0.148445	Yes	Yes	-7.22	874.66	263.20	611.46	0.96	0.134	263.20	611.46	89.84	0.522	1.70	95.05	0.0	95.1	0.131	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.237	1.170	1.25
7.382	45.766	0.039	121.98	Yes	4	0	0.085216	Yes	Yes	-7.38	894.67	273.44	621.23	0.96	0.135	273.44	621.23	73.54	0.564	1.70	77.80	0.1	77.9	0.114	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	1.03
7.546	32.344	0.058	118.77	Yes	5	0	0.179322	Yes	Yes	-7.55	914.15	283.67	630.48	0.96	0.136	283.67	630.48	51.97	0.631	1.70	54.98	0.1	55.1	0.096	0.07	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.83
7.71	30.706	0.111	118.77	Yes	5	0	0.361493	Yes	Yes	-7.71	933.63	293.90	639.72	0.96	0.137	293.90	639.72	49.34	0.641	1.70	52.20	0.1	52.3	0.094	0.07	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.115	1.082	0.80
7.874	29.517	0.208	118.77	Yes	15	0	0.704679	Yes	Yes	-7.87	953.10	304.14	648.97	0.96	0.137	304.14	648.97	47.43	0.648	1.70	50.18	19.6	69.8	0.107	0.07	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	0.93
8.038	35.001	0.263	118.77	Yes	14	0	0.751407	Yes	Yes	-8.04	972.58	314.37	658.21	0.96	0.138	314.37	658.21	56.24	0.617	1.70	59.50	16.7	76.2	0.112	0.07	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	0.98
8.202	59.412	0.189	121.98	Yes	5	0	0.318118	Yes	Yes	-8.20	992.59	324.60	667.98	0.96	0.138	324.60	667.98	95.46	0.508	1.70	101.00	0.2	101.2	0.139	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.267	1.192	1.30
8.366	79.304	0.11	125.19	Yes	2	0	0.138707	Yes	Yes	-8.37	1013.12	334.84	678.28	0.95	0.139	334.84	678.28	124.74	0.448	1.66	131.98	0.0	132.0	0.204	0.13	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.484	1.347	2.15
8.53	85.356	0.043	125.19	Yes	1	0	0.050377	Yes	Yes	-8.53	1033.65	345.07	688.58	0.95	0.140	345.07	688.58	131.50	0.435	1.63	139.13	0.0	139.1	0.231	0.14	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.552	1.396	2.51
8.694	83.497	0.108	125.19	Yes	1	0	0.129346	Yes	Yes	-8.69	1054.18	355.31	698.87	0.95	0.140	355.31	698.87	128.57	0.441	1.63	136.03	0.0	136.0	0.218	0.13	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.522	1.374	2.33
8.858	97.316	0.116	125.19	Yes	0	0	0.119199	Yes	Yes	-8.86	1074.71	365.54	709.17	0.95	0.141	365.54	709.17	144.41	0.413	1.57	152.78	0.0	152.8	0.308	0.15	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.702	1.503	3.58
9.022	103.93	0.236	125.19	Yes	1	0	0.227076	Yes	Yes	-9.02	1095.24	375.77	719.47	0.95	0.141	375.77	719.47	151.40	0.401	1.54	160.18	0.0	160.2	0.373	0.16	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.795	1.570	4.52
9.186	95.778	0.333	125.19	Yes	3	0	0.347679	Yes	Yes	-9.19	1115.77	386.01	729.77	0.95	0.141	386.01	729.77	141.26	0.418	1.56	149.45	0.0	149.5	0.285	0.15	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.662	1.475	3.23
9.35	76.549	0.433	121.98	Yes	6	0	0.565651	Yes	Yes	-9.35	1135.78	396.24	739.54	0.95	0.142	396.24	739.54	117.54	0.462	1.62	124.36	0.6	125.0	0.183	0.12	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.425	1.304	1.83
9.514	60.004	0.268	121.98	Yes	5	0	0.446637	Yes	Yes	-9.51	1155.78	406.47	749.31	0.95	0.142	406.47	749.31	96.01	0.507	1.69	101.58	0.2	101.7	0.140	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.271	1.194	1.27
9.678	64.493	0.051	121.98	Yes	2	0	0.079078	Yes	Yes	-9.68	1175.79	416.71	759.08	0.94	0.143	416.71	759.08	101.29	0.495	1.66	107.16	0.0	107.2	0.147	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.301	1.216	1.36
9.842	55.262	0.034	121.98	Yes	3	0	0.061525	Yes	Yes	-9.84	1195.79	426.94	768.85	0.94	0.143	426.94	768.85	88.79	0.524	1.70	93.94	0.0	93.9	0.130	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.232	1.166	1.15
10.006	40.687	0.033	121.98	Yes	5	0	0.081107	Yes	Yes	-10.01	1215.80	437.17	778.62	0.94	0.143	437.17	778.62	65.38	0.587	1.70	69.17	0.1	69.3	0.107	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	0.88
10.17	34.38	0.041	121.98	Yes	5	0	0.119255	Yes	Yes	-10.17	1235.80	447.41	788.39	0.94	0.144	447.41	788.39	55.24	0.620	1.70	58.45	0.1	58.6	0.098	0.07	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.79
10.335	28.939	0.088	118.77	Yes	5	0	0.304088	Yes	Yes	-10.34	1255.40	457.70	797.69	0.94	0.144	457.70	797.69	46.50	0.652	1.70	49.20	0.1	49.3	0.092	0.07	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.111	1.079	0.72
10.499	20.292	0.162	115.56	Yes	22	0	0.798344	Yes	Yes	-10.50	1274.35	467.94	806.41	0.94	0.145	467.94	806.41	32.61	0.713	1.70	34.50	31.0	65.5	0.104	0.06	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.82
10.663	15.45	0.128	115.56	Yes	26	0	0.828479	Yes	Yes	-10.66	1293.30	478.17	815.13	0.94	0.145	478.17	815.13	24.83	0.757	1.70	26.27	36.1	62.4	0.101	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.79
10.827	28.401	0.163	118.77	Yes	15	0	0.573923	Yes	Yes	-10.83	1312.78	488.40	824.38	0.94	0.145	488.40	824.38	45.63	0.655	1.70	48.28	19.3	67.6	0.105	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.103	0.84
10.991	28.125	0.166	118.77	Yes	16	0	0.590222	Yes	Yes	-10.99	1332.26	498.64	833.62	0.93	0.146	498.64	833.62	45.19	0.657	1.70	47.81	20.1	68.0	0.106	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.84
11.155	37.966	0.048	121.98	Yes	5	0	0.126429	Yes	Yes	-11.16	1352.26	508.87	843.39	0.93	0.146	508.87	843.39	61.00	0.601	1.70	64.54	0.1	64.7	0.103	0.08	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.82
11.319	43.929	0.055	121.98	Yes	5	0	0.125202	Yes	Yes	-11.32	1372.27	519.11	853.16	0.93	0.146	519.11	853.16	69.93	0.574	1.68	73.98	0.1	74.1	0.111	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.160	1.115	0.89
11.483	34.46	0.059	121.98	Yes	5	0	0.171213	Yes	Yes	-11.48	1392.27	529.34	862.93	0.93	0.146	529.34	862.93	55.37	0.620	1.70	58.58	0.1	58.7	0.099	0.07	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.77
11.647	28.434	0.058	118.77	Yes	5	0	0.203981	Yes	Yes	-11.65	1411.75	539.57	872.18	0.93	0.147	539.57	872.18	45.69	0.655	1.70	48.34	0.1	48.5	0.091	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.110	1.079	0.70
11.811	32.263	0.049	118.77	Yes	5	0	0.151877	Yes	Yes	-11.81	1431.23	549.81	881.42	0.93	0.147	549.81	881.42	51.84	0.632	1.70	54.85	0.1	55.0	0.096	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.74
11.975	29.151	0.037	118.77	Yes	5	0	0.126925	Yes	Yes	-11.98	1450.71	560.04	890.67	0.93	0.147	560.04	890.67	46.84	0.651	1.70	49.56	0.1	49.7	0.092	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.111	1.080	0.70
12.139	26.056	0.031	118.77	Yes	5	0	0.118975	Yes	Yes	-12.14	1470.19	570.27	899.91	0.92	0.147	570.27	899.91	41.87	0.671	1.70	44.30	0.1	44.4	0.088	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.105	1.075	0.67
12.303	23.068	0.017	118.77	Yes	5	0	0.073695	Yes	Yes	-12.30	1489.66	580.51	909.16	0.92	0.148	580.51	909.16	37.07	0.692	1.70	39.22	0.1	39.3	0.085	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.100	1.072	0.64
12.467	20.528	0.042	118.77	Yes	5	0	0.204599	Yes	Yes	-12.47	1509.14	590.74	918.40	0.92	0.148	590.74	918.40	32.98	0.711	1.70	34.90	0.1	35.0	0.082	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.097	1.070	0.61
12.631	22.123	0.077	118.77	Yes	5	0	0.348054	Yes	Yes	-12.63	1528.62	600.97	927.65	0.92	0.148	600.97	927.65	35.55	0.699	1.70	37.61	0.1	37.7	0.084	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.099	1.071	0.63
12.795	26.017	0.245	118.77	Yes	21	0	0.941692	Yes	Yes	-12.80	1548.10	611.21	936.89	0.92	0.148	611.21	936.89	41.80	0.671	1.70	44.23	30.6	74.8	0.111	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.162	1.116	0.87
12.959	35.551	0.288	118.77	Yes	16	0	0.810104	Yes	Yes	-12.96	1567.58	621.44	946.14	0.92	0.148	621.44	946.14	55.33	0.620	1.65	58.54	21.5	80.0	0.116	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.178	1.128	0.92
13.123	53.82	0.483	121.98	Yes	12	0	0.897436	Yes	Yes	-13.12	1587.58	631.68	955.91	0.92	0.148	631.68	955.91	78.72	0.550	1.55	83.29	13.6	96.9	0.133	0.09	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.246	1.177	1.11
13.287	53.323	0.596	118.77	Yes	14	0	1.117717	Yes	Yes	-13.29	1607.06	641.91	965.15	0.92	0.149	641.91	965.15	77.74	0.552	1.54	82.25	18.6	100.9	0.138	0.09	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.266	1.191	1.16
13.451	39.22	0.648	118.77	Yes	21	0	1.652218	Yes	Yes	-13.45	1626.54	652.14	974.40	0.91	0.149	652.14	974.40	59.32	0.606	1.60	62.76	33.4	96.1	0.132	0.08	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.242	1.174	1.09
13.615	28.603	0.568	115.56	Yes	27	0	1.985806	Yes	Yes	-13.62	1645.49	662.38	983.11	0.91	0.149	662.38	983.11	44.79	0.659	1.66	47.39	40.9	88.3	0.124	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.208	1.149	0.98
13.779	27.686	0.418	115.56	Yes	25	0	1.509788	Yes	Yes	-13.78	1664.44	672.61	991.83	0.91	0.149	672.61	991.83	43.30	0.665	1.65	45.81	37.2	83.1	0.119	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.188	1.135	0.93
13.943	24.828	0.284	115.56	Yes	24	0	1.14387	Yes	Yes	-13.94	1683.39	682.84	1000.55	0.91	0.149	682.84	1000.55	39.12	0.682	1.67	41.39	34.9	76.3	0.112	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	0.87
14.107	23.332	0.193	118.77	Yes	22	0	0.82719	Yes	Yes	-14.11	1702.87	693.08	1009.80	0.91	0.149	693.08	1009.80	36.82	0.693	1.67	38.95	31.5	70.5	0.108	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.108	0.82
14.271	25.357	0.142	118.77	Yes	18	0	0.560003	Yes	Yes	-14.27	1722.35	703.31	1019.04	0.91	0.149	703.31	1019.04	39.42	0.681	1.64	41.71	24.5	66.2	0.104	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.79
14.436	26.755	0.145	118.77	Yes	17	0	0.541955	Yes	Yes	-14.44	1741.95	713.61	1028.34	0.91	0.150	713.61	1028.34	41.12	0.674	1.63	43.51	22.8	66.3	0.104	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.79
14.6	26.579	0.167	118.77	Yes	18	0	0.628316	Yes	Yes	-14.60	1761.43	723.84	1037.59	0.90	0.150	723.84	1037.59	40.66	0.676	1.62	43.02	25.2	68.2	0.106	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.104	0.80
14.764	26.882	0.205	118.77	Yes	19	0	0.762592	Yes	Yes	-14.76	1780.90	734.07	1046.83	0.90	0.150	734.07	1046.83	40.86	0.675	1.61	43.23	27.8	71.1	0.108	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.152	1.109	0.82
14.928	25.614	0.193	118.77	Yes	20	0	0.753494	Yes	Yes	-14.93	1800.38	744.31	1056.08	0.90	0.150	744.31	1056.08	38.93	0.683	1.61	41.18	28.8	70.0	0.107	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.107	0.81
15.092	24.336	0.173	118.77	Yes	20	0	0.710881	Yes	Yes	-15.09	1819.86	754.54	1065.32	0.90	0.150	754.54	1065.32	36.99	0.692	1.61	39.13	29.1	68.2	0.106	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.104	0.79
15.256	21.265	0.166	118.77	Yes	23	0	0.780625	Yes	Yes	-15.26	1839.34	764.77	1074.57	0.90	0.150	764.77	1074.57	32.59	0.713	1.62	34.48	33.0	67.5	0.105	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.102	0.79
15.42	21.73	0.166	118.77	Yes	23	0	0.763921	Yes	Yes	-15.42	1858.82	775.01	1083.81	0.90	0.150	775.01	1083.81	33.05	0.711	1.61	34.97	32.4	67.4	0.105	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	0.78
15.584	23.006	0.181	118.77	Yes	22	0	0.786751	Yes	Yes	-15.58	1878.30	785.24	1093.05	0.90	0.150	785.24	1093.05	34.60	0.703	1.59	36.61	31.8	68.4	0.106	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	0.79
15.748	20.523	0.166	115.56	Yes	24	0	0.808849	Yes	Yes	-15.75	1897.25	795.48	1101.77	0.89	0.150	795.48	1101.77	31.06	0.721	1.60	32.86	34.2	67.1	0.105	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	0.78
15.912	16.671	0.154	115.56	Yes	29	0	0.92376	Yes	Yes	-15.91	1916.20	805.71	1110.49	0.89	0.150	805.71	1110.49	25.59	0.752	1.62	27.07	38.9	66.0	0.104	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.77
16.076	14.062	0.149	115.56	Yes	33	0	1.059593	Yes	Yes	-16.08	1935.15	815.94	1119.21	0.89	0.150	815.94	1119.21	21.79	0.776	1.64	23.06	42.3	65.3	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.76
16.24	12.93	0.121	115.56	Yes	33	0	0.935808	Yes	Yes	-16.24	1954.10	826.18	1127.93	0.89	0.150	826.18	1127.93	20.07	0.788	1.64	21.23	42.2	63.4	0.102	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.75
16.404	12.242	0.133	115.56	Yes	34	0	1.086424	Yes	Yes	-16.40	1973.06	836.41	1136.65	0.89	0.150	836.41	1136.65	18.98	0.796	1.64	20.08	42.3	62.4	0.101	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.74
16.568	14.157	0.159	115.56	Yes	34	0	1.123119	Yes	Yes	-16.57	1992.01	846.64	1145.36	0.89	0.150	846.64	1145.36	21.57	0.778	1.61	22.82	42.8	65.6	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.76
16.732	15.409	0.163	115.56	Yes	31	0	1.057823	Yes	Yes	-16.73	2010.96	856.88	1154.08	0.89	0.150	856.88	1154.08	23.19	0.767	1.59	24.53	41.4	65.9	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.76

CPT Liquefaction Analysis

16.896	17.853	0.165	115.56	Yes	28	0	0.924214	Yes	Yes	-16.90	2029.91	867.11	1162.80	0.88	0.150	867.11	1162.80	26.39	0.747	1.56	27.92	38.2	66.2	0.104	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.77
17.06	18.137	0.165	115.56	Yes	27	0	0.909743	Yes	Yes	-17.06	2048.86	877.34	1171.52	0.88	0.150	877.34	1171.52	26.64	0.746	1.55	28.19	37.9	66.1	0.104	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.77
17.224	17.565	0.162	115.56	Yes	28	0	0.922289	Yes	Yes	-17.22	2067.81	887.58	1180.24	0.88	0.151	887.58	1180.24	25.74	0.751	1.55	27.23	38.5	65.8	0.104	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.76
17.388	17.356	0.198	115.56	Yes	30	0	1.140816	Yes	Yes	-17.39	2086.77	897.81	1188.96	0.88	0.151	897.81	1188.96	25.33	0.754	1.54	26.80	40.8	67.6	0.105	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.103	0.77
17.552	16.473	0.233	115.56	Yes	34	0	1.414436	Yes	Yes	-17.55	2105.72	908.04	1197.67	0.88	0.151	908.04	1197.67	24.02	0.762	1.54	25.41	43.4	68.9	0.106	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	0.78
17.716	13.405	0.261	115.56	Yes	38	0	1.947035	Yes	Yes	-17.72	2124.67	918.28	1206.39	0.88	0.151	918.28	1206.39	19.76	0.791	1.56	20.90	45.6	66.5	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	0.76
17.88	11.106	0.266	115.56	Yes	45	0	2.395102	Yes	Yes	-17.88	2143.62	928.51	1215.11	0.88	0.151	928.51	1215.11	16.51	0.816	1.57	17.46	48.5	66.0	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.76
18.044	8.864	0.278	115.56	Yes	56	0	3.136282	Yes	Yes	-18.04	2162.57	938.75	1223.83	0.87	0.151	938.75	1223.83	13.31	0.845	1.59	14.08	51.3	65.4	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.75
18.208	7.376	0.283	112.35	Yes	65	0	3.836768	Yes	Yes	-18.21	2181.00	948.98	1232.02	0.87	0.151	948.98	1232.02	11.15	0.867	1.60	11.79	52.9	64.7	0.103	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.75
18.372	7.926	0.282	112.35	Yes	61	0	3.557911	Yes	Yes	-18.37	2199.42	959.21	1240.21	0.87	0.151	959.21	1240.21	11.86	0.860	1.58	12.55	52.4	64.9	0.103	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.75
18.537	8.372	0.297	112.35	Yes	60	0	3.547539	Yes	Yes	-18.54	2217.96	969.51	1248.45	0.87	0.151	969.51	1248.45	12.42	0.854	1.57	13.14	52.2	65.3	0.104	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.75
18.701	9.888	0.317	115.56	Yes	54	0	3.205906	Yes	Yes	-18.70	2236.91	979.74	1257.17	0.87	0.151	979.74	1257.17	14.43	0.834	1.54	15.27	51.0	66.3	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.76
18.865	10.943	0.328	115.56	Yes	50	0	2.99735	Yes	Yes	-18.87	2255.87	989.98	1265.89	0.87	0.151	989.98	1265.89	15.78	0.822	1.53	16.69	50.2	66.9	0.105	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.76
19.029	11.489	0.302	115.56	Yes	47	0	2.628601	Yes	Yes	-19.03	2274.82	1000.21	1274.61	0.86	0.150	1000.21	1274.61	16.43	0.817	1.51	17.38	49.2	66.6	0.105	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.76
19.193	13.452	0.258	115.56	Yes	39	0	1.91793	Yes	Yes	-19.19	2293.77	1010.44	1283.33	0.86	0.150	1010.44	1283.33	18.94	0.797	1.49	20.04	46.0	66.0	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.76
19.357	13.928	0.231	115.56	Yes	37	0	1.65853	Yes	Yes	-19.36	2312.72	1020.68	1292.04	0.86	0.150	1020.68	1292.04	19.46	0.793	1.48	20.59	44.6	65.2	0.103	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.75
19.521	12.68	0.158	115.56	Yes	35	0	1.246057	Yes	Yes	-19.52	2331.67	1030.91	1300.76	0.86	0.150	1030.91	1300.76	17.74	0.806	1.48	18.77	43.4	62.1	0.101	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.73
19.685	12.523	0.184	115.56	Yes	38	0	1.469296	Yes	Yes	-19.69	2350.63	1041.14	1309.48	0.86	0.150	1041.14	1309.48	17.45	0.808	1.47	18.46	44.8	63.3	0.102	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.74
19.849	12.806	0.227	115.56	Yes	40	0	1.772607	Yes	Yes	-19.85	2369.58	1051.38	1318.20	0.86	0.150	1051.38	1318.20	17.73	0.806	1.46	18.75	46.1	64.8	0.103	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.75
20.013	10.694	0.247	115.56	Yes	48	0	2.309706	Yes	Yes	-20.01	2388.53	1061.61	1326.92	0.86	0.150	1061.61	1326.92	14.89	0.830	1.47	15.75	49.2	64.9	0.103	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.75
20.177	10.417	0.254	115.56	Yes	50	0	2.438322	Yes	Yes	-20.18	2407.48	1071.84	1335.64	0.85	0.150	1071.84	1335.64	14.45	0.834	1.47	15.29	49.7	65.0	0.103	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.75
20.341	9.681	0.274	115.56	Yes	54	0	2.830286	Yes	Yes	-20.34	2426.43	1082.08	1344.35	0.85	0.150	1082.08	1344.35	13.42	0.844	1.47	14.20	50.9	65.1	0.103	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.75
20.505	8.11	0.307	112.35	Yes	65	0	3.78545	Yes	Yes	-20.51	2444.86	1092.31	1352.55	0.85	0.150	1092.31	1352.55	11.29	0.866	1.47	11.95	52.9	64.9	0.103	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.74
20.669	7.815	0.318	112.35	Yes	68	0	4.069098	Yes	Yes	-20.67	2463.28	1102.55	1360.74	0.85	0.150	1102.55	1360.74	10.85	0.871	1.47	11.48	53.3	64.8	0.103	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.74
20.833	10.813	0.335	115.56	Yes	53	0	3.098123	Yes	Yes	-20.83	2482.24	1112.78	1369.46	0.85	0.150	1112.78	1369.46	14.68	0.832	1.44	15.53	50.9	66.4	0.104	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	0.76
20.997	15.931	0.417	115.56	Yes	41	0	2.617538	Yes	Yes	-21.00	2501.19	1123.01	1378.17	0.85	0.150	1123.01	1378.17	21.05	0.781	1.40	22.27	47.7	70.0	0.107	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.107	0.78
21.161	24.525	0.53	115.56	Yes	33	0	2.16106	Yes	Yes	-21.16	2520.14	1133.25	1386.89	0.85	0.150	1133.25	1386.89	31.41	0.719	1.36	33.23	44.6	77.8	0.114	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	0.84
21.325	42.338	0.581	118.77	Yes	20	0	1.37229	Yes	Yes	-21.33	2539.62	1143.48	1396.14	0.84	0.150	1143.48	1396.14	52.03	0.631	1.30	55.05	31.4	86.4	0.122	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.201	1.144	0.92
21.489	48.541	0.658	118.77	Yes	19	0	1.355555	Yes	Yes	-21.49	2559.10	1153.71	1405.38	0.84	0.150	1153.71	1405.38	58.84	0.608	1.28	62.25	28.7	90.9	0.127	0.08	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.219	1.157	0.97
21.653	42.187	0.732	118.77	Yes	23	0	1.735132	Yes	Yes	-21.65	2578.57	1163.95	1414.63	0.84	0.149	1163.95	1414.63	51.46	0.633	1.29	54.44	35.7	90.2	0.126	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.216	1.155	0.96
21.817	41.351	0.714	118.77	Yes	23	0	1.726681	Yes	Yes	-21.82	2598.05	1174.18	1423.87	0.84	0.149	1174.18	1423.87	50.31	0.637	1.29	53.23	36.0	89.2	0.125	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.212	1.152	0.95
21.981	38.5	0.66	115.56	Yes	24	0	1.714286	Yes	Yes	-21.98	2617.00	1184.41	1432.59	0.84	0.149	1184.41	1432.59	46.90	0.650	1.29	49.62	36.9	86.5	0.122	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.201	1.144	0.92
22.145	35.564	0.617	115.56	Yes	25	0	1.7349	Yes	Yes	-22.15	2635.96	1194.65	1441.31	0.84	0.149	1194.65	1441.31	43.38	0.664	1.29	45.90	38.2	84.1	0.120	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.192	1.138	0.90
22.309	32.889	0.626	115.56	Yes	27	0	1.903372	Yes	Yes	-22.31	2654.91	1204.88	1450.03	0.83	0.149	1204.88	1450.03	40.16	0.678	1.29	42.49	40.5	83.0	0.119	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.188	1.135	0.89
22.473	32.809	0.623	115.56	Yes	27	0	1.898869	Yes	Yes	-22.47	2673.86	1215.12	1458.74	0.83	0.149	1215.12	1458.74	39.92	0.679	1.29	42.23	40.5	82.7	0.118	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.187	1.134	0.89
22.638	38.937	0.667	115.56	Yes	24	0	1.713024	Yes	Yes	-22.64	2692.93	1225.41	1467.52	0.83	0.149	1225.41	1467.52	46.70	0.651	1.27	49.41	36.9	86.3	0.122	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.200	1.143	0.92
22.802	43.948	0.454	118.77	Yes	18	0	1.033039	Yes	Yes	-22.80	2712.41	1235.64	1476.76	0.83	0.149	1235.64	1476.76	52.12	0.631	1.25	55.14	25.9	81.0	0.117	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.181	1.130	0.87
22.966	43.121	0.368	118.77	Yes	17	0	0.853412	Yes	Yes	-22.97	2731.88	1245.88	1486.00	0.83	0.148	1245.88	1486.00	51.01	0.635	1.25	53.97	22.9	76.9	0.113	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.120	0.84
23.13	34.717	0.337	118.77	Yes	20	0	0.970706	Yes	Yes	-23.13	2751.36	1256.11	1495.25	0.83	0.148	1256.11	1495.25	41.44	0.672	1.26	43.85	29.7	73.6	0.110	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.113	0.81
23.294	30.328	0.388	118.77	Yes	25	0	1.279346	Yes	Yes	-23.29	2770.84	1266.35	1504.49	0.83	0.148	1266.35	1504.49	36.33	0.695	1.27	38.44	36.2	74.6	0.111	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.116	0.82
23.458	21.838	0.432	115.56	Yes	35	0	1.978203	Yes	Yes	-23.46	2789.79	1276.58	1513.21	0.82	0.148	1276.58	1513.21	26.51	0.746	1.28	28.05	44.9	72.9	0.110	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.157	1.112	0.80
23.622	14.777	0.415	115.56	Yes	46	0	2.808418	Yes	Yes	-23.62	2808.74	1286.81	1521.93	0.82	0.148	1286.81	1521.93	18.19	0.802	1.30	19.25	49.4	68.6	0.106	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	0.77
23.786	12.316	0.389	115.56	Yes	53	0	3.158493	Yes	Yes	-23.79	2827.70	1297.05	1530.65	0.82	0.148	1297.05	1530.65	15.22	0.827	1.31	16.10	51.0	67.1	0.105	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	0.76
23.95	11.999	0.358	115.56	Yes	53	0	2.983582	Yes	Yes	-23.95	2846.65	1307.28	1539.37	0.82	0.148	1307.28	1539.37	14.77	0.831	1.30	15.63	50.9	66.5	0.104	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	0.76
24.114	12.268	0.316	115.56	Yes	50	0	2.575807	Yes	Yes	-24.11	2865.60	1317.51	1548.09	0.82	0.148	1317.51	1548.09	15.02	0.829	1.30	15.90	50.0	65.9	0.104	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.75
24.278	10.982	0.288	115.56	Yes	54	0	2.622473	Yes	Yes	-24.28	2884.55	1327.75	1556.80	0.82	0.147	1327.75	1556.80	13.45	0.844	1.30	14.23	50.7	64.9	0.103	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.75
24.442	10.573	0.274	115.56	Yes	55	0	2.591507	Yes	Yes	-24.44	2903.50	1337.98	1565.52	0.81	0.147	1337.98	1565.52	12.91	0.849	1.29	13.65	50.9	64.5	0.103	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.74
24.606	11.231	0.25	115.56	Yes	51	0	2.225982	Yes	Yes	-24.61	2922.45	1348.21	1574.24	0.81	0.147	1348.21	1574.24	13.62	0.842	1.28	14.41	49.8	64.2	0.103	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.74
24.77	11.555	0.223	115.56	Yes	48	0	1.9299	Yes	Yes	-24.77	2941.41	1358.45	1582.96	0.81	0.147	1358.45	1582.96	13.93	0.839	1.28	14.74	48.9	63.7	0.102	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.74
24.934	10.223	0.211	115.56	Yes	52	0	2.063973	Yes	Yes	-24.93	2960.36	1368.68	1591.68	0.81	0.147	1368.68	1591.68	12.33	0.855	1.28	13.04	50.1	63.1	0.102	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.74
25.098	7.877	0.203	115.56	Yes	65	0	2.577123	Yes	Yes	-25.10	2979.31	1378.92	1600.39	0.81	0.147	1378.92	1600.39	9.54	0.886	1.28	10.09	52.4	62.5	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.73
25.262	6.297	0.169	115.56	Yes	75	0	2.683818	Yes	Yes	-25.26	2998.26	1389.15	1609.11	0.81	0.147	1389.15	1609.11	7.64	0.912	1.28	8.08	53.6	61.6	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.73
25.426	6.007	0.149	115.56	Yes	75	0	2.480439	Yes	Yes	-25.43	3017.21	1399.38	1617.83	0.81	0.146	1399.38	1617.83	7.26	0.918	1.28	7.69	53.6	61.3	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.72
25.59	4.873	0.116	112.35	Yes	85	0	2.380464	Yes	Yes	-25.59	3035.64	1409.62	1626.02	0.80	0.146	1409.62	1626.02	5.90	0.940	1.28	6.24	54.4	60.6	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.72
25.754	4.798	0.101	115.56	Yes	84	0	2.105044	Yes	Yes	-25.75	3054.59	1419.85	1634.74	0.80	0.146	1419.85	1634.74	5.78	0.942	1.28	6.12	54.2	60.4	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.72
25.918	4.716	0.078	112.35	Yes	84	0	1.653944	Yes	Yes	-25.92	3073.02	1430.08	1642.93	0.80	0.146	1430.08	1642.93	5.66	0.944	1.27	5.99	54.2	60.2	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.72
26.082	4.684	0.087	115.56	Yes	84	0	1.857387	Yes	Yes	-26.08	3091.97	1440.32	1651.65	0.80	0.146	1440.32	1651.65	5.60	0.946	1.26	5.92	54.1	60.1	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.72
26.246	4.288	0.086	112.35	Yes	91	0	2.005597	Yes	Yes	-26.25	3110.39	1450.55	1659.84	0.80	0.146	1450.55	1659.84	5.11	0.955	1.26	5.41	54.7	60.1	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.72
26.41	5.663	0.086	112.35	Yes	91	0	1.51863	Yes	Yes	-26.41	3128.82	1460.78	1668.04	0.80	0.146	1460.78	1668.04	6.67	0.927	1.25	7.06	55.2	62.3	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.73
26.574	5.311	0.096	115.56	Yes	77	0	1.807569	Yes	Yes	-26.57	3147.77	1471.02	1676.75	0.79	0.145	1471.02	1676.75	6.24	0.934	1.24	6.60	53.5	60.1	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.72
26.739	5.537	0.119	115.56	Yes	79	0	2.149178	Yes	Yes	-26.74	3166.84	1481.31	1685.52	0.79	0.145	1481.31	1685.52	6.47	0.930	1.24	6.84	53.8	60.6	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.72
26.903	9.244	0.15	115.56	Yes	54	0	1.622674	Yes	Yes	-26.90	3185.79	1491.55	1694.24	0.79	0.145	1491.55	1694.24	10.61	0.874	1.21	11.23	50.1	61.3	0.101	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.73
27.067	11.782	0.163	115.56	Yes	45	0	1.383466	Yes	Yes	-27.07	3204.74	1501.78	1702.96	0.79	0.145	1501.78	1702.96	13.38	0.844	1.20	14.15	47.6	61.7	0.101	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.73
27.231	12.392	0.175	115.56	Yes	44	0	1.412201	Yes	Yes	-27.23	3223.69	1512.01	1711.68	0.79	0.145	1512.01	1711.68	13.99	0.838	1.19	14.80	47.3	62.1	0.101	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.73
27.395	11.564	0.19	115.56	Yes	48	0	1.64303	Yes	Yes	-27.40	3242.65	1522.25	1720.40	0.79	0.145	1522.25	1720.40	13.03	0.848	1.19	13.78	48.7	62.5	0.101	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.74
27.559	9.928	0.208	115.56	Yes	56	0	2.095085	Yes	Yes	-27.56	3261.60	1532.48	1729.12	0.78	0.144	1532.48	1729.12	11.18	0.867	1.19	11.83	50.9	62.7	0.102	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.74
27.723	8.892	0.208	115.56	Yes	62	0	2.339181	Yes	Yes	-27.72	3280.55	1542.72	1737.83	0.78	0.144	1542.72	1737.83	10.00	0.881	1.19	10.58	51.9	62.5	0.101	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.74
27.887	7.061	0.19	115.56	Yes	73	0	2.690837	Yes	Yes	-27.89	3299.50	1552.95	1746.55	0.78	0.144	1552.95	1746.55	7.94	0.908	1.19	8.40	53.5	61.9	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.73
28.051	5.268	0.163	112.35	Yes	91	0	3.094153	Yes	Yes	-28.05	3317.93	1563.18	1754.74	0.78	0.144	1563.18	1754.74	5.94	0.940	1.19	6.28	55.0	61.3	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.73
28.215	4.621	0.127	112.35	Yes	97	0	2.748323	Yes	Yes	-28.22	3336.35	1573.42	1762.94	0.78	0.144	1573.42	1762.94	5.20	0.953	1.19	5.50	55.3	60.8	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
28.379	5.396	0.118	115.56	Yes	83	0	2.186805	Yes	Yes	-28.38	3355.30	1583.65	1771.65	0.78	0.143	1583.65	1771.65	6.02	0.938	1.18	6.37	54.2	60.6	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
28.543	5.409	0.12	115.56	Yes	83	0	2.218525	Yes	Yes	-28.54	3374.26	1593.88	1780.37	0.78	0.143	1593.88	1780.37	6.01	0.938	1.18	6.36	54.2	60.6	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
28.707	6.806	0.133	115.56	Yes	70	0	1.954158	Yes	Yes	-28.71	3393.21	1604.12	1789.09	0.77	0.143	1604.12	1789.09	7.50	0.914	1.17	7.93	52.8	60.8	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.73
28.871	6.551	0.13	115.56	Yes	72	0	1.98443	Yes	Yes	-28.87	3412.16	1614.35	1797.81	0.77	0.143	1614.35	1797.81	7.19	0.919	1.16	7.61	53.1	60.7	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
29.035	6.504	0.127	115.56	Yes	73	0	1.952645	Yes	Yes	-29.04	3431.11	1624.58	1806.53	0.77	0.143	1624.58	1806.53	7.11	0.920	1.16	7.52	53.1	60.6	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
29.199	6.149	0.119	115.56	Yes	75	0	1.935274	Yes	Yes	-29.20	3450.06	1634.82	1815.25	0.77	0.143	1634.82	1815.25	6.70	0.927	1.15	7.09	53.4	60.5	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
29.363	5.341	0.13	115.56	Yes	87	0	2.434001	Yes	Yes	-29.36	3469.01	1645.05	1823.96	0.77	0.142	1645.05	1823.96	5.81	0.942	1.15	6.14	54.6	60.7	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
29.527	4.812	0.11	112.35	Yes	93	0	2.285952	Yes	Yes	-29.53	3487.44	1655.28	1832.16	0.77	0.142	1655.28	1832.16	5.22	0.953	1.15	5.52	54.9	60.5	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
29.691	5.612	0.094	115.56	Yes	78	0	1.674982	Yes	Yes	-29.69	3506.39	1665.52	1840.87	0.76	0.142	1665.52	1840.87	6.04	0.938	1.14	6.39	53.6	60.0	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.73
29.855	4.704	0.111	112.35	Yes	96	0	2.359694	Yes	Yes	-29.86	3524.82	1675.75	1849.07	0.76	0.142	1675.75	1849.07	5.06	0.956	1.14	5.35	55.1	60.5	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
30.019	4.19	0.103	112.35	Yes	100	0	2.458234	Yes	Yes	-30.02	3543.24	1685.99	1857.26	0.76	0.142	1685.99	1857.26	4.49	0.968	1.13	4.75	55.3	60.1	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.73
30.183	7.064	0.099	115.56	Yes	65	0	1.401472	Yes	Yes	-30.18	3562.19	1696.22	1865.98	0.76	0.141	1696.22	1865.98	7.49	0.914	1.12	7.92	51.9	59.9	0.099	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.73
30.347	6.12	0.097	115.56	Yes	74	0	1.584967	Yes	Yes	-30.35	3581.15	1706.45	1874.69	0.76	0.141	1706.45	1874.69	6.47	0.930	1.12	6.85	53.1	60.0	0.099	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.73
30.511	6.898	0.106	115.56	Yes	68	0	1.536677	Yes	Yes	-30.51	3600.10	1716.69	1883.41	0.76	0.141	1716.69	1883.41	7.26	0.918	1.11	7.68	52.4	60.1	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.73
30.675	5.863	0.102	115.56	Yes	78	0	1.739724	Yes	Yes	-30.68	3619.05	1726.92	1892.13	0.76	0.141	1726.92	1892.13	6.15	0.936	1.11	6.51	53.6	60.1	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.73
30.84	5.782	0.095	115.56	Yes	78	0	1.64303	Yes	Yes	-30.84	3638.12	1737.22	1900.90	0.75	0.141	1737.22	1900.90	6.04	0.938	1.11	6.39	53.6	60.0	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.73
31.004	5.452	0.088	112.35	Yes	78	0	1.614087	Yes	Yes	-31.00	3656.54	1747.45	1909.09	0.75	0.140	1747.45	1909.09	5.68	0.944	1.10	6.01	53.5	59.5	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.73
31.168	5.476	0.083	112.35	Yes	78	0	1.515705	Yes	Yes	-31.17	3674.97	1757.68	1917.29	0.75	0.140	1757.68	1917.29	5.68	0.944	1.10	6.01	53.5	59.5	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.73
31.332	5.095	0.079	112.35	Yes	78	0	1.55054	Yes	Yes	-31.33	3693.39	1767.92	1925.48	0.75	0.140	1767.92	1925.48	5.27	0.952	1.09	5.57	53.4	58.9	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.72
31.496	4.989	0.075	112.35	Yes	78	0	1.503307	Yes	Yes	-31.50	3711.82	1778.15	1933.67	0.75	0.140	1778.15	1933.67	5.14	0.954	1.09	5.44	53.3	58.8	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.72
31.66	5.409	0.069	112.35	Yes	78	0	1.275652	Yes	Yes	-31.66	3730.24	1788.38	1941.86	0.75	0.140	1788.38	1941.86	5.55	0.947	1.08	5.87	53.4	59.3	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.73
31.824	4.951	0.068	112.35	Yes	78	0	1.37346	Yes	Yes	-31.82	3748.67	1798.62	1950.05	0.74	0.139	1798.62	1950.05	5.06	0.956	1.08	5.35	53.3	58.6	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.72
31.988	4.415	0.064	112.35	Yes	78	0	1.449604	Yes	Yes	-31.99	3767.10	1808.85	1958.24	0.74	0.139	1808.85	1958.24	4.50	0.968	1.08	4.76	53.1	57.9	0.098	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.72
32.152	4.52	0.051	112.35	Yes	78	0	1.128319	Yes	Yes	-32.15	3785.52	1819.08	1966.44	0.74	0.139	1819.08	1966.44	4.59	0.966	1.07	4.85	53.1	58.0	0.098	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.089	0.72
32.316	4.934	0.055	112.35	Yes	78	0	1.114714	Yes	Yes	-32.32	3803.95	1829.32	1974.63	0.74	0.139	1829.32	1974.63	4.98	0.958	1.07	5.27	53.3	58.5	0.098	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.73
32.48	5.48	0.07	112.35	Yes	78	0	1.277372	Yes	Yes	-32.48	3822.37	1839.55	1982.82	0.74	0.139	1839.55	1982.82	5.51	0.947	1.06	5.83	53.4	59.3	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.73
32.644	5.629	0.142	115.56	Yes	91	0	2.522651	Yes	Yes	-32.64	3841.32	1849.79	1991.54	0.74	0.138	1849.79	1991.54	5.63	0.945	1.06	5.96	54.9	60.8	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.74
32.808	5.49	0.137	115.56	Yes	92	0	2.495446	Yes	Yes	-32.81	3860.28	1860.02	2000.26	0.73	0.138	1860.02	2000.26	5.47	0.948	1.05	5.79	55.0	60.8	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
32.972	8.241	0.136	115.56	Yes	65	0	1.650285	Yes	Yes	-32.97	3879.23	1870.25	2008.97	0.73	0.138	1870.25	2008.97	8.16	0.905	1.05	8.64	52.0	60.6	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
33.136	7.92	0.14	115.56	Yes	67	0	1.767677	Yes	Yes	-33.14	3898.18	1880.49	2017.69	0.73	0.138	1880.49	2017.69	7.82	0.909	1.04	8.27	52.5	60.7	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
33.3	7.537	0.152	115.56	Yes	72	0	2.016718	Yes	Yes	-33.30	3917.13	1890.72	2026.41	0.73	0.138	1890.72	2026.41	7.41	0.915	1.04	7.84	53.1	61.0	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.74
33.464	7.161	0.141	115.56	Yes	74	0	1.968999	Yes	Yes	-33.46	3936.08	1900.95	2035.13	0.73	0.137	1900.95	2035.13	7.02	0.922	1.04	7.42	53.3	60.7	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
33.628	6.765	0.139	115.56	Yes	78	0	2.054693	Yes	Yes	-33.63	3955.03	1911.19	2043.85	0.73	0.137	1911.19	2043.85	6.60	0.928	1.03	6.99	53.7	60.7	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
33.792	5.824	0.122	115.56	Yes	87	0	2.09478	Yes	Yes	-33.79	3973.99	1921.42	2052.57	0.73	0.137	1921.42	2052.57	5.67	0.944	1.03	5.99	54.5	60.5	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
33.956	5.454	0.107	115.56	Yes	90	0	1.961863	Yes	Yes	-33.96	3992.94	1931.65	2061.28	0.72	0.137	1931.65	2061.28	5.29	0.952	1.03	5.59	54.7	60.3	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.74
34.12	6.852	0.108	115.56	Yes	73	0	1.576182	Yes	Yes	-34.12	4011.89	1941.89	2070.00	0.72	0.137	1941.89	2070.00	6.61	0.928	1.02	6.99	53.1	60.1	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.74
34.284	6.034	0.114	115.56	Yes	83	0	1.889294	Yes	Yes	-34.28	4030.84	1952.12	2078.72	0.72	0.136	1952.12	2078.72	5.80	0.942	1.02	6.14	54.2	60.3	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.75
34.448	6.784	0.125	115.56	Yes	77	0	1.842571	Yes	Yes	-34.45	4049.79	1962.36	2087.44	0.72	0.136	1962.36	2087.44	6.49	0.930	1.01	6.87	53.6	60.4	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.75
34.612	8.666	0.147	115.56	Yes	65	0	1.696284	Yes	Yes	-34.61	4068.75	1972.59	2096.16	0.72	0.136	1972.59	2096.16	8.26	0.903	1.01	8.74	52.1	60.8	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.75
34.776	9.1	0.167	115.56	Yes	64	0	1.835165	Yes	Yes	-34.78	4087.70	1982.82	2104.88	0.72	0.136	1982.82	2104.88	8.64	0.898	1.00	9.14	52.1	61.2	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.75
34.941	7.306	0.163	115.56	Yes	77	0	2.231043	Yes	Yes	-34.94	4106.76	1993.12	2113.65	0.71	0.135	1993.12	2113.65	6.91	0.923	1.00	7.31	53.7	61.1	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.75
35.105	6.636	0.157	115.56	Yes	84	0	2.365883	Yes	Yes	-35.11	4125.72	2003.35	2122.36	0.71	0.135	2003.35	2122.36	6.25	0.934	1.00	6.62	54.3	60.9	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.75
35.269	8.409	0.157	115.56	Yes	68	0	1.867047	Yes	Yes	-35.27	4144.67	2013.59	2131.08	0.71	0.135	2013.59	2131.08	7.90	0.908	0.99	8.35	52.6	61.0	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.75
35.433	10.078	0.171	115.56	Yes	60	0	1.696765	Yes	Yes	-35.43	4163.62	2023.82	2139.80	0.71	0.135	2023.82	2139.80	9.43	0.888	0.99	9.98	51.3	61.3	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.76
35.597	9.154	0.166	115.56	Yes	65	0	1.813415	Yes	Yes	-35.60	4182.57	2034.05	2148.52	0.71	0.135	2034.05	2148.52	8.53	0.899	0.99	9.03	52.1	61.1	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.76
35.761	7.968	0.182	115.56	Yes	75	0	2.284137	Yes	Yes	-35.76	4201.52	2044.29	2157.24	0.71	0.134	2044.29	2157.24	7.40	0.916	0.98	7.83	53.5	61.3	0.101	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.76

CPT Liquefaction Analysis

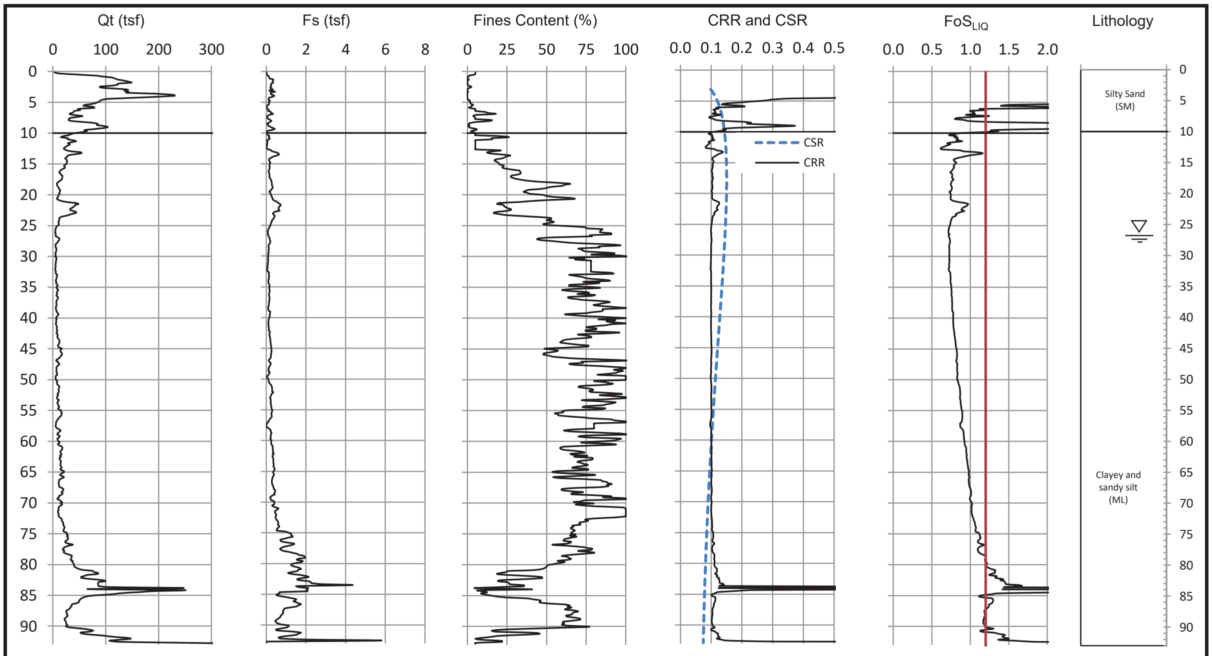
35.925	7.464	0.16	115.56	Yes	77	0	2.143623	Yes	Yes	-35.93	4220.48	2054.52	2165.96	0.71	0.134	2054.52	2165.96	6.90	0.923	0.98	7.30	53.7	61.0	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.76
36.089	8.207	0.148	115.56	Yes	70	0	1.803339	Yes	Yes	-36.09	4239.43	2064.75	2174.67	0.70	0.134	2064.75	2174.67	7.57	0.913	0.98	8.00	52.8	60.8	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.76
36.253	6.844	0.138	115.56	Yes	81	0	2.016365	Yes	Yes	-36.25	4258.38	2074.99	2183.39	0.70	0.134	2074.99	2183.39	6.28	0.934	0.97	6.65	54.0	60.6	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.76
36.417	7.238	0.143	115.56	Yes	77	0	1.975684	Yes	Yes	-36.42	4277.33	2085.22	2192.11	0.70	0.133	2085.22	2192.11	6.62	0.928	0.97	7.00	53.7	60.7	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.76
36.581	9.414	0.162	115.56	Yes	64	0	1.720841	Yes	Yes	-36.58	4296.28	2095.45	2200.83	0.70	0.133	2095.45	2200.83	8.59	0.899	0.97	9.09	51.9	61.0	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.76
36.745	9.502	0.167	115.56	Yes	64	0	1.757525	Yes	Yes	-36.75	4315.24	2105.69	2209.55	0.70	0.133	2105.69	2209.55	8.64	0.898	0.96	9.14	52.0	61.1	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.76
36.909	8.8	0.17	115.56	Yes	69	0	1.931818	Yes	Yes	-36.91	4334.19	2115.92	2218.27	0.70	0.133	2115.92	2218.27	7.97	0.907	0.96	8.43	52.7	61.1	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.76
37.073	8.013	0.164	115.56	Yes	74	0	2.046674	Yes	Yes	-37.07	4353.14	2126.16	2226.98	0.70	0.132	2126.16	2226.98	7.23	0.918	0.95	7.65	53.4	61.0	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.76
37.237	6.696	0.152	115.56	Yes	85	0	2.270012	Yes	Yes	-37.24	4372.09	2136.39	2235.70	0.69	0.132	2136.39	2235.70	6.01	0.938	0.95	6.36	54.4	60.8	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.76
37.401	6.341	0.153	115.56	Yes	90	0	2.412869	Yes	Yes	-37.40	4391.04	2146.62	2244.42	0.69	0.132	2146.62	2244.42	5.67	0.944	0.95	6.00	54.8	60.8	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.76
37.565	6.598	0.146	115.56	Yes	86	0	2.212792	Yes	Yes	-37.57	4409.99	2156.86	2253.14	0.69	0.132	2156.86	2253.14	5.88	0.941	0.94	6.22	54.5	60.7	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.76
37.729	6.771	0.136	115.56	Yes	83	0	2.008566	Yes	Yes	-37.73	4428.95	2167.09	2261.86	0.69	0.132	2167.09	2261.86	6.01	0.938	0.94	6.36	54.2	60.5	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.76
37.893	7.085	0.134	115.56	Yes	80	0	1.89132	Yes	Yes	-37.89	4447.90	2177.32	2270.57	0.69	0.131	2177.32	2270.57	6.27	0.934	0.94	6.63	53.9	60.5	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.76
38.057	6.536	0.13	115.56	Yes	85	0	1.988984	Yes	Yes	-38.06	4466.85	2187.56	2279.29	0.69	0.131	2187.56	2279.29	5.76	0.943	0.93	6.09	54.4	60.5	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.76
38.221	5.76	0.115	115.56	Yes	94	0	1.996528	Yes	Yes	-38.22	4485.80	2197.79	2288.01	0.68	0.131	2197.79	2288.01	5.05	0.956	0.93	5.35	55.0	60.3	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.76
38.385	5.251	0.096	115.56	Yes	100	0	1.828223	Yes	Yes	-38.39	4504.75	2208.02	2296.73	0.68	0.131	2208.02	2296.73	4.59	0.966	0.92	4.85	55.4	60.2	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.77
38.549	6.22	0.102	115.56	Yes	85	0	1.639871	Yes	Yes	-38.55	4523.71	2218.26	2305.45	0.68	0.130	2218.26	2305.45	5.42	0.949	0.92	5.73	54.3	60.0	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.76
38.713	6.336	0.11	115.56	Yes	86	0	1.736111	Yes	Yes	-38.71	4542.66	2228.49	2314.17	0.68	0.130	2228.49	2314.17	5.50	0.947	0.92	5.82	54.3	60.1	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.77
38.877	6.573	0.123	115.56	Yes	85	0	1.871292	Yes	Yes	-38.88	4561.61	2238.72	2322.88	0.68	0.130	2238.72	2322.88	5.69	0.944	0.92	6.02	54.3	60.3	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.77
39.042	8.178	0.207	115.56	Yes	79	0	2.531181	Yes	Yes	-39.04	4580.68	2249.02	2331.66	0.68	0.130	2249.02	2331.66	7.07	0.921	0.91	7.48	54.0	61.5	0.101	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.78
39.206	8.745	0.195	115.56	Yes	74	0	2.229846	Yes	Yes	-39.21	4599.63	2259.25	2340.37	0.68	0.129	2259.25	2340.37	7.54	0.914	0.91	7.98	53.4	61.4	0.101	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.78
39.37	10.704	0.189	115.56	Yes	62	0	1.765695	Yes	Yes	-39.37	4618.58	2269.49	2349.09	0.67	0.129	2269.49	2349.09	9.22	0.890	0.91	9.75	51.7	61.5	0.101	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.78
39.534	9.666	0.183	115.56	Yes	67	0	1.893234	Yes	Yes	-39.53	4637.53	2279.72	2357.81	0.67	0.129	2279.72	2357.81	8.29	0.903	0.91	8.77	52.5	61.3	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.78
39.698	8.152	0.173	115.56	Yes	77	0	2.122179	Yes	Yes	-39.70	4656.48	2289.96	2366.53	0.67	0.129	2289.96	2366.53	6.95	0.923	0.90	7.35	53.7	61.0	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.78
39.862	6.836	0.177	115.56	Yes	90	0	2.589233	Yes	Yes	-39.86	4675.44	2300.19	2375.25	0.67	0.129	2300.19	2375.25	~~5.79~~	~~0.942~~	~~0.90~~	6.13	54.9	61.0	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.78
40.026	5.86	0.156	115.56	Yes	100	0	2.662116	Yes	Yes	-40.03	4694.39	2310.42	2383.97	0.67	0.128	2310.42	2383.97	4.94	0.958	0.89	5.23	55.5	60.7	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.78
40.19	7.131	0.138	115.56	Yes	83	0	1.935212	Yes	Yes	-40.19	4713.34	2320.66	2392.68	0.67	0.128	2320.66	2392.68	6.01	0.938	0.89	6.35	54.1	60.5	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.78
40.354	6.097	0.122	115.56	Yes	93	0	2.000984	Yes	Yes	-40.35	4732.29	2330.89	2401.40	0.67	0.128	2330.89	2401.40	5.11	0.955	0.89	5.40	55.0	60.4	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.78
40.518	6.472	0.118	115.56	Yes	88	0	1.823239	Yes	Yes	-40.52	4751.24	2341.12	2410.12	0.66	0.128	2341.12	2410.12	5.41	0.949	0.88	5.72	54.5	60.2	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.78
40.682	6.246	0.119	115.56	Yes	91	0	1.905219	Yes	Yes	-40.68	4770.19	2351.36	2418.84	0.66	0.127	2351.36	2418.84	5.20	0.953	0.88	5.50	54.8	60.3	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.78
40.846	5.458	0.109	115.56	Yes	100	0	1.997069	Yes	Yes	-40.85	4789.15	2361.59	2427.56	0.66	0.127	2361.59	2427.56	4.52	0.967	0.88	4.78	55.3	60.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.78
41.01	6.181	0.109	115.56	Yes	91	0	1.763469	Yes	Yes	-41.01	4808.10	2371.82	2436.27	0.66	0.127	2371.82	2436.27	5.11	0.955	0.87	5.40	54.7	60.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.78
41.174	6.506	0.109	115.56	Yes	87	0	1.675377	Yes	Yes	-41.17	4827.05	2382.06	2444.99	0.66	0.127	2382.06	2444.99	5.36	0.950	0.87	5.67	54.4	60.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.78
41.338	7.309	0.115	115.56	Yes	79	0	1.573403	Yes	Yes	-41.34	4846.00	2392.29	2453.71	0.66	0.126	2392.29	2453.71	6.01	0.938	0.87	6.36	53.7	60.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.78
41.502	7.87	0.122	115.56	Yes	75	0	1.550191	Yes	Yes	-41.50	4864.95	2402.52	2462.43	0.65	0.126	2402.52	2462.43	6.46	0.931	0.87	6.83	53.3	60.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.78
41.666	7.344	0.13	115.56	Yes	81	0	1.770153	Yes	Yes	-41.67	4883.91	2412.76	2471.15	0.65	0.126	2412.76	2471.15	6.00	0.938	0.86	6.35	54.0	60.3	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.78
41.83	7.439	0.136	115.56	Yes	81	0	1.828203	Yes	Yes	-41.83	4902.86	2422.99	2479.87	0.65	0.126	2422.99	2479.87	6.06	0.937	0.86	6.41	54.0	60.4	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.79
41.994	8.274	0.139	115.56	Yes	75	0	1.679961	Yes	Yes	-41.99	4921.81	2433.23	2488.58	0.65	0.125	2433.23	2488.58	6.73	0.926	0.86	7.12	53.3	60.4	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.79
42.158	8.167	0.139	115.56	Yes	76	0	1.701971	Yes	Yes	-42.16	4940.76	2443.46	2497.30	0.65	0.125	2443.46	2497.30	6.62	0.928	0.86	7.00	53.4	60.4	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.79
42.322	6.795	0.188	115.56	Yes	96	0	2.76674	Yes	Yes	-42.32	4959.71	2453.69	2506.02	0.65	0.125	2453.69	2506.02	5.47	0.948	0.85	5.79	55.3	61.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.79
42.486	7.421	0.173	115.56	Yes	87	0	2.331222	Yes	Yes	-42.49	4978.67	2463.93	2514.74	0.65	0.125	2463.93	2514.74	5.96	0.939	0.85	6.31	54.6	60.9	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.79
42.65	9.438	0.17	115.56	Yes	70	0	1.801229	Yes	Yes	-42.65	4997.62	2474.16	2523.46	0.64	0.125	2474.16	2523.46	7.60	0.913	0.85	8.04	52.9	60.9	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.79
42.814	8.691	0.16	115.56	Yes	75	0	1.840985	Yes	Yes	-42.81	5016.57	2484.39	2532.18	0.64	0.124	2484.39	2532.18	6.96	0.922	0.85	7.36	53.4	60.7	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.79
42.978	8.468	0.173	115.56	Yes	78	0	2.042985	Yes	Yes	-42.98	5035.52	2494.63	2540.89	0.64	0.124	2494.63	2540.89	6.76	0.926	0.84	7.15	53.8	60.9	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.80
43.143	8.608	0.186	115.56	Yes	78	0	2.160781	Yes	Yes	-43.14	5054.59	2504.92	2549.66	0.64	0.124	2504.92	2549.66	6.85	0.924	0.84	7.25	53.8	61.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.80
43.307	9.968	0.198	115.56	Yes	70	0	1.986356	Yes	Yes	-43.31	5073.54	2515.16	2558.38	0.64	0.124	2515.16	2558.38	7.93	0.908	0.84	8.39	52.9	61.3	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.80
43.471	11.459	0.205	115.56	Yes	63	0	1.788987	Yes	Yes	-43.47	5092.49	2525.39	2567.10	0.64	0.123	2525.39	2567.10	9.12	0.892	0.84	9.65	51.9	61.5	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.80
43.635	12.093	0.209	115.56	Yes	60	0	1.728273	Yes	Yes	-43.64	5111.44	2535.62	2575.82	0.64	0.123	2535.62	2575.82	9.60	0.886	0.84	10.16	51.5	61.7	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.81
43.799	12.393	0.21	115.56	Yes	59	0	1.694505	Yes	Yes	-43.80	5130.40	2545.86	2584.54	0.63	0.123	2545.86	2584.54	9.82	0.883	0.84	10.39	51.3	61.7	0.101	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.81
43.963	12.652	0.214	115.56	Yes	59	0	1.691432	Yes	Yes	-43.96	5149.35	2556.09	2593.26	0.63	0.123	2556.09	2593.26	10.00	0.881	0.84	10.58	51.2	61.8	0.101	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	0.81
44.127	11.644	0.221	115.56	Yes	64	0	1.897973	Yes	Yes	-44.13	5168.30	2566.32	2601.97	0.63	0.122	2566.32	2601.97	9.15	0.891	0.83	9.68	52.1	61.8	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	0.81
44.291	10.744	0.226	115.56	Yes	69	0	2.1035	Yes	Yes	-44.29	5187.25	2576.56	2610.69	0.63	0.122	2576.56	2610.69	8.40	0.901	0.83	8.89	52.8	61.7	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.81
44.455	9.609	0.235	115.56	Yes	77	0	2.445624	Yes	Yes	-44.46	5206.20	2586.79	2619.41	0.63	0.122	2586.79	2619.41	7.47	0.915	0.82	7.91	53.8	61.7	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.81
44.619	9.903	0.252	115.56	Yes	76	0	2.544683	Yes	Yes	-44.62	5225.15	2597.03	2628.13	0.63	0.122	2597.03	2628.13	7.68	0.911	0.82	8.13	53.8	61.9	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.81
44.783	12.039	0.243	115.56	Yes	64	0	2.01844	Yes	Yes	-44.78	5244.11	2607.26	2636.85	0.63	0.121	2607.26	2636.85	9.36	0.889	0.82	9.90	52.2	62.1	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.82
44.947	16.64	0.249	115.56	Yes	49	0	1.496394	Yes	Yes	-44.95	5263.06	2617.49	2645.57	0.62	0.121	2617.49	2645.57	13.01	0.848	0.83	13.77	49.0	62.8	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.82
45.111	15.197	0.266	115.56	Yes	54	0	1.750345	Yes	Yes	-45.11	5282.01	2627.73	2654.28	0.62	0.121	2627.73	2654.28	11.82	0.860	0.82	12.51	50.4	62.9	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.82
45.275	14.116	0.262	115.56	Yes	57	0	1.85605	Yes	Yes	-45.28	5300.96	2637.96	2663.00	0.62	0.121	2637.96	2663.00	10.92	0.870	0.82	11.56	51.1	62.6	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.82
45.439	14.75	0.267	115.56	Yes	56	0	1.810169	Yes	Yes	-45.44	5319.91	2648.19	2671.72	0.62	0.120	2648.19	2671.72	11.40	0.865	0.82	12.06	50.8	62.8	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.83
45.603	16.322	0.265	115.56	Yes	51	0	1.623576	Yes	Yes	-45.60	5338.87	2658.43	2680.44	0.62	0.120	2658.43	2680.44	12.61	0.852	0.82	13.34	49.7	63.0	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.83
45.767	17.264	0.256	115.56	Yes	48	0	1.482854	Yes	Yes	-45.77	5357.82	2668.66	2689.16	0.62	0.120	2668.66	2689.16	13.33	0.845	0.82	14.10	48.9	62.9	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.83
45.931	17.084	0.246	115.56	Yes	48	0	1.439944	Yes	Yes	-45.93	5376.77	2678.89	2697.87	0.62	0.120	2678.89	2697.87	13.15	0.846	0.81	13.91	48.8	62.7	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.83
46.095	15.692	0.24	115.56	Yes	52	0	1.529442	Yes	Yes	-46.10	5395.72	2689.13	2706.59	0.62	0.120	2689.13	2706.59	12.01	0.858	0.81	12.70	49.7	62.4	0.101	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.83
46.259	14.722	0.235	115.56	Yes	54	0	1.596251	Yes	Yes	-46.26	5414.67	2699.36	2715.31	0.61	0.119	2699.36	2715.31	11.21	0.867	0.81	11.86	50.3	62.2	0.101	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.83
46.423	12.826	0.233	115.56	Yes	61	0	1.816622	Yes	Yes	-46.42	5433.62	2709.60	2724.03	0.61	0.119	2709.60	2724.03	9.70	0.884	0.80	10.26	51.7	61.9	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.83
46.587	10.565	0.217	115.56	Yes	71	0	2.053952	Yes	Yes	-46.59	5452.58	2719.83	2732.75	0.61	0.119	2719.83	2732.75	7.92	0.908	0.79	8.38	53.1	61.5	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.82
46.751	7.727	0.186	115.56	Yes	91	0	2.407144	Yes	Yes	-46.75	5471.53	2730.06	2741.47	0.61	0.119	2730.06	2741.47	5.72	0.943	0.78	6.05	54.9	60.9	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.82
46.915	6.043	0.132	115.56	Yes	100	0	2.184346	Yes	Yes	-46.92	5490.48	2740.30	2750.18	0.61	0.118	2740.30	2750.18	4.43	0.969	0.78	4.69	55.3	60.0	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.82
47.079	9.327	0.141	115.56	Yes	72	0	1.51174	Yes	Yes	-47.08	5509.43	2750.53	2758.90	0.61	0.118	2750.53	2758.90	6.90	0.923	0.78	7.30	53.0	60.3	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.82
47.244	9.72	0.175	115.56	Yes	73	0	1.800412	Yes	Yes	-47.24	5528.50	2760.83	2767.67	0.61	0.118	2760.83	2767.67	7.18	0.919	0.78	7.59	53.2	60.8	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.82
47.408	12.141	0.228	115.56	Yes	64	0	1.877934	Yes	Yes	-47.41	5547.45	2771.06	2776.39	0.60	0.118	2771.06	2776.39	9.00	0.893	0.78	9.53	52.2	61.7	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.83
47.572	11.575	0.225	115.56	Yes	67	0	1.943844	Yes	Yes	-47.57	5566.40	2781.29	2785.11	0.60	0.117	2781.29	2785.11	8.55	0.899	0.78	9.04	52.6	61.6	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.83
47.736	9.137	0.199	115.56	Yes	80	0	2.177958	Yes	Yes	-47.74	5585.36	2791.53	2793.83	0.60	0.117	2791.53	2793.83	6.67	0.927	0.77	7.06	54.0	61.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.83
47.9	7.697	0.178	115.56	Yes	91	0	2.312589	Yes	Yes	-47.90	5604.31	2801.76	2802.55	0.60	0.117	2801.76	2802.55	5.58	0.946	0.77	5.90	54.9	60.8	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.83
48.064	6.753	0.148	115.56	Yes	100	0	2.191619	Yes	Yes	-48.06	5623.26	2811.99	2811.27	0.60	0.117	2811.99	2811.27	4.86	0.960	0.76	5.14	55.4	60.6	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.83
48.228	6.693	0.129	115.56	Yes	98	0	1.927387	Yes	Yes	-48.23	5642.21	2822.23	2819.98	0.60	0.117	2822.23	2819.98	4.80	0.961	0.76	5.08	55.3	60.3	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.83
48.392	7.003	0.12	115.56	Yes	93	0	1.713551	Yes	Yes	-48.39	5661.16	2832.46	2828.70	0.60	0.116	2832.46	2828.70	5.01	0.957	0.76	5.30	54.9	60.2	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.83
48.556	6.61	0.12	115.56	Yes	98	0	1.815431	Yes	Yes	-48.56	5680.11	2842.69	2837.42	0.59	0.116	2842.69	2837.42	4.71	0.963	0.75	4.98	55.3	60.2	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.83
48.72	6.829	0.121	115.56	Yes	95	0	1.771855	Yes	Yes	-48.72	5699.07	2852.93	2846.14	0.59	0.116	2852.93	2846.14	4.86	0.960	0.75	5.14	55.1	60.2	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.83
48.884	7.644	0.182	115.56	Yes	94	0	2.380952	Yes	Yes	-48.88	5718.02	2863.16	2854.86	0.59	0.116	2863.16	2854.86	5.44	0.949	0.75	5.75	55.1	60.9	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.84
49.048	7.834	0.156	115.56	Yes	89	0	1.99132	Yes	Yes	-49.05	5736.97	2873.40	2863.57	0.59	0.115	2873.40	2863.57	5.56	0.946	0.75	5.88	54.7	60.6	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.84
49.212	8.229	0.136	115.56	Yes	82	0	1.652692	Yes	Yes	-49.21	5755.92	2883.63	2872.29	0.59	0.115	2883.63	2872.29	5.83	0.941	0.75	6.17	54.1	60.2	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.83
49.376	5.913	0.097	115.56	Yes	100	0	1.640453	Yes	Yes	-49.38	5774.87	2893.86	2881.01	0.59	0.115	2893.86	2881.01	4.14	0.976	0.74	4.38	55.2	59.6	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.83
49.54	5.117	0.05	112.35	Yes	100	0	0.977135	Yes	Yes	-49.54	5793.30	2904.10	2889.20	0.59	0.115	2904.10	2889.20	3.55	0.990	0.73	3.76	55.0	58.8	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.83
49.704	5.411	0.026	112.35	Yes	100	0	0.480503	Yes	Yes	-49.70	5811.72	2914.33	2897.39	0.59	0.115	2914.33	2897.39	3.75	0.985	0.73	3.97	55.1	59.1	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.83
49.868	5.423	0.087	112.35	Yes	100	0	1.604278	Yes	Yes	-49.87	5830.15	2924.56	2905.59	0.58	0.114	2924.56	2905.59	3.75	0.985	0.73	3.97	55.1	59.1	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.83
50.032	5.573	0.105	115.56	Yes	100	0	1.884084	Yes	Yes	-50.03	5849.10	2934.80	2914.30	0.58	0.114	2934.80	2914.30	3.85	0.983	0.73	4.07	55.1	59.2	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.83
50.196	8.298	0.118	115.56	Yes	80	0	1.422029	Yes	Yes	-50.20	5868.05	2945.03	2923.02	0.58	0.114	2945.03	2923.02	5.78	0.942	0.74	6.12	53.8	59.9	0.099	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.84
50.36	7.816	0.122	115.56	Yes	86	0	1.560901	Yes	Yes	-50.36	5887.01	2955.26	2931.74	0.58	0.114	2955.26	2931.74	5.42	0.949	0.73	5.74	54.3	60.1	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.84
50.524	7.872	0.151	115.56	Yes	90	0	1.918191	Yes	Yes	-50.52	5905.96	2965.50	2940.46	0.58	0.113	2965.50	2940.46	5.45	0.948	0.73	5.76	54.7	60.5	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.85
50.688	7.856	0.166	115.56	Yes	92	0	2.113035	Yes	Yes	-50.69	5924.91	2975.73	2949.18	0.58	0.113	2975.73	2949.18	5.42	0.949	0.73	5.73	54.9	60.6	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.85
50.852	9.261	0.219	115.56	Yes	84	0	2.364755	Yes	Yes	-50.85	5943.86	2985.96	2957.90	0.58	0.113	2985.96	2957.90	6.41	0.931	0.73	6.78	54.4	61.2	0.100	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.85
51.016	11.714	0.257	115.56	Yes	71	0	2.193956	Yes	Yes	-51.02	5962.81	2996.20	2966.61	0.58	0.113	2996.20	2966.61	8.16	0.905	0.74	8.63	53.2	61.8	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.86
51.18	12.27	0.277	115.56	Yes	70	0	2.257539	Yes	Yes	-51.18	5981.76	3006.43	2975.33	0.57	0.112	3006.43	2975.33	8.54	0.899	0.74	9.03	53.1	62.1	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.86
51.345	11.621	0.289	115.56	Yes	74	0	2.486877	Yes	Yes	-51.35	6000.83	3016.73	2984.10	0.57	0.112	3016.73	2984.10	8.04	0.906	0.73	8.51	53.6	62.1	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.86
51.509	10.964	0.295	115.56	Yes	79	0	2.690624	Yes	Yes	-51.51	6019.78	3026.96	2992.82	0.57	0.112	3026.96	2992.82	7.55	0.913	0.73	7.99	54.1	62.1	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.86
51.673	10.926	0.303	115.56	Yes	80	0	2.773202	Yes	Yes	-51.67	6038.74	3037.20	3001.54	0.57	0.112	3037.20	3001.54	7.50	0.914	0.73	7.94	54.2	62.1	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.87
51.837	11.368	0.302	115.56	Yes	77	0	2.65658	Yes	Yes	-51.84	6057.69	3047.43	3010.26	0.57	0.112	3047.43	3010.26	7.80	0.910	0.73	8.25	53.9	62.2	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.87
52.001	11.105	0.299	115.56	Yes	78	0	2.692481	Yes	Yes	-52.00	6076.64	3057.66	3018.98	0.57	0.111	3057.66	3018.98	7.59	0.913	0.72	8.03	54.1	62.1	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.87
52.165	9.824	0.361	112.35	Yes	91	0	3.674674	Yes	Yes	-52.17	6095.06	3067.90	3027.17	0.57	0.111	3067.90	3027.17	6.66	0.927	0.72	7.05	55.3	62.3	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.87
52.329	8.712	0.302	112.35	Yes	98	0	3.466483	Yes	Yes	-52.33	6113.49	3078.13	3035.36	0.56	0.111	3078.13	3035.36	5.86	0.941	0.71	6.20	55.6	61.8	0.101	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.87
52.493	10.049	0.266	115.56	Yes	84	0	2.64703	Yes	Yes	-52.49	6132.44	3088.36	3044.08	0.56	0.111	3088.36	3044.08	6.78	0.925	0.71	7.18	54.5	61.7	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.87
52.657	8.834	0.244	115.56	Yes	92	0	2.762056	Yes	Yes	-52.66	6151.39	3098.60	3052.80	0.56	0.110	3098.60	3052.80	5.92	0.940	0.71	6.26	55.1	61.4	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.87
52.821	7.862	0.221	115.56	Yes	100	0	2.81099	Yes	Yes	-52.82	6170.35	3108.83	3061.52	0.56	0.110	3108.83	3061.52	5.23	0.953	0.70	5.53	55.6	61.1	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.87
52.985	7.549	0.2	115.56	Yes	100	0	2.649358	Yes	Yes	-52.99	6189.30	3119.06	3070.23	0.56	0.110	3119.06	3070.23	5.00	0.957	0.70	5.29	55.5	60.8	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.87
53.149	8.82	0.194	115.56	Yes	88	0	2.199546	Yes	Yes	-53.15	6208.25	3129.30	3078.95	0.56	0.110	3129.30	3078.95	5.86	0.941	0.70	6.20	54.7	60.9	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.87
53.313	11.535	0.23	115.56	Yes	72	0	1.993932	Yes	Yes	-53.31	6227.20	3139.53	3087.67	0.56	0.110	3139.53	3087.67	7.73	0.911	0.71	8.18	53.2	61.4	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.87
53.477	9.976	0.232	115.56	Yes	82	0	2.325581	Yes	Yes	-53.48	6246.15	3149.76	3096.39	0.56	0.109	3149.76	3096.39	6.62	0.928	0.70	7.01	54.3	61.3	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.87
53.641	8.617	0.225	115.56	Yes	94	0	2.611118	Yes	Yes	-53.64	6265.10	3160.00	3105.11	0.55	0.109	3160.00	3105.11	5.67	0.944	0.70	6.00	55.2	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.87
53.805	8.745	0.222	115.56	Yes	92	0	2.538593	Yes	Yes	-53.81	6284.06	3170.23	3113.82	0.55	0.109	3170.23	3113.82	5.74	0.943	0.69	6.07	55.1	61.1	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.88
53.969	9.311	0.231	115.56	Yes	88	0	2.480937	Yes	Yes	-53.97	6303.01	3180.47	3122.54	0.55	0.109	3180.47	3122.54	6.11	0.936	0.69	6.47	54.8	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.88
54.133	9.763	0.241	115.56	Yes	85	0	2.468504	Yes	Yes	-54.13	6321.96	3190.70	3131.26	0.55	0.109	3190.70	3131.26	6.41	0.931	0.69	6.78	54.6	61.3	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.88
54.297	11.399	0.238	115.56	Yes	74	0	2.087902	Yes	Yes	-54.30	6340.91	3200.93	3139.98	0.55	0.108	3200.93	3139.98	7.51	0.914	0.70	7.95	53.5	61.4	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.88
54.461	11.961	0.259	115.56	Yes	73	0	2.165371	Yes	Yes	-54.46	6359.86	3211.17	3148.70	0.55	0.108	3211.17	3148.70	7.88	0.909	0.70	8.34	53.4	61.7	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.88
54.625	9.83	0.262	115.56	Yes	87	0	2.66531	Yes	Yes	-54.63	6378.82	3221.40	3157.42	0.55	0.108	3221.40	3157.42	6.40	0.932	0.69	6.77	54.7	61.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.88
54.789	10.369	0.275	115.56	Yes	84	0	2.652136	Yes	Yes	-54.79	6397.77	3231.63	3166.13	0.55	0.108	3231.63	3166.13	6.75	0.926	0.69	7.14	54.5	61.7	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.89

CPT Liquefaction Analysis

54.953	14.441	0.286	115.56	Yes	64	0	1.980472	Yes	Yes	-54.95	6416.72	3241.87	3174.85	0.55	0.107	3241.87	3174.85	9.53	0.887	0.70	10.08	52.2	62.3	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.89
55.117	15.954	0.308	115.56	Yes	60	0	1.93055	Yes	Yes	-55.12	6435.67	3252.10	3183.57	0.54	0.107	3252.10	3183.57	10.55	0.874	0.70	11.16	51.7	62.8	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.90
55.281	15.481	0.288	115.56	Yes	61	0	1.860345	Yes	Yes	-55.28	6454.62	3262.33	3192.29	0.54	0.107	3262.33	3192.29	10.20	0.878	0.70	10.79	51.7	62.5	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.90
55.446	17.117	0.281	115.56	Yes	55	0	1.641643	Yes	Yes	-55.45	6473.69	3272.63	3201.06	0.54	0.107	3272.63	3201.06	11.31	0.866	0.70	11.96	50.6	62.6	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.90
55.61	16.096	0.262	115.56	Yes	57	0	1.627734	Yes	Yes	-55.61	6492.64	3282.86	3209.78	0.54	0.107	3282.86	3209.78	10.57	0.874	0.69	11.18	51.0	62.2	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.90
55.774	16.109	0.265	115.56	Yes	58	0	1.645043	Yes	Yes	-55.77	6511.59	3293.10	3218.50	0.54	0.106	3293.10	3218.50	10.55	0.874	0.69	11.16	51.1	62.2	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.90
55.938	14.595	0.274	115.56	Yes	63	0	1.877355	Yes	Yes	-55.94	6530.55	3303.33	3227.21	0.54	0.106	3303.33	3227.21	9.49	0.887	0.69	10.04	52.1	62.1	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.90
56.102	12.581	0.28	115.56	Yes	72	0	2.225578	Yes	Yes	-56.10	6549.50	3313.56	3235.93	0.54	0.106	3313.56	3235.93	8.09	0.906	0.68	8.56	53.4	61.9	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.90
56.266	11.073	0.255	115.56	Yes	79	0	2.302899	Yes	Yes	-56.27	6568.45	3323.80	3244.65	0.54	0.106	3323.80	3244.65	7.06	0.921	0.67	7.47	54.0	61.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.90
56.43	8.965	0.202	115.56	Yes	91	0	2.253207	Yes	Yes	-56.43	6587.40	3334.03	3253.37	0.53	0.106	3334.03	3253.37	5.64	0.945	0.67	5.97	54.9	60.9	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.89
56.594	8.398	0.166	115.56	Yes	93	0	1.976661	Yes	Yes	-56.59	6606.35	3344.27	3262.09	0.53	0.105	3344.27	3262.09	5.26	0.952	0.66	5.56	55.0	60.5	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.89
56.758	7.002	0.133	115.56	Yes	100	0	1.899457	Yes	Yes	-56.76	6625.31	3354.50	3270.81	0.53	0.105	3354.50	3270.81	4.34	0.971	0.66	4.59	55.3	59.9	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.89
56.922	6.019	0.109	115.56	Yes	100	0	1.810932	Yes	Yes	-56.92	6644.26	3364.73	3279.52	0.53	0.105	3364.73	3279.52	3.69	0.986	0.65	3.91	55.1	59.0	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.88
57.086	5.835	0.069	112.35	Yes	80	0	1.182519	Yes	Yes	-57.09	6662.68	3374.97	3287.72	0.53	0.105	3374.97	3287.72	3.57	0.990	0.65	3.77	53.1	56.9	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.87
57.25	5.891	0.037	112.35	Yes	80	0	0.628077	Yes	Yes	-57.25	6681.11	3385.20	3295.91	0.53	0.105	3385.20	3295.91	3.59	0.989	0.65	3.80	53.1	56.9	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.87
57.414	5.389	0.015	112.35	Yes	80	0	0.278345	Yes	Yes	-57.41	6699.53	3395.43	3304.10	0.53	0.104	3395.43	3304.10	3.27	0.998	0.64	3.45	53.0	56.5	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.87
57.578	5.296	0.013	112.35	Yes	80	0	0.245468	Yes	Yes	-57.58	6717.96	3405.67	3312.29	0.53	0.104	3405.67	3312.29	3.20	1.000	0.64	3.38	53.0	56.4	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.87
57.742	6.13	0.024	112.35	Yes	80	0	0.391517	Yes	Yes	-57.74	6736.38	3415.90	3320.48	0.53	0.104	3415.90	3320.48	3.72	0.986	0.64	3.93	53.1	57.1	0.097	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.88
57.906	8.42	0.076	112.35	Yes	80	0	0.902613	Yes	Yes	-57.91	6754.81	3426.13	3328.68	0.52	0.104	3426.13	3328.68	5.17	0.954	0.65	5.47	53.6	59.0	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.89
58.07	11.922	0.148	115.56	Yes	67	0	1.241402	Yes	Yes	-58.07	6773.76	3436.37	3337.39	0.52	0.104	3436.37	3337.39	7.43	0.915	0.66	7.86	52.2	60.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.90
58.234	14.614	0.215	115.56	Yes	61	0	1.471192	Yes	Yes	-58.23	6792.71	3446.60	3346.11	0.52	0.103	3446.60	3346.11	9.18	0.891	0.66	9.72	51.5	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.91
58.398	13.412	0.222	115.56	Yes	66	0	1.655234	Yes	Yes	-58.40	6811.66	3456.84	3354.83	0.52	0.103	3456.84	3354.83	8.37	0.902	0.66	8.85	52.4	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.91
58.562	10.631	0.214	115.56	Yes	81	0	2.012981	Yes	Yes	-58.56	6830.62	3467.07	3363.55	0.52	0.103	3467.07	3363.55	6.53	0.929	0.65	6.91	54.1	61.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.91
58.726	9.215	0.267	115.56	Yes	97	0	2.89745	Yes	Yes	-58.73	6849.57	3477.30	3372.27	0.52	0.103	3477.30	3372.27	5.61	0.946	0.64	5.93	55.4	61.4	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.92
58.89	8.278	0.252	115.56	Yes	100	0	3.044214	Yes	Yes	-58.89	6868.52	3487.54	3380.98	0.52	0.103	3487.54	3380.98	5.00	0.957	0.64	5.29	55.5	60.8	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.91
59.054	12.018	0.232	115.56	Yes	74	0	1.930438	Yes	Yes	-59.05	6887.47	3497.77	3389.70	0.52	0.102	3497.77	3389.70	7.38	0.916	0.65	7.81	53.4	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.92
59.218	12.853	0.233	115.56	Yes	70	0	1.812806	Yes	Yes	-59.22	6906.42	3508.00	3398.42	0.52	0.102	3508.00	3398.42	7.90	0.908	0.65	8.36	52.9	61.3	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.92
59.382	11.361	0.229	115.56	Yes	78	0	2.015668	Yes	Yes	-59.38	6925.38	3518.24	3407.14	0.51	0.102	3518.24	3407.14	6.92	0.923	0.64	7.32	53.8	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.92
59.547	8.885	0.219	115.56	Yes	97	0	2.464828	Yes	Yes	-59.55	6944.44	3528.53	3415.91	0.51	0.102	3528.53	3415.91	5.33	0.951	0.63	5.64	55.3	61.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.92
59.711	8.887	0.201	115.56	Yes	95	0	2.261731	Yes	Yes	-59.71	6963.40	3538.77	3424.63	0.51	0.101	3538.77	3424.63	5.31	0.951	0.63	5.62	55.2	60.8	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.92
59.875	9.753	0.253	115.56	Yes	92	0	2.594074	Yes	Yes	-59.88	6982.35	3549.00	3433.35	0.51	0.101	3549.00	3433.35	5.85	0.941	0.63	6.18	55.1	61.3	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.92
60.039	11.279	0.252	115.56	Yes	81	0	2.234241	Yes	Yes	-60.04	7001.30	3559.23	3442.07	0.51	0.101	3559.23	3442.07	6.80	0.925	0.64	7.19	54.2	61.4	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.93
60.203	12.92	0.254	115.56	Yes	72	0	1.965944	Yes	Yes	-60.20	7020.25	3569.47	3450.78	0.51	0.101	3569.47	3450.78	7.83	0.909	0.64	8.28	53.2	61.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.93
60.367	10.202	0.256	115.56	Yes	89	0	2.509312	Yes	Yes	-60.37	7039.20	3579.70	3459.50	0.51	0.101	3579.70	3459.50	6.08	0.937	0.63	6.44	54.9	61.3	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.93
60.531	9.65	0.252	115.56	Yes	94	0	2.611399	Yes	Yes	-60.53	7058.15	3589.93	3468.22	0.51	0.101	3589.93	3468.22	5.72	0.943	0.63	6.05	55.2	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.93
60.695	12.68	0.278	115.56	Yes	75	0	2.192429	Yes	Yes	-60.70	7077.11	3600.17	3476.94	0.51	0.100	3600.17	3476.94	7.62	0.912	0.64	8.06	53.6	61.7	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.93
60.859	16.734	0.319	115.56	Yes	61	0	1.906299	Yes	Yes	-60.86	7096.06	3610.40	3485.66	0.50	0.100	3610.40	3485.66	10.20	0.878	0.65	10.79	51.9	62.7	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.94
61.023	17.846	0.33	115.56	Yes	59	0	1.849154	Yes	Yes	-61.02	7115.01	3620.64	3494.37	0.50	0.100	3620.64	3494.37	10.90	0.870	0.65	11.53	51.4	63.0	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.95
61.187	17.805	0.332	115.56	Yes	59	0	1.864645	Yes	Yes	-61.19	7133.96	3630.87	3503.09	0.50	0.100	3630.87	3503.09	10.85	0.871	0.64	11.48	51.5	63.0	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.95
61.351	17.403	0.338	115.56	Yes	60	0	1.942194	Yes	Yes	-61.35	7152.91	3641.10	3511.81	0.50	0.100	3641.10	3511.81	10.56	0.874	0.64	11.18	51.8	63.0	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.95
61.515	15.241	0.328	115.56	Yes	67	0	2.15209	Yes	Yes	-61.52	7171.87	3651.34	3520.53	0.50	0.099	3651.34	3520.53	9.15	0.891	0.64	9.68	52.8	62.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.95
61.679	14.282	0.349	115.56	Yes	72	0	2.443635	Yes	Yes	-61.68	7190.82	3661.57	3529.25	0.50	0.099	3661.57	3529.25	8.52	0.900	0.63	9.01	53.5	62.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.95
61.843	14.051	0.356	115.56	Yes	74	0	2.533627	Yes	Yes	-61.84	7209.77	3671.80	3537.97	0.50	0.099	3671.80	3537.97	8.35	0.902	0.63	8.84	53.7	62.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.95
62.007	15.869	0.325	115.56	Yes	65	0	2.048018	Yes	Yes	-62.01	7228.72	3682.04	3546.68	0.50	0.099	3682.04	3546.68	9.49	0.887	0.63	10.04	52.5	62.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.95
62.171	16.317	0.387	115.56	Yes	67	0	2.37176	Yes	Yes	-62.17	7247.67	3692.27	3555.40	0.50	0.099	3692.27	3555.40	9.75	0.884	0.63	10.31	52.9	63.2	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.96
62.335	13.498	0.337	115.56	Yes	76	0	2.496666	Yes	Yes	-62.34	7266.62	3702.50	3564.12	0.49	0.098	3702.50	3564.12	7.95	0.908	0.62	8.41	53.8	62.2	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.95
62.499	15.211	0.317	115.56	Yes	67	0	2.084018	Yes	Yes	-62.50	7285.58	3712.74	3572.84	0.49	0.098	3712.74	3572.84	9.00	0.893	0.63	9.53	52.8	62.3	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.95
62.663	12.846	0.324	115.56	Yes	79	0	2.522186	Yes	Yes	-62.66	7304.53	3722.97	3581.56	0.49	0.098	3722.97	3581.56	7.51	0.914	0.62	7.94	54.1	62.0	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.95
62.827	12.966	0.346	115.56	Yes	79	0	2.668518	Yes	Yes	-62.83	7323.48	3733.20	3590.28	0.49	0.098	3733.20	3590.28	7.56	0.913	0.62	8.00	54.2	62.2	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.96
62.991	13.357	0.357	115.56	Yes	78	0	2.672756	Yes	Yes	-62.99	7342.43	3743.44	3598.99	0.49	0.098	3743.44	3598.99	7.79	0.910	0.62	8.24	54.1	62.3	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.96
63.155	14.886	0.362	115.56	Yes	71	0	2.431815	Yes	Yes	-63.16	7361.38	3753.67	3607.71	0.49	0.097	3753.67	3607.71	8.72	0.897	0.62	9.22	53.4	62.6	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.96
63.319	15.418	0.362	115.56	Yes	69	0	2.347905	Yes	Yes	-63.32	7380.34	3763.91	3616.43	0.49	0.097	3763.91	3616.43	9.03	0.893	0.62	9.55	53.2	62.7	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.96
63.483	14.783	0.355	115.56	Yes	72	0	2.401407	Yes	Yes	-63.48	7399.29	3774.14	3625.15	0.49	0.097	3774.14	3625.15	8.61	0.898	0.62	9.11	53.4	62.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.96
63.648	14.516	0.363	115.56	Yes	73	0	2.500689	Yes	Yes	-63.65	7418.35	3784.44	3633.92	0.49	0.097	3784.44	3633.92	8.43	0.901	0.61	8.92	53.6	62.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.96
63.812	14.079	0.376	115.56	Yes	76	0	2.670644	Yes	Yes	-63.81	7437.31	3794.67	3642.64	0.49	0.097	3794.67	3642.64	8.14	0.905	0.61	8.61	53.9	62.6	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.97
63.976	14.783	0.384	115.56	Yes	74	0	2.597578	Yes	Yes	-63.98	7456.26	3804.90	3651.36	0.48	0.097	3804.90	3651.36	8.56	0.899	0.61	9.05	53.7	62.7	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.97
64.14	16.024	0.363	115.56	Yes	68	0	2.265352	Yes	Yes	-64.14	7475.21	3815.14	3660.07	0.48	0.096	3815.14	3660.07	9.30	0.889	0.61	9.84	52.9	62.8	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.97
64.304	16.621	0.376	115.56	Yes	66	0	2.262198	Yes	Yes	-64.30	7494.16	3825.37	3668.79	0.48	0.096	3825.37	3668.79	9.65	0.885	0.61	10.21	52.8	63.0	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.97
64.468	14.579	0.413	115.56	Yes	76	0	2.832842	Yes	Yes	-64.47	7513.11	3835.60	3677.51	0.48	0.096	3835.60	3677.51	8.37	0.902	0.61	8.86	54.0	62.9	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.97
64.632	14.737	0.429	115.56	Yes	76	0	2.91104	Yes	Yes	-64.63	7532.07	3845.84	3686.23	0.48	0.096	3845.84	3686.23	8.45	0.901	0.61	8.94	54.0	63.0	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.98
64.796	19.716	0.406	115.56	Yes	59	0	2.059241	Yes	Yes	-64.80	7551.02	3856.07	3694.95	0.48	0.096	3856.07	3694.95	11.52	0.863	0.62	12.18	51.7	63.8	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.98
64.96	21.444	0.374	115.56	Yes	54	0	1.744078	Yes	Yes	-64.96	7569.97	3866.30	3703.67	0.48	0.095	3866.30	3703.67	12.58	0.852	0.62	13.31	50.5	63.8	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.096	0.98
65.124	18.875	0.346	115.56	Yes	59	0	1.833113	Yes	Yes	-65.12	7588.92	3876.54	3712.38	0.48	0.095	3876.54	3712.38	10.94	0.870	0.61	11.58	51.5	63.0	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.98
65.288	15.24	0.362	115.56	Yes	71	0	2.375328	Yes	Yes	-65.29	7607.87	3886.77	3721.10	0.48	0.095	3886.77	3721.10	8.68	0.897	0.60	9.18	53.4	62.6	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.98
65.452	13.571	0.396	115.56	Yes	81	0	2.917987	Yes	Yes	-65.45	7626.83	3897.00	3729.82	0.48	0.095	3897.00	3729.82	7.65	0.912	0.60	8.09	54.4	62.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.98
65.616	16.389	0.382	115.56	Yes	68	0	2.330832	Yes	Yes	-65.62	7645.78	3907.24	3738.54	0.48	0.095	3907.24	3738.54	9.34	0.889	0.60	9.88	53.0	62.9	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.98
65.78	20.809	0.35	115.56	Yes	54	0	1.681965	Yes	Yes	-65.78	7664.73	3917.47	3747.26	0.47	0.095	3917.47	3747.26	12.05	0.858	0.61	12.75	50.6	63.4	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.99
65.944	19.039	0.334	115.56	Yes	58	0	1.754294	Yes	Yes	-65.94	7683.68	3927.71	3755.98	0.47	0.094	3927.71	3755.98	10.92	0.870	0.61	11.56	51.3	62.9	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.99
66.108	14.415	0.314	115.56	Yes	73	0	2.178287	Yes	Yes	-66.11	7702.63	3937.94	3764.69	0.47	0.094	3937.94	3764.69	8.09	0.906	0.59	8.55	53.4	62.0	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.98
66.272	12.084	0.298	115.56	Yes	84	0	2.466071	Yes	Yes	-66.27	7721.58	3948.17	3773.41	0.47	0.094	3948.17	3773.41	6.68	0.927	0.58	7.07	54.5	61.6	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.98
66.436	11.885	0.289	115.56	Yes	85	0	2.431637	Yes	Yes	-66.44	7740.54	3958.41	3782.13	0.47	0.094	3958.41	3782.13	6.55	0.929	0.58	6.93	54.6	61.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.98
66.6	11.387	0.284	115.56	Yes	88	0	2.494072	Yes	Yes	-66.60	7759.49	3968.64	3790.85	0.47	0.094	3968.64	3790.85	6.24	0.934	0.58	6.60	54.8	61.4	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.98
66.764	11.385	0.291	115.56	Yes	89	0	2.555995	Yes	Yes	-66.76	7778.44	3978.87	3799.57	0.47	0.094	3978.87	3799.57	6.23	0.934	0.58	6.59	54.9	61.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.98
66.928	11.047	0.29	115.56	Yes	91	0	2.625147	Yes	Yes	-66.93	7797.39	3989.11	3808.28	0.47	0.093	3989.11	3808.28	6.02	0.938	0.58	6.37	55.0	61.4	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.98
67.092	11.6	0.298	115.56	Yes	88	0	2.568966	Yes	Yes	-67.09	7816.34	3999.34	3817.00	0.47	0.093	3999.34	3817.00	6.32	0.933	0.58	6.69	54.8	61.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.99
67.256	11.782	0.331	115.56	Yes	89	0	2.80937	Yes	Yes	-67.26	7835.30	4009.57	3825.72	0.47	0.093	4009.57	3825.72	6.42	0.931	0.58	6.79	55.0	61.7	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.99
67.42	12.846	0.347	115.56	Yes	84	0	2.70123	Yes	Yes	-67.42	7854.25	4019.81	3834.44	0.46	0.093	4019.81	3834.44	7.02	0.921	0.58	7.43	54.5	62.0	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.99
67.584	17.339	0.365	115.56	Yes	65	0	2.105081	Yes	Yes	-67.58	7873.20	4030.04	3843.16	0.46	0.093	4030.04	3843.16	9.67	0.885	0.59	10.23	52.6	62.8	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	1.00
67.749	19.686	0.385	115.56	Yes	60	0	1.955705	Yes	Yes	-67.75	7892.27	4040.34	3851.93	0.46	0.092	4040.34	3851.93	11.06	0.868	0.59	11.70	51.7	63.4	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	1.00
67.913	19.658	0.389	115.56	Yes	60	0	1.978838	Yes	Yes	-67.91	7911.22	4050.57	3860.65	0.46	0.092	4050.57	3860.65	11.02	0.869	0.59	11.66	51.8	63.4	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	1.01
68.077	18.662	0.453	115.56	Yes	65	0	2.427393	Yes	Yes	-68.08	7930.17	4060.80	3869.37	0.46	0.092	4060.80	3869.37	10.40	0.876	0.59	11.00	52.8	63.8	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	1.01
68.241	16.331	0.453	115.56	Yes	73	0	2.773866	Yes	Yes	-68.24	7949.12	4071.04	3878.08	0.46	0.092	4071.04	3878.08	8.98	0.893	0.58	9.50	53.7	63.2	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	1.01
68.405	18.086	0.431	115.56	Yes	66	0	2.383059	Yes	Yes	-68.41	7968.07	4081.27	3886.80	0.46	0.092	4081.27	3886.80	10.01	0.881	0.59	10.59	52.9	63.4	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	1.01
68.569	17.932	0.403	115.56	Yes	66	0	2.247379	Yes	Yes	-68.57	7987.03	4091.51	3895.52	0.46	0.092	4091.51	3895.52	9.89	0.882	0.58	10.47	52.7	63.2	0.102	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	1.01
68.733	14.73	0.434	115.56	Yes	79	0	2.946368	Yes	Yes	-68.73	8005.98	4101.74	3904.24	0.46	0.091	4101.74	3904.24	7.99	0.907	0.57	8.45	54.3	62.8	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	1.01
68.897	11.689	0.328	115.56	Yes	91	0	2.806057	Yes	Yes	-68.90	8024.93	4111.97	3912.96	0.46	0.091	4111.97	3912.96	6.22	0.935	0.56	6.58	55.1	61.7	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.00
69.061	11.628	0.249	115.56	Yes	86	0	2.141383	Yes	Yes	-69.06	8043.88	4122.21	3921.67	0.46	0.091	4122.21	3921.67	6.17	0.935	0.56	6.53	54.5	61.1	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.00
69.225	9.194	0.201	115.56	Yes	100	0	2.186208	Yes	Yes	-69.23	8062.83	4132.44	3930.39	0.45	0.091	4132.44	3930.39	4.79	0.961	0.55	5.07	55.4	60.5	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.00
69.389	8.747	0.217	115.56	Yes	100	0	2.480851	Yes	Yes	-69.39	8081.78	4142.67	3939.11	0.45	0.091	4142.67	3939.11	4.53	0.967	0.55	4.80	55.3	60.1	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.99
69.553	13.458	0.23	115.56	Yes	74	0	1.709021	Yes	Yes	-69.55	8100.74	4152.91	3947.83	0.45	0.091	4152.91	3947.83	7.17	0.919	0.56	7.59	53.4	61.0	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	1.00
69.717	14.697	0.279	115.56	Yes	72	0	1.898347	Yes	Yes	-69.72	8119.69	4163.14	3956.55	0.45	0.091	4163.14	3956.55	7.87	0.909	0.57	8.32	53.2	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.01
69.881	17.581	0.398	115.56	Yes	67	0	2.263808	Yes	Yes	-69.88	8138.64	4173.37	3965.27	0.45	0.090	4173.37	3965.27	9.52	0.887	0.57	10.07	52.9	63.0	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	1.02
70.045	14.495	0.405	115.56	Yes	80	0	2.794067	Yes	Yes	-70.05	8157.59	4183.61	3973.98	0.45	0.090	4183.61	3973.98	7.72	0.911	0.56	8.16	54.3	62.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	1.02
70.209	17.495	0.419	115.56	Yes	69	0	2.39497	Yes	Yes	-70.21	8176.54	4193.84	3982.70	0.45	0.090	4193.84	3982.70	9.43	0.888	0.57	9.98	53.1	63.1	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	1.02
70.373	16.193	0.395	115.56	Yes	72	0	2.439326	Yes	Yes	-70.37	8195.50	4204.08	3991.42	0.45	0.090	4204.08	3991.42	8.66	0.898	0.57	9.16	53.5	62.7	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	1.02
70.537	13.053	0.3	115.56	Yes	82	0	2.298322	Yes	Yes	-70.54	8214.45	4214.31	4000.14	0.45	0.090	4214.31	4000.14	6.85	0.924	0.56	7.25	54.3	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.01
70.701	11.15	0.351	115.56	Yes	98	0	3.147982	Yes	Yes	-70.70	8233.40	4224.54	4008.86	0.45	0.090	4224.54	4008.86	5.77	0.942	0.55	6.11	55.6	61.7	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.02
70.865	10.677	0.483	112.35	Yes	100	0	4.523743	Yes	Yes	-70.87	8251.83	4234.78	4017.05	0.45	0.089	4234.78	4017.05	5.50	0.948	0.54	5.82	55.6	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.02
71.029	10.726	0.617	112.35	Yes	100	0	5.752377	Yes	Yes	-71.03	8270.25	4245.01	4025.24	0.45	0.089	4245.01	4025.24	5.51	0.947	0.54	5.83	55.6	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.02
71.193	10.927	0.556	112.35	Yes	100	0	5.088313	Yes	Yes	-71.19	8288.68	4255.24	4033.43	0.44	0.089	4255.24	4033.43	5.61	0.945	0.54	5.94	55.7	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.02
71.357	9.549	0.495	112.35	Yes	100	0	5.183789	Yes	Yes	-71.36	8307.10	4265.48	4041.62	0.44	0.089	4265.48	4041.62	4.85	0.960	0.54	5.13	55.4	60.6	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.01
71.521	9.75	0.438	112.35	Yes	100	0	4.492308	Yes	Yes	-71.52	8325.53	4275.71	4049.82	0.44	0.089	4275.71	4049.82	4.95	0.958	0.54	5.23	55.5	60.7	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.02
71.685	10.389	0.443	112.35	Yes	100	0	4.264126	Yes	Yes	-71.69	8343.95	4285.94	4058.01	0.44	0.089	4285.94	4058.01	5.28	0.952	0.54	5.59	55.6	61.2	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.02
71.85	11.068	0.471	112.35	Yes	100	0	4.255511	Yes	Yes	-71.85	8362.49	4296.24	4066.25	0.44	0.089	4296.24	4066.25	5.64	0.945	0.54	5.97	55.7	61.7	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.03
72.014	10.656	0.508	112.35	Yes	100	0	4.767267	Yes	Yes	-72.01	8380.92	4306.47	4074.44	0.44	0.088	4306.47	4074.44	5.41	0.949	0.54	5.72	55.6	61.3	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.02
72.178	11.363	0.501	112.35	Yes	100	0	4.409047	Yes	Yes	-72.18	8399.34	4316.71	4082.63	0.44	0.088	4316.71	4082.63	5.78	0.942	0.54	6.12	55.7	61.8	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.03
72.342	13.08	0.468	115.56	Yes	92.195	0	3.577982	Yes	Yes	-72.34	8418.29	4326.94	4091.35	0.44	0.088	4326.94	4091.35	6.71	0.926	0.54	7.10	55.4	62.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	1.04
72.506	15.472	0.479	115.56	Yes	80.316	0	3.095915	Yes	Yes	-72.51	8437.24	4337.17	4100.07	0.44	0.088	4337.17	4100.07	8.03	0.906	0.55	8.49	54.5	63.0	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	1.04
72.67	16.971	0.481	115.56	Yes	74.407	0	2.834247	Yes	Yes	-72.67	8456.20	4347.41	4108.79	0.44	0.088	4347.41	4108.79	8.86	0.895	0.55	9.37	53.9	63.3	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	1.04
72.834	16.79	0.512	115.56	Yes	76.4	0	3.049434	Yes	Yes	-72.83	8475.15	4357.64	4117.51	0.44	0.088	4357.64	4117.51	8.74	0.897	0.55	9.24	54.2	63.4	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	1.05
72.998	17.798	0.563	115.56	Yes	74.646	0	3.163277	Yes	Yes	-73.00	8494.10	4367.88	4126.22	0.44	0.088	4367.88	4126.22	9.29	0.890	0.55	9.83	54.1	63.9	0.102	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	1.05
73.162	19.254	0.593	115.56	Yes	70.948	0	3.07988	Yes	Yes	-73.16	8513.05	4378.11	4134.94	0.44	0.087	4378.11	4134.94	10.10	0.880	0.55	10.68	53.7	64.4	0.103	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	1.06
73.326	19.539	0.61	115.56	Yes	70.704	0	3.121961	Yes	Yes	-73.33	8532.00	4388.34	4143.66	0.43	0.087	4388.34	4143.66	10.24	0.878	0.55	10.83	53.7	64.5	0.103	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	1.06
73.49	19.295	0.607	115.56	Yes	71.439	0	3.145893	Yes	Yes	-73.49	8550.96	4398.58	4152.38	0.43	0.087	4398.58	4152.38	10.08	0.880	0.55	10.66	53.8	64.5	0.103	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	1.06
73.654	20.86	0.587	115.56	Yes	66.413	0	2.813998	Yes	Yes	-73.65	8569.91	4408.81	4161.10	0.43	0.087	4408.81	4161.10	10.95	0.870	0.56	11.59	53.2	64.7	0.103	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	1.07
73.818	21.178	0.635	115.56	Yes	67.083	0	2.998395	Yes	Yes	-73.82	8588.86	4419.04	4169.82	0.43	0.087	4419.04	4169.82	11.11	0.868	0.56	11.76	53.3	65.1	0.103	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	1.07

CPT Liquefaction Analysis

73.982	22.079	0.658	115.56	Yes	65.514	0	2.980207	Yes	Yes	-73.98	8607.81	4429.28	4178.53	0.43	0.087	4429.28	4178.53	11.61	0.862	0.56	12.28	53.2	65.4	0.104	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	1.07
74.146	21.642	0.616	115.56	Yes	65.489	0	2.846317	Yes	Yes	-74.15	8626.76	4439.51	4187.25	0.43	0.086	4439.51	4187.25	11.33	0.865	0.55	11.99	53.1	65.1	0.103	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	1.07
74.31	20.44	0.563	115.56	Yes	67.115	0	2.754403	Yes	Yes	-74.31	8645.71	4449.74	4195.97	0.43	0.086	4449.74	4195.97	10.63	0.873	0.55	11.24	53.2	64.4	0.103	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	1.07
74.474	19.837	0.532	115.56	Yes	67.875	0	2.681857	Yes	Yes	-74.47	8664.67	4459.98	4204.69	0.43	0.086	4459.98	4204.69	10.26	0.878	0.55	10.86	53.2	64.1	0.103	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	1.07
74.638	20.406	0.54	115.56	Yes	66.622	0	2.646281	Yes	Yes	-74.64	8683.62	4470.21	4213.41	0.43	0.086	4470.21	4213.41	10.56	0.874	0.55	11.18	53.1	64.3	0.103	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	1.07
74.802	25.313	0.969	115.56	Yes	65.741	0	3.828073	Yes	Yes	-74.80	8702.57	4480.44	4222.13	0.43	0.086	4480.44	4222.13	13.35	0.844	0.56	14.13	53.7	67.8	0.106	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	1.10
74.966	26.805	1.112	115.56	Yes	65.432	0	4.14848	Yes	Yes	-74.97	8721.52	4490.68	4230.84	0.43	0.086	4490.68	4230.84	14.19	0.836	0.56	15.02	53.9	68.9	0.106	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	1.12
75.13	26.55	1.253	112.35	Yes	68.387	0	4.719397	Yes	Yes	-75.13	8739.95	4500.91	4239.04	0.43	0.086	4500.91	4239.04	14.02	0.838	0.56	14.83	54.4	69.2	0.107	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	1.12
75.294	28.426	1.248	115.56	Yes	64.745	0	4.390347	Yes	Yes	-75.29	8758.90	4511.15	4247.75	0.43	0.086	4511.15	4247.75	15.09	0.828	0.56	15.96	54.0	70.0	0.107	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.107	1.13
75.458	26.683	1.301	112.35	Yes	69.023	0	4.875764	Yes	Yes	-75.46	8777.32	4521.38	4255.95	0.42	0.085	4521.38	4255.95	14.04	0.838	0.56	14.86	54.5	69.4	0.107	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.106	1.12
75.622	28.913	1.336	115.56	Yes	65.334	0	4.620759	Yes	Yes	-75.62	8796.28	4531.61	4264.66	0.42	0.085	4531.61	4264.66	15.32	0.826	0.56	16.20	54.2	70.4	0.108	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.107	1.14
75.786	28.624	1.115	115.56	Yes	62.422	0	3.895333	Yes	Yes	-75.79	8815.23	4541.85	4273.38	0.42	0.085	4541.85	4273.38	15.12	0.828	0.56	16.00	53.5	69.5	0.107	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	1.13
75.951	27.584	0.924	115.56	Yes	60.892	0	3.349768	Yes	Yes	-75.95	8834.30	4552.14	4282.15	0.42	0.085	4552.14	4282.15	14.49	0.834	0.56	15.33	53.0	68.3	0.106	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	1.12
76.115	25.389	0.722	115.56	Yes	60.764	0	2.843751	Yes	Yes	-76.12	8853.25	4562.38	4290.87	0.42	0.085	4562.38	4290.87	13.20	0.846	0.55	13.96	52.6	66.6	0.105	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	1.10
76.279	23.289	0.727	115.56	Yes	65.479	0	3.121645	Yes	Yes	-76.28	8872.20	4572.61	4299.59	0.42	0.085	4572.61	4299.59	11.98	0.858	0.54	12.67	53.3	65.9	0.104	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	1.10
76.443	24.449	0.812	115.56	Yes	64.973	0	3.321199	Yes	Yes	-76.44	8891.15	4582.84	4308.31	0.42	0.085	4582.84	4308.31	12.61	0.852	0.55	13.34	53.3	66.7	0.105	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	1.11
76.607	29.329	1.133	115.56	Yes	61.82	0	3.863071	Yes	Yes	-76.61	8910.10	4593.08	4317.03	0.42	0.084	4593.08	4317.03	15.39	0.826	0.56	16.28	53.5	69.7	0.107	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	1.14
76.771	37.977	1.41	115.56	Yes	53.684	0	3.712774	Yes	Yes	-76.77	8929.05	4603.31	4325.74	0.42	0.084	4603.31	4325.74	20.47	0.786	0.57	21.66	52.7	74.3	0.111	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.160	1.115	1.18
76.935	30.362	1.331	115.56	Yes	63.268	0	4.383769	Yes	Yes	-76.94	8948.01	4613.54	4334.46	0.42	0.084	4613.54	4334.46	15.93	0.821	0.56	16.85	53.9	70.8	0.108	0.05	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.151	1.108	1.15



Earthquake Magnitude, M = 5.77

Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2014),
CPT and SPT Based Liquefaction
Triggering Procedures,
UCD/CGM-14/01

Project: Plant Scherer GA EPD Closure		Sounding ECP05A Avg.
Project Number: 60563110	Date: 1/23/2018	AECOM

CPT Liquefaction Analysis

Method: Idriss and Boulanger (2014), CPT and SPT Based Liquefaction Triggering Procedures

Title: Liquefaction Analysis
Project: Plant Scherer
Project No.: 60563110

Date: 1/24/2018
Boring No. CP-111

Input Parameters:
Peak ground acceleration, pga (g): 0.15
Earthquake Magnitude (M): 4.9
Water Table Depth at the time of drilling 5 ft
Water Table Depth at the time of earthquake 5 ft
Ground Surface Elevation 0 ft

Notes:
1. Sand-like behavior = "Yes", Clay-like behavior = "No" (See Idriss and Boulanger, 2014).
2. Make sure to turn on iterative calculations.
3. User to confirm highlighted values are reasonable.

												At the time of earthquake				At the time of drilling																			
Depth	Qt	Fs	Unit Weight	Liquefiable?[1]	FC	α (From static stress analysis)	Fs/Qt	Below Water Table?	Liquefaction Calculation Needed?	Sample Elev.	Total stress	Pore Pressure	Effective stress	Stress reduction coeff, r_d	CSR	Pore Pressure	Effective stress	qc1n	m	Cn	qc1	Delta qc1ncs	qc1ncs	CRR_{cpt}[3]	C_σ	K_σ	Assg. α	State Para	Para a	Para b	Para c	Kα	MSF_{max}	MSF	IB FSL
(ft)	(TSF)	(TSF)	(pcf)	(Yes/No)			(%)			(ft)	(psf)	(psf)	(psf)			(psf)	(psf)				(TSF)														
0.164	5.235	0.011	112.35	Yes	5	0	0.210124	No	No	-0.16	0.00		0.00				0.00																		
0.328	24.553	0.067	118.77	Yes	5	0	0.272879	No	No	-0.33	19.48		19.48				19.48																		
0.492	54.457	0.225	121.98	Yes	5	0	0.41317	No	No	-0.49	39.48		39.48				39.48																		
0.656	215.906	0.537	128.4	Yes	0	0	0.248719	No	No	-0.66	60.54		60.54				60.54																		
0.82	267.525	0.946	128.4	Yes	0	0	0.353612	No	No	-0.82	81.60		81.60				81.60																		
0.984	231.264	1.27	125.19	Yes	1	0	0.549156	No	No	-0.98	102.13		102.13				102.13																		
1.148	207.621	1.36	125.19	Yes	2	0	0.65504	No	No	-1.15	122.66		122.66				122.66																		
1.312	179.351	1.358	125.19	Yes	3	0	0.757174	No	No	-1.31	143.19		143.19				143.19																		
1.476	155.464	1.161	125.19	Yes	3	0	0.746797	No	No	-1.48	163.72		163.72				163.72																		
1.64	141.204	0.888	125.19	Yes	3	0	0.628877	No	No	-1.64	184.25		184.25				184.25																		
1.804	123.158	0.792	125.19	Yes	4	0	0.643076	No	No	-1.80	204.79		204.79				204.79																		
1.968	116.094	0.673	125.19	Yes	4	0	0.579703	No	No	-1.97	225.32		225.32				225.32																		
2.133	113.167	0.567	125.19	Yes	3	0	0.501029	No	No	-2.13	245.97		245.97				245.97																		
2.297	104.778	0.573	125.19	Yes	4	0	0.546871	No	No	-2.30	266.50		266.50				266.50																		
2.461	100.663	0.699	121.98	Yes	5	0	0.694396	No	No	-2.46	286.51		286.51				286.51																		
2.625	92.682	0.53	121.98	Yes	5	0	0.571848	No	No	-2.63	306.51		306.51				306.51																		
2.789	79.466	0.539	121.98	Yes	6	0	0.678278	No	No	-2.79	326.52		326.52				326.52																		
2.953	78.404	0.409	121.98	Yes	5	0	0.521657	No	No	-2.95	346.52		346.52				346.52																		
3.117	55.142	0.298	121.98	Yes	8	0	0.540423	No	No	-3.12	366.53		366.53				366.53																		
3.281	26.596	0.166	118.77	Yes	16	0	0.624154	No	No	-3.28	386.01		386.01				386.01																		
3.445	23.154	0.102	118.77	Yes	5	0	0.440529	No	No	-3.45	405.48		405.48				405.48																		
3.609	25.978	0.062	118.77	Yes	5	0	0.238663	No	No	-3.61	424.96		424.96				424.96																		
3.773	26.319	0.145	118.77	Yes	15	0	0.550933	No	No	-3.77	444.44		444.44				444.44																		
3.937	23.152	0.333	115.56	Yes	24	0	1.438321	No	No	-3.94	463.39		463.39				463.39																		
4.101	33.331	0.412	118.77	Yes	18	0	1.236087	No	No	-4.10	482.87		482.87				482.87																		
4.265	96.032	1.059	121.98	Yes	8	0	1.102757	No	No	-4.27	502.88		502.88				502.88																		
4.429	123.072	0.43	125.19	Yes	1	0	0.349389	No	No	-4.43	523.41		523.41				523.41																		
4.593	219.607	0.09	128.4	Yes	0	0	0.040982	No	No	-4.59	544.46		544.46				544.46																		
4.757	162.046	0.204	125.19	Yes	0	0	0.12589	No	No	-4.76	565.00		565.00				565.00																		
4.921	95.963	0.337	125.19	Yes	3	0	0.351177	No	No	-4.92	585.53		585.53				585.53																		
5.085	49.994	0.393	121.98	Yes	11	0	0.786094	Yes	Yes	-5.09	605.53	5.30	600.23	0.98	0.096	5.30	600.23	80.33	0.545	1.70	84.99	9.4	94.4	0.130	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.234	1.168	1.73
5.249	30.109	0.266	118.77	Yes	17	0	0.883457	Yes	Yes	-5.25	625.01	15.54	609.47	0.98	0.098	15.54	609.47	48.38	0.645	1.70	51.19	22.9	74.1	0.111	0.07	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.160	1.115	1.36
5.413	16.65	0.331	115.56	Yes	33	0	1.987988	Yes	Yes	-5.41	643.96	25.77	618.19	0.98	0.099	25.77	618.19	26.75	0.745	1.70	28.31	43.2	71.5	0.109	0.06	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.110	1.29
5.577	18.312	0.177	115.56	Yes	24	0	0.966579	Yes	Yes	-5.58	662.91	36.00	626.91	0.97	0.101	36.00	626.91	29.42	0.730	1.70	31.13	33.8	64.9	0.103	0.06	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	1.20
5.741	131.534	0.175	125.19	Yes	0	0	0.133045	Yes	Yes	-5.74	683.44	46.24	637.21	0.97	0.102	46.24	637.21	188.22	0.346	1.51	199.14	0.0	199.1	1.800371	0.23	1.10	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	35.94
5.905	78.788	0.23	121.98	Yes	3	0	0.291923	Yes	Yes	-5.91	703.45	56.47	646.98	0.97	0.103	56.47	646.98	126.18	0.445	1.69	133.49	0.0	133.5	0.209	0.13	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.498	1.357	3.00
6.069	40.076	0.437	118.77	Yes	15	0	1.090428	Yes	Yes	-6.07	722.93	66.71	656.22	0.97	0.104	66.71	656.22	64.39	0.590	1.70	68.13	20.7	88.8	0.124	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.210	1.151	1.49
6.234	25.179	0.584	115.56	Yes	28	0	2.319393	Yes	Yes	-6.23	741.99	77.00	664.99	0.97	0.106	77.00	664.99	40.46	0.677	1.70	42.80	41.6	84.4	0.120	0.07	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.193	1.138	1.38
6.398	20.126	0.307	115.56	Yes	27	0	1.52539	Yes	Yes	-6.40	760.95	87.24	673.71	0.97	0.107	87.24	673.71	32.34	0.715	1.70	34.21	38.3	72.5	0.109	0.06	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	1.21
6.562	39.011	0.205	118.77	Yes	11	0	0.525493	Yes	Yes	-6.56	780.42	97.47	682.96	0.97	0.108	97.47	682.96	62.68	0.596	1.70	66.32	8.6	74.9	0.111	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.162	1.116	1.25
6.726	53.42	0.073	121.98	Yes	4	0	0.136653	Yes	Yes	-6.73	800.43	107.70	692.73	0.97	0.109	107.70	692.73	85.84	0.531	1.70	90.81	0.0	90.8	0.126	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.218	1.157	1.47
6.89	43.93	0.025	121.98	Yes	5	0	0.056909	Yes	Yes	-6.89	820.43	117.94	702.50	0.97	0.110	117.94	702.50	70.59	0.572	1.70	74.68	0.1	74.8	0.111	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.162	1.116	1.22
7.054	38.067	0.063	121.98	Yes	5	0	0.165498	Yes	Yes	-7.05	840.44	128.17	712.27	0.96	0.111	128.17	712.27	61.17	0.600	1.70	64.71	0.1	64.8	0.103	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	1.10
7.218	30.066	0.093	118.77	Yes	5	0	0.309319	Yes	Yes	-7.22	859.92	138.40	721.51	0.96	0.112	138.40	721.51	48.31	0.645	1.70	51.11	0.1	51.2	0.093	0.07	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.113	1.081	0.96
7.382	39.671	0.12	121.98	Yes	5	0	0.302488	Yes	Yes	-7.38	879.92	148.64	731.29	0.96	0.113	148.64	731.29	63.74	0.592	1.70	67.44	0.1	67.6	0.105	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.102	1.11
7.546	63.098	0.124	121.98	Yes	4	0	0.19652	Yes	Yes	-7.55	899.93	158.87	741.06	0.96	0.114	158.87	741.06	100.47	0.497	1.68	106.30	0.0	106.3	0.146	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.296	1.212	1.70
7.71	64.886	0.124	121.98	Yes	3	0	0.191104	Yes	Yes	-7.71	919.93	169.10	750.83	0.96	0.115	169.10	750.83	102.24	0.493	1.67	108.17	0.0	108.2	0.149	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.307	1.220	1.73
7.874	57.149	0.076	121.98	Yes	4	0	0.132986	Yes	Yes	-7.87	939.94	179.34	760.60	0.96	0.115	179.34	760.60	91.69	0.517	1.70	97.01	0.0	97.0	0.134	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.247	1.177	1.48
8.038	64.839	0.098	121.98	Yes	3	0	0.151144	Yes	Yes	-8.04	959.94	189.57	770.37	0.96	0.116	189.57	770.37	101.13	0.496	1.65	106.99	0.0	107.0	0.147	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.300	1.215	1.67
8.202	48.769	0.176	121.98	Yes	5	0	0.360885	Yes	Yes	-8.20	979.95	199.80	780.14	0.96	0.117	199.80	780.14	78.36	0.551	1.70	82.91	0.1	83.1	0.119	0.09	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.188	1.135	1.24
8.366	37.739	0.146	118.77	Yes	5	0	0.386868	Yes	Yes	-8.37	999.42	210.04	789.39	0.95	0.118	210.04	789.39	60.64	0.602	1.70	64.16	0.1	64.3	0.103	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	1.02
8.53	41.79	0.126	121.98	Yes	5	0	0.301508	Yes	Yes	-8.53	1019.43	220.27	799.16	0.95	0.119	220.27	799.16	67.15	0.582	1.70	71.04	0.1	71.2	0.108	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.152	1.109	1.08
8.694	59.801	0.041	121.98	Yes	3	0	0.068561	Yes	Yes	-8.69	1039.43	230.51	808.93	0.95	0.119	230.51	808.93	92.72	0.515	1.64	98.10	0.0	98.1	0.135	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.252	1.181	1.45
8.858	62.35	0.047	121.98	Yes	3	0	0.075381	Yes	Yes	-8.86	1059.44	240.74	818.70	0.95	0.120	240.74	818.70	95.49	0.508	1.62	101.03	0.0	101.0	0.139	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.267	1.191	1.49
9.022	71.492	0.117	121.98	Yes	3	0	0.163655	Yes	Yes	-9.02	1079.44	250.97	828.47	0.95	0.121	250.97	828.47	106.41	0.484	1.57	112.58	0.0	112.6	0.156	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.335	1.240	1.75
9.186	67.271	0.135	121.98	Yes	4	0	0.200681	Yes	Yes	-9.19	1099.45	261.21	838.24	0.95	0.121	261.21	838.24	100.70	0.497	1.58	106.54	0.0	106.6	0.147	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.297	1.213	1.59
9.35	76.043	0.148	121.98	Yes	3	0	0.194627	Yes	Yes	-9.35	1119.45	271.44	848.01	0.95	0.122	271.44	848.01	110.95	0.475	1.54	117.38	0.0	117.4	0.166	0.12	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.367	1.263	1.86
9.514	54.846	0.128	121.98	Yes	5	0	0.233381	Yes	Yes	-9.51	1139.46	281.67	857.78	0.95	0.123	281.67	857.78	84.09	0.536	1.62	88.96	0.1	89.1	0.125	0.09	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.211	1.152	1.25
9.678	32.095	0.061	118.77	Yes	5	0	0.190061	Yes	Yes	-9.68	1158.94	291.91	867.03	0.94	0.123	291.91	867.03	51.57	0.633	1.70	54.56	0.1	54.7	0.096	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.89
9.842	21.079	0.125	118.77	Yes	20	0	0.593007	Yes	Yes	-9.84	1178.41	302.14	876.27	0.94	0.124	302.14	876.27	33.87	0.707	1.70	35.83	27.4	63.2	0.102	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.94
10.006	12.814	0.105	115.56	Yes	30	0	0.819416	Yes	Yes	-10.01	1197.37	312.37	884.99	0.94	0.124	312.37	884.99	20.59	0.785	1.70	21.78	39.3	61.1	0.100	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.91
10.17	10.582	0.094	115.56	Yes	34	0	0.888301	Yes	Yes	-10.17	1216.32	322.61	893.71	0.94	0.125	322.61	893.71	17.00	0.812	1.70	17.99	42.2	60.2	0.100	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.90
10.335	12.085	0.121	115.56	Yes	33	0	1.001241	Yes	Yes	-10.34	1235.38	332.90	902.48	0.94	0.125	332.90	902.48	19.42	0.793	1.70	20.54	41.8	62.4	0.101	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.91
10.499	13.393	0.189	115.56	Yes	35	0	1.411185	Yes	Yes	-10.50	1254.34	343.14	911.20	0.94	0.126	343.14	911.20	21.52	0.778	1.70	22.77	43.7	66.5	0.104	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	0.94
10.663	20.519	0.215	115.56	Yes	25	0	1.047809	Yes	Yes	-10.66	1273.29	353.37	919.92	0.94	0.126	353.37	919.92	32.97	0.711	1.70	34.88	35.8	70.6	0.108	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.108	0.98
10.827	37.223	0.283	118.77	Yes	15	0	0.760283	Yes	Yes	-10.83	1292.77	363.60	929.16	0.94	0.127	363.60	929.16	58.13	0.610	1.65	61.51	19.0	80.5	0.116	0.08	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	1.08
10.991	47.077	0.263	121.98	Yes	11	0	0.558659	Yes	Yes	-10.99	1312.77	373.84	938.93	0.93	0.127	373.84	938.93	70.79	0.571	1.59	74.89	8.5	83.4	0.119	0.08	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.189	1.136	1.12
11.155	31.38	0.272	118.77	Yes	18	0	0.866794	Yes	Yes	-11.16	1332.25	384.07	948.18	0.93	0.128	384.07	948.18	49.58	0.640	1.67	52.46	25.5	78.0	0.114	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	1.04
11.319	19.91	0.25	115.56	Yes	27	0	1.25565	Yes	Yes	-11.32	1351.20	394.31	956.90	0.93	0.128	394.31	956.90	31.99	0.716	1.70	33.85	38.8	72.6	0.109	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	0.98
11.483	17.418	0.311	115.56	Yes	33	0	1.785509	Yes	Yes	-11.48	1370.15	404.54	965.61	0.93	0.129	404.54	965.61	27.99	0.738	1.70	29.61	44.1	73.7	0.110	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.159	1.114	0.98
11.647	17.042	0.286	115.56	Yes	33	0	1.678207	Yes	Yes	-11.65	1389.11	414.77	974.33	0.93	0.129	414.77	974.33	27.38	0.741	1.70	28.97	43.7	72.7	0.109	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	0.97
11.811	14.342	0.263	115.56	Yes	35	0	1.833775	Yes	Yes	-11.81	1408.06	425.01	983.05	0.93	0.130	425.01	983.05	23.04	0.768	1.70	24.38	44.0	68.4	0.106	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	0.93
11.975	14.692	0.249	115.56	Yes	33	0	1.6948	Yes	Yes	-11.98	1427.01	435.24	991.77	0.93	0.130	435.24	991.77	23.61	0.764	1.70	24.98	43.2	68.1	0.106	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.92
12.139	17.588	0.27	115.56	Yes	32	0	1.535138	Yes	Yes	-12.14	1445.96	445.47	1000.49	0.92	0.130	445.47	1000.49	28.26	0.736	1.70	29.90	42.7	72.6	0.109	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	0.96
12.303	17.859	0.376	115.56	Yes	33	0	2.105381	Yes	Yes	-12.30	1464.91	455.71	1009.21	0.92	0.131	455.71	1009.21	28.70	0.734	1.70	30.36	43.9	74.2	0.111	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.160	1.115	0.97
12.467	19.423	0.336	115.56	Yes	32	0	1.729908	Yes	Yes	-12.47	1483.86	465.94	1017.92	0.92	0.131	465.94	1017.92	31.11	0.721	1.69	32.92	43.2	76.1	0.112	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	0.98
12.631	18.541	0.304	115.56	Yes	32	0	1.63961	Yes	Yes	-12.63	1502.82	476.17	1026.64	0.92	0.131	476.17	1026.64	29.68	0.729	1.69	31.40	43.1	74.5	0.111	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.115	0.96
12.795	16.898	0.268	115.56	Yes	33	0	1.585987	Yes	Yes	-12.80	1521.77	486.41	1035.36	0.92	0.132	486.41	1035.36	27.15	0.743	1.70	28.73	43.7	72.4	0.109	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.94
12.959	17.368	0.19	115.56	Yes	29	0	1.093966	Yes	Yes	-12.96	1540.72	496.64	1044.08	0.92	0.132	496.64	1044.08	27.68	0.740	1.69	29.29	39.7	69.0	0.106	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	0.91
13.123	16.316	0.176	115.56	Yes	30	0	1.078696	Yes	Yes	-13.12	1559.67	506.88	1052.80	0.92	0.132	506.88	1052.80	26.02	0.749	1.69	27.53	40.4	67.9	0.106	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.90
13.287	16.746	0.142	115.56	Yes	27	0	0.847964	Yes	Yes	-13.29	1578.62	517.11	1061.51	0.92	0.133	517.11	1061.51	26.49	0.747	1.67	28.03	37.6	65.7	0.104	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.88
13.451	15.24	0.179	115.56	Yes	32	0	1.174541	Yes	Yes	-13.45	1597.58	527.34	1070.23	0.91	0.133	527.34	1070.23	24.19	0.761	1.68	25.59	42.0	67.6	0.105	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.103	0.89
13.615	15.919	0.196	115.56	Yes	32	0	1.231233	Yes	Yes	-13.62	1616.53	537.58	1078.95	0.91	0.133	537.58	1078.95	25.03	0.755	1.66	26.48	42.0	68.5	0.106	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	0.89
13.779	16.516	0.184	115.56	Yes	30	0	1.114071	Yes	Yes	-13.78	1635.48	547.81	1087.67	0.91	0.134	547.81	1087.67	25.73	0.751	1.65	27.23	40.7	67.9	0.106	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.89
13.943	17.151	0.218	115.56	Yes	31	0	1.271063	Yes	Yes	-13.94	1654.43	558.04	1096.39	0.91	0.134	558.04	1096.39	26.49	0.747	1.63	28.02	41.6	69.6	0.107	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	0.90
14.107	17.59	0.239	115.56	Yes	31	0	1.358727	Yes	Yes	-14.11	1673.38	568.28	1105.11	0.91	0.134	568.28	1105.11	26.95	0.744	1.62	28.52	42.0	70.5	0.108	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.108	0.90
14.271	20.532	0.279	115.56	Yes	29	0	1.358854	Yes	Yes	-14.27	1692.33	578.51	1113.82	0.91	0.134	578.51	1113.82	30.85	0.722	1.59	32.64	40.3	73.0	0.110	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.157	1.112	0.92
14.436	22.814	0.401	115.56	Yes	30	0	1.757693	Yes	Yes	-14.44	1711.40	588.81	1122.60	0.91	0.135	588.81	1122.60	33.77	0.707	1.57	35.72	42.2	77.9	0.114	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	0.97
14.6	22.162	0.434	115.56	Yes	32	0	1.958307	Yes	Yes	-14.60	1730.35	599.04	1131.31	0.90	0.135	599.04	1131.31	32.73	0.713	1.56	34.63	43.7	78.3	0.114	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.172	1.124	0.97
14.764	19.713	0.436	115.56	Yes	33	0	2.211738	Yes	Yes	-14.76	1749.31	609.27	1140.03	0.90	0.135	609.27	1140.03	29.28	0.731	1.57	30.98	44.4	75.3	0.112	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.163	1.117	0.94
14.928	18.27	0.378	115.56	Yes	34	0	2.068966	Yes	Yes	-14.93	1768.26	619.51	1148.75	0.90	0.135	619.51	1148.75	27.18	0.743	1.57	28.76	44.3	73.1	0.110	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.157	1.113	0.91
15.092	18.271	0.302	115.56	Yes	33	0	1.652893	Yes	Yes	-15.09	1787.21	629.74	1157.47	0.90	0.135	629.74	1157.47	27.04	0.743	1.57	28.61	43.8	72.4	0.109	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.90
15.256	17.553	0.212	115.56	Yes	31	0	1.207771	Yes	Yes	-15.26	1806.16	639.97	1166.19	0.90	0.136	639.97	1166.19	25.94	0.750	1.56	27.44	41.1	68.6	0.106	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	0.87
15.42	13.681	0.161	115.56	Yes	35	0	1.176815	Yes	Yes	-15.42	1825.11	650.21	1174.90	0.90	0.136	650.21	1174.90	20.52	0.785	1.59	21.71	43.5	65.3	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.84
15.584	8.413	0.14	115.56	Yes	46	0	1.664091	Yes	Yes	-15.58	1844.06	660.44	1183.62	0.90	0.136	660.44	1183.62	13.01	0.848	1.64	13.77	47.9	61.7	0.101	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.81
15.748	7.115	0.172	115.56	Yes	56	0	2.417428	Yes	Yes	-15.75	1863.02	670.68	1192.34	0.89	0.136	670.68	1192.34	11.07	0.868	1.65	11.71	50.9	62.6	0.101	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.82
15.912	7.036	0.21	115.56	Yes	60	0	2.98465	Yes	Yes	-15.91	1881.97	680.91	1201.06	0.89	0.136	680.91	1201.06	10.89	0.870	1.64	11.52	51.8	63.4	0.102	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.82
16.076	10.625	0.254	115.56	Yes	46	0	2.390588	Yes	Yes	-16.08	1900.92	691.14	1209.78	0.89	0.137	691.14	1209.78	15.89	0.821	1.58	16.82	48.6	65.4	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.84
16.24	11.375	0.242	115.56	Yes	43	0	2.127473	Yes	Yes	-16.24	1919.87	701.38	1218.50	0.89	0.137	701.38	1218.50	16.84	0.813	1.57	17.82	47.4	65.3	0.104	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.83
16.404	12.072	0.23	115.56	Yes	40	0	1.905235	Yes	Yes	-16.40	1938.82	711.61	1227.21	0.89	0.137	711.61	1227.21	17.70	0.806	1.55	18.73	46.3	65.0	0.103	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.83
16.568	10.944	0.207	115.56	Yes	42	0	1.891447	Yes	Yes	-16.57	1957.78	721.84	1235.93	0.89	0.137	721.84	1235.93	16.07	0.820	1.55	17.01	47.1	64.1	0.103	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.82
16.732	7.924	0.177	115.56	Yes	53	0	2.23372	Yes	Yes	-16.73	1976.73	732.08	1244.65	0.89	0.137	732.08	1244.65	11.82	0.860	1.58	12.51	50.2	62.7	0.102	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.81

CPT Liquefaction Analysis

16.896	8.361	0.154	115.56	Yes	49	0	1.841885	Yes	Yes	-16.90	1995.68	742.31	1253.37	0.88	0.137	742.31	1253.37	12.36	0.854	1.56	13.08	48.9	62.0	0.101	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.80
17.06	11.369	0.165	115.56	Yes	39	0	1.451315	Yes	Yes	-17.06	2014.63	752.54	1262.09	0.88	0.137	752.54	1262.09	16.39	0.817	1.53	17.34	45.1	62.4	0.101	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.81
17.224	13.39	0.176	115.56	Yes	35	0	1.314414	Yes	Yes	-17.22	2033.58	762.78	1270.81	0.88	0.137	762.78	1270.81	18.99	0.796	1.50	20.10	43.6	63.7	0.102	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.81
17.388	14	0.193	115.56	Yes	35	0	1.378571	Yes	Yes	-17.39	2052.53	773.01	1279.52	0.88	0.138	773.01	1279.52	19.70	0.791	1.49	20.84	43.7	64.5	0.103	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.82
17.552	10.577	0.183	115.56	Yes	43	0	1.730169	Yes	Yes	-17.55	2071.49	783.24	1288.24	0.88	0.138	783.24	1288.24	15.08	0.828	1.51	15.95	47.1	63.1	0.102	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.81
17.716	7.385	0.167	115.56	Yes	57	0	2.261341	Yes	Yes	-17.72	2090.44	793.48	1296.96	0.88	0.138	793.48	1296.96	10.70	0.872	1.53	11.32	50.9	62.2	0.101	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.80
17.88	5.744	0.158	112.35	Yes	69	0	2.750696	Yes	Yes	-17.88	2108.86	803.71	1305.15	0.88	0.138	803.71	1305.15	8.39	0.901	1.55	8.88	52.8	61.7	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.79
18.044	4.379	0.138	112.35	Yes	83	0	3.151404	Yes	Yes	-18.04	2127.29	813.95	1313.34	0.87	0.138	813.95	1313.34	6.45	0.931	1.56	6.83	54.3	61.1	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.79
18.208	5.59	0.152	112.35	Yes	70	0	2.719141	Yes	Yes	-18.21	2145.71	824.18	1321.54	0.87	0.138	824.18	1321.54	8.09	0.906	1.53	8.56	53.0	61.5	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.79
18.372	6.322	0.169	115.56	Yes	65	0	2.673205	Yes	Yes	-18.37	2164.67	834.41	1330.25	0.87	0.138	834.41	1330.25	9.04	0.893	1.51	9.57	52.4	62.0	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.79
18.537	4.754	0.161	112.35	Yes	82	0	3.386622	Yes	Yes	-18.54	2183.20	844.71	1338.50	0.87	0.138	844.71	1338.50	6.86	0.924	1.53	7.26	54.3	61.5	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.79
18.701	4.655	0.155	112.35	Yes	82	0	3.329753	Yes	Yes	-18.70	2201.63	854.94	1346.69	0.87	0.138	854.94	1346.69	6.69	0.927	1.52	7.08	54.3	61.4	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.78
18.865	4.969	0.159	112.35	Yes	79	0	3.199839	Yes	Yes	-18.87	2220.06	865.18	1354.88	0.87	0.138	865.18	1354.88	7.08	0.921	1.51	7.49	54.0	61.5	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.78
19.029	6.06	0.178	112.35	Yes	70	0	2.937294	Yes	Yes	-19.03	2238.48	875.41	1363.07	0.86	0.138	875.41	1363.07	8.51	0.900	1.49	9.00	53.0	62.0	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.79
19.193	13.103	0.188	115.56	Yes	37	0	1.434786	Yes	Yes	-19.19	2257.43	885.64	1371.79	0.86	0.139	885.64	1371.79	17.57	0.807	1.42	18.59	44.5	63.1	0.102	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.80
19.357	8.951	0.203	115.56	Yes	53	0	2.267903	Yes	Yes	-19.36	2276.38	895.88	1380.51	0.86	0.139	895.88	1380.51	12.19	0.856	1.44	12.90	50.2	63.1	0.102	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.80
19.521	5.193	0.124	115.56	Yes	73	0	2.38783	Yes	Yes	-19.52	2295.34	906.11	1389.23	0.86	0.139	906.11	1389.23	7.22	0.918	1.47	7.64	53.2	60.8	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.78
19.685	3.707	0.115	112.35	Yes	95	0	3.102239	Yes	Yes	-19.69	2313.76	916.34	1397.42	0.86	0.139	916.34	1397.42	5.20	0.953	1.49	5.51	55.1	60.6	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.77
19.849	4.472	0.123	112.35	Yes	83	0	2.750447	Yes	Yes	-19.85	2332.19	926.58	1405.61	0.86	0.139	926.58	1405.61	6.20	0.935	1.47	6.56	54.2	60.8	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.78
20.013	4.643	0.13	112.35	Yes	82	0	2.799914	Yes	Yes	-20.01	2350.61	936.81	1413.80	0.86	0.139	936.81	1413.80	6.39	0.932	1.46	6.76	54.1	60.9	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.78
20.177	5.418	0.14	112.35	Yes	74	0	2.583979	Yes	Yes	-20.18	2369.04	947.04	1421.99	0.85	0.139	947.04	1421.99	7.37	0.916	1.44	7.80	53.3	61.1	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.78
20.341	5.835	0.159	112.35	Yes	72	0	2.724936	Yes	Yes	-20.34	2387.46	957.28	1430.18	0.85	0.139	957.28	1430.18	7.87	0.909	1.43	8.33	53.2	61.5	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.78
20.505	6.649	0.14	115.56	Yes	63	0	2.10558	Yes	Yes	-20.51	2406.42	967.51	1438.90	0.85	0.139	967.51	1438.90	8.87	0.895	1.41	9.39	51.8	61.2	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.78
20.669	6.92	0.134	115.56	Yes	60	0	1.936416	Yes	Yes	-20.67	2425.37	977.75	1447.62	0.85	0.139	977.75	1447.62	9.17	0.891	1.40	9.71	51.3	61.0	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.77
20.833	8.197	0.125	115.56	Yes	51	0	1.524948	Yes	Yes	-20.83	2444.32	987.98	1456.34	0.85	0.139	987.98	1456.34	10.73	0.872	1.39	11.35	49.3	60.7	0.100	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.77
20.997	7.257	0.134	115.56	Yes	58	0	1.846493	Yes	Yes	-21.00	2463.27	998.21	1465.06	0.85	0.139	998.21	1465.06	9.50	0.887	1.39	10.05	50.9	61.0	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.77
21.161	6.82	0.15	115.56	Yes	63	0	2.199413	Yes	Yes	-21.16	2482.22	1008.45	1473.78	0.85	0.139	1008.45	1473.78	8.91	0.894	1.38	9.43	52.0	61.4	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.78
21.325	6.646	0.156	115.56	Yes	66	0	2.347277	Yes	Yes	-21.33	2501.17	1018.68	1482.49	0.84	0.139	1018.68	1482.49	8.65	0.898	1.38	9.15	52.3	61.5	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.78
21.489	6.498	0.149	115.56	Yes	66	0	2.293013	Yes	Yes	-21.49	2520.13	1028.91	1491.21	0.84	0.139	1028.91	1491.21	8.42	0.901	1.37	8.91	52.4	61.3	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.77
21.653	6.583	0.155	115.56	Yes	66	0	2.35455	Yes	Yes	-21.65	2539.08	1039.15	1499.93	0.84	0.139	1039.15	1499.93	8.48	0.900	1.36	8.97	52.5	61.4	0.101	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.77
21.817	7.759	0.163	115.56	Yes	59	0	2.100786	Yes	Yes	-21.82	2558.03	1049.38	1508.65	0.84	0.139	1049.38	1508.65	9.88	0.882	1.35	10.46	51.3	61.7	0.101	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.78
21.981	7.58	0.169	115.56	Yes	61	0	2.229551	Yes	Yes	-21.98	2576.98	1059.61	1517.37	0.84	0.139	1059.61	1517.37	9.62	0.885	1.34	10.18	51.6	61.8	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	0.78
22.145	7.392	0.177	115.56	Yes	63	0	2.394481	Yes	Yes	-22.15	2595.93	1069.85	1526.09	0.84	0.139	1069.85	1526.09	9.34	0.889	1.34	9.88	52.1	61.9	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.78
22.309	6.67	0.167	115.56	Yes	68	0	2.503748	Yes	Yes	-22.31	2614.89	1080.08	1534.80	0.83	0.139	1080.08	1534.80	8.42	0.901	1.34	8.91	52.7	61.6	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.77
22.473	7.508	0.16	115.56	Yes	61	0	2.13106	Yes	Yes	-22.47	2633.84	1090.32	1543.52	0.83	0.139	1090.32	1543.52	9.39	0.888	1.32	9.94	51.6	61.6	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.77
22.638	8.935	0.178	115.56	Yes	55	0	1.992166	Yes	Yes	-22.64	2652.90	1100.61	1552.29	0.83	0.139	1100.61	1552.29	11.05	0.868	1.31	11.69	50.4	62.1	0.101	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.78
22.802	10.377	0.14	115.56	Yes	45	0	1.349138	Yes	Yes	-22.80	2671.86	1110.84	1561.01	0.83	0.138	1110.84	1561.01	12.71	0.851	1.30	13.44	47.5	61.0	0.100	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.77
22.966	8.823	0.145	115.56	Yes	53	0	1.643432	Yes	Yes	-22.97	2690.81	1121.08	1569.73	0.83	0.138	1121.08	1569.73	10.82	0.871	1.30	11.44	49.7	61.2	0.100	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.77
23.13	8.874	0.162	115.56	Yes	54	0	1.825558	Yes	Yes	-23.13	2709.76	1131.31	1578.45	0.83	0.138	1131.31	1578.45	10.83	0.871	1.29	11.45	50.2	61.7	0.101	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.77
23.294	8.815	0.229	115.56	Yes	60	0	2.597845	Yes	Yes	-23.29	2728.71	1141.55	1587.17	0.83	0.138	1141.55	1587.17	10.71	0.872	1.29	11.33	51.7	63.1	0.102	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.78
23.458	10.498	0.261	115.56	Yes	54	0	2.486188	Yes	Yes	-23.46	2747.66	1151.78	1595.88	0.82	0.138	1151.78	1595.88	12.62	0.852	1.27	13.35	50.7	64.1	0.103	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.79
23.622	10.321	0.295	115.56	Yes	57	0	2.85825	Yes	Yes	-23.62	2766.62	1162.01	1604.60	0.82	0.138	1162.01	1604.60	12.36	0.854	1.27	13.07	51.5	64.5	0.103	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.79
23.786	10.444	0.31	115.56	Yes	58	0	2.968211	Yes	Yes	-23.79	2785.57	1172.25	1613.32	0.82	0.138	1172.25	1613.32	12.44	0.854	1.26	13.16	51.6	64.8	0.103	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.80
23.95	13.329	0.343	115.56	Yes	49	0	2.573336	Yes	Yes	-23.95	2804.52	1182.48	1622.04	0.82	0.138	1182.48	1622.04	15.68	0.823	1.24	16.59	49.7	66.3	0.104	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.81
24.114	12.072	0.403	115.56	Yes	56	0	3.338304	Yes	Yes	-24.11	2823.47	1192.71	1630.76	0.82	0.138	1192.71	1630.76	14.19	0.836	1.24	15.01	51.6	66.6	0.105	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.81
24.278	12.55	0.541	112.35	Yes	59	0	4.310757	Yes	Yes	-24.28	2841.90	1202.95	1638.95	0.82	0.138	1202.95	1638.95	14.67	0.832	1.24	15.52	52.7	68.2	0.106	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.104	0.82
24.442	37.446	0.545	118.77	Yes	24	0	1.455429	Yes	Yes	-24.44	2861.37	1213.18	1648.19	0.81	0.138	1213.18	1648.19	41.85	0.671	1.18	44.28	35.5	79.8	0.116	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.177	1.127	0.92
24.606	36.666	0.798	115.56	Yes	28	0	2.176403	Yes	Yes	-24.61	2880.33	1223.41	1656.91	0.81	0.138	1223.41	1656.91	40.87	0.675	1.18	43.25	41.7	85.0	0.120	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	0.97
24.77	45.893	1.051	115.56	Yes	26	0	2.29011	Yes	Yes	-24.77	2899.28	1233.65	1665.63	0.81	0.138	1233.65	1665.63	50.52	0.637	1.16	53.45	40.3	93.8	0.130	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.231	1.166	1.07
24.934	54.959	1.18	115.56	Yes	23	0	2.147055	Yes	Yes	-24.93	2918.23	1243.88	1674.35	0.81	0.138	1243.88	1674.35	59.84	0.605	1.15	63.32	37.1	100.4	0.138	0.08	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.264	1.189	1.16
25.098	55.537	1.333	115.56	Yes	24	0	2.400202	Yes	Yes	-25.10	2937.18	1254.12	1683.07	0.81	0.138	1254.12	1683.07	60.27	0.603	1.15	63.76	39.2	102.9	0.141	0.08	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.277	1.199	1.20
25.262	51.805	1.193	115.56	Yes	24	0	2.302867	Yes	Yes	-25.26	2956.13	1264.35	1691.79	0.81	0.137	1264.35	1691.79	56.21	0.617	1.15	59.47	39.2	98.7	0.136	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.255	1.183	1.13
25.426	39.141	1.049	115.56	Yes	30	0	2.680054	Yes	Yes	-25.43	2975.09	1274.58	1700.50	0.81	0.137	1274.58	1700.50	42.80	0.667	1.16	45.28	44.2	89.4	0.125	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.213	1.152	1.02
25.59	28.639	0.904	115.56	Yes	37	0	3.156535	Yes	Yes	-25.59	2994.04	1284.82	1709.22	0.80	0.137	1284.82	1709.22	31.56	0.719	1.17	33.39	47.4	80.8	0.116	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	0.93
25.754	31.145	0.76	115.56	Yes	33	0	2.440199	Yes	Yes	-25.75	3012.99	1295.05	1717.94	0.80	0.137	1295.05	1717.94	34.10	0.706	1.16	36.08	44.7	80.8	0.116	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	0.93
25.918	25.248	0.739	115.56	Yes	38	0	2.926965	Yes	Yes	-25.92	3031.94	1305.28	1726.66	0.80	0.137	1305.28	1726.66	27.74	0.739	1.16	29.34	47.4	76.8	0.113	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.120	0.89
26.082	23.843	0.624	115.56	Yes	38	0	2.61712	Yes	Yes	-26.08	3050.89	1315.52	1735.38	0.80	0.137	1315.52	1735.38	26.14	0.749	1.16	27.66	46.8	74.5	0.111	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.115	0.87
26.246	18.58	0.55	115.56	Yes	45	0	2.960172	Yes	Yes	-26.25	3069.84	1325.75	1744.09	0.80	0.137	1325.75	1744.09	20.44	0.786	1.16	21.63	49.3	70.9	0.108	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.151	1.108	0.84
26.41	14.952	0.447	115.56	Yes	50	0	2.989567	Yes	Yes	-26.41	3088.80	1335.98	1752.81	0.80	0.137	1335.98	1752.81	16.48	0.816	1.17	17.44	50.5	67.9	0.106	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.82
26.574	12.377	0.378	115.56	Yes	56	0	3.054052	Yes	Yes	-26.57	3107.75	1346.22	1761.53	0.79	0.137	1346.22	1761.53	13.65	0.842	1.17	14.44	51.5	65.9	0.104	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.80
26.739	9.673	0.352	112.35	Yes	67	0	3.638995	Yes	Yes	-26.74	3126.29	1356.51	1769.77	0.79	0.137	1356.51	1769.77	10.69	0.873	1.17	11.31	53.2	64.5	0.103	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.79
26.903	9.432	0.391	112.35	Yes	70	0	4.145462	Yes	Yes	-26.90	3144.71	1366.75	1777.96	0.79	0.136	1366.75	1777.96	10.38	0.876	1.16	10.99	53.7	64.7	0.103	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.79
27.067	23.023	0.388	115.56	Yes	33	0	1.685271	Yes	Yes	-27.07	3163.66	1376.98	1786.68	0.79	0.136	1376.98	1786.68	24.73	0.757	1.14	26.17	43.4	69.6	0.107	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	0.83
27.231	13.659	0.403	115.56	Yes	53	0	2.950436	Yes	Yes	-27.23	3182.62	1387.21	1795.40	0.79	0.136	1387.21	1795.40	14.80	0.831	1.15	15.66	51.0	66.6	0.105	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.81
27.395	12.898	0.451	115.56	Yes	58	0	3.496666	Yes	Yes	-27.40	3201.57	1397.45	1804.12	0.79	0.136	1397.45	1804.12	13.94	0.839	1.14	14.74	52.0	66.8	0.105	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.81
27.559	15.069	0.521	115.56	Yes	53	0	3.457429	Yes	Yes	-27.56	3220.52	1407.68	1812.84	0.78	0.136	1407.68	1812.84	16.17	0.819	1.13	17.10	51.4	68.5	0.106	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	0.82
27.723	24.858	0.472	115.56	Yes	34	0	1.898785	Yes	Yes	-27.72	3239.47	1417.92	1821.56	0.78	0.136	1417.92	1821.56	26.28	0.748	1.12	27.81	43.9	71.8	0.109	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.110	0.85
27.887	29.886	0.457	115.56	Yes	28	0	1.529144	Yes	Yes	-27.89	3258.42	1428.15	1830.27	0.78	0.136	1428.15	1830.27	31.36	0.720	1.11	33.17	39.7	72.9	0.110	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	0.86
28.051	19.378	0.397	115.56	Yes	40	0	2.048715	Yes	Yes	-28.05	3277.37	1438.38	1838.99	0.78	0.136	1438.38	1838.99	20.45	0.786	1.12	21.64	46.7	68.4	0.106	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	0.82
28.215	13.132	0.445	115.56	Yes	57	0	3.388669	Yes	Yes	-28.22	3296.33	1448.62	1847.71	0.78	0.135	1448.62	1847.71	13.91	0.839	1.12	14.71	51.9	66.7	0.105	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.81
28.379	16.242	0.619	115.56	Yes	54	0	3.811107	Yes	Yes	-28.38	3315.28	1458.85	1856.43	0.78	0.135	1458.85	1856.43	17.07	0.811	1.11	18.06	51.8	69.8	0.107	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	0.83
28.543	29.945	0.764	115.56	Yes	35	0	2.551344	Yes	Yes	-28.54	3334.23	1469.08	1865.15	0.78	0.135	1469.08	1865.15	31.00	0.722	1.10	32.80	45.6	78.4	0.114	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	0.91
28.707	31.687	0.834	115.56	Yes	34	0	2.631994	Yes	Yes	-28.71	3353.18	1479.32	1873.87	0.77	0.135	1479.32	1873.87	32.66	0.713	1.09	34.55	45.6	80.2	0.116	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.178	1.128	0.92
28.871	26.588	0.845	115.56	Yes	40	0	3.178125	Yes	Yes	-28.87	3372.13	1489.55	1882.58	0.77	0.135	1489.55	1882.58	27.40	0.741	1.09	28.99	48.5	77.5	0.114	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	0.90
29.035	28.335	0.723	115.56	Yes	36	0	2.551615	Yes	Yes	-29.04	3391.09	1499.78	1891.30	0.77	0.135	1499.78	1891.30	29.07	0.732	1.09	30.76	46.1	76.9	0.113	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.120	0.89
29.199	29.206	0.66	115.56	Yes	34	0	2.25981	Yes	Yes	-29.20	3410.04	1510.02	1900.02	0.77	0.135	1510.02	1900.02	29.85	0.728	1.08	31.59	44.6	76.2	0.112	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	0.89
29.363	18.764	0.538	115.56	Yes	46	0	2.867192	Yes	Yes	-29.36	3428.99	1520.25	1908.74	0.77	0.134	1520.25	1908.74	19.25	0.794	1.09	20.37	49.6	70.0	0.107	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.107	0.84
29.527	15.034	0.408	115.56	Yes	51	0	2.713849	Yes	Yes	-29.53	3447.94	1530.48	1917.46	0.77	0.134	1530.48	1917.46	15.41	0.825	1.08	16.31	50.4	66.7	0.105	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.81
29.691	13.379	0.391	115.56	Yes	56	0	2.92249	Yes	Yes	-29.69	3466.89	1540.72	1926.17	0.76	0.134	1540.72	1926.17	13.69	0.841	1.08	14.48	51.4	65.9	0.104	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.81
29.855	14.245	0.41	115.56	Yes	54	0	2.878203	Yes	Yes	-29.86	3485.84	1550.95	1934.89	0.76	0.134	1550.95	1934.89	14.51	0.834	1.08	15.35	51.0	66.4	0.104	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	0.81
30.019	13.481	0.378	115.56	Yes	55	0	2.803946	Yes	Yes	-30.02	3504.80	1561.19	1943.61	0.76	0.134	1561.19	1943.61	13.69	0.841	1.07	14.48	51.2	65.7	0.104	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.81
30.183	12.054	0.397	115.56	Yes	61	0	3.293513	Yes	Yes	-30.18	3523.75	1571.42	1952.33	0.76	0.134	1571.42	1952.33	12.21	0.856	1.07	12.91	52.4	65.3	0.104	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.80
30.347	13.181	0.596	112.35	Yes	64	0	4.52166	Yes	Yes	-30.35	3542.17	1581.65	1960.52	0.76	0.134	1581.65	1960.52	13.29	0.845	1.07	14.06	53.4	67.5	0.105	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.102	0.82
30.511	21.811	1.054	112.35	Yes	52	0	4.832424	Yes	Yes	-30.51	3560.60	1591.89	1968.71	0.76	0.133	1591.89	1968.71	21.80	0.776	1.06	23.07	52.5	75.6	0.112	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.164	1.118	0.89
30.675	65.563	1.5	118.77	Yes	22	0	2.287876	Yes	Yes	-30.68	3580.08	1602.12	1977.96	0.76	0.133	1602.12	1977.96	64.49	0.590	1.04	68.23	37.1	105.3	0.145	0.08	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.290	1.208	1.24
30.84	60.379	1.819	115.56	Yes	27	0	3.012637	Yes	Yes	-30.84	3599.15	1612.42	1986.73	0.75	0.133	1612.42	1986.73	59.29	0.606	1.04	62.73	43.2	105.9	0.146	0.08	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.294	1.211	1.25
31.004	49.249	1.579	115.56	Yes	30	0	3.206156	Yes	Yes	-31.00	3618.10	1622.65	1995.45	0.75	0.133	1622.65	1995.45	48.34	0.645	1.04	51.15	45.5	96.7	0.133	0.07	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.245	1.176	1.11
31.168	33.23	1.365	115.56	Yes	41	0	4.107734	Yes	Yes	-31.17	3637.05	1632.88	2004.17	0.75	0.133	1632.88	2004.17	32.65	0.713	1.04	34.54	50.3	84.9	0.120	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	0.97
31.332	32.853	1.031	115.56	Yes	37	0	3.138222	Yes	Yes	-31.33	3656.00	1643.12	2012.88	0.75	0.133	1643.12	2012.88	32.18	0.715	1.04	34.05	47.8	81.9	0.117	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.184	1.132	0.95
31.496	38.176	0.835	115.56	Yes	29	0	2.187238	Yes	Yes	-31.50	3674.95	1653.35	2021.60	0.75	0.132	1653.35	2021.60	37.24	0.691	1.03	39.40	42.2	81.6	0.117	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.183	1.131	0.94
31.66	26.983	0.82	115.56	Yes	41	0	3.03895	Yes	Yes	-31.66	3693.90	1663.58	2030.32	0.75	0.132	1663.58	2030.32	26.30	0.748	1.03	27.83	48.6	76.4	0.113	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.167	1.119	0.90
31.824	20.68	0.619	115.56	Yes	46	0	2.99323	Yes	Yes	-31.82	3712.86	1673.82	2039.04	0.74	0.132	1673.82	2039.04	20.13	0.788	1.03	21.29	49.8	71.1	0.108	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.152	1.109	0.85
31.988	20.168	0.811	115.56	Yes	52	0	4.021222	Yes	Yes	-31.99	3731.81	1684.05	2047.76	0.74	0.132	1684.05	2047.76	19.56	0.792	1.03	20.70	51.8	72.5	0.109	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.86
32.152	36.676	0.897	115.56	Yes	32	0	2.445741	Yes	Yes	-32.15	3750.76	1694.28	2056.48	0.74	0.132	1694.28	2056.48	35.36	0.700	1.02	37.42	44.0	81.4	0.117	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.182	1.131	0.94
32.316	58.694	0.782	118.77	Yes	19	0	1.332334	Yes	Yes	-32.32	3770.24	1704.52	2065.72	0.74	0.132	1704.52	2065.72	56.30	0.616	1.01	59.57	28.1	87.7	0.123	0.08	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.206	1.147	1.01
32.48	35.698	0.759	115.56	Yes	30	0	2.12617	Yes	Yes	-32.48	3789.19	1714.75	2074.44	0.74	0.131	1714.75	2074.44	34.22	0.705	1.01	36.20	42.5	78.7	0.115	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.174	1.124	0.92
32.644	25.068	0.444	115.56	Yes	34	0	1.771182	Yes	Yes	-32.64	3808.14	1724.99	2083.16	0.74	0.131	1724.99	2083.16	23.98	0.762	1.01	25.37	43.6	69.0	0.106	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	0.84
32.808	41.591	0.38	118.77	Yes	20	0	0.913659	Yes	Yes	-32.81	3827.62	1735.22	2092.40	0.73	0.131	1735.22	2092.40	39.61	0.680	1.01	41.91	28.3	70.2	0.107	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.107	0.85
32.972	36.056	0.406	118.77	Yes	23	0	1.126026	Yes	Yes	-32.97	3847.10	1745.45	2101.65	0.73	0.131	1745.45	2101.65	34.24	0.705	1.00	36.23	34.0	70.2	0.107	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.107	0.85
33.136	37.925	0.485	118.77	Yes	24	0	1.27884	Yes	Yes	-33.14	3866.58	1755.69	2110.89	0.73	0.131	1755.69	2110.89	35.91	0.697	1.00	37.99	35.0	73.0	0.110	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.157	1.112	0.87
33.3	40.108	0.531	118.77	Yes	24	0	1.323925	Yes	Yes	-33.30	3886.05	1765.92	2120.13	0.73	0.131	1765.92	2120.13	37.86	0.688	1.00	40.05	34.7	74.8	0.111	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.162	1.116	0.89
33.464	43.75	0.535	118.77	Yes	22	0	1.222857	Yes	Yes	-33.46	3905.53	1776.15	2129.38	0.73	0.130	1776.15	2129.38	41.18	0.674	1.00	43.56	32.1	75.7	0.112	0.07	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.164	1.118	0.90
33.628	43.351	0.711	118.77	Yes	25	0	1.640101	Yes	Yes	-33.63	3925.01	1786.39	2138.62	0.73	0.130	1786.39	2138.62	40.68	0.676	0.99	43.04	36.9	79.9	0.116	0.07	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.178	1.127	0.94
33.792	51.766	0.711	118.77	Yes	21	0	1.373488	Yes	Yes	-33.79	3944.49	1796.62	2147.87	0.73	0.130	1796.62	2147.87	48.46	0.644	0.99	51.27	31.3	82.6	0.118	0.07	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.187	1.134	0.96
33.956	38.31	0.64	118.77	Yes	27	0	1.670582	Yes	Yes	-33.96	3963.97	1806.85	2157.11	0.72	0.130	1806.85	2157.11	35.73	0.698	0.99	37.80	38.8	76.6	0.113	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.167	1.120	0.91
34.12	25.085	0.596	115.56	Yes	40	0	2.375922	Yes	Yes	-34.12	3982.92	1817.09	2165.83	0.72	0.130	1817.09	2165.83	23.29	0.766	0.98	24.64	47.5	72.1	0.109	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.154	1.111	0.87
34.284	25.719	0.449	115.56	Yes	35	0	1.745791	Yes	Yes	-34.28	4001.87	1827.32	2174.55	0.72	0.129	1827.32	2174.55	23.81	0.763	0.98	25.19	44.7	69.9	0.107	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.106	0.85
34.448	30.323	0.538	115.56	Yes	31	0	1.774231	Yes	Yes	-34.45	4020.82	1837.56	2183.27	0.72	0.129	1837.56	2183.27	28.01	0.738	0.98	29.63	42.1	71.7	0.109	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.110	0.87
34.612	37.576	0.769	115.56	Yes	29	0	2.046519	Yes	Yes	-34.61	4039.78	1847.79	2191.99	0.72	0.129	1847.79	2191.99	34.65	0.703	0.98	36.66	41.7	78.4	0.114	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	0.93
34.776	46.147	0.892	115.56	Yes	26	0	1.932953	Yes	Yes	-34.78	4058.73	1858.02	2200.70	0.72	0.129	1858.02	2200.70	42.49	0.668	0.97	44.95	38.8	83.8	0.119	0.07	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.191	1.137	0.98
34.941	46.047	1.064	115.56	Yes	28	0	2.310683	Yes	Yes	-34.94	4077.79	1868.32	2209.48	0.71	0.129	1868.32	2209.48	42.28	0.669	0.97	44.73	41.5	86.3	0.122	0.07	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.200	1.143	1.00
35.105	45.021	1.052	115.56	Yes	28	0	2.336687	Yes	Yes	-35.11	4096.75	1878.55	2218.19	0.71	0.128	1878.55	2218.19	41.22	0.673	0.97	43.61	41.9	85.5	0.121	0.07	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.197	1.141	1.00
35.269	36.079	0.894	115.56	Yes	33	0	2.477896	Yes	Yes	-35.27	4115.70	1888.79	2226.91	0.71	0.128	1888.79	2226.91	32.88	0.712	0.96	34.79	44.4	79.2	0.115	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.175	1.126	0.94
35.433	31.143	0.843	115.56	Yes	38	0	2.706868	Yes	Yes	-35.43	4134.65	1899.02	2235.63	0.71	0.128	1899.02	2235.63	28.27	0.736	0.96	29.91	47.5	77.4	0.113	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.169	1.122	0.92
35.597	35.323	0.897	115.56	Yes	33	0	2.539422	Yes	Yes	-35.60	4153.60	1909.25	2244.35	0.71	0.128	1909.25	2244.35	32.01	0.716	0.96	33.86	44.9	78.8	0.115	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.174	1.125	0.93
35.761	46.309	1.006	115.56	Yes	27	0	2.172364	Yes	Yes	-35.76	4172.55	1919.49	2253.07	0.71	0.128	1919.49	2253.07	41.97	0.670	0.96	44.40	40.6	85.0	0.121	0.07	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	0.99

CPT Liquefaction Analysis

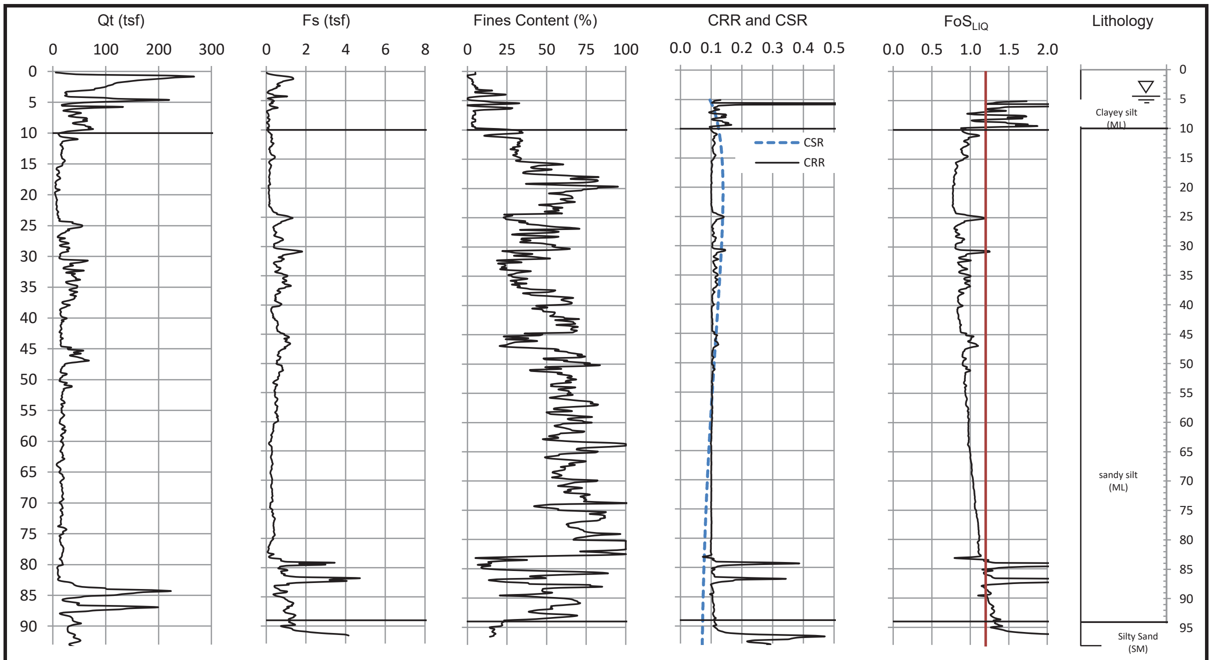
35.925	40.527	1.013	115.56	Yes	31	0	2.499568	Yes	Yes	-35.93	4191.51	1929.72	2261.79	0.71	0.128	1929.72	2261.79	36.57	0.694	0.95	38.70	43.7	82.4	0.118	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.186	1.133	0.97
36.089	38.139	0.819	115.56	Yes	30	0	2.147408	Yes	Yes	-36.09	4210.46	1939.95	2270.50	0.70	0.127	1939.95	2270.50	34.30	0.705	0.95	36.29	42.3	78.6	0.115	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	0.93
36.253	32.972	0.9	115.56	Yes	37	0	2.729589	Yes	Yes	-36.25	4229.41	1950.19	2279.22	0.70	0.127	1950.19	2279.22	29.52	0.729	0.95	31.23	47.4	78.6	0.115	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	0.94
36.417	43.612	0.937	115.56	Yes	28	0	2.148491	Yes	Yes	-36.42	4248.36	1960.42	2287.94	0.70	0.127	1960.42	2287.94	39.08	0.683	0.95	41.35	41.1	82.5	0.118	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.186	1.133	0.97
36.581	41.171	1.164	115.56	Yes	33	0	2.827233	Yes	Yes	-36.58	4267.31	1970.65	2296.66	0.70	0.127	1970.65	2296.66	36.77	0.693	0.94	38.90	45.2	84.1	0.120	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.192	1.138	0.99
36.745	41.468	1.242	115.56	Yes	33	0	2.995081	Yes	Yes	-36.75	4286.26	1980.89	2305.38	0.70	0.127	1980.89	2305.38	36.94	0.692	0.94	39.08	45.8	84.9	0.120	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	1.00
36.909	39.361	0.984	115.56	Yes	32	0	2.499936	Yes	Yes	-36.91	4305.22	1991.12	2314.10	0.70	0.126	1991.12	2314.10	34.94	0.702	0.94	36.97	44.0	81.0	0.117	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.181	1.130	0.96
37.073	34.107	0.937	115.56	Yes	37	0	2.747237	Yes	Yes	-37.07	4324.17	2001.36	2322.81	0.70	0.126	2001.36	2322.81	30.13	0.726	0.93	31.87	47.4	79.3	0.115	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.175	1.126	0.95
37.237	26.241	0.642	115.56	Yes	41	0	2.446553	Yes	Yes	-37.24	4343.12	2011.59	2331.53	0.69	0.126	2011.59	2331.53	23.02	0.768	0.93	24.36	48.0	72.3	0.109	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.89
37.401	18.261	0.639	115.56	Yes	55	0	3.499261	Yes	Yes	-37.40	4362.07	2021.82	2340.25	0.69	0.126	2021.82	2340.25	15.89	0.821	0.92	16.81	52.0	68.8	0.106	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	0.86
37.565	17.861	0.563	115.56	Yes	54	0	3.152119	Yes	Yes	-37.57	4381.02	2032.06	2348.97	0.69	0.126	2032.06	2348.97	15.49	0.825	0.92	16.39	51.5	67.9	0.106	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.85
37.729	21.751	0.706	115.56	Yes	50	0	3.245828	Yes	Yes	-37.73	4399.98	2042.29	2357.69	0.69	0.125	2042.29	2357.69	18.86	0.797	0.92	19.95	50.9	70.9	0.108	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.151	1.108	0.88
37.893	32.176	0.697	115.56	Yes	35	0	2.166211	Yes	Yes	-37.89	4418.93	2052.52	2366.40	0.69	0.125	2052.52	2366.40	28.00	0.738	0.92	29.63	45.7	75.3	0.112	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.163	1.117	0.91
38.057	27.408	0.612	115.56	Yes	39	0	2.232925	Yes	Yes	-38.06	4437.88	2062.76	2375.12	0.69	0.125	2062.76	2375.12	23.72	0.764	0.92	25.09	47.1	72.2	0.109	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.89
38.221	24.016	0.48	115.56	Yes	41	0	1.998668	Yes	Yes	-38.22	4456.83	2072.99	2383.84	0.68	0.125	2072.99	2383.84	20.67	0.784	0.91	21.87	47.2	69.1	0.107	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	0.86
38.385	18.316	0.455	115.56	Yes	50	0	2.484167	Yes	Yes	-38.39	4475.78	2083.22	2392.56	0.68	0.125	2083.22	2392.56	15.65	0.823	0.90	16.55	50.3	66.8	0.105	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.85
38.549	14.514	0.461	115.56	Yes	61	0	3.176244	Yes	Yes	-38.55	4494.74	2093.46	2401.28	0.68	0.124	2093.46	2401.28	12.31	0.855	0.90	13.03	52.5	65.5	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.84
38.713	13.375	0.492	115.56	Yes	67	0	3.678505	Yes	Yes	-38.71	4513.69	2103.69	2410.00	0.68	0.124	2103.69	2410.00	11.30	0.866	0.89	11.95	53.3	65.3	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.84
38.877	14.623	0.454	115.56	Yes	61	0	3.104698	Yes	Yes	-38.88	4532.64	2113.92	2418.71	0.68	0.124	2113.92	2418.71	12.33	0.855	0.89	13.04	52.4	65.4	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.84
39.042	15.528	0.488	115.56	Yes	59	0	3.14271	Yes	Yes	-39.04	4551.71	2124.22	2427.49	0.68	0.124	2124.22	2427.49	13.06	0.847	0.89	13.82	52.2	66.1	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.85
39.206	14.292	0.431	115.56	Yes	61	0	3.015673	Yes	Yes	-39.21	4570.66	2134.45	2436.20	0.68	0.124	2134.45	2436.20	11.97	0.858	0.89	12.66	52.4	65.1	0.103	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.84
39.37	14.162	0.492	115.56	Yes	64	0	3.474086	Yes	Yes	-39.37	4589.61	2144.69	2444.92	0.67	0.123	2144.69	2444.92	11.82	0.860	0.88	12.51	53.0	65.5	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.84
39.534	14.752	0.596	112.35	Yes	66	0	4.04013	Yes	Yes	-39.53	4608.04	2154.92	2453.11	0.67	0.123	2154.92	2453.11	12.29	0.855	0.88	13.00	53.5	66.5	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	0.85
39.698	15.836	0.702	112.35	Yes	66	0	4.432938	Yes	Yes	-39.70	4626.46	2165.16	2461.31	0.67	0.123	2165.16	2461.31	13.17	0.846	0.88	13.93	53.6	67.6	0.105	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.102	0.86
39.862	18.697	0.773	115.56	Yes	59	0	4.134353	Yes	Yes	-39.86	4645.41	2175.39	2470.02	0.67	0.123	2175.39	2470.02	15.56	0.824	0.88	16.46	52.9	69.4	0.107	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.106	0.88
40.026	26.336	0.722	115.56	Yes	44	0	2.741495	Yes	Yes	-40.03	4664.36	2185.62	2478.74	0.67	0.123	2185.62	2478.74	22.02	0.775	0.88	23.30	49.3	72.6	0.109	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.90
40.19	23.029	0.64	115.56	Yes	47	0	2.779105	Yes	Yes	-40.19	4683.32	2195.86	2487.46	0.67	0.122	2195.86	2487.46	19.14	0.795	0.88	20.25	50.0	70.3	0.107	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.107	0.88
40.354	16.543	0.316	115.56	Yes	50	0	1.910173	Yes	Yes	-40.35	4702.27	2206.09	2496.18	0.67	0.122	2206.09	2496.18	13.61	0.842	0.87	14.39	49.8	64.2	0.103	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.84
40.518	20.402	0.286	115.56	Yes	41	0	1.401823	Yes	Yes	-40.52	4721.22	2216.32	2504.90	0.66	0.122	2216.32	2504.90	16.81	0.813	0.87	17.79	46.5	64.3	0.103	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.84
40.682	16.763	0.248	115.56	Yes	47	0	1.479449	Yes	Yes	-40.68	4740.17	2226.56	2513.61	0.66	0.122	2226.56	2513.61	13.71	0.841	0.87	14.50	48.4	62.9	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.83
40.846	16.523	0.256	115.56	Yes	48	0	1.549355	Yes	Yes	-40.85	4759.12	2236.79	2522.33	0.66	0.122	2236.79	2522.33	13.47	0.843	0.86	14.25	48.8	63.0	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.83
41.01	16.288	0.245	115.56	Yes	48	0	1.504175	Yes	Yes	-41.01	4778.08	2247.02	2531.05	0.66	0.121	2247.02	2531.05	13.23	0.846	0.86	14.00	48.8	62.8	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.83
41.174	14.407	0.277	115.56	Yes	55	0	1.922676	Yes	Yes	-41.17	4797.03	2257.26	2539.77	0.66	0.121	2257.26	2539.77	11.63	0.862	0.85	12.31	50.7	63.0	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.83
41.338	14.658	0.29	115.56	Yes	55	0	1.978442	Yes	Yes	-41.34	4815.98	2267.49	2548.49	0.66	0.121	2267.49	2548.49	11.81	0.860	0.85	12.49	50.8	63.3	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.84
41.502	15.562	0.333	115.56	Yes	55	0	2.139828	Yes	Yes	-41.50	4834.93	2277.72	2557.21	0.65	0.121	2277.72	2557.21	12.52	0.853	0.85	13.24	50.8	64.0	0.103	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.84
41.666	16.114	0.348	115.56	Yes	54	0	2.159613	Yes	Yes	-41.67	4853.88	2287.96	2565.92	0.65	0.121	2287.96	2565.92	12.93	0.849	0.85	13.68	50.7	64.4	0.103	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.85
41.83	16.456	0.334	115.56	Yes	52	0	2.029655	Yes	Yes	-41.83	4872.83	2298.19	2574.64	0.65	0.120	2298.19	2574.64	13.17	0.846	0.85	13.94	50.3	64.2	0.103	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.85
41.994	14.361	0.37	115.56	Yes	61	0	2.576422	Yes	Yes	-41.99	4891.79	2308.43	2583.36	0.65	0.120	2308.43	2583.36	11.42	0.864	0.84	12.09	52.0	64.1	0.103	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.85
42.158	13.623	0.338	115.56	Yes	62	0	2.481098	Yes	Yes	-42.16	4910.74	2318.66	2592.08	0.65	0.120	2318.66	2592.08	10.79	0.871	0.84	11.41	52.2	63.6	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.84
42.322	12.563	0.426	115.56	Yes	70	0	3.39091	Yes	Yes	-42.32	4929.69	2328.89	2600.80	0.65	0.120	2328.89	2600.80	9.90	0.882	0.83	10.47	53.6	64.1	0.103	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.85
42.486	16.879	0.431	115.56	Yes	56	0	2.553469	Yes	Yes	-42.49	4948.64	2339.13	2609.52	0.65	0.119	2339.13	2609.52	13.37	0.844	0.84	14.14	51.3	65.5	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.86
42.65	15.771	0.507	115.56	Yes	62	0	3.214761	Yes	Yes	-42.65	4967.59	2349.36	2618.23	0.64	0.119	2349.36	2618.23	12.43	0.854	0.83	13.15	52.6	65.8	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.86
42.814	14.847	0.56	115.56	Yes	67	0	3.771806	Yes	Yes	-42.81	4986.55	2359.59	2626.95	0.64	0.119	2359.59	2626.95	11.65	0.862	0.83	12.32	53.4	65.8	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.86
42.978	14.951	0.577	115.56	Yes	67	0	3.859274	Yes	Yes	-42.98	5005.50	2369.83	2635.67	0.64	0.119	2369.83	2635.67	11.70	0.861	0.83	12.37	53.5	65.9	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.87
43.143	14.732	0.577	115.56	Yes	68	0	3.916644	Yes	Yes	-43.14	5024.56	2380.12	2644.44	0.64	0.119	2380.12	2644.44	11.49	0.864	0.82	12.15	53.6	65.8	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.87
43.307	18.918	0.596	115.56	Yes	56	0	3.150439	Yes	Yes	-43.31	5043.52	2390.36	2653.16	0.64	0.118	2390.36	2653.16	14.82	0.831	0.83	15.68	51.9	67.6	0.105	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.102	0.88
43.471	16.149	0.586	115.56	Yes	64	0	3.628708	Yes	Yes	-43.47	5062.47	2400.59	2661.88	0.64	0.118	2400.59	2661.88	12.55	0.852	0.82	13.28	53.1	66.4	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.87
43.635	14.11	0.545	115.56	Yes	70	0	3.862509	Yes	Yes	-43.64	5081.42	2410.82	2670.60	0.64	0.118	2410.82	2670.60	10.89	0.870	0.82	11.52	53.7	65.3	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.87
43.799	14.787	0.53	115.56	Yes	67	0	3.584229	Yes	Yes	-43.80	5100.37	2421.06	2679.31	0.63	0.118	2421.06	2679.31	11.40	0.865	0.82	12.06	53.3	65.4	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.87
43.963	15.078	0.528	115.56	Yes	66	0	3.501791	Yes	Yes	-43.96	5119.32	2431.29	2688.03	0.63	0.118	2431.29	2688.03	11.59	0.862	0.81	12.27	53.2	65.5	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.87
44.127	15.315	0.544	115.56	Yes	66	0	3.552073	Yes	Yes	-44.13	5138.28	2441.52	2696.75	0.63	0.117	2441.52	2696.75	11.75	0.861	0.81	12.43	53.2	65.7	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.87
44.291	14.571	0.566	115.56	Yes	69	0	3.884428	Yes	Yes	-44.29	5157.23	2451.76	2705.47	0.63	0.117	2451.76	2705.47	11.13	0.868	0.81	11.77	53.7	65.5	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.87
44.455	15.003	0.568	115.56	Yes	68	0	3.785909	Yes	Yes	-44.46	5176.18	2461.99	2714.19	0.63	0.117	2461.99	2714.19	11.44	0.864	0.81	12.10	53.5	65.6	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.87
44.619	16.469	0.675	115.56	Yes	66	0	4.09861	Yes	Yes	-44.62	5195.13	2472.23	2722.91	0.63	0.117	2472.23	2722.91	12.56	0.852	0.81	13.28	53.6	66.9	0.105	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.88
44.783	34.419	0.722	115.56	Yes	37	0	2.097679	Yes	Yes	-44.78	5214.08	2482.46	2731.62	0.63	0.117	2482.46	2731.62	26.90	0.744	0.83	28.46	46.2	74.7	0.111	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.116	0.95
44.947	28.011	0.907	115.56	Yes	47	0	3.238014	Yes	Yes	-44.95	5233.04	2492.69	2740.34	0.62	0.116	2492.69	2740.34	21.66	0.777	0.82	22.91	50.7	73.6	0.110	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.114	0.94
45.111	29.704	0.907	115.56	Yes	45	0	3.053461	Yes	Yes	-45.11	5251.99	2502.93	2749.06	0.62	0.116	2502.93	2749.06	22.96	0.768	0.82	24.29	50.1	74.4	0.111	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.115	0.95
45.275	57.454	1.01	118.77	Yes	23	0	1.757928	Yes	Yes	-45.28	5271.47	2513.16	2758.31	0.62	0.116	2513.16	2758.31	45.65	0.655	0.84	48.29	35.8	84.1	0.120	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.192	1.138	1.04
45.439	46.795	1.135	115.56	Yes	30	0	2.425473	Yes	Yes	-45.44	5290.42	2523.39	2767.02	0.62	0.116	2523.39	2767.02	36.72	0.693	0.83	38.85	42.8	81.6	0.117	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.183	1.131	1.02
45.603	39.517	1.138	115.56	Yes	38	0	2.879773	Yes	Yes	-45.60	5309.37	2533.63	2775.74	0.62	0.115	2533.63	2775.74	30.70	0.723	0.82	32.48	48.4	80.9	0.117	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.181	1.130	1.01
45.767	53.221	0.906	118.77	Yes	24	0	1.702336	Yes	Yes	-45.77	5328.85	2543.86	2784.99	0.62	0.115	2543.86	2784.99	41.84	0.671	0.83	44.26	36.3	80.6	0.116	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	1.01
45.931	38.233	1.046	115.56	Yes	39	0	2.735856	Yes	Yes	-45.93	5347.80	2554.09	2793.70	0.62	0.115	2554.09	2793.70	29.51	0.730	0.82	31.22	48.1	79.3	0.115	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.176	1.126	1.00
46.095	32.18	0.996	115.56	Yes	44	0	3.09509	Yes	Yes	-46.10	5366.75	2564.33	2802.42	0.62	0.115	2564.33	2802.42	24.58	0.758	0.81	26.01	50.0	76.0	0.112	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.118	0.97
46.259	42.172	0.968	115.56	Yes	31	0	2.295362	Yes	Yes	-46.26	5385.70	2574.56	2811.14	0.61	0.115	2574.56	2811.14	32.55	0.714	0.82	34.43	43.0	77.4	0.113	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	0.98
46.423	50.425	1.125	115.56	Yes	28	0	2.231036	Yes	Yes	-46.42	5404.65	2584.80	2819.86	0.61	0.114	2584.80	2819.86	39.18	0.682	0.82	41.45	41.1	82.5	0.118	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.186	1.134	1.04
46.587	56.587	1.209	118.77	Yes	26	0	2.136533	Yes	Yes	-46.59	5424.13	2595.03	2829.10	0.61	0.114	2595.03	2829.10	44.14	0.661	0.83	46.70	39.3	86.0	0.121	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.199	1.143	1.07
46.751	59.841	1.186	118.77	Yes	24	0	1.981919	Yes	Yes	-46.75	5443.61	2605.26	2838.35	0.61	0.114	2605.26	2838.35	46.72	0.651	0.83	49.43	37.4	86.9	0.122	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.202	1.145	1.08
46.915	68.405	1.078	118.77	Yes	20	0	1.575908	Yes	Yes	-46.92	5463.09	2615.50	2847.59	0.61	0.114	2615.50	2847.59	53.70	0.625	0.83	56.81	31.4	88.2	0.124	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.208	1.149	1.10
47.079	53.939	1.035	118.77	Yes	25	0	1.918834	Yes	Yes	-47.08	5482.57	2625.73	2856.84	0.61	0.114	2625.73	2856.84	41.68	0.671	0.82	44.09	38.2	82.3	0.118	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.185	1.133	1.04
47.244	36.577	0.918	115.56	Yes	39	0	2.509774	Yes	Yes	-47.24	5501.64	2636.03	2865.61	0.61	0.113	2636.03	2865.61	27.62	0.740	0.80	29.22	47.8	77.0	0.113	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.121	0.99
47.408	24.742	0.972	115.56	Yes	55	0	3.928543	Yes	Yes	-47.41	5520.59	2646.26	2874.33	0.60	0.113	2646.26	2874.33	18.29	0.802	0.78	19.36	52.5	71.8	0.109	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.154	1.110	0.94
47.572	22.033	0.842	115.56	Yes	58	0	3.82154	Yes	Yes	-47.57	5539.54	2656.49	2883.05	0.60	0.113	2656.49	2883.05	16.17	0.819	0.78	17.10	52.7	69.8	0.107	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	0.93
47.736	22.209	0.747	115.56	Yes	55	0	3.363501	Yes	Yes	-47.74	5558.49	2666.73	2891.76	0.60	0.113	2666.73	2891.76	16.26	0.818	0.77	17.20	52.0	69.2	0.107	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	0.92
47.9	18.5	0.68	115.56	Yes	62	0	3.675676	Yes	Yes	-47.90	5577.44	2676.96	2900.48	0.60	0.113	2676.96	2900.48	13.40	0.844	0.77	14.18	53.0	67.2	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	0.91
48.064	17.369	0.62	115.56	Yes	64	0	3.569578	Yes	Yes	-48.06	5596.39	2687.19	2909.20	0.60	0.112	2687.19	2909.20	12.51	0.853	0.76	13.24	53.1	66.4	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.90
48.228	16.362	0.644	115.56	Yes	68	0	3.935949	Yes	Yes	-48.23	5615.35	2697.43	2917.92	0.60	0.112	2697.43	2917.92	11.73	0.861	0.76	12.41	53.7	66.1	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.90
48.392	14.909	0.615	112.35	Yes	72	0	4.125025	Yes	Yes	-48.39	5633.77	2707.66	2926.11	0.60	0.112	2707.66	2926.11	10.62	0.873	0.75	11.23	54.1	65.4	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.90
48.556	15.383	0.576	115.56	Yes	70	0	3.744393	Yes	Yes	-48.56	5652.72	2717.89	2934.83	0.59	0.112	2717.89	2934.83	10.94	0.870	0.75	11.57	53.7	65.3	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.90
48.72	14.293	0.592	112.35	Yes	74	0	4.141888	Yes	Yes	-48.72	5671.15	2728.13	2943.02	0.59	0.111	2728.13	2943.02	10.11	0.879	0.75	10.69	54.3	65.0	0.103	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.90
48.884	16.303	0.718	112.35	Yes	71	0	4.404097	Yes	Yes	-48.88	5689.57	2738.36	2951.21	0.59	0.111	2738.36	2951.21	11.56	0.863	0.75	12.23	54.1	66.4	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.91
49.048	26.092	0.71	115.56	Yes	48	0	2.721141	Yes	Yes	-49.05	5708.53	2748.60	2959.93	0.59	0.111	2748.60	2959.93	18.87	0.797	0.77	19.97	50.3	70.3	0.108	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.107	0.94
49.212	25.134	0.681	115.56	Yes	49	0	2.709477	Yes	Yes	-49.21	5727.48	2758.83	2968.65	0.59	0.111	2758.83	2968.65	18.10	0.803	0.76	19.15	50.5	69.6	0.107	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	0.94
49.376	18.371	0.653	115.56	Yes	63	0	3.554515	Yes	Yes	-49.38	5746.43	2769.06	2977.37	0.59	0.111	2769.06	2977.37	13.00	0.848	0.75	13.75	53.0	66.8	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.92
49.54	17.843	0.539	115.56	Yes	61	0	3.020792	Yes	Yes	-49.54	5765.38	2779.30	2986.09	0.59	0.110	2779.30	2986.09	12.57	0.852	0.75	13.30	52.5	65.8	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.91
49.704	15.181	0.547	115.56	Yes	70	0	3.603188	Yes	Yes	-49.70	5784.33	2789.53	2994.80	0.59	0.110	2789.53	2994.80	10.59	0.874	0.74	11.21	53.7	64.9	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.90
49.868	13.443	0.548	112.35	Yes	77	0	4.076471	Yes	Yes	-49.87	5802.76	2799.76	3003.00	0.58	0.110	2799.76	3003.00	9.31	0.889	0.73	9.85	54.5	64.3	0.103	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.90
50.032	13.934	0.512	115.56	Yes	74	0	3.674465	Yes	Yes	-50.03	5821.71	2810.00	3011.71	0.58	0.110	2810.00	3011.71	9.64	0.885	0.73	10.19	54.1	64.3	0.103	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.90
50.196	12.462	0.579	112.35	Yes	84	0	4.646124	Yes	Yes	-50.20	5840.14	2820.23	3019.91	0.58	0.110	2820.23	3019.91	8.55	0.899	0.73	9.05	55.0	64.1	0.103	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.90
50.36	16.658	0.778	112.35	Yes	72	0	4.670429	Yes	Yes	-50.36	5858.56	2830.46	3028.10	0.58	0.109	2830.46	3028.10	11.56	0.863	0.73	12.23	54.4	66.6	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.92
50.524	26.521	0.784	115.56	Yes	50	0	2.956148	Yes	Yes	-50.52	5877.51	2840.70	3036.82	0.58	0.109	2840.70	3036.82	18.79	0.798	0.75	19.88	50.9	70.8	0.108	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.151	1.108	0.96
50.688	23.431	0.811	115.56	Yes	56	0	3.461227	Yes	Yes	-50.69	5896.47	2850.93	3045.53	0.58	0.109	2850.93	3045.53	16.45	0.816	0.74	17.40	52.2	69.6	0.107	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	0.95
50.852	21.955	0.815	115.56	Yes	59	0	3.712138	Yes	Yes	-50.85	5915.42	2861.16	3054.25	0.58	0.109	2861.16	3054.25	15.32	0.826	0.74	16.21	52.8	69.0	0.106	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	0.94
51.016	35.32	0.813	115.56	Yes	40	0	2.301812	Yes	Yes	-51.02	5934.37	2871.40	3062.97	0.58	0.109	2871.40	3062.97	25.26	0.754	0.76	26.72	47.8	74.5	0.111	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.115	0.99
51.18	35.441	0.856	115.56	Yes	40	0	2.415282	Yes	Yes	-51.18	5953.32	2881.63	3071.69	0.57	0.108	2881.63	3071.69	25.29	0.754	0.76	26.76	48.2	74.9	0.111	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.162	1.116	1.00
51.345	26.006	0.777	115.56	Yes	51	0	2.987772	Yes	Yes	-51.35	5972.39	2891.93	3080.46	0.57	0.108	2891.93	3080.46	18.18	0.802	0.74	19.24	51.1	70.4	0.108	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.107	0.96
51.509	20.328	0.669	115.56	Yes	60	0	3.291027	Yes	Yes	-51.51	5991.34	2902.16	3089.18	0.57	0.108	2902.16	3089.18	13.99	0.838	0.73	14.80	52.5	67.3	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	0.94
51.673	21.157	0.643	115.56	Yes	57	0	3.039183	Yes	Yes	-51.67	6010.29	2912.40	3097.90	0.57	0.108	2912.40	3097.90	14.56	0.833	0.73	15.40	52.0	67.4	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.102	0.94
51.837	19.819	0.655	115.56	Yes	61	0	3.304909	Yes	Yes	-51.84	6029.24	2922.63	3106.61	0.57	0.108	2922.63	3106.61	13.55	0.842	0.72	14.34	52.6	67.0	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.101	0.94
52.001	18.142	0.66	115.56	Yes	65	0	3.637967	Yes	Yes	-52.00	6048.20	2932.86	3115.33	0.57	0.107	2932.86	3115.33	12.32	0.855	0.72	13.03	53.3	66.4	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.93
52.165	17.863	0.65	115.56	Yes	66	0	3.638806	Yes	Yes	-52.17	6067.15	2943.10	3124.05	0.57	0.107	2943.10	3124.05	12.09	0.857	0.72	12.79	53.4	66.2	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.93
52.329	18.23	0.586	115.56	Yes	63	0	3.214482	Yes	Yes	-52.33	6086.10	2953.33	3132.77	0.56	0.107	2953.33	3132.77	12.32	0.855	0.72	13.04	52.9	65.9	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.93
52.493	17.449	0.596	115.56	Yes	66	0	3.415669	Yes	Yes	-52.49	6105.05	2963.56	3141.49	0.56	0.107	2963.56	3141.49	11.74	0.861	0.71	12.42	53.3	65.7	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.93
52.657	16.607	0.603	115.56	Yes	69	0	3.630999	Yes	Yes	-52.66	6124.00	2973.80	3150.21	0.56	0.107	2973.80	3150.21	11.11	0.868	0.71	11.76	53.6	65.4	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.93
52.821	17.748	0.545	115.56	Yes	63	0	3.070769	Yes	Yes	-52.82	6142.95	2984.03	3158.92	0.56	0.106	2984.03	3158.92	11.89	0.859	0.71	12.58	52.8	65.4	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.93
52.985	17.086	0.45	115.56	Yes	62	0	2.633735	Yes	Yes	-52.99	6161.91	2994.26	3167.64	0.56	0.106	2994.26	3167.64	11.39	0.865	0.71	12.05	52.4	64.4	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.92
53.149	15.367	0.394	115.56	Yes	66	0	2.563936	Yes	Yes	-53.15	6180.86	3004.50	3176.36	0.56	0.106	3004.50	3176.36	10.16	0.879	0.70	10.75	52.8	63.5	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.92
53.313	17.024	0.35	115.56	Yes	58	0	2.055921	Yes	Yes	-53.31	6199.81	3014.73	3185.08	0.56	0.106	3014.73	3185.08	11.29	0.866	0.70	11.95	51.5	63.4	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.92
53.477	20.326	0.418	115.56	Yes	53	0	2.056479	Yes	Yes	-53.48	6218.76	3024.96	3193.80	0.56	0.106	3024.96	3193.80	13.58	0.842	0.71	14.37	50.6	64.9	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.93
53.641	21.949	0.551	115.56	Yes	54	0	2.510365	Yes	Yes	-53.64	6237.71	3035.20	3202.52	0.55	0.105	3035.20	3202.52	14.70	0.832	0.71	15.55	51.1	66.7	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.95
53.805	22.246	0.538	115.56	Yes	53	0	2.418412	Yes	Yes	-53.81	6256.67	3045.43	3211.23	0.55	0.105	3045.43	3211.23	14.87	0.830	0.71	15.73	50.9	66.6	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.95
53.969	15.821	0.476	115.56	Yes	68	0	3.008659	Yes	Yes	-53.97	6275.62	3055.67	3219.95	0.55	0.105	3055.67	3219.95	10.35	0.877	0.69	10.95	53.2	64.2	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.93
54.133	16.641	0.472	115.56	Yes	65	0	2.836368	Yes	Yes	-54.13	6294.57	3065.90	3228.67	0.55	0.105	3065.90	3228.67	10.89	0.870	0.69	11.52	52.9	64.4	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.93
54.297	19.13	0.462	115.56	Yes	58	0	2.415055	Yes	Yes	-54.30	6313.52	3076.13	3237.39	0.55	0.105	3076.13	3237.39	12.59	0.852	0.70	13.32	51.7	65.0	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.94
54.461	18.078	0.444	115.56	Yes	60	0	2.456024	Yes	Yes	-54.46	6332.47	3086.37	3246.11	0.55	0.104	3086.37	3246.11	11.83	0.860	0.69	12.51	52.0	64.5	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.94
54.625	16.295	0.412	115.56	Yes	64	0	2.528383	Yes	Yes	-54.63	6351.42	3096.60	3254.82	0.55	0.104	3096.60	3254.82	10.57	0.874	0.69	11.18	52.6	63.8	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.93
54.789	16.429	0.417	115.56	Yes	64	0	2.538195	Yes	Yes	-54.79	6370.38	3106.83	3263.54	0.55	0.104	3106.83	3263.54	10.64	0.873	0.68	11.25	52.6	63.8	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.096	0.93

CPT Liquefaction Analysis

54.953	16.578	0.46	115.56	Yes	65	0	2.774762	Yes	Yes	-54.95	6389.33	3117.07	3272.26	0.55	0.104	3117.07	3272.26	10.71	0.872	0.68	11.33	52.9	64.2	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.94
55.117	16.969	0.436	115.56	Yes	63	0	2.569391	Yes	Yes	-55.12	6408.28	3127.30	3280.98	0.54	0.104	3127.30	3280.98	10.95	0.870	0.68	11.59	52.5	64.1	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.94
55.281	16.146	0.451	115.56	Yes	67	0	2.793261	Yes	Yes	-55.28	6427.23	3137.53	3289.70	0.54	0.103	3137.53	3289.70	10.37	0.876	0.68	10.97	53.0	64.0	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.94
55.446	18.081	0.429	115.56	Yes	60	0	2.372656	Yes	Yes	-55.45	6446.30	3147.83	3298.47	0.54	0.103	3147.83	3298.47	11.66	0.862	0.68	12.33	51.9	64.3	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.94
55.61	19.904	0.447	115.56	Yes	56	0	2.24578	Yes	Yes	-55.61	6465.25	3158.06	3307.19	0.54	0.103	3158.06	3307.19	12.88	0.849	0.68	13.62	51.3	64.9	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.95
55.774	21.933	0.46	115.56	Yes	52	0	2.097296	Yes	Yes	-55.77	6484.20	3168.30	3315.91	0.54	0.103	3168.30	3315.91	14.24	0.836	0.69	15.07	50.5	65.5	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.95
55.938	20.229	0.54	115.56	Yes	58	0	2.669435	Yes	Yes	-55.94	6503.16	3178.53	3324.62	0.54	0.103	3178.53	3324.62	13.04	0.848	0.68	13.79	52.0	65.8	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.96
56.102	18.528	0.572	115.56	Yes	64	0	3.087219	Yes	Yes	-56.10	6522.11	3188.76	3333.34	0.54	0.102	3188.76	3333.34	11.85	0.860	0.68	12.54	52.9	65.4	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.96
56.266	16.329	0.557	115.56	Yes	70	0	3.411109	Yes	Yes	-56.27	6541.06	3199.00	3342.06	0.54	0.102	3199.00	3342.06	10.34	0.877	0.67	10.94	53.7	64.6	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.95
56.43	14.388	0.538	115.56	Yes	78	0	3.739227	Yes	Yes	-56.43	6560.01	3209.23	3350.78	0.53	0.102	3209.23	3350.78	9.02	0.893	0.66	9.54	54.4	63.9	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.95
56.594	13.645	0.49	115.56	Yes	79	0	3.591059	Yes	Yes	-56.59	6578.96	3219.47	3359.50	0.53	0.102	3219.47	3359.50	8.51	0.900	0.66	9.00	54.5	63.5	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.94
56.758	13.575	0.451	115.56	Yes	78	0	3.322284	Yes	Yes	-56.76	6597.91	3229.70	3368.22	0.53	0.102	3229.70	3368.22	8.44	0.901	0.66	8.93	54.3	63.2	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.94
56.922	12.721	0.455	115.56	Yes	83	0	3.576763	Yes	Yes	-56.92	6616.87	3239.93	3376.93	0.53	0.101	3239.93	3376.93	7.86	0.909	0.65	8.32	54.7	63.0	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.94
57.086	13.074	0.471	115.56	Yes	82	0	3.60257	Yes	Yes	-57.09	6635.82	3250.17	3385.65	0.53	0.101	3250.17	3385.65	8.07	0.906	0.65	8.54	54.6	63.2	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.95
57.25	15.975	0.539	115.56	Yes	72	0	3.374022	Yes	Yes	-57.25	6654.77	3260.40	3394.37	0.53	0.101	3260.40	3394.37	9.96	0.881	0.66	10.53	53.8	64.3	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.96
57.414	19.865	0.576	115.56	Yes	61	0	2.899572	Yes	Yes	-57.41	6673.72	3270.63	3403.09	0.53	0.101	3270.63	3403.09	12.52	0.853	0.67	13.25	52.5	65.7	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.97
57.578	22.205	0.542	115.56	Yes	55	0	2.440892	Yes	Yes	-57.58	6692.67	3280.87	3411.81	0.53	0.101	3280.87	3411.81	14.07	0.838	0.67	14.88	51.3	66.2	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.97
57.742	22.429	0.551	115.56	Yes	55	0	2.456641	Yes	Yes	-57.74	6711.63	3291.10	3420.52	0.53	0.101	3291.10	3420.52	14.19	0.836	0.67	15.01	51.3	66.3	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.98
57.906	18.882	0.543	115.56	Yes	63	0	2.875755	Yes	Yes	-57.91	6730.58	3301.33	3429.24	0.52	0.100	3301.33	3429.24	11.78	0.860	0.66	12.46	52.7	65.2	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.099	0.97
58.07	17.764	0.527	115.56	Yes	66	0	2.966674	Yes	Yes	-58.07	6749.53	3311.57	3437.96	0.52	0.100	3311.57	3437.96	11.01	0.869	0.66	11.65	53.1	64.7	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.97
58.234	24.121	0.494	115.56	Yes	50	0	2.048008	Yes	Yes	-58.23	6768.48	3321.80	3446.68	0.52	0.100	3321.80	3446.68	15.23	0.827	0.67	16.11	50.1	66.2	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.98
58.398	22.748	0.449	115.56	Yes	51	0	1.9738	Yes	Yes	-58.40	6787.43	3332.04	3455.40	0.52	0.100	3332.04	3455.40	14.27	0.836	0.66	15.10	50.2	65.3	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.97
58.562	22.688	0.489	115.56	Yes	53	0	2.155324	Yes	Yes	-58.56	6806.38	3342.27	3464.12	0.52	0.100	3342.27	3464.12	14.20	0.836	0.66	15.02	50.7	65.7	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.98
58.726	19.164	0.542	115.56	Yes	63	0	2.82822	Yes	Yes	-58.73	6825.34	3352.50	3472.83	0.52	0.099	3352.50	3472.83	11.83	0.860	0.65	12.52	52.6	65.1	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.099	0.97
58.89	16.652	0.535	115.56	Yes	70	0	3.212827	Yes	Yes	-58.89	6844.29	3362.74	3481.55	0.52	0.099	3362.74	3481.55	10.16	0.879	0.65	10.75	53.6	64.4	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.97
59.054	15.02	0.599	115.56	Yes	79	0	3.988016	Yes	Yes	-59.05	6863.24	3372.97	3490.27	0.52	0.099	3372.97	3490.27	9.08	0.892	0.64	9.61	54.6	64.2	0.103	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.97
59.218	17.27	0.532	115.56	Yes	68	0	3.080486	Yes	Yes	-59.22	6882.19	3383.20	3498.99	0.52	0.099	3383.20	3498.99	10.51	0.875	0.64	11.12	53.4	64.5	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.97
59.382	19.398	0.574	115.56	Yes	63	0	2.959068	Yes	Yes	-59.38	6901.14	3393.44	3507.71	0.51	0.099	3393.44	3507.71	11.87	0.859	0.65	12.56	52.8	65.4	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.98
59.547	18.954	0.59	115.56	Yes	65	0	3.112799	Yes	Yes	-59.55	6920.21	3403.73	3516.48	0.51	0.098	3403.73	3516.48	11.56	0.863	0.65	12.23	53.1	65.3	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.98
59.711	16.764	0.599	115.56	Yes	72	0	3.573133	Yes	Yes	-59.71	6939.16	3413.97	3525.20	0.51	0.098	3413.97	3525.20	10.12	0.879	0.64	10.70	54.0	64.7	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.98
59.875	16.506	0.602	115.56	Yes	74	0	3.647159	Yes	Yes	-59.88	6958.11	3424.20	3533.91	0.51	0.098	3424.20	3533.91	9.93	0.882	0.64	10.50	54.1	64.6	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.98
60.039	14.628	0.517	115.56	Yes	78	0	3.534318	Yes	Yes	-60.04	6977.07	3434.43	3542.63	0.51	0.098	3434.43	3542.63	8.71	0.897	0.63	9.21	54.4	63.6	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.97
60.203	18.675	0.437	115.56	Yes	61	0	2.340027	Yes	Yes	-60.20	6996.02	3444.67	3551.35	0.51	0.098	3444.67	3551.35	11.27	0.866	0.64	11.93	52.1	64.1	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.98
60.367	18.854	0.388	115.56	Yes	59	0	2.057919	Yes	Yes	-60.37	7014.97	3454.90	3560.07	0.51	0.098	3454.90	3560.07	11.36	0.865	0.64	12.02	51.6	63.6	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.97
60.531	20.069	0.369	115.56	Yes	55	0	1.838657	Yes	Yes	-60.53	7033.92	3465.13	3568.79	0.51	0.097	3465.13	3568.79	12.12	0.857	0.64	12.82	50.8	63.6	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.98
60.695	19.767	0.373	115.56	Yes	56	0	1.886983	Yes	Yes	-60.70	7052.87	3475.37	3577.51	0.51	0.097	3475.37	3577.51	11.90	0.859	0.64	12.59	51.0	63.6	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.98
60.859	18.057	0.365	115.56	Yes	60	0	2.021377	Yes	Yes	-60.86	7071.83	3485.60	3586.22	0.50	0.097	3485.60	3586.22	10.78	0.872	0.63	11.40	51.8	63.2	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.98
61.023	17.279	0.367	115.56	Yes	63	0	2.123966	Yes	Yes	-61.02	7090.78	3495.84	3594.94	0.50	0.097	3495.84	3594.94	10.26	0.878	0.63	10.85	52.2	63.0	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.98
61.187	16.39	0.354	115.56	Yes	65	0	2.159854	Yes	Yes	-61.19	7109.73	3506.07	3603.66	0.50	0.097	3506.07	3603.66	9.67	0.885	0.62	10.23	52.5	62.8	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.97
61.351	15.93	0.348	115.56	Yes	66	0	2.184557	Yes	Yes	-61.35	7128.68	3516.30	3612.38	0.50	0.096	3516.30	3612.38	9.36	0.889	0.62	9.90	52.7	62.6	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.97
61.515	14.304	0.366	115.56	Yes	74	0	2.558725	Yes	Yes	-61.52	7147.63	3526.54	3621.10	0.50	0.096	3526.54	3621.10	8.33	0.902	0.62	8.81	53.7	62.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.98
61.679	14.544	0.353	115.56	Yes	72	0	2.427118	Yes	Yes	-61.68	7166.59	3536.77	3629.82	0.50	0.096	3536.77	3629.82	8.46	0.901	0.62	8.95	53.4	62.4	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.98
61.843	17.745	0.314	115.56	Yes	59	0	1.769513	Yes	Yes	-61.84	7185.54	3547.00	3638.53	0.50	0.096	3547.00	3638.53	10.43	0.876	0.62	11.04	51.5	62.5	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.98
62.007	18.047	0.307	115.56	Yes	58	0	1.701114	Yes	Yes	-62.01	7204.49	3557.24	3647.25	0.50	0.096	3557.24	3647.25	10.60	0.874	0.62	11.22	51.2	62.5	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.98
62.171	18.405	0.263	115.56	Yes	55	0	1.42896	Yes	Yes	-62.17	7223.44	3567.47	3655.97	0.50	0.096	3567.47	3655.97	10.80	0.871	0.62	11.43	50.5	61.9	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.97
62.335	19.489	0.246	115.56	Yes	52	0	1.262251	Yes	Yes	-62.34	7242.39	3577.70	3664.69	0.49	0.095	3577.70	3664.69	11.46	0.864	0.62	12.13	49.6	61.7	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.97
62.499	18.353	0.295	115.56	Yes	57	0	1.607367	Yes	Yes	-62.50	7261.34	3587.94	3673.41	0.49	0.095	3587.94	3673.41	10.72	0.872	0.62	11.34	51.0	62.3	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.98
62.663	18.006	0.282	115.56	Yes	57	0	1.566145	Yes	Yes	-62.66	7280.30	3598.17	3682.12	0.49	0.095	3598.17	3682.12	10.48	0.875	0.62	11.09	51.0	62.1	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.98
62.827	21.969	0.269	115.56	Yes	48	0	1.224453	Yes	Yes	-62.83	7299.25	3608.40	3690.84	0.49	0.095	3608.40	3690.84	12.95	0.848	0.62	13.70	48.6	62.3	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.98
62.991	19.993	0.253	115.56	Yes	51	0	1.265443	Yes	Yes	-62.99	7318.20	3618.64	3699.56	0.49	0.095	3618.64	3699.56	11.68	0.862	0.62	12.35	49.5	61.8	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.98
63.155	15.967	0.243	115.56	Yes	62	0	1.521889	Yes	Yes	-63.16	7337.15	3628.87	3708.28	0.49	0.094	3628.87	3708.28	9.15	0.891	0.61	9.68	51.6	61.3	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.98
63.319	13.35	0.25	115.56	Yes	73	0	1.872659	Yes	Yes	-63.32	7356.10	3639.11	3717.00	0.49	0.094	3639.11	3717.00	7.54	0.914	0.60	7.98	53.2	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.98
63.483	9.564	0.172	115.56	Yes	91	0	1.798411	Yes	Yes	-63.48	7375.06	3649.34	3725.72	0.49	0.094	3649.34	3725.72	5.28	0.952	0.58	5.58	54.8	60.3	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.97
63.648	7.708	0.138	115.56	Yes	100	0	1.790348	Yes	Yes	-63.65	7394.12	3659.64	3734.49	0.49	0.094	3659.64	3734.49	4.19	0.975	0.57	4.43	55.2	59.7	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.97
63.812	7.01	0.138	115.56	Yes	100	0	1.968616	Yes	Yes	-63.81	7413.07	3669.87	3743.21	0.49	0.094	3669.87	3743.21	3.78	0.984	0.57	4.00	55.1	59.1	0.099	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.97
63.976	8.26	0.184	115.56	Yes	100	0	2.227603	Yes	Yes	-63.98	7432.03	3680.10	3751.92	0.48	0.094	3680.10	3751.92	4.48	0.968	0.57	4.74	55.3	60.1	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.98
64.14	10.508	0.241	115.56	Yes	90	0	2.293491	Yes	Yes	-64.14	7450.98	3690.34	3760.64	0.48	0.093	3690.34	3760.64	5.78	0.942	0.58	6.11	54.8	61.0	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.98
64.304	13.099	0.276	115.56	Yes	76	0	2.107031	Yes	Yes	-64.30	7469.93	3700.57	3769.36	0.48	0.093	3700.57	3769.36	7.29	0.917	0.59	7.71	53.7	61.4	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.99
64.468	14.585	0.275	115.56	Yes	69	0	1.885499	Yes	Yes	-64.47	7488.88	3710.80	3778.08	0.48	0.093	3710.80	3778.08	8.16	0.905	0.59	8.63	52.9	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.99
64.632	14.821	0.282	115.56	Yes	69	0	1.902706	Yes	Yes	-64.63	7507.83	3721.04	3786.80	0.48	0.093	3721.04	3786.80	8.28	0.903	0.59	8.76	52.9	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.99
64.796	13.536	0.276	115.56	Yes	74	0	2.039007	Yes	Yes	-64.80	7526.79	3731.27	3795.52	0.48	0.093	3731.27	3795.52	7.50	0.914	0.59	7.93	53.5	61.4	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.99
64.96	12.286	0.293	115.56	Yes	82	0	2.384828	Yes	Yes	-64.96	7545.74	3741.50	3804.23	0.48	0.093	3741.50	3804.23	6.75	0.926	0.58	7.14	54.3	61.5	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.00
65.124	12.704	0.302	115.56	Yes	81	0	2.377204	Yes	Yes	-65.12	7564.69	3751.74	3812.95	0.48	0.092	3751.74	3812.95	6.98	0.922	0.58	7.38	54.2	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.00
65.288	16.047	0.295	115.56	Yes	66	0	1.83835	Yes	Yes	-65.29	7583.64	3761.97	3821.67	0.48	0.092	3761.97	3821.67	8.94	0.894	0.59	9.46	52.4	61.9	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.00
65.452	18.303	0.284	115.56	Yes	58	0	1.551658	Yes	Yes	-65.45	7602.59	3772.20	3830.39	0.48	0.092	3772.20	3830.39	10.28	0.877	0.59	10.87	51.1	62.0	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.00
65.616	18.409	0.283	115.56	Yes	58	0	1.537292	Yes	Yes	-65.62	7621.54	3782.44	3839.11	0.48	0.092	3782.44	3839.11	10.32	0.877	0.59	10.92	51.1	62.0	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.00
65.78	19.664	0.253	115.56	Yes	53	0	1.286615	Yes	Yes	-65.78	7640.50	3792.67	3847.82	0.47	0.092	3792.67	3847.82	11.06	0.868	0.59	11.70	50.0	61.7	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.00
65.944	21.182	0.236	115.56	Yes	49	0	1.114154	Yes	Yes	-65.94	7659.45	3802.91	3856.54	0.47	0.092	3802.91	3856.54	11.96	0.859	0.60	12.65	48.8	61.5	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.00
66.108	20.252	0.234	115.56	Yes	51	0	1.155441	Yes	Yes	-66.11	7678.40	3813.14	3865.26	0.47	0.091	3813.14	3865.26	11.37	0.865	0.59	12.03	49.3	61.4	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.00
66.272	17.729	0.244	115.56	Yes	58	0	1.376276	Yes	Yes	-66.27	7697.35	3823.37	3873.98	0.47	0.091	3823.37	3873.98	9.82	0.883	0.59	10.39	50.9	61.3	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.00
66.436	15.583	0.269	115.56	Yes	66	0	1.72624	Yes	Yes	-66.44	7716.30	3833.61	3882.70	0.47	0.091	3833.61	3882.70	8.53	0.899	0.58	9.03	52.5	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.01
66.6	13.803	0.281	115.56	Yes	75	0	2.035789	Yes	Yes	-66.60	7735.26	3843.84	3891.42	0.47	0.091	3843.84	3891.42	7.47	0.915	0.57	7.91	53.5	61.4	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.01
66.764	14.456	0.297	115.56	Yes	73	0	2.05451	Yes	Yes	-66.76	7754.21	3854.07	3900.13	0.47	0.091	3854.07	3900.13	7.84	0.909	0.57	8.29	53.4	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.01
66.928	16.376	0.297	115.56	Yes	65	0	1.81363	Yes	Yes	-66.93	7773.16	3864.31	3908.85	0.47	0.091	3864.31	3908.85	8.94	0.894	0.58	9.46	52.4	61.9	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.01
67.092	17.191	0.324	115.56	Yes	64	0	1.884707	Yes	Yes	-67.09	7792.11	3874.54	3917.57	0.47	0.090	3874.54	3917.57	9.40	0.888	0.58	9.95	52.3	62.2	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.02
67.256	16.177	0.328	115.56	Yes	68	0	2.02757	Yes	Yes	-67.26	7811.06	3884.77	3926.29	0.47	0.090	3884.77	3926.29	8.79	0.896	0.57	9.30	52.8	62.1	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.02
67.42	17.057	0.304	115.56	Yes	64	0	1.782259	Yes	Yes	-67.42	7830.01	3895.01	3935.01	0.46	0.090	3895.01	3935.01	9.28	0.890	0.58	9.82	52.2	62.0	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.02
67.584	18.194	0.276	115.56	Yes	59	0	1.516984	Yes	Yes	-67.58	7848.97	3905.24	3943.73	0.46	0.090	3905.24	3943.73	9.93	0.882	0.58	10.51	51.3	61.8	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	1.02
67.749	17.234	0.271	115.56	Yes	62	0	1.572473	Yes	Yes	-67.75	7868.03	3915.54	3952.50	0.46	0.090	3915.54	3952.50	9.35	0.889	0.57	9.89	51.7	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.02
67.913	17.284	0.272	115.56	Yes	62	0	1.57371	Yes	Yes	-67.91	7886.99	3925.77	3961.21	0.46	0.090	3925.77	3961.21	9.36	0.889	0.57	9.90	51.7	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.02
68.077	17.66	0.285	115.56	Yes	61	0	1.613817	Yes	Yes	-68.08	7905.94	3936.00	3969.93	0.46	0.090	3936.00	3969.93	9.56	0.886	0.57	10.11	51.7	61.8	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	1.02
68.241	18.424	0.266	115.56	Yes	58	0	1.443769	Yes	Yes	-68.24	7924.89	3946.24	3978.65	0.46	0.089	3946.24	3978.65	9.98	0.881	0.57	10.56	51.1	61.6	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.02
68.405	19.248	0.233	115.56	Yes	54	0	1.210515	Yes	Yes	-68.41	7943.84	3956.47	3987.37	0.46	0.089	3956.47	3987.37	10.45	0.875	0.57	11.05	50.1	61.2	0.100	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.02
68.569	19.184	0.221	115.56	Yes	54	0	1.152002	Yes	Yes	-68.57	7962.79	3966.71	3996.09	0.46	0.089	3966.71	3996.09	10.39	0.876	0.57	10.99	50.0	61.0	0.100	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	1.02
68.733	17.925	0.207	115.56	Yes	56	0	1.154812	Yes	Yes	-68.73	7981.75	3976.94	4004.81	0.46	0.089	3976.94	4004.81	9.63	0.885	0.57	10.19	50.5	60.7	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.02
68.897	17.444	0.216	115.56	Yes	58	0	1.238248	Yes	Yes	-68.90	8000.70	3987.17	4013.52	0.46	0.089	3987.17	4013.52	9.33	0.889	0.57	9.87	50.9	60.8	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	1.02
69.061	17.57	0.24	115.56	Yes	60	0	1.365965	Yes	Yes	-69.06	8019.65	3997.41	4022.24	0.46	0.089	3997.41	4022.24	9.39	0.888	0.57	9.93	51.2	61.2	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.02
69.225	18.624	0.253	115.56	Yes	57	0	1.358462	Yes	Yes	-69.23	8038.60	4007.64	4030.96	0.45	0.088	4007.64	4030.96	9.98	0.881	0.57	10.56	50.9	61.4	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.03
69.389	20.457	0.263	115.56	Yes	53	0	1.285624	Yes	Yes	-69.39	8057.55	4017.87	4039.68	0.45	0.088	4017.87	4039.68	11.03	0.869	0.57	11.66	50.0	61.7	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.03
69.553	18.268	0.279	115.56	Yes	60	0	1.527261	Yes	Yes	-69.55	8076.50	4028.11	4048.40	0.45	0.088	4028.11	4048.40	9.73	0.884	0.56	10.29	51.4	61.7	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.03
69.717	16.424	0.293	115.56	Yes	67	0	1.783975	Yes	Yes	-69.72	8095.46	4038.34	4057.12	0.45	0.088	4038.34	4057.12	8.65	0.898	0.56	9.16	52.5	61.7	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.03
69.881	13.109	0.305	115.56	Yes	82	0	2.326646	Yes	Yes	-69.88	8114.41	4048.57	4065.83	0.45	0.088	4048.57	4065.83	6.77	0.925	0.55	7.16	54.3	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.04
70.045	13.14	0.295	115.56	Yes	81	0	2.245053	Yes	Yes	-70.05	8133.36	4058.81	4074.55	0.45	0.088	4058.81	4074.55	6.77	0.925	0.55	7.17	54.2	61.4	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.04
70.209	15.895	0.295	115.56	Yes	69	0	1.85593	Yes	Yes	-70.21	8152.31	4069.04	4083.27	0.45	0.088	4069.04	4083.27	8.30	0.903	0.55	8.78	52.9	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.04
70.373	16.784	0.292	115.56	Yes	66	0	1.739752	Yes	Yes	-70.37	8171.26	4079.28	4091.99	0.45	0.087	4079.28	4091.99	8.79	0.896	0.55	9.29	52.4	61.7	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.04
70.537	17.597	0.293	115.56	Yes	63	0	1.665057	Yes	Yes	-70.54	8190.22	4089.51	4100.71	0.45	0.087	4089.51	4100.71	9.23	0.890	0.55	9.76	52.0	61.8	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	1.04
70.701	18.202	0.269	115.56	Yes	60	0	1.47786	Yes	Yes	-70.70	8209.17	4099.74	4109.42	0.45	0.087	4099.74	4109.42	9.55	0.886	0.56	10.11	51.4	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.04
70.865	18.717	0.244	115.56	Yes	57	0	1.303628	Yes	Yes	-70.87	8228.12	4109.98	4118.14	0.45	0.087	4109.98	4118.14	9.83	0.883	0.56	10.40	50.8	61.2	0.100	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.04
71.029	15.832	0.251	115.56	Yes	67	0	1.585397	Yes	Yes	-71.03	8247.07	4120.21	4126.86	0.45	0.087	4120.21	4126.86	8.18	0.904	0.55	8.65	52.5	61.1	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.04
71.193	14.392	0.244	115.56	Yes	73	0	1.695386	Yes	Yes	-71.19	8266.02	4130.44	4135.58	0.44	0.087	4130.44	4135.58	7.36	0.916	0.54	7.79	53.2	61.0	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	1.04
71.357	16.274	0.265	115.56	Yes	66	0	1.628364	Yes	Yes	-71.36	8284.97	4140.68	4144.30	0.44	0.087	4140.68	4144.30	8.39	0.901	0.55	8.88	52.4	61.3	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.04
71.521	17.806	0.299	115.56	Yes	63.374	0	1.679209	Yes	Yes	-71.52	8303.93	4150.91	4153.02	0.44	0.086	4150.91	4153.02	9.23	0.890	0.55	9.77	52.1	61.8	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.05
71.685	17.198	0.299	115.56	Yes	65.401	0	1.738574	Yes	Yes	-71.69	8322.88	4161.14	4161.73	0.44	0.086	4161.14	4161.73	8.87	0.895	0.55	9.39	52.4	61.8	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.05
71.85	18.65	0.299	115.56	Yes	61.044	0	1.603217	Yes	Yes	-71.85	8341.95	4171.44	4170.51	0.44	0.086	4171.44	4170.51	9.67	0.885	0.55	10.23	51.7	61.9	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.05
72.014	18.19	0.295	115.56	Yes	62.254	0	1.62177	Yes	Yes	-72.01	8360.90	4181.67	4179.22	0.44	0.086	4181.67	4179.22	9.39	0.888	0.55	9.94	51.9	61.8	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	1.05
72.178	15.059	0.306	115.56	Yes	74.135	0	2.032007	Yes	Yes	-72.18	8379.85	4191.91	4187.94	0.44	0.086	4191.91	4187.94	7.64	0.912	0.54	8.08	53.5	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.05
72.342	14.375	0.308	115.56	Yes	77.444	0	2.142609	Yes	Yes	-72.34	8398.80	4202.14	4196.66	0.44	0.086	4202.14	4196.66	7.25	0.918	0.53	7.67	53.9	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.05
72.506	15.221	0.307	115.56	Yes	73.699	0	2.01695	Yes	Yes	-72.51	8417.75	4212.37	4205.38	0.44	0.086	4212.37	4205.38	7.69	0.911	0.53	8.14	53.4	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.06
72.67	16.013	0.322	115.56	Yes	71.424	0	2.010866	Yes	Yes	-72.67	8436.70	4222.61	4214.10	0.44	0.085	4222.61	4214.10	8.11	0.905	0.54	8.58	53.2	61.8	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	1.06
72.834	15.13	0.306	115.56	Yes	74.232	0	2.022472	Yes	Yes	-72.83	8455.66	4232.84	4222.82	0.44	0.085	4232.84	4222.82	7.61	0.912	0.53	8.05	53.5	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.06
72.998	14.931	0.279	115.56	Yes	73.573	0	1.868596	Yes	Yes	-73.00	8474.61	4243.08	4231.53	0.44	0.085	4243.08	4231.53	7.49	0.914	0.53	7.92	53.4	61.3	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.06
73.162	14.97	0.304	115.56	Yes	75.011	0	2.030728	Yes	Yes	-73.16	8493.56	4253.31	4240.25	0.44	0.085	4253.31	4240.25	7.49	0.914	0.53	7.93	53.6	61.5	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.06
73.326	15.211	0.318	115.56	Yes	74.868	0	2.090592	Yes	Yes	-73.33	8512.51	4263.54	4248.97	0.43	0.085	4263.54	4248.97	7.61	0.913	0.53	8.05	53.6	61.6	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.06
73.49	15.612	0.326	115.56	Yes	73.723	0	2.088137	Yes	Yes	-73.49	8531.46	4273.78	4257.69	0.43	0.085	4273.78	4257.69	7.81	0.910	0.53	8.27	53.5	61.8	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.07
73.654	12.668	0.324	115.56	Yes	88.671	0	2.557626	Yes	Yes	-73.65	8550.42	4284.01	4266.41	0.43	0.085	4284.01	4266.41	6.22	0.935	0.52	6.58	54.9	61.4	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.07
73.818	9.806	0.245	115.56	Yes	100	0	2.49847	Yes	Yes	-73.82	8569.37	4294.24	4275.12	0.43	0.084	4294.24	4275.12	4.71	0.963	0.51	4.98	55.4	60.4	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.06

CPT Liquefaction Analysis

73.982	19.342	0.206	115.56	Yes	54.967	0	1.06504	Yes	Yes	-73.98	8588.32	4304.48	4283.84	0.43	0.084	4304.48	4283.84	9.81	0.883	0.54	10.38	50.2	60.5	0.100	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.06
74.146	23.375	0.214	118.77	Yes	46.972	0	0.915508	Yes	Yes	-74.15	8607.80	4314.71	4293.09	0.43	0.084	4314.71	4293.09	12.04	0.858	0.55	12.74	48.1	60.8	0.100	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	1.06
74.31	26.026	0.2	118.77	Yes	42.033	0	0.768462	Yes	Yes	-74.31	8627.28	4324.94	4302.33	0.43	0.084	4324.94	4302.33	13.53	0.843	0.55	14.31	46.3	60.6	0.100	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.06
74.474	23.496	0.203	118.77	Yes	46.291	0	0.863977	Yes	Yes	-74.47	8646.75	4335.18	4311.58	0.43	0.084	4335.18	4311.58	12.06	0.857	0.54	12.76	47.8	60.6	0.100	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.06
74.638	19.634	0.186	115.56	Yes	53.264	0	0.947336	Yes	Yes	-74.64	8665.71	4345.41	4320.30	0.43	0.084	4345.41	4320.30	9.89	0.882	0.53	10.46	49.7	60.1	0.100	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	1.06
74.802	18.771	0.218	115.56	Yes	57.595	0	1.161366	Yes	Yes	-74.80	8684.66	4355.64	4329.01	0.43	0.084	4355.64	4329.01	9.39	0.888	0.53	9.94	50.8	60.7	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.07
74.966	20.194	0.277	115.56	Yes	57.305	0	1.371695	Yes	Yes	-74.97	8703.61	4365.88	4337.73	0.43	0.084	4365.88	4337.73	10.16	0.879	0.53	10.75	50.9	61.6	0.101	0.05	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.07
75.13	16.372	0.321	115.56	Yes	71.413	0	1.960665	Yes	Yes	-75.13	8722.56	4376.11	4346.45	0.43	0.083	4376.11	4346.45	8.06	0.906	0.52	8.53	53.2	61.7	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.08
75.294	12.824	0.299	115.56	Yes	87.329	0	2.331566	Yes	Yes	-75.29	8741.51	4386.35	4355.17	0.43	0.083	4386.35	4355.17	6.17	0.935	0.51	6.53	54.7	61.2	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.08
75.458	12.966	0.285	115.56	Yes	85.641	0	2.198056	Yes	Yes	-75.46	8760.47	4396.58	4363.89	0.42	0.083	4396.58	4363.89	6.23	0.934	0.51	6.59	54.5	61.1	0.100	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	1.08
75.622	15.175	0.332	115.56	Yes	77.234	0	2.187809	Yes	Yes	-75.62	8779.42	4406.81	4372.60	0.42	0.083	4406.81	4372.60	7.38	0.916	0.51	7.81	53.9	61.7	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.08
75.786	14.025	0.361	115.56	Yes	84.559	0	2.573975	Yes	Yes	-75.79	8798.37	4417.05	4381.32	0.42	0.083	4417.05	4381.32	6.76	0.926	0.51	7.15	54.6	61.7	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.08
75.951	13.232	0.322	115.56	Yes	86.834	0	2.433495	Yes	Yes	-75.95	8817.44	4427.34	4390.09	0.42	0.083	4427.34	4390.09	6.33	0.933	0.51	6.70	54.7	61.4	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.08
76.115	13.347	0.322	115.56	Yes	86.277	0	2.412527	Yes	Yes	-76.12	8836.39	4437.58	4398.81	0.42	0.083	4437.58	4398.81	6.38	0.932	0.51	6.75	54.7	61.4	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.08
76.279	13.645	0.36	115.56	Yes	86.937	0	2.638329	Yes	Yes	-76.28	8855.34	4447.81	4407.53	0.42	0.082	4447.81	4407.53	6.52	0.930	0.51	6.90	54.8	61.7	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.09
76.443	14.739	0.411	115.56	Yes	83.937	0	2.78852	Yes	Yes	-76.44	8874.29	4458.04	4416.25	0.42	0.082	4458.04	4416.25	7.08	0.921	0.51	7.49	54.6	62.1	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.09
76.607	15.108	0.446	115.56	Yes	83.907	0	2.952078	Yes	Yes	-76.61	8893.24	4468.28	4424.97	0.42	0.082	4468.28	4424.97	7.26	0.918	0.51	7.68	54.7	62.3	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	1.10
76.771	15.431	0.427	115.56	Yes	81.615	0	2.767157	Yes	Yes	-76.77	8912.20	4478.51	4433.69	0.42	0.082	4478.51	4433.69	7.41	0.915	0.51	7.84	54.4	62.3	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.10
76.935	17.529	0.403	115.56	Yes	72.172	0	2.299047	Yes	Yes	-76.94	8931.15	4488.74	4442.40	0.42	0.082	4488.74	4442.40	8.50	0.900	0.51	8.99	53.4	62.4	0.101	0.04	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	1.10



Earthquake Magnitude, M = 5.77

Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2014),
CPT and SPT Based Liquefaction
Triggering Procedures,
UCD/CGM-14/01

Project: Plant Scherer GA EPD Closure		Sounding ECP05A Avg.
Project Number: 60563110	Date: 1/24/2018	AECOM

CPT Liquefaction Analysis

Method: Idriss and Boulanger (2014), CPT and SPT Based Liquefaction Triggering Procedures

Title: Liquefaction Analysis
Project: Plant Scherer
Project No.: 60563110

Date: 1/24/2018
Boring No. CP-112

Input Parameters:
Peak ground acceleration, pga (g): 0.15
Earthquake Magnitude (M): 4.9
Water Table Depth at the time of drilling 5 ft
Water Table Depth at the time of earthquake 5 ft
Ground Surface Elevation 0 ft

Notes:
1. Sand-like behavior = "Yes", Clay-like behavior = "No" (See Idriss and Boulanger, 2014).
2. Make sure to turn on iterative calculations.
3. User to confirm highlighted values are reasonable.

												At the time of earthquake				At the time of drilling																			
Depth	Qt	Fs	Unit Weight	Liquefiable?[1]	FC	α (From static stress analysis)	Fs/Qt	Below Water Table?	Liquefaction Calculation Needed?	Sample Elev.	Total stress	Pore Pressure	Effective stress	Stress reduction coeff, r_d	CSR	Pore Pressure	Effective stress	qc1n	m	Cn	qc1	Delta qc1ncs	qc1ncs	CRR$_{cpt}$[3]	C_σ	K_σ	Assg. α	State Para	Para a	Para b	Para c	Kα	MSF_{max}	MSF	IB FSL
(ft)	(TSF)	(TSF)	(pcf)	(Yes/No)			(%)			(ft)	(psf)	(psf)	(psf)			(psf)	(psf)				(TSF)														
0.164	3.084	0.01	112.35	Yes	5	0	0.324254	No	No	-0.16	0.00		0.00				0.00																		
0.328	8.662	0.025	112.35	Yes	5	0	0.288617	No	No	-0.33	18.43		18.43				18.43																		
0.492	21.686	0.054	118.77	Yes	5	0	0.249009	No	No	-0.49	37.90		37.90				37.90																		
0.656	31.789	0.084	118.77	Yes	5	0	0.264242	No	No	-0.66	57.38		57.38				57.38																		
0.82	41.131	0.097	121.98	Yes	5	0	0.235832	No	No	-0.82	77.39		77.39				77.39																		
0.984	56.188	0.142	121.98	Yes	5	0	0.252723	No	No	-0.98	97.39		97.39				97.39																		
1.148	73.378	0.121	121.98	Yes	2	0	0.1649	No	No	-1.15	117.40		117.40				117.40																		
1.312	82.532	0.178	125.19	Yes	2	0	0.215674	No	No	-1.31	137.93		137.93				137.93																		
1.476	82.933	0.222	125.19	Yes	3	0	0.267686	No	No	-1.48	158.46		158.46				158.46																		
1.64	80.676	0.204	125.19	Yes	3	0	0.252863	No	No	-1.64	178.99		178.99				178.99																		
1.804	82.222	0.195	125.19	Yes	2	0	0.237163	No	No	-1.80	199.52		199.52				199.52																		
1.968	81.039	0.193	125.19	Yes	3	0	0.238157	No	No	-1.97	220.05		220.05				220.05																		
2.133	82.402	0.163	125.19	Yes	2	0	0.197811	No	No	-2.13	240.71		240.71				240.71																		
2.297	79.813	0.204	121.98	Yes	3	0	0.255597	No	No	-2.30	260.71		260.71				260.71																		
2.461	81.661	0.237	125.19	Yes	3	0	0.290224	No	No	-2.46	281.24		281.24				281.24																		
2.625	77.059	0.202	121.98	Yes	3	0	0.262137	No	No	-2.63	301.25		301.25				301.25																		
2.789	68.51	0.16	121.98	Yes	3	0	0.233543	No	No	-2.79	321.25		321.25				321.25																		
2.953	60.162	0.149	121.98	Yes	4	0	0.247665	No	No	-2.95	341.26		341.26				341.26																		
3.117	56.029	0.18	121.98	Yes	5	0	0.321262	No	No	-3.12	361.26		361.26				361.26																		
3.281	52.191	0.111	121.98	Yes	5	0	0.21268	No	No	-3.28	381.27		381.27				381.27																		
3.445	48.172	0.11	121.98	Yes	5	0	0.228348	No	No	-3.45	401.27		401.27				401.27																		
3.609	48.513	0.086	121.98	Yes	5	0	0.177272	No	No	-3.61	421.28		421.28				421.28																		
3.773	49.275	0.107	121.98	Yes	5	0	0.217149	No	No	-3.77	441.28		441.28				441.28																		
3.937	52.698	0.155	121.98	Yes	5	0	0.294129	No	No	-3.94	461.29		461.29				461.29																		
4.101	57.944	0.076	121.98	Yes	3	0	0.131161	No	No	-4.10	481.29		481.29				481.29																		
4.265	47.383	0.075	121.98	Yes	5	0	0.158285	No	No	-4.27	501.30		501.30				501.30																		
4.429	32.364	0.074	118.77	Yes	5	0	0.228649	No	No	-4.43	520.77		520.77				520.77																		
4.593	21.476	0.125	118.77	Yes	18	0	0.582045	No	No	-4.59	540.25		540.25				540.25																		
4.757	14.469	0.072	115.56	Yes	22	0	0.497616	No	No	-4.76	559.20		559.20				559.20																		
4.921	27.481	0.069	118.77	Yes	5	0	0.251083	No	No	-4.92	578.68		578.68				578.68																		
5.085	82.982	0.121	125.19	Yes	1	0	0.145815	Yes	Yes	-5.09	599.21	5.30	593.91	0.98	0.096	5.30	593.91	133.34	0.432	1.70	141.07	0.0	141.1	0.239	0.14	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.571	1.410	3.83
5.249	75.603	0.091	121.98	Yes	2	0	0.120366	Yes	Yes	-5.25	619.22	15.54	603.68	0.98	0.098	15.54	603.68	121.48	0.454	1.70	128.53	0.0	128.5	0.193	0.13	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.454	1.326	2.86
5.413	61.212	0.081	121.98	Yes	3	0	0.132327	Yes	Yes	-5.41	639.22	25.77	613.45	0.98	0.099	25.77	613.45	98.36	0.502	1.70	104.06	0.0	104.1	0.143	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.283	1.203	1.89
5.577	29.066	0.115	118.77	Yes	5	0	0.395651	Yes	Yes	-5.58	658.70	36.00	622.70	0.97	0.101	36.00	622.70	46.70	0.651	1.70	49.41	0.1	49.5	0.092	0.07	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.111	1.079	1.06
5.741	25.27	0.073	118.77	Yes	5	0	0.28888	Yes	Yes	-5.74	678.18	46.24	631.94	0.97	0.102	46.24	631.94	40.60	0.676	1.70	42.96	0.1	43.1	0.087	0.07	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.104	1.074	0.99
5.905	28.969	0.076	118.77	Yes	5	0	0.262349	Yes	Yes	-5.91	697.66	56.47	641.19	0.97	0.103	56.47	641.19	46.55	0.652	1.70	49.25	0.1	49.4	0.092	0.07	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.111	1.079	1.03
6.069	45.112	0.079	121.98	Yes	5	0	0.17512	Yes	Yes	-6.07	717.66	66.71	650.96	0.97	0.104	66.71	650.96	72.49	0.567	1.70	76.69	0.1	76.8	0.113	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.120	1.32
6.234	35.476	0.043	121.98	Yes	5	0	0.121209	Yes	Yes	-6.23	737.79	77.00	660.79	0.97	0.106	77.00	660.79	57.00	0.614	1.70	60.31	0.1	60.4	0.100	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.11
6.398	51.143	0.053	121.98	Yes	4	0	0.103631	Yes	Yes	-6.40	757.79	87.24	670.56	0.97	0.107	87.24	670.56	82.18	0.541	1.70	86.94	0.0	87.0	0.122	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.203	1.145	1.43
6.562	46.366	0.084	121.98	Yes	5	0	0.181167	Yes	Yes	-6.56	777.80	97.47	680.33	0.97	0.108	97.47	680.33	74.50	0.561	1.70	78.82	0.1	79.0	0.115	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.174	1.125	1.31
6.726	40.466	0.052	121.98	Yes	5	0	0.128503	Yes	Yes	-6.73	797.80	107.70	690.10	0.97	0.109	107.70	690.10	65.02	0.588	1.70	68.79	0.1	68.9	0.106	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	1.17
6.89	42.431	0.02	121.98	Yes	5	0	0.047135	Yes	Yes	-6.89	817.81	117.94	699.87	0.97	0.110	117.94	699.87	68.18	0.579	1.70	72.13	0.1	72.3	0.109	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	1.19
7.054	44.823	0.046	121.98	Yes	5	0	0.102626	Yes	Yes	-7.05	837.81	128.17	709.64	0.96	0.111	128.17	709.64	72.02	0.568	1.70	76.20	0.1	76.3	0.113	0.09	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.166	1.119	1.23
7.218	37.632	0.026	121.98	Yes	5	0	0.06909	Yes	Yes	-7.22	857.82	138.40	719.41	0.96	0.112	138.40	719.41	60.47	0.603	1.70	63.97	0.1	64.1	0.103	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	1.08
7.382	37.639	0.066	121.98	Yes	5	0	0.17535	Yes	Yes	-7.38	877.82	148.64	729.19	0.96	0.113	148.64	729.19	60.48	0.603	1.70	63.99	0.1	64.1	0.103	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	1.07
7.546	37.213	0.11	121.98	Yes	5	0	0.295596	Yes	Yes	-7.55	897.83	158.87	738.96	0.96	0.114	158.87	738.96	59.79	0.605	1.70	63.26	0.1	63.4	0.102	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	1.05
7.71	28.155	0.125	118.77	Yes	5	0	0.443971	Yes	Yes	-7.71	917.31	169.10	748.20	0.96	0.115	169.10	748.20	45.24	0.657	1.70	47.86	0.1	48.0	0.091	0.07	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.109	1.078	0.91
7.874	25.453	0.109	118.77	Yes	5	0	0.42824	Yes	Yes	-7.87	936.78	179.34	757.45	0.96	0.116	179.34	757.45	40.90	0.675	1.70	43.27	0.1	43.4	0.088	0.07	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.104	1.075	0.86
8.038	41.134	0.086	121.98	Yes	5	0	0.209073	Yes	Yes	-8.04	956.79	189.57	767.22	0.96	0.116	189.57	767.22	66.09	0.585	1.70	69.93	0.1	70.1	0.107	0.08	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.107	1.09
8.202	64.925	0.062	121.98	Yes	3	0	0.095495	Yes	Yes	-8.20	976.79	199.80	776.99	0.96	0.117	199.80	776.99	100.88	0.496	1.64	106.74	0.0	106.7	0.147	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.299	1.214	1.66
8.366	67.251	0.055	121.98	Yes	2	0	0.081783	Yes	Yes	-8.37	996.80	210.04	786.76	0.95	0.118	210.04	786.76	103.31	0.491	1.63	109.30	0.0	109.3	0.151	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.314	1.225	1.71
8.53	46.16	0.148	121.98	Yes	5	0	0.320624	Yes	Yes	-8.53	1016.80	220.27	796.53	0.95	0.119	220.27	796.53	74.17	0.562	1.70	78.47	0.1	78.6	0.115	0.09	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	1.16
8.694	25.377	0.17	118.77	Yes	18	0	0.669898	Yes	Yes	-8.69	1036.28	230.51	805.78	0.95	0.119	230.51	805.78	40.78	0.675	1.70	43.14	23.9	67.1	0.105	0.07	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	1.02
8.858	13.218	0.203	115.56	Yes	35	0	1.535785	Yes	Yes	-8.86	1055.23	240.74	814.49	0.95	0.120	240.74	814.49	21.24	0.780	1.70	22.47	43.8	66.2	0.104	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.99
9.022	7.78	0.177	115.56	Yes	43	0	2.275064	Yes	Yes	-9.02	1074.18	250.97	823.21	0.95	0.121	250.97	823.21	12.50	0.853	1.70	13.23	46.5	59.7	0.099	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.93
9.186	5.836	0.12	115.56	Yes	49	0	2.056203	Yes	Yes	-9.19	1093.14	261.21	831.93	0.95	0.122	261.21	831.93	9.38	0.888	1.70	9.92	48.0	58.0	0.098	0.04	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.123	1.088	0.90
9.35	20.745	0.07	118.77	Yes	5	0	0.337431	Yes	Yes	-9.35	1112.61	271.44	841.17	0.95	0.122	271.44	841.17	33.33	0.710	1.70	35.27	0.1	35.4	0.082	0.06	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.098	1.070	0.75
9.514	21.979	0.04	118.77	Yes	5	0	0.181992	Yes	Yes	-9.51	1132.09	281.67	850.42	0.95	0.123	281.67	850.42	35.32	0.700	1.70	37.36	0.1	37.5	0.084	0.06	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.099	1.071	0.76
9.678	7.63	0.042	112.35	Yes	5	0	0.550459	Yes	Yes	-9.68	1150.52	291.91	858.61	0.94	0.123	291.91	858.61	12.26	0.855	1.70	12.97	0.1	13.1	0.068	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.61
9.842	7.628	0.042	112.35	Yes	5	0	0.550603	Yes	Yes	-9.84	1168.94	302.14	866.80	0.94	0.124	302.14	866.80	12.26	0.855	1.70	12.97	0.1	13.1	0.068	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.60
10.006	4.22	0.043	112.35	Yes	5	0	1.018957	Yes	Yes	-10.01	1187.37	312.37	874.99	0.94	0.125	312.37	874.99	6.78	0.925	1.70	7.17	0.1	7.3	0.065	0.04	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.57
10.17	5.172	0.037	112.35	Yes	5	0	0.715391	Yes	Yes	-10.17	1205.79	322.61	883.19	0.94	0.125	322.61	883.19	8.31	0.903	1.70	8.79	0.1	8.9	0.066	0.04	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.57
10.335	6.43	0.056	112.35	Yes	5	0	0.870918	Yes	Yes	-10.34	1224.33	332.90	891.43	0.94	0.126	332.90	891.43	10.33	0.877	1.70	10.93	0.1	11.0	0.067	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.58
10.499	6.776	0.029	112.35	Yes	5	0	0.427981	Yes	Yes	-10.50	1242.76	343.14	899.62	0.94	0.126	343.14	899.62	10.89	0.870	1.70	11.52	0.1	11.6	0.067	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.58
10.663	9.803	0.019	112.35	Yes	5	0	0.193818	Yes	Yes	-10.66	1261.18	353.37	907.81	0.94	0.127	353.37	907.81	15.75	0.822	1.70	16.67	0.1	16.8	0.070	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.61
10.827	9.661	0.012	112.35	Yes	5	0	0.124211	Yes	Yes	-10.83	1279.61	363.60	916.00	0.94	0.127	363.60	916.00	15.52	0.824	1.70	16.42	0.1	16.5	0.070	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.60
10.991	7.479	0.019	112.35	Yes	5	0	0.254045	Yes	Yes	-10.99	1298.03	373.84	924.20	0.93	0.128	373.84	924.20	12.02	0.858	1.70	12.71	0.1	12.8	0.068	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.58
11.155	6.565	0.034	112.35	Yes	5	0	0.517898	Yes	Yes	-11.16	1316.46	384.07	932.39	0.93	0.128	384.07	932.39	10.55	0.874	1.70	11.16	0.1	11.3	0.067	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.57
11.319	8.66	0.024	112.35	Yes	5	0	0.277136	Yes	Yes	-11.32	1334.88	394.31	940.58	0.93	0.129	394.31	940.58	13.91	0.839	1.70	14.72	0.1	14.8	0.069	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.59
11.483	11.903	0.019	115.56	Yes	5	0	0.159624	Yes	Yes	-11.48	1353.84	404.54	949.30	0.93	0.129	404.54	949.30	19.13	0.795	1.70	20.24	0.1	20.3	0.073	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.066	0.61
11.647	14.412	0.01	115.56	Yes	5	0	0.069387	Yes	Yes	-11.65	1372.79	414.77	958.02	0.93	0.130	414.77	958.02	23.16	0.767	1.70	24.50	0.1	24.6	0.075	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.066	0.63
11.811	12.101	0.01	115.56	Yes	5	0	0.082638	Yes	Yes	-11.81	1391.74	425.01	966.73	0.93	0.130	425.01	966.73	19.44	0.793	1.70	20.57	0.1	20.7	0.073	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.61
11.975	9.413	0.018	112.35	Yes	5	0	0.191225	Yes	Yes	-11.98	1410.17	435.24	974.93	0.93	0.131	435.24	974.93	15.12	0.828	1.70	16.00	0.1	16.1	0.070	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.58
12.139	10.309	0.01	115.56	Yes	5	0	0.097003	Yes	Yes	-12.14	1429.12	445.47	983.64	0.92	0.131	445.47	983.64	16.56	0.816	1.70	17.53	0.1	17.6	0.071	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.59
12.303	19.212	0.01	118.77	Yes	5	0	0.052051	Yes	Yes	-12.30	1448.60	455.71	992.89	0.92	0.131	455.71	992.89	30.87	0.722	1.70	32.66	0.1	32.8	0.081	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.67
12.467	20.497	0.011	118.77	Yes	5	0	0.053666	Yes	Yes	-12.47	1468.07	465.94	1002.13	0.92	0.132	465.94	1002.13	32.93	0.712	1.70	34.84	0.1	35.0	0.082	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.097	1.070	0.68
12.631	19.279	0.017	118.77	Yes	5	0	0.088179	Yes	Yes	-12.63	1487.55	476.17	1011.38	0.92	0.132	476.17	1011.38	30.98	0.722	1.70	32.77	0.1	32.9	0.081	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.67
12.795	19.609	0.012	118.77	Yes	5	0	0.061196	Yes	Yes	-12.80	1507.03	486.41	1020.62	0.92	0.132	486.41	1020.62	31.33	0.720	1.69	33.14	0.1	33.3	0.081	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.67
12.959	17.49	0.013	118.77	Yes	5	0	0.074328	Yes	Yes	-12.96	1526.51	496.64	1029.87	0.92	0.133	496.64	1029.87	28.10	0.737	1.70	29.73	0.1	29.8	0.079	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.095	1.068	0.65
13.123	15.096	0.01	115.56	Yes	5	0	0.066243	Yes	Yes	-13.12	1545.46	506.88	1038.59	0.92	0.133	506.88	1038.59	24.26	0.760	1.70	25.66	0.1	25.8	0.076	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.62
13.287	13.653	0.01	115.56	Yes	5	0	0.073244	Yes	Yes	-13.29	1564.41	517.11	1047.30	0.92	0.133	517.11	1047.30	21.94	0.775	1.70	23.21	0.1	23.3	0.075	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.61
13.451	11.581	0.04	115.56	Yes	27	0	0.345393	Yes	Yes	-13.45	1583.36	527.34	1056.02	0.91	0.134	527.34	1056.02	18.61	0.799	1.70	19.69	35.7	55.4	0.096	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.085	0.79
13.615	13.447	0.035	115.56	Yes	5	0	0.260281	Yes	Yes	-13.62	1602.32	537.58	1064.74	0.91	0.134	537.58	1064.74	21.61	0.778	1.70	22.86	0.1	23.0	0.074	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.60
13.779	25.086	0.01	118.77	Yes	5	0	0.039863	Yes	Yes	-13.78	1621.79	547.81	1073.99	0.91	0.134	547.81	1073.99	37.82	0.688	1.59	40.01	0.1	40.1	0.085	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.101	1.072	0.70
13.943	27.148	0.01	118.77	Yes	5	0	0.036835	Yes	Yes	-13.94	1641.27	558.04	1083.23	0.91	0.134	558.04	1083.23	40.38	0.677	1.57	42.72	0.1	42.8	0.087	0.07	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.103	1.074	0.71
14.107	20.867	0.012	118.77	Yes	5	0	0.057507	Yes	Yes	-14.11	1660.75	568.28	1092.47	0.91	0.135	568.28	1092.47	31.70	0.718	1.61	33.54	0.1	33.7	0.081	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.097	1.069	0.66
14.271	16.438	0.01	118.77	Yes	5	0	0.060835	Yes	Yes	-14.27	1680.23	578.51	1101.72	0.91	0.135	578.51	1101.72	25.40	0.753	1.63	26.87	0.1	27.0	0.077	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.62
14.436	13.694	0.015	115.56	Yes	5	0	0.109537	Yes	Yes	-14.44	1699.30	588.81	1110.49	0.91	0.135	588.81	1110.49	21.39	0.779	1.65	22.63	0.1	22.7	0.074	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.59
14.6	14.549	0.01	115.56	Yes	5	0	0.068733	Yes	Yes	-14.60	1718.25	599.04	1119.21	0.90	0.135	599.04	1119.21	22.48	0.772	1.63	23.78	0.1	23.9	0.075	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.60
14.764	16.9	0.01	118.77	Yes	5	0	0.059172	Yes	Yes	-14.76	1737.73	609.27	1128.45	0.90	0.136	609.27	1128.45	25.62	0.752	1.60	27.11	0.1	27.2	0.077	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.61
14.928	14.284	0.01	115.56	Yes	5	0	0.070008	Yes	Yes	-14.93	1756.68	619.51	1137.17	0.90	0.136	619.51	1137.17	21.86	0.776	1.62	23.13	0.1	23.2	0.074	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.59
15.092	12.972	0.011	115.56	Yes	5	0	0.084798	Yes	Yes	-15.09	1775.63	629.74	1145.89	0.90	0.136	629.74	1145.89	19.90	0.790	1.62	21.05	0.1	21.2	0.073	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.58
15.256	12.035	0.01	115.56	Yes	5	0	0.083091	Yes	Yes	-15.26	1794.58	639.97	1154.61	0.90	0.136	639.97	1154.61	18.47	0.800	1.62	19.54	0.1	19.7	0.072	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.57
15.42	10.295	0.011	115.56	Yes	25	0	0.106848	Yes	Yes	-15.42	1813.53	650.21	1163.33	0.90	0.136	650.21	1163.33	15.90	0.821	1.63	16.83	33.1	49.9	0.092	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.111	1.080	0.73
15.584	10.047	0.01	112.35	Yes	25	0	0.099532	Yes	Yes	-15.58	1831.96	660.44	1171.52	0.90	0.137	660.44	1171.52	15.47	0.825	1.63	16.36	33.0	49.4	0.092	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.111	1.079	0.73
15.748	11.295	0.014	115.56	Yes	5	0	0.123949	Yes	Yes	-15.75	1850.91	670.68	1180.24	0.89	0.137	670.68	1180.24	17.14	0.811	1.61	18.13	0.1	18.2	0.071	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.56
15.912	12.422	0.012	115.56	Yes	5	0	0.096603	Yes	Yes	-15.91	1869.86	680.91	1188.95	0.89	0.137	680.91	1188.95	18.61	0.799	1.59	19.69	0.1	19.8	0.072	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.57
16.076	14.568	0.017	115.56	Yes	5	0	0.116694	Yes	Yes	-16.08	1888.82	691.14	1197.67	0.89	0.137	691.14	1197.67	21.45	0.779	1.56	22.69	0.1	22.8	0.074	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.58
16.24	15.565	0.028	115.56	Yes	5	0	0.179891	Yes	Yes	-16.24	1907.77	701.38	1206.39	0.89	0.137	701.38	1206.39	22.68	0.770	1.54	24.00	0.1	24.1	0.075	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.59
16.404	17.826	0.018	118.77	Yes	5	0	0.100976	Yes	Yes	-16.40	1927.25	711.61	1215.64	0.89	0.137	711.61	1215.64	25.56	0.752	1.52	27.05	0.1	27.2	0.077	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.60
16.568	22.288	0.01	118.77	Yes	5	0	0.044867	Yes	Yes	-16.57	1946.72	721.84	1224.88	0.89	0.137	721.84	1224.88	31.23	0.720	1.48	33.04	0.1	33.2	0.081	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.63
16.732	22.767	0.024	118.77	Yes	5	0	0.105416	Yes	Yes	-16.73	1966.20	732.08	1234.13	0.89	0.138	732.08	1234.13	31.69	0.718	1.47	33.53	0.1	33.6	0.081	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.097	1.069	0.63

CPT Liquefaction Analysis

16.896	21.657	0.017	118.77	Yes	5	0	0.078497	Yes	Yes	-16.90	1985.68	742.31	1243.37	0.88	0.138	742.31	1243.37	30.12	0.726	1.47	31.86	0.1	32.0	0.080	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.62
17.06	25.892	0.013	118.77	Yes	5	0	0.050209	Yes	Yes	-17.06	2005.16	752.54	1252.61	0.88	0.138	752.54	1252.61	35.32	0.700	1.44	37.37	0.1	37.5	0.084	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.099	1.071	0.65
17.224	25.221	0.01	118.77	Yes	5	0	0.039649	Yes	Yes	-17.22	2024.64	762.78	1261.86	0.88	0.138	762.78	1261.86	34.32	0.705	1.44	36.31	0.1	36.4	0.083	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.098	1.070	0.65
17.388	22.45	0.016	118.77	Yes	5	0	0.071269	Yes	Yes	-17.39	2044.12	773.01	1271.10	0.88	0.138	773.01	1271.10	30.68	0.723	1.45	32.46	0.1	32.6	0.080	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.62
17.552	18.595	0.012	118.77	Yes	5	0	0.064533	Yes	Yes	-17.55	2063.59	783.24	1280.35	0.88	0.138	783.24	1280.35	25.64	0.752	1.46	27.13	0.1	27.2	0.077	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.59
17.716	15.472	0.012	118.77	Yes	5	0	0.077559	Yes	Yes	-17.72	2083.07	793.48	1289.59	0.88	0.138	793.48	1289.59	21.50	0.778	1.47	22.75	0.1	22.9	0.074	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.57
17.88	14.456	0.01	115.56	Yes	5	0	0.069175	Yes	Yes	-17.88	2102.02	803.71	1298.31	0.88	0.138	803.71	1298.31	20.08	0.788	1.47	21.25	0.1	21.4	0.073	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.56
18.044	15.457	0.02	115.56	Yes	5	0	0.129391	Yes	Yes	-18.04	2120.98	813.95	1307.03	0.87	0.138	813.95	1307.03	21.27	0.780	1.46	22.51	0.1	22.6	0.074	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.57
18.208	16.819	0.043	118.77	Yes	5	0	0.255663	Yes	Yes	-18.21	2140.45	824.18	1316.27	0.87	0.138	824.18	1316.27	22.90	0.769	1.44	24.23	0.1	24.3	0.075	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.58
18.372	21.782	0.092	118.77	Yes	5	0	0.422367	Yes	Yes	-18.37	2159.93	834.41	1325.52	0.87	0.138	834.41	1325.52	29.00	0.732	1.41	30.68	0.1	30.8	0.079	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.095	1.068	0.61
18.537	32.055	0.072	118.77	Yes	5	0	0.224614	Yes	Yes	-18.54	2179.53	844.71	1334.82	0.87	0.138	844.71	1334.82	41.31	0.673	1.36	43.71	0.1	43.8	0.088	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.104	1.075	0.68
18.701	49.367	0.046	121.98	Yes	5	0	0.09318	Yes	Yes	-18.70	2199.53	854.94	1344.59	0.87	0.138	854.94	1344.59	61.25	0.600	1.31	64.81	0.1	64.9	0.103	0.08	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.82
18.865	46.553	0.058	121.98	Yes	5	0	0.124589	Yes	Yes	-18.87	2219.54	865.18	1354.36	0.87	0.138	865.18	1354.36	57.80	0.611	1.31	61.15	0.1	61.3	0.100	0.08	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.79
19.029	40.804	0.05	121.98	Yes	5	0	0.122537	Yes	Yes	-19.03	2239.54	875.41	1364.13	0.86	0.138	875.41	1364.13	50.97	0.635	1.32	53.92	0.1	54.1	0.095	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.74
19.193	39.952	0.057	121.98	Yes	5	0	0.142671	Yes	Yes	-19.19	2259.55	885.64	1373.90	0.86	0.138	885.64	1373.90	49.77	0.639	1.32	52.66	0.1	52.8	0.094	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.115	1.083	0.74
19.357	38.523	0.024	121.98	Yes	5	0	0.0623	Yes	Yes	-19.36	2279.55	895.88	1383.68	0.86	0.138	895.88	1383.68	47.92	0.646	1.32	50.70	0.1	50.8	0.093	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.113	1.081	0.72
19.521	34.624	0.024	121.98	Yes	5	0	0.069316	Yes	Yes	-19.52	2299.56	906.11	1393.45	0.86	0.138	906.11	1393.45	43.21	0.665	1.32	45.71	0.1	45.8	0.089	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.107	1.076	0.69
19.685	31.323	0.027	118.77	Yes	5	0	0.086199	Yes	Yes	-19.69	2319.04	916.34	1402.69	0.86	0.138	916.34	1402.69	39.19	0.682	1.32	41.46	0.1	41.6	0.086	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.102	1.073	0.67
19.849	33.744	0.026	121.98	Yes	5	0	0.077051	Yes	Yes	-19.85	2339.04	926.58	1412.46	0.86	0.138	926.58	1412.46	41.83	0.671	1.31	44.25	0.1	44.4	0.088	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.105	1.075	0.68
20.013	37.221	0.024	121.98	Yes	5	0	0.06448	Yes	Yes	-20.01	2359.05	936.81	1422.23	0.86	0.138	936.81	1422.23	45.64	0.655	1.30	48.29	0.1	48.4	0.091	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.109	1.078	0.71
20.177	38.441	0.031	121.98	Yes	5	0	0.080643	Yes	Yes	-20.18	2379.05	947.04	1432.00	0.85	0.138	947.04	1432.00	46.84	0.651	1.29	49.56	0.1	49.7	0.092	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.111	1.080	0.71
20.341	31.881	0.023	118.77	Yes	5	0	0.072143	Yes	Yes	-20.34	2398.53	957.28	1441.25	0.85	0.138	957.28	1441.25	39.16	0.682	1.30	41.43	0.1	41.6	0.086	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.102	1.073	0.66
20.505	22.995	0.029	118.77	Yes	5	0	0.126114	Yes	Yes	-20.51	2418.01	967.51	1450.49	0.85	0.138	967.51	1450.49	28.68	0.734	1.32	30.34	0.1	30.5	0.079	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.095	1.068	0.60
20.669	25.5	0.027	118.77	Yes	5	0	0.105882	Yes	Yes	-20.67	2437.48	977.75	1459.74	0.85	0.138	977.75	1459.74	31.48	0.719	1.31	33.30	0.1	33.4	0.081	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.62
20.833	26.186	0.053	118.77	Yes	5	0	0.202398	Yes	Yes	-20.83	2456.96	987.98	1468.98	0.85	0.138	987.98	1468.98	32.14	0.716	1.30	34.00	0.1	34.1	0.081	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.097	1.069	0.62
20.997	23.505	0.034	118.77	Yes	5	0	0.14465	Yes	Yes	-21.00	2476.44	998.21	1478.23	0.85	0.138	998.21	1478.23	28.90	0.733	1.30	30.57	0.1	30.7	0.079	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.095	1.068	0.60
21.161	21.07	0.029	118.77	Yes	5	0	0.137636	Yes	Yes	-21.16	2495.92	1008.45	1487.47	0.85	0.138	1008.45	1487.47	25.94	0.750	1.30	27.44	0.1	27.6	0.077	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.067	0.59
21.325	22.877	0.031	118.77	Yes	5	0	0.135507	Yes	Yes	-21.33	2515.40	1018.68	1496.72	0.84	0.138	1018.68	1496.72	27.92	0.738	1.29	29.54	0.1	29.7	0.079	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.068	0.60
21.489	17.793	0.031	118.77	Yes	5	0	0.174226	Yes	Yes	-21.49	2534.88	1028.91	1505.96	0.84	0.138	1028.91	1505.96	21.89	0.776	1.30	23.16	0.1	23.3	0.074	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.56
21.653	18.781	0.11	118.77	Yes	25	0	0.585698	Yes	Yes	-21.65	2554.35	1039.15	1515.21	0.84	0.138	1039.15	1515.21	22.95	0.769	1.29	24.28	34.7	59.0	0.099	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.76
21.817	30.225	0.194	118.77	Yes	19	0	0.641853	Yes	Yes	-21.82	2573.83	1049.38	1524.45	0.84	0.138	1049.38	1524.45	35.91	0.697	1.26	37.99	26.6	64.6	0.103	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.80
21.981	33.916	0.414	118.77	Yes	23	0	1.220663	Yes	Yes	-21.98	2593.31	1059.61	1533.70	0.84	0.138	1059.61	1533.70	39.89	0.679	1.24	42.20	33.8	76.0	0.112	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.119	0.89
22.145	39.441	0.679	118.77	Yes	24	0	1.721559	Yes	Yes	-22.15	2612.79	1069.85	1542.94	0.84	0.138	1069.85	1542.94	45.84	0.654	1.23	48.50	37.0	85.5	0.121	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.197	1.141	0.98
22.309	33.068	1.098	115.56	Yes	35	0	3.320431	Yes	Yes	-22.31	2631.74	1080.08	1551.66	0.83	0.138	1080.08	1551.66	38.65	0.685	1.24	40.89	47.7	88.6	0.124	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.209	1.150	1.01
22.473	37.184	0.907	115.56	Yes	29	0	2.439221	Yes	Yes	-22.47	2650.69	1090.32	1560.38	0.83	0.138	1090.32	1560.38	43.05	0.666	1.22	45.54	43.0	88.6	0.124	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.209	1.150	1.01
22.638	71.06	0.334	121.98	Yes	5	0	0.470025	Yes	Yes	-22.64	2670.82	1100.61	1570.21	0.83	0.138	1100.61	1570.21	79.11	0.549	1.18	83.69	0.1	83.8	0.119	0.09	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.191	1.137	0.97
22.802	79.64	0.381	121.98	Yes	5	0	0.478403	Yes	Yes	-22.80	2690.82	1110.84	1579.98	0.83	0.138	1110.84	1579.98	87.79	0.527	1.17	92.88	0.1	93.0	0.129	0.10	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.228	1.164	1.07
22.966	80.191	0.643	121.98	Yes	10	0	0.801836	Yes	Yes	-22.97	2710.83	1121.08	1589.75	0.83	0.138	1121.08	1589.75	88.09	0.526	1.16	93.20	8.3	101.5	0.139	0.10	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.269	1.193	1.19
23.13	77.396	0.909	121.98	Yes	13	0	1.174479	Yes	Yes	-23.13	2730.83	1131.31	1599.52	0.83	0.138	1131.31	1599.52	84.93	0.534	1.16	89.86	16.9	106.7	0.147	0.09	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.299	1.214	1.28
23.294	63.358	0.969	118.77	Yes	18	0	1.529404	Yes	Yes	-23.29	2750.31	1141.55	1608.77	0.83	0.138	1141.55	1608.77	70.08	0.573	1.17	74.14	27.3	101.5	0.139	0.08	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.269	1.193	1.18
23.458	42.807	0.921	115.56	Yes	26	0	2.151517	Yes	Yes	-23.46	2769.26	1151.78	1617.48	0.82	0.137	1151.78	1617.48	48.12	0.646	1.19	50.91	39.9	90.8	0.126	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.218	1.157	1.04
23.622	34.972	0.725	115.56	Yes	28	0	2.073087	Yes	Yes	-23.62	2788.22	1162.01	1626.20	0.82	0.137	1162.01	1626.20	39.54	0.681	1.20	41.84	41.5	83.3	0.119	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.189	1.136	0.96
23.786	38.347	0.623	118.77	Yes	24	0	1.624638	Yes	Yes	-23.79	2807.69	1172.25	1635.45	0.82	0.137	1172.25	1635.45	43.03	0.666	1.19	45.52	36.8	82.4	0.118	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.186	1.133	0.95
23.95	41.762	0.658	118.77	Yes	23	0	1.575595	Yes	Yes	-23.95	2827.17	1182.48	1644.69	0.82	0.137	1182.48	1644.69	46.52	0.652	1.18	49.22	35.2	84.4	0.120	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.193	1.138	0.97
24.114	39.218	0.717	115.56	Yes	25	0	1.828242	Yes	Yes	-24.11	2846.12	1192.71	1653.41	0.82	0.137	1192.71	1653.41	43.66	0.663	1.18	46.19	38.4	84.6	0.120	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.194	1.139	0.97
24.278	39.495	0.775	115.56	Yes	26	0	1.962274	Yes	Yes	-24.28	2865.08	1202.95	1662.13	0.82	0.137	1202.95	1662.13	43.81	0.663	1.17	46.35	39.5	85.8	0.121	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.198	1.142	0.98
24.442	50.801	0.996	118.77	Yes	23	0	1.960591	Yes	Yes	-24.44	2884.55	1213.18	1671.37	0.81	0.137	1213.18	1671.37	55.56	0.619	1.16	58.79	36.4	95.2	0.131	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.238	1.170	1.09
24.606	52.382	1.206	115.56	Yes	24	0	2.302318	Yes	Yes	-24.61	2903.51	1223.41	1680.09	0.81	0.137	1223.41	1680.09	57.04	0.614	1.15	60.35	39.0	99.4	0.136	0.08	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.258	1.185	1.15
24.77	61.134	1.804	115.56	Yes	25	0	2.950895	Yes	Yes	-24.77	2922.46	1233.65	1688.81	0.81	0.137	1233.65	1688.81	65.94	0.586	1.14	69.76	42.2	112.0	0.155	0.08	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.331	1.237	1.37
24.934	74.546	2.105	115.56	Yes	22	0	2.82376	Yes	Yes	-24.93	2941.41	1243.88	1697.53	0.81	0.137	1243.88	1697.53	79.49	0.548	1.13	84.10	39.5	123.6	0.180	0.09	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.414	1.297	1.66
25.098	87.796	2	118.77	Yes	18	0	2.278008	Yes	Yes	-25.10	2960.89	1254.12	1706.77	0.81	0.137	1254.12	1706.77	92.69	0.515	1.12	98.07	32.0	130.1	0.198	0.10	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.468	1.335	1.88
25.262	50.52	1.48	115.56	Yes	28	0	2.929533	Yes	Yes	-25.26	2979.84	1264.35	1715.49	0.81	0.137	1264.35	1715.49	54.42	0.623	1.14	57.57	43.6	101.2	0.139	0.07	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.268	1.192	1.17
25.426	38.482	0.977	115.56	Yes	30	0	2.538849	Yes	Yes	-25.43	2998.79	1274.58	1724.21	0.81	0.137	1274.58	1724.21	41.73	0.671	1.15	44.15	43.6	87.7	0.123	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.206	1.148	1.00
25.59	50.461	1.092	115.56	Yes	24	0	2.164047	Yes	Yes	-25.59	3017.74	1284.82	1732.93	0.80	0.136	1284.82	1732.93	54.03	0.624	1.13	57.16	38.5	95.6	0.132	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.240	1.172	1.10
25.754	86.369	0.942	121.98	Yes	12	0	1.090669	Yes	Yes	-25.75	3037.75	1295.05	1742.70	0.80	0.136	1295.05	1742.70	90.31	0.520	1.11	95.55	13.7	109.2	0.151	0.10	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.314	1.225	1.32
25.918	56.782	0.587	118.77	Yes	16	0	1.033778	Yes	Yes	-25.92	3057.23	1305.28	1751.94	0.80	0.136	1305.28	1751.94	60.15	0.604	1.12	63.64	22.1	85.7	0.121	0.08	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.198	1.142	0.98
26.082	43.197	0.431	118.77	Yes	19	0	0.997754	Yes	Yes	-26.08	3076.70	1315.52	1761.19	0.80	0.136	1315.52	1761.19	46.03	0.654	1.13	48.70	27.3	76.0	0.112	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.119	0.89
26.246	42.963	0.7	118.77	Yes	23	0	1.629309	Yes	Yes	-26.25	3096.18	1325.75	1770.43	0.80	0.136	1325.75	1770.43	45.64	0.655	1.12	48.29	35.8	84.1	0.120	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.192	1.138	0.96
26.41	50.228	1.101	115.56	Yes	25	0	2.192004	Yes	Yes	-26.41	3115.13	1335.98	1779.15	0.80	0.136	1335.98	1779.15	52.94	0.628	1.12	56.01	38.9	94.9	0.131	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.236	1.170	1.09
26.574	56.888	1.585	115.56	Yes	26	0	2.786176	Yes	Yes	-26.57	3134.09	1346.22	1787.87	0.79	0.136	1346.22	1787.87	59.55	0.606	1.11	63.00	42.0	105.0	0.144	0.08	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.288	1.207	1.23
26.739	55.795	1.782	115.56	Yes	28	0	3.193835	Yes	Yes	-26.74	3153.15	1356.51	1796.64	0.79	0.136	1356.51	1796.64	58.27	0.610	1.10	61.65	44.5	106.2	0.146	0.08	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.295	1.212	1.25
26.903	52.319	1.809	115.56	Yes	30	0	3.457635	Yes	Yes	-26.90	3172.11	1366.75	1805.36	0.79	0.136	1366.75	1805.36	54.59	0.622	1.10	57.75	46.2	103.9	0.143	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.283	1.203	1.22
27.067	54.521	1.782	115.56	Yes	29	0	3.268465	Yes	Yes	-27.07	3191.06	1376.98	1814.08	0.79	0.135	1376.98	1814.08	56.65	0.615	1.10	59.94	45.1	105.0	0.144	0.08	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.288	1.207	1.23
27.231	52.018	1.803	115.56	Yes	30	0	3.466108	Yes	Yes	-27.23	3210.01	1387.21	1822.80	0.79	0.135	1387.21	1822.80	53.97	0.624	1.10	57.10	46.3	103.4	0.142	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.279	1.200	1.21
27.395	62.544	1.637	115.56	Yes	24	0	2.617357	Yes	Yes	-27.40	3228.96	1397.45	1831.51	0.79	0.135	1397.45	1831.51	64.38	0.590	1.09	68.11	40.0	108.1	0.149	0.08	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.307	1.220	1.29
27.559	58.661	1.553	115.56	Yes	25	0	2.647415	Yes	Yes	-27.56	3247.91	1407.68	1840.23	0.78	0.135	1407.68	1840.23	60.32	0.603	1.09	63.81	40.8	104.7	0.144	0.08	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.287	1.205	1.23
27.723	52.424	1.367	115.56	Yes	26	0	2.607584	Yes	Yes	-27.72	3266.87	1417.92	1848.95	0.78	0.135	1417.92	1848.95	53.91	0.625	1.09	57.03	41.6	98.6	0.136	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.255	1.183	1.14
27.887	55.497	1.224	115.56	Yes	24	0	2.205525	Yes	Yes	-27.89	3285.82	1428.15	1857.67	0.78	0.135	1428.15	1857.67	56.82	0.615	1.08	60.12	38.1	98.2	0.135	0.08	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.252	1.181	1.13
28.051	51.926	1.303	115.56	Yes	26	0	2.50934	Yes	Yes	-28.05	3304.77	1438.38	1866.39	0.78	0.135	1438.38	1866.39	53.10	0.627	1.08	56.18	41.1	97.3	0.134	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.248	1.178	1.12
28.215	50.737	1.222	115.56	Yes	26	0	2.408499	Yes	Yes	-28.22	3323.72	1448.62	1875.10	0.78	0.135	1448.62	1875.10	51.76	0.632	1.08	54.77	40.6	95.4	0.132	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.239	1.171	1.09
28.379	46.76	0.981	115.56	Yes	25	0	2.097947	Yes	Yes	-28.38	3342.67	1458.85	1883.82	0.78	0.134	1458.85	1883.82	47.65	0.647	1.08	50.41	39.2	89.6	0.125	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.213	1.153	1.02
28.543	39.73	0.825	115.56	Yes	28	0	2.076516	Yes	Yes	-28.54	3361.62	1469.08	1892.54	0.78	0.134	1469.08	1892.54	40.50	0.676	1.08	42.85	40.8	83.7	0.119	0.07	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.190	1.136	0.96
28.707	30.793	0.475	115.56	Yes	28	0	1.542558	Yes	Yes	-28.71	3380.58	1479.32	1901.26	0.77	0.134	1479.32	1901.26	31.43	0.719	1.08	33.26	39.7	72.9	0.110	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.157	1.112	0.87
28.871	32.934	0.294	118.77	Yes	22	0	0.892694	Yes	Yes	-28.87	3400.05	1489.55	1910.50	0.77	0.134	1489.55	1910.50	33.47	0.709	1.08	35.41	31.6	67.0	0.105	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.101	0.82
29.035	33.76	0.155	118.77	Yes	5	0	0.459123	Yes	Yes	-29.04	3419.53	1499.78	1919.75	0.77	0.134	1499.78	1919.75	34.18	0.705	1.07	36.16	0.1	36.3	0.083	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.098	1.070	0.63
29.199	26.134	0.089	118.77	Yes	5	0	0.340553	Yes	Yes	-29.20	3439.01	1510.02	1928.99	0.77	0.134	1510.02	1928.99	26.47	0.747	1.07	28.00	0.1	28.1	0.078	0.06	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.067	0.59
29.363	18.948	0.097	118.77	Yes	26	0	0.511927	Yes	Yes	-29.36	3458.49	1520.25	1938.24	0.77	0.134	1520.25	1938.24	19.20	0.795	1.07	20.32	35.3	55.6	0.096	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.086	0.74
29.527	14.26	0.123	115.56	Yes	38	0	0.862553	Yes	Yes	-29.53	3477.44	1530.48	1946.96	0.77	0.133	1530.48	1946.96	14.45	0.834	1.07	15.29	44.2	59.5	0.099	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.77
29.691	14.945	0.18	115.56	Yes	40	0	1.204416	Yes	Yes	-29.69	3496.39	1540.72	1955.67	0.76	0.133	1540.72	1955.67	15.08	0.828	1.07	15.95	45.8	61.8	0.101	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.094	0.78
29.855	23.561	0.179	118.77	Yes	26	0	0.75973	Yes	Yes	-29.86	3515.87	1550.95	1964.92	0.76	0.133	1550.95	1964.92	23.57	0.765	1.06	24.93	35.5	60.5	0.100	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.78
30.019	26.927	0.182	118.77	Yes	23	0	0.675902	Yes	Yes	-30.02	3535.35	1561.19	1974.16	0.76	0.133	1561.19	1974.16	26.80	0.745	1.05	28.35	32.0	60.4	0.100	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.78
30.183	24.256	0.193	118.77	Yes	26	0	0.795679	Yes	Yes	-30.18	3554.83	1571.42	1983.41	0.76	0.133	1571.42	1983.41	24.08	0.761	1.05	25.48	35.6	61.1	0.100	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.78
30.347	26.454	0.232	118.77	Yes	25	0	0.876994	Yes	Yes	-30.35	3574.31	1581.65	1992.65	0.76	0.133	1581.65	1992.65	26.15	0.749	1.05	27.67	35.4	63.0	0.102	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.79
30.511	28.16	0.284	118.77	Yes	26	0	1.008523	Yes	Yes	-30.51	3593.78	1591.89	2001.90	0.76	0.132	1591.89	2001.90	27.73	0.739	1.04	29.34	36.1	65.4	0.104	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.81
30.675	30.968	0.292	118.77	Yes	24	0	0.942909	Yes	Yes	-30.68	3613.26	1602.12	2011.14	0.76	0.132	1602.12	2011.14	30.37	0.725	1.04	32.13	33.8	65.9	0.104	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.82
30.84	37.058	0.373	118.77	Yes	22	0	1.00653	Yes	Yes	-30.84	3632.86	1612.42	2020.44	0.75	0.132	1612.42	2020.44	36.17	0.696	1.03	38.27	31.6	69.9	0.107	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.106	0.85
31.004	36.376	0.373	118.77	Yes	22	0	1.025401	Yes	Yes	-31.00	3652.34	1622.65	2029.69	0.75	0.132	1622.65	2029.69	35.40	0.700	1.03	37.45	32.2	69.7	0.107	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.148	1.106	0.85
31.168	38.396	0.414	118.77	Yes	22	0	1.078237	Yes	Yes	-31.17	3671.82	1632.88	2038.93	0.75	0.132	1632.88	2038.93	37.23	0.691	1.03	39.39	32.1	71.5	0.108	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.109	0.86
31.332	34.489	0.697	115.56	Yes	30	0	2.020934	Yes	Yes	-31.33	3690.77	1643.12	2047.65	0.75	0.132	1643.12	2047.65	33.37	0.709	1.02	35.30	42.1	77.4	0.114	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	0.91
31.496	41.937	1.253	115.56	Yes	32	0	2.987815	Yes	Yes	-31.50	3709.72	1653.35	2056.37	0.75	0.131	1653.35	2056.37	40.41	0.677	1.02	42.76	45.5	88.3	0.124	0.07	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.208	1.149	1.02
31.66	68.64	1.362	118.77	Yes	21	0	1.984266	Yes	Yes	-31.66	3729.20	1663.58	2065.61	0.75	0.131	1663.58	2065.61	65.80	0.586	1.01	69.62	33.8	103.4	0.142	0.08	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.279	1.200	1.22
31.824	72.518	0.838	121.98	Yes	15	0	1.155575	Yes	Yes	-31.82	3749.20	1673.82	2075.39	0.74	0.131	1673.82	2075.39	69.31	0.576	1.01	73.33	20.8	94.2	0.130	0.08	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.233	1.167	1.09
31.988	60.052	0.178	121.98	Yes	5	0	0.29641	Yes	Yes	-31.99	3769.21	1684.05	2085.16	0.74	0.131	1684.05	2085.16	57.27	0.613	1.01	60.60	0.1	60.7	0.100	0.08	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.78
32.152	36.277	0.139	118.77	Yes	5	0	0.383163	Yes	Yes	-32.15	3788.69	1694.28	2094.40	0.74	0.131	1694.28	2094.40	34.54	0.704	1.01	36.54	0.1	36.7	0.083	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.098	1.071	0.64
32.316	28.284	0.121	118.77	Yes	5	0	0.427804	Yes	Yes	-32.32	3808.16	1704.52	2103.65	0.74	0.131	1704.52	2103.65	26.85	0.744	1.00	28.41	0.1	28.5	0.078	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.067	0.60
32.48	28.779	0.089	118.77	Yes	5	0	0.309253	Yes	Yes	-32.48	3827.64	1714.75	2112.89	0.74	0.130	1714.75	2112.89	27.23	0.742	1.00	28.81	0.1	28.9	0.078	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.094	1.068	0.60
32.644	32.769	0.195	118.77	Yes	20	0	0.595075	Yes	Yes	-32.64	3847.12	1724.99	2122.14	0.74	0.130	1724.99	2122.14	30.91	0.722	1.00	32.70	27.3	60.0	0.099	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.78
32.808	27.487	0.278	118.77	Yes	27	0	1.011387	Yes	Yes	-32.81	3866.60	1735.22	2131.38	0.73	0.130	1735.22	2131.38	25.84	0.750	0.99	27.34	36.9	64.2	0.103	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.81
32.972	25.737	0.346	115.56	Yes	31	0	1.344368	Yes	Yes	-32.97	3885.55	1745.45	2140.10	0.73	0.130	1745.45	2140.10	24.12	0.761	0.99	25.52	40.8	66.3	0.104	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.83
33.136	27.735	0.333	118.77	Yes	28	0	1.200649	Yes	Yes	-33.14	3905.03	1755.69	2149.34	0.73	0.130	1755.69	2149.34	25.91	0.750	0.99	27.41	38.7	66.1	0.104	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.83
33.3	26.95	0.29	118.77	Yes	28	0	1.076067	Yes	Yes	-33.30	3924.51	1765.92	2158.59	0.73	0.129	1765.92	2158.59	25.09	0.755	0.99	26.55	37.9	64.4	0.103	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.81
33.464	29.178	0.24	118.77	Yes	24	0	0.822538	Yes	Yes	-33.46	3943.99	1776.15	2167.83	0.73	0.129	1776.15	2167.83	27.09	0.743	0.98	28.66	33.7	62.3	0.101	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.80
33.628	26.115	0.203	118.77	Yes	25	0	0.777331	Yes	Yes	-33.63	3963.46	1786.39	2177.08	0.73	0.129	1786.39	2177.08	24.15	0.761	0.98	25.56	34.9	60.4	0.100	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.79
33.792	22.873	0.174	118.77	Yes	27	0	0.760722	Yes	Yes	-33.79	3982.94	1796.62	2186.32	0.73	0.129	1796.62	2186.32	21.07	0.781	0.97	22.30	36.8	59.1	0.099	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.78
33.956	23.478	0.164	118.77	Yes	26	0	0.698526	Yes	Yes	-33.96	4002.42	1806.85	2195.57	0.72	0.129	1806.85	2195.57	21.56	0.778	0.97	22.81	35.6	58.4	0.098	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.77
34.12	24.16	0.2	118.77	Yes	27	0	0.827815	Yes	Yes	-34.12	4021.90	1817.09	2204.81	0.72	0.129	1817.09	2204.81	22.12	0.774	0.97	23.40	36.8	60.2	0.100	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.79
34.284	27.385	0.202	118.77	Yes	24	0	0.73763	Yes	Yes	-34.28	4041.38	1827.32	2214.06	0.72	0.128	1827.32	2214.06	25.01	0.755	0.97	26.46	33.7	60.1	0.100	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.79
34.448	29.734	0.237	118.77	Yes	24	0	0.797067	Yes	Yes	-34.45	4060.86	1837.56	2223.30	0.72	0.128	1837.56	2223.30	27.09	0.743	0.96	28.66	33.2	61.8	0.101	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.80
34.612	32.315	0.266	118.77	Yes	23	0	0.823147	Yes	Yes	-34.61	4080.33	1847.79	2232.54	0.72	0.128	1847.79	2232.54	29.37	0.730	0.96	31.07	32.1	63.2	0.102	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.81
34.776	34.127	0.316	118.77	Yes	23	0	0.925953	Yes	Yes	-34.78	4099.81	1858.02	2241.79	0.72	0.128	1858.02	2241.79	30.94	0.722	0.96	32.73	32.7	65.5	0.104	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.83
34.941	36.151	0.319	118.77	Yes	22	0	0.88241	Yes	Yes	-34.94	4119.41	1868.32	2251.09	0.71	0.128	1868.32	2251.09	32.69	0.713	0.96	34.59	31.1	65.7	0.104	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.83
35.105	41.31	0.355	118.77	Yes	20	0	0.859356	Yes	Yes	-35.11	4138.89	1878.55	2260.34	0.71	0.127	1878.55	2260.34	37.31	0.691	0.96	39.47	28.2	67.7	0.105	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.143	1.103	0.85
35.269	37.324	0.342	118.77	Yes	22	0	0.916301	Yes	Yes	-35.27	4158.37	1888.79	2269.58	0.71	0.127	1888.79	2269.58	33.57	0.708	0.95	35.52	31.1	66.6	0.105	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.84
35.433	28.436	0.317	118.77	Yes	28	0	1.114784	Yes	Yes	-35.43	4177.84	1899.02	2278.82	0.71	0.127	1899.02	2278.82	25.42	0.753	0.95	26.89	37.9	64.8	0.103	0.06	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.83
35.597	21.756	0.295	115.56	Yes	37	0	1.355948	Yes	Yes	-35.60	4196.80	1909.25	2287.54	0.71	0.127	1909.25	2287.54	19.33	0.794	0.94	20.45	44.7	65.2	0.103	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.099	0.83
35.761	18.964	0.315	115.56	Yes	43	0	1.661042	Yes	Yes	-35.76	4215.75	1919.49	2296.26	0.71	0.127	1919.49	2296.26	16.77	0.814	0.94	17.74	47.4	65.1	0.103	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.83

CPT Liquefaction Analysis

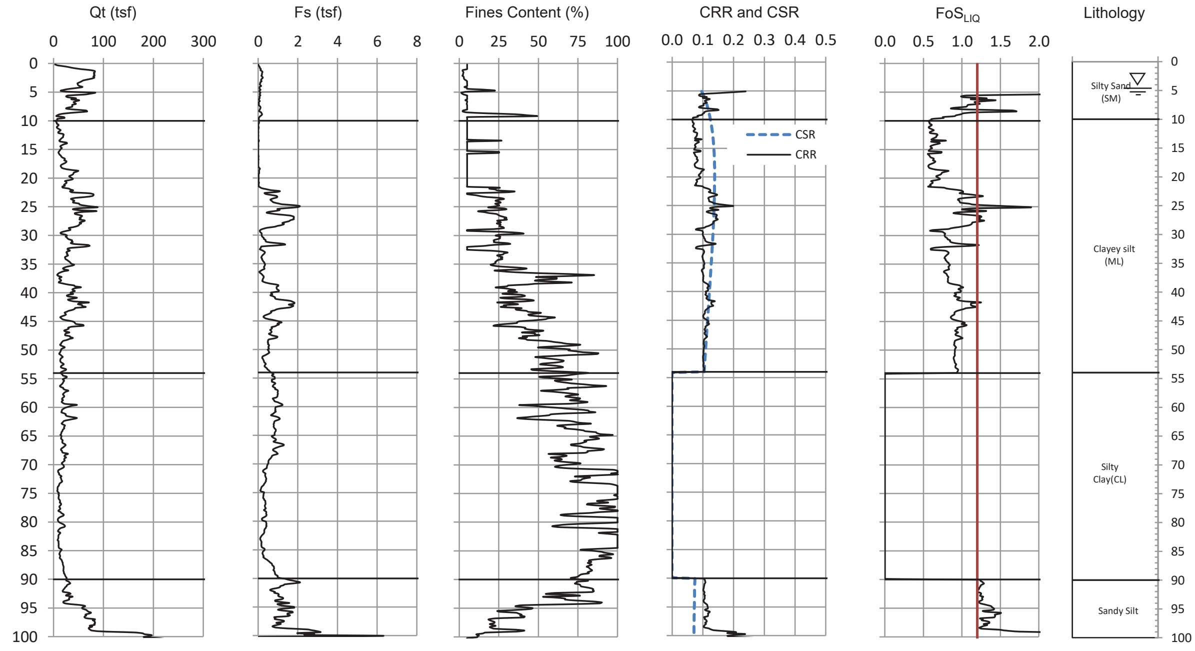
35.925	21.224	0.319	115.56	Yes	39	0	1.503015	Yes	Yes	-35.93	4234.70	1929.72	2304.98	0.71	0.126	1929.72	2304.98	18.74	0.798	0.93	19.82	45.8	65.6	0.104	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.83
36.089	29.912	0.203	118.77	Yes	23	0	0.678657	Yes	Yes	-36.09	4254.18	1939.95	2314.22	0.70	0.126	1939.95	2314.22	26.44	0.747	0.94	27.98	31.5	59.5	0.099	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.79
36.253	20.729	0.13	118.77	Yes	28	0	0.627141	Yes	Yes	-36.25	4273.66	1950.19	2323.47	0.70	0.126	1950.19	2323.47	18.18	0.803	0.93	19.23	36.9	56.1	0.097	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.77
36.417	14.484	0.063	115.56	Yes	36	0	0.434963	Yes	Yes	-36.42	4292.61	1960.42	2332.19	0.70	0.126	1960.42	2332.19	12.60	0.852	0.92	13.33	42.5	55.8	0.096	0.05	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.77
36.581	10.801	0.094	115.56	Yes	51	0	0.87029	Yes	Yes	-36.58	4311.56	1970.65	2340.91	0.70	0.126	1970.65	2340.91	9.33	0.889	0.91	9.87	48.8	58.7	0.099	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.79
36.745	8.465	0.154	115.56	Yes	71	0	1.819256	Yes	Yes	-36.75	4330.51	1980.89	2349.62	0.70	0.125	1980.89	2349.62	7.27	0.918	0.91	7.69	52.9	60.6	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.80
36.909	7.416	0.206	115.56	Yes	85	0	2.777778	Yes	Yes	-36.91	4349.46	1991.12	2358.34	0.70	0.125	1991.12	2358.34	6.34	0.933	0.90	6.70	54.5	61.2	0.100	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.81
37.073	10.198	0.248	115.56	Yes	69	0	2.431849	Yes	Yes	-37.07	4368.42	2001.36	2367.06	0.70	0.125	2001.36	2367.06	8.72	0.897	0.90	9.22	52.9	62.1	0.101	0.04	1.00	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.81
37.237	16.087	0.282	115.56	Yes	49	0	1.752968	Yes	Yes	-37.24	4387.37	2011.59	2375.78	0.69	0.125	2011.59	2375.78	13.80	0.840	0.91	14.60	49.1	63.7	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.83
37.401	12.157	0.283	115.56	Yes	62	0	2.327877	Yes	Yes	-37.40	4406.32	2021.82	2384.50	0.69	0.125	2021.82	2384.50	10.35	0.877	0.90	10.95	52.0	62.9	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.82
37.565	11.764	0.252	115.56	Yes	61	0	2.142129	Yes	Yes	-37.57	4425.27	2032.06	2393.21	0.69	0.124	2032.06	2393.21	9.98	0.881	0.90	10.55	51.9	62.4	0.101	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.82
37.729	14.439	0.234	115.56	Yes	51	0	1.620611	Yes	Yes	-37.73	4444.22	2042.29	2401.93	0.69	0.124	2042.29	2401.93	12.24	0.856	0.90	12.96	49.5	62.5	0.101	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.82
37.893	15.196	0.222	115.56	Yes	48	0	1.460911	Yes	Yes	-37.89	4463.17	2052.52	2410.65	0.69	0.124	2052.52	2410.65	12.86	0.849	0.90	13.60	48.7	62.3	0.101	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.82
38.057	11.707	0.214	115.56	Yes	60	0	1.827966	Yes	Yes	-38.06	4482.13	2062.76	2419.37	0.69	0.124	2062.76	2419.37	9.83	0.883	0.89	10.40	51.4	61.8	0.101	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.82
38.221	10.682	0.311	115.56	Yes	71	0	2.91144	Yes	Yes	-38.22	4501.08	2072.99	2428.09	0.68	0.124	2072.99	2428.09	8.93	0.894	0.88	9.45	53.4	62.8	0.102	0.04	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.82
38.385	18.78	0.47	115.56	Yes	50	0	2.502662	Yes	Yes	-38.39	4520.03	2083.22	2436.81	0.68	0.124	2083.22	2436.81	15.81	0.822	0.89	16.72	50.3	67.0	0.105	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	0.86
38.549	27.289	0.767	115.56	Yes	43	0	2.810656	Yes	Yes	-38.55	4538.98	2093.46	2445.52	0.68	0.123	2093.46	2445.52	23.08	0.768	0.89	24.42	49.2	73.6	0.110	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.113	0.91
38.713	41.404	1.006	115.56	Yes	31	0	2.429717	Yes	Yes	-38.71	4557.93	2103.69	2454.24	0.68	0.123	2103.69	2454.24	35.27	0.700	0.90	37.32	43.4	80.7	0.116	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	0.97
38.877	42.798	1.017	115.56	Yes	30	0	2.376279	Yes	Yes	-38.88	4576.89	2113.92	2462.96	0.68	0.123	2113.92	2462.96	36.40	0.695	0.90	38.51	42.9	81.4	0.117	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.182	1.131	0.98
39.042	55.069	0.942	118.77	Yes	23	0	1.710581	Yes	Yes	-39.04	4596.48	2124.22	2472.26	0.68	0.123	2124.22	2472.26	47.04	0.650	0.90	49.77	35.2	85.0	0.120	0.07	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	1.02
39.206	43.937	0.935	115.56	Yes	29	0	2.128047	Yes	Yes	-39.21	4615.43	2134.45	2480.98	0.68	0.123	2134.45	2480.98	37.20	0.691	0.90	39.36	41.2	80.6	0.116	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	0.98
39.37	38.218	0.939	115.56	Yes	33	0	2.456957	Yes	Yes	-39.37	4634.39	2144.69	2489.70	0.67	0.122	2144.69	2489.70	32.15	0.716	0.89	34.02	44.2	78.2	0.114	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.172	1.123	0.95
39.534	38.461	0.992	115.56	Yes	35	0	2.579236	Yes	Yes	-39.53	4653.34	2154.92	2498.42	0.67	0.122	2154.92	2498.42	32.28	0.715	0.89	34.15	46.6	80.8	0.116	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	0.98
39.698	42.804	1.055	115.56	Yes	31	0	2.464723	Yes	Yes	-39.70	4672.29	2165.16	2507.13	0.67	0.122	2165.16	2507.13	35.95	0.697	0.89	38.03	43.4	81.4	0.117	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.183	1.131	0.99
39.862	37.706	1.023	115.56	Yes	37	0	2.713096	Yes	Yes	-39.86	4691.24	2175.39	2515.85	0.67	0.122	2175.39	2515.85	31.47	0.719	0.88	33.29	47.3	80.6	0.116	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	0.98
40.026	33.959	0.661	115.56	Yes	32	0	1.946465	Yes	Yes	-40.03	4710.19	2185.62	2524.57	0.67	0.122	2185.62	2524.57	28.18	0.737	0.88	29.82	42.6	72.4	0.109	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.91
40.19	39.595	0.667	118.77	Yes	28	0	1.684556	Yes	Yes	-40.19	4729.67	2195.86	2533.82	0.67	0.121	2195.86	2533.82	32.92	0.712	0.88	34.83	39.3	74.1	0.111	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.160	1.115	0.92
40.354	30.436	0.722	115.56	Yes	39	0	2.372191	Yes	Yes	-40.35	4748.62	2206.09	2542.53	0.67	0.121	2206.09	2542.53	25.04	0.755	0.87	26.49	47.5	74.0	0.111	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.159	1.114	0.92
40.518	26.726	0.617	115.56	Yes	42	0	2.308613	Yes	Yes	-40.52	4767.58	2216.32	2551.25	0.66	0.121	2216.32	2551.25	21.85	0.776	0.86	23.12	48.1	71.2	0.108	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.152	1.109	0.90
40.682	31.352	0.743	115.56	Yes	39	0	2.369865	Yes	Yes	-40.68	4786.53	2226.56	2559.97	0.66	0.121	2226.56	2559.97	25.68	0.751	0.87	27.17	47.3	74.5	0.111	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.115	0.93
40.846	46.721	0.851	118.77	Yes	26	0	1.821451	Yes	Yes	-40.85	4806.01	2236.79	2569.22	0.66	0.121	2236.79	2569.22	38.67	0.684	0.88	40.91	38.5	79.4	0.115	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.176	1.126	0.97
41.01	40.074	0.848	115.56	Yes	30	0	2.116085	Yes	Yes	-41.01	4824.96	2247.02	2577.93	0.66	0.120	2247.02	2577.93	32.91	0.712	0.87	34.82	42.1	77.0	0.113	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.121	0.95
41.174	29.235	0.908	115.56	Yes	44	0	3.105866	Yes	Yes	-41.17	4843.91	2257.26	2586.65	0.66	0.120	2257.26	2586.65	23.70	0.764	0.86	25.08	49.9	75.0	0.111	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.162	1.116	0.94
41.338	31.377	1.27	115.56	Yes	47	0	4.047551	Yes	Yes	-41.34	4862.86	2267.49	2595.37	0.66	0.120	2267.49	2595.37	25.43	0.753	0.86	26.91	51.6	78.5	0.114	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	0.97
41.502	41.929	1.62	115.56	Yes	40	0	3.863674	Yes	Yes	-41.50	4881.81	2277.72	2604.09	0.65	0.120	2277.72	2604.09	34.23	0.705	0.86	36.22	50.5	86.7	0.122	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.202	1.145	1.05
41.666	70.817	1.752	115.56	Yes	24	0	2.473982	Yes	Yes	-41.67	4900.76	2287.96	2612.81	0.65	0.120	2287.96	2612.81	58.88	0.608	0.88	62.30	39.2	101.5	0.139	0.08	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.269	1.193	1.25
41.83	52.604	1.836	115.56	Yes	33	0	3.490229	Yes	Yes	-41.83	4919.72	2298.19	2621.52	0.65	0.119	2298.19	2621.52	43.11	0.665	0.87	45.62	46.7	92.3	0.128	0.07	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.225	1.161	1.12
41.994	48.934	1.799	115.56	Yes	37	0	3.67638	Yes	Yes	-41.99	4938.67	2308.43	2630.24	0.65	0.119	2308.43	2630.24	39.90	0.679	0.86	42.21	49.6	91.8	0.128	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.223	1.160	1.12
42.158	56.851	1.544	115.56	Yes	28	0	2.715871	Yes	Yes	-42.16	4957.62	2318.66	2638.96	0.65	0.119	2318.66	2638.96	46.53	0.652	0.87	49.23	42.7	91.9	0.128	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.223	1.160	1.12
42.322	57.968	1.77	115.56	Yes	30	0	3.053409	Yes	Yes	-42.32	4976.57	2328.89	2647.68	0.65	0.119	2328.89	2647.68	47.38	0.648	0.86	50.13	44.4	94.5	0.131	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.235	1.168	1.15
42.486	64.145	1.716	115.56	Yes	26	0	2.675189	Yes	Yes	-42.49	4995.52	2339.13	2656.40	0.65	0.118	2339.13	2656.40	52.54	0.629	0.87	55.59	41.5	97.1	0.134	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.247	1.177	1.19
42.65	43.687	1.584	115.56	Yes	39	0	3.625793	Yes	Yes	-42.65	5014.48	2349.36	2665.12	0.64	0.118	2349.36	2665.12	35.13	0.701	0.85	37.16	49.9	87.1	0.123	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.203	1.146	1.07
42.814	42.606	1.172	115.56	Yes	36	0	2.750786	Yes	Yes	-42.81	5033.43	2359.59	2673.83	0.64	0.118	2359.59	2673.83	34.14	0.706	0.85	36.12	47.2	83.4	0.119	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.189	1.136	1.03
42.978	38.024	0.943	115.56	Yes	36	0	2.480013	Yes	Yes	-42.98	5052.38	2369.83	2682.55	0.64	0.118	2369.83	2682.55	30.26	0.725	0.84	32.01	46.9	78.9	0.115	0.06	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.174	1.125	0.98
43.143	30.369	0.824	115.56	Yes	42	0	2.713293	Yes	Yes	-43.14	5071.45	2380.12	2691.32	0.64	0.118	2380.12	2691.32	23.89	0.762	0.83	25.28	49.0	74.3	0.111	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.160	1.115	0.94
43.307	26.61	0.648	115.56	Yes	44	0	2.435175	Yes	Yes	-43.31	5090.40	2390.36	2700.04	0.64	0.117	2390.36	2700.04	20.78	0.783	0.83	21.99	48.9	70.9	0.108	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.151	1.108	0.91
43.471	22.257	0.675	115.56	Yes	52	0	3.032754	Yes	Yes	-43.47	5109.35	2400.59	2708.76	0.64	0.117	2400.59	2708.76	17.22	0.810	0.82	18.22	51.1	69.4	0.107	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.106	0.90
43.635	23.687	0.618	115.56	Yes	48	0	2.609026	Yes	Yes	-43.64	5128.30	2410.82	2717.48	0.64	0.117	2410.82	2717.48	18.32	0.801	0.82	19.38	50.0	69.4	0.107	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.106	0.90
43.799	24.91	0.533	115.56	Yes	44	0	2.139703	Yes	Yes	-43.80	5147.25	2421.06	2726.20	0.63	0.117	2421.06	2726.20	19.25	0.794	0.82	20.37	48.5	68.9	0.106	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	0.90
43.963	21.641	0.39	115.56	Yes	45	0	1.802135	Yes	Yes	-43.96	5166.21	2431.29	2734.91	0.63	0.117	2431.29	2734.91	16.59	0.815	0.81	17.56	48.4	65.9	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.88
44.127	16.23	0.303	115.56	Yes	53	0	1.866913	Yes	Yes	-44.13	5185.16	2441.52	2743.63	0.63	0.116	2441.52	2743.63	12.28	0.855	0.80	13.00	50.4	63.4	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.86
44.291	13.487	0.268	115.56	Yes	61	0	1.987099	Yes	Yes	-44.29	5204.11	2451.76	2752.35	0.63	0.116	2451.76	2752.35	10.12	0.879	0.79	10.70	51.7	62.4	0.101	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.094	0.85
44.455	15.693	0.322	115.56	Yes	56	0	2.05187	Yes	Yes	-44.46	5223.06	2461.99	2761.07	0.63	0.116	2461.99	2761.07	11.80	0.860	0.80	12.48	51.0	63.5	0.102	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.86
44.619	18.069	0.431	115.56	Yes	54	0	2.385301	Yes	Yes	-44.62	5242.01	2472.23	2769.79	0.63	0.116	2472.23	2769.79	13.61	0.842	0.80	14.40	51.0	65.4	0.104	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.88
44.783	24.907	0.701	115.56	Yes	48	0	2.81447	Yes	Yes	-44.78	5260.97	2482.46	2778.51	0.63	0.116	2482.46	2778.51	18.95	0.797	0.80	20.05	50.4	70.4	0.108	0.05	0.99	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.107	0.92
44.947	35.833	0.892	115.56	Yes	38	0	2.489325	Yes	Yes	-44.95	5279.92	2492.69	2787.22	0.62	0.115	2492.69	2787.22	27.62	0.740	0.82	29.22	47.6	76.8	0.113	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.120	0.98
45.111	41.099	1.086	115.56	Yes	37	0	2.6424	Yes	Yes	-45.11	5298.87	2502.93	2795.94	0.62	0.115	2502.93	2795.94	31.81	0.717	0.82	33.65	47.4	81.0	0.117	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.181	1.130	1.02
45.275	43.043	1.186	115.56	Yes	36	0	2.755384	Yes	Yes	-45.28	5317.82	2513.16	2804.66	0.62	0.115	2513.16	2804.66	33.31	0.710	0.82	35.24	47.6	82.8	0.118	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.187	1.134	1.04
45.439	44.948	0.978	115.56	Yes	29	0	2.175848	Yes	Yes	-45.44	5336.77	2523.39	2813.38	0.62	0.115	2523.39	2813.38	34.78	0.703	0.82	36.80	41.8	78.6	0.114	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.173	1.124	1.00
45.603	59.486	1.057	118.77	Yes	23	0	1.776889	Yes	Yes	-45.60	5356.25	2533.63	2822.62	0.62	0.115	2533.63	2822.62	46.60	0.651	0.83	49.31	35.6	84.9	0.120	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	1.06
45.767	60.027	0.939	118.77	Yes	22	0	1.564296	Yes	Yes	-45.77	5375.73	2543.86	2831.87	0.62	0.114	2543.86	2831.87	46.94	0.650	0.83	49.67	33.3	82.9	0.119	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.188	1.135	1.04
45.931	36.953	0.867	115.56	Yes	37	0	2.346224	Yes	Yes	-45.93	5394.68	2554.09	2840.59	0.62	0.114	2554.09	2840.59	28.11	0.737	0.80	29.74	47.0	76.8	0.113	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.120	0.98
46.095	29.524	0.678	115.56	Yes	42	0	2.296437	Yes	Yes	-46.10	5413.63	2564.33	2849.30	0.62	0.114	2564.33	2849.30	22.17	0.774	0.79	23.45	48.3	71.7	0.109	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.153	1.110	0.94
46.259	30.291	0.705	115.56	Yes	42	0	2.327424	Yes	Yes	-46.26	5432.58	2574.56	2858.02	0.61	0.114	2574.56	2858.02	22.71	0.770	0.79	24.03	48.3	72.3	0.109	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.95
46.423	26.874	0.663	115.56	Yes	45	0	2.467069	Yes	Yes	-46.42	5451.54	2584.80	2866.74	0.61	0.114	2584.80	2866.74	19.99	0.789	0.79	21.15	49.4	70.5	0.108	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.108	0.93
46.587	21.474	0.608	115.56	Yes	53	0	2.831331	Yes	Yes	-46.59	5470.49	2595.03	2875.46	0.61	0.113	2595.03	2875.46	15.77	0.822	0.78	16.69	51.2	67.9	0.106	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.91
46.751	24.054	0.662	115.56	Yes	50	0	2.752141	Yes	Yes	-46.75	5489.44	2605.26	2884.18	0.61	0.113	2605.26	2884.18	17.71	0.806	0.78	18.74	50.6	69.3	0.107	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.106	0.92
46.915	31.798	0.681	115.56	Yes	40	0	2.141644	Yes	Yes	-46.92	5508.39	2615.50	2892.90	0.61	0.113	2615.50	2892.90	23.67	0.764	0.79	25.04	47.4	72.4	0.109	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.95
47.079	24.995	0.642	115.56	Yes	48	0	2.568514	Yes	Yes	-47.08	5527.34	2625.73	2901.61	0.61	0.113	2625.73	2901.61	18.34	0.801	0.78	19.41	50.1	69.5	0.107	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.106	0.93
47.244	23.481	0.541	115.56	Yes	48	0	2.30399	Yes	Yes	-47.24	5546.41	2636.03	2910.39	0.61	0.113	2636.03	2910.39	17.14	0.811	0.77	18.13	49.8	67.9	0.106	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.92
47.408	23.303	0.626	115.56	Yes	51	0	2.686349	Yes	Yes	-47.41	5565.36	2646.26	2919.10	0.60	0.112	2646.26	2919.10	16.96	0.812	0.77	17.94	50.7	68.6	0.106	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.145	1.104	0.92
47.572	32.474	0.741	115.56	Yes	40	0	2.281825	Yes	Yes	-47.57	5584.32	2656.49	2927.82	0.60	0.112	2656.49	2927.82	23.97	0.762	0.78	25.36	47.9	73.2	0.110	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.157	1.113	0.96
47.736	33.698	0.969	115.56	Yes	43	0	2.875542	Yes	Yes	-47.74	5603.27	2666.73	2936.54	0.60	0.112	2666.73	2936.54	24.86	0.756	0.78	26.30	49.5	75.8	0.112	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.118	0.99
47.9	38.84	0.95	115.56	Yes	38	0	2.445932	Yes	Yes	-47.90	5622.22	2676.96	2945.26	0.60	0.112	2676.96	2945.26	28.81	0.733	0.78	30.48	47.4	77.9	0.114	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	1.01
48.064	32.002	0.802	115.56	Yes	42	0	2.506093	Yes	Yes	-48.06	5641.17	2687.19	2953.98	0.60	0.111	2687.19	2953.98	23.43	0.765	0.77	24.79	48.7	73.5	0.110	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.113	0.97
48.228	26.842	0.552	115.56	Yes	43	0	2.056479	Yes	Yes	-48.23	5660.12	2697.43	2962.70	0.60	0.111	2697.43	2962.70	19.43	0.793	0.77	20.55	48.4	68.9	0.106	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	0.93
48.392	19.584	0.503	115.56	Yes	55	0	2.568423	Yes	Yes	-48.39	5679.07	2707.66	2971.41	0.60	0.111	2707.66	2971.41	13.92	0.839	0.75	14.73	51.3	66.1	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.91
48.556	17.791	0.5	115.56	Yes	60	0	2.81041	Yes	Yes	-48.56	5698.03	2717.89	2980.13	0.59	0.111	2717.89	2980.13	12.56	0.852	0.75	13.29	52.2	65.5	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.91
48.72	15.968	0.485	115.56	Yes	65	0	3.037325	Yes	Yes	-48.72	5716.98	2728.13	2988.85	0.59	0.111	2728.13	2988.85	11.19	0.867	0.74	11.84	52.9	64.7	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.90
48.884	15.348	0.512	115.56	Yes	68	0	3.33594	Yes	Yes	-48.88	5735.93	2738.36	2997.57	0.59	0.110	2738.36	2997.57	10.71	0.872	0.74	11.33	53.4	64.7	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.90
49.048	13.171	0.495	115.56	Yes	77	0	3.758257	Yes	Yes	-49.05	5754.88	2748.60	3006.29	0.59	0.110	2748.60	3006.29	9.10	0.892	0.73	9.63	54.3	63.9	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.90
49.212	14.792	0.548	115.56	Yes	72	0	3.704705	Yes	Yes	-49.21	5773.83	2758.83	3015.00	0.59	0.110	2758.83	3015.00	10.25	0.878	0.73	10.84	53.9	64.7	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.91
49.376	19.439	0.544	115.56	Yes	57	0	2.798498	Yes	Yes	-49.38	5792.79	2769.06	3023.72	0.59	0.110	2769.06	3023.72	13.60	0.842	0.74	14.39	51.9	66.3	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.92
49.54	22.617	0.516	115.56	Yes	50	0	2.28147	Yes	Yes	-49.54	5811.74	2779.30	3032.44	0.59	0.110	2779.30	3032.44	15.91	0.821	0.74	16.83	50.2	67.0	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.101	0.92
49.704	17.993	0.532	115.56	Yes	61	0	2.956705	Yes	Yes	-49.70	5830.69	2789.53	3041.16	0.59	0.109	2789.53	3041.16	12.48	0.853	0.73	13.20	52.4	65.6	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.92
49.868	15.357	0.545	115.56	Yes	70	0	3.54887	Yes	Yes	-49.87	5849.64	2799.76	3049.88	0.58	0.109	2799.76	3049.88	10.54	0.874	0.73	11.16	53.7	64.8	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.91
50.032	15.023	0.485	115.56	Yes	69	0	3.228383	Yes	Yes	-50.03	5868.59	2810.00	3058.60	0.58	0.109	2810.00	3058.60	10.28	0.877	0.72	10.87	53.4	64.3	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.91
50.196	14.23	0.531	115.56	Yes	74	0	3.731553	Yes	Yes	-50.20	5887.54	2820.23	3067.31	0.58	0.109	2820.23	3067.31	9.68	0.885	0.72	10.25	54.1	64.3	0.103	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.91
50.36	13.403	0.539	112.35	Yes	78	0	4.021488	Yes	Yes	-50.36	5905.97	2830.46	3075.51	0.58	0.109	2830.46	3075.51	9.07	0.892	0.72	9.60	54.5	64.1	0.103	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.91
50.524	11.819	0.568	112.35	Yes	88	0	4.805821	Yes	Yes	-50.52	5924.40	2840.70	3083.70	0.58	0.108	2840.70	3083.70	7.94	0.908	0.71	8.40	55.3	63.7	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.91
50.688	11.632	0.515	112.35	Yes	87	0	4.427442	Yes	Yes	-50.69	5942.82	2850.93	3091.89	0.58	0.108	2850.93	3091.89	7.79	0.910	0.71	8.24	55.2	63.4	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.91
50.852	14.476	0.441	115.56	Yes	70	0	3.046422	Yes	Yes	-50.85	5961.77	2861.16	3100.61	0.58	0.108	2861.16	3100.61	9.76	0.884	0.71	10.33	53.4	63.8	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.91
51.016	16.094	0.336	115.56	Yes	60	0	2.087735	Yes	Yes	-51.02	5980.72	2871.40	3109.33	0.58	0.108	2871.40	3109.33	10.88	0.870	0.72	11.51	51.7	63.2	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.91
51.18	18.521	0.239	115.56	Yes	48	0	1.290427	Yes	Yes	-51.18	5999.68	2881.63	3118.04	0.57	0.108	2881.63	3118.04	12.58	0.852	0.72	13.31	48.7	62.0	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.90
51.345	16.436	0.214	115.56	Yes	52	0	1.30202	Yes	Yes	-51.35	6018.74	2891.93	3126.82	0.57	0.107	2891.93	3126.82	11.07	0.868	0.71	11.71	49.7	61.4	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.89
51.509	14.37	0.211	115.56	Yes	58	0	1.468337	Yes	Yes	-51.51	6037.70	2902.16	3135.53	0.57	0.107	2902.16	3135.53	9.59	0.886	0.71	10.14	51.0	61.2	0.100	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.89
51.673	13.751	0.247	115.56	Yes	63	0	1.796233	Yes	Yes	-51.67	6056.65	2912.40	3144.25	0.57	0.107	2912.40	3144.25	9.13	0.892	0.70	9.66	52.0	61.7	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.90
51.837	13.476	0.272	115.56	Yes	66	0	2.018403	Yes	Yes	-51.84	6075.60	2922.63	3152.97	0.57	0.107	2922.63	3152.97	8.92	0.894	0.70	9.43	52.5	61.9	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.90
52.001	14.02	0.293	115.56	Yes	65	0	2.089872	Yes	Yes	-52.00	6094.55	2932.86	3161.69	0.57	0.107	2932.86	3161.69	9.27	0.890	0.70	9.81	52.4	62.2	0.101	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.91
52.165	15.437	0.299	115.56	Yes	61	0	1.936905	Yes	Yes	-52.17	6113.50	2943.10	3170.41	0.57	0.106	2943.10	3170.41	10.23	0.878	0.70	10.82	51.7	62.5	0.101	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.91
52.329	18.888	0.342	115.56	Yes	53	0	1.810673	Yes	Yes	-52.33	6132.45	2953.33	3179.13	0.56	0.106	2953.33	3179.13	12.62	0.852	0.71	13.35	50.3	63.7	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.92
52.493	20.532	0.389	115.56	Yes	51	0	1.894604	Yes	Yes	-52.49	6151.41	2963.56	3187.84	0.56	0.106	2963.56	3187.84	13.75	0.841	0.71	14.55	50.1	64.6	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.098	0.93
52.657	17.189	0.362	115.56	Yes	58	0	2.105998	Yes	Yes	-52.66	6170.36	2973.80	3196.56	0.56	0.106	2973.80	3196.56	11.37	0.865	0.70	12.03	51.5	63.6	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.92
52.821	15.111	0.328	115.56	Yes	64	0	2.170604	Yes	Yes	-52.82	6189.31	2984.03	3205.28	0.56	0.106	2984.03	3205.28	9.90	0.882	0.69	10.48	52.3	62.8	0.102	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.92
52.985	14.703	0.334	115.56	Yes	65	0	2.271645	Yes	Yes	-52.99	6208.26	2994.26	3214.00	0.56	0.105	2994.26	3214.00	9.60	0.886	0.69	10.15	52.6	62.7	0.102	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.92
53.149	17.718	0.393	115.56	Yes	59	0	2.218083	Yes	Yes	-53.15	6227.21	3004.50	3222.72	0.56	0.105	3004.50	3222.72	11.65	0.862	0.70	12.33	51.6	64.0	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.93
53.313	24.937	0.453	115.56	Yes	46	0	1.816578	Yes	Yes	-53.31	6246.17	3014.73	3231.43	0.56	0.105	3014.73	3231.43	16.70	0.814	0.71	17.66	48.7	66.4	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	0.95
53.477	24.705	0.477	115.56	Yes	47	0	1.930783	Yes	Yes	-53.48	6265.12	3024.96	3240.15	0.56	0.105	3024.96	3240.15	16.49	0.816	0.71	17.45	49.2	66.6	0.105	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.95
53.641	20.046	0.543	115.56	Yes	58	0	2.70877	Yes	Yes	-53.64	6284.07	3035.20	3248.87	0.55	0.105	3035.20	3248.87	13.18	0.846	0.70	13.95	51.9	65.9	0.104	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.95
53.805	16.138	0.583	115.56	Yes	71	0	3.612591	Yes	Yes	-53.81	6303.02	3045.43	3257.59	0.55	0.104	3045.43	3257.59	10.46	0.875	0.69	11.06	53.8	64.9	0.103	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.94
53.969	13.995	0.634	112.35	Yes	82	0	4.530189	Yes	Yes	-53.97	6321.45	3055.67	3265.78	0.55	0.104	3055.67	3265.78	8.98	0.894	0.68	9.50	54.9	64.4	0.103	0.04	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.94
54.133	16.052	0.718	112.35	No	76	0	4.472963	Yes	No	-54.13	6339.87	3065.90	3273.97		0.000	3065.90	3273.97							0.000											0.00
54.297	17.868	0.782	112.35	No	71	0	4.376539	Yes	No	-54.30	6358.30	3076.13	3282.16		0.000	3076.13	3282.16							0.000											0.00
54.461	19.229	0.707	115.56	No	65	0	3.676738	Yes	No	-54.46	6377.25	3086.37	3290.88		0.000	3086.37	3290.88							0.000											0.00
54.625	26.245	0.716	115.56	No	51	0	2.728139	Yes	No	-54.63	6396.20	3096.60	3299.60		0.000	3096.60	3299.60							0.000											0.00
54.789	26.028	0.828	115.56	No	54	0	3.181189	Yes	No	-54.79	6415.15	3106.83	3308.32		0.000	3106.83	3308.32							0.000											0.00

CPT Liquefaction Analysis

54.953	21.266	0.839	115.56	No	64	0	3.945265	Yes	No	-54.95	6434.10	3117.07	3317.04		0.000	3117.07	3317.04							0.000											0.00
55.117	18.496	0.836	112.35	No	71	0	4.519896	Yes	No	-55.12	6452.53	3127.30	3325.23		0.000	3127.30	3325.23							0.000											0.00
55.281	21.129	0.692	115.56	No	61	0	3.27512	Yes	No	-55.28	6471.48	3137.53	3333.95		0.000	3137.53	3333.95							0.000											0.00
55.446	20.826	0.705	115.56	No	62	0	3.385192	Yes	No	-55.45	6490.55	3147.83	3342.72		0.000	3147.83	3342.72							0.000											0.00
55.61	19.202	0.695	115.56	No	66	0	3.619415	Yes	No	-55.61	6509.50	3158.06	3351.44		0.000	3158.06	3351.44							0.000											0.00
55.774	18.64	0.822	112.35	No	71	0	4.409871	Yes	No	-55.77	6527.93	3168.30	3359.63		0.000	3168.30	3359.63							0.000											0.00
55.938	16.789	0.87	112.35	No	78	0	5.181964	Yes	No	-55.94	6546.35	3178.53	3367.82		0.000	3178.53	3367.82							0.000											0.00
56.102	14.921	0.807	112.35	No	84	0	5.408485	Yes	No	-56.10	6564.78	3188.76	3376.01		0.000	3188.76	3376.01							0.000											0.00
56.266	12.943	0.762	112.35	No	93	0	5.887352	Yes	No	-56.27	6583.20	3199.00	3384.20		0.000	3199.00	3384.20							0.000											0.00
56.43	14.56	0.736	112.35	No	84	0	5.054945	Yes	No	-56.43	6601.63	3209.23	3392.40		0.000	3209.23	3392.40							0.000											0.00
56.594	19.356	0.793	115.56	No	68	0	4.096921	Yes	No	-56.59	6620.58	3219.47	3401.11		0.000	3219.47	3401.11							0.000											0.00
56.758	19.825	0.872	112.35	No	69	0	4.398487	Yes	No	-56.76	6639.01	3229.70	3409.31		0.000	3229.70	3409.31							0.000											0.00
56.922	22.741	0.858	115.56	No	62	0	3.772921	Yes	No	-56.92	6657.96	3239.93	3418.02		0.000	3239.93	3418.02							0.000											0.00
57.086	29.721	0.974	115.56	No	52	0	3.277144	Yes	No	-57.09	6676.91	3250.17	3426.74		0.000	3250.17	3426.74							0.000											0.00
57.25	25.04	1.002	115.56	No	60	0	4.001597	Yes	No	-57.25	6695.86	3260.40	3435.46		0.000	3260.40	3435.46							0.000											0.00
57.414	22.168	0.988	112.35	No	66	0	4.456875	Yes	No	-57.41	6714.29	3270.63	3443.65		0.000	3270.63	3443.65							0.000											0.00
57.578	20.019	0.985	112.35	No	71	0	4.920326	Yes	No	-57.58	6732.71	3280.87	3451.84		0.000	3280.87	3451.84							0.000											0.00
57.742	18.896	1.002	112.35	No	75	0	5.30271	Yes	No	-57.74	6751.14	3291.10	3460.04		0.000	3291.10	3460.04							0.000											0.00
57.906	20.635	0.982	112.35	No	70	0	4.758905	Yes	No	-57.91	6769.56	3301.33	3468.23		0.000	3301.33	3468.23							0.000											0.00
58.07	21.732	0.981	112.35	No	67	0	4.514081	Yes	No	-58.07	6787.99	3311.57	3476.42		0.000	3311.57	3476.42							0.000											0.00
58.234	19.967	0.965	112.35	No	72	0	4.832974	Yes	No	-58.23	6806.41	3321.80	3484.61		0.000	3321.80	3484.61							0.000											0.00
58.398	17.983	0.905	112.35	No	76	0	5.032531	Yes	No	-58.40	6824.84	3332.04	3492.80		0.000	3332.04	3492.80							0.000											0.00
58.562	16.985	0.74	112.35	No	76	0	4.356785	Yes	No	-58.56	6843.26	3342.27	3501.00		0.000	3342.27	3501.00							0.000											0.00
58.726	19.036	0.774	115.56	No	70	0	4.06598	Yes	No	-58.73	6862.22	3352.50	3509.71		0.000	3352.50	3509.71							0.000											0.00
58.89	17.244	0.807	112.35	No	77	0	4.679889	Yes	No	-58.89	6880.64	3362.74	3517.91		0.000	3362.74	3517.91							0.000											0.00
59.054	16.303	0.835	112.35	No	81	0	5.121757	Yes	No	-59.05	6899.07	3372.97	3526.10		0.000	3372.97	3526.10							0.000											0.00
59.218	18.816	0.992	112.35	No	76	0	5.272109	Yes	No	-59.22	6917.49	3383.20	3534.29		0.000	3383.20	3534.29							0.000											0.00
59.382	23.231	1.086	112.35	No	66	0	4.674788	Yes	No	-59.38	6935.92	3393.44	3542.48		0.000	3393.44	3542.48							0.000											0.00
59.547	46.577	1.2	115.56	No	39	0	2.576379	Yes	No	-59.55	6954.99	3403.73	3551.25		0.000	3403.73	3551.25							0.000											0.00
59.711	37.333	1.23	115.56	No	47	0	3.294672	Yes	No	-59.71	6973.94	3413.97	3559.97		0.000	3413.97	3559.97							0.000											0.00
59.875	30.992	1.115	115.56	No	53	0	3.597703	Yes	No	-59.88	6992.89	3424.20	3568.69		0.000	3424.20	3568.69							0.000											0.00
60.039	24.083	0.899	115.56	No	61	0	3.732924	Yes	No	-60.04	7011.84	3434.43	3577.41		0.000	3434.43	3577.41							0.000											0.00
60.203	20.668	0.871	115.56	No	69	0	4.214244	Yes	No	-60.20	7030.79	3444.67	3586.13		0.000	3444.67	3586.13							0.000											0.00
60.367	17.877	0.865	112.35	No	77	0	4.838619	Yes	No	-60.37	7049.22	3454.90	3594.32		0.000	3454.90	3594.32							0.000											0.00
60.531	16.707	0.88	112.35	No	82	0	5.267253	Yes	No	-60.53	7067.64	3465.13	3602.51		0.000	3465.13	3602.51							0.000											0.00
60.695	16.465	0.856	112.35	No	82	0	5.198907	Yes	No	-60.70	7086.07	3475.37	3610.70		0.000	3475.37	3610.70							0.000											0.00
60.859	15.858	0.895	112.35	No	86	0	5.643839	Yes	No	-60.86	7104.49	3485.60	3618.89		0.000	3485.60	3618.89							0.000											0.00
61.023	20.795	0.821	115.56	No	67	0	3.948064	Yes	No	-61.02	7123.45	3495.84	3627.61		0.000	3495.84	3627.61							0.000											0.00
61.187	24.522	0.77	115.56	No	58	0	3.140038	Yes	No	-61.19	7142.40	3506.07	3636.33		0.000	3506.07	3636.33							0.000											0.00
61.351	24.3	0.696	115.56	No	57	0	2.864198	Yes	No	-61.35	7161.35	3516.30	3645.05		0.000	3516.30	3645.05							0.000											0.00
61.515	27.423	0.655	115.56	No	50	0	2.388506	Yes	No	-61.52	7180.30	3526.54	3653.77		0.000	3526.54	3653.77							0.000											0.00
61.679	36.762	0.857	115.56	No	43	0	2.331212	Yes	No	-61.68	7199.25	3536.77	3662.48		0.000	3536.77	3662.48							0.000											0.00
61.843	46.722	1	115.56	No	37	0	2.140319	Yes	No	-61.84	7218.21	3547.00	3671.20		0.000	3547.00	3671.20							0.000											0.00
62.007	41.308	1.081	115.56	No	42	0	2.616927	Yes	No	-62.01	7237.16	3557.24	3679.92		0.000	3557.24	3679.92							0.000											0.00
62.171	30.417	1.088	115.56	No	55	0	3.576947	Yes	No	-62.17	7256.11	3567.47	3688.64		0.000	3567.47	3688.64							0.000											0.00
62.335	21.858	0.986	112.35	No	69	0	4.510934	Yes	No	-62.34	7274.53	3577.70	3696.83		0.000	3577.70	3696.83							0.000											0.00
62.499	19.409	0.86	112.35	No	73	0	4.430934	Yes	No	-62.50	7292.96	3587.94	3705.02		0.000	3587.94	3705.02							0.000											0.00
62.663	18.078	0.811	112.35	No	76	0	4.486116	Yes	No	-62.66	7311.38	3598.17	3713.21		0.000	3598.17	3713.21							0.000											0.00
62.827	16.219	0.812	112.35	No	83	0	5.006474	Yes	No	-62.83	7329.81	3608.40	3721.41		0.000	3608.40	3721.41							0.000											0.00
62.991	19.568	0.783	115.56	No	71	0	4.001431	Yes	No	-62.99	7348.76	3618.64	3730.12		0.000	3618.64	3730.12							0.000											0.00
63.155	23.169	0.788	115.56	No	62	0	3.401096	Yes	No	-63.16	7367.71	3628.87	3738.84		0.000	3628.87	3738.84							0.000											0.00
63.319	21.878	0.793	115.56	No	65	0	3.624646	Yes	No	-63.32	7386.67	3639.11	3747.56		0.000	3639.11	3747.56							0.000											0.00
63.483	20.973	0.781	115.56	No	67	0	3.723835	Yes	No	-63.48	7405.62	3649.34	3756.28		0.000	3649.34	3756.28							0.000											0.00
63.648	21.561	0.812	115.56	No	67	0	3.766059	Yes	No	-63.65	7424.69	3659.64	3765.05		0.000	3659.64	3765.05							0.000											0.00
63.812	19.423	0.836	115.56	No	73	0	4.304175	Yes	No	-63.81	7443.64	3669.87	3773.77		0.000	3669.87	3773.77							0.000											0.00
63.976	18.237	0.887	112.35	No	78	0	4.863739	Yes	No	-63.98	7462.06	3680.10	3781.96		0.000	3680.10	3781.96							0.000											0.00
64.14	17.876	0.893	112.35	No	80	0	4.995525	Yes	No	-64.14	7480.49	3690.34	3790.15		0.000	3690.34	3790.15							0.000											0.00
64.304	16.161	0.88	112.35	No	86	0	5.445208	Yes	No	-64.30	7498.91	3700.57	3798.34		0.000	3700.57	3798.34							0.000											0.00
64.468	15.833	0.849	112.35	No	87	0	5.362218	Yes	No	-64.47	7517.34	3710.80	3806.54		0.000	3710.80	3806.54							0.000											0.00
64.632	15.207	0.83	112.35	No	89	0	5.458013	Yes	No	-64.63	7535.76	3721.04	3814.73		0.000	3721.04	3814.73							0.000											0.00
64.796	13.754	0.83	112.35	No	97	0	6.034608	Yes	No	-64.80	7554.19	3731.27	3822.92		0.000	3731.27	3822.92							0.000											0.00
64.96	15.767	0.829	112.35	No	87	0	5.257817	Yes	No	-64.96	7572.61	3741.50	3831.11		0.000	3741.50	3831.11							0.000											0.00
65.124	15.853	0.689	112.35	No	83	0	4.346181	Yes	No	-65.12	7591.04	3751.74	3839.30		0.000	3751.74	3839.30							0.000											0.00
65.288	15.111	0.72	112.35	No	87	0	4.764741	Yes	No	-65.29	7609.47	3761.97	3847.49		0.000	3761.97	3847.49							0.000											0.00
65.452	15.258	0.783	112.35	No	88	0	5.131734	Yes	No	-65.45	7627.89	3772.20	3855.69		0.000	3772.20	3855.69							0.000											0.00
65.616	16.978	0.872	112.35	No	84	0	5.136058	Yes	No	-65.62	7646.32	3782.44	3863.88		0.000	3782.44	3863.88							0.000											0.00
65.78	18.424	0.904	112.35	No	79	0	4.906644	Yes	No	-65.78	7664.74	3792.67	3872.07		0.000	3792.67	3872.07							0.000											0.00
65.944	17.624	0.838	112.35	No	80	0	4.75488	Yes	No	-65.94	7683.17	3802.91	3880.26		0.000	3802.91	3880.26							0.000											0.00
66.108	17.751	0.78	112.35	No	78	0	4.394119	Yes	No	-66.11	7701.59	3813.14	3888.45		0.000	3813.14	3888.45							0.000											0.00
66.272	19.497	0.927	112.35	No	76	0	4.754578	Yes	No	-66.27	7720.02	3823.37	3896.65		0.000	3823.37	3896.65							0.000											0.00
66.436	23.209	1.141	112.35	No	71	0	4.916196	Yes	No	-66.44	7738.44	3833.61	3904.84		0.000	3833.61	3904.84							0.000											0.00
66.6	24.258	1.291	112.35	No	71	0	5.321956	Yes	No	-66.60	7756.87	3843.84	3913.03		0.000	3843.84	3913.03							0.000											0.00
66.764	22.032	1.283	112.35	No	76	0	5.823348	Yes	No	-66.76	7775.29	3854.07	3921.22		0.000	3854.07	3921.22							0.000											0.00
66.928	20.116	1.114	112.35	No	79	0	5.53788	Yes	No	-66.93	7793.72	3864.31	3929.41		0.000	3864.31	3929.41							0.000											0.00
67.092	17.463	0.984	112.35	No	85	0	5.634771	Yes	No	-67.09	7812.14	3874.54	3937.60		0.000	3874.54	3937.60							0.000											0.00
67.256	15.331	0.862	112.35	No	91	0	5.622595	Yes	No	-67.26	7830.57	3884.77	3945.80		0.000	3884.77	3945.80							0.000											0.00
67.42	15.067	0.768	112.35	No	90	0	5.097232	Yes	No	-67.42	7849.00	3895.01	3953.99		0.000	3895.01	3953.99							0.000											0.00
67.584	17.037	0.753	112.35	No	81	0	4.419792	Yes	No	-67.58	7867.42	3905.24	3962.18		0.000	3905.24	3962.18							0.000											0.00
67.749	17.471	0.812	112.35	No	81	0	4.647702	Yes	No	-67.75	7885.96	3915.54	3970.42		0.000	3915.54	3970.42							0.000											0.00
67.913	18.82	0.907	112.35	No	79	0	4.819341	Yes	No	-67.91	7904.38	3925.77	3978.61		0.000	3925.77	3978.61							0.000											0.00
68.077	28.921	0.956	115.56	No	57	0	3.305557	Yes	No	-68.08	7923.34	3936.00	3987.33		0.000	3936.00	3987.33							0.000											0.00
68.241	24.958	0.987	115.56	No	65	0	3.954644	Yes	No	-68.24	7942.29	3946.24	3996.05		0.000	3946.24	3996.05							0.000											0.00
68.405	22.07	0.829	115.56	No	68	0	3.75623	Yes	No	-68.41	7961.24	3956.47	4004.77		0.000	3956.47	4004.77							0.000											0.00
68.569	22.128	0.711	115.56	No	65	0	3.213124	Yes	No	-68.57	7980.19	3966.71	4013.49		0.000	3966.71	4013.49							0.000											0.00
68.733	25.266	0.688	115.56	No	58	0	2.723027	Yes	No	-68.73	7999.14	3976.94	4022.20		0.000	3976.94	4022.20							0.000											0.00
68.897	22.189	0.654	115.56	No	64	0	2.947406	Yes	No	-68.90	8018.10	3987.17	4030.92		0.000	3987.17	4030.92							0.000											0.00
69.061	21.277	0.619	115.56	No	65	0	2.909245	Yes	No	-69.06	8037.05	3997.41	4039.64		0.000	3997.41	4039.64							0.000											0.00
69.225	22.538	0.564	115.56	No	60	0	2.50244	Yes	No	-69.23	8056.00	4007.64	4048.36		0.000	4007.64	4048.36							0.000											0.00
69.389	21.149	0.538	115.56	No	63	0	2.543856	Yes	No	-69.39	8074.95	4017.87	4057.08		0.000	4017.87	4057.08							0.000											0.00
69.553	18.639	0.518	115.56	No	69	0	2.779119	Yes	No	-69.55	8093.90	4028.11	4065.80		0.000	4028.11	4065.80							0.000											0.00
69.717	16.557	0.521	115.56	No	77	0	3.146705	Yes	No	-69.72	8112.85	4038.34	4074.51		0.000	4038.34	4074.51							0.000											0.00
69.881	17.501	0.514	115.56	No	73	0	2.936975	Yes	No	-69.88	8131.81	4048.57	4083.23		0.000	4048.57	4083.23							0.000											0.00
70.045	19.62	0.491	115.56	No	66	0	2.502548	Yes	No	-70.05	8150.76	4058.81	4091.95		0.000	4058.81	4091.95							0.000											0.00
70.209	20.561	0.464	115.56	No	62	0	2.2567	Yes	No	-70.21	8169.71	4069.04	4100.67		0.000	4069.04	4100.67							0.000											0.00
70.373	21.129	0.456	115.56	No	61	0	2.158171	Yes	No	-70.37	8188.66	4079.28	4109.39		0.000	4079.28	4109.39							0.000											0.00
70.537	18.934	0.436	115.56	No	66	0	2.302736	Yes	No	-70.54	8207.61	4089.51	4118.10		0.000	4089.51	4118.10							0.000											0.00
70.701	15.643	0.441	115.56	No	78	0	2.819152	Yes	No	-70.70	8226.57	4099.74	4126.82		0.000	4099.74	4126.82							0.000											0.00
70.865	11.487	0.364	115.56	No	97	0	3.1688	Yes	No	-70.87	8245.52	4109.98	4135.54		0.000	4109.98	4135.54							0.000											0.00
71.029	9.318	0.295	115.56	No	100	0	3.165915	Yes	No	-71.03	8264.47	4120.21	4144.26		0.000	4120.21	4144.26							0.000											0.00
71.193	9.125	0.25	115.56	No	100	0	2.739726	Yes	No	-71.19	8283.42	4130.44	4152.98		0.000	4130.44	4152.98							0.000											0.00
71.357	9.67	0.255	115.56	No	100	0	2.637022	Yes	No	-71.36	8302.37	4140.68	4161.70		0.000	4140.68	4161.70							0.000											0.00
71.521	11.256	0.307	115.56	No	95.909	0	2.727434	Yes	No	-71.52	8321.32	4150.91	4170.41		0.000	4150.91	4170.41							0.000											0.00
71.685	11.134	0.379	115.56	No	100	0	3.403988	Yes	No	-71.69	8340.28	4161.14	4179.13		0.000	4161.14	4179.13							0.000											0.00
71.85	13.37	0.357	115.56	No	85.316	0	2.670157	Yes	No	-71.85	8359.34	4171.44	4187.90		0.000	4171.44	4187.90							0.000											0.00
72.014	16.021	0.357	115.56	No	72.985	0	2.228325	Yes	No	-72.01	8378.30	4181.67	4196.62		0.000	4181.67	4196.62							0.000											0.00
72.178	14.062	0.368	115.56	No	82.444	0	2.616982	Yes	No	-72.18	8397.25	4191.91	4205.34		0.000	4191.91	4205.34							0.000											0.00
72.342	14.776	0.388	115.56	No	80.092	0	2.62588	Yes	No	-72.34	8416.20	4202.14	4214.06		0.000	4202.14	4214.06							0.000											0.00
72.506	15.573	0.408	115.56	No	77.597	0	2.619919	Yes	No	-72.51	8435.15	4212.37	4222.78		0.000	4212.37	4222.78							0.000											0.00
72.67	15.834	0.412	115.56	No	76.782	0	2.601996	Yes	No	-72.67	8454.10	4222.61	4231.50		0.000	4222.61	4231.50							0.000											0.00
72.834	17.364	0.392	115.56	No	70.162	0	2.257544	Yes	No	-72.83	8473.06	4232.84	4240.21		0.000	4232.84	4240.21							0.000											0.00
72.998	16.847	0.402	115.56	No	72.552	0	2.386182	Yes	No	-73.00	8492.01	4243.08	4248.93		0.000	4243.08	4248.93							0.000											0.00
73.162	14.036	0.368	115.56	No	83.249	0	2.62183	Yes	No	-73.16	8510.96	4253.31	4257.65		0.000	4253.31	4257.65							0.000											0.00
73.326	11.973	0.349	115.56	No	94.855	0	2.914892	Yes	No	-73.33	8529.91	4263.54	4266.37		0.000	4263.54	4266.37							0.000											0.00
73.49	11.19	0.308	115.56	No	98.263	0	2.752458	Yes	No	-73.49	8548.86	4273.78	4275.09		0.000	4273.78	4275.09							0.000											0.00
73.654	10.651	0.283	115.56	No	100	0	2.657028	Yes	No	-73.65	8567.81	4284.01	4283.80		0.000	4284.01	4283.80							0.000											0.00
73.818	9.029	0.236	115.56	No	100	0	2.6138	Yes	No	-73.82	8586.77	4294.24	4292.52		0.000	4294.24	4292.52							0.000											0.00

CPT Liquefaction Analysis

73.982	8.342	0.19	115.56	No	100	0	2.277631	Yes	No	-73.98	8605.72	4304.48	4301.24		0.000	4304.48	4301.24							0.000											0.00
74.146	7.963	0.165	115.56	No	100	0	2.072083	Yes	No	-74.15	8624.67	4314.71	4309.96		0.000	4314.71	4309.96							0.000											0.00
74.31	8.186	0.151	115.56	No	100	0	1.844613	Yes	No	-74.31	8643.62	4324.94	4318.68		0.000	4324.94	4318.68							0.000											0.00
74.474	7.804	0.134	115.56	No	100	0	1.717068	Yes	No	-74.47	8662.57	4335.18	4327.40		0.000	4335.18	4327.40							0.000											0.00
74.638	7.642	0.111	115.56	No	100	0	1.452499	Yes	No	-74.64	8681.53	4345.41	4336.11		0.000	4345.41	4336.11							0.000											0.00
74.802	9.42	0.159	115.56	No	100	0	1.687898	Yes	No	-74.80	8700.48	4355.64	4344.83		0.000	4355.64	4344.83							0.000											0.00
74.966	10.937	0.298	115.56	No	100	0	2.724696	Yes	No	-74.97	8719.43	4365.88	4353.55		0.000	4365.88	4353.55							0.000											0.00
75.13	9.712	0.29	115.56	No	100	0	2.985997	Yes	No	-75.13	8738.38	4376.11	4362.27		0.000	4376.11	4362.27							0.000											0.00
75.294	11.094	0.27	115.56	No	97.823	0	2.433748	Yes	No	-75.29	8757.33	4386.35	4370.99		0.000	4386.35	4370.99							0.000											0.00
75.458	10.469	0.274	115.56	No	100	0	2.617251	Yes	No	-75.46	8776.28	4396.58	4379.71		0.000	4396.58	4379.71							0.000											0.00
75.622	10.281	0.263	115.56	No	100	0	2.558117	Yes	No	-75.62	8795.24	4406.81	4388.42		0.000	4406.81	4388.42							0.000											0.00
75.786	10.222	0.262	115.56	No	100	0	2.563099	Yes	No	-75.79	8814.19	4417.05	4397.14		0.000	4417.05	4397.14							0.000											0.00
75.951	10.386	0.257	115.56	No	100	0	2.474485	Yes	No	-75.95	8833.26	4427.34	4405.91		0.000	4427.34	4405.91							0.000											0.00
76.115	11.861	0.298	115.56	No	94.594	0	2.512436	Yes	No	-76.12	8852.21	4437.58	4414.63		0.000	4437.58	4414.63							0.000											0.00
76.279	13.133	0.311	115.56	No	87.13	0	2.36808	Yes	No	-76.28	8871.16	4447.81	4423.35		0.000	4447.81	4423.35							0.000											0.00
76.443	13.155	0.359	115.56	No	90.056	0	2.729	Yes	No	-76.44	8890.11	4458.04	4432.07		0.000	4458.04	4432.07							0.000											0.00
76.607	12.639	0.366	115.56	No	93.909	0	2.895799	Yes	No	-76.61	8909.06	4468.28	4440.79		0.000	4468.28	4440.79							0.000											0.00
76.771	14.917	0.372	115.56	No	81.45	0	2.493799	Yes	No	-76.77	8928.01	4478.51	4449.50		0.000	4478.51	4449.50							0.000											0.00
76.935	15.164	0.379	115.56	No	80.751	0	2.499341	Yes	No	-76.94	8946.97	4488.74	4458.22		0.000	4488.74	4458.22							0.000											0.00



Earthquake Magnitude, M = 5.77

Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2014),
CPT and SPT Based Liquefaction
Triggering Procedures,
UCD/CGM-14/01

Project: Plant Scherer GA EPD Closure		Sounding ECP05A Avg.
Project Number: 60563110	Date: 1/24/2018	AECOM

CPT Liquefaction Analysis

Method: Idriss and Boulanger (2014), CPT and SPT Based Liquefaction Triggering Procedures

Title: Liquefaction Analysis
Project: Plant Scherer
Project No.: 60563110

Date: 1/24/2018
Boring No. CP-113

Input Parameters:
Peak ground acceleration, pga (g): 0.15
Earthquake Magnitude (M): 4.9
Water Table Depth at the time of drilling 4 ft
Water Table Depth at the time of earthquake 4 ft
Ground Surface Elevation 0 ft

Notes:
1. Sand-like behavior = "Yes", Clay-like behavior = "No" (See Idriss and Boulanger, 2014).
2. Make sure to turn on iterative calculations.
3. User to confirm highlighted values are reasonable.

												At the time of earthquake				At the time of drilling																			
Depth	Qt	Fs	Unit Weight	Liquefiable?[1]	FC	α (From static stress analysis)	Fs/Qt	Below Water Table?	Liquefaction Calculation Needed?	Sample Elev.	Total stress	Pore Pressure	Effective stress	Stress reduction coeff, r_d	CSR	Pore Pressure	Effective stress	qc1n	m	Cn	qc1	Delta qc1ncs	qc1ncs	CRR_{cpt}[3]	C_σ	K_σ	Assg. α	State Para	Para a	Para b	Para c	Kα	MSF_{max}	MSF	IB FSL
(ft)	(TSF)	(TSF)	(pcf)	(Yes/No)			(%)			(ft)	(psf)	(psf)	(psf)			(psf)	(psf)				(TSF)														
0.164	4.976	0.012	112.35	Yes		0	0.241158	No	No	-0.16	0.00		0.00				0.00																		
0.328	11.001	0.032	115.56	Yes	5	0	0.290883	No	No	-0.33	18.95		18.95				18.95																		
0.492	31.613	0.06	118.77	Yes	5	0	0.189795	No	No	-0.49	38.43		38.43				38.43																		
0.656	41.2	0.071	121.98	Yes	5	0	0.17233	No	No	-0.66	58.43		58.43				58.43																		
0.82	50.915	0.09	121.98	Yes	5	0	0.176765	No	No	-0.82	78.44		78.44				78.44																		
0.984	54.101	0.155	121.98	Yes	5	0	0.286501	No	No	-0.98	98.44		98.44				98.44																		
1.148	57.897	0.331	121.98	Yes	8	0	0.571705	No	No	-1.15	118.45		118.45				118.45																		
1.312	67.821	0.256	121.98	Yes	5	0	0.377464	No	No	-1.31	138.45		138.45				138.45																		
1.476	101.538	0.365	125.19	Yes	2	0	0.359471	No	No	-1.48	158.98		158.98				158.98																		
1.64	163.687	0.551	125.19	Yes	0	0	0.336618	No	No	-1.64	179.52		179.52				179.52																		
1.804	190.762	0.57	125.19	Yes	0	0	0.298802	No	No	-1.80	200.05		200.05				200.05																		
1.968	190.666	0.674	125.19	Yes	0	0	0.353498	No	No	-1.97	220.58		220.58				220.58																		
2.133	197.941	0.682	125.19	Yes	0	0	0.344547	No	No	-2.13	241.23		241.23				241.23																		
2.297	196.171	0.62	125.19	Yes	0	0	0.316051	No	No	-2.30	261.77		261.77				261.77																		
2.461	205.97	0.642	125.19	Yes	0	0	0.311696	No	No	-2.46	282.30		282.30				282.30																		
2.625	208.275	0.652	125.19	Yes	0	0	0.313048	No	No	-2.63	302.83		302.83				302.83																		
2.789	211.376	0.661	125.19	Yes	0	0	0.312713	No	No	-2.79	323.36		323.36				323.36																		
2.953	198.039	0.611	125.19	Yes	0	0	0.308525	No	No	-2.95	343.89		343.89				343.89																		
3.117	193.907	0.339	125.19	Yes	0	0	0.174826	No	No	-3.12	364.42		364.42				364.42																		
3.281	202.266	0.405	125.19	Yes	0	0	0.200231	No	No	-3.28	384.95		384.95				384.95																		
3.445	259.762	0.515	128.4	Yes	0	0	0.198258	No	No	-3.45	406.01		406.01				406.01																		
3.609	180.069	0.799	125.19	Yes	1	0	0.443719	No	No	-3.61	426.54		426.54				426.54																		
3.773	119.55	0.683	125.19	Yes	3	0	0.571309	No	No	-3.77	447.07		447.07				447.07																		
3.937	73.464	0.603	121.98	Yes	8	0	0.82081	No	No	-3.94	467.08		467.08				467.08																		
4.101	59.95	0.271	121.98	Yes	5	0	0.452043	Yes	Yes	-4.10	487.08	6.30	480.78	0.98	0.097	6.30	480.78	96.33	0.506	1.70	101.92	0.2	102.1	0.140	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.272	1.195	1.88
4.265	28.791	0.119	118.77	Yes	5	0	0.413324	Yes	Yes	-4.27	506.56	16.54	490.02	0.98	0.099	16.54	490.02	46.26	0.653	1.70	48.94	0.1	49.1	0.092	0.07	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.110	1.079	1.09
4.429	15.343	0.143	115.56	Yes	26	0	0.932021	Yes	Yes	-4.43	525.51	26.77	498.74	0.98	0.101	26.77	498.74	24.65	0.758	1.70	26.08	36.0	62.1	0.101	0.06	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	1.18
4.593	10.971	0.054	115.56	Yes	27	0	0.492207	Yes	Yes	-4.59	544.46	37.00	507.46	0.98	0.103	37.00	507.46	17.63	0.807	1.70	18.65	35.2	53.8	0.095	0.05	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	1.07
4.757	24.034	0.078	118.77	Yes	5	0	0.32454	Yes	Yes	-4.76	563.94	47.24	516.71	0.98	0.104	47.24	516.71	38.62	0.685	1.70	40.86	0.1	41.0	0.086	0.06	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.102	1.073	0.96
4.921	17.786	0.108	115.56	Yes	21	0	0.607219	Yes	Yes	-4.92	582.89	57.47	525.42	0.98	0.106	57.47	525.42	28.58	0.735	1.70	30.24	28.5	58.7	0.099	0.06	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	1.09
5.085	13.645	0.108	115.56	Yes	27	0	0.791499	Yes	Yes	-5.09	601.85	67.70	534.14	0.98	0.107	67.70	534.14	21.92	0.775	1.70	23.20	36.0	59.2	0.099	0.05	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	1.07
5.249	24.472	0.125	118.77	Yes	16	0	0.510788	Yes	Yes	-5.25	621.32	77.94	543.39	0.98	0.109	77.94	543.39	39.32	0.682	1.70	41.60	19.1	60.7	0.100	0.06	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.08
5.413	15.486	0.124	115.56	Yes	25	0	0.800723	Yes	Yes	-5.41	640.28	88.17	552.11	0.98	0.110	88.17	552.11	24.88	0.756	1.70	26.33	34.2	60.5	0.100	0.06	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	1.06
5.577	14.589	0.129	115.56	Yes	26	0	0.884228	Yes	Yes	-5.58	659.23	98.40	560.82	0.97	0.112	98.40	560.82	23.44	0.765	1.70	24.80	36.2	61.0	0.100	0.05	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	1.05
5.741	14.386	0.137	115.56	Yes	27	0	0.952315	Yes	Yes	-5.74	678.18	108.64	569.54	0.97	0.113	108.64	569.54	23.12	0.767	1.70	24.46	37.2	61.6	0.101	0.05	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	1.04
5.905	24.789	0.054	118.77	Yes	5	0	0.217839	Yes	Yes	-5.91	697.66	118.87	578.79	0.97	0.114	118.87	578.79	39.83	0.679	1.70	42.14	0.1	42.3	0.087	0.06	1.08	0.00	0.100	1.000	0.000	0.138	1.000	1.103	1.074	0.88
6.069	48.482	0.059	121.98	Yes	4	0	0.121695	Yes	Yes	-6.07	717.66	129.11	588.56	0.97	0.115	129.11	588.56	77.90	0.552	1.70	82.42	0.0	82.5	0.118	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.186	1.133	1.27
6.234	57.773	0.059	121.98	Yes	3	0	0.102124	Yes	Yes	-6.23	737.79	139.40	598.39	0.97	0.117	139.40	598.39	92.83	0.514	1.70	98.21	0.0	98.2	0.135	0.10	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.252	1.181	1.49
6.398	48.869	0.057	121.98	Yes	4	0	0.116638	Yes	Yes	-6.40	757.79	149.64	608.16	0.97	0.118	149.64	608.16	78.52	0.550	1.70	83.08	0.0	83.1	0.119	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.188	1.135	1.25
6.562	36.835	0.144	118.77	Yes	5	0	0.390933	Yes	Yes	-6.56	777.27	159.87	617.40	0.97	0.119	159.87	617.40	59.19	0.607	1.70	62.62	0.1	62.8	0.102	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	1.02
6.726	38.307	0.162	118.77	Yes	5	0	0.422899	Yes	Yes	-6.73	796.75	170.10	626.65	0.97	0.120	170.10	626.65	61.55	0.599	1.70	65.12	0.1	65.3	0.104	0.08	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	1.03
6.89	70.719	0.165	121.98	Yes	3	0	0.233318	Yes	Yes	-6.89	816.76	180.34	636.42	0.97	0.121	180.34	636.42	113.63	0.469	1.70	120.22	0.0	120.2	0.172	0.12	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.388	1.278	1.98
7.054	66.742	0.24	121.98	Yes	5	0	0.359594	Yes	Yes	-7.05	836.76	190.57	646.19	0.96	0.122	190.57	646.19	107.24	0.483	1.70	113.46	0.1	113.6	0.158	0.11	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.341	1.245	1.76
7.218	48.001	0.192	121.98	Yes	5	0	0.399992	Yes	Yes	-7.22	856.77	200.80	655.96	0.96	0.123	200.80	655.96	77.13	0.554	1.70	81.60	0.1	81.7	0.117	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.184	1.132	1.18
7.382	47.863	0.12	121.98	Yes	5	0	0.250716	Yes	Yes	-7.38	876.77	211.04	665.73	0.96	0.124	211.04	665.73	76.91	0.554	1.70	81.37	0.1	81.5	0.117	0.09	1.10	0.00	0.100	1.000	0.000	0.138	1.000	1.183	1.131	1.17
7.546	40.611	0.113	121.98	Yes	5	0	0.27825	Yes	Yes	-7.55	896.77	221.27	675.50	0.96	0.124	221.27	675.50	65.25	0.588	1.70	69.04	0.1	69.2	0.107	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	1.02
7.71	39.412	0.109	121.98	Yes	5	0	0.276566	Yes	Yes	-7.71	916.78	231.50	685.28	0.96	0.125	231.50	685.28	63.33	0.594	1.70	67.00	0.1	67.1	0.105	0.08	1.09	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	1.00
7.874	24.133	0.165	118.77	Yes	18	0	0.683711	Yes	Yes	-7.87	936.26	241.74	694.52	0.96	0.126	241.74	694.52	38.78	0.684	1.70	41.03	23.7	64.8	0.103	0.06	1.07	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.95
8.038	12.057	0.161	115.56	Yes	34	0	1.335324	Yes	Yes	-8.04	955.21	251.97	703.24	0.96	0.127	251.97	703.24	19.37	0.793	1.70	20.50	42.5	63.0	0.102	0.05	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.92
8.202	9.254	0.086	115.56	Yes	35	0	0.929328	Yes	Yes	-8.20	974.16	262.20	711.96	0.96	0.128	262.20	711.96	14.87	0.830	1.70	15.73	42.4	58.1	0.098	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.87
8.366	15.004	0.07	115.56	Yes	5	0	0.466542	Yes	Yes	-8.37	993.11	272.44	720.67	0.95	0.128	272.44	720.67	24.11	0.761	1.70	25.51	0.1	25.6	0.076	0.06	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.067	0.66
8.53	14.449	0.062	115.56	Yes	5	0	0.429095	Yes	Yes	-8.53	1012.06	282.67	729.39	0.95	0.129	282.67	729.39	23.22	0.767	1.70	24.56	0.1	24.7	0.075	0.05	1.06	0.00	0.100	1.000	0.000	0.138	1.000	1.093	1.066	0.65
8.694	8.399	0.041	112.35	Yes	5	0	0.488153	Yes	Yes	-8.69	1030.49	292.91	737.58	0.95	0.130	292.91	737.58	13.50	0.843	1.70	14.28	0.1	14.4	0.069	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.59
8.858	5.776	0.043	112.35	Yes	5	0	0.74446	Yes	Yes	-8.86	1048.92	303.14	745.78	0.95	0.130	303.14	745.78	9.28	0.890	1.70	9.82	0.1	9.9	0.066	0.04	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.56
9.022	4.726	0.051	112.35	Yes	5	0	1.079137	Yes	Yes	-9.02	1067.34	313.37	753.97	0.95	0.131	313.37	753.97	7.59	0.913	1.70	8.03	0.1	8.1	0.065	0.04	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.55
9.186	5.048	0.063	112.35	Yes	5	0	1.248019	Yes	Yes	-9.19	1085.77	323.61	762.16	0.95	0.132	323.61	762.16	8.11	0.905	1.70	8.58	0.1	8.7	0.066	0.04	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.55
9.35	5.112	0.077	112.35	Yes	5	0	1.50626	Yes	Yes	-9.35	1104.19	333.84	770.35	0.95	0.132	333.84	770.35	8.21	0.904	1.70	8.69	0.1	8.8	0.066	0.04	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.55
9.514	6.76	0.074	112.35	Yes	5	0	1.094675	Yes	Yes	-9.51	1122.62	344.07	778.54	0.95	0.133	344.07	778.54	10.86	0.871	1.70	11.49	0.1	11.6	0.067	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.56
9.678	9.436	0.048	112.35	Yes	5	0	0.50869	Yes	Yes	-9.68	1141.04	354.31	786.74	0.94	0.134	354.31	786.74	15.16	0.828	1.70	16.04	0.1	16.1	0.070	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.58
9.842	9.646	0.037	112.35	Yes	5	0	0.383579	Yes	Yes	-9.84	1159.47	364.54	794.93	0.94	0.134	364.54	794.93	15.50	0.825	1.70	16.40	0.1	16.5	0.070	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.065	0.58
10.006	7.902	0.057	112.35	Yes	5	0	0.721336	Yes	Yes	-10.01	1177.89	374.77	803.12	0.94	0.135	374.77	803.12	12.70	0.851	1.70	13.43	0.1	13.5	0.069	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.56
10.17	6.58	0.067	112.35	Yes	5	0	1.018237	Yes	Yes	-10.17	1196.32	385.01	811.31	0.94	0.135	385.01	811.31	10.57	0.874	1.70	11.19	0.1	11.3	0.067	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.090	1.065	0.54
10.335	12.065	0.079	115.56	Yes	28	0	0.654787	Yes	Yes	-10.34	1215.39	395.30	820.08	0.94	0.136	395.30	820.08	19.39	0.793	1.70	20.51	37.5	58.1	0.098	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.81
10.499	11.467	0.101	115.56	Yes	32	0	0.880788	Yes	Yes	-10.50	1234.34	405.54	828.80	0.94	0.136	405.54	828.80	18.43	0.801	1.70	19.49	40.7	60.2	0.100	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.83
10.663	9.745	0.097	115.56	Yes	35	0	0.995382	Yes	Yes	-10.66	1253.29	415.77	837.52	0.94	0.137	415.77	837.52	15.66	0.823	1.70	16.57	42.4	59.0	0.099	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.81
10.827	8.528	0.095	115.56	Yes	39	0	1.113977	Yes	Yes	-10.83	1272.24	426.00	846.24	0.94	0.137	426.00	846.24	13.70	0.841	1.70	14.50	44.5	59.0	0.099	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.81
10.991	10.543	0.092	115.56	Yes	34	0	0.872617	Yes	Yes	-10.99	1291.19	436.24	854.96	0.93	0.138	436.24	854.96	16.94	0.812	1.70	17.92	41.9	59.8	0.099	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.81
11.155	10.652	0.089	115.56	Yes	33	0	0.835524	Yes	Yes	-11.16	1310.15	446.47	863.67	0.93	0.138	446.47	863.67	17.12	0.811	1.70	18.11	41.5	59.6	0.099	0.05	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.81
11.319	10.021	0.086	115.56	Yes	35	0	0.858198	Yes	Yes	-11.32	1329.10	456.71	872.39	0.93	0.138	456.71	872.39	16.10	0.819	1.70	17.04	42.4	59.5	0.099	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.80
11.483	8.91	0.084	115.56	Yes	36	0	0.942761	Yes	Yes	-11.48	1348.05	466.94	881.11	0.93	0.139	466.94	881.11	14.32	0.835	1.70	15.15	43.0	58.1	0.098	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.79
11.647	9.572	0.09	115.56	Yes	35	0	0.940242	Yes	Yes	-11.65	1367.00	477.17	889.83	0.93	0.139	477.17	889.83	15.38	0.826	1.70	16.27	42.3	58.5	0.098	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.79
11.811	9.35	0.089	115.56	Yes	35	0	0.951872	Yes	Yes	-11.81	1385.95	487.41	898.55	0.93	0.139	487.41	898.55	15.02	0.829	1.70	15.90	42.6	58.5	0.098	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.79
11.975	10.873	0.084	115.56	Yes	33	0	0.772556	Yes	Yes	-11.98	1404.90	497.64	907.26	0.93	0.140	497.64	907.26	17.47	0.808	1.70	18.48	41.1	59.6	0.099	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.79
12.139	8.036	0.097	115.56	Yes	37	0	1.207068	Yes	Yes	-12.14	1423.86	507.87	915.98	0.92	0.140	507.87	915.98	12.91	0.849	1.70	13.66	43.4	57.0	0.097	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.122	1.087	0.77
12.303	9.72	0.102	115.56	Yes	36	0	1.049383	Yes	Yes	-12.30	1442.81	518.11	924.70	0.92	0.140	518.11	924.70	15.62	0.824	1.70	16.52	42.9	59.4	0.099	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.79
12.467	17.936	0.098	115.56	Yes	22	0	0.546387	Yes	Yes	-12.47	1461.76	528.34	933.42	0.92	0.141	528.34	933.42	28.82	0.733	1.70	30.49	30.5	61.0	0.100	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.80
12.631	17.787	0.108	115.56	Yes	23	0	0.607185	Yes	Yes	-12.63	1480.71	538.57	942.14	0.92	0.141	538.57	942.14	28.58	0.735	1.70	30.24	31.9	62.2	0.101	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.81
12.795	15.462	0.12	115.56	Yes	27	0	0.776096	Yes	Yes	-12.80	1499.66	548.81	950.86	0.92	0.141	548.81	950.86	24.84	0.757	1.70	26.29	36.9	63.2	0.102	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.81
12.959	14.998	0.134	115.56	Yes	29	0	0.893452	Yes	Yes	-12.96	1518.62	559.04	959.57	0.92	0.142	559.04	959.57	24.10	0.761	1.70	25.50	38.8	64.3	0.103	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.82
13.123	19.292	0.131	115.56	Yes	23	0	0.679038	Yes	Yes	-13.12	1537.57	569.28	968.29	0.92	0.142	569.28	968.29	31.00	0.722	1.70	32.80	32.0	64.8	0.103	0.06	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.82
13.287	15.049	0.125	115.56	Yes	28	0	0.83062	Yes	Yes	-13.29	1556.52	579.51	977.01	0.92	0.142	579.51	977.01	24.18	0.761	1.70	25.58	38.2	63.8	0.102	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.096	0.81
13.451	14.553	0.12	115.56	Yes	29	0	0.824572	Yes	Yes	-13.45	1575.47	589.74	985.73	0.91	0.142	589.74	985.73	23.38	0.766	1.70	24.74	38.7	63.4	0.102	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.80
13.615	10.953	0.123	115.56	Yes	34	0	1.12298	Yes	Yes	-13.62	1594.42	599.98	994.45	0.91	0.143	599.98	994.45	17.60	0.807	1.70	18.62	42.5	61.1	0.100	0.05	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.78
13.779	14.978	0.116	115.56	Yes	28	0	0.774469	Yes	Yes	-13.78	1613.37	610.21	1003.17	0.91	0.143	610.21	1003.17	24.07	0.761	1.70	25.46	37.9	63.3	0.102	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.134	1.096	0.80
13.943	20.426	0.125	118.77	Yes	21	0	0.611965	Yes	Yes	-13.94	1632.85	620.44	1012.41	0.91	0.143	620.44	1012.41	32.66	0.713	1.69	34.55	30.2	64.8	0.103	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.81
14.107	20.441	0.133	118.77	Yes	22	0	0.650653	Yes	Yes	-14.11	1652.33	630.68	1021.65	0.91	0.143	630.68	1021.65	32.49	0.714	1.68	34.37	31.0	65.4	0.104	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.138	1.099	0.81
14.271	22.446	0.157	118.77	Yes	21	0	0.699456	Yes	Yes	-14.27	1671.81	640.91	1030.90	0.91	0.143	640.91	1030.90	35.12	0.701	1.66	37.16	30.2	67.3	0.105	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.142	1.102	0.83
14.436	29.985	0.173	118.77	Yes	16	0	0.576955	Yes	Yes	-14.44	1691.41	651.21	1040.20	0.91	0.144	651.21	1040.20	45.19	0.657	1.59	47.81	21.1	68.9	0.106	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.146	1.105	0.84
14.6	26.639	0.181	118.77	Yes	19	0	0.679455	Yes	Yes	-14.60	1710.89	661.44	1049.45	0.90	0.144	661.44	1049.45	40.47	0.677	1.61	42.81	26.4	69.2	0.107	0.07	1.05	0.00	0.100	1.000	0.000	0.138	1.000	1.147	1.105	0.84
14.764	18.74	0.173	115.56	Yes	26	0	0.923159	Yes	Yes	-14.76	1729.84	671.67	1058.16	0.90	0.144	671.67	1058.16	29.38	0.730	1.66	31.08	36.9	68.0	0.106	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.82
14.928	16.158	0.155	115.56	Yes	29	0	0.959277	Yes	Yes	-14.93	1748.79	681.91	1066.88	0.90	0.144	681.91	1066.88	25.56	0.752	1.67	27.04	39.4	66.5	0.104	0.06	1.04	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.101	0.81
15.092	11.337	0.162	115.56	Yes	37	0	1.428949	Yes	Yes	-15.09	1767.74	692.14	1075.60	0.90	0.144	692.14	1075.60	18.22	0.802	1.70	19.27	44.8	64.0	0.103	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.79
15.256	7.555	0.143	115.56	Yes	48	0	1.892786	Yes	Yes	-15.26	1786.69	702.37	1084.32	0.90	0.144	702.37	1084.32	12.14	0.857	1.70	12.84	48.7	61.5	0.101	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.77
15.42	7.719	0.121	115.56	Yes	46	0	1.567561	Yes	Yes	-15.42	1805.64	712.61	1093.04	0.90	0.144	712.61	1093.04	12.40	0.854	1.70	13.12	47.6	60.7	0.100	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.76
15.584	7.532	0.101	115.56	Yes	44	0	1.340945	Yes	Yes	-15.58	1824.60	722.84	1101.75	0.90	0.145	722.84	1101.75	12.10	0.857	1.70	12.80	47.0	59.8	0.099	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.75
15.748	5.127	0.095	115.56	Yes	61	0	1.852935	Yes	Yes	-15.75	1843.55	733.08	1110.47	0.89	0.145	733.08	1110.47	8.24	0.904	1.70	8.72	51.2	59.9	0.099	0.04	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.75
15.912	3.878	0.103	112.35	Yes	78	0	2.656008	Yes	Yes	-15.91	1861.97	743.31	1118.66	0.89	0.145	743.31	1118.66	6.23	0.934	1.70	6.59	53.7	60.3	0.100	0.04	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.75
16.076	4.056	0.106	112.35	Yes	76	0	2.613412	Yes	Yes	-16.08	1880.40	753.54	1126.86	0.89	0.145	753.54	1126.86	6.52	0.930	1.70	6.90	53.5	60.4	0.100	0.04	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.75
16.24	5.824	0.076	112.35	Yes	76	0	1.304945	Yes	Yes	-16.24	1898.82	763.78	1135.05	0.89	0.145	763.78	1135.05	9.36	0.889	1.70	9.90	54.3	64.2	0.103	0.04	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.78
16.404	5.869	0.073	112.35	Yes	76	0	1.243823	Yes	Yes	-16.40	1917.25	774.01	1143.24	0.89	0.145	774.01	1143.24	9.43	0.888	1.70	9.98	54.3	64.3	0.103	0.04	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.136	1.097	0.78
16.568	3.923	0.073	112.35	Yes	76	0	1.860821	Yes	Yes	-16.57	1935.67	784.24	1151.43	0.89	0.145	784.24	1151.43	6.30	0.933	1.70	6.67	53.4	60.1	0.100	0.04	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.75
16.732	3.437	0.085	112.35	Yes	85	0	2.473087	Yes	Yes	-16.73	1954.10	794.48	1159.62	0.89	0.145	794.48	1159.62	5.52	0.947	1.70	5.84	54.2	60.1	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.74

CPT Liquefaction Analysis

16.896	4.953	0.089	115.56	Yes	63	0	1.796891	Yes	Yes	-16.90	1973.05	804.71	1168.34	0.88	0.146	804.71	1168.34	7.96	0.907	1.70	8.42	51.7	60.1	0.100	0.04	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.75
17.06	7.26	0.087	112.35	Yes	63	0	1.198347	Yes	Yes	-17.06	1991.48	814.94	1176.53	0.88	0.146	814.94	1176.53	11.40	0.865	1.66	12.06	52.7	64.7	0.103	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.137	1.098	0.78
17.224	8.548	0.077	115.56	Yes	39	0	0.900796	Yes	Yes	-17.22	2010.43	825.18	1185.25	0.88	0.146	825.18	1185.25	13.19	0.846	1.63	13.96	44.3	58.3	0.098	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.73
17.388	7.296	0.074	112.35	Yes	39	0	1.014254	Yes	Yes	-17.39	2028.85	835.41	1193.44	0.88	0.146	835.41	1193.44	11.32	0.865	1.64	11.98	43.9	55.9	0.096	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.72
17.552	7.123	0.084	112.35	Yes	39	0	1.179278	Yes	Yes	-17.55	2047.28	845.64	1201.64	0.88	0.146	845.64	1201.64	11.01	0.869	1.64	11.65	43.8	55.5	0.096	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.086	0.71
17.716	6.842	0.1	115.56	Yes	51	0	1.461561	Yes	Yes	-17.72	2066.23	855.88	1210.35	0.88	0.146	855.88	1210.35	10.54	0.874	1.63	11.15	49.1	60.3	0.100	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.74
17.88	9.264	0.097	115.56	Yes	39	0	1.047064	Yes	Yes	-17.88	2085.18	866.11	1219.07	0.88	0.146	866.11	1219.07	13.91	0.839	1.59	14.71	44.7	59.4	0.099	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.74
18.044	8.882	0.106	115.56	Yes	42	0	1.193425	Yes	Yes	-18.04	2104.14	876.35	1227.79	0.87	0.146	876.35	1227.79	13.30	0.845	1.58	14.07	46.0	60.1	0.100	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.74
18.208	8.331	0.097	115.56	Yes	43	0	1.164326	Yes	Yes	-18.21	2123.09	886.58	1236.51	0.87	0.146	886.58	1236.51	12.45	0.853	1.58	13.18	46.6	59.7	0.099	0.05	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.74
18.372	6.055	0.098	115.56	Yes	57	0	1.618497	Yes	Yes	-18.37	2142.04	896.81	1245.23	0.87	0.146	896.81	1245.23	9.18	0.891	1.60	9.71	50.6	60.3	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.74
18.537	3.789	0.09	112.35	Yes	83	0	2.375297	Yes	Yes	-18.54	2160.58	907.11	1253.47	0.87	0.146	907.11	1253.47	5.86	0.941	1.64	6.20	54.2	60.4	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
18.701	3.844	0.1	112.35	Yes	85	0	2.601457	Yes	Yes	-18.70	2179.00	917.34	1261.66	0.87	0.146	917.34	1261.66	5.91	0.940	1.63	6.25	54.3	60.6	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
18.865	3.81	0.087	112.35	Yes	83	0	2.283465	Yes	Yes	-18.87	2197.43	927.58	1269.85	0.87	0.146	927.58	1269.85	5.82	0.942	1.62	6.16	54.1	60.3	0.100	0.04	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.74
19.029	7.889	0.057	112.35	Yes	83	0	0.722525	Yes	Yes	-19.03	2215.85	937.81	1278.04	0.86	0.146	937.81	1278.04	11.52	0.863	1.55	12.19	55.8	68.0	0.106	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.144	1.103	0.79
19.193	10.565	0.044	115.56	Yes	32	0	0.416469	Yes	Yes	-19.19	2234.81	948.04	1286.76	0.86	0.146	948.04	1286.76	15.08	0.828	1.51	15.95	39.8	55.7	0.096	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.71
19.357	7.566	0.03	112.35	Yes	32	0	0.396511	Yes	Yes	-19.36	2253.23	958.28	1294.95	0.86	0.146	958.28	1294.95	10.96	0.870	1.53	11.60	38.9	50.5	0.093	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.112	1.080	0.68
19.521	9.741	0.015	112.35	Yes	32	0	0.153988	Yes	Yes	-19.52	2271.66	968.51	1303.15	0.86	0.146	968.51	1303.15	13.83	0.840	1.50	14.64	39.5	54.2	0.095	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.70
19.685	11.013	0.023	115.56	Yes	27	0	0.208844	Yes	Yes	-19.69	2290.61	978.74	1311.86	0.86	0.146	978.74	1311.86	15.44	0.825	1.48	16.34	35.5	51.8	0.094	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.114	1.082	0.69
19.849	11.262	0.028	115.56	Yes	28	0	0.248624	Yes	Yes	-19.85	2309.56	988.98	1320.58	0.86	0.146	988.98	1320.58	15.69	0.823	1.47	16.60	36.0	52.6	0.094	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.115	1.082	0.69
20.013	12.679	0.042	115.56	Yes	27	0	0.331256	Yes	Yes	-20.01	2328.51	999.21	1329.30	0.86	0.146	999.21	1329.30	17.45	0.808	1.46	18.46	35.8	54.3	0.095	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.70
20.177	10.448	0.098	115.56	Yes	37	0	0.937979	Yes	Yes	-20.18	2347.46	1009.44	1338.02	0.85	0.146	1009.44	1338.02	14.47	0.834	1.47	15.31	43.8	59.1	0.099	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.090	0.73
20.341	8.838	0.146	115.56	Yes	48	0	1.651957	Yes	Yes	-20.34	2366.42	1019.68	1346.74	0.85	0.146	1019.68	1346.74	12.29	0.855	1.47	13.01	48.7	61.7	0.101	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.74
20.505	17.015	0.196	115.56	Yes	32	0	1.151925	Yes	Yes	-20.51	2385.37	1029.91	1355.46	0.85	0.146	1029.91	1355.46	22.67	0.770	1.41	23.98	41.8	65.7	0.104	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.099	0.77
20.669	29.726	0.191	118.77	Yes	19	0	0.642535	Yes	Yes	-20.67	2404.85	1040.15	1364.70	0.85	0.146	1040.15	1364.70	37.99	0.688	1.35	40.19	25.9	66.1	0.104	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.78
20.833	32.769	0.145	118.77	Yes	5	0	0.442491	Yes	Yes	-20.83	2424.32	1050.38	1373.94	0.85	0.146	1050.38	1373.94	41.41	0.673	1.34	43.81	0.1	43.9	0.088	0.07	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.105	1.075	0.64
20.997	29.579	0.12	118.77	Yes	5	0	0.405693	Yes	Yes	-21.00	2443.80	1060.61	1383.19	0.85	0.146	1060.61	1383.19	37.49	0.690	1.34	39.66	0.1	39.8	0.085	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.101	1.072	0.62
21.161	25.637	0.132	118.77	Yes	19	0	0.514881	Yes	Yes	-21.16	2463.28	1070.85	1392.43	0.85	0.146	1070.85	1392.43	32.66	0.713	1.35	34.55	26.5	61.0	0.100	0.06	1.03	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.74
21.325	15.942	0.151	115.56	Yes	32	0	0.947184	Yes	Yes	-21.33	2482.23	1081.08	1401.15	0.84	0.146	1081.08	1401.15	20.81	0.783	1.38	22.02	41.0	63.0	0.102	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.095	0.75
21.489	12.827	0.146	115.56	Yes	36	0	1.138224	Yes	Yes	-21.49	2501.18	1091.31	1409.87	0.84	0.146	1091.31	1409.87	16.87	0.813	1.39	17.84	43.5	61.3	0.101	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.74
21.653	12.901	0.135	115.56	Yes	35	0	1.046431	Yes	Yes	-21.65	2520.14	1101.55	1418.59	0.84	0.146	1101.55	1418.59	16.88	0.813	1.38	17.86	43.0	60.9	0.100	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.74
21.817	13.068	0.121	115.56	Yes	35	0	0.925926	Yes	Yes	-21.82	2539.09	1111.78	1427.31	0.84	0.146	1111.78	1427.31	17.00	0.812	1.38	17.99	43.1	61.1	0.100	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.093	0.74
21.981	12.209	0.118	115.56	Yes	36	0	0.9665	Yes	Yes	-21.98	2558.04	1122.01	1436.02	0.84	0.145	1122.01	1436.02	15.87	0.821	1.37	16.79	43.1	59.9	0.099	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.73
22.145	9.96	0.12	115.56	Yes	43	0	1.204819	Yes	Yes	-22.15	2576.99	1132.25	1444.74	0.84	0.145	1132.25	1444.74	13.01	0.848	1.38	13.76	46.7	60.4	0.100	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
22.309	9.522	0.145	115.56	Yes	47	0	1.522789	Yes	Yes	-22.31	2595.94	1142.48	1453.46	0.83	0.145	1142.48	1453.46	12.40	0.854	1.38	13.12	48.3	61.5	0.101	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.74
22.473	10.044	0.122	115.56	Yes	43	0	1.214656	Yes	Yes	-22.47	2614.89	1152.72	1462.18	0.83	0.145	1152.72	1462.18	12.99	0.848	1.37	13.74	46.7	60.5	0.100	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.73
22.638	24.528	0.098	118.77	Yes	5	0	0.399543	Yes	Yes	-22.64	2634.49	1163.01	1471.48	0.83	0.145	1163.01	1471.48	30.18	0.726	1.30	31.93	0.1	32.0	0.080	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.58
22.802	25.024	0.072	118.77	Yes	5	0	0.287724	Yes	Yes	-22.80	2653.97	1173.24	1480.73	0.83	0.145	1173.24	1480.73	30.62	0.724	1.29	32.40	0.1	32.5	0.080	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.096	1.069	0.58
22.966	15.817	0.066	115.56	Yes	26	0	0.417273	Yes	Yes	-22.97	2672.92	1183.48	1489.44	0.83	0.145	1183.48	1489.44	19.73	0.791	1.32	20.88	34.6	55.5	0.096	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.119	1.086	0.70
23.13	12.138	0.047	115.56	Yes	30	0	0.387214	Yes	Yes	-23.13	2691.87	1193.71	1498.16	0.83	0.145	1193.71	1498.16	15.26	0.827	1.33	16.15	38.4	54.5	0.096	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.084	0.70
23.294	11.317	0.047	115.56	Yes	32	0	0.415304	Yes	Yes	-23.29	2710.83	1203.95	1506.88	0.83	0.145	1203.95	1506.88	14.21	0.836	1.33	15.03	39.8	54.8	0.096	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.118	1.085	0.70
23.458	8.506	0.059	112.35	Yes	32	0	0.693628	Yes	Yes	-23.46	2729.25	1214.18	1515.07	0.82	0.145	1214.18	1515.07	10.76	0.872	1.34	11.38	39.1	50.5	0.093	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.112	1.080	0.67
23.622	8.484	0.081	115.56	Yes	46	0	0.954738	Yes	Yes	-23.62	2748.20	1224.41	1523.79	0.82	0.145	1224.41	1523.79	10.68	0.873	1.33	11.30	47.4	58.7	0.099	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.72
23.786	15.169	0.131	115.56	Yes	32	0	0.863603	Yes	Yes	-23.79	2767.15	1234.65	1532.51	0.82	0.144	1234.65	1532.51	18.56	0.800	1.29	19.63	41.2	60.9	0.100	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.129	1.092	0.74
23.95	25.207	0.176	118.77	Yes	22	0	0.698219	Yes	Yes	-23.95	2786.63	1244.88	1541.75	0.82	0.144	1244.88	1541.75	29.99	0.727	1.26	31.73	31.5	63.3	0.102	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.133	1.096	0.75
24.114	24.146	0.241	118.77	Yes	26	0	0.998095	Yes	Yes	-24.11	2806.11	1255.11	1551.00	0.82	0.144	1255.11	1551.00	28.67	0.734	1.26	30.33	36.6	66.9	0.105	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.141	1.101	0.78
24.278	25.197	0.229	118.77	Yes	25	0	0.908838	Yes	Yes	-24.28	2825.59	1265.35	1560.24	0.82	0.144	1265.35	1560.24	29.73	0.728	1.25	31.46	34.8	66.3	0.104	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.140	1.100	0.78
24.442	25.831	0.222	118.77	Yes	24	0	0.859432	Yes	Yes	-24.44	2845.07	1275.58	1569.49	0.81	0.144	1275.58	1569.49	30.32	0.725	1.24	32.08	33.8	65.9	0.104	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.139	1.100	0.77
24.606	21.395	0.19	115.56	Yes	27	0	0.888058	Yes	Yes	-24.61	2864.02	1285.81	1578.21	0.81	0.144	1285.81	1578.21	25.23	0.754	1.25	26.69	37.2	63.8	0.102	0.06	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.135	1.097	0.76
24.77	18.746	0.172	115.56	Yes	30	0	0.917529	Yes	Yes	-24.77	2882.97	1296.05	1586.92	0.81	0.144	1296.05	1586.92	22.14	0.774	1.25	23.42	39.3	62.8	0.102	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.75
24.934	19.908	0.151	115.56	Yes	27	0	0.758489	Yes	Yes	-24.93	2901.92	1306.28	1595.64	0.81	0.144	1306.28	1595.64	23.36	0.766	1.24	24.71	36.7	61.4	0.101	0.05	1.02	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.74
25.098	17.965	0.15	115.56	Yes	30	0	0.834957	Yes	Yes	-25.10	2920.88	1316.52	1604.36	0.81	0.143	1316.52	1604.36	21.08	0.781	1.24	22.30	39.1	61.4	0.101	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.130	1.093	0.74
25.262	13.978	0.118	115.56	Yes	34	0	0.844184	Yes	Yes	-25.26	2939.83	1326.75	1613.08	0.81	0.143	1326.75	1613.08	16.49	0.816	1.25	17.44	42.3	59.7	0.099	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.091	0.73
25.426	11.827	0.098	115.56	Yes	38	0	0.828612	Yes	Yes	-25.43	2958.78	1336.98	1621.80	0.81	0.143	1336.98	1621.80	~~13.97~~	~~0.838~~	~~1.25~~	14.78	44.0	58.7	0.099	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.72
25.59	9.896	0.077	115.56	Yes	42	0	0.778092	Yes	Yes	-25.59	2977.73	1347.22	1630.51	0.80	0.143	1347.22	1630.51	11.71	0.861	1.25	12.39	45.7	58.0	0.098	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.72
25.754	9.269	0.084	115.56	Yes	45	0	0.906247	Yes	Yes	-25.75	2996.68	1357.45	1639.23	0.80	0.143	1357.45	1639.23	10.94	0.870	1.25	11.57	47.1	58.7	0.099	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.125	1.089	0.72
25.918	7.871	0.092	115.56	Yes	54	0	1.168848	Yes	Yes	-25.92	3015.63	1367.68	1647.95	0.80	0.143	1367.68	1647.95	9.29	0.889	1.25	9.83	49.6	59.5	0.099	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.73
26.082	10.185	0.057	115.56	Yes	38	0	0.559647	Yes	Yes	-26.08	3034.59	1377.92	1656.67	0.80	0.143	1377.92	1656.67	11.88	0.859	1.23	12.57	43.8	56.4	0.097	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.121	1.087	0.71
26.246	9.658	0.079	115.56	Yes	44	0	0.817975	Yes	Yes	-26.25	3053.54	1388.15	1665.39	0.80	0.143	1388.15	1665.39	11.23	0.866	1.23	11.88	46.4	58.3	0.098	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.72
26.41	12.11	0.091	115.56	Yes	37	0	0.751445	Yes	Yes	-26.41	3072.49	1398.38	1674.11	0.80	0.142	1398.38	1674.11	13.93	0.839	1.22	14.74	43.5	58.2	0.098	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.124	1.089	0.72
26.574	16.394	0.079	115.56	Yes	27	0	0.481884	Yes	Yes	-26.57	3091.44	1408.62	1682.82	0.79	0.142	1408.62	1682.82	18.61	0.799	1.20	19.69	36.1	55.8	0.096	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.120	1.086	0.71
26.739	18.208	0.078	118.77	Yes	5	0	0.428383	Yes	Yes	-26.74	3111.04	1418.91	1692.13	0.79	0.142	1418.91	1692.13	20.51	0.785	1.19	21.70	0.1	21.8	0.074	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.092	1.066	0.53
26.903	16.769	0.054	118.77	Yes	5	0	0.322023	Yes	Yes	-26.90	3130.52	1429.15	1701.37	0.79	0.142	1429.15	1701.37	18.86	0.797	1.19	19.95	0.1	20.1	0.072	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.091	1.066	0.52
27.067	14.8	0.056	115.56	Yes	27	0	0.378378	Yes	Yes	-27.07	3149.47	1439.38	1710.09	0.79	0.142	1439.38	1710.09	16.64	0.815	1.19	17.61	36.1	53.7	0.095	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.117	1.084	0.70
27.231	8.747	0.068	112.35	Yes	27	0	0.777409	Yes	Yes	-27.23	3167.89	1449.61	1718.28	0.79	0.142	1449.61	1718.28	9.93	0.882	1.20	10.51	34.8	45.3	0.089	0.05	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.106	1.076	0.65
27.395	6.094	0.064	112.35	Yes	27	0	1.050213	Yes	Yes	-27.40	3186.32	1459.85	1726.47	0.79	0.141	1459.85	1726.47	6.95	0.923	1.21	7.35	34.2	41.6	0.086	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.102	1.073	0.63
27.559	7.544	0.064	112.35	Yes	27	0	0.848356	Yes	Yes	-27.56	3204.75	1470.08	1734.66	0.78	0.141	1470.08	1734.66	8.53	0.900	1.20	9.02	34.5	43.6	0.088	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.104	1.075	0.64
27.723	7.613	0.059	112.35	Yes	27	0	0.77499	Yes	Yes	-27.72	3223.17	1480.32	1742.86	0.78	0.141	1480.32	1742.86	8.57	0.899	1.19	9.06	34.6	43.6	0.088	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.104	1.075	0.64
27.887	8.471	0.054	112.35	Yes	27	0	0.637469	Yes	Yes	-27.89	3241.60	1490.55	1751.05	0.78	0.141	1490.55	1751.05	9.47	0.887	1.18	10.02	34.7	44.7	0.089	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.105	1.076	0.65
28.051	7.386	0.053	112.35	Yes	27	0	0.717574	Yes	Yes	-28.05	3260.02	1500.78	1759.24	0.78	0.141	1500.78	1759.24	8.25	0.903	1.18	8.73	34.5	43.2	0.088	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.104	1.074	0.64
28.215	6.336	0.06	112.35	Yes	27	0	0.94697	Yes	Yes	-28.22	3278.45	1511.02	1767.43	0.78	0.141	1511.02	1767.43	7.07	0.921	1.18	7.48	34.3	41.7	0.087	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.102	1.073	0.63
28.379	6.567	0.071	112.35	Yes	27	0	1.081163	Yes	Yes	-28.38	3296.87	1521.25	1775.62	0.78	0.141	1521.25	1775.62	7.29	0.917	1.17	7.71	34.3	42.0	0.087	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.103	1.074	0.63
28.543	6.72	0.096	115.56	Yes	65	0	1.428571	Yes	Yes	-28.54	3315.82	1531.48	1784.34	0.78	0.140	1531.48	1784.34	7.42	0.915	1.17	7.85	51.9	59.8	0.099	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.74
28.707	5.534	0.107	115.56	Yes	80	0	1.933502	Yes	Yes	-28.71	3334.78	1541.72	1793.06	0.77	0.140	1541.72	1793.06	6.11	0.937	1.17	6.46	53.8	60.3	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.091	0.74
28.871	4.937	0.108	115.56	Yes	89	0	2.187563	Yes	Yes	-28.87	3353.73	1551.95	1801.78	0.77	0.140	1551.95	1801.78	5.44	0.949	1.16	5.75	54.6	60.4	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
29.035	5.294	0.113	115.56	Yes	84	0	2.134492	Yes	Yes	-29.04	3372.68	1562.18	1810.50	0.77	0.140	1562.18	1810.50	5.80	0.942	1.16	6.13	54.3	60.4	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.128	1.092	0.74
29.199	6.426	0.104	115.56	Yes	70	0	1.618425	Yes	Yes	-29.20	3391.63	1572.42	1819.21	0.77	0.140	1572.42	1819.21	6.98	0.922	1.15	7.39	52.7	60.1	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.74
29.363	7.879	0.049	112.35	Yes	70	0	0.621906	Yes	Yes	-29.36	3410.06	1582.65	1827.41	0.77	0.140	1582.65	1827.41	8.50	0.900	1.14	8.99	53.1	62.1	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.131	1.094	0.75
29.527	8.185	0.05	112.35	Yes	70	0	0.610874	Yes	Yes	-29.53	3428.48	1592.88	1835.60	0.77	0.140	1592.88	1835.60	8.79	0.896	1.14	9.30	53.2	62.5	0.101	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.132	1.095	0.76
29.691	6.561	0.056	112.35	Yes	70	0	0.853528	Yes	Yes	-29.69	3446.91	1603.12	1843.79	0.76	0.139	1603.12	1843.79	7.04	0.921	1.14	7.45	52.7	60.1	0.100	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.127	1.091	0.74
29.855	5.958	0.069	112.35	Yes	70	0	1.158107	Yes	Yes	-29.86	3465.33	1613.35	1851.98	0.76	0.139	1613.35	1851.98	6.38	0.932	1.13	6.75	52.5	59.2	0.099	0.04	1.01	0.00	0.100	1.000	0.000	0.138	1.000	1.126	1.090	0.74
30.019	5.573	0.087	112.35	No	70	0	1.561098	Yes	No	-30.02	3483.76	1623.59	1860.17		0.000	1623.59	1860.17							0.000											0.00
30.183	5.415	0.09	112.35	No	70	0	1.66205	Yes	No	-30.18	3502.18	1633.82	1868.36		0.000	1633.82	1868.36							0.000											0.00
30.347	5.56	0.104	115.56	No	81	0	1.870504	Yes	No	-30.35	3521.14	1644.05	1877.08		0.000	1644.05	1877.08							0.000											0.00
30.511	6.138	0.117	115.56	No	77	0	1.906158	Yes	No	-30.51	3540.09	1654.29	1885.80		0.000	1654.29	1885.80							0.000											0.00
30.675	5.857	0.137	115.56	No	83	0	2.339081	Yes	No	-30.68	3559.04	1664.52	1894.52		0.000	1664.52	1894.52							0.000											0.00
30.84	5.829	0.147	115.56	No	85	0	2.521873	Yes	No	-30.84	3578.11	1674.82	1903.29		0.000	1674.82	1903.29							0.000											0.00
31.004	6.09	0.159	115.56	No	84	0	2.610837	Yes	No	-31.00	3597.06	1685.05	1912.01		0.000	1685.05	1912.01							0.000											0.00
31.168	6.568	0.173	115.56	No	80	0	2.633983	Yes	No	-31.17	3616.01	1695.28	1920.73		0.000	1695.28	1920.73							0.000											0.00
31.332	6.508	0.186	115.56	No	83	0	2.858021	Yes	No	-31.33	3634.96	1705.52	1929.45		0.000	1705.52	1929.45							0.000											0.00
31.496	6.645	0.194	112.35	No	82	0	2.919488	Yes	No	-31.50	3653.39	1715.75	1937.64		0.000	1715.75	1937.64							0.000											0.00
31.66	6.535	0.191	112.35	No	84	0	2.922724	Yes	No	-31.66	3671.81	1725.98	1945.83		0.000	1725.98	1945.83							0.000											0.00
31.824	6.405	0.187	112.35	No	85	0	2.919594	Yes	No	-31.82	3690.24	1736.22	1954.02		0.000	1736.22	1954.02							0.000											0.00
31.988	6.373	0.183	112.35	No	85	0	2.871489	Yes	No	-31.99	3708.66	1746.45	1962.21		0.000	1746.45	1962.21							0.000											0.00
32.152	5.719	0.171	112.35	No	92	0	2.990033	Yes	No	-32.15	3727.09	1756.68	1970.40		0.000	1756.68	1970.40							0.000											0.00
32.316	5.385	0.159	112.35	No	96	0	2.952646	Yes	No	-32.32	3745.51	1766.92	1978.60		0.000	1766.92	1978.60							0.000											0.00
32.48	4.759	0.142	112.35	No	100	0	2.98382	Yes	No	-32.48	3763.94	1777.15	1986.79		0.000	1777.15	1986.79							0.000											0.00
32.644	4.526	0.089	115.56	No	100	0	1.966416	Yes	No	-32.64	3782.89	1787.39	1995.51		0.000	1787.39	1995.51							0.000											0.00
32.808	4.985	0.126	112.35	No	98	0	2.527583	Yes	No	-32.81	3801.32	1797.62	2003.70		0.000	1797.62	2003.70							0.000											0.00
32.972	7.208	0.164	115.56	No	76	0	2.27525	Yes	No	-32.97	3820.27	1807.85	2012.42		0.000	1807.85	2012.42							0.000											0.00
33.136	8.391	0.156	115.56	No	66	0	1.859135	Yes	No	-33.14	3839.22	1818.09	2021.13		0.000	1818.09	2021.13							0.000											0.00
33.3	14.111	0.153	115.56	No	42	0	1.084261	Yes	No	-33.30	3858.17	1828.32	2029.85		0.000	1828.32	2029.85							0.000											0.00
33.464	13.042	0.145	115.56	No	44	0	1.111793	Yes	No	-33.46	3877.12	1838.55	2038.57		0.000	1838.55	2038.57							0.000											0.00
33.628	6.534	0.149	115.56	No	81	0	2.28038	Yes	No	-33.63	3896.08	1848.79	2047.29		0.000	1848.79	2047.29							0.000											0.00
33.792	4.705	0.091	115.56	No	100	0	1.934113	Yes	No	-33.79	3915.03	1859.02	2056.01		0.000	1859.02	2056.01							0.000											0.00
33.956	5.15	0.065	112.35	No	100	0	1.262136	Yes	No	-33.96	3933.45	1869.25	2064.20		0.000	1869.25	2064.20							0.000											0.00
34.12	5.81	0.088	112.35	No	100	0	1.51463	Yes	No	-34.12	3951.88	1879.49	2072.39		0.000	1879.49	2072.39							0.000											0.00
34.284	10.585	0.284	115.56	No	64	0	2.683042	Yes	No	-34.28	3970.83	1889.72	2081.11		0.000	1889.72	2081.11							0.000											0.00
34.448	16.609	0.525	115.56	No	53	0	3.160937	Yes	No	-34.45	3989.78	1899.96	2089.83		0.000	1899.96	2089.83							0.000											0.00
34.612	17.385	0.722	115.56	No	57	0	4.153005	Yes	No	-34.61	4008.73	1910.19	2098.55		0.000	1910.19	2098.55							0.000											0.00
34.776	16.293	0.734	112.35	No	60	0	4.505002	Yes	No	-34.78	4027.16	1920.42	2106.74		0.000	1920.42	2106.74							0.000											0.00
34.941	15.111	0.634	112.35	No	61	0	4.195619	Yes	No	-34.94	4045.70	1930.72	2114.98		0.000	1930.72	2114.98							0.000											0.00
35.105	12.373	0.551	112.35	No	69	0	4.453245	Yes	No	-35.11	4064.12	1940.95	2123.17		0.000	1940.95	2123.17							0.000											0.00
35.269	11.918	0.536	112.35	No	71	0	4.497399	Yes	No	-35.27	4082.55	1951.19	2131.36		0.000	1951.19	2131.36							0.000											0.00
35.433	12.31	0.518	112.35	No	69	0	4.207961	Yes	No	-35.43	4100.97	1961.42	2139.55		0.000	1961.42	2139.55							0.000											0.00
35.597	10.727	0.517	112.35	No	77	0	4.819614	Yes	No	-35.60	4119.40	1971.65	2147.75		0.000	1971.65	2147.75							0.000											0.00
35.761	10.02	0.49	112.35	No	80	0	4.89022	Yes	No	-35.76	4137.82	1981.89	2155.94		0.000	1981.89	2155.94							0.000											0.00

CPT Liquefaction Analysis

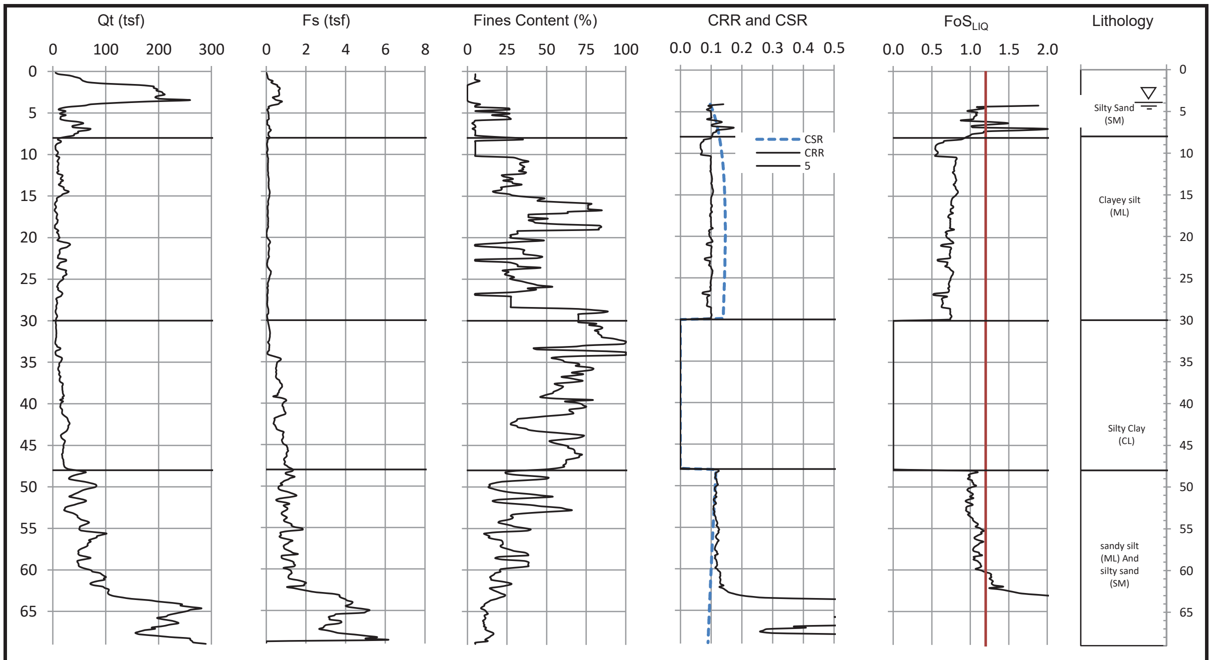
35.925	10.328	0.496	112.35	No	78	0	4.802479	Yes	No	-35.93	4156.25	1992.12	2164.13		0.000	1992.12	2164.13							0.000											0.00
36.089	11.875	0.517	112.35	No	71	0	4.353684	Yes	No	-36.09	4174.68	2002.35	2172.32		0.000	2002.35	2172.32							0.000											0.00
36.253	12.824	0.49	115.56	No	66	0	3.820961	Yes	No	-36.25	4193.63	2012.59	2181.04		0.000	2012.59	2181.04							0.000											0.00
36.417	11.476	0.515	112.35	No	73	0	4.487626	Yes	No	-36.42	4212.05	2022.82	2189.23		0.000	2022.82	2189.23							0.000											0.00
36.581	12.616	0.503	112.35	No	68	0	3.987001	Yes	No	-36.58	4230.48	2033.05	2197.42		0.000	2033.05	2197.42							0.000											0.00
36.745	14.664	0.488	115.56	No	59	0	3.327878	Yes	No	-36.75	4249.43	2043.29	2206.14		0.000	2043.29	2206.14							0.000											0.00
36.909	13.319	0.496	115.56	No	65	0	3.724003	Yes	No	-36.91	4268.38	2053.52	2214.86		0.000	2053.52	2214.86							0.000											0.00
37.073	12.773	0.552	112.35	No	69	0	4.321616	Yes	No	-37.07	4286.81	2063.76	2223.05		0.000	2063.76	2223.05							0.000											0.00
37.237	12.763	0.655	112.35	No	73	0	5.132022	Yes	No	-37.24	4305.23	2073.99	2231.24		0.000	2073.99	2231.24							0.000											0.00
37.401	14.667	0.685	112.35	No	66	0	4.670348	Yes	No	-37.40	4323.66	2084.22	2239.44		0.000	2084.22	2239.44							0.000											0.00
37.565	18.758	0.715	115.56	No	55	0	3.811707	Yes	No	-37.57	4342.61	2094.46	2248.15		0.000	2094.46	2248.15							0.000											0.00
37.729	18.849	0.786	115.56	No	57	0	4.169982	Yes	No	-37.73	4361.56	2104.69	2256.87		0.000	2104.69	2256.87							0.000											0.00
37.893	17.634	0.798	112.35	No	60	0	4.525349	Yes	No	-37.89	4379.99	2114.92	2265.06		0.000	2114.92	2265.06							0.000											0.00
38.057	17.874	0.797	112.35	No	60	0	4.458991	Yes	No	-38.06	4398.41	2125.16	2273.26		0.000	2125.16	2273.26							0.000											0.00
38.221	17.862	0.73	115.56	No	58	0	4.086888	Yes	No	-38.22	4417.36	2135.39	2281.97		0.000	2135.39	2281.97							0.000											0.00
38.385	18.099	0.681	115.56	No	57	0	3.762639	Yes	No	-38.39	4436.32	2145.62	2290.69		0.000	2145.62	2290.69							0.000											0.00
38.549	18.64	0.645	115.56	No	54	0	3.4603	Yes	No	-38.55	4455.27	2155.86	2299.41		0.000	2155.86	2299.41							0.000											0.00
38.713	18.775	0.636	115.56	No	54	0	3.387483	Yes	No	-38.71	4474.22	2166.09	2308.13		0.000	2166.09	2308.13							0.000											0.00
38.877	19.583	0.575	115.56	No	51	0	2.93622	Yes	No	-38.88	4493.17	2176.32	2316.85		0.000	2176.32	2316.85							0.000											0.00
39.042	21.007	0.578	115.56	No	48	0	2.751464	Yes	No	-39.04	4512.24	2186.62	2325.62		0.000	2186.62	2325.62							0.000											0.00
39.206	18.304	0.353	115.56	No	46	0	1.92854	Yes	No	-39.21	4531.19	2196.85	2334.34		0.000	2196.85	2334.34							0.000											0.00
39.37	19.233	0.749	115.56	No	56	0	3.894348	Yes	No	-39.37	4550.14	2207.09	2343.05		0.000	2207.09	2343.05							0.000											0.00
39.534	13.675	0.963	112.35	No	79	0	7.042048	Yes	No	-39.53	4568.57	2217.32	2351.25		0.000	2217.32	2351.25							0.000											0.00
39.698	19.317	1.014	112.35	No	62	0	5.249262	Yes	No	-39.70	4586.99	2227.56	2359.44		0.000	2227.56	2359.44							0.000											0.00
39.862	16.256	0.909	112.35	No	69	0	5.591781	Yes	No	-39.86	4605.42	2237.79	2367.63		0.000	2237.79	2367.63							0.000											0.00
40.026	14.855	0.849	112.35	No	72	0	5.715247	Yes	No	-40.03	4623.84	2248.02	2375.82		0.000	2248.02	2375.82							0.000											0.00
40.19	14.378	0.817	112.35	No	73	0	5.682292	Yes	No	-40.19	4642.27	2258.26	2384.01		0.000	2258.26	2384.01							0.000											0.00
40.354	13.975	0.822	112.35	No	75	0	5.881932	Yes	No	-40.35	4660.70	2268.49	2392.21		0.000	2268.49	2392.21							0.000											0.00
40.518	15.065	0.871	112.35	No	72	0	5.781613	Yes	No	-40.52	4679.12	2278.72	2400.40		0.000	2278.72	2400.40							0.000											0.00
40.682	17.484	0.879	112.35	No	65	0	5.027454	Yes	No	-40.68	4697.55	2288.96	2408.59		0.000	2288.96	2408.59							0.000											0.00
40.846	17.705	0.901	112.35	No	65	0	5.088958	Yes	No	-40.85	4715.97	2299.19	2416.78		0.000	2299.19	2416.78							0.000											0.00
41.01	17.351	0.934	112.35	No	66	0	5.382975	Yes	No	-41.01	4734.40	2309.42	2424.97		0.000	2309.42	2424.97							0.000											0.00
41.174	17.565	0.98	112.35	No	67	0	5.579277	Yes	No	-41.17	4752.82	2319.66	2433.16		0.000	2319.66	2433.16							0.000											0.00
41.338	19.852	0.949	112.35	No	60	0	4.780375	Yes	No	-41.34	4771.25	2329.89	2441.36		0.000	2329.89	2441.36							0.000											0.00
41.502	23.172	0.739	115.56	No	49	0	3.189194	Yes	No	-41.50	4790.20	2340.12	2450.07		0.000	2340.12	2450.07							0.000											0.00
41.666	26.531	0.57	115.56	No	40	0	2.14843	Yes	No	-41.67	4809.15	2350.36	2458.79		0.000	2350.36	2458.79							0.000											0.00
41.83	27.881	0.416	115.56	No	32	0	1.492056	Yes	No	-41.83	4828.10	2360.59	2467.51		0.000	2360.59	2467.51							0.000											0.00
41.994	28.716	0.43	115.56	No	31	0	1.497423	Yes	No	-41.99	4847.06	2370.83	2476.23		0.000	2370.83	2476.23							0.000											0.00
42.158	29.881	0.408	115.56	No	30	0	1.365416	Yes	No	-42.16	4866.01	2381.06	2484.95		0.000	2381.06	2484.95							0.000											0.00
42.322	31.622	0.389	118.77	No	28	0	1.230156	Yes	No	-42.32	4885.49	2391.29	2494.19		0.000	2391.29	2494.19							0.000											0.00
42.486	31.212	0.368	118.77	No	28	0	1.179034	Yes	No	-42.49	4904.96	2401.53	2503.44		0.000	2401.53	2503.44							0.000											0.00
42.65	29.096	0.436	115.56	No	31	0	1.498488	Yes	No	-42.65	4923.92	2411.76	2512.16		0.000	2411.76	2512.16							0.000											0.00
42.814	29.286	0.471	115.56	No	32	0	1.608277	Yes	No	-42.81	4942.87	2421.99	2520.87		0.000	2421.99	2520.87							0.000											0.00
42.978	28.406	0.507	115.56	No	37	0	1.784834	Yes	No	-42.98	4961.82	2432.23	2529.59		0.000	2432.23	2529.59							0.000											0.00
43.143	27.256	0.534	115.56	No	39	0	1.959202	Yes	No	-43.14	4980.89	2442.52	2538.36		0.000	2442.52	2538.36							0.000											0.00
43.307	25.214	0.68	115.56	No	45	0	2.696914	Yes	No	-43.31	4999.84	2452.76	2547.08		0.000	2452.76	2547.08							0.000											0.00
43.471	21.675	0.877	115.56	No	56	0	4.046136	Yes	No	-43.47	5018.79	2462.99	2555.80		0.000	2462.99	2555.80							0.000											0.00
43.635	17.606	0.856	112.35	No	66	0	4.861979	Yes	No	-43.64	5037.22	2473.22	2563.99		0.000	2473.22	2563.99							0.000											0.00
43.799	15.138	0.837	112.35	No	74	0	5.529132	Yes	No	-43.80	5055.64	2483.46	2572.18		0.000	2483.46	2572.18							0.000											0.00
43.963	15.548	0.851	112.35	No	73	0	5.473373	Yes	No	-43.96	5074.07	2493.69	2580.38		0.000	2493.69	2580.38							0.000											0.00
44.127	16.644	0.861	112.35	No	69	0	5.173035	Yes	No	-44.13	5092.49	2503.92	2588.57		0.000	2503.92	2588.57							0.000											0.00
44.291	19.725	0.831	115.56	No	60	0	4.212928	Yes	No	-44.29	5111.44	2514.16	2597.29		0.000	2514.16	2597.29							0.000											0.00
44.455	23.008	0.786	115.56	No	52	0	3.416203	Yes	No	-44.46	5130.40	2524.39	2606.00		0.000	2524.39	2606.00							0.000											0.00
44.619	22.542	0.802	115.56	No	53	0	3.557803	Yes	No	-44.62	5149.35	2534.63	2614.72		0.000	2534.63	2614.72							0.000											0.00
44.783	21.388	0.834	115.56	No	56	0	3.899383	Yes	No	-44.78	5168.30	2544.86	2623.44		0.000	2544.86	2623.44							0.000											0.00
44.947	20.108	0.885	112.35	No	60	0	4.401233	Yes	No	-44.95	5186.72	2555.09	2631.63		0.000	2555.09	2631.63							0.000											0.00
45.111	19.933	1.019	112.35	No	64	0	5.112126	Yes	No	-45.11	5205.15	2565.33	2639.82		0.000	2565.33	2639.82							0.000											0.00
45.275	20.27	1.048	112.35	No	64	0	5.170202	Yes	No	-45.28	5223.58	2575.56	2648.02		0.000	2575.56	2648.02							0.000											0.00
45.439	19.308	1.079	112.35	No	67	0	5.588357	Yes	No	-45.44	5242.00	2585.79	2656.21		0.000	2585.79	2656.21							0.000											0.00
45.603	18.988	1.077	112.35	No	68	0	5.672003	Yes	No	-45.60	5260.43	2596.03	2664.40		0.000	2596.03	2664.40							0.000											0.00
45.767	19.171	1.107	112.35	No	68	0	5.774347	Yes	No	-45.77	5278.85	2606.26	2672.59		0.000	2606.26	2672.59							0.000											0.00
45.931	18.737	1.048	112.35	No	68	0	5.593211	Yes	No	-45.93	5297.28	2616.49	2680.78		0.000	2616.49	2680.78							0.000											0.00
46.095	17.114	1.018	112.35	No	72	0	5.948346	Yes	No	-46.10	5315.70	2626.73	2688.97		0.000	2626.73	2688.97							0.000											0.00
46.259	17.836	1.034	112.35	No	71	0	5.797264	Yes	No	-46.26	5334.13	2636.96	2697.17		0.000	2636.96	2697.17							0.000											0.00
46.423	17.843	1.029	112.35	No	71	0	5.766967	Yes	No	-46.42	5352.55	2647.20	2705.36		0.000	2647.20	2705.36							0.000											0.00
46.587	18.573	0.958	112.35	No	67	0	5.158025	Yes	No	-46.59	5370.98	2657.43	2713.55		0.000	2657.43	2713.55							0.000											0.00
46.751	19.776	0.895	112.35	No	63	0	4.525688	Yes	No	-46.75	5389.40	2667.66	2721.74		0.000	2667.66	2721.74							0.000											0.00
46.915	20.006	0.913	112.35	No	62	0	4.563631	Yes	No	-46.92	5407.83	2677.90	2729.93		0.000	2677.90	2729.93							0.000											0.00
47.079	20.393	0.953	112.35	No	62	0	4.673172	Yes	No	-47.08	5426.25	2688.13	2738.13		0.000	2688.13	2738.13							0.000											0.00
47.244	20.409	0.925	112.35	No	62	0	4.532314	Yes	No	-47.24	5444.79	2698.43	2746.37		0.000	2698.43	2746.37							0.000											0.00
47.408	21.051	0.925	115.56	No	60	0	4.394091	Yes	No	-47.41	5463.74	2708.66	2755.09		0.000	2708.66	2755.09							0.000											0.00
47.572	21.844	1.047	112.35	No	61	0	4.793078	Yes	No	-47.57	5482.17	2718.89	2763.28		0.000	2718.89	2763.28							0.000											0.00
47.736	24.704	1.126	112.35	No	57	0	4.557966	Yes	No	-47.74	5500.60	2729.13	2771.47		0.000	2729.13	2771.47							0.000											0.00
47.9	31.57	1.276	115.56	No	49	0	4.041812	Yes	No	-47.90	5519.55	2739.36	2780.19		0.000	2739.36	2780.19							0.000											0.00
48.064	49.421	1.358	115.56	Yes	31	0	2.74782	Yes	Yes	-48.06	5538.50	2749.59	2788.91	0.60	0.116	2749.59	2788.91	38.67	0.684	0.83	40.91	44.1	85.0	0.120	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	1.04
48.228	62.454	1.282	118.77	Yes	24	0	2.052711	Yes	Yes	-48.23	5557.98	2759.83	2798.15	0.60	0.116	2759.83	2798.15	49.35	0.641	0.84	52.21	37.5	89.7	0.125	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.214	1.153	1.10
48.392	54.59	0.995	118.77	Yes	25	0	1.822678	Yes	Yes	-48.39	5577.46	2770.06	2807.39	0.60	0.115	2770.06	2807.39	42.73	0.667	0.83	45.21	37.1	82.3	0.118	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.186	1.133	1.02
48.556	43.194	0.994	115.56	Yes	31	0	2.301246	Yes	Yes	-48.56	5596.41	2780.29	2816.11	0.59	0.115	2780.29	2816.11	33.33	0.710	0.82	35.26	42.8	78.1	0.114	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.172	1.123	0.98
48.72	35.774	1.216	115.56	Yes	43	0	3.399117	Yes	Yes	-48.72	5615.36	2790.53	2824.83	0.59	0.115	2790.53	2824.83	27.29	0.742	0.81	28.87	50.4	79.2	0.115	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.175	1.126	0.99
48.884	31.423	1.433	115.56	Yes	51	0	4.560354	Yes	Yes	-48.88	5634.31	2800.76	2833.55	0.59	0.115	2800.76	2833.55	23.77	0.763	0.80	25.15	52.8	77.9	0.114	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	0.98
49.048	30.835	1.21	115.56	Yes	49	0	3.924112	Yes	Yes	-49.05	5653.26	2811.00	2842.27	0.59	0.115	2811.00	2842.27	23.24	0.767	0.80	24.59	51.9	76.5	0.113	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.167	1.119	0.97
49.212	43.158	1.106	115.56	Yes	36	0	2.562677	Yes	Yes	-49.21	5672.21	2821.23	2850.99	0.59	0.114	2821.23	2850.99	33.00	0.711	0.81	34.91	47.0	81.9	0.118	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.184	1.132	1.02
49.376	59.637	0.917	118.77	Yes	22	0	1.537636	Yes	Yes	-49.38	5691.69	2831.46	2860.23	0.59	0.114	2831.46	2860.23	46.30	0.653	0.82	48.99	33.2	82.2	0.118	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.185	1.133	1.02
49.54	71.051	0.824	121.98	Yes	17	0	1.15973	Yes	Yes	-49.54	5711.70	2841.70	2870.00	0.59	0.114	2841.70	2870.00	55.62	0.619	0.83	58.84	24.7	83.6	0.119	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.190	1.136	1.04
49.704	80.489	0.728	121.98	Yes	14	0	0.904471	Yes	Yes	-49.70	5731.70	2851.93	2879.77	0.59	0.114	2851.93	2879.77	63.36	0.593	0.83	67.04	17.1	84.1	0.120	0.08	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.192	1.138	1.04
49.868	82.652	0.814	121.98	Yes	14	0	0.984852	Yes	Yes	-49.87	5751.71	2862.16	2889.54	0.58	0.113	2862.16	2889.54	65.04	0.588	0.83	68.81	18.2	87.0	0.122	0.08	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.203	1.146	1.08
50.032	80.071	0.647	121.98	Yes	13	0	0.808033	Yes	Yes	-50.03	5771.71	2872.40	2899.31	0.58	0.113	2872.40	2899.31	62.74	0.595	0.83	66.38	15.1	81.5	0.117	0.08	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.183	1.131	1.02
50.196	68.62	0.613	121.98	Yes	16	0	0.893326	Yes	Yes	-50.20	5791.72	2882.63	2909.09	0.58	0.113	2882.63	2909.09	53.12	0.627	0.82	56.20	20.6	76.8	0.113	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.120	0.98
50.36	58.542	0.634	118.77	Yes	19	0	1.082983	Yes	Yes	-50.36	5811.19	2892.86	2918.33	0.58	0.113	2892.86	2918.33	44.77	0.659	0.81	47.37	27.5	74.9	0.111	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.162	1.116	0.96
50.524	52.749	0.768	118.77	Yes	23	0	1.455952	Yes	Yes	-50.52	5830.67	2903.10	2927.58	0.58	0.112	2903.10	2927.58	40.00	0.679	0.80	42.32	34.3	76.6	0.113	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.167	1.120	0.98
50.688	47.557	1.054	115.56	Yes	29	0	2.216288	Yes	Yes	-50.69	5849.62	2913.33	2936.29	0.58	0.112	2913.33	2936.29	35.76	0.698	0.80	37.84	41.7	79.5	0.115	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.176	1.126	1.01
50.852	41.478	1.25	115.56	Yes	39	0	3.013646	Yes	Yes	-50.85	5868.58	2923.56	2945.01	0.58	0.112	2923.56	2945.01	30.88	0.722	0.79	32.67	49.0	81.7	0.117	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.183	1.132	1.04
51.016	36.171	1.441	115.56	Yes	47	0	3.983854	Yes	Yes	-51.02	5887.53	2933.80	2953.73	0.58	0.112	2933.80	2953.73	26.66	0.746	0.78	28.21	51.7	80.0	0.116	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.178	1.127	1.02
51.18	31.203	1.517	112.35	Yes	54	0	4.861712	Yes	Yes	-51.18	5905.95	2944.03	2961.92	0.57	0.112	2944.03	2961.92	22.77	0.770	0.77	24.09	53.3	77.4	0.113	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	1.00
51.345	43.337	1.188	115.56	Yes	37	0	2.741307	Yes	Yes	-51.35	5925.02	2954.33	2970.69	0.57	0.111	2954.33	2970.69	32.13	0.716	0.78	33.99	48.0	82.0	0.118	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.184	1.132	1.04
51.509	56.258	0.692	118.77	Yes	21	0	1.230047	Yes	Yes	-51.51	5944.50	2964.56	2979.94	0.57	0.111	2964.56	2979.94	42.29	0.669	0.80	44.74	30.6	75.3	0.112	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.163	1.117	0.98
51.673	62.993	0.502	121.98	Yes	16	0	0.796914	Yes	Yes	-51.67	5964.50	2974.80	2989.71	0.57	0.111	2974.80	2989.71	47.60	0.648	0.80	50.36	20.8	71.2	0.108	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.152	1.109	0.94
51.837	58.947	0.6	121.98	Yes	19	0	1.017864	Yes	Yes	-51.84	5984.51	2985.03	2999.48	0.57	0.111	2985.03	2999.48	44.24	0.661	0.79	46.81	26.5	73.3	0.110	0.07	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.158	1.113	0.96
52.001	48.391	0.984	115.56	Yes	28	0	2.033436	Yes	Yes	-52.00	6003.46	2995.26	3008.20	0.57	0.110	2995.26	3008.20	35.78	0.698	0.78	37.86	40.4	78.3	0.114	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.172	1.124	1.01
52.165	40.396	1.171	115.56	Yes	40	0	2.898802	Yes	Yes	-52.17	6022.41	3005.50	3016.92	0.57	0.110	3005.50	3016.92	29.47	0.730	0.77	31.18	49.0	80.1	0.116	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.178	1.128	1.03
52.329	29.897	0.887	115.56	Yes	47	0	2.966853	Yes	Yes	-52.33	6041.36	3015.73	3025.63	0.56	0.110	3015.73	3025.63	21.39	0.779	0.76	22.63	50.5	73.1	0.110	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.157	1.113	0.97
52.493	23.614	0.951	115.56	Yes	58	0	4.027272	Yes	Yes	-52.49	6060.32	3025.96	3034.35	0.56	0.110	3025.96	3034.35	16.64	0.815	0.75	17.60	53.0	70.6	0.108	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.108	0.95
52.657	22.787	1.063	112.35	Yes	62	0	4.664941	Yes	Yes	-52.66	6078.74	3036.20	3042.54	0.56	0.110	3036.20	3042.54	15.99	0.820	0.74	16.92	53.7	70.6	0.108	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.150	1.108	0.95
52.821	21.34	1.061	112.35	Yes	66	0	4.971884	Yes	Yes	-52.82	6097.17	3046.43	3050.74	0.56	0.109	3046.43	3050.74	14.89	0.830	0.74	15.75	54.1	69.9	0.107	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.149	1.106	0.94
52.985	27.616	0.956	115.56	Yes	52	0	3.461761	Yes	Yes	-52.99	6116.12	3056.66	3059.45	0.56	0.109	3056.66	3059.45	19.49	0.793	0.75	20.62	51.8	72.4	0.109	0.05	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.155	1.111	0.97
53.149	37.092	0.817	115.56	Yes	38	0	2.202631	Yes	Yes	-53.15	6135.07	3066.90	3068.17	0.56	0.109	3066.90	3068.17	26.57	0.746	0.76	28.11	47.2	75.3	0.112	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.163	1.117	0.99
53.313	42.461	0.771	115.56	Yes	29	0	1.815784	Yes	Yes	-53.31	6154.02	3077.13	3076.89	0.56	0.109	3077.13	3076.89	30.61	0.724	0.76	32.38	40.4	72.8	0.110	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.156	1.112	0.97
53.477	46.395	0.821	118.77	Yes	27	0	1.769587	Yes	Yes	-53.48	6173.50	3087.36	3086.14	0.56	0.108	3087.36	3086.14	33.56	0.708	0.77	35.51	39.1	74.6	0.111	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.161	1.116	0.99
53.641	46.783	0.951	115.56	Yes	29	0	2.03279	Yes	Yes	-53.64	6192.45	3097.60	3094.85	0.55	0.108	3097.60	3094.85	33.79	0.707	0.76	35.75	40.9	76.6	0.113	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.167	1.120	1.01
53.805	50.218	1.049	115.56	Yes	28	0	2.088892	Yes	Yes	-53.81	6211.40	3107.83	3103.57	0.55	0.108	3107.83	3103.57	36.37	0.695	0.77	38.48	40.6	79.0	0.115	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.175	1.125	1.03
53.969	54.521	0.966	118.77	Yes	25	0	1.771794	Yes	Yes	-53.97	6230.88	3118.07	3112.82	0.55	0.108	3118.07	3112.82	39.63	0.680	0.77	41.93	37.3	79.2	0.115	0.06	0.98	0.00	0.100	1.000	0.000	0.138	1.000	1.175	1.126	1.03
54.133	63.93	0.887	118.77	Yes	21	0	1.387455	Yes	Yes	-54.13	6250.36	3128.30	3122.06	0.55	0.108	3128.30	3122.06	46.92	0.650	0.78	49.64	30.9	80.5	0.116	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.179	1.129	1.05
54.297	68.678	0.946	118.77	Yes	20	0	1.377443	Yes	Yes	-54.30	6269.84	3138.53	3131.31	0.55	0.107	3138.53	3131.31	50.58	0.636	0.78	53.52	29.5	83.0	0.119	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.188	1.135	1.08
54.461	63.85	1.157	118.77	Yes	23	0	1.81206	Yes	Yes	-54.46	6289.32	3148.77	3140.55	0.55	0.107	3148.77	3140.55	46.67	0.651	0.77	49.37	35.7	85.0	0.121	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.195	1.140	1.10
54.625	56.988	1.282	115.56	Yes	27	0	2.249596	Yes	Yes	-54.63	6308.27	3159.00	3149.27	0.55	0.107	3159.00	3149.27	41.21	0.673	0.77	43.60	40.4	84.0	0.120	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.192	1.138	1.09
54.789	51.254	1.277	115.56	Yes	30	0	2.491513	Yes	Yes	-54.79	6327.22	3169.23	3157.99	0.55	0.107	3169.23	3157.99	36.70	0.693	0.76	38.83	42.8	81.6	0.117	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.183	1.131	1.07

CPT Liquefaction Analysis

54.953	50.844	1.445	115.56	Yes	36	0	2.842027	Yes	Yes	-54.95	6346.17	3179.47	3166.71	0.55	0.107	3179.47	3166.71	36.31	0.695	0.76	38.42	48.0	86.4	0.122	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.201	1.144	1.12
55.117	50.022	1.824	115.56	Yes	40	0	3.646396	Yes	Yes	-55.12	6365.13	3189.70	3175.42	0.54	0.106	3189.70	3175.42	35.61	0.699	0.75	37.67	50.6	88.3	0.124	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.208	1.149	1.15
55.281	54.515	1.831	115.56	Yes	37	0	3.358709	Yes	Yes	-55.28	6384.08	3199.93	3184.14	0.54	0.106	3199.93	3184.14	38.98	0.683	0.76	41.24	49.5	90.8	0.126	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.218	1.156	1.18
55.446	76.744	1.086	118.77	Yes	19	0	1.415094	Yes	Yes	-55.45	6403.67	3210.23	3193.44	0.54	0.106	3210.23	3193.44	56.28	0.616	0.78	59.55	28.2	87.8	0.123	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.206	1.148	1.14
55.61	101.053	0.719	121.98	Yes	11	0	0.711508	Yes	Yes	-55.61	6423.68	3220.46	3203.21	0.54	0.106	3220.46	3203.21	75.80	0.557	0.79	80.20	8.8	89.0	0.125	0.09	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.211	1.151	1.15
55.774	93.361	0.731	121.98	Yes	12	0	0.782982	Yes	Yes	-55.77	6443.68	3230.70	3212.99	0.54	0.105	3230.70	3212.99	69.39	0.575	0.79	73.42	12.2	85.6	0.121	0.08	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.198	1.142	1.11
55.938	83.624	0.747	121.98	Yes	14	0	0.893284	Yes	Yes	-55.94	6463.69	3240.93	3222.76	0.54	0.105	3240.93	3222.76	61.42	0.600	0.78	64.98	17.2	82.2	0.118	0.08	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.185	1.133	1.08
56.102	82.959	0.668	121.98	Yes	13	0	0.805217	Yes	Yes	-56.10	6483.69	3251.16	3232.53	0.54	0.105	3251.16	3232.53	60.77	0.602	0.77	64.29	15.5	79.8	0.116	0.08	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.177	1.127	1.05
56.266	75.168	0.791	121.98	Yes	16	0	1.052309	Yes	Yes	-56.27	6503.70	3261.40	3242.30	0.54	0.105	3261.40	3242.30	54.47	0.623	0.77	57.63	22.9	80.5	0.116	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.179	1.129	1.06
56.43	68.306	1.095	118.77	Yes	21	0	1.60308	Yes	Yes	-56.43	6523.18	3271.63	3251.54	0.53	0.105	3271.63	3251.54	48.99	0.642	0.76	51.83	32.7	84.6	0.120	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.194	1.139	1.11
56.594	71.724	1.33	118.77	Yes	22	0	1.85433	Yes	Yes	-56.59	6542.65	3281.87	3260.79	0.53	0.104	3281.87	3260.79	51.56	0.633	0.76	54.55	34.7	89.3	0.125	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.212	1.152	1.17
56.758	67.356	1.167	118.77	Yes	22	0	1.732585	Yes	Yes	-56.76	6562.13	3292.10	3270.03	0.53	0.104	3292.10	3270.03	48.06	0.646	0.75	50.85	34.4	85.2	0.121	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.196	1.141	1.12
56.922	65.615	1.096	118.77	Yes	22	0	1.67035	Yes	Yes	-56.92	6581.61	3302.33	3279.28	0.53	0.104	3302.33	3279.28	46.62	0.651	0.75	49.32	34.1	83.4	0.119	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.190	1.136	1.11
57.086	65.76	0.946	118.77	Yes	21	0	1.438564	Yes	Yes	-57.09	6601.09	3312.57	3288.52	0.53	0.104	3312.57	3288.52	46.64	0.651	0.75	49.34	31.4	80.8	0.117	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.180	1.129	1.08
57.25	61.696	0.878	118.77	Yes	22	0	1.423107	Yes	Yes	-57.25	6620.57	3322.80	3297.77	0.53	0.104	3322.80	3297.77	43.43	0.664	0.74	45.95	32.3	78.3	0.114	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.172	1.123	1.05
57.414	55.385	0.893	118.77	Yes	24	0	1.61235	Yes	Yes	-57.41	6640.05	3333.03	3307.01	0.53	0.103	3333.03	3307.01	38.55	0.685	0.74	40.79	35.9	76.7	0.113	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.167	1.120	1.04
57.578	50.267	0.936	118.77	Yes	27	0	1.862057	Yes	Yes	-57.58	6659.52	3343.27	3316.26	0.53	0.103	3343.27	3316.26	34.64	0.703	0.73	36.65	39.2	75.9	0.112	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.165	1.118	1.04
57.742	48.031	1.082	115.56	Yes	30	0	2.252712	Yes	Yes	-57.74	6678.48	3353.50	3324.97	0.53	0.103	3353.50	3324.97	32.91	0.712	0.72	34.82	42.2	77.0	0.113	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.168	1.121	1.05
57.906	48.722	1.235	115.56	Yes	36	0	2.534789	Yes	Yes	-57.91	6697.43	3363.73	3333.69	0.52	0.103	3363.73	3333.69	33.36	0.709	0.72	35.29	47.5	82.8	0.118	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.187	1.134	1.11
58.07	47.898	1.351	115.56	Yes	38	0	2.820577	Yes	Yes	-58.07	6716.38	3373.97	3342.41	0.52	0.102	3373.97	3342.41	32.68	0.713	0.72	34.58	48.6	83.2	0.119	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.189	1.135	1.12
58.234	50.852	1.583	115.56	Yes	38	0	3.112955	Yes	Yes	-58.23	6735.33	3384.20	3351.13	0.52	0.102	3384.20	3351.13	34.80	0.702	0.72	36.82	49.3	86.2	0.122	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.200	1.143	1.15
58.398	62.885	0.797	118.77	Yes	20	0	1.267393	Yes	Yes	-58.40	6754.81	3394.44	3360.37	0.52	0.102	3394.44	3360.37	43.74	0.663	0.74	46.28	30.1	76.4	0.113	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.167	1.119	1.04
58.562	71.264	0.772	121.98	Yes	18	0	1.083296	Yes	Yes	-58.56	6774.81	3404.67	3370.15	0.52	0.102	3404.67	3370.15	50.04	0.638	0.74	52.94	24.9	77.9	0.114	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.171	1.123	1.06
58.726	59.068	0.811	118.77	Yes	22	0	1.372994	Yes	Yes	-58.73	6794.29	3414.90	3379.39	0.52	0.102	3414.90	3379.39	40.69	0.676	0.73	43.05	32.6	75.6	0.112	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.164	1.118	1.04
58.89	46.858	1.043	115.56	Yes	36	0	2.225874	Yes	Yes	-58.89	6813.24	3425.14	3388.11	0.52	0.101	3425.14	3388.11	31.58	0.718	0.71	33.41	46.6	80.0	0.116	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.178	1.127	1.09
59.054	46.514	1.276	115.56	Yes	39	0	2.74326	Yes	Yes	-59.05	6832.20	3435.37	3396.83	0.52	0.101	3435.37	3396.83	31.27	0.720	0.71	33.08	48.6	81.7	0.117	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.183	1.132	1.11
59.218	48.352	1.389	115.56	Yes	39	0	2.872684	Yes	Yes	-59.22	6851.15	3445.60	3405.54	0.52	0.101	3445.60	3405.54	32.54	0.714	0.71	34.43	48.9	83.3	0.119	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.189	1.136	1.13
59.382	48.742	1.387	115.56	Yes	38	0	2.845595	Yes	Yes	-59.38	6870.10	3455.84	3414.26	0.51	0.101	3455.84	3414.26	32.76	0.712	0.71	34.66	48.8	83.4	0.119	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.190	1.136	1.13
59.547	49.512	1.456	115.56	Yes	39	0	2.940701	Yes	Yes	-59.55	6889.17	3466.13	3423.03	0.51	0.101	3466.13	3423.03	33.26	0.710	0.71	35.19	49.0	84.2	0.120	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.192	1.138	1.14
59.711	54.609	1.38	115.56	Yes	30	0	2.527056	Yes	Yes	-59.71	6908.12	3476.37	3431.75	0.51	0.100	3476.37	3431.75	36.93	0.692	0.72	39.07	42.7	81.8	0.117	0.06	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.184	1.132	1.12
59.875	63.021	0.876	118.77	Yes	21	0	1.390013	Yes	Yes	-59.88	6927.60	3486.60	3441.00	0.51	0.100	3486.60	3441.00	43.10	0.665	0.72	45.60	31.9	77.5	0.114	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.170	1.122	1.07
60.039	72.563	1.09	118.77	Yes	20	0	1.502143	Yes	Yes	-60.04	6947.08	3496.83	3450.24	0.51	0.100	3496.83	3450.24	50.21	0.638	0.73	53.12	31.0	84.1	0.120	0.07	0.97	0.00	0.100	1.000	0.000	0.138	1.000	1.192	1.138	1.14
60.203	74.94	1.237	118.77	Yes	21	0	1.650654	Yes	Yes	-60.20	6966.55	3507.07	3459.49	0.51	0.100	3507.07	3459.49	51.93	0.632	0.73	54.94	32.3	87.2	0.123	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.204	1.146	1.18
60.367	88.349	1.267	121.98	Yes	18	0	1.434085	Yes	Yes	-60.37	6986.56	3517.30	3469.26	0.51	0.100	3517.30	3469.26	62.15	0.597	0.74	65.76	26.6	92.4	0.128	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.225	1.162	1.25
60.531	92.429	1.283	121.98	Yes	17	0	1.388092	Yes	Yes	-60.53	7006.56	3527.53	3479.03	0.51	0.099	3527.53	3479.03	65.22	0.588	0.75	69.01	25.1	94.1	0.130	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.233	1.167	1.27
60.695	96.127	1.183	121.98	Yes	15	0	1.230664	Yes	Yes	-60.70	7026.57	3537.77	3488.80	0.51	0.099	3537.77	3488.80	68.00	0.579	0.75	71.95	21.7	93.6	0.130	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.231	1.165	1.27
60.859	100.572	1.127	121.98	Yes	14	0	1.12059	Yes	Yes	-60.86	7046.57	3548.00	3498.57	0.50	0.099	3548.00	3498.57	71.38	0.570	0.75	75.52	18.7	94.2	0.130	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.233	1.167	1.27
61.023	96.272	1.114	121.98	Yes	15	0	1.157138	Yes	Yes	-61.02	7066.58	3558.24	3508.34	0.50	0.099	3558.24	3508.34	67.87	0.580	0.75	71.81	20.4	92.2	0.128	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.224	1.161	1.25
61.187	97.703	1.178	121.98	Yes	15	0	1.205695	Yes	Yes	-61.19	7086.58	3568.47	3518.11	0.50	0.099	3568.47	3518.11	68.87	0.577	0.75	72.87	21.0	93.8	0.130	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.232	1.166	1.27
61.351	84.103	1.571	118.77	Yes	21	0	1.867948	Yes	Yes	-61.35	7106.06	3578.70	3527.36	0.50	0.098	3578.70	3527.36	58.20	0.610	0.73	61.58	33.2	94.7	0.131	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.236	1.169	1.29
61.515	74.269	1.843	115.56	Yes	26	0	2.48152	Yes	Yes	-61.52	7125.01	3588.94	3536.08	0.50	0.098	3588.94	3536.08	50.63	0.636	0.72	53.57	40.0	93.5	0.129	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.230	1.165	1.28
61.679	70.751	2.012	115.56	Yes	28	0	2.843776	Yes	Yes	-61.68	7143.96	3599.17	3544.79	0.50	0.098	3599.17	3544.79	47.91	0.646	0.72	50.68	42.6	93.3	0.129	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.229	1.164	1.28
61.843	77.243	1.915	115.56	Yes	25	0	2.479189	Yes	Yes	-61.84	7162.92	3609.40	3553.51	0.50	0.098	3609.40	3553.51	52.70	0.629	0.72	55.76	39.6	95.4	0.132	0.07	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.239	1.171	1.31
62.007	93.895	1.898	118.77	Yes	20	0	2.021407	Yes	Yes	-62.01	7182.39	3619.64	3562.76	0.50	0.098	3619.64	3562.76	65.35	0.587	0.74	69.14	33.3	102.5	0.141	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.275	1.197	1.43
62.171	98.164	1.057	121.98	Yes	14	0	1.076769	Yes	Yes	-62.17	7202.40	3629.87	3572.53	0.50	0.097	3629.87	3572.53	68.55	0.578	0.74	72.53	18.6	91.1	0.127	0.08	0.96	0.00	0.100	1.000	0.000	0.138	1.000	1.220	1.157	1.25
62.335	105.385	1.419	121.98	Yes	15	0	1.346491	Yes	Yes	-62.34	7222.40	3640.10	3582.30	0.49	0.097	3640.10	3582.30	74.09	0.562	0.74	78.39	22.1	100.5	0.138	0.09	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.264	1.189	1.39
62.499	105.676	1.751	118.77	Yes	17	0	1.656951	Yes	Yes	-62.50	7241.88	3650.34	3591.54	0.49	0.097	3650.34	3591.54	74.20	0.562	0.74	78.51	27.0	105.5	0.145	0.09	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.291	1.209	1.49
62.663	104.411	2.128	118.77	Yes	19	0	2.038099	Yes	Yes	-62.66	7261.36	3660.57	3600.79	0.49	0.097	3660.57	3600.79	73.09	0.565	0.74	77.33	32.1	109.4	0.151	0.09	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.315	1.226	1.58
62.827	104.212	2.539	118.77	Yes	21	0	2.43638	Yes	Yes	-62.83	7280.84	3670.80	3610.03	0.49	0.097	3670.80	3610.03	72.81	0.566	0.74	77.04	36.3	113.3	0.158	0.09	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.340	1.243	1.67
62.991	107.441	3.319	115.56	Yes	24	0	3.089137	Yes	Yes	-62.99	7299.79	3681.04	3618.75	0.49	0.097	3681.04	3618.75	75.24	0.559	0.74	79.60	41.3	120.9	0.173	0.09	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.393	1.282	1.89
63.155	115.612	3.69	115.56	Yes	23	0	3.19171	Yes	Yes	-63.16	7318.74	3691.27	3627.47	0.49	0.096	3691.27	3627.47	81.59	0.542	0.75	86.32	41.6	127.9	0.191	0.09	0.95	0.00	0.100	1.000	0.000	0.138	1.000	1.449	1.322	2.15
63.319	131.574	3.686	118.77	Yes	20	0	2.801465	Yes	Yes	-63.32	7338.22	3701.51	3636.71	0.49	0.096	3701.51	3636.71	94.29	0.511	0.76	99.76	37.4	137.1	0.222	0.10	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.532	1.382	2.60
63.483	148.935	3.788	118.77	Yes	18	0	2.543391	Yes	Yes	-63.48	7357.70	3711.74	3645.96	0.49	0.096	3711.74	3645.96	108.41	0.480	0.77	114.70	33.3	148.0	0.276	0.11	0.94	0.00	0.100	1.000	0.000	0.138	1.000	1.646	1.463	3.40
63.648	181.466	3.983	118.77	Yes	15	0	2.194902	Yes	Yes	-63.65	7377.30	3722.04	3655.26	0.49	0.096	3722.04	3655.26	135.77	0.428	0.79	143.65	25.8	169.4	0.494	0.14	0.92	0.00	0.100	1.000	0.000	0.138	1.000	1.924	1.662	6.81
63.812	199.556	4.077	121.98	Yes	13	0	2.043036	Yes	Yes	-63.81	7397.30	3732.27	3665.03	0.49	0.096	3732.27	3665.03	151.32	0.401	0.80	160.09	21.7	181.8	0.780347	0.16	0.91	0.00	0.100	1.000	0.000	0.138	1.000	2.120	1.803	11.55
63.976	226.436	4.34	121.98	Yes	12	0	1.916656	Yes	Yes	-63.98	7417.31	3742.50	3674.80	0.48	0.095	3742.50	3674.80	175.03	0.364	0.82	185.18	17.1	202.3	2.158301	0.20	0.89	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	32.22
64.14	244.359	4.321	121.98	Yes	11	0	1.7683	Yes	Yes	-64.14	7437.31	3752.74	3684.57	0.48	0.095	3752.74	3684.57	191.11	0.342	0.83	202.19	13.0	215.2	3.724576	0.24	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	54.40
64.304	241.78	4.208	121.98	Yes	11	0	1.740425	Yes	Yes	-64.30	7457.31	3762.97	3694.35	0.48	0.095	3762.97	3694.35	188.54	0.345	0.83	199.48	12.8	212.2	3.724576	0.23	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	54.67
64.468	260.788	4.002	121.98	Yes	9	0	1.53458	Yes	Yes	-64.47	7477.32	3773.20	3704.12	0.48	0.095	3773.20	3704.12	205.85	0.322	0.84	217.79	7.8	225.6	3.724576	0.28	0.84	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	52.95
64.632	281.532	4.255	121.98	Yes	9	0	1.511373	Yes	Yes	-64.63	7497.32	3783.44	3713.89	0.48	0.095	3783.44	3713.89	225.08	0.298	0.85	238.14	6.3	244.4	3.724576	0.30	0.83	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	52.34
64.796	260.746	4.797	121.98	Yes	11	0	1.839721	Yes	Yes	-64.80	7517.33	3793.67	3723.66	0.48	0.094	3793.67	3723.66	205.40	0.322	0.83	217.31	13.2	230.5	3.724576	0.28	0.84	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	53.08
64.96	254.296	5.202	121.98	Yes	12	0	2.045648	Yes	Yes	-64.96	7537.33	3803.90	3733.43	0.48	0.094	3803.90	3733.43	199.23	0.331	0.83	210.78	17.4	228.2	3.724576	0.26	0.85	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	53.83
65.124	241.955	5.054	121.98	Yes	12	0	2.088818	Yes	Yes	-65.12	7557.34	3814.14	3743.20	0.48	0.094	3814.14	3743.20	187.70	0.346	0.82	198.59	19.2	217.8	3.724576	0.23	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	55.00
65.288	229.326	4.914	121.98	Yes	13	0	2.142801	Yes	Yes	-65.29	7577.34	3824.37	3752.97	0.48	0.094	3824.37	3752.97	176.06	0.363	0.81	186.27	21.1	207.4	2.941787	0.20	0.88	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	44.22
65.452	218.045	3.524	121.98	Yes	11	0	1.61618	Yes	Yes	-65.45	7597.35	3834.60	3762.74	0.48	0.094	3834.60	3762.74	165.77	0.378	0.80	175.38	12.7	188.1	1.02717	0.18	0.89	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	15.65
65.616	214.095	3.433	121.98	Yes	11	0	1.603494	Yes	Yes	-65.62	7617.35	3844.84	3772.51	0.48	0.094	3844.84	3772.51	162.07	0.384	0.80	171.47	12.8	184.3	0.868547	0.18	0.90	0.00	0.100	1.000	0.000	0.138	1.000	2.164	1.834	13.11
65.78	197.399	3.153	121.98	Yes	12	0	1.597273	Yes	Yes	-65.78	7637.36	3855.07	3782.29	0.47	0.093	3855.07	3782.29	147.22	0.408	0.79	155.76	14.3	170.1	0.505	0.16	0.91	0.00	0.100	1.000	0.000	0.138	1.000	1.934	1.670	7.05
65.944	206.913	3.19	121.98	Yes	11	0	1.541711	Yes	Yes	-65.94	7657.36	3865.31	3792.06	0.47	0.093	3865.31	3792.06	155.36	0.395	0.79	164.37	12.4	176.8	0.641139	0.17	0.90	0.00	0.100	1.000	0.000	0.138	1.000	2.038	1.744	9.29
66.108	223.41	3.195	121.98	Yes	10	0	1.430106	Yes	Yes	-66.11	7677.37	3875.54	3801.83	0.47	0.093	3875.54	3801.83	169.79	0.372	0.80	179.63	9.0	188.6	1.054846	0.19	0.89	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	16.06
66.272	233.241	3.735	121.98	Yes	10	0	1.601348	Yes	Yes	-66.27	7697.37	3885.77	3811.60	0.47	0.093	3885.77	3811.60	178.42	0.359	0.81	188.77	11.3	200.0	1.894297	0.21	0.88	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	28.55
66.436	237.442	3.792	121.98	Yes	10	0	1.597022	Yes	Yes	-66.44	7717.38	3896.01	3821.37	0.47	0.093	3896.01	3821.37	182.02	0.354	0.81	192.58	10.9	203.5	2.310886	0.22	0.87	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	34.69
66.6	221.289	3.599	121.98	Yes	11	0	1.62638	Yes	Yes	-66.60	7737.38	3906.24	3831.14	0.47	0.092	3906.24	3831.14	167.33	0.376	0.80	177.03	12.8	189.8	1.114356	0.19	0.89	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	17.07
66.764	209.402	3.024	121.98	Yes	10	0	1.444112	Yes	Yes	-66.76	7757.39	3916.47	3840.91	0.47	0.092	3916.47	3840.91	156.62	0.393	0.79	165.71	10.6	176.3	0.628509	0.17	0.90	0.00	0.100	1.000	0.000	0.138	1.000	2.029	1.738	9.11
66.928	187.212	2.916	121.98	Yes	12	0	1.557592	Yes	Yes	-66.93	7777.39	3926.71	3850.68	0.47	0.092	3926.71	3850.68	137.19	0.425	0.78	145.15	14.9	160.0	0.372	0.14	0.91	0.00	0.100	1.000	0.000	0.138	1.000	1.793	1.568	4.95
67.092	193.239	2.865	121.98	Yes	11	0	1.48262	Yes	Yes	-67.09	7797.39	3936.94	3860.45	0.47	0.092	3936.94	3860.45	142.20	0.416	0.78	150.44	12.9	163.3	0.408	0.15	0.91	0.00	0.100	1.000	0.000	0.138	1.000	1.837	1.600	5.54
67.256	174.002	2.668	121.98	Yes	12	0	1.533316	Yes	Yes	-67.26	7817.40	3947.17	3870.23	0.47	0.092	3947.17	3870.23	125.64	0.446	0.76	132.92	16.0	148.9	0.281	0.13	0.92	0.00	0.100	1.000	0.000	0.138	1.000	1.656	1.470	3.55
67.42	164.254	3.071	121.98	Yes	15	0	1.869665	Yes	Yes	-67.42	7837.40	3957.41	3880.00	0.46	0.092	3957.41	3880.00	117.32	0.462	0.76	124.13	23.0	147.1	0.270	0.12	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.636	1.456	3.40
67.584	156.196	3.385	118.77	Yes	16	0	2.167149	Yes	Yes	-67.58	7856.88	3967.64	3889.24	0.46	0.091	3967.64	3889.24	110.52	0.476	0.75	116.93	28.3	145.3	0.260	0.12	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.615	1.441	3.26
67.749	163.898	3.691	118.77	Yes	16	0	2.25201	Yes	Yes	-67.75	7876.48	3977.94	3898.54	0.46	0.091	3977.94	3898.54	116.73	0.463	0.75	123.50	28.8	152.3	0.304	0.12	0.93	0.00	0.100	1.000	0.000	0.138	1.000	1.696	1.499	3.96
67.913	194.442	4.426	118.77	Yes	15	0	2.276257	Yes	Yes	-67.91	7895.96	3988.17	3907.79	0.46	0.091	3988.17	3907.79	142.39	0.416	0.77	150.64	26.5	177.2	0.650009	0.15	0.91	0.00	0.100	1.000	0.000	0.138	1.000	2.043	1.748	9.68
68.077	221.725	5.029	118.77	Yes	14	0	2.268125	Yes	Yes	-68.08	7915.44	3998.40	3917.03	0.46	0.091	3998.40	3917.03	166.07	0.378	0.79	175.70	24.3	200.0	1.887182	0.18	0.89	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	29.23
68.241	259.057	5.59	121.98	Yes	12	0	2.157826	Yes	Yes	-68.24	7935.44	4008.64	3926.80	0.46	0.091	4008.64	3926.80	199.67	0.330	0.82	211.25	19.7	231.0	3.724576	0.26	0.84	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	54.65
68.405	260.007	4.996	121.98	Yes	11	0	1.921487	Yes	Yes	-68.41	7955.45	4018.87	3936.57	0.46	0.091	4018.87	3936.57	200.35	0.329	0.82	211.97	15.4	227.3	3.724576	0.26	0.84	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	54.60
68.569	263.518	6.053	118.77	Yes	13	0	2.296997	Yes	Yes	-68.57	7974.92	4029.11	3945.82	0.46	0.090	4029.11	3945.82	203.41	0.325	0.82	215.21	21.9	237.1	3.724576	0.27	0.83	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	54.25
68.733	266.059	0.01	128.4	Yes	5	0	0.003759	Yes	Yes	-68.73	7995.98	4039.34	3956.64	0.46	0.090	4039.34	3956.64	205.55	0.322	0.82	217.47	0.2	217.7	3.724576	0.28	0.82	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	54.00
68.897	289.517	0.01	128.4	Yes	5	0	0.003454	Yes	Yes	-68.90	8017.04	4049.57	3967.47	0.46	0.090	4049.57	3967.47	227.36	0.295	0.83	240.55	0.2	240.8	3.724576	0.30	0.81	0.00	0.100	1.000	0.000	0.138	1.000	2.200	1.860	53.24
				Yes	60	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	57	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	53	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	60	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	67	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	82	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	81	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	69	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	66	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	63	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	60	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	57	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	67	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	73	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	66	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	63.374	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	65.401	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	61.044	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	62.254	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	74.135	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	77.444	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	73.699	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	71.424	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	74.232	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	73.573	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	75.011	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	74.868	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	73.723	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	88.671	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	100	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		

CPT Liquefaction Analysis

				Yes	54.967	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	46.972	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	42.033	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	46.291	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	53.264	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	57.595	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	57.305	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	71.413	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	87.329	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	85.641	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	77.234	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	84.559	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	86.834	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	86.277	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	86.937	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	83.937	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	83.907	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	81.615	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		
				Yes	72.172	0	#DIV/0!	No	No	0.00	8017.04		8017.04				8017.04																		



Earthquake Magnitude, M = 5.77

Ground Motion: 2,475-Year Modal

Method: Idriss & Boulanger (2014),
CPT and SPT Based Liquefaction
Triggering Procedures,
UCD/CGM-14/01

Project: Plant Scherer GA EPD Closure		Sounding ECP05A Avg.
Project Number: 60563110	Date: 1/24/2018	AECOM

Appendix A4

Slope Stability Analysis

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Appendix A4

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**1** of **7**
Description	**Geotechnical Calculations**	Computed by	**SAL**	Date	**09/10/21**
	Slope Stability Analysis	Checked by	**CAD**	Date	**09/10/21**

This calculation package summarizes the limit equilibrium slope stability analyses for both the static and seismic loading conditions performed in support of the Engineering Report for the Plant Scherer Ash Pond Basin Closure. Figures, calculations and computer program outputs are provided as attachments and are referenced herein.

I. Objective

The objective for the slope stability analysis is to determine factors of safety (FoS) at critical cross section locations across the Ash Pond dikes and proposed berm for the following loading cases:

- Static, Steady-State, Global Failure Conditions;
- Static, Steady-State, Local Failure Conditions;
- Static, Temporary Loading Conditions;
- Static, Surcharge Loading Conditions;
- Seismic Slope Stability Analysis; and
- Post-Liquefaction Condition.

The factors of safety determined from each of these loading conditions will be utilized to determine if the requirements outlined by the USEPA CCR Rule criteria are met or if additional measures will be needed for stability purposes. The methodology used to perform the slope stability analysis and the results of the analyses are summarized in the subsequent sections listed below.

II. Development of Cross-Sections for Analysis

A total of four cross-sections (1-1, 2-2, 3-3 and 4-4) were utilized to evaluate the stability of the existing perimeter embankment and the proposed berm at the Ash Pond, as shown in the attached **SSA Figure A**. The location of each cross-section was selected based on the volume and quality of available geotechnical data, existing site topography (locations with critical topographic geometries were used to the greatest extent possible), proposed grade, and subsurface stratigraphy. In general, the selected cross-sections represent the most critical configuration for the segment of the embankment or berm that they represent. Each of the four analysis cross-sections are briefly summarized below:

Section 1-1: This section was taken on the southern embankment where it begins near the knob. The crest of the embankment in this section is approximately El. 506 ft. with the downstream toe near El. 484.75 ft. The embankment in this area generally varies between 25 to 30 ft wide and has a downstream slope of approximately 3H:1V. The ash impounded at this section contains a crust on the surface and is similar in elevation to the embankment crest. Section 1-1 was established as the typical configuration of the southern embankment for comparison purposes.

Section 2-2: This section was taken near the center of the eastern embankment of the Ash Pond near Berry Creek as it flows away from the toe of the embankment. This section goes through the tallest embankment height around the pond and contains a mid-slope bench. The crest of the embankment in this section is approximately El. 502 to 503 ft. with the mid-slope bench at El. 458 ft. and the downstream toe near El. 424 ft. The embankment in this area generally varies between 20 to 25 ft wide and has a downstream slope of approximately 3H:1V. This section goes through the ash delta and the grades inside the pond are similar in elevation to the embankment crest. Section 2-2 was established as the tallest embankment height of the eastern embankment for comparison purposes.

Section 3-3: This section was taken along thenortheastern portion of the proposed berm of the Ash Pond closure. The crest of the berm in this section is approximately El. 466.3 ft. with the downstream toe near El. 439.3 ft. The proposed berm is designed to be 24 ft wide and has a downstream slope of 3H:1V. The area behind the berm will be filled with ash removed from the northern portion of the pond outside of the closure cap and be stacked at 5H:1V slopes. Section 3-3 was established as the typical configuration of the northeastern berm for comparison purposes.

Section 4-4: This section was taken at the bend near the center of the proposed berm of the Ash Pond closure. The crest of the berm in this section is approximately El. 467.8 ft. with the downstream toe near El. 439.8 ft. The proposed berm is designed to be 24 ft wide and has a downstream slope of 3H:1V. The area behind the berm will be filled with ash removed from the northern portion of the pond outside of the closure cap and be stacked at 5H:1V slopes. Section 4-4 was established as the typical configuration of the northwestern berm for comparison purposes.

III. Subsurface Conditions

Subsurface materials and extents (stratigraphy) at each cross section were developed by utilizing nearby subsurface explorations (CPTs and borings) from AECOM's exploration activities and historic geotechnical explorations. The subsurface strata generally encountered across the exploration locations can be generalized into six typical layers used in the slope stability analysis. These layers are listed below and are further described in Appendix A1 – Material Characterization.

- Proposed Stacked Ash Materials
- Sluiced Ash Materials
- Embankment Fill Materials
- Residuum
- Saprolite
- Partially Weathered Rock

Material interfaces inferred from the subsurface explorations nearest to the cross-sections were transposed onto the profile and a reasonable interpretation of the subsurface stratigraphy between the exploration locations was developed. **Table 1** below summarizes the exploration locations utilized to construct each cross-section:

Table 1: Summary of Geotechnical Explorations at Cross Sectional Locations

Cross-Section	Geotechnical Explorations Used
1-1	B-102
2-2	B-100, B101, B-104, S-2*, SPT-01**
3-3	B-110, SPT-01**
4-4	B-108, B-111, B-105, SPT-01**

(*) - Denotes historic boring data from the 2010 geotechnical exploration performed by Southern Company Services.

(**) - Denotes historic borings from the 2015 geotechnical exploration performed by Southern Company Services.

Groundwater tables were modeled as piezometric lines in SLOPE/W, with elevations and configuration of the lines primarily established based on the piezometers installed during the 2016 AECOM exploration. The normal operating level of the pond is near El. 494.5 ft. The phreatic surface for the sections through the ash delta and locations south was assumed to be 10 feet below the lowest excavation grade to simulate dewatering needs for closure construction. In addition, the phreatic surface located downstream of the ash face of the ash delta and directly behind the proposed northern berm was conservatively assumed to be slightly elevated (approximately 5 feet above existing CCR ash limits) for post-closure conditions. These groundwater assumptions are conservative for the analysis conditions presented herein, as the long term phreatic levels are anticipated to drop down substantially in most areas of the pond, relative to current conditions and the conditions expected after construction dewatering has occurred.

The groundwater elevations downstream of the embankments were established based on the post-closure groundwater modeling analysis as documented in the Phase 3 Advanced Engineering Methods report (AECOM, 2017) and groundwater depths at the time of drilling.

IV. Analysis Methodology

Analyses were performed using Spencer's Method which is a limit equilibrium slope stability analysis procedure. The computer program SLOPE/W 2016 by Geo-Slope International was utilized. The program analyzes a large number of potential slip surface geometries and identifies the geometry that results in a critical (i.e. lowest) factor of safety (FS). Additional information on the program is available at http://www.geo-slope.com/. Both circular and block shaped failure surfaces were analyzed, for the each of the loading cases considered.

Each section was analyzed for the following cases:

- **Static, Steady-State, Global Failure Condition:** This case models the conditions under static, long-term conditions. Drained (effective stress) shear strength parameters were used for all materials, and phreatic conditions were estimated as described in the preceding section. A **Factor of Safety of 1.50** is targeted for this loading condition. Failure extends from toe crest to toe.
- **Static, Steady-State, Local Failure Condition:** This case models the conditions under static, long-term conditions. Drained (effective stress) shear strength parameters were used for all materials, and phreatic conditions were estimated as described in the preceding section. A **Factor of Safety of 1.50** is targeted for this loading condition. Failure is located within the proposed berm.
- **Static, Steady-State, Temporary Loading Condition:** This case models the conditions under static, long-term conditions, with a temporary construction load placed at the crest of the slope. Undrained (total stress) shear strength parameters were used for materials which would experience significant changes in stress as a result of the surcharge loading, and phreatic conditions were estimated as described in the preceding section. A **Factor of Safety of 1.30** is targeted for this loading condition.
- **Seismic Stability Condition:** These analyses incorporate a horizontal seismic coefficient k_h selected to be representative of expected loading during the design earthquake event (i.e., a "pseudostatic" analysis). The analyses utilized peak undrained strength parameters in soils that are not consider to be rapidly draining materials, and peak drained strengths in soils considered to freely drain. The phreatic surface and pore water pressures corresponding to the Steady State case from the static analyses were utilized. Seismic loading was included in this analysis using a pseudostatic coefficient (k_h). A **Factor of Safety of 1.00** is targeted for this loading condition.

The pseudostatic coefficient was selected using the United States Geological Survey (USGS) online Unified Hazard Tool to determine the site peak ground acceleration having a 2% or greater probability of occurring in 50 years of 0.0894g as shown in the attachments. Two borings were analyzed to determine the Seismic Site Class utilizing Method B of the AASHTO LRFD Bridge Design Specifications Article C3.10.3.1. The site was found to be Seismic Site Class D with a peak transverse base acceleration of 0.14g and a peak transverse crest acceleration of 0.44g when adjusted for the site class. Specifically, the pseudostatic coefficient was taken as the parameter k_{max}, which represents the peak average acceleration along the failure surface. As shown in **Figure 1** below the ratio k_{max}/u_{max} (where u_{max} is the peak acceleration at the crest of the embankment) for a full height failure surface (y/H=1.0) is 0.34. Therefore, the pseudostatic coefficient k_h was estimated as k_h=0.34*0.44g = 0.15g for these analyses.

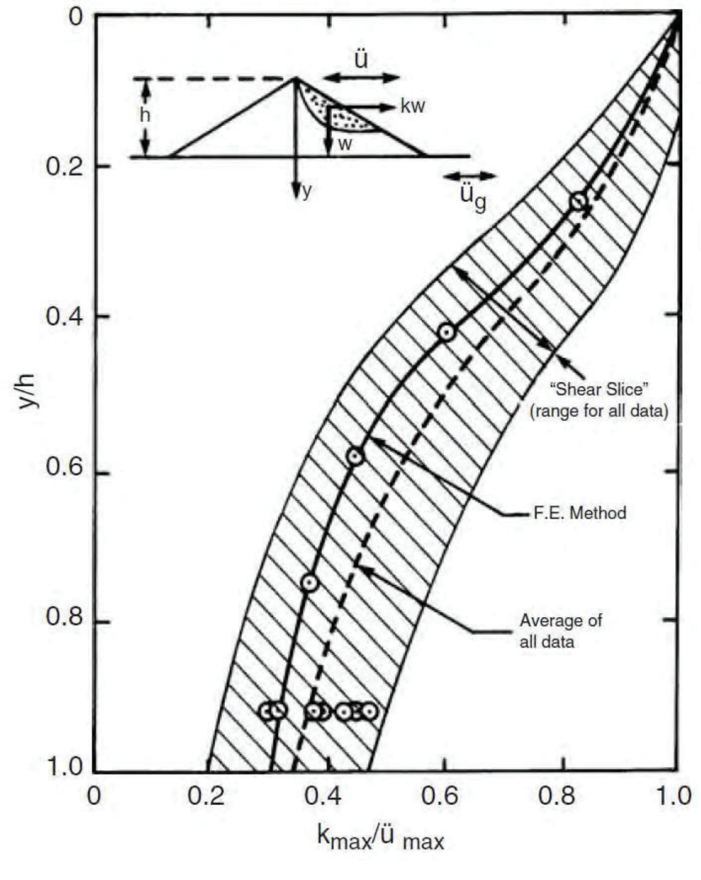


Figure 1: Determination of Maximum Average Acceleration Along Failure Surface

- **Static, Post-Liquefaction Condition:** These analyses were performed at each stability cross section where liquefaction triggering analysis indicates potential liquefaction of granular, non-plastic materials or cyclic softening of fine-grained soils. The purpose of the post-liquefaction stability analysis is to assess stability conditions immediately following a seismic event. No horizontal seismic coefficient is included in these analyses, but selection of strength parameters for the analyses takes into account the potential for softening/ weakening of the soils as a result of pore pressures generated in sand-like materials, or cyclic softening in clay-like materials due to the earthquake shaking. A **Factor of Safety of 1.20** is targeted for this loading condition.

V. Material Properties for Analysis

Material properties for slope stability analyses were developed using both laboratory testing data (index and strength testing) and strength correlations from CPT and SPT data. Details of the material characterization and strength parameter selection for each stratum are provided in **Attachment A1** of the Engineering Report. The properties used in the stability analysis are summarized in **Table 2** below:

Table 2: Summary of Material Parameters used in Stability Analysis

Material	**Unit Weight (pcf)**	**Effective (drained) Shear Strength Parameters**		**Total (undrained) Shear Strength Parameters**		**Post-Liquefaction Shear Strength Parameters**	
		c' (psf)	Φ' (°)	c (psf)	Φ (°)	*τ/ σ ratio*	Minimum strength (psf)
Stacked Ash	95	150	34	150	34	-	-
Sluiced Ash	95	0	32	430	10	0.08	32
Embankment Fill	116	100	33	900	13	-	-
Berm Fill	116	100	33	900	13	-	-
Residuum	114	100	32	50	20	-	-
Saprolite	105	0	32	0	32	-	-
Partially Weathered Rock	135	300	35	300	35	-	-

VI. Results

Table 3 summarizes the results of the stability analyses for each section, and output figures from the SLOPE/W models are provided at the back of this document.

Table 3: Summary of Minimum Slope Stability Factors

Load Case	CCR Rule Criteria	Geometry	1-1	2-2	3-3	4-4
Steady State (Global Failure)	FS ≥ 1.50	Circular	2.67	2.71	3.16	3.13
Steady State (Local Failure)	FS ≥ 1.50	Circular	-	-	2.17	2.05
Temporary Loading (500 psf)	FS ≥ 1.30	Circular	2.67	2.26	2.65	1.99
Seismic (Pseudostatic)	FS ≥ 1.00	Circular	1.68	1.62	1.56	1.31
		Block	-	-	1.55	1.61
Post Liquefaction	FS ≥ 1.20	Circular	2.73	2.72	2.56	2.00
		Block	2.67	2.66	1.95	1.22

VII. Conclusions

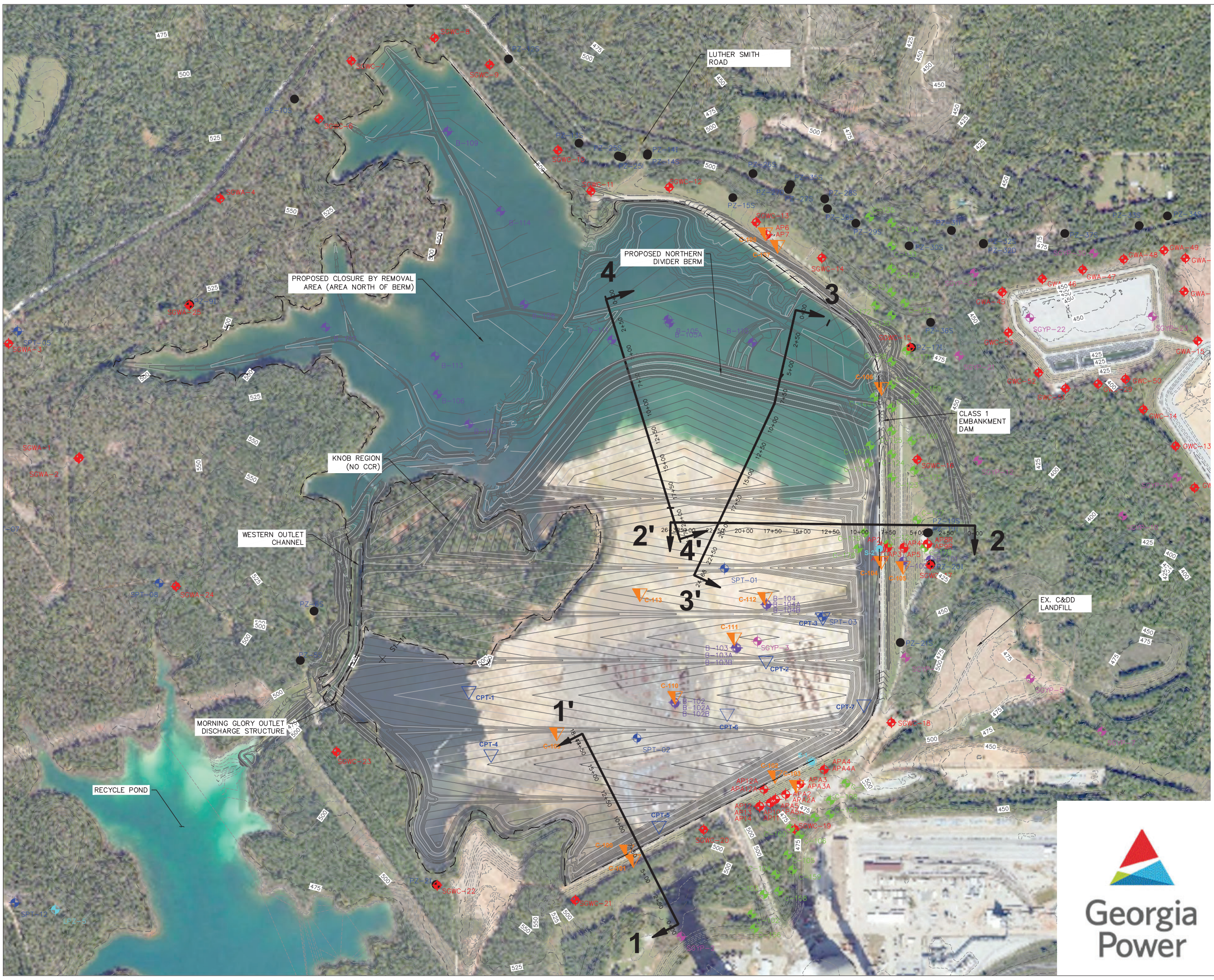
All cross-sections pass the static loading conditions (steady-state and maximum surcharge pool conditions). Both earthquake conditions (seismic and post-liquefaction conditions) were also satisfied at all cross sections.

VIII. References

- AECOM (2016). Geotechnical Data Report: Phase 2 Closure Feasibility Study – Southern Company Services, Inc./Georgia Power Company Plant Scherer Ash Pond.
- Makdisi, F.I. and Seed, B. H., August, 1977. “A Simplified Procedure for Estimating Earthquake-Induced Deformations in Dams and Embankments”, Earthquake Engineering Research Center Report No. UCB/EERC-77/19, University of California, Berkeley, CA.
- Southern Services, Inc. (1976). Hand Calculation for Slope Stability Analysis, Scherer Steam Plant. November 1, 1976.
- Southern Company Services, Inc. (1986). Plant Scherer Ash Pond Dam Stability Analysis. May 30, 1986.
- Southern Company Services, Inc. (2010). Slope Stability Analyses of Ash Pond and Retention Pond Dikes, Plant Scherer Ash Pond and Retention Pond. Calculation Number TV-SH-ECS9241-001. September 10, 2010.

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**7** of **7**
Description	**Geotechnical Calculations**	Computed by	**SAL**	Date	**09/10/21**
	Slope Stability Analysis	Checked by	**CAD**	Date	**09/10/21**

- Southern Company Services, Inc. (2015). Log of Test Boring, Geotechnical Investigation, Plant Scherer. Boring logs SPT-01 through SPT-12. May 11, 2015.
- Sowers, G.F. (1973). Engineering properties of residual soils derived from igneous and metamorphic rocks. Proc. 2nd Panamerican Conference on Soil Mechanics and Foundation Engineering, Sao Paulo, Brazil, 39-62.
- Thompson Engineering (2015). Logs for CPT-1 through CPT-7. June 11, 2015.



N

0 400 800

SCALE IN FEET

LEGEND

SGYP-7	EASTERN LANDFILL MONITORING WELL	
SGWC-18	CCR MONITORING WELLS	
C-156	1974 LAW ENGINEERING TESTING COMPANY BORINGS	
AP9R	1985 GEORGIA POWER BORING	
S-1	2010 SCS BORING LOCATION	
LPZ-5	2015 GOLDER ASSOCIATES PIEZOMETER LOCATION	
SPT-01	2015 SCS AS-BUILT SPT LOCATION	
● PZ-29S	2015–2016 SCS PIEZOMETER LOCATION	
▽ C-113	2016 SCS CPT LOCATION	
▽ CPT-7	2016 AECOM AS-BUILT CPT LOCATION	
B-103	2016 AECOM AS-BUILD BORING LOCATION	
450	PROPOSED MAJOR TOPO LINE	
———	PROPOSED MINOR TOPO LINE	
— — 450 — —	EXISTING MAJOR TOPO LINE	
- - - - - -	EXISTING MINOR TOPO LINE	

Georgia Power

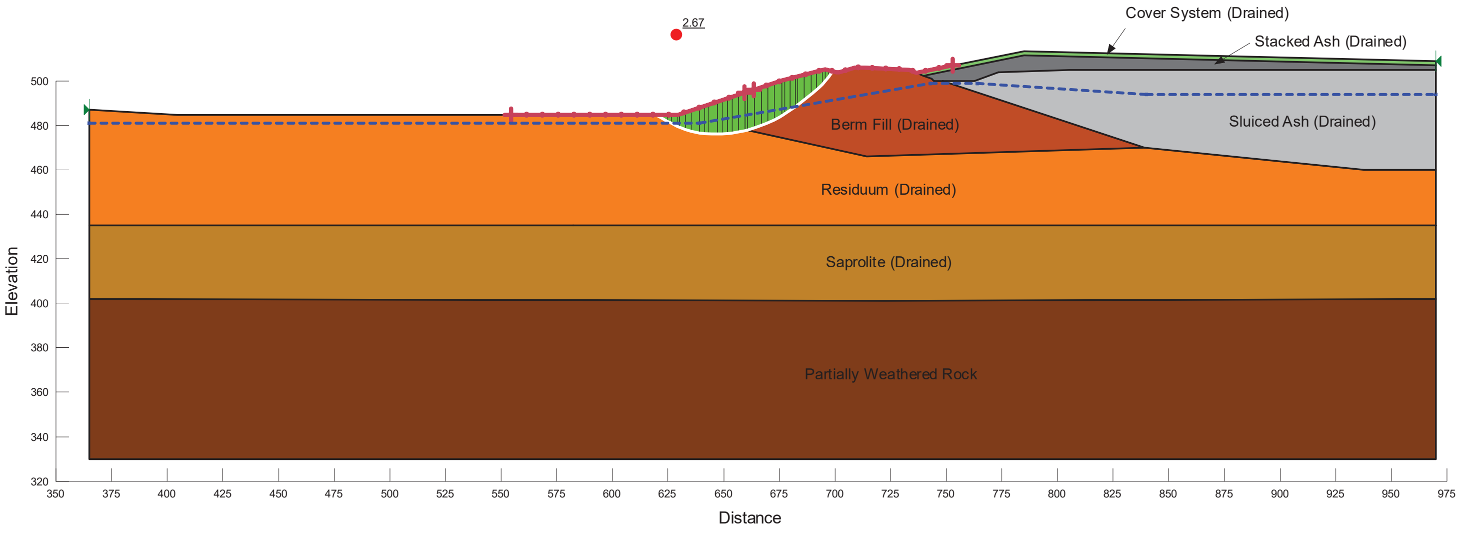
CCR CLOSURE
FOR
GEORGIA POWER
PLANT SCHERER ASH POND
MONROE COUNTY, GEORGIA

AECOM
(919) 461-1100
WWW.AECOM.COM
1600 PERIMETER PARK DRIVE
SUITE 400
MORRISVILLE, NC 27560

PROJ. NO.: 60563110	DWG. XXX-X-XX	EDIT MM/DD/YY	
SCALE: 1" = 400'	SSA FIGURE A		
DATE: 09/14/2021			

PROJECT: Plant Scherer
CROSS SECTION: 1-1'
CREATED BY: Lyons, Shane
ANALYSIS: 01-Long Term (Drained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Drained)	Mohr-Coulomb	95	0	32	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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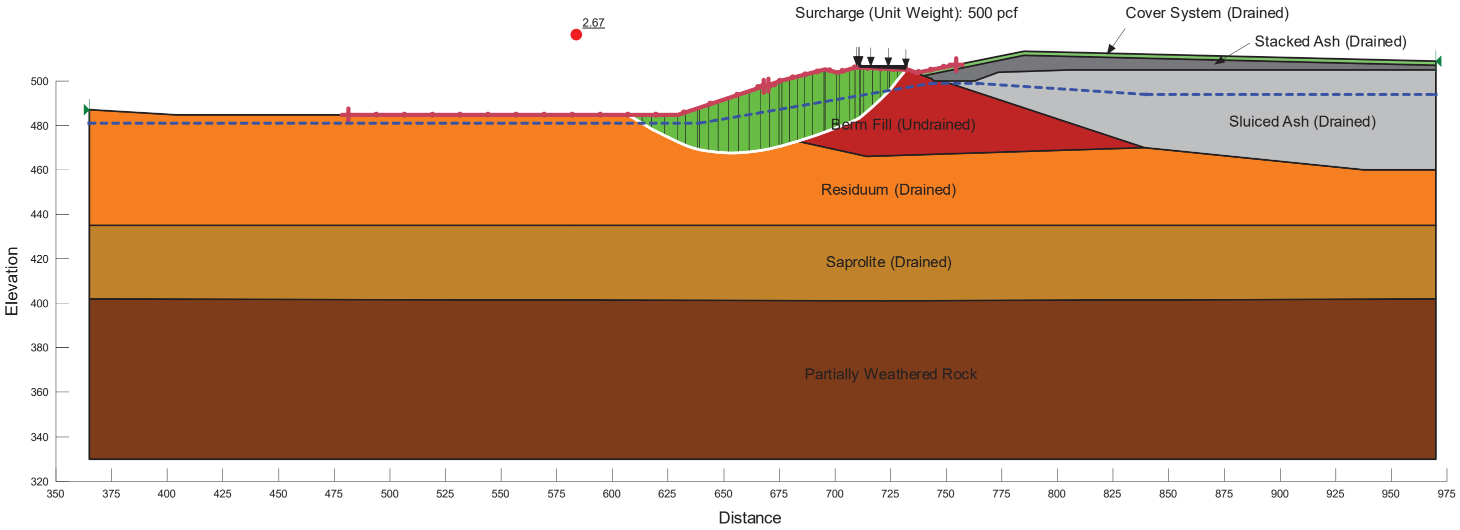
PROJECT: Plant Scherer
CROSS SECTION: 1-1'
CREATED BY: Lyons, Shane
ANALYSIS: 02-Temporary Loading (Undrained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Undrained)	Mohr-Coulomb	116	900	13	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Drained)	Mohr-Coulomb	95	0	32	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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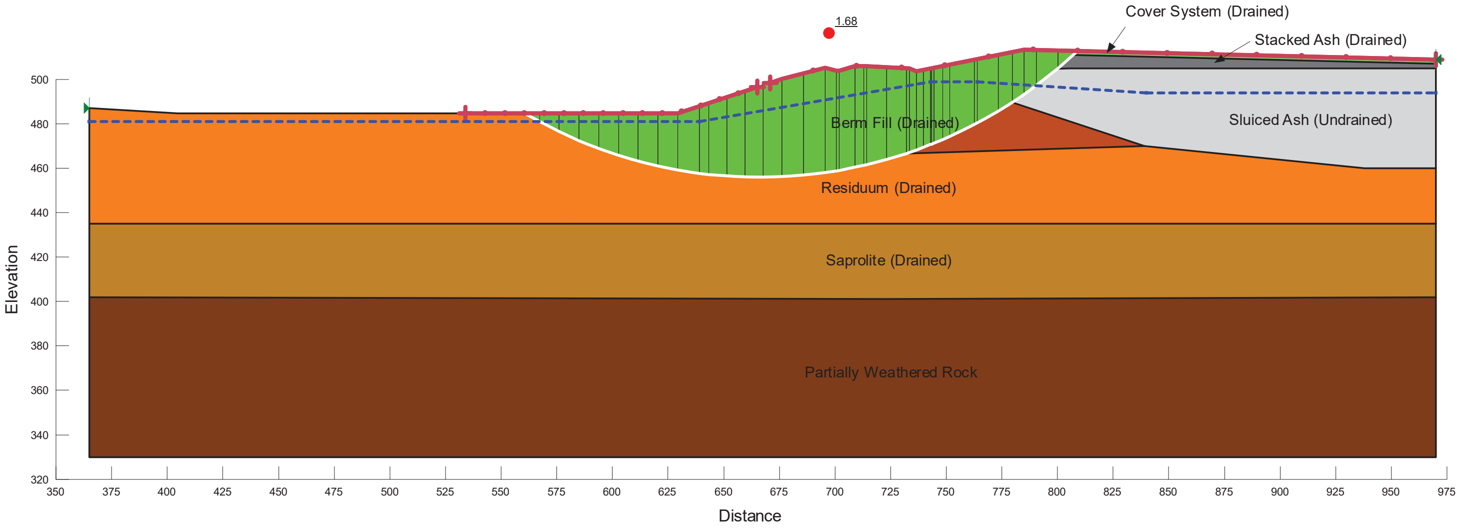
PROJECT: Plant Scherer
CROSS SECTION: 1-1'
CREATED BY: Lyons, Shane
ANALYSIS: 03-Pseudostatic (Drained)
METHOD: Spencer
DATE: 9/4/2018

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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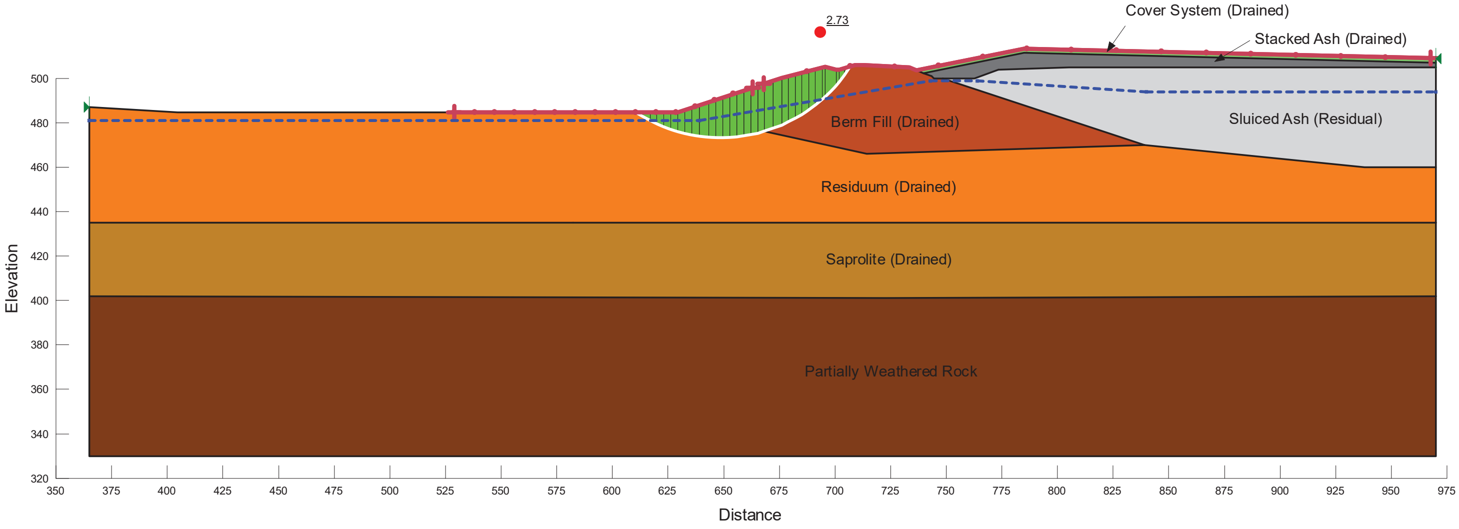
PROJECT: Plant Scherer
CROSS SECTION: 1-1'
CREATED BY: Lyons, Shane
ANALYSIS: 04a-Post Earthquake (Residual) - Circular
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Mi Str (ps
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1		
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1		
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1		
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1		
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1		
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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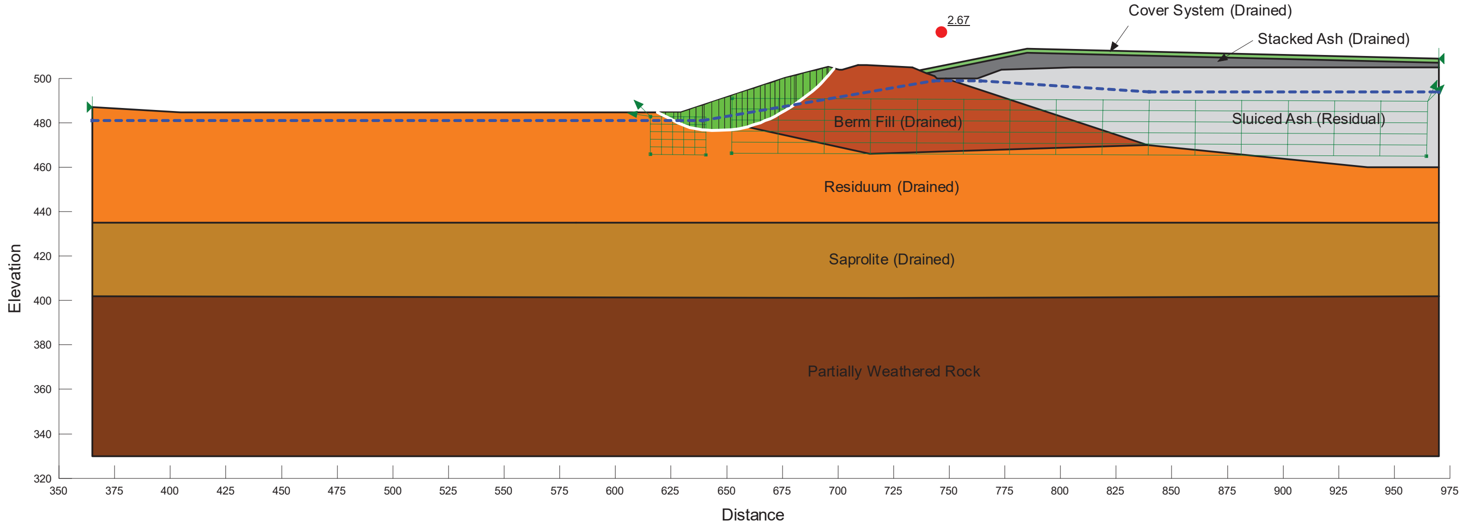
PROJECT: Plant Scherer
CROSS SECTION: 1-1'
CREATED BY: Lyons, Shane
ANALYSIS: 04b-Post Earthquake (Residual) - Block
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Mi Str (ps
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1		
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1		
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1		
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1		
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1		
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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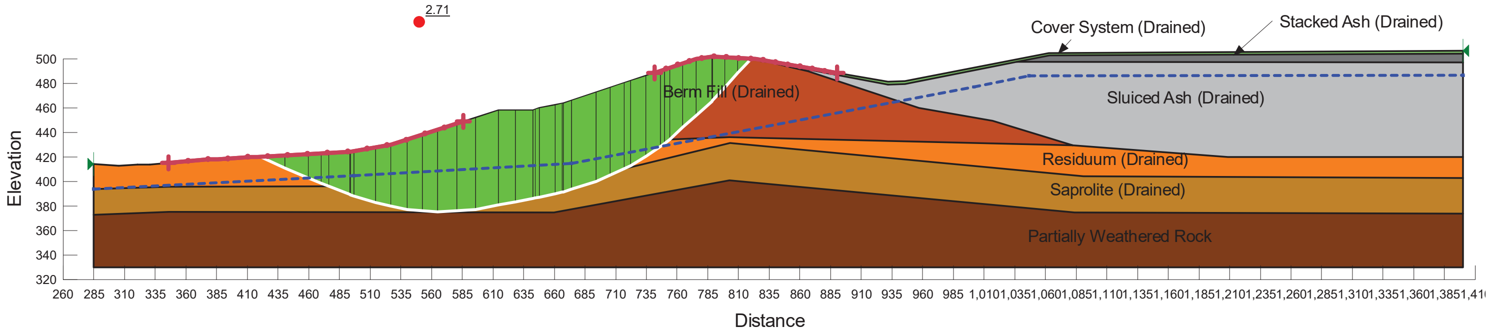
PROJECT: Plant Scherer
CROSS SECTION: 2-2'
CREATED BY: Lyons, Shane
ANALYSIS: 01-Long Term (Drained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Drained)	Mohr-Coulomb	95	0	32	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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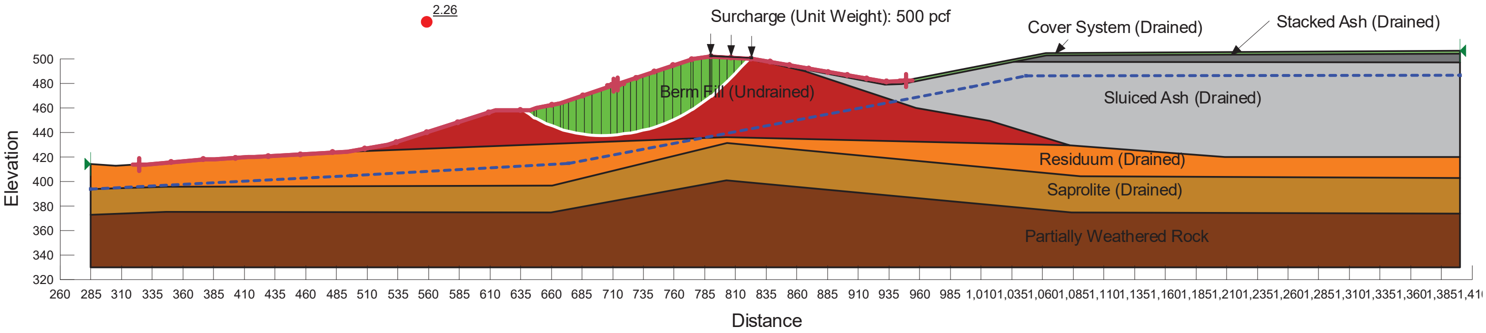
PROJECT: Plant Scherer
CROSS SECTION: 2-2'
CREATED BY: Lyons, Shane
ANALYSIS: 02-Temporary Loading (Undrained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Undrained)	Mohr-Coulomb	116	900	13	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Drained)	Mohr-Coulomb	95	0	32	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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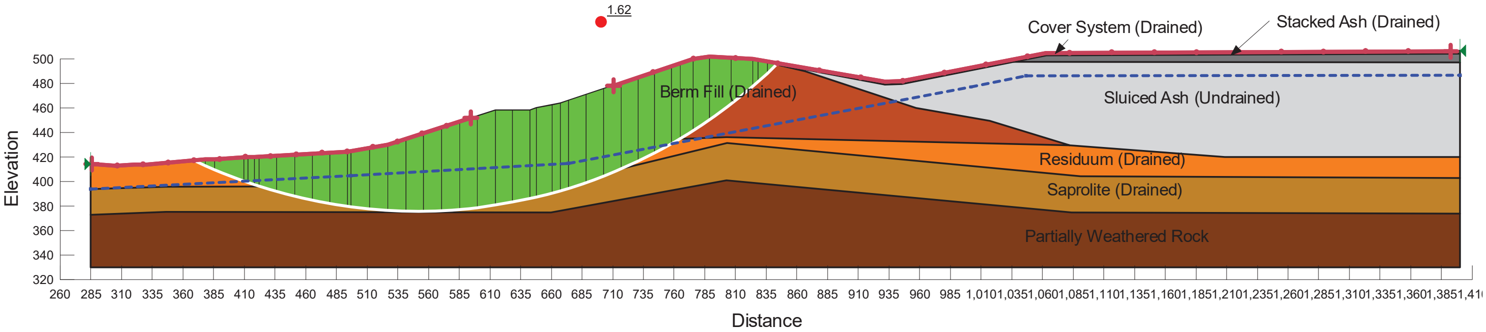
PROJECT: Plant Scherer
CROSS SECTION: 2-2'
CREATED BY: Lyons, Shane
ANALYSIS: 03-Pseudostatic (Drained)
METHOD: Spencer
DATE: 9/4/2018

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟨	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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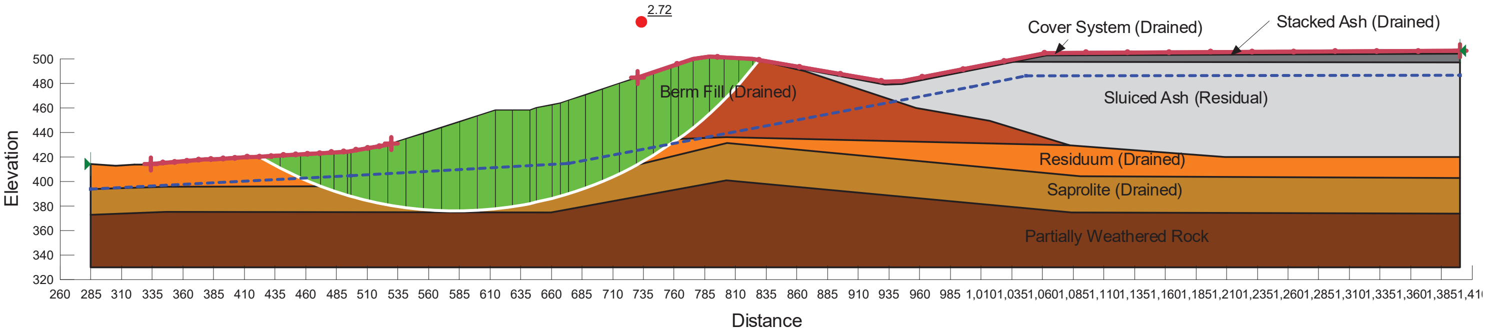
PROJECT: Plant Scherer
CROSS SECTION: 2-2'
CREATED BY: Lyons, Shane
ANALYSIS: 04a-Post Earthquake (Residual) - Circular
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigm Ratio
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1	
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1	
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1	
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1	
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1	
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1	



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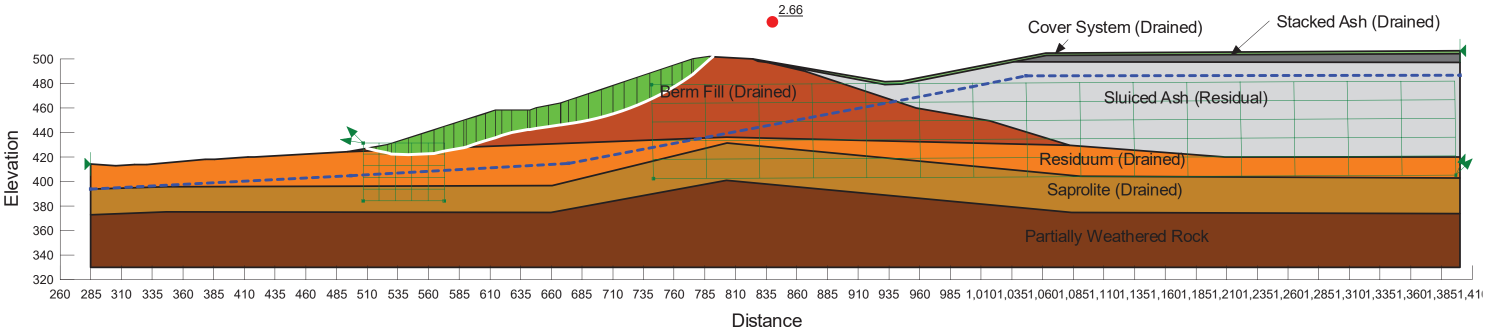
PROJECT: Plant Scherer
CROSS SECTION: 2-2'
CREATED BY: Lyons, Shane
ANALYSIS: 04b-Post Earthquake (Residual) - Block
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigm Ratio
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1	
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1	
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1	
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1	
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1	
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1	



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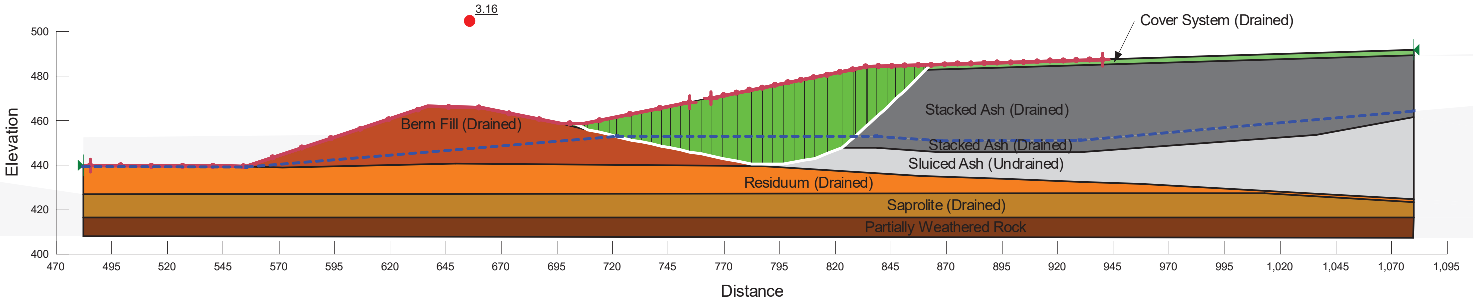
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 01a-Long Term (Drained)
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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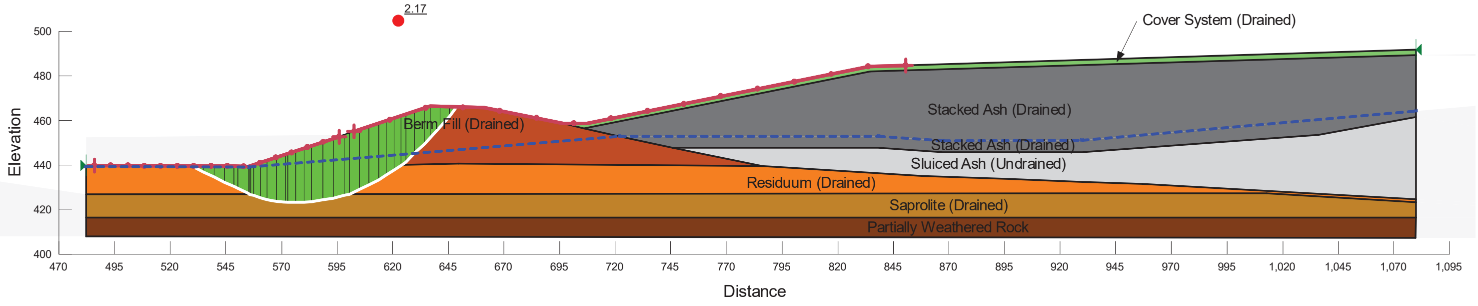
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 01b-Berm Failure (Drained)
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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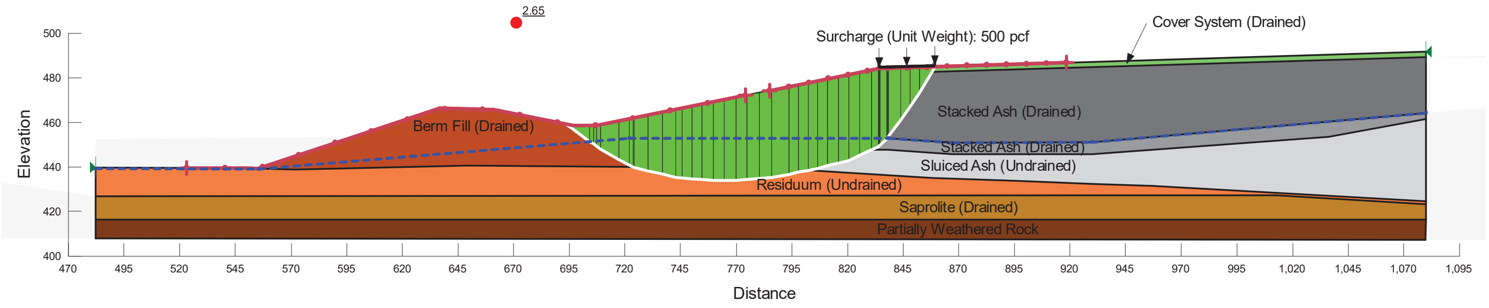
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 02-Temporary Loading (Undrained)
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Undrained)	Mohr-Coulomb	114	50	20	0	1
🟨	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
◼	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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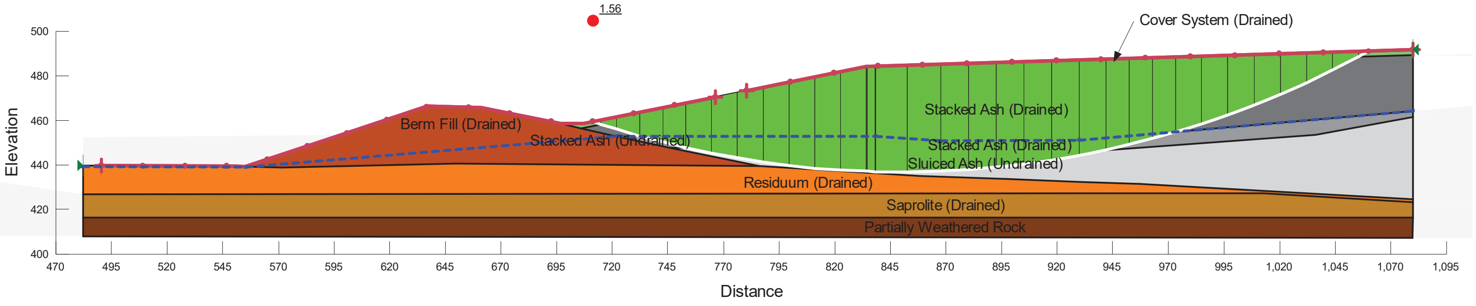
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 03a-Pseudostatic (Undrained)
METHOD: Spencer
DATE: 9/10/2021

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
▩	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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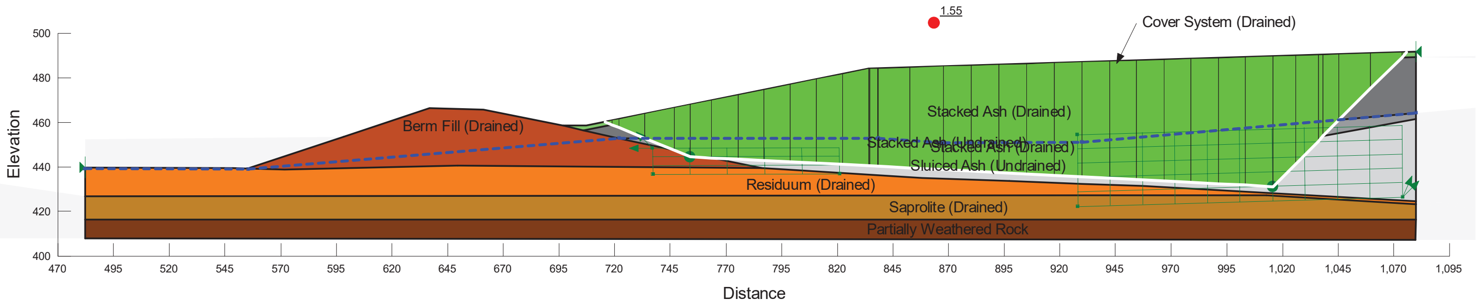
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 03b-Pseudostatic Translational (Undrained)
METHOD: Spencer
DATE: 9/10/2021

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
◼	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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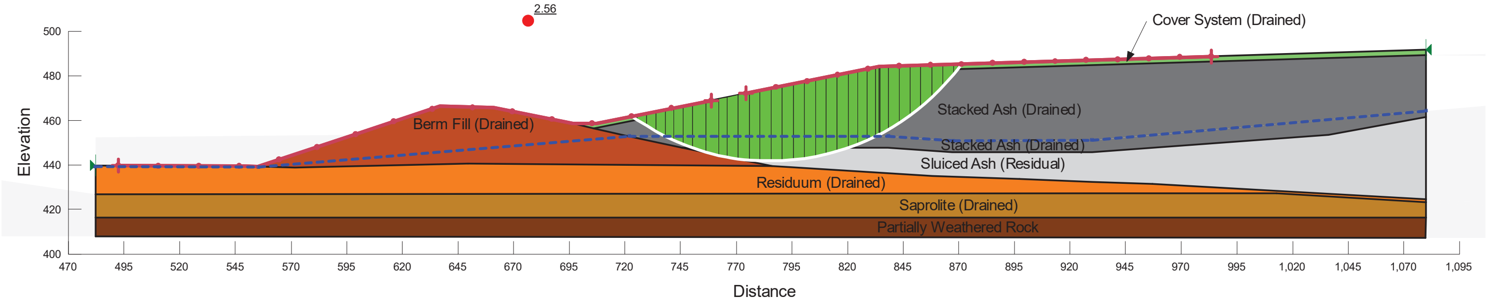
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 04a-Post Earthquake (Residual) - Circular
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Minimum Strength (psf)
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1		
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1		
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1		
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1		
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1		
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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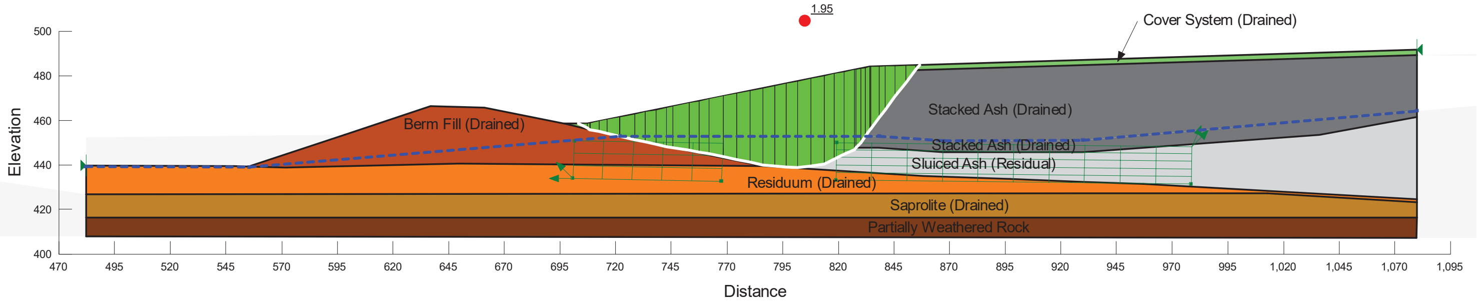
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 04b-Post Earthquake (Residual) - Block
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Minimum Strength (psf)
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1		
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1		
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1		
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1		
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1		
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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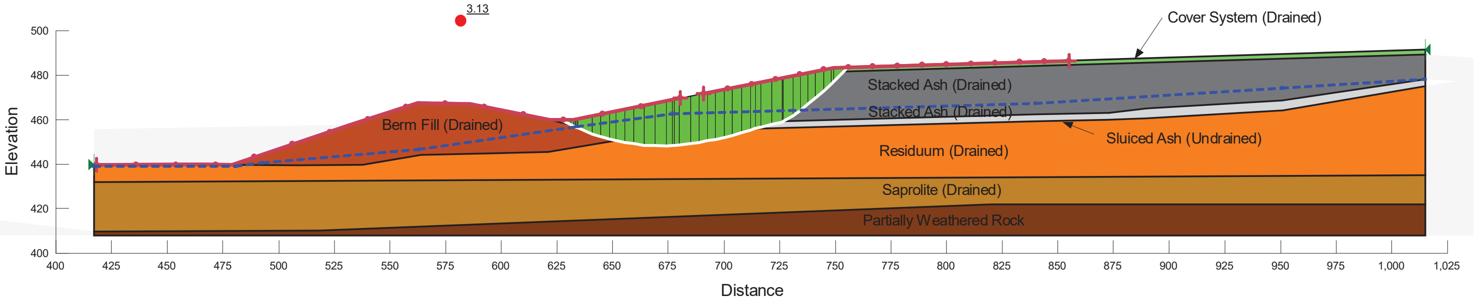
PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 01a-Long Term (Drained)
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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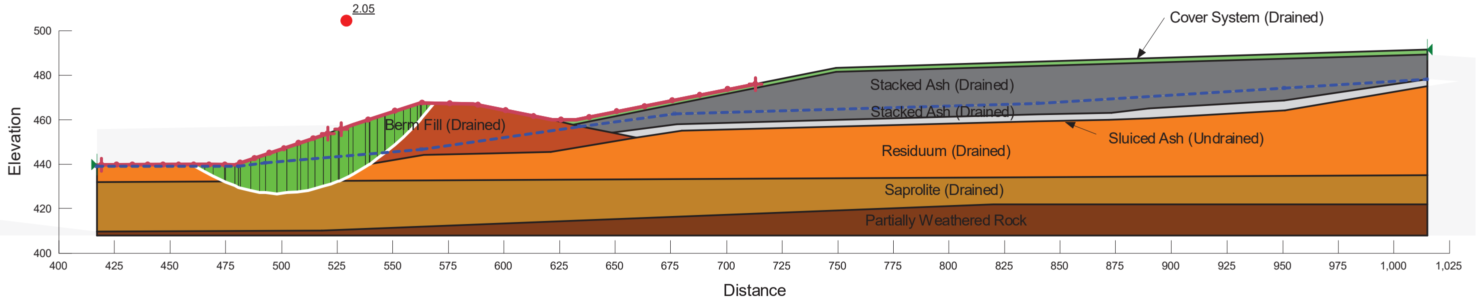
PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 01b- Berm Failure (Drained)
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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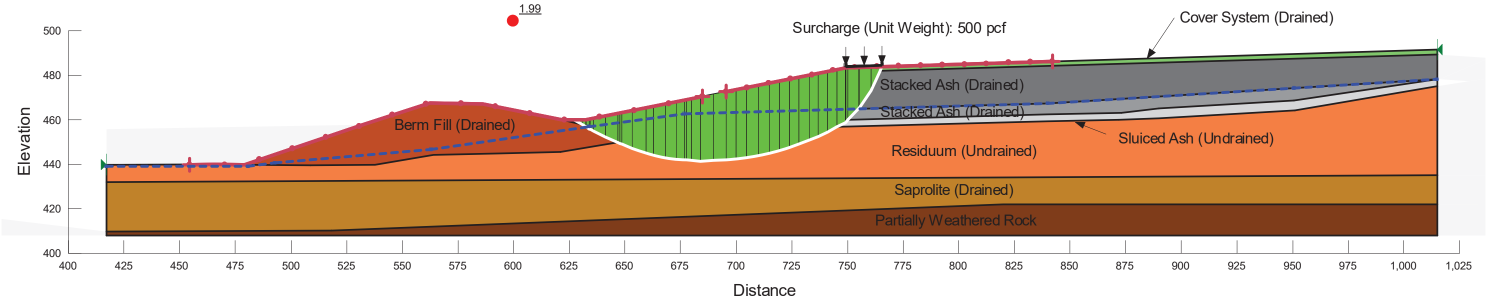
PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 02-Temporary Loading (Undrained)
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Undrained)	Mohr-Coulomb	114	50	20	0	1
🟨	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
◼	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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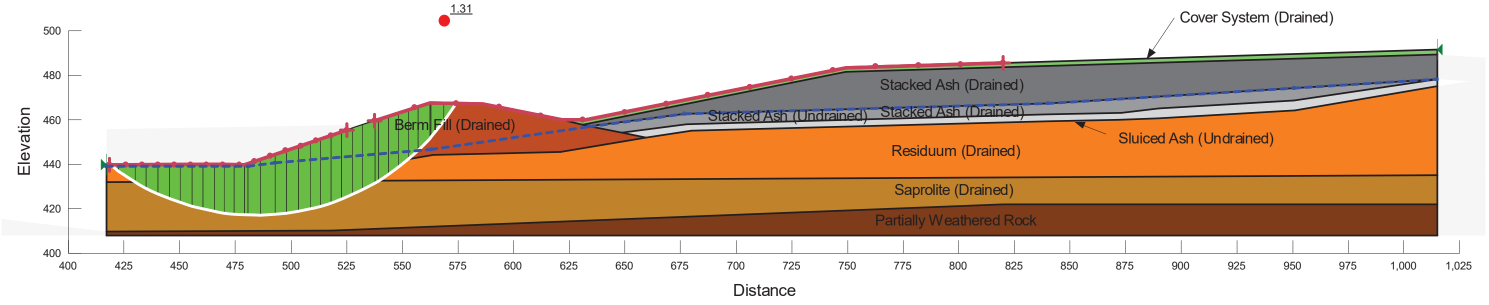
PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 03a-Pseudostatic (Undrained)
METHOD: Spencer
DATE: 9/10/2021

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
⬜	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1

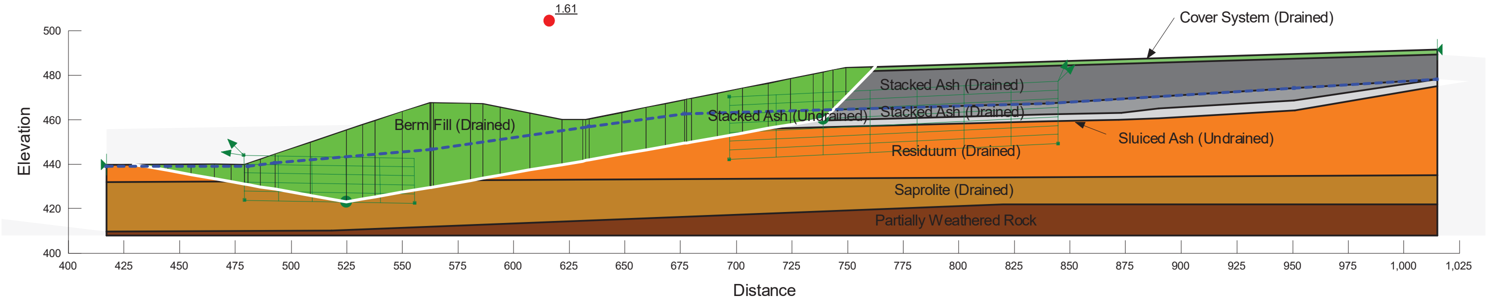


Directory: \\na.aecomnet.com\lfs\AMER\Morrisville-USMVL01\DCS\Projects\L-URS\Jobs4_Projects\SCS CCP\Scherer GA_EPD_CCR Permitting (60563110)\9.0 Calculations\A4 - SSA\Rev1 - 2021\Plant Scherer XS 4-4' - S

PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 03b-Pseudostatic Translational (Undrained)
METHOD: Spencer
DATE: 9/10/2021

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
⬛	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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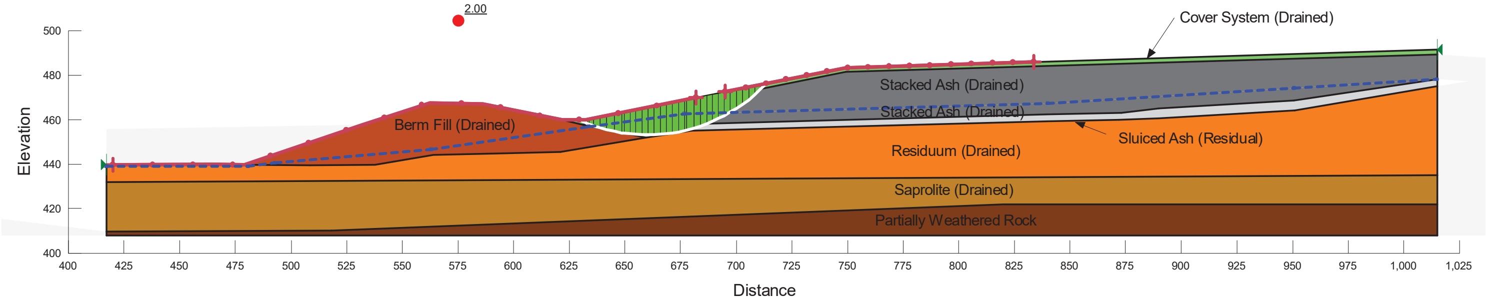
PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 04a-Post Earthquake (Residual) - Circular
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Minimum Strength (psf)
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1		
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1		
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1		
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1		
🟨	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1		
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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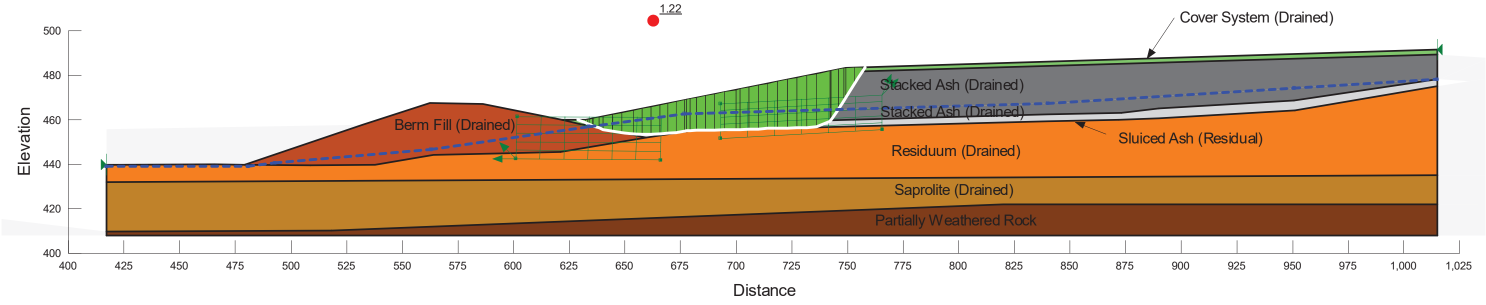
PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 04b-Post Earthquake (Residual) - Block
METHOD: Spencer
DATE: 9/10/2021

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Minimum Strength (psf)
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1		
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1		
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1		
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1		
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1		
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (v4.1

Spectral Period

Peak ground acceleration

Latitude

Decimal degrees

33.06045

Time Horizon

Return period in years

2475

Longitude

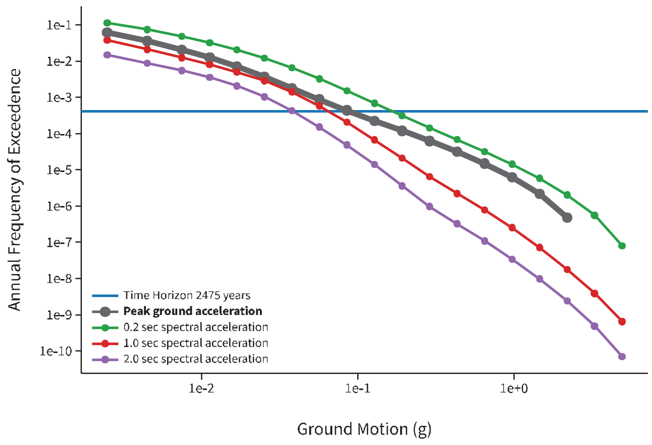
Decimal degrees, negative values for western longitudes

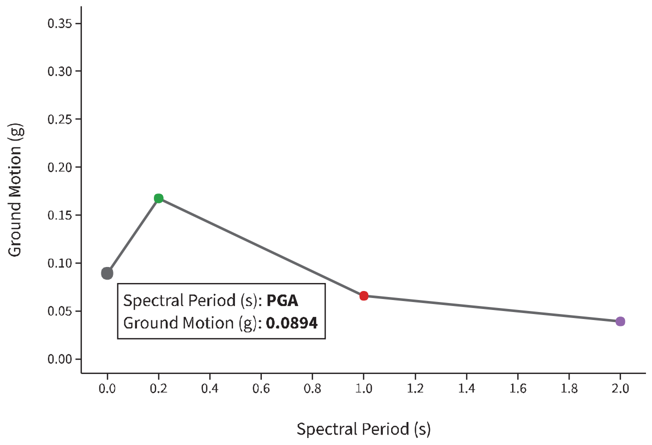
-83.81007

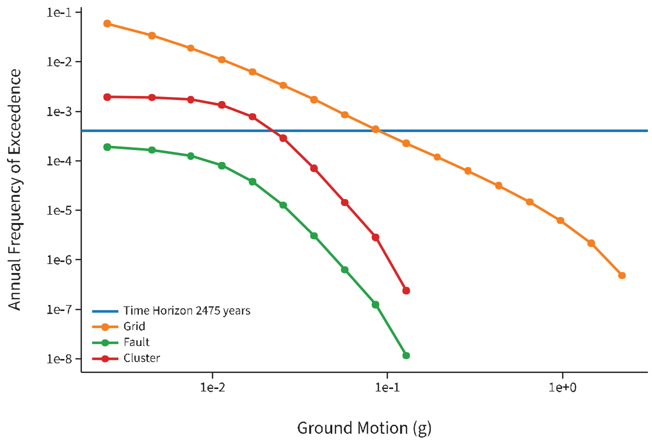
Site Class

760 m/s (B/C boundary)

Hazard Curve


Hazard Curves


Uniform Hazard Response Spectrum

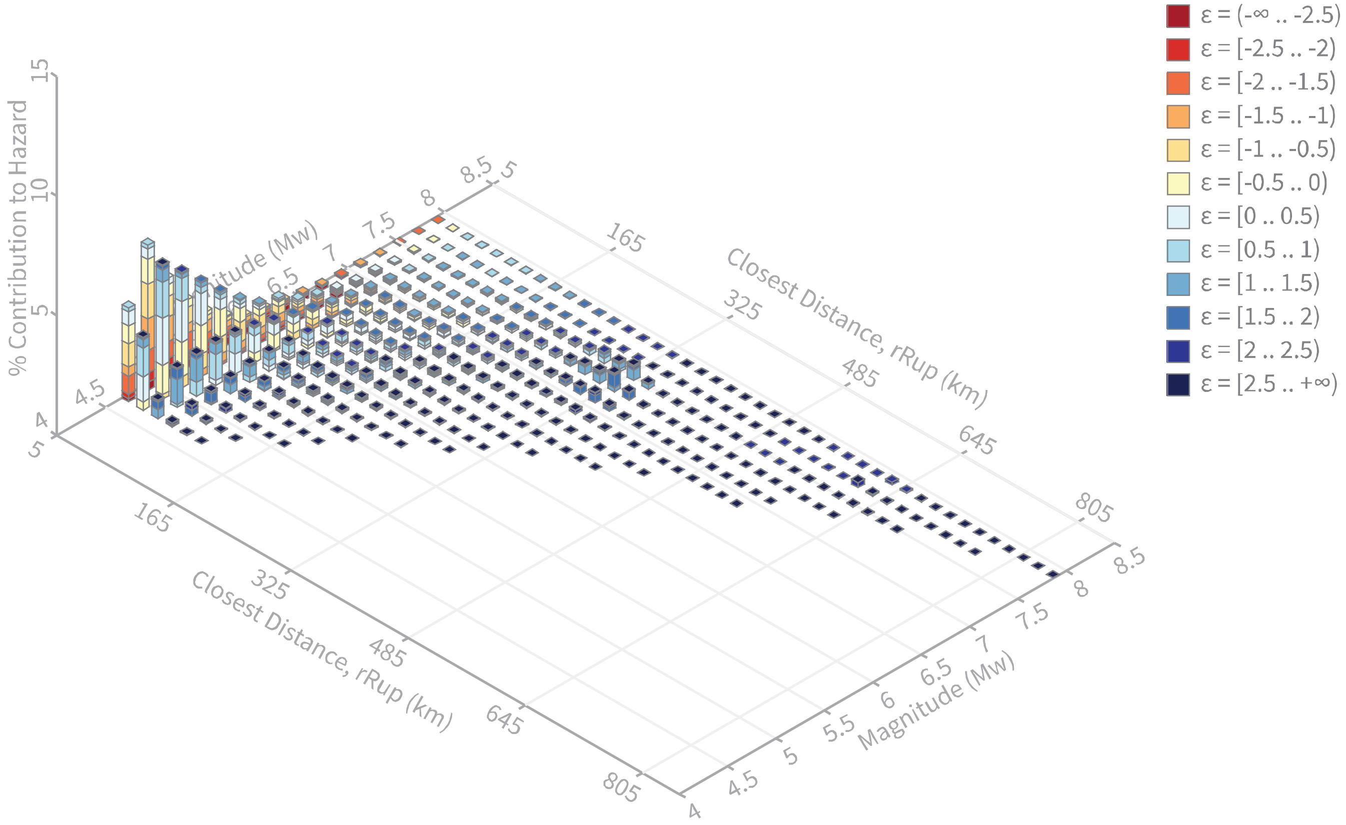

Component Curves for Peak ground acceleration

View Raw Data

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.089372474 g

Recovered targets

Return period: 2480.2455 yrs
Exceedance rate: 0.0004031859 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 1.52 %

Mean (for all sources)

r: 79.16 km
m: 5.77
ε_0: 0.08 σ

Mode (largest r-m bin)

r: 13.6 km
m: 4.9
ε_0: -1.05 σ
Contribution: 6.07 %

Mode (largest ε_0 bin)

r: 28.68 km
m: 4.9
ε_0: 0.28 σ
Contribution: 1.98 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)

ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
USGS Fixed Smoothing Zone 2 (opt)	Grid							25.92
PointSourceFinite: -83.810, 33.218		17.93	5.21	-0.85	83.810°W	33.218°N	0.00	2.44
PointSourceFinite: -83.810, 33.308		27.46	5.33	-0.23	83.810°W	33.308°N	0.00	2.40
PointSourceFinite: -83.810, 33.263		22.68	5.27	-0.50	83.810°W	33.263°N	0.00	1.97
PointSourceFinite: -83.810, 33.353		32.24	5.39	-0.02	83.810°W	33.353°N	0.00	1.75
PointSourceFinite: -83.810, 33.173		13.27	5.17	-1.35	83.810°W	33.173°N	0.00	1.68
PointSourceFinite: -83.810, 33.398		37.02	5.46	0.15	83.810°W	33.398°N	0.00	1.36
PointSourceFinite: -83.810, 33.488		46.53	5.60	0.39	83.810°W	33.488°N	0.00	1.35
PointSourceFinite: -83.810, 33.443		41.78	5.53	0.28	83.810°W	33.443°N	0.00	1.11
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USGS Adaptive Smoothing Zone 2 (opt)	Grid							20.57
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PointSourceFinite: -83.810, 33.308		27.46	5.33	-0.23	83.810°W	33.308°N	0.00	2.10
PointSourceFinite: -83.810, 33.263		22.68	5.27	-0.50	83.810°W	33.263°N	0.00	1.72
PointSourceFinite: -83.810, 33.173		13.27	5.17	-1.35	83.810°W	33.173°N	0.00	1.57
PointSourceFinite: -83.810, 33.353		32.24	5.39	-0.02	83.810°W	33.353°N	0.00	1.55
PointSourceFinite: -83.810, 33.398		37.02	5.46	0.15	83.810°W	33.398°N	0.00	1.07
PointSourceFinite: -83.810, 33.488		46.53	5.60	0.39	83.810°W	33.488°N	0.00	1.04
SSCn Fixed Smoothing Zone 4 (opt)	Grid							14.82
PointSourceFinite: -83.810, 33.263		22.68	5.27	-0.50	83.810°W	33.263°N	0.00	1.78
PointSourceFinite: -83.810, 33.173		13.27	5.17	-1.35	83.810°W	33.173°N	0.00	1.68
PointSourceFinite: -83.810, 33.308		27.46	5.33	-0.23	83.810°W	33.308°N	0.00	1.51
PointSourceFinite: -83.810, 33.353		32.24	5.39	-0.02	83.810°W	33.353°N	0.00	1.22
SSCn Adaptive Smoothing Zone 4 (opt)	Grid							13.30
PointSourceFinite: -83.810, 33.173		13.27	5.17	-1.35	83.810°W	33.173°N	0.00	1.57
PointSourceFinite: -83.810, 33.263		22.68	5.27	-0.50	83.810°W	33.263°N	0.00	1.55
PointSourceFinite: -83.810, 33.308		27.46	5.33	-0.23	83.810°W	33.308°N	0.00	1.36
PointSourceFinite: -83.810, 33.353		32.24	5.39	-0.02	83.810°W	33.353°N	0.00	1.12
SSCn Fixed Smoothing Zone 7 (opt)	Grid							10.82
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SSCn Adaptive Smoothing Zone 7 (opt)	Grid							7.09
PointSourceFinite: -83.810, 33.218		17.93	5.21	-0.85	83.810°W	33.218°N	0.00	1.53
Charleston Local Zone	Grid							3.38
Charleston Regional Zone	Grid							1.75
Charleston Narrow Zone	Grid							1.48

Appendix A5

Foundation Analysis (North Berm)

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Appendix A5

AECOM

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**1** of 6
Description	**Geotechnical Calculations**	Computed by	**SAL**	Date	**07/30/18**
	Design of Proposed North Berm	Checked by	**VKG**	Date	**08/30/18**

This calculation package summarizes the design process performed for the proposed North Berm in support of the Engineering Report for the Plant Scherer Ash Pond Basin Closure. Figures, calculations and computer program outputs are provided as attachments and are referenced herein.

I. Objective

The objective for the North Berm is to provide a visual separation between the closure and the surrounding areas and function as a haul road for site access, as well as provide toe support for the closure slope, if necessary. In order to determine a minimum size for the berm for geotechnical stability of the closure, a slope stability analysis was performed to determine factors of safety (FoS) at critical cross section locations across the proposed North Berm for the following loading cases:

- Static, Steady-State, Global Failure Conditions;
- Static, Steady-State, Post-Construction Conditions;
- Static, Temporary Loading, Post-Construction Conditions;
- Seismic Slope Stability Analysis; and
- Post-Liquefaction Condition.

The factors of safety determined from each of these loading conditions will be utilized to determine a design for the North Berm that enables the closure to meet the requirements outlined by the USEPA CCR Rule criteria. The methodology used to perform the slope stability analysis and the results of the analyses are summarized in the subsequent sections listed below.

II. Selection of Design Geometry

The proposed North Berm is to have multiple purposes, functioning as both a visual separation between the closure and the surrounding areas as well as a haul road for site access. The berm will also provide toe support for geotechnical stability of the closure slopes. The berm is to be constructed directly on the native soils, and any CCR material located in the alignment of the proposed berm is to be removed prior to berm construction. To accommodate vehicle traffic, the crest of the berm was designed to be 16 feet wide and varied from 476 feet above mean sea level (ft-msl) where it meets with the crest of the east embankment to approximately 464 ft-msl near the detention basin. The side slopes then extended down at 3H:1V slopes to the surface of the native soils. A minimum embankment height of 10 ft was selected to minimize the volume of the berm while still maintaining it as a visual separation of the closure from the surrounding areas. The analyses presented herein are based on this design.

III. Development of Cross-Sections for Analysis

A total of two cross-sections (3-3 and 4-4) were utilized to evaluate the proposed berm stability, as shown in the attached **SSA Figure A**. The location of each cross-section was selected based on the volume and quality of available geotechnical data, existing site topography (locations with critical topographic geometries were used to the greatest extent possible), proposed grades including the height of the closure fill above the berm,, and subsurface stratigraphy. In general, the selected cross-sections represent the most critical configuration for the segment of the berm that they represent. Each of the analysis cross-sections selected are briefly summarized below:

Section 3-3: This section was taken near the center of the northeastern portion of the proposed berm of the Ash Pond closure. The crest of the berm in this section is approximately El. 453.3 ft. with the downstream toe near El. 445.5 ft. The proposed berm is designed to be 16 ft wide and has a downstream slope of 3H:1V. The area behind the berm will be filled with ash removed from the northern portion of the pond outside of the closure cap and be stacked at 5H:1V slopes. Section 3-3 was established as the typical configuration of the northeastern berm for comparison purposes.

Section 4-4: This section was taken near the center of the northwestern portion of the proposed berm of the Ash Pond closure. The crest of the berm in this section is approximately El. 450.6 ft. with the downstream toe near El. 439.4 ft. The proposed berm is designed to be 16 ft wide and has a downstream slope of 3H:1V. The area behind the berm will be filled with ash removed from the northern portion of the pond outside of the closure cap and be stacked at 5H:1V slopes. Section 4-4 was established as the typical configuration of the northwestern berm for comparison purposes.

IV. Subsurface Conditions

Subsurface materials and extents (stratigraphy) at each cross section were developed by utilizing nearby subsurface explorations (CPTs and borings) from AECOM's exploration activities and historic geotechnical explorations. The subsurface strata generally encountered across the exploration locations can be generalized into six typical layers used in the slope stability analysis. These layers are listed below and are further described in Appendix A1 – Material Characterization.

- Proposed Stacked Ash Materials
- Sluiced Ash Materials
- Berm Fill Materials
- Residuum
- Saprolite
- Partially Weathered Rock

Material interfaces inferred from the subsurface explorations nearest to the cross-sections were transposed onto the profile and a reasonable interpretation of the subsurface stratigraphy between the exploration locations was developed. **Table 1** below summarizes the exploration locations utilized to construct each cross-section:

Table 1: Summary of Geotechnical Explorations at Cross Sectional Locations

Cross-Section	Geotechnical Explorations Used
3-3	B-110, SPT-01*
4-4	B-108, B-111, B-105, SPT-01*

(*) - Denotes historic borings from the 2015 geotechnical exploration performed by Southern Company Services.

Groundwater tables were modeled as piezometric lines in SLOPE/W, with elevations and configuration of the lines primarily established based on the piezometers installed during the 2016 AECOM exploration. The normal operating level of the pond is near El. 494.5 ft. The phreatic surface for the sections through the ash delta and locations south was assumed to be 10 feet below the lowest excavation grade to simulate dewatering needs for closure construction. In addition, the phreatic surface located downstream of the ash face of the ash delta and directly behind the proposed northern berm was conservatively assumed to be slightly elevated (approximately 5 feet above existing CCR ash limits) for post-closure conditions. The groundwater elevations downstream of the embankments were utilized based on the post-closure groundwater modeling analysis as documented in the Phase 3 Advanced Engineering Methods report (AECOM, 2017) and groundwater depths at the time of drilling. These groundwater assumptions are conservative for the analysis conditions presented herein, as the long term phreatic levels are anticipated to drop down substantially in most areas of the pond, relative to current conditions and the conditions expected after construction dewatering has occurred.

The groundwater elevations downstream of the berm were established based on the post-closure groundwater modeling analysis as documented in the Phase 3 Advanced Engineering Methods report (AECOM, 2017) and groundwater depths at the time of drilling.

V. Analysis Methodology

Analyses were performed using Spencer's Method which is a limit equilibrium slope stability analysis procedure. The computer program SLOPE/W 2016 by Geo-Slope International was utilized. The program analyzes a large number of potential slip surface geometries and identifies the geometry that results in a critical (i.e. lowest) factor of safety (FS). Additional information on the program is available at http://www.geo-slope.com/. Both circular and block shaped failure surfaces were analyzed, for the each of the loading cases considered.

Each section was analyzed for the following cases:

- **Static, Steady-State, Global Failure Condition:** This case models the conditions under static, long-term conditions. Drained (effective stress) shear strength parameters were used for all materials, and phreatic conditions were estimated as described in the preceding section. A **Factor of Safety of 1.50** is targeted for this loading condition. Failure is located within the proposed berm.
- **Static, Steady-State, Temporary Loading, Post-Construction Condition:** This case models the conditions under static, long-term conditions, with a temporary construction load placed at the crest of the slope. Undrained (total stress) shear strength parameters were used for materials which would experience significant changes in stress as a result of the surcharge loading, and phreatic conditions were estimated as described in the preceding section. A **Factor of Safety of 1.30** is targeted for this loading condition.
- **Seismic Stability Condition:** These analyses incorporate a horizontal seismic coefficient k_h selected to be representative of expected loading during the design earthquake event (i.e., a "pseudostatic" analysis). The analyses utilized peak undrained strength parameters in soils that are not consider to be rapidly draining materials, and peak drained strengths in soils considered to freely drain. The phreatic surface and pore water pressures corresponding to the Steady State case from the static analyses were utilized. Seismic loading was included in this analysis using a pseudostatic coefficient (k_h). A **Factor of Safety of 1.00** is targeted for this loading condition.

  The pseudostatic coefficient was selected using the United States Geological Survey (USGS) online Unified Hazard Tool to determine the site peak ground acceleration having a 2% or greater probability of occurring in 50 years of 0.0894g as shown in the attachments. Two borings were analyzed to determine the Seismic Site Class utilizing Method B of the AASHTO LRFD Bridge Design Specifications Article C3.10.3.1. The site was found to be Seismic Site Class D with a peak transverse base acceleration of 0.14g and a peak transverse crest acceleration of 0.44g when adjusted for the site class. Specifically, the pseudostatic coefficient was taken as the parameter k_{max}, which represents the peak average acceleration along the failure surface. As shown in **Figure 1** below the ratio k_{max}/u_{max} (where u_{max} is the peak acceleration at the crest of the embankment) for a full height failure surface (y/H=1.0) is 0.34. Therefore, the pseudostatic coefficient k_h was estimated as k_h=0.34*0.44g = 0.15g for these analyses.

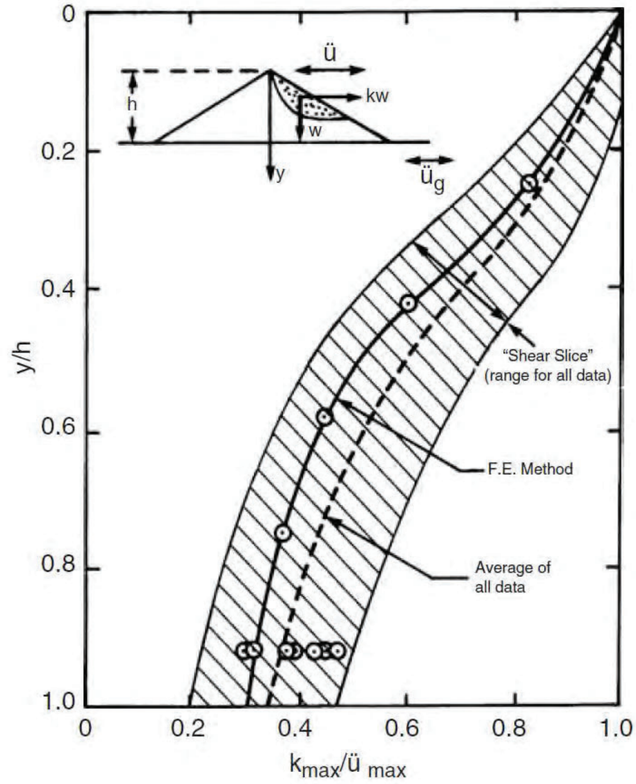

Figure 1: Determination of Maximum Average Acceleration Along Failure Surface

- **Static, Post-Liquefaction Condition:** These analyses were performed at each stability cross section where liquefaction triggering analysis indicates potential liquefaction of granular, non-plastic materials or cyclic softening of fine-grained soils. The purpose of the post-liquefaction stability analysis is to assess stability conditions immediately following a seismic event. No horizontal seismic coefficient is included in these analyses, but selection of strength parameters for the analyses takes into account the potential for softening/ weakening of the soils as a result of pore pressures generated in sand-like materials, or cyclic softening in clay-like materials due to the earthquake shaking. A **Factor of Safety of 1.20** is targeted for this loading condition.

VI. Material Properties for Analysis

Material properties for slope stability analyses were developed using both laboratory testing data (index and strength testing) and strength correlations from CPT and SPT data. Details of the material characterization and strength parameter selection for each stratum are provided in **Attachment A1** of the Engineering Report. The properties used in the stability analysis are summarized in **Table 2** below:

Table 2: Summary of Material Parameters used in Stability Analysis

Material	**Unit Weight (pcf)**	**Effective (drained) Shear Strength Parameters**		**Total (undrained) Shear Strength Parameters**		**Post-Liquefaction Shear Strength Parameters**	
		c’ (psf)	Φ’ (°)	c (psf)	Φ (°)	*τ/ σ ratio*	Minimum strength (psf)
Stacked Ash	95	150	34	150	34	-	-
Sluiced Ash	95	0	32	430	10	0.08	32
Berm Fill	116	100	33	900	13	-	-
Residuum	114	100	32	50	20	-	-
Saprolite	105	0	32	0	32	-	-
Partially Weathered Rock	135	300	35	300	35	-	-

VII. Results

Table 3 summarizes the results of the stability analyses for each section, and output figures from the SLOPE/W models are provided at the back of this document.

Table 3: Summary of Minimum Slope Stability Factors

Load Case	**CCR Rule Criteria**	**Geometry**	**3-3**	**4-4**
Steady State (Global Failure)	FS ≥ 1.50	Circular	3.39	3.08
Steady State (Local Failure)	FS ≥ 1.50	Circular	3.41	3.03
Temporary Loading (500 psf)	FS ≥ 1.30	Circular	2.56	2.68
Seismic (Pseudostatic)	FS ≥ 1.00	Circular	1.85	1.59
		Block	1.61	1.65
Post Liquefaction	FS ≥ 1.20	Circular	3.08	2.40
		Block	2.01	2.65

Job	**Plant Scherer – Ash Pond Closure**	Project No.	**60563110**	Sheet	**6** of 6
Description	**Geotechnical Calculations**	Computed by	**SAL**	Date	**07/30/18**
	Design of Proposed North Berm	Checked by	**VKG**	Date	**08/30/18**

VIII. Conclusions

All cross-sections pass both the static (steady-state and maximum surcharge pool) and earthquake (seismic and post-liquefaction) loading conditions.

The analyses indicate that proposed berm is stable under the conditions analyzed, if the minimum berm described in Section II of this memo is utilized. Therefore, the design used for the North Berm is as follows:

- Minimum berm height: 10 ft;
- Berm crest elevations: 464 ft to 476 ft
- Berm crest width: 16 ft;
- Exterior berm slope: 3H:1V; and
- Interior berm slope: 2H:1V.

IX. References

- AECOM (2016). Geotechnical Data Report: Phase 2 Closure Feasibility Study – Southern Company Services, Inc./Georgia Power Company Plant Scherer Ash Pond.
- Makdisi, F.I. and Seed, B. H., August, 1977. “A Simplified Procedure for Estimating Earthquake-Induced Deformations in Dams and Embankments”, Earthquake Engineering Research Center Report No. UCB/EERC-77/19, University of California, Berkeley, CA.
- Southern Services, Inc. (1976). Hand Calculation for Slope Stability Analysis, Scherer Steam Plant. November 1, 1976.
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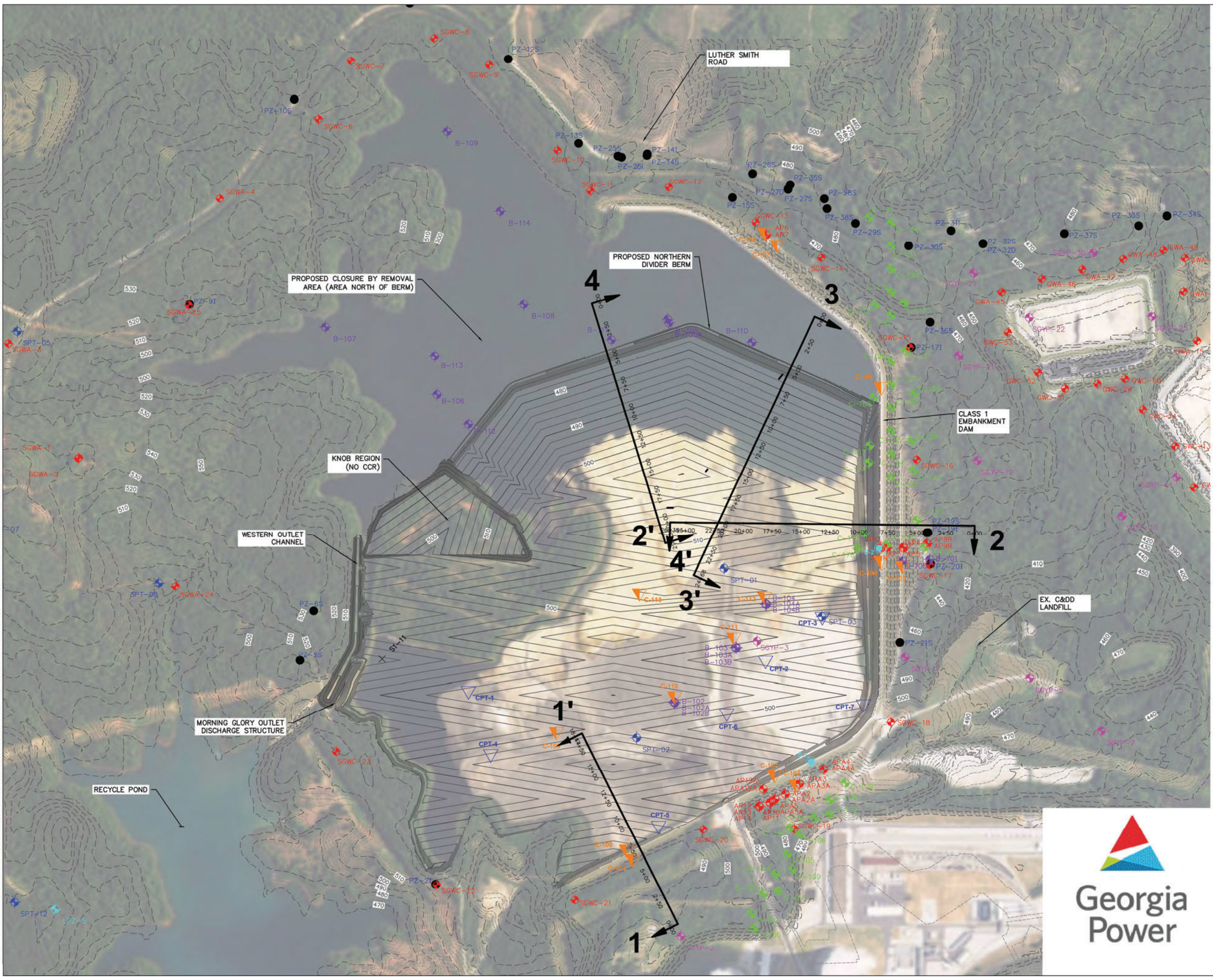


LEGEND

SGYP-7	EASTERN LANDFILL MONITORING WELL
SGWC-18	CCR MONITORING WELLS
C-156	1974 LAW ENGINEERING TESTING COMPANY BORINGS
AP9R	1985 GEORGIA POWER BORING
S-1	2010 SCS BORING LOCATION
LPZ-5	2015 GOLDER ASSOCIATES PIEZOMETER LOCATION
SPT-01	2015 SCS AS-BUILT SPT LOCATION
● PZ-29S	2015-2016 SCS PIEZOMETER LOCATION
▽ C-113	2016 SCS CPT LOCATION
▽ CPT-7	2016 AECOM AS-BUILT CPT LOCATION
B-103	2016 AECOM AS-BUILD BORING LOCATION
——450——	PROPOSED MAJOR TOPO LINE
————	PROPOSED MINOR TOPO LINE
— — 450 — —	EXISTING MAJOR TOPO LINE
- - - - - -	EXISTING MINOR TOPO LINE

Georgia Power

CCR CLOSURE
FOR
GEORGIA POWER
PLANT SHERER ASH POND 1
MONROE COUNTY, GEORGIA

AECOM

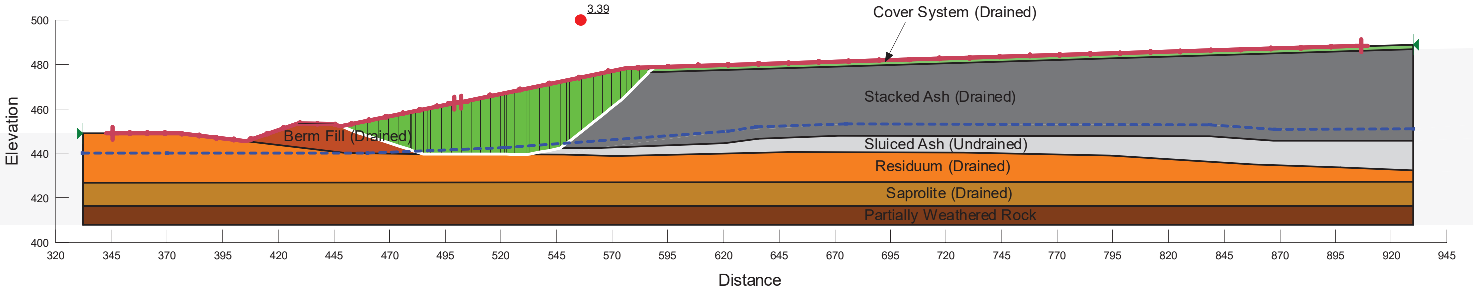
(919) 461-1100
WWW.AECOM.COM

1600 PERIMETER PARK DRIVE
SUITE 400
MORRISVILLE, NC 27560

PROJ. NO.: 60563110	DWG. NA	EDIT Revision 0	
SCALE: 1" = 400'	SSA FIGURE A		
DATE: JUNE 5, 2018			

PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 01a-Long Term (Drained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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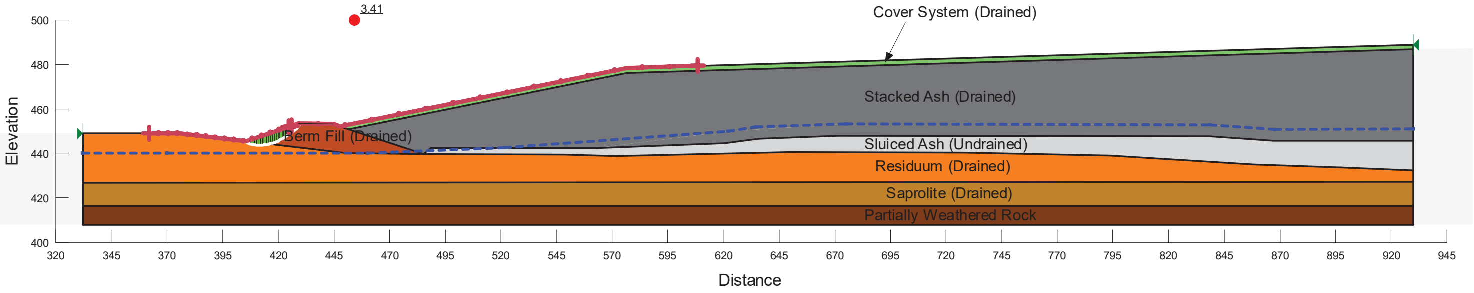
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 01b-Berm Failure (Drained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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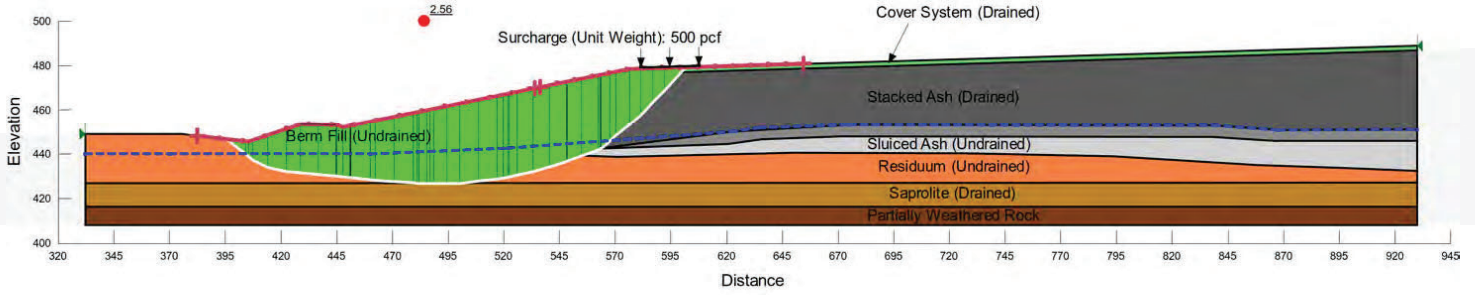
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 02-Temporary Loading (Undrained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Undrained)	Mohr-Coulomb	116	900	13	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Undrained)	Mohr-Coulomb	114	50	20	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
◼	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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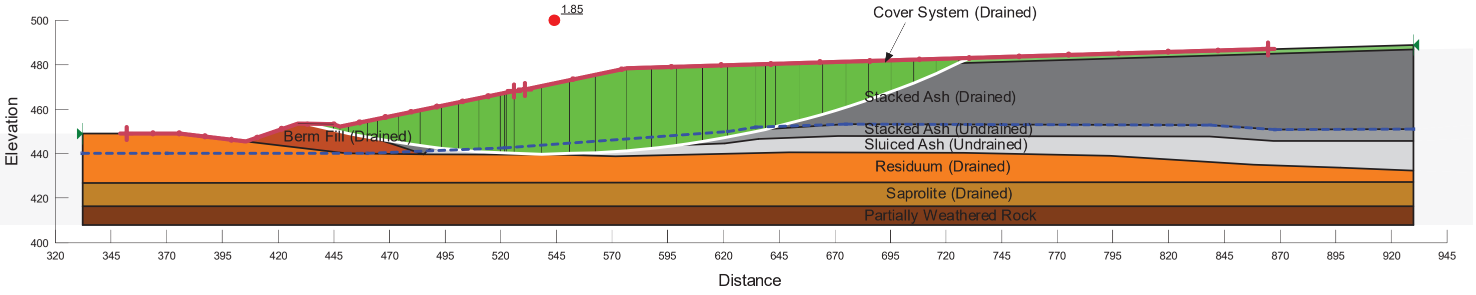
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 03a-Pseudostatic (Undrained)
METHOD: Spencer
DATE: 9/4/2018

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
◼	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 03b-Pseudostatic Translational (Undrained)
METHOD: Spencer
DATE: 9/4/2018

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
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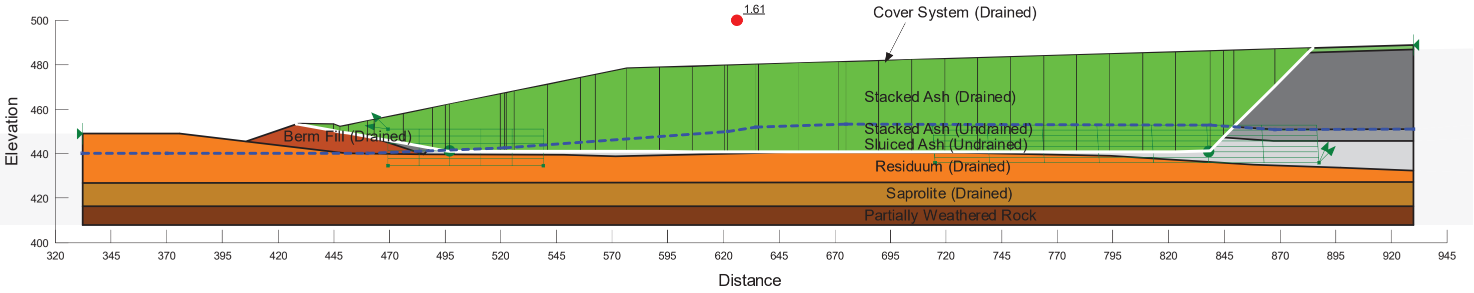
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
◼	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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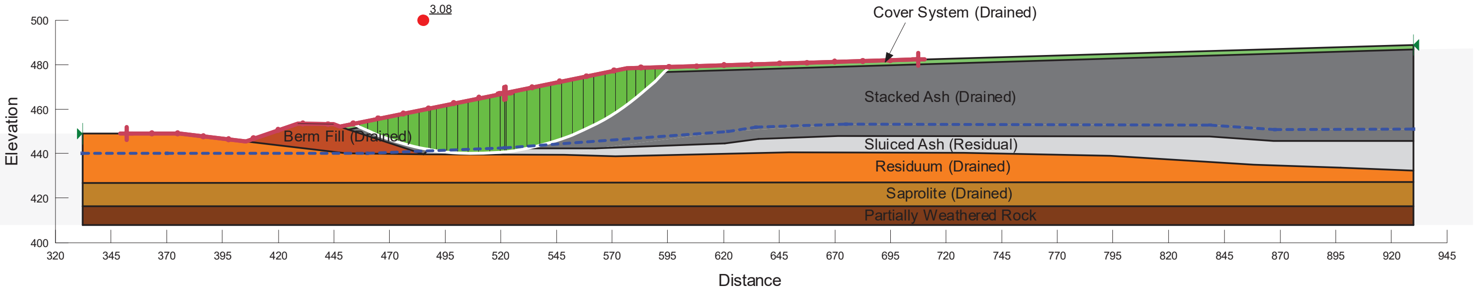
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 04a-Post Earthquake (Residual) - Circular
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Minimum Strength (psf)
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1		
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1		
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1		
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1		
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1		
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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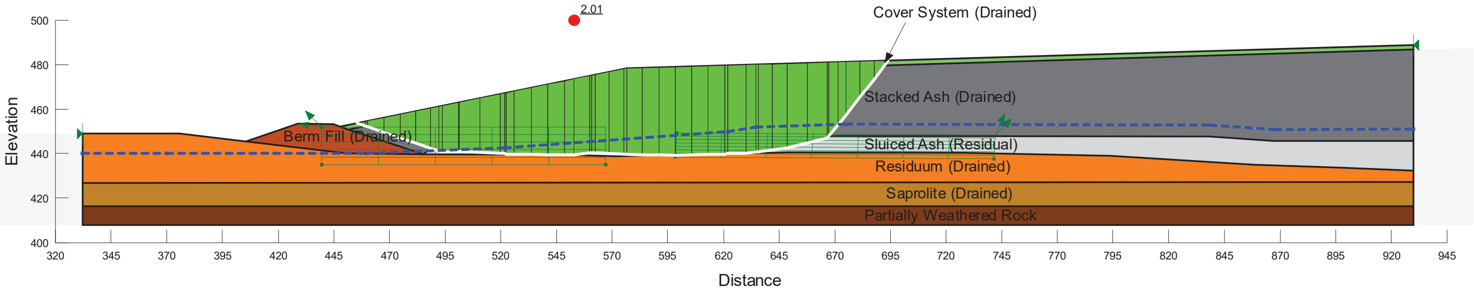
PROJECT: Plant Scherer
CROSS SECTION: 3-3'
CREATED BY: Lyons, Shane
ANALYSIS: 04b-Post Earthquake (Residual) - Block
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Minimum Strength (psf)
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1		
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1		
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1		
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1		
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1		
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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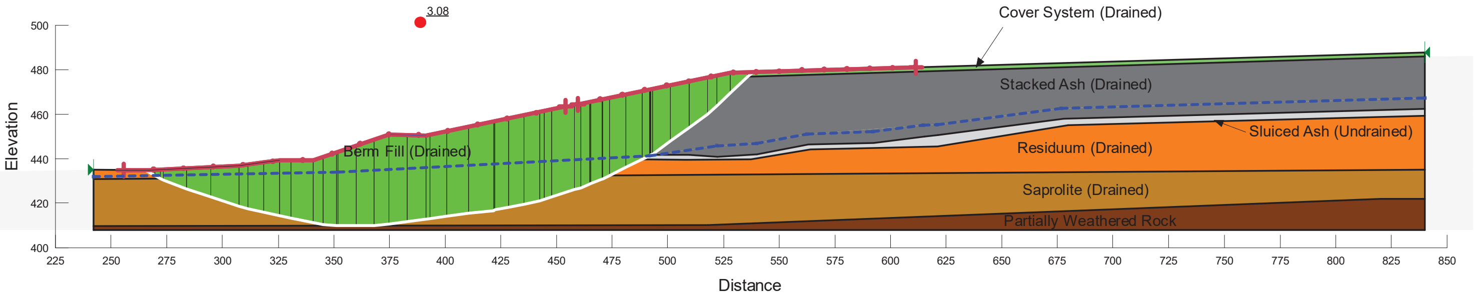
PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 01a-Long Term (Drained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1
🟫	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 01b- Berm Failure (Drained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
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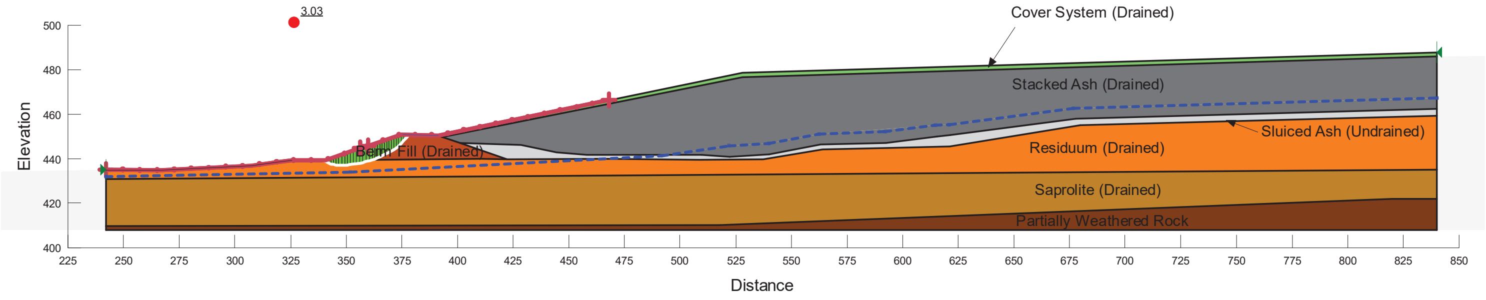
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1



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PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 02-Temporary Loading (Undrained)
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1
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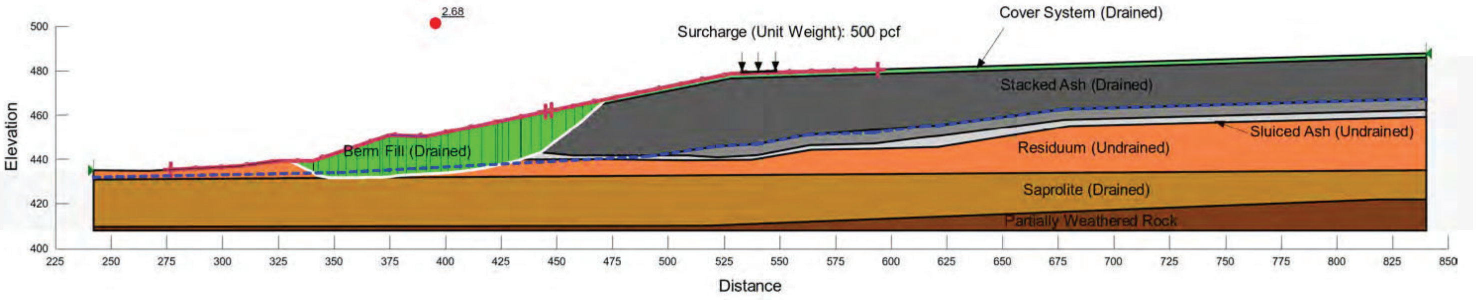
🟧	Residuum (Undrained)	Mohr-Coulomb	114	50	20	0	1
🟨	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1
⬜	Sluiced Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
▨	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 03a-Pseudostatic (Undrained)
METHOD: Spencer
DATE: 9/4/2018

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
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⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
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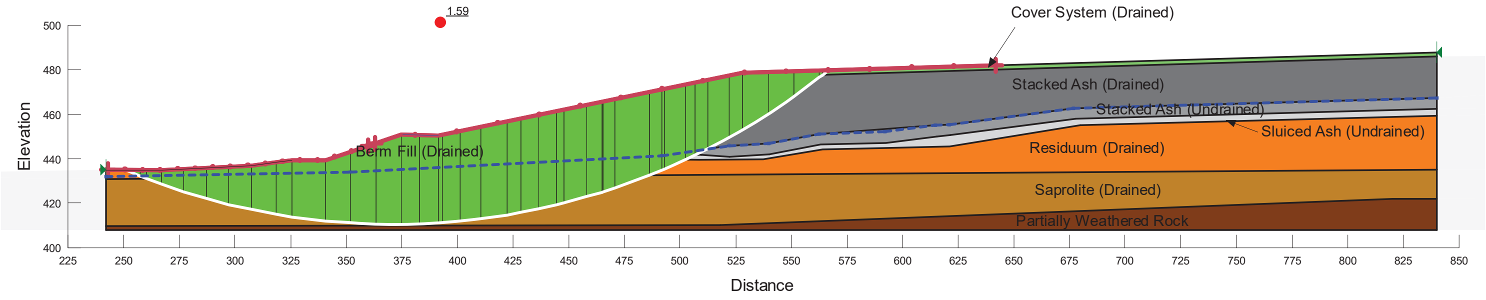

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PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 03b-Pseudostatic Translational (Undrained)
METHOD: Spencer
DATE: 9/4/2018

Horz Seismic Coef.: 0.15

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
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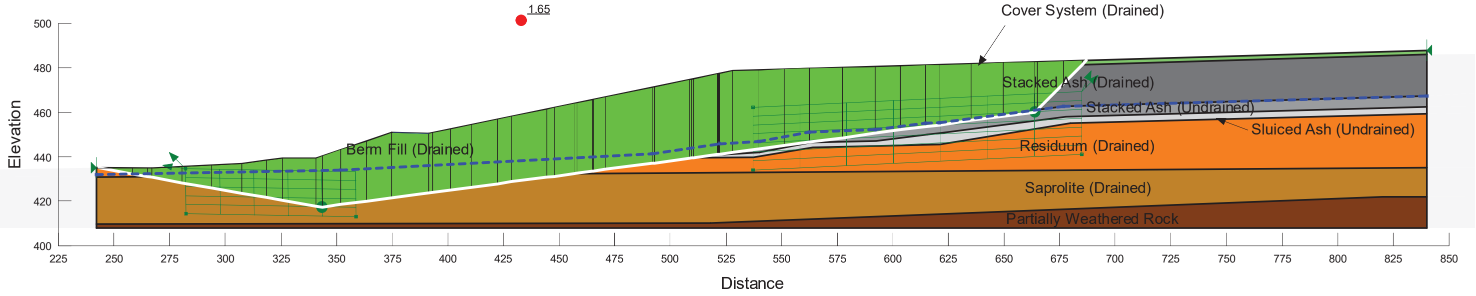
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1
⬛	Stacked Ash (Undrained)	Mohr-Coulomb	95	430	10	0	1



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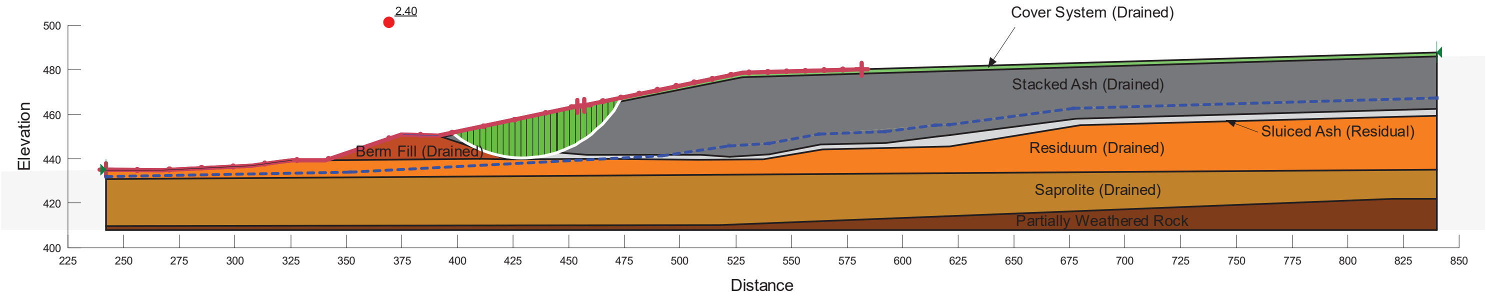
PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 04a-Post Earthquake (Residual) - Circular
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Minimum Strength (psf)
🟥	Berm Fill (Drained)	Mohr-Coulomb	116	100	33	0	1		
🟩	Cover System (Drained)	Mohr-Coulomb	115	0	25	0	1		
🟫	Partially Weathered Rock	Mohr-Coulomb	135	300	35	0	1		
🟧	Residuum (Drained)	Mohr-Coulomb	114	100	32	0	1		
🟨	Saprolite (Drained)	Mohr-Coulomb	105	0	32	0	1		
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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PROJECT: Plant Scherer
CROSS SECTION: 4-4'
CREATED BY: Lyons, Shane
ANALYSIS: 04b-Post Earthquake (Residual) - Block
METHOD: Spencer
DATE: 9/4/2018

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line	Tau/Sigma Ratio	Minimum Strength (psf)
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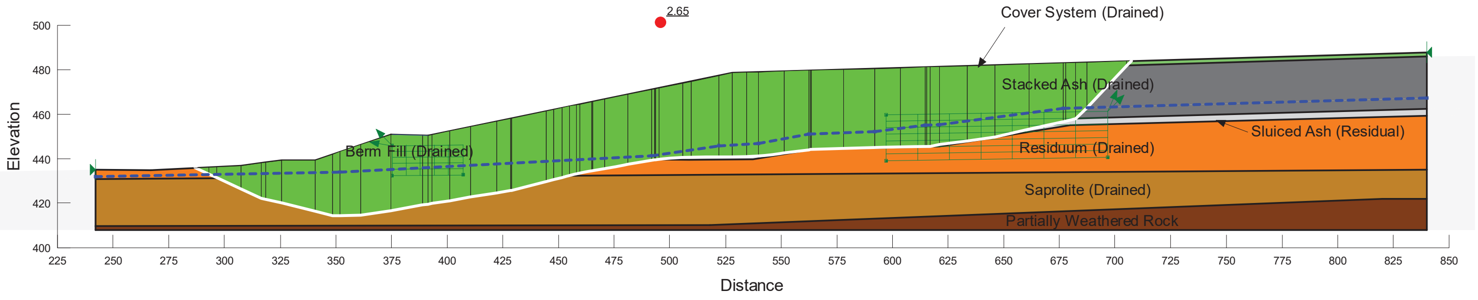
⬜	Sluiced Ash (Residual)	S=f(overburden)	95				1	0.08	0
⬛	Stacked Ash (Drained)	Mohr-Coulomb	95	150	34	0	1		



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Appendix B

Final Cover Design

Appendix B1

Final Cover System Demonstration

I. PURPOSE

A cap system is required at Georgia Power Company's (GPC) Scherer Power Plant ash pond closure project pursuant to the United States Environmental Protection Agency's (USEPA) Coal Combustion Residuals (CCR) Final Rule - 40 CFR 257 and the State of Georgia's Environmental Rule 391-3-4-.10 for CCR. Pursuant to 40 CFR 257. 102(d)(3)(iI), a different cover system than specified in the regulations is permissible if it achieves the equivalent reduction in infiltration, includes an erosion layer that provides equivalent protection from wind or water erosion, and can accommodate settling and subsidence. The purpose of this analysis is to demonstrate that the proposed alternate cover system provides equivalent or superior performance when compared to the minimum performance standard set by the USEPA and State requirements.

Three cover systems are compared in this document including the USEPA Final CCR Rule Specified Cover System, the Final Cover System described in this document and an Alternate Cover System.

II. SITE AND PROJECT DESCRIPTION

The current ash pond site covers an area of approximately 550 acres. The exposed area currently consists primarily of fly ash. Based on a feasibility study, a hybrid closure option will be performed which involves dewatering the pond, constructing a soil berm within the limits of the former pond, and stacking formerly submerged ash behind this berm to consolidate the existing ash to reduce the overall footprint. The final ash footprint area will be approximately 300 acres and will be regraded to improve drainage and receive the final cover system.

III. COVER SYSTEM REQUIREMENTS

a. USEPA CCR Cover Requirements

As required by 40 CFR 257.102(d)(3)(i), the final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section.

(A) The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less.

(B) The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.

(C) The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.

(D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

For the purpose of this alternate cover system demonstration, the cover system described above is referred to as the “USEPA CCR Cover System”. Figure 1 depicts this cover system.

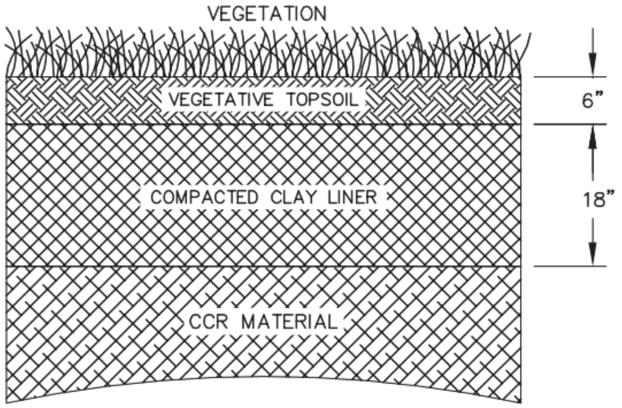


Figure 1. USEPA CCR Cover System

b. Proposed Final Cover System Requirements

As permitted by 40 CFR 257.102(d)(3)(ii), the owner or operator may select a different final cover system design, provided the final cover system is designed and constructed to meet the criteria in paragraphs (d)(3)(ii)(A) through (C) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.

(A) The design of the final cover system must include an infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (d)(3)(i)(A) and (B) of this section.

(B) The design of the final cover system must include an erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in paragraph (d)(3)(i)(C) of this section.

(C) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

The proposed Final Cover System that is for GPC’s Scherer Plant Ash Pond is an engineered turf system specifically manufactured for closure of landfills and impoundments. It includes three components:

- 1 to 2-in Engineered Turf Grass
- 0.5-in Sand Infill (for ballast)
- 40-mil Textured Geomembrane

Figure 2 depicts this Alternate Cover System.

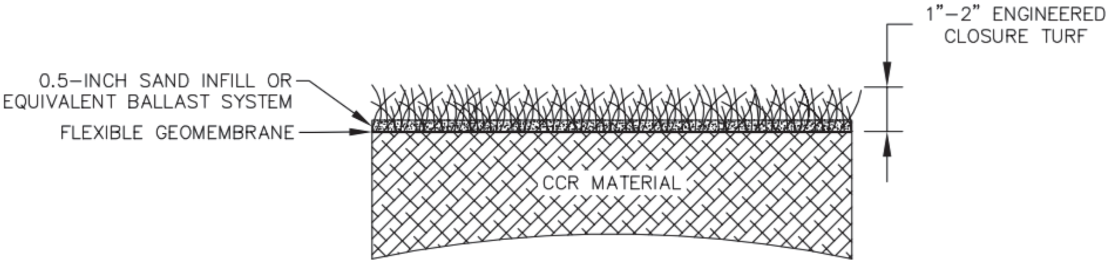


Figure 2. Proposed Final Cover System

c. Proposed Alternate Cover System Requirements

As required by 40 CFR 257.102(d)(3)(ii), the owner or operator may select an alternative final cover system design, provided the alternative final cover system is designed and constructed to meet the criteria in paragraphs (d)(3)(ii)(A) through (C) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.

(D) The design of the final cover system must include an infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (d)(3)(i)(A) and (B) of this section.

(E) The design of the final cover system must include an erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in paragraph (d)(3)(i)(C) of this section.

(F) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

The Alternate Cover System 1 that is proposed for GPC's Scherer Plant Ash Pond includes four components:

- 6-in Vegetative Growth Layer
- 18-in Protective Cover Layer
- 200-mil (minimum) Geocomposite Drainage Media
- 40-mil Textured LLDPE geomembrane

Figure 3 depicts this Alternate Cover System.

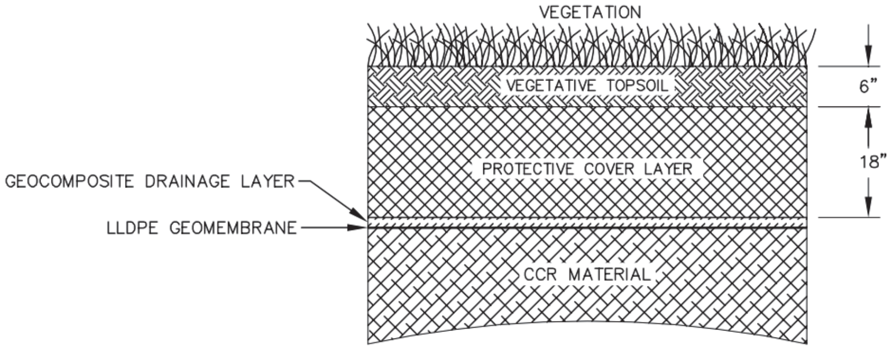


Figure 3. Proposed Alternate Cover System

IV. FINAL COVER EQUIVALENCY METHODOLOGY

The regulatory performance standard to be met for the cover system is a soil barrier layer with a hydraulic conductivity less than or equal to 10^{-5} cm/s, with the primary purpose of minimizing moisture infiltration through the final cover.

An analysis was performed comparing the baseline cover system required by the U.S. Environmental Protection Agency’s (USEPA) to the proposed cover system using the Hydrologic Evaluation of Landfill Performance (HELP) Model, version 4 on the basis of the amount of contact water generated due to infiltration through the barrier layer in the cover system. The results of the HELP Model provide a long-term estimation of water migration through the final cover given the cover design parameters along with soil and local climate information.

As a secondary parameter, the potential erosivity of the surficial soils were evaluated using the Revised Universal Soil Loss Equation which estimates the potential erosivity of the surficial soil materials by multiplying five unitless coefficients together representing key parameters influencing erosion potential. Lower coefficients represent a lower overall potential for erosivity. These are outlined in more detail below.

Because settlement potential is governed by the underlying materials, settlement potential is equivalent regardless of the cover materials. The LLDPE used in the Proposed Final Cover or the Alternate Cover is highly flexible and can maintain its integrity at more than 10% strain. It is therefore equivalent or superior to the soil only USEPA cover system. Further comparison of proposed Final Cover is not necessary.

a. HELP Model Parameters

The HELP Model requires four different types of climate data to execute including: evapotranspiration, precipitation, temperature, and solar radiation. Each data group is based on a specific location and can either be synthetically generated using the HELP Model or manually entered. For this analysis, the most important parameter is precipitation because it directly correlates to the amount of contact water generated. For all four groups, the program was used to generate 100 years of synthetic data based on the default database associated with Juliette, Georgia, which is the town where the plant is located. The synthetic precipitation data was back checked with the National Oceanic and Atmospheric Administration’s (NOAA) Summary of Monthly Normals for precipitation to determine if the actual climate values were consistent with the model data. It was determined that they were in good agreement for purposes of this analysis. This comparison is included in the calculations in **Appendix A**.

The remaining model parameters included site geometry and material characteristics. A standard of one acre with a minimum slope of two percent with a 300-foot slope length was set up for each analysis as a representative area for the cover system. With the exception of the three different cover systems modeled, all other inputs into the model were held constant to facilitate a fair comparison. For purposes of the comparison, each final cover system was input into the model and the amount of contact water measured after 100 years was compared. The model presents peak daily results and average annual results over the 100-year simulation period. Input parameters are included in the output files contained in **Appendix B**.

b. HELP Model Assumptions

The following assumptions were made in performing the HELP Model Analysis. For reference, the *HELP Model User's Guide For Version 4.0* can be found online at:

https://www.epa.gov/land-research/hydrologic-evaluation-landfill-performance-help-model.

- The geosynthetics materials will be constructed with good quality workmanship and in accordance with the project CQA Plan.
- The initial water contents of all layers were manually set equal to the default HELP specified field capacity of the material, which represents the water content of the material after a prolonged period of gravity drainage. However, it should be noted that for the purpose of calculating hydraulic flow through the landfill system, the HELP Model automatically assumes that all barrier layers (final cover barrier layer) are saturated.
- The HELP Model was utilized to synthetically generate temperature, precipitation, evapotranspiration, and solar radiation data based on a location of Juliette, Georgia. The evaporative zone depth was conservatively reduced from the default value based on the given cover system.
- The HELP Model results are independent of the landfill area. A one (1) acre area was considered for the analysis. Therefore, cover system leakage results are presented as cubic feet per acre per time period (annual or daily). Results were converted to gallons per acre per time period using the conversion factor listed below:

$$\frac{ft^3}{time\ period} \times \frac{7.48\ gallons}{ft^3} \times \frac{time\ period}{\#\ of\ days}$$

i. USEPA Final CCR Specified Cover System Material Textures

Cover materials for USEPA CCR Cover system used in the HELP Model were modeled as follows:

- The Erosion Layer was modeled as HELP default texture 10 (USCS Classification SC) with a vertical percolation layer type and a default permeability of 1.2×10^{-4} cm/sec.

- The Infiltration Layer was modeled as HELP user-defined custom layer, with a barrier soil liner layer type and with a default permeability of 1.0x10^{-5} cm/sec.

ii. Proposed Final Cover System Material Textures

Cover materials for the Proposed Cover System used in the HELP Model were modeled as follows:

- The Sand Infill Layer was modeled as HELP default texture 2 (USCS Classification SW) with a lateral drainage layer type and a default permeability of 5.8x10-3 cm/sec.
- The Textured 40-mil Linear Low Density Polyethylene (LLDPE) Layer was modeled as HELP default texture 36 (Flexible Membrane Liner) with a default permeability of 4.0x10-13 cm/sec. An industry standard defect area of 0.0001 m^2 was assumed in the analysis with a placement quality of “good”. This represents one pinhole-type defect and four pinhole installation defects per acre.

iii. Alternate Cover System Material Textures

Cover materials for the Alternative Cover System 1 used in the HELP Model were modeled as follows:

- The Vegetative Growth Layer was modelled as HELP default texture 10 (USCS Classification SC) with a vertical percolation layer type and a default permeability of 1.2x10-4 cm/sec.
- The Protective Cover Layer was modeled as HELP default texture 10 (USCS Classification SC) with a vertical percolation layer type and a default permeability of 1.2x10-4 cm/sec.
- The Geocomposite Drainage Media Layer was modeled as HELP default texture 20 (Lateral Drainage Layer) with a default permeability of 10 cm/sec.
- The Textured 40-mil Linear Low Density Polyethylene (LLDPE) Layer was modeled as HELP default texture 36 (Flexible Membrane Liner) with a default permeability of 4.0x10-13 cm/sec. An industry standard defect area of 0.0001 m^2 was assumed in the analysis with a placement quality of “good”. This represents one pinhole-type defect and four pinhole installation defects per acre.

c. RUSLE Equation Parameters

The Revised Universal Soil Loss Equation is a technology for estimating soil loss from most undisturbed lands experiencing overland flow, from lands undergoing disturbance, and from newly or established reclaimed lands. RUSLE also may be used as a part of the procedures to prepare permit applications and to assess reclamation success in support of bond release. The Revised Universal Soil Loss Equation is structured as follows with five coefficients representing the parameters that govern erosion from overland flow:

$$A = R \cdot K \cdot LS \cdot C \cdot P$$

Where: A = Average annual soil loss in tons per acre per year

R = Rainfall/runoff erosivity

K = Soil erodibility

LS = Hillslope length and steepness

C = Cover-management

P = Support practice

Of the five parameters, only K, LS, and C are influenced by the final cover characteristics. The parameters R and P will be the same regardless of the cover choice and are estimated for calculation purposes but are not important for the comparison.

The K factor is an expression of the inherent erodibility of the soil or surface material at a particular site under standard experimental conditions. The value of "K" is a function of the particle size distribution, organic-matter content, structure, and permeability of the soil or surface material.

The LS factor is an expression of the effect of topography, specifically hillslope length and steepness, on rates of soil loss at a particular site, for a particular soil. The value of "LS" increases as hillslope length and steepness increase, under the assumption that runoff accumulates and accelerates in the downslope direction.

The C factor is an expression of the effects of surface covers and roughness, soil biomass, and soil-disturbing activities on rates of soil loss at a particular site. The value of "C" decreases as surface cover and soil biomass increase, thus protecting the soil from rainsplash and runoff.

Specialized software for RUSLE version 1.06c was used to evaluate each of the parameters. For reference, the *Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06 on Mined Lands, Construction Sites, and Reclaimed Lands* can be found online at:

https://www.osmre.gov/resources/library/ghm/rusleGuidelines.pdf

V. RESULTS

The HELP model output files for the required and proposed cover systems are provided in Appendix B. The key results of the HELP Model comparison depicting the hydraulic performance of each cover system are included in **Table 1** and **Table 2** below. Note that these results are presented for comparative purposes and may not represent accurate estimates of actual leakage through the constructed cover system.

Table 1. Rainfall/Runoff/Infiltration of USEPA CCR Cover versus Proposed Final Cover

Final Cover System Case	Average Annual Precipitation (In)	Average Annual Runoff (In)	Average Annual Percolation (In)
USEPA CCR Final Cover	46.4	5.59	27.8
Alternate Final Cover	46.4	4.69	0.072
Proposed Final Cover	46.4	28.65	0.258

Table 2. Hydraulic Performance of USEPA CCR Cover versus Proposed Final Cover

Final Cover System Case	Average Daily Leakage Rate (Gal/Acre/Day)	Peak Daily Leakage Rate (Gal/Acre/Day)	Average Annual Leakage Rate (Gal/Acre/Year)
USEPA CCR Final Cover	2,069	12,299	755,327
Alternate Final Cover	5.4	865	1,959
Proposed Final Cover	19.2	57.7	7,013

The key results of the RUSLE equation analysis comparison depicting the erosivity potential of each cover system are included in **Table 3** below. Note that these results are presented for comparative purposes and may not represent accurate estimates of actual erosion of the surficial layer.

Table 3. Estimated Erosivity Potential of USEPA CCR Cover versus Proposed Final Cover

Final Cover System Case	R-Factor	K-Factor	LS-Factor	C-Factor	P-Factor	Soil Loss, A (Tns/Ac)
USEPA CCR Final Cover	350	0.24	0.46	0.003	1	0.12
Alternate Final Cover	350	0.24	0.46	0.003	1	0.12
Proposed Final Cover	350	0.05	0.46	0.003	1	0.02

The erosive potential from the proposed final cover is in good agreement with published test results for this type of material as depicted in the test results contained in Appendix C.

VI. CONCLUSIONS

The results in Tables 1 and 2 provide a side by side comparison of the minimum CCR rule required cover system characteristics versus the proposed final cover system and alternate final cover system. The proposed final cover will result in more stormwater collection and both the final cover system and alternative final cover systems will have less contact water through the cover than the CCR rule cover system.

Table 3 compares the erosivity potential of the three cover systems. It also shows the proposed final cover system has less erosion potential than the CCR rule system. The USEPA cover system provides 6 inches of soil capable of supporting vegetation to minimize the potential for erosion. The proposed alternative final cover also utilizes a 6-inch soil layer supporting vegetation, and will exhibit the same soil loss potential as the USEPA cover system. The alternate cover is an engineered turf system that eliminates erosion of the cover soil, as it utilizes a system that does not depend on vegetative cover. The turf system is placed on the liner without soil. A sand layer is used as ballast on the final cover system, which may need replaced on occasion. Soil loss would be the sand ballast lost, and is presented in Table 3.

All three systems would be constructed using methods that achieve adequate compaction, moisture content, and enough time to allow for settling and subsidence prior to the cover system being placed.

Based on the modeled results, the proposed cover system and the alternate system meet the required performance standard of the CCR rules.

VII. REFERENCES

Galetovic, Joe R., Guidelines for the Use of the Revised Universal Soil Loss Equation (RUSLE) Version 1.06 on Mined Lands, Construction Sites, and Reclaimed Lands. The Office of Technology Transfer Western Regional Coordinating Center Office of Surface Mining, 1998.

Koerner, R.M., “Designing with Geosynthetics”, 6th Edition, Xlibris, 2012.

Schroeder, P.R., Lloyd, C.M., and Zappi, P.A., “The Hydraulic Evaluation of Landfill Performance (HELP) Model, User’s Manual for Version 4”, U.S. Environmental Protection Agency, Center for Environmental Solutions and Emergency Management Cincinnati, Ohio, 45268, January 2020

Schroeder, P.R., Dozier, T.S., Zappi, P.A., McEnroe, B.M., Sjostrom, J.W., and Peyton, R.L., “The Hydraulic Evaluation of Landfill Performance (HELP) Model, Engineering Documentation for Version 3”, U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C., Report No. EPA/600/R094/168b, 1994 b.

United States Environmental Protection Agency (USEPA), April 2015. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, (Revised April 2015).

Watershed Geo, ClosureTurf Design Guidelines Manual, www.watershedgeo.com, June 2016.

Appendix A

Final Cover Comparison Calculations

AECOM
564 White Pond Drive
Akron, OH 44320
Tel. (330) 836-9111

Georgia Power Company

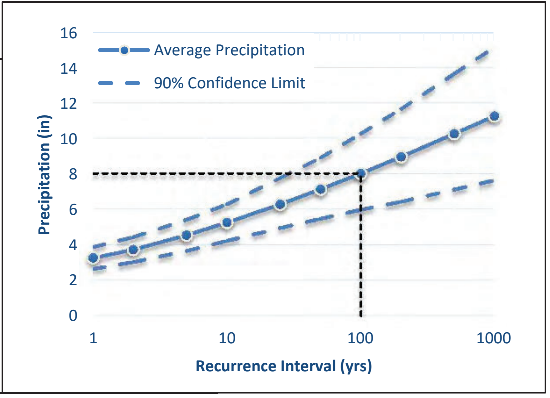
FINAL COVER COMPARISON
Plant Scherer

JOB	**60478286**		
SHT NO	**1**	OF	**2**
CALC BY	**KMJ**	DATE	**08/28/18**
CHK BY	**NSG**	DATE	

Review climate data for the site and determine total normal precip, monthly extreme values, and 100 yr/24 hr storm based on local NOAA data.

National Environmental Satellite, Data, and Information Service
Climate Normals 1981-2010 Station Data: Juliette, GA Lat 33.1139° N Long 83.7881° W

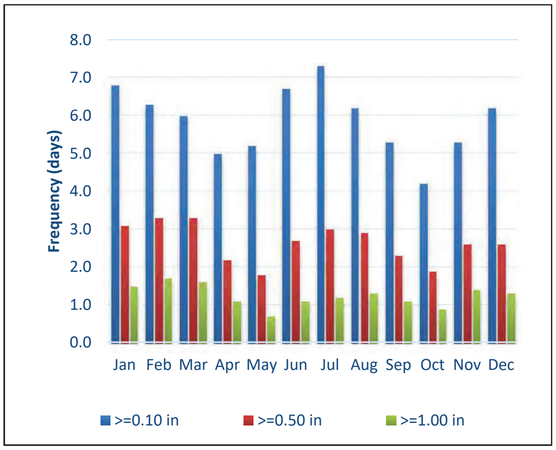
Month	Normal Precip. (in)	Extreme Daily Precip.* (in)	Date	24-hr Storm Duration Precipitation Recurrence Interval (yr)	Precip. (in)
Jan	4.35	2.6	2010		0
Feb	4.69	4.2	1961	1	3.3
Mar	5.10	7.3	1990	2	3.8
Apr	3.24	4.0	1975	5	4.6
May	2.79	6.3	1976	10	5.3
Jun	3.67	3.3	2005	25	6.3
Jul	4.47	5.5	1994	50	7.2
Aug	4.20	5.1	1962	100	8.1
Sep	3.60	4.0	1997	200	9.0
Oct	3.04	6.1	1964	500	10.3
Nov	3.70	4.1	2009	1000	11.3
Dec	3.96	3.6	2014		
	Sum= 46.81	4.7 =average			



*Extreme data from 1958 through 2017

Frequency Distrib. for Daily Precip. (Juliette GA, 1981-2010)

	Mean Number of Days			
Mth/Rain	>=0.01 in	>=0.10 in	>=0.50 in	>=1.00 in
Jan	9.5	6.8	3.1	1.5
Feb	8.0	6.3	3.3	1.7
Mar	7.8	6.0	3.3	1.6
Apr	6.5	5.0	2.2	1.1
May	6.9	5.2	1.8	0.7
Jun	8.9	6.7	2.7	1.1
Jul	9.5	7.3	3.0	1.2
Aug	8.3	6.2	2.9	1.3
Sep	7.0	5.3	2.3	1.1
Oct	6.0	4.2	1.9	0.9
Nov	7.1	5.3	2.6	1.4
Dec	8.3	6.2	2.6	1.3
Year	93.8	70.5	31.7	1.4

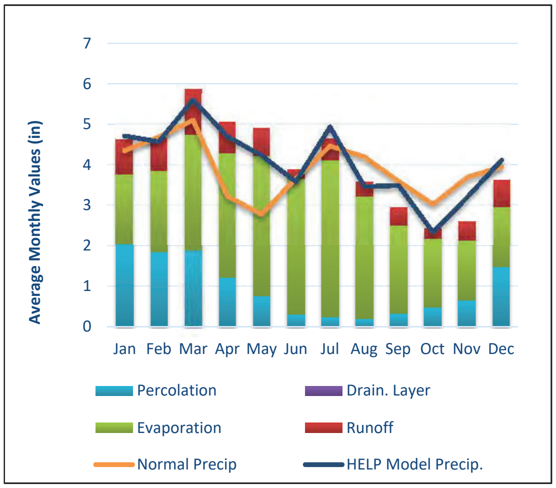


Compare climate data and HELP model results. Determine average daily precipitation, stormwater runoff, and leachate generation due to percolation through the infiltration layer based on HELP model data.

HELP Model Average Monthly Water Balance & Contact Water Data

HELP Model - 100 yrs of Synthetic Weather Data - Closed Conditions (USEPA CCR Cover, 1 Acre, 100 ft/2% slope, SCS Curve No. 95.3)

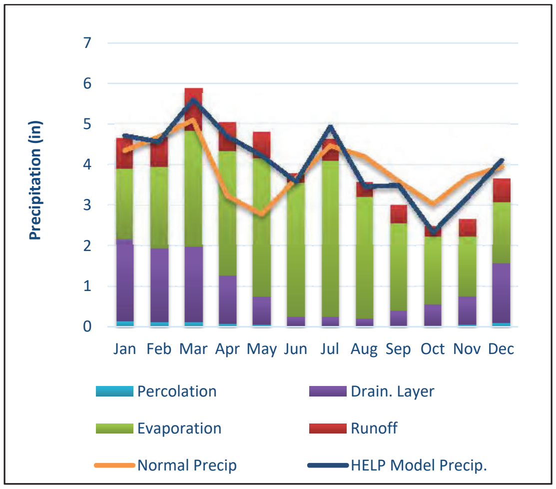
Average Month	Precipitation in	Runoff in	Evaporation in	Drain. Layer in	Percolation in
Jan	4.72	0.86	1.72	0.00	2.05
Feb	4.57	0.84	2.01	0.00	1.84
Mar	5.60	1.14	2.86	0.00	1.88
Apr	4.70	0.78	3.07	0.00	1.21
May	4.23	0.69	3.45	0.00	0.76
Jun	3.59	0.25	3.34	0.00	0.31
Jul	4.94	0.54	3.88	0.00	0.24
Aug	3.47	0.38	3.02	0.00	0.20
Sep	3.50	0.47	2.18	0.00	0.33
Oct	2.35	0.26	1.70	0.00	0.49
Nov	3.21	0.47	1.50	0.00	0.65
Dec	4.12	0.66	1.50	0.00	1.46
Total	49.0	7.3	30.2	0.0	11.4
Peak Daily	5.28	3.73			0.62



AECOM	**Georgia Power Company**	JOB			
564 White Pond Drive		SHT NO	**2**	OF	**2**
Akron, OH 44320	FINAL COVER COMPARISON	CALC BY	**KMJ**	DATE	**08/28/18**
Tel. (330) 836-9111	Plant Scherer	CHK BY	**NSG**	DATE	

HELP Model - 100 yrs of Synthetic Weather Data - Closed Conditions (Final Cover System, 1 Acre, 100 ft/2% slope, SCS Curve No. 95.3)

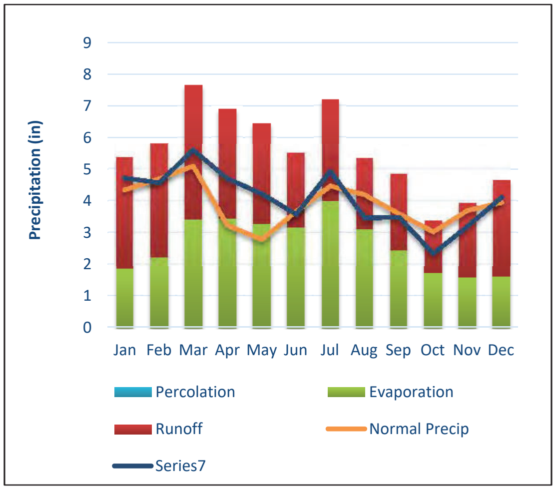
Average Month	Precipitation in	Runoff in	Evaporation in	Drain. Layer in	Percolation in
Jan	4.72	0.76	1.72	2.03	0.1479
Feb	4.57	0.75	2.01	1.80	0.1327
Mar	5.60	1.04	2.86	1.84	0.1345
Apr	4.70	0.71	3.08	1.17	0.0963
May	4.23	0.64	3.40	0.70	0.0671
Jun	3.59	0.24	3.28	0.24	0.0320
Jul	4.94	0.53	3.85	0.23	0.0235
Aug	3.47	0.37	3.00	0.20	0.0236
Sep	3.50	0.45	2.17	0.37	0.0328
Oct	2.35	0.25	1.69	0.50	0.0487
Nov	3.21	0.44	1.49	0.69	0.0596
Dec	4.12	0.59	1.51	1.47	0.1071
Total	49.0	6.78	30.1	11.24	0.9058
Peak Daily	5.28	3.69		0.76	0.0010



AECOM	**Georgia Power Company**	JOB			
564 White Pond Drive		SHT NO	**2**	OF	**2**
Akron, OH 44320	FINAL COVER COMPARISON	CALC BY	**KMJ**	DATE	**01/23/18**
Tel. (330) 836-9111	Plant Scherer	CHK BY		DATE	

HELP Model - 100 yrs of Synthetic Weather Data - Closed Conditions (Alternative Cover System - ClosureTurf, 1 Acre, 100 ft/2% slope, SCS Curve No. 95.3)

Average Month	Precipitation in	Runoff in	Evaporation in	Percolation in
Jan	4.72	3.52	1.86	0.0014
Feb	4.57	3.59	2.23	0.0012
Mar	5.60	4.26	3.40	0.0014
Apr	4.70	3.46	3.45	0.0013
May	4.23	3.19	3.28	0.0010
Jun	3.58	2.33	3.18	0.0008
Jul	4.94	3.22	3.99	0.0006
Aug	3.47	2.23	3.11	0.0006
Sep	3.49	2.41	2.44	0.0006
Oct	2.35	1.66	1.74	0.0009
Nov	3.21	2.37	1.58	0.0007
Dec	4.12	3.04	1.61	0.0009
Total	49.0	35.29	31.9	0.0114
Peak Daily	5.28	3.69		0.0010



The average monthly HELP model values show good agreement with the site specific climate data. The monthly totals from the HELP model generally are conservative relative to the historical data. Where the HELP model underpredicts the historical climate data, it is at the lesser rainfall amounts in the fall and the values are still within 0.5 in of one another. Overall, the HELP model conservatively overpredicts the amount of annual rainfall by approximately 2.5 in. This makes the HELP model suitable for comparing different cover systems on the basis of generating contact water as well as for estimating the total amount of contact water generated from percolation through the cover layers.

However, the peak daily value generated by the synthetic HELP model data underpredicts the extreme historical events and the 100 yr/24-hr storm event. The frequency distribution shows precipitation events in excess of 1 in are limited to between one and two days a month. The statistical 24-hr duration storm precipitation amounts should be used in design where collection points or pumps need to be sized.

The final cover comparison shows that the LLDPE barrier dramatically reduces the potential for contact water to infiltrate and pass through the cover system. Nearly all the contact water that infiltrates into the underlying CCR in the USEPA CCR Cover is collected in the Alternative Cover 1 design. It is therefore a superior cover system to the minimum requirements of the USEPA CCR rules and meets the alternative cover performance requirements.

Appendix B

HELP Model Results

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 4.0 BETA (2018)
DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY

Title: Scherer Final Cover **Simulated On:** 8/25/2021 9:53

Layer 1

Type 1 - Vertical Percolation Layer (Cover Soil)
S - Sand
Material Texture Number 2

Thickness	=	0.5	inches
Porosity	=	0.437	vol/vol
Field Capacity	=	0.062	vol/vol
Wilting Point	=	0.024	vol/vol
Initial Soil Water Content	=	0.1524	vol/vol
Effective Sat. Hyd. Conductivity	=	5.80E-03	cm/sec

Layer 2

Type 4 - Flexible Membrane Liner
LDPE Membrane
Material Texture Number 36

Thickness	=	0.04	inches
Effective Sat. Hyd. Conductivity	=	4.00E-13	cm/sec
FML Pinhole Density	=	1	Holes/Acre
FML Installation Defects	=	4	Holes/Acre
FML Placement Quality	=	3	Good

Layer 3

Type 1 - Vertical Percolation Layer (Waste)
High-Density Electric Plant Coal Bottom Ash
Material Texture Number 31

Thickness	=	120	inches
Porosity	=	0.578	vol/vol
Field Capacity	=	0.076	vol/vol
Wilting Point	=	0.025	vol/vol
Initial Soil Water Content	=	0.0785	vol/vol
Effective Sat. Hyd. Conductivity	=	4.10E-03	cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

General Design and Evaporative Zone Data

SCS Runoff Curve Number = 90
Fraction of Area Allowing Runoff = 100 %
Area projected on a horizontal plane = 1 acres
Evaporative Zone Depth = 0.5 inches
Initial Water in Evaporative Zone = 0.076 inches
Upper Limit of Evaporative Storage = 0.218 inches
Lower Limit of Evaporative Storage = 0.012 inches
Initial Snow Water = 0 inches
Initial Water in Layer Materials = 9.498 inches
Total Initial Water = 9.498 inches
Total Subsurface Inflow = 0 inches/year

Note: SCS Runoff Curve Number was User-Specified.

Evapotranspiration and Weather Data

Station Latitude = 33.05 Degrees
Maximum Leaf Area Index = 5
Start of Growing Season (Julian Date) = 77 days
End of Growing Season (Julian Date) = 316 days
Average Wind Speed = 7 mph
Average 1st Quarter Relative Humidity = 67 %
Average 2nd Quarter Relative Humidity = 69 %
Average 3rd Quarter Relative Humidity = 77 %
Average 4th Quarter Relative Humidity = 72 %

Note: Evapotranspiration data was obtained for Juliette, Georgia

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
4.482415	4.513041	4.728331	3.310596	2.864451	3.873931
4.619486	4.282922	3.674894	2.865716	3.663677	3.522973

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.05/-83.8

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
52.3	53.2	57.6	66.7	74.6	79.7
82.8	81.2	75.2	67.1	58.2	52.5

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.05/-83.8
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.05/-83.8

Average Annual Totals Summary

Title: Scherer Final Cover
Simulated on: 8/25/2021 10:13

	Average Annual Totals for Years 1 - 100*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	46.40	[6.56]	168,440.8	100.00
Runoff	28.652	[5.52]	104,006.8	61.75
Evapotranspiration	17.493	[1.946]	63,498.5	37.70
Subprofile1				
Percolation/leakage through Layer 2	0.258300	[0.02659]	937.6	0.56
Average Head on Top of Layer 2	0.1509	[0.0166]	---	---
Subprofile2				
Percolation/leakage through Layer 3	0.209118	[0.090836]	759.1	0.45
Water storage				
Change in water storage	0.0486	[0.3792]	176.4	0.10

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Scherer Final Cover
Simulated on: 8/25/2021 10:14

	Peak Values for Years 1 - 100*	
	(inches)	(cubic feet)
Precipitation	4.33	15,710.8
Runoff	4.572	16,595.3
Subprofile1		
Percolation/leakage through Layer 2	0.002125	7.7124
Average head on Layer 2	0.5000	
Subprofile2		
Percolation/leakage through Layer 3	0.001926	6.9923
Other Parameters		
Snow water	3.9177	14,221.3
Maximum vegetation soil water	0.4370 (vol/vol)	
Minimum vegetation soil water	0.0240 (vol/vol)	

Final Water Storage in Landfill Profile at End of Simulation Period

Title: Scherer Final Cover
Simulated on: 8/25/2021 10:15
Simulation period: 100 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	0.0163	0.0326
2	0.0000	0.0000
3	14.3397	0.1195
Snow water	0.0000	---

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 4.0 BETA (2018)
DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY

Title: Scherer Alternate Cover **Simulated On:** 8/25/2021 11:10

Layer 1

Type 1 - Vertical Percolation Layer (Cover Soil)
SCL - Sandy Clay Loam
Material Texture Number 10

Thickness = 6 inches
Porosity = 0.398 vol/vol
Field Capacity = 0.244 vol/vol
Wilting Point = 0.136 vol/vol
Initial Soil Water Content = 0.2685 vol/vol
Effective Sat. Hyd. Conductivity = 1.20E-04 cm/sec

Layer 2

Type 1 - Vertical Percolation Layer
SCL - Sandy Clay Loam
Material Texture Number 10

Thickness = 18 inches
Porosity = 0.398 vol/vol
Field Capacity = 0.244 vol/vol
Wilting Point = 0.136 vol/vol
Initial Soil Water Content = 0.294 vol/vol
Effective Sat. Hyd. Conductivity = 1.20E-04 cm/sec

Layer 3

Type 2 - Lateral Drainage Layer
Drainage Net (0.5 cm)
Material Texture Number 20

Thickness = 0.25 inches
Porosity = 0.85 vol/vol
Field Capacity = 0.01 vol/vol
Wilting Point = 0.005 vol/vol
Initial Soil Water Content = 0.0512 vol/vol
Effective Sat. Hyd. Conductivity = 1.00E+01 cm/sec
Slope = 2 %
Drainage Length = 300 ft

Layer 4

Type 4 - Flexible Membrane Liner
LDPE Membrane
Material Texture Number 36

Thickness = 0.04 inches
Effective Sat. Hyd. Conductivity = 4.00E-13 cm/sec
FML Pinhole Density = 1 Holes/Acre
FML Installation Defects = 4 Holes/Acre
FML Placement Quality = 3 Good

Layer 5

Type 1 - Vertical Percolation Layer (Waste)
High-Density Electric Plant Coal Bottom Ash
Material Texture Number 31

Thickness = 120 inches
Porosity = 0.578 vol/vol
Field Capacity = 0.076 vol/vol
Wilting Point = 0.025 vol/vol
Initial Soil Water Content = 0.0768 vol/vol
Effective Sat. Hyd. Conductivity = 4.10E-03 cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

General Design and Evaporative Zone Data

SCS Runoff Curve Number = 90
Fraction of Area Allowing Runoff = 100 %
Area projected on a horizontal plane = 1 acres
Evaporative Zone Depth = 0.5 inches
Initial Water in Evaporative Zone = 0.068 inches
Upper Limit of Evaporative Storage = 0.199 inches
Lower Limit of Evaporative Storage = 0.068 inches
Initial Snow Water = 0 inches
Initial Water in Layer Materials = 16.129 inches
Total Initial Water = 16.129 inches
Total Subsurface Inflow = 0 inches/year

Note: SCS Runoff Curve Number was User-Specified.

Evapotranspiration and Weather Data

Station Latitude = 33.05 Degrees
Maximum Leaf Area Index = 5
Start of Growing Season (Julian Date) = 77 days

End of Growing Season (Julian Date) = 316 days
Average Wind Speed = 7 mph
Average 1st Quarter Relative Humidity = 67 %
Average 2nd Quarter Relative Humidity = 69 %
Average 3rd Quarter Relative Humidity = 77 %
Average 4th Quarter Relative Humidity = 72 %

Note: Evapotranspiration data was obtained for Juliette, Georgia

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
4.482415	4.513041	4.728331	3.310596	2.864451	3.873931
4.619486	4.282922	3.674894	2.865716	3.663677	3.522973

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.05/-83.8

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
52.3	53.2	57.6	66.7	74.6	79.7
82.8	81.2	75.2	67.1	58.2	52.5

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.05/-83.8
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.05/-83.8

Average Annual Totals Summary

Title: Scherer Alternate Cover
Simulated on: 8/25/2021 11:32

	Average Annual Totals for Years 1 - 100*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	46.40	[6.56]	168,440.8	100.00
Runoff	4.685	[2.037]	17,005.1	10.10
Evapotranspiration	13.213	[1.881]	47,964.2	28.48
Subprofile1				
Lateral drainage collected from Layer 3	28.4352	[4.3328]	103,219.9	61.28
Percolation/leakage through Layer 4	0.072140	[0.017806]	261.9	0.16
Average Head on Top of Layer 4	0.0338	[0.0191]	---	---
Subprofile2				
Percolation/leakage through Layer 5	0.041874	[0.029682]	152.0	0.09
Water storage				
Change in water storage	0.0274	[0.7129]	99.6	0.06

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Scherer Alternate Cover
Simulated on: 8/25/2021 11:33

	Peak Values for Years 1 - 100*	
	(inches)	(cubic feet)
Precipitation	4.33	15,710.8
Runoff	3.207	11,639.6
Subprofile1		
Drainage collected from Layer 3	0.9456	3,432.4
Percolation/leakage through Layer 4	0.031851	115.6
Average head on Layer 4	14.6446	---
Maximum head on Layer 4	19.7193	---
Location of maximum head in Layer 3	98.03	(feet from drain)
Subprofile2		
Percolation/leakage through Layer 5	0.000440	1.5986
Other Parameters		
Snow water	3.9177	14,221.3
Maximum vegetation soil water	0.3980	(vol/vol)
Minimum vegetation soil water	0.1360	(vol/vol)

Final Water Storage in Landfill Profile at End of Simulation Period

Title: Scherer Alternate Cover
Simulated on: 8/25/2021 11:34
Simulation period: 100 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	1.4756	0.2459
2	5.1443	0.2858
3	0.0147	0.0586
4	0.0000	0.0000
5	12.2390	0.1020
Snow water	0.0000	---

```
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             HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
                    HELP MODEL VERSION 4.0 BETA (2018)
  DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
----------------------------------------------------------------------------------------------------------------
     Title:     Scherer USEPA Cover                    Simulated On:     8/19/2021 15:18
----------------------------------------------------------------------------------------------------------------

                                   Layer 1
                 Type 1 - Vertical Percolation Layer (Cover Soil)
                         SCL - Sandy Clay Loam
                       Material Texture Number 10
     Thickness                                   =            6  inches
     Porosity                                    =        0.398  vol/vol
     Field Capacity                              =        0.244  vol/vol
     Wilting Point                               =        0.136  vol/vol
     Initial Soil Water Content                  =        0.235  vol/vol
     Effective Sat. Hyd. Conductivity            =     1.20E-04  cm/sec

                                   Layer 2
                       Type 3 - Barrier Soil Liner
                               Soil Cover
                       Material Texture Number 45
     Thickness                                   =           18  inches
     Porosity                                    =        0.479  vol/vol
     Field Capacity                              =        0.371  vol/vol
     Wilting Point                               =        0.251  vol/vol
     Initial Soil Water Content                  =        0.479  vol/vol
     Effective Sat. Hyd. Conductivity            =     1.00E-05  cm/sec

                                   Layer 3
                  Type 1 - Vertical Percolation Layer (Waste)
                  High-Density Electric Plant Coal Bottom Ash
                       Material Texture Number 31
     Thickness                                   =          120  inches
     Porosity                                    =        0.578  vol/vol
     Field Capacity                              =        0.076  vol/vol
     Wilting Point                               =        0.025  vol/vol
     Initial Soil Water Content                  =       0.2147  vol/vol
     Effective Sat. Hyd. Conductivity            =     4.10E-03  cm/sec
     ----------------------------------------------------------------------------------------------------------------
     Note:      Initial moisture content of the layers and snow water were
                computed as nearly steady-state values by HELP.
```

General Design and Evaporative Zone Data

SCS Runoff Curve Number	=	90	
Fraction of Area Allowing Runoff	=	100	%
Area projected on a horizontal plane	=	1	acres
Evaporative Zone Depth	=	0.5	inches
Initial Water in Evaporative Zone	=	0.068	inches
Upper Limit of Evaporative Storage	=	0.199	inches
Lower Limit of Evaporative Storage	=	0.068	inches
Initial Snow Water	=	0	inches
Initial Water in Layer Materials	=	35.795	inches
Total Initial Water	=	35.795	inches
Total Subsurface Inflow	=	0	inches/year

Note: SCS Runoff Curve Number was User-Specified.

Evapotranspiration and Weather Data

Station Latitude	=	33.05	Degrees
Maximum Leaf Area Index	=	5	
Start of Growing Season (Julian Date)	=	77	days
End of Growing Season (Julian Date)	=	316	days
Average Wind Speed	=	7	mph
Average 1st Quarter Relative Humidity	=	67	%
Average 2nd Quarter Relative Humidity	=	69	%
Average 3rd Quarter Relative Humidity	=	77	%
Average 4th Quarter Relative Humidity	=	72	%

Note: Evapotranspiration data was obtained for Juliette, Georgia

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
4.482415	4.513041	4.728331	3.310596	2.864451	3.873931
4.619486	4.282922	3.674894	2.865716	3.663677	3.522973

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.05/-83.8

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
52.3	53.2	57.6	66.7	74.6	79.7
82.8	81.2	75.2	67.1	58.2	52.5

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.05/-83.8
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 33.05/-83.8

Average Annual Totals Summary

Title: Scherer USEPA Cover
Simulated on: 8/19/2021 15:21

	Average Annual Totals for Years 1 - 100*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	46.40	[6.56]	168,440.8	100.00
Runoff	5.588	[2.522]	20,284.6	12.04
Evapotranspiration	12.996	[1.889]	47,176.5	28.01
Subprofile1				
Percolation/leakage through Layer 2	27.818056	[4.088121]	100,979.5	59.95
Average Head on Top of Layer 2	0.3204	[0.0734]	---	---
Subprofile2				
Percolation/leakage through Layer 3	27.819507	[3.695946]	100,984.8	59.95
Water storage				
Change in water storage	-0.0014	[1.622]	-5.1533	0.00

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Scherer USEPA Cover
Simulated on: 8/19/2021 15:21

	Peak Values for Years 1 - 100*		
	(inches)		(cubic feet)
Precipitation	4.33		15,710.8
Runoff	3.480		12,633.7
Subprofile1			
Percolation/leakage through Layer 2	0.452947		1,644.2
Average head on Layer 2	5.9688		
Subprofile2			
Percolation/leakage through Layer 3	0.437221		1,587.1
Other Parameters			
Snow water	3.9177		14,221.3
Maximum vegetation soil water	0.3980	(vol/vol)	
Minimum vegetation soil water	0.1360	(vol/vol)	

Final Water Storage in Landfill Profile at End of Simulation Period

Title:	Scherer USEPA Cover
Simulated on:	8/19/2021 15:21
Simulation period:	100 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	1.4132	0.2355
2	8.6165	0.4787
3	25.6179	0.2135
Snow water	0.0000	---

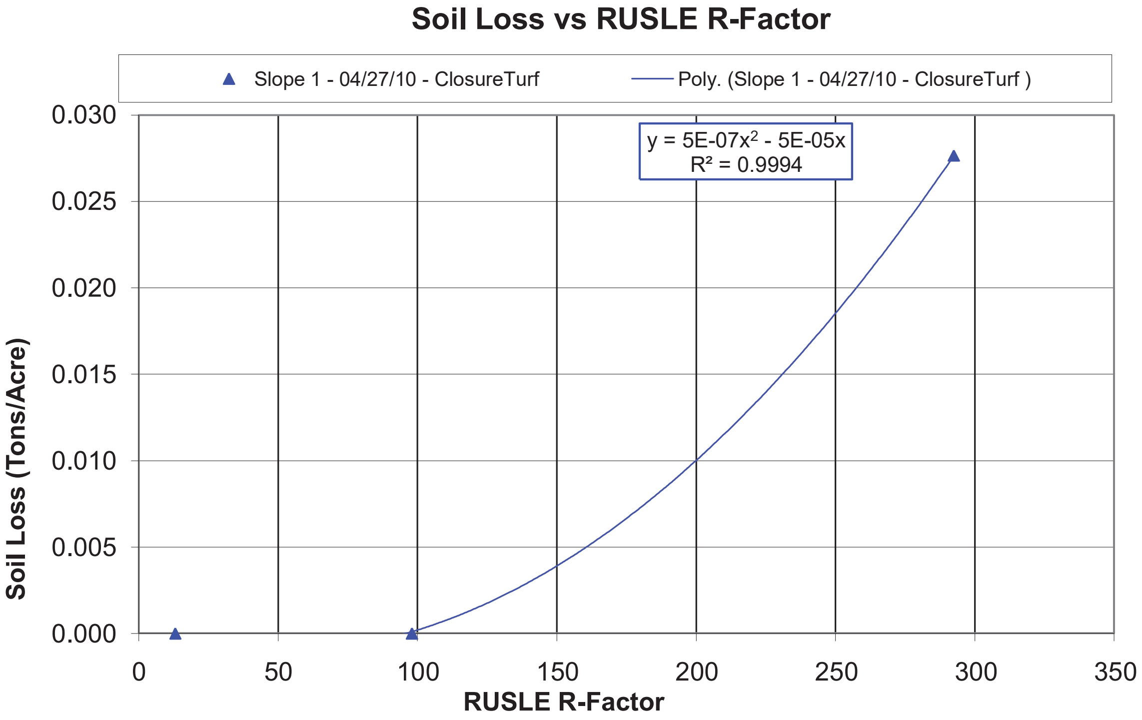
Appendix C

Soil Loss Test Result on Representative Sample of Engineered Turf

Project: ASTM D 6459
Client: RPH
Test Date: 4/26/2010
Rainfall Rates: 2,4,6 in/hr (target); 20 minutes at each intensity (60 min. total)
Bed Size & Slope: 8-ft wide x 40-ft long; 3H:1V
Sand Ballast Layer, lbs: 1130 (approximately 1/2-inch thick, hand spread)

Plot	Intensity (in/hr)	Runoff (gallons)	Cumm. R-Factor	Soil Loss (lbs/slope)	Sediment Yield (tons/acre)	% of Ballast in Runoff/Seepage
ClosureTurf	2.36	93	13.13	0.00	0.00	0.04%
	4.65	258	97.99	0.00	0.00	
	6.57	360	292.43	0.41	0.03	

Time (min)	Cumm. Rainfall (in)	Cumm. Runoff (in)	Peak Runoff (cfs)	CN[1]	Rational "C"[2]
20	0.79	0.46	0.013	96.2	0.74
40	2.34	1.76	0.026	94.5	0.76
60	4.53	3.56	0.038	91.3	0.78



1. The effective runoff curve number was determined by solving for S in the equation Q = [(P-0.2S)2/(P+0.8S)] where Q is the depth of runoff (in) and P is the rainfall depth (in). Then, CN = 1000/(S+10).

2. The rational "C" coefficient was determined by solving for C in Q = C I A where Q is the peak discharge rate (cfs), I is the peak rainfall intensity (in/hr) and A is the drainage area (acre).

Note: The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose

CJS 5/5/10
Quality Review / Date

Appendix B2

Final Cover Veneer Stability Analysis

I. PURPOSE

The purpose of this memorandum is to present the results of the veneer stability analysis performed for the proposed alternative final cover system in support of the Closure Plan submittal for the Plant Scherer. These calculations are being provided pursuant to the US Environmental Protection Agency's (USEPA) Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule (CCR Rules), which became effective on April 17, 2015. The CCR Rules state that there should be a stability assessment of excavated sideslopes and that the closure must provide for major slope stability to prevent sloughing or movement of the cover system during closure and throughout the post-closure care period.

Veneer stability analyses were performed to estimate the required interface friction angle by evaluating the shallow translational failure potential and demonstrate the stability of the final cover soils over the cap/cover system geosynthetics under static and seismic conditions using limit equilibrium forces and a finite slope model. The following sections summarize the methodology, assumptions, and the results of the analyses. Figures and calculations are provided as attachments and are referenced herein.

II. CONFIGURATION OF THE FINAL COVER SYSTEM

Veneer stability was evaluated for the specified final cover system. Assumptions and parameters for the stability models were selected for the analyses, including modeling the maximum design grades and longest design slopes. The proposed alternative cover system will consist of the following components (from bottom to top):

- CCR Material (prepared CCR);
- 40-MIL Textured Flexible Membrane (LLDPE);
- Geocomposite Drainage Media (GDM);
- 18" Protective Cover Layer; and
- 6" Vegetative Growth Layer.

Figure 1 below depicts the details of the alternative final cover system based on the permit-level submittal design.

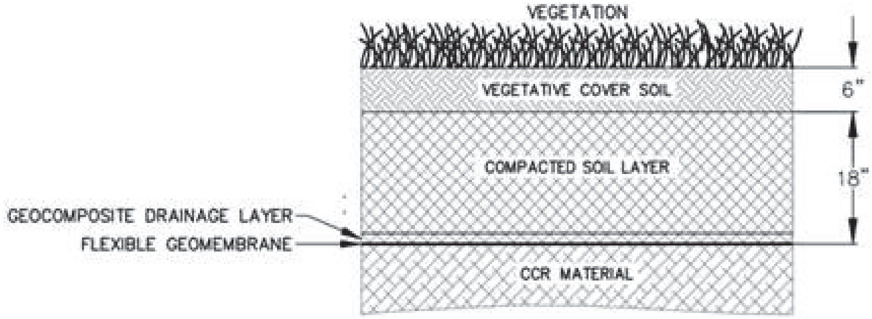


Figure 1 – Top and Sideslope
Alternative Final Cover System

III. SHALLOW TRANSLATIONAL FAILURE ANALYSIS - METHODOLOGY

Analysis of the sliding potential of relatively thin cover soil layers (veneer) above both geosynthetic and natural soil liners (i.e. geomembranes (GM), geosynthetic clay liners (GCL) and compacted soil liners) is important. This is because the underlying barrier materials generally represent a low interface shear strength boundary with respect to the soil placed above them and the geosynthetics are oriented precisely in the direction of potential sliding.

The method used in this analysis closely follows the methods outlined by Koerner and Soong (Koerner and Soong, 2005) and is performed by use of limit equilibrium procedures to balance the driving forces due to gravity pulling on the cover soils and the resistance to sliding due to friction between the underlying subsurface and cover material. Resistance to sliding is also due in part to the toe support (passive wedge) located at the base of the sliding mass. It is assumed that the cover soil is of uniform thickness. This is conceptually illustrated in **Figure 2** below.

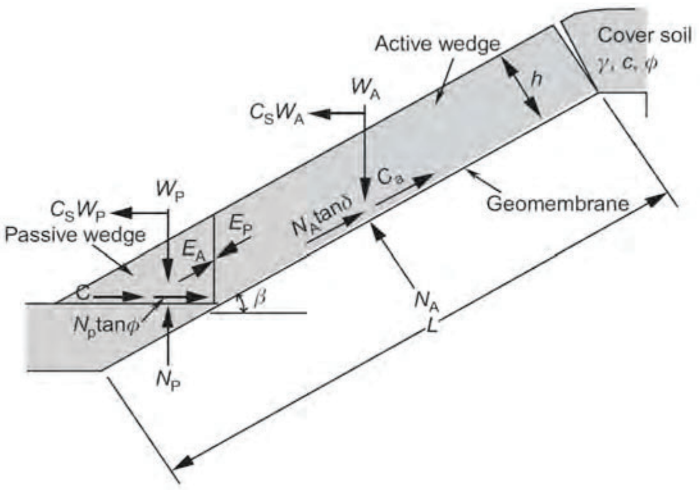


Figure 2 – Conceptual Veneer Stability Analysis Cross Section/Free Body Diagram

Where,

W_A = Total Weight of the Active Wedge
W_P = Total Weight of the Passive Wedge
N_A = Effective Force Normal to the Failure Plane of the Active Wedge
N_P = Effective Force Normal to the Failure Plane of the Passive Wedge
γ = Unit Weight of the Cover Soil
h = Thickness of the Cover Soil
L = Length of Slope Measured Along the Geomembrane
β = Soil Slope Angle beneath the Geomembrane
ϕ = Friction Angle of the Cover Soil
δ = Interface Friction Angle between Cover Soil and Geomembrane
C_A = Adhesive Force between Active Wedge Cover Soil and Geomembrane
c_A = Adhesion between Active Wedge Cover Soil and the Geomembrane
C = Cohesive Force along the Failure Plane of the Passive Wedge
c = Cohesion of the Cover Soil
E_A = Interwedge Force Acting on the Active Wedge from the Passive Wedge
E_P = Interwedge Force Acting on the Passive Wedge from the Active Wedge
FS = Factor of Safety Against Cover Soil Sliding on the Geomembrane

The shallow translational failure analysis is analyzed by fully satisfying the equilibrium of forces in the vertical and horizontal directions. By taking force summation parallel to the slope and comparing the resisting force with the driving or mobilizing forces, a global factor of safety (FS) results:

$$FS = \frac{\sum Resisting\ Forces}{\sum Driving\ Forces}$$

As noted in the procedure proposed in the Koerner and Soong paper (2005), the FS for veneer stability (as depicted in **Figure 2**) is determined by solving the following quadratic equation:

$$FS = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

Where,

$$a = (W_A - N_A cos\beta)cos\beta$$

$$b = -\begin{bmatrix} (W_A - N_A cos\beta)sin\beta tan\varphi \\ +(N_A tan\delta + C_A)sin\beta cos\beta \\ +sin\beta(C + W_P tan\phi) \end{bmatrix}$$

$$c = (N_A tan\delta + C_A)sin^2\beta tan\phi$$

When the calculated FS value falls below 1.0, sliding of the cover soil on the geosynthetics is anticipated.

Veneer stability analyses were performed to evaluate the required minimum interface friction angle to demonstrate the stability of the proposed alternative final cover system. Typically slope stability analyses require a static factor of safety between 1.4 and 2.0. Since the subsurface conditions and CCR material properties have been robustly characterized for this project, the following FS requirement for long-term static conditions and peak strength was used for this analysis:

- Static Conditions (Peak Strength): FS ≥ 1.50 (long-term conditions)

In addition to long term static conditions, a number of other loading scenarios representing various temporary or extreme conditions were also considered. These included:

- Significant deformation along the interface has occurred and residual strength conditions have been mobilized.
- A large stormwater event has occurred and the drainage layer is at full capacity allowing buildup of seepage forces in the drainage layer.
- Additional temporary forces act on the slope such as construction equipment or a seismic event.

For short-term or extreme conditions, a lower factor of safety is usually warranted commensurate with the consequences of failure and the duration of the temporary condition. A lower factor of safety is also warranted where residual strengths could be mobilized in service. Herein, the following factors of safety were established as minimum values for the various temporary/extreme conditions considered:

- Static Conditions (Residual Strength): FS ≥ 1.10
- Static Conditions (Full Drainage Layer): FS ≥ 1.10

- Static Conditions (Equipment Loads): FS ≥ 1.25
- Seismic Conditions: FS ≥ 1.00

The stability analysis for construction equipment loading condition only accounts for the weight of the vehicle and assumes very small and gradual acceleration and deceleration on the slope such that it can be neglected. It also assumes placement of the material beginning from the toe of slope progressing to the top.

Note that this analysis is not intended to design and size the drainage layer as it relates to the seepage analysis. The stability analysis including seepage forces assumes the infiltration from the design storm will be properly conveyed such that the maximum head within the geocomposite drainage layer does not exceed the thickness of the drainage layer.

IV. SELECTION OF PARAMETERS

For the final cover system, the following assumptions and design parameters were used. Slope lengths and angles used in all analyses correspond to the maximum (i.e. worst case) values.

a. Slope Geometry

The majority of the cover will have maximum cross-slopes of 3 % to 5%. Short areas of steeper slopes will be constructed at the perimeter of the closure footprint. The following slope conditions were considered in the veneer stability analyses:

Condition	Slope (%)	Height of Slope (ft)	Slope Length (ft)
1	3%	33.6	1120
2	5%	26	533
3	20%	32	160

These represent the longest and steepest slopes of the cover system shown on the grading plans. Since the shallow slopes (3% and 5%) are anticipated to be stable by inspection, specific analyses were only performed for the 20% section. The conclusions/required interface shear parameters for the 20% section will be applied to all areas of the cover that has a shallower slope.

b. Layers

Interfaces within the cover system are anticipated to be as follows (from bottom to top):

c. CCR Material (prepared CCR) to 40-mil textured LLDPE Membrane;

d. 40-mil textured LLDPE Membrane to Geocomposite Drainage Layer;

e. Geocomposite Drainage Layer to protective cover layer;

f. Protective Cover Layer to vegetative cover layer

g. Critical Interfaces

The critical interfaces analyzed represent preferential pathways for mass sliding. Critical interfaces in the cover or liner system are typically between adjacent geosynthetic materials or between geosynthetic and soil materials. The geosynthetics are of negligible thickness so the depth to the failure surface does not require adjustment for the individual components when they are stacked.

Geosynthetic Research Institute Report #30 (Koerner and Narejo, 2005) tabulates the results of a large number of direct shear tests on geosynthetic-to-geosynthetic and geosynthetic-to-soil interfaces. Review of the data presented in this report indicates that for the final cover system, the 40-mil LLDPE membrane to geocomposite drainage layer interface is likely to be the interface with lowest interface shear strength. This interface is therefore considered to be critical. GRI Report #30 presents the following interface strength parameters for this interface:

Table 1: Estimated Interface Shear Strengths for LLDPE Geomembrane to Geocomposite Interface

Shear Strength Condition	Friction Angle (deg)	Adhesion (psf)
Peak Strength Condition	26	169
Residual Strength Condition	17	198

Two types of analyses were performed:

1. The basic interface strength properties given in Table 1 were input into the veneer stability analyses, and corresponding factors of safety for each loading condition were calculated. For these analyses, friction angles from Table 1 were input directly. However, the adhesion was conservatively limited to 50 psf in the analyses.
2. Combinations of friction angle and adhesion that satisfy the minimum FS requirements were calculated for each loading condition. These “strength envelopes” were then plotted and the most conservative envelope developed from

the various conditions is used to develop material specifications for use in construction.

h. Material Parameters

The material parameters used in the veneer stability analyses are tabulated in **Table 2.**

Table 2: Material Parameters

Parameter	Value	Comments
Dry Unit Weight of Protective Cover Soil, γ	100 pcf	Assumed (Typical unit weight)
Dry Unit Weight of Vegetative Cover Soil, γ	90 pcf	Assumed (Typical unit weight)
Cohesion of Protective Cover Material, c	0 psf	Conservatively assumed
Cohesion of Vegetative Cover Material, c	0 psf	Conservatively assumed
Moisture Content of Protective Cover Soil, w_F	26.0 %	Assumed (Typical field conditions)
Moisture Content of Vegetative Cover Soil, w_F	24.0%	Assumed (Typical field conditions)
Minimum Friction Angle of Protective Cover Soil, ϕ	25.0°	Conservatively assumed (Sand-clay soils)
Minimum Friction Angle of Vegetative Cover Soil, ϕ	25.0°	Conservatively assumed (Sand-clay soils)
Specific Gravity of the Protective Cover Soil, G_s	2.72	Conservatively assumed (Sand-clay soils)
Specific Gravity of the Vegetative Cover Soil, G_s	2.72	Conservatively assumed (Sand-clay soils)

i. Drainage Conditions

The geocomposite drainage layer is currently designed to discharge to channels located at various sections of the finished grades. For static slope stability analysis of the steep slope considered (20%), it has been assumed that the alternative final cover soil is fully drained given the steep inclination of the slope which should promote effective drainage conditions. Therefore, a water depth of 0.08 foot was assumed over the geocomposite drainage layer. For seismic (pseudo-static) conditions for all design slope grades, it has been assumed that the alternative cover system is fully drained.

j. Seismic Coefficient

The seismic analysis evaluates the cover system’s response to the design earthquake, which is considered an event with a probability of exceedance of 2 percent in 50 years, and corresponds to an event with an approximate 2,500-year (2,475-year) return period. Utilizing the Koerner and Soong method described above, horizontal and vertical forces may be applied to determine the impact of such an event; though the vertical seismic coefficient typically has little impact to the calculated FS. Therefore, the seismic loading conditions FS is based on peak strength and horizontal peak ground acceleration.

It was determined that the design horizontal peak ground acceleration for the site was 0.15g. This coefficient was applied to veneer stability analyses to determine the FS of the sliding mass under seismic loading conditions.

V. RESULTS OF ANALYSES

Five conditions were evaluated with regard to the stability of the proposed alternative cover system, for both the 20% slope section:

1. Static conditions of the cover system (no water present within the cover system).
2. Static conditions with a full geocomposite drainage layer (0.08-ft depth of water).
3. Static conditions with equipment loading on the cover system (CAT D8 Dozer).
4. Seismic conditions with a horizontal peak ground acceleration of 0.150g assuming that the cover system is fully drained (no water is present in the cover system).
5. Static conditions of the cover system utilizing the residual strength parameters of the soil (no water present within the cover system)

The results of the analyses for the first analysis using the basic interface shear strength properties given in Table 1 are summarized in **Table 3** below. Results of analyses for the second analysis in which minimum combinations of friction angle and adhesion are calculated are given in **Figure 2**. Detailed calculations of the 20% grades are included as **Attachment A.**

Table 3 – Calculated Factors of Safety Using Interface Properties From GRI Report #30

Loading Condition	Slope	Required FS	Calculated Factor of Safety
Static (No water on Geocomposite)	20%	1.50	3.57
Static (Water on Geocomposite)	20%	1.10	2.45
Static (Equipment loading)	20%	1.25	3.24
Pseudo-static (Seismic loading)	20%	1.00	1.96
Static (Residual Strength)	20%	1.10	2.66

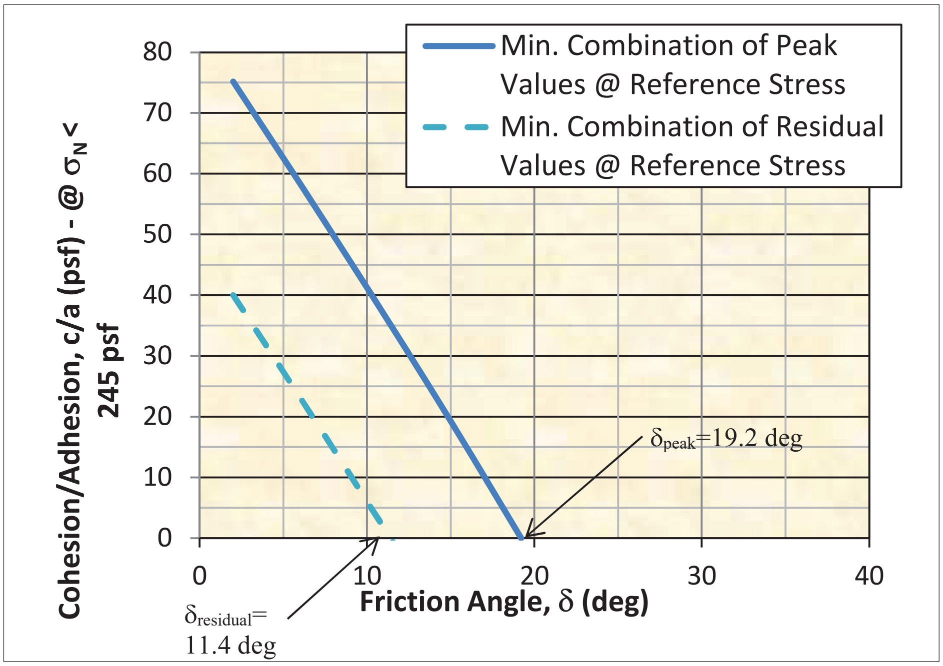


Figure 2. Minimum Interface Strength Envelope For 20% Slope

The analyses indicate that using the basic interface shear strength parameters sourced from GRI Report #30, factors of safety are well above minimum required values for all loading conditions. Minimum peak and residual friction angles are 26.5 and 19.2 degrees for the 20% slope. Pre-construction testing with the actual materials is anticipated to be conducted to verify that the materials used exhibit interface properties above the minimum shear strength envelopes.

VI. TESTING REQUIREMENTS

The minimum interface friction angle calculated can be met with a proper selection of geosynthetic components. However, pre-construction testing will be required to verify that the materials used exhibit interface properties above the minimum shear strength parameters recommended.

It is essential that interface strength testing is performed using the site-specific construction materials to verify the minimum friction angle requirements (identified in this calculation) are met for the typical closure system or alternate closure system components. Specifically, the following interfaces should be tested using ASTM D 5321 or other approved procedures:

- Prepared subgrade (interim cover or existing/re-worked ash) against geomembrane;
- Geomembrane against geocomposite; and
- Geocomposite against the protective cover soil.

Several products which may be considered as geomembranes or geocomposite drainage layers have different texturing on each side. Care should be taken to ensure that testing is performed on interfaces as they will be constructed in the field. Furthermore, it is critical that construction procedures be put in place to ensure the materials are oriented to reflect the alignment under test conditions. Any of these interface combinations may result in the most critical interface strength condition and each condition should be properly tested and evaluated.

The normal loads used during friction testing should be similar to the normal loads that will be imposed on the cover system.

A valid interpretation of interface friction testing results is very important. One method of reviewing interface friction testing results is to superimpose a line on a graph of shear stress at failure versus normal load with a slope angle equal to the required interface friction angle and a y-intercept of 0. The interfaces are expected to be stable for veneer stability for those normal loads where the reported interface friction envelope is higher than the superimposed line.

VII. CONCLUSIONS

The longest and steepest slopes within the proposed final Closure Plan submittal for the Plant Scherer footprint were analyzed for veneer stability to determine the minimum required shear strength parameters for the proposed alternative cap system. It is shown that a lower minimum internal friction angle is achievable for slopes proposed at 20% or shallower – i.e., the envelope shown in Figure 2.

The minimum interface shear strength requirements are within a reasonable range for the type of materials specified in the design, as indicated by the results given in Table 3. The actual materials used in construction are anticipated to undergo preconstruction interface testing as part of the construction project. The results of these tests will verify that the minimum interface shear strengths are exhibited by all the applicable cap materials. It is the responsibility of the project's design and construction certifying engineer to verify that the materials meet the minimum requirements specified for interface strength as part of this analysis. This testing and verification are outside the current scope of work.

For construction materials including the protective cover and final vegetative cover, no test results verifying the shear strength characteristics of the materials were available. It is the responsibility of the project's design and construction certifying engineer to verify that the materials meet the minimum requirements assumed herein. This testing and verification are outside the current scope of work.

VIII. REFERENCES

Koerner, G.R. and Narejo, D. (2005), "Direct Shear Database of Geosynthetic-to-Geosynthetic and Geosynthetic-to-Soil Interfaces", Geosynthetic Research Institute Report #30.

Koerner, R. M. and Soong, T. Y. (2005), "*Analysis and Design of Veneer Cover Soils*", Geosynthetics International, Vol. 12, No. 1, pp. 28-49.

Poulos, H.G. and Davis, E.H. (1974) *Elastic Solutions for Soil and Rock Mechanics*, J. Wiley & Sons, Inc., New York, NY, USA, 441 pgs.

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ATTACHMENT A

Veneer Stability Analysis Calculations – 20% Slope

AECOM
564 White Pond Drive
Akron, OH 44320
Tel. (330) 836-9111

Georgia Power Company

COVER VENEER STABILITY
Plant Scherer

JOB	60563110		
SHT NO	1	OF	11
CALC BY	SW	DATE	08/20/18
CHK BY	VKG	DATE	08/31/18
SCALE	NA		

Objective:

Determine the veneer stability of the **cover system** for pond closure at Plant Scherer. Each interface was analyzed using peak strength parameters to reflect static conditions; with acceptation to the residual strength case.

Method:

Use methods outlined in the paper by Koerner and Soong, *Analysis and Design of Veneer Cover Soils* published in **Geosynthetics International,** 2005, 12, No.1.

Procedure:

Determine the static stability of the veneer **cover system** to evaluate the minimum factor of safety for the **cover system**. Balance the forces as shown in **Figure 1** and compare to the required factor of safety (FS).

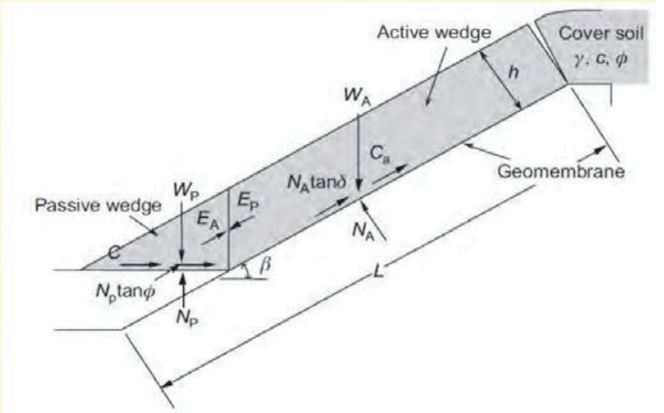

Figure 1. Limit equilibrium forces involved in a finite length slope analysis for a uniformly thick cover soil

Determine: Static factor of safety for cover system based on gravitational forces only and peak strength.

Assumptions:

1. No geosynthetic reinforcements
2. No interface adhesion for geosynthetic components.
3. No tension allowed in geosynthetics
4. Minimum cohesion for multilayered systems
5. Weighted average friction angle for multilayered systems in passive wedge.

Veg. Cover Soil (VC)/Prot. Cover Soil (CS) and Slope Parameters	VC	CS	Utilized		Source
Thickness (h)	0.5	1.5	2.0	ft.	Design
Dry Unit Weight (γ_D)	90.0	100.0	97.5	pcf	Conservatively assumed based on typ. values
Mois. Cont. (field cond.) (w_F)	24.0	26.0	25.5	%	Conservatively assumed based on typ. values
Avg Field Unit Wt (γ)	-	-	122.4	pcf	
Reference Stress	-	-	**240.0**	**pcf**	
Min. Friction Angle (φ)	25.0	25.0	25.0	deg	Conservatively assumed based on typ. values
Min. Cohesion (c)	0.0	0.0	0.0	psf	Conservatively assumed based on typ. values
Slope Angle Beneath the Geom. (β)	-	-	11.31	deg	Design
Ht. of Slp. Meas. Along Geom. (H_L)	-	-	32.0	ft	Design
Lng. of Slp. Meas. Along Geom. (L)	-	-	163.2	ft.	
Inter. Frict. Angle for Prot. Soil & DL (δ)	-	-	26.0	deg	Peak shear strength parameters for critical Geomembrane to geocomposite interface.
Adhesion for Prot. Soil & DL (c_a)	-	-	50.0	psf	Parameters from GRI Direct Shear Database
Required Factor of Safety (FS_R)	-	-	1.50		Min. req. FS for long term conditions

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Tel. (330) 836-9111	Plant Scherer	CHK BY	**VKG**	DATE	**8/31/18**
		SCALE	**NA**		

Active Wedge Calculations

Determine the total weight of the active wedge (W_A),the effective force normal to the failure plan of the active wedge (N_A), the adhesive force between the cover soil of the active wedge and the geomembrane (C_a), and the interwedge force acting on the active wedge from the passive wedge (E_A) using the following eqs:

$$W_A = \gamma h^2\left(\frac{L}{h} - \frac{1}{\sin\beta} - \frac{\tan\beta}{2}\right) = \textbf{37,387 lbs.}$$

$$N_A = W_A \cos\beta = \textbf{36,661 lbs.}$$

$$C_a = c_a\left(L - \frac{h}{\sin\beta}\right) = \textbf{7,648 lbs.}$$

$$E_A = \frac{(FS)(W_A - N_A\cos\beta) - (N_A\tan\delta + C_a)\sin\beta}{\sin\beta(FS)} = \textbf{(9,687) lbs.}$$

Passive Wedge Calculations

Determine the total weight of the passive wedge (W_P),the effective force normal to the failure plan of the passive wedge (N_P), the cohesive force along the failure plane (C), and the interwedge force acting on the passive wedge from the active wedge (E_P) using the following eqs:

$$W_P = \frac{\gamma h^2}{\sin 2\beta} = \textbf{1,273 lbs.}$$

$$C = \frac{ch}{\sin\beta} = \textbf{- lbs.}$$

$$E_P = \frac{C + W_P\tan\phi}{\cos\beta(FS) - \sin\beta\tan\phi} = \textbf{430 lbs.}$$

$$N_P = W_P + E_P\sin\beta = \textbf{1,357 lbs.}$$

Static Factor of Safety

Determine the calculated Factor of Safety (FS_A) using a quadratic equation relationship where the constants are defined as follows:

$$a = (W_A - N_A\cos\beta)\cos\beta = \textbf{1,410 lbs./ft.}$$

$$b = -\left[\begin{array}{l}(W_A - N_A\cos\beta)\sin\beta\tan\phi \\ +(N_A\tan\delta + C_a)\sin\beta\cos\beta \\ +\sin\beta(C + W_P\tan\phi)\end{array}\right] = \textbf{(5,157) lbs./ft.}$$

$$c = (N_A\tan\delta + C_a)\sin^2\beta\tan\phi = \textbf{458 lbs./ft.}$$

Allow Exceeds Req'd - OK

FS_R =	**1.50**	
FS_A =	**3.57**	
Min. Resid. δ	**26.0**	**deg**
Min. Resid. c_a	**50.0**	**psf**

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		CHK BY	VKG	DATE	8/31/18
		SCALE	NA		

Determine: Static factor of safety for cover system based on peak strength and additional seepage forces.

Procedure:

Determine the static stability of the veneer cover system to determine the minimum required interface friction angle for all engineered components of the cover system. Balance the forces as shown in **Figure 1** and the required factor of safety (FS) then solve for minimum interface shear strength parameters. Account for seepage forces in drainage layer as noted in **Figure 2**.

Assumptions:

In addition to the static case assumptions:
1. Seepage is parallel to slope.
2. If geocomposite is used - it is less than 0.75 inches thick.

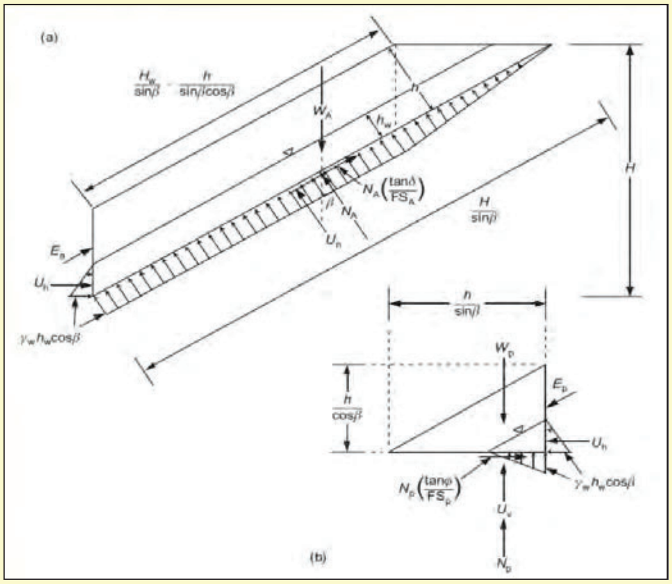

Figure 2. Limit equilibrium forces involved in finite-length slope of uniform cover soil with parallel-to-slope seepage build-up: (a) active wedge; (b) passive wedge

Veg. Cover Soil (VC)/Prot. Cover Soil (CS) and Slope Parameters					Source
	VC	CS	Utilized		
Thickness (h)	0.5	1.5	2.0	ft.	Design
Dry Unit Weight (γ_D)	90.0	100.0	97.5	pcf	Conservatively assumed based on typ. values
Mois. Cont. (field cond.) (w_F)	24.0	26.0	25.5	%	Conservatively assumed based on typ. values
Avg Field Unit Wt (γ)	-	-	122.4	pcf	
Specific Gravity of the (G_S)	2.72	2.72	2.72		Conservatively assumed based on typ. values
Unit Weight of Water (γ_W)	-	-	62.4	pcf	
Saturated Unit Weight (γ_{SAT})	-	-	124.1	pcf	
Min. Friction Angle (ϕ)	25.0	25.0	25.0	deg	Conservatively assumed based on typ. values
Min. Cohesion (c)	0.0	0.0	0.0	psf	Conservatively assumed based on typ. values
Slope Angle Beneath the Geom. (β)	-	-	11.31	degrees	Design
Ht. of Slp. Meas. Along Geom. (H_L)	-	-	32.0	ft.	Design
Lng. of Slp. Meas. Along Geom. (L)	-	-	163.2	ft.	
Depth of Water in DL (h_W)	-	-	0.08	ft.	Max. thickness of geocomposite
Inter. Frict. Angle for Prot. Soil & DL (δ)	-	-	26.0	deg	Peak shear strength parameters for critical Geomembrane to geocomposite interface. Parameters from GRI Direct Shear Database
Adhesion for Prot. Soil & DL (c_a)	-	-	50.0	psf	
Required Factor of Safety (FS_R)	-	-	1.10		Min. req. FS for temporary conditions

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Tel. (330) 836-9111	Plant Scherer	CHK BY	**VKG**	DATE	**8/31/18**
		SCALE	**NA**		

Active Wedge Calculations

Determine the total weight of the active wedge (W_A), resultant of the pore pressures acting on the interwedge surfaces (U_h), resultant of the pore pressures acting perpendicular to the slope (U_n), the effective force normal to the failure plan of the active wedge (N_A), and the interwedge force acting on the active wedge from the passive wedge (E_A) using the following eqs:

$$W_A = \frac{\gamma_D(h-h_W)[2H\cos\beta-(h+h_W)]}{\sin 2\beta} + \frac{\gamma_{SAT}(h_W)(2H\cos\beta - h_W)}{\sin 2\beta} = \mathbf{31{,}164 \text{ lbs.}}$$

$$U_h = \frac{\gamma_w h_W^2}{2} = \mathbf{0.22 \text{ lbs.}} \qquad U_n = \frac{\gamma_w(h_w)(\cos\beta)(2H\cos\beta - h_w)}{\sin 2\beta} = \mathbf{831 \text{ lbs.}}$$

$$N_A = W_A \cos\beta + U_h \sin\beta - U_n = \mathbf{29{,}728 \text{ lbs.}}$$

$$E_A = W_A \sin\beta - U_h \cos\beta - \frac{N_A \sin\delta}{(FS)} = \mathbf{(5{,}736) \text{ lbs.}}$$

Passive Wedge Calculations

Determine the total weight of the passive wedge (W_P), resultant of the vertical pore pressures acting on the passive wedge (U_V), and the interwedge force acting on the pass wedge from the active wedge (E_P) using the following eqs:

$$W_P = \frac{\gamma_D(h^2 - h_w^2) + \gamma_{SAT} h_w^2}{\sin 2\beta} = \mathbf{1{,}014 \text{ lbs.}} \qquad U_V = U_h \cot\beta = \mathbf{1.1 \text{ lbs.}}$$

$$E_P = \frac{U_h(FS) - (W_P - U_V \tan\phi)}{\sin\beta\tan\phi - \cos\beta(FS)} = \mathbf{1027 \text{ lbs.}}$$

Static Factor of Safety w/ Seepage Forces

Determine the calculated Factor of Safety (FS_A) using a quadratic equation relationship where the constants are defined as follows:

$$a = W_A \sin\beta\cos\beta - U_h \cos^2\beta + U_h = \mathbf{5{,}993 \text{ lbs./ft.}}$$

$$b = -W_A \sin^2\beta\tan\phi + U_h \sin\beta\cos\beta\tan\phi - N_A \cos\beta\tan\delta - (W_P - U_V)\tan\phi = \mathbf{(15{,}249) \text{ lbs./ft.}}$$

$$c = N_A \sin\beta \tan\delta \tan\phi = \mathbf{1{,}326 \text{ lbs./ft.}}$$

Allow Exceeds Req'd - OK

FS_R = 1.10

FS_A = 2.45

Min. Peak δ 26.0 deg

Min. Peak c_a 50.0 psf

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		CHK BY	**VKG**	DATE	**8/31/18**
		SCALE	**NA**		

Determine: Static factor of safety for cover system based on peak strength and additional equipment loads.

Procedure:

Determine the veneer static stability of the **cover system** to determine the minimum required interface friction angle for all engineered components of the **cover system**. Balance the forces as shown in **Figure 1** and the required factor of safety (FS) then solve for minimum interface shear strength parameters. Account for equipment loads (W_b) as final cover is placed as noted in **Figure 3**.

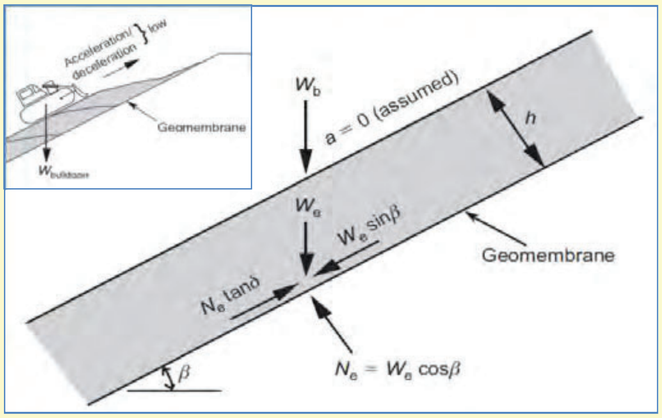

Figure 3. Additional load due to construction equipment moving on cover soil.

Assumptions:

In addition to the static case assumptions:
1. The equipment pushes material up slope leaving a toe buttress behind.
2. The equipment accelerates slowly with no sudden starts or turns to minimize additional loads besides the weight of the machine.

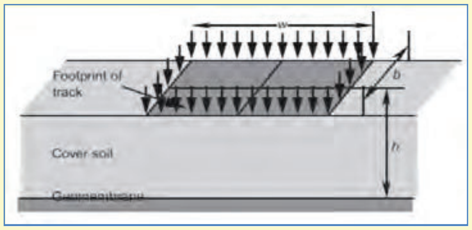

Figure 4. Illustration of stress distribution from overlying equipment.

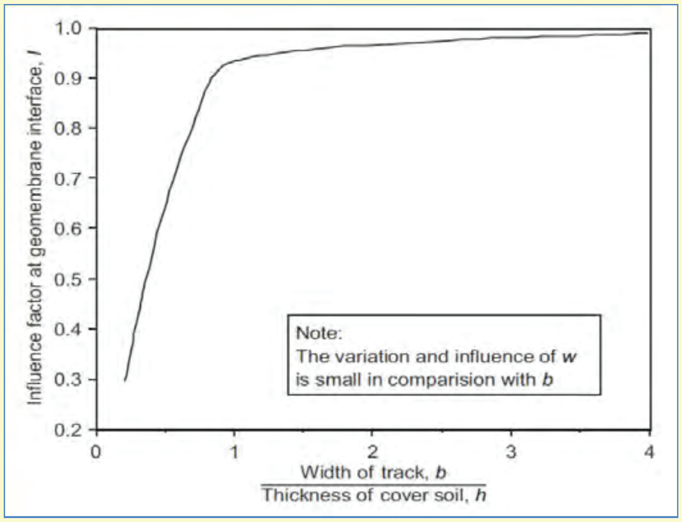

Figure 5. Values of influence factor I to dissipate surface force through cover soil to geomembrane interface (after Poulos and Davis 1974)

Equipment Parameters			Source
Equiv. Equipment Load per Unit Width (W_e)	14939	lbs.	W_e = qwl
Influence Factor at the Geom. Interface (I)	0.95		See Figure 5 above.
Track Width to Cover Soil Thickness Ratio (b/h)	1.40		
Distributed Equipment Load (q)	1492	psf	$q = W_b/(2 \times w \times b)$
Weight of Equipment (W_b)	**87,733**	lbs.	**Typical weight of CAT D8 dozer**
Length of Equipment Track (w)	**10.50**	ft.	**Typical track dimensions of CAT D8 dozer**
Width of Equipment Track (b)	**2.80**	ft.	

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Tel. (330) 836-9111	Plant Scherer	CHK BY	**VKG**	DATE	**8/31/18**	
		SCALE	**NA**			

Veg. Cover Soil (VC)/Prot. Cover Soil (CS) and Slope Parameters

	VC	CS	Utilized		Source
Thickness (h)	0.5	1.5	2.0	ft.	Design
Dry Unit Weight (γ_D)	90.0	100.0	97.5	pcf	Conservatively assumed based on typ. values
Mois. Cont. (field cond.) (w_F)	24.0	26.0	25.5	%	Conservatively assumed based on typ. values
Avg Field Unit Wt (γ)	-	-	122.4	pcf	
Min. Friction Angle (ϕ)	25.0	25.0	25.0	deg	Conservatively assumed based on typ. values
Min. Cohesion (c)	0.0	0.0	0.0	psf	Conservatively assumed based on typ. values
Slope Angle Beneath the Geom. (β)	-	-	11.31	deg	Design
Ht. of Slp. Meas. Along Geom. (H_L)	-	-	32.0	ft.	Design
Lng. of Slp. Meas. Along Geom. (L)	-	-	163.2	ft.	
Inter. Frict. Angle for Prot. Soil & DL (δ)	-	-	26.0	deg	Peak shear strength parameters for critical Geomembrane to geocomposite interface.
Adhesion for Prot. Soil & DL (c_a)	-	-	50.0	psf	Parameters from GRI Direct Shear Database
Required Factor of Safety (FS_R)	-	-	**1.25**		Min. req. FS for temporary conditions

Active Wedge Calculations

Determine the total weight of the active wedge (W_A),the effective force normal to the failure plan of the active wedge (N_A), the adhesive force between the cover soil of the active wedge and the geomembrane (C_a), and the interwedge force acting on the active wedge from the passive wedge (E_A) using the following eqs:

$$W_A = \gamma h^2 \left(\frac{L}{h} - \frac{1}{\sin\beta} - \frac{\tan\beta}{2} \right) + W_e \quad = \quad \mathbf{52{,}326 \ lbs.} \qquad N_A = W_A \cos\beta \quad = \quad \mathbf{51{,}310 \ lbs.}$$

$$C_a = c_a \left(L - \frac{h}{\sin\beta} \right) \quad = \quad \mathbf{7{,}648 \ lbs.} \qquad E_A = \frac{(FS)(W_A - N_A\cos\beta) - (N_A \tan\delta + C_a)\sin\beta}{\sin\beta(FS)} \quad = \quad \mathbf{(15{,}877) \ lbs.}$$

Passive Wedge Calculations

Determine the total weight of the passive wedge (W_P),the effective force normal to the failure plan of the passive wedge (N_P), the cohesive force along the failure plane (C), and the interwedge force acting on the passive wedge from the active wedge (E_P) using the following eqs:

$$W_P = \frac{\gamma h^2}{\sin 2\beta} \quad = \quad \mathbf{1{,}273 \ lbs.} \qquad C = \frac{ch}{\sin\beta} \quad = \quad \mathbf{- \ lbs.}$$

$$E_P = \frac{C + W_P \tan\phi}{\cos\beta(FS) - \sin\beta\tan\phi} \quad = \quad \mathbf{523 \ lbs.} \qquad N_P = W_P + E_P \sin\beta \quad = \quad \mathbf{1{,}375 \ lbs.}$$

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Tel. (330) 836-9111	Plant Scherer	CHK BY	**VKG**	DATE	**8/31/18**
		SCALE	**NA**		

Static Factor of Safety w/ Equipment Load

Determine the calculated Factor of Safety (FS_A) using a quadratic equation relationship where the constants are defined as follows:

$$a = \left(W_A - N_A \cos\beta\right)\cos\beta$$ = **1,973 lbs./ft.**

$$b = -\begin{bmatrix} (W_A - N_A \cos\beta)\sin\beta\tan\phi \\ +(N_A \tan\delta + C_a)\sin\beta\cos\beta \\ +\sin\beta(C + W_P \tan\phi) \end{bmatrix}$$ = **(6,584) lbs./ft.**

$$c = \left(N_A \tan\delta + C_a\right)\sin^2\beta\tan\phi$$ = **586 lbs./ft.**

Allow Exceeds Req'd - OK

FS_R = 1.25

FS_A = 3.24

Min. Peak δ 26.0 deg

Min. Peak c_a 50.0 psf

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		SCALE	**NA**		

Determine: Static factor of safety for cover system based on peak strength and additional seismic loads.

Procedure:

Determine the static stability of the veneer **cover system** to determine critical factor of safety for all engineered components of the **cover system**. Balance the forces as shown in **Figure 1** and compare to the required factor of safety (FS). Account for seismic loads (C_S) as noted in **Figure 6**.

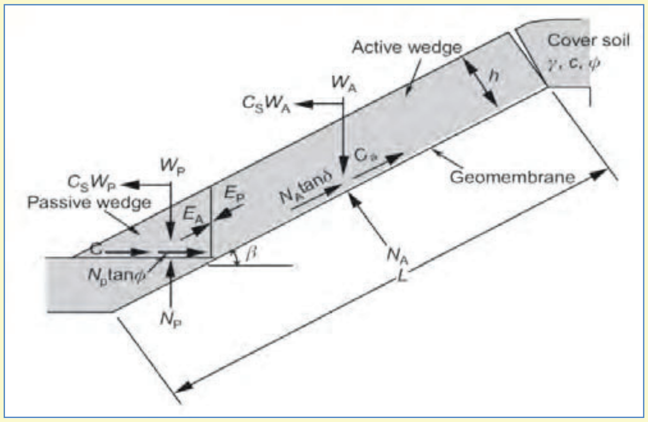

Figure 6. Limit equilibrium forces involved in pseudo-static analysis using a horizontal seismic coefficient.

Assumptions:

In addition to the static case assumptions:
1. Seismic force acts on the centroid of the cover soil.
2. Seismic force is horizontal.
3. Deformation analysis not required.

Veg. Cover Soil (VC)/Prot. Cover Soil (CS) and Slope Parameters	VC	CS	Utilized		**Source**
Thickness (h)	0.5	1.5	2.0	ft.	Design
Dry Unit Weight (γ_D)	90.0	100.0	97.5	pcf	Conservatively assumed based on typ. values
Mois. Cont. (field cond.) (w_F)	24.0	26.0	25.5	%	Conservatively assumed based on typ. values
Avg Field Unit Wt (γ)	-	-	122.4	pcf	
Min. Friction Angle (ϕ)	25.0	25.0	25.0	deg	Conservatively assumed based on typ. values
Min. Cohesion (c)	0.0	0.0	0.0	psf	Conservatively assumed based on typ. values
Slope Angle Beneath the Geom. (β)	-	-	11.31	degrees	Design
Ht. of Slp. Meas. Along Geom. (H_L)	-	-	32.0	ft.	Design
Lng. of Slp. Meas. Along Geom. (L)	-	-	163.2	ft.	
Inter. Frict. Angle for Prot. Soil & DL (δ)	-	-	26.0	deg	**Min. req. shear strength parameters**
Adhesion for Prot. Soil & DL (c_a)	-	-	50.0	psf	
Seismic Coefficient (C_S or K_S)	-	-	**0.150**	%g	**PGA for 2% Exceedance in 50 Years**
Required Factor of Safety (FS_R)	-	-	**1.00**		**Min. req. FS for seismic conditions**

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		SCALE	**NA**		

Active Wedge Calculations

Determine the total weight of the active wedge (W_A),the effective force normal to the failure plan of the active wedge (N_A), the adhesive force between the cover soil of the active wedge and the geomembrane (C_a), and the interwedge force acting on the active wedge from the passive wedge (E_A) using the following eqs:

$$W_A = \gamma h^2\left(\frac{L}{h} - \frac{1}{\sin\beta} - \frac{\tan\beta}{2}\right) = \textbf{37,387 lbs.}$$

$$N_A = W_A \cos\beta = \textbf{36,661 lbs.}$$

$$C_a = c_a\left(L - \frac{h}{\sin\beta}\right) = \textbf{7,648 lbs.}$$

$$E_A = \frac{(FS)(C_S W_A + N_A \sin\beta)}{(FS)\cos\beta} + \frac{(N_A \tan\delta + C_a)\cos\beta}{(FS)\cos\beta} = \textbf{38,580 lbs.}$$

Passive Wedge Calculations

Determine the total weight of the passive wedge (W_P),the effective force normal to the failure plan of the passive wedge (N_P), the cohesive force along the failure plane (C), and the interwedge force acting on the passive wedge from the active wedge (E_P) using the following eqs:

$$W_P = \frac{\gamma h^2}{\sin 2\beta} = \textbf{1,273 lbs.}$$

$$C = \frac{ch}{\sin\ \beta} = \textbf{- lbs.}$$

$$E_P = \frac{C + W_P \tan\phi - C_S W_P (FS)}{\cos\ \beta (FS) - \sin\ \beta \tan\phi} = \textbf{453 lbs.}$$

$$N_P = W_P + E_P \sin\ \beta = \textbf{1,361 lbs.}$$

Seismic Factor of Safety

Determine the calculated Factor of Safety (FS_A) using a quadratic equation relationship where the constants are defined as follows:

$$a = (C_S W_A + N_A \sin\beta)\cos\beta + C_S W_P \cos\beta = \textbf{12,845 lbs./ft.}$$

$$b = -\begin{bmatrix} (C_S W_A + N_A \sin\beta)\sin\beta \tan\phi \\ + (N_A \tan\delta + C_a)\cos^2\beta \\ + (C + W_P \tan\phi)\cos\beta \end{bmatrix} = \textbf{(26,299) lbs./ft.}$$

$$c = (N_A \tan\delta + C_a)\cos\beta \sin\beta \tan\phi = \textbf{2289 lbs./ft.}$$

Allow Exceeds Req'd - OK

FS_R =	**1.00**	
FS_A =	**1.96**	
Min. Peak δ	**26.0**	**deg**
Min. Peak c_a	**50.0**	**psf**

AECOM	**Georgia Power Company**	JOB	**60563110**		
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		SCALE	**NA**		

Determine: Static factor of safety for liner system based on residual strength.

Procedure:

Determine the static stability of the cover system to evaluate the minimum required interface friction angle for all engineered components of the cover system. Balance the forces as shown in **Figure 7** and the required factor of safety (FS) then solve for minimum interface shear strength parameters.

Assumptions:

No additional assumptions

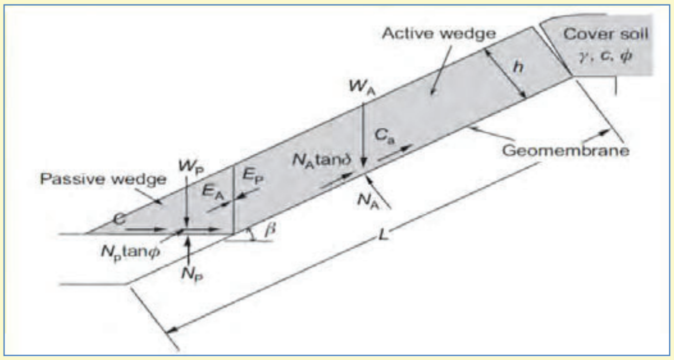

Figure 7. Limit equilibrium forces involved in a finite length slope analysis for a uniformly thick cover soil

Veg. Cover Soil (VC)/Prot. Cover Soil (CS) and Slope Parameters	VC	CS	Utilized		Source
Thickness (h)	0.5	1.5	2.0	ft.	Design
Dry Unit Weight (γ_D)	90.0	100.0	97.5	pcf	Conservatively assumed based on typ. values
Mois. Cont. (field cond.) (w_F)	24.0	26.0	25.5	%	Conservatively assumed based on typ. values
Avg Field Unit Wt (γ)	-	-	122.4	pcf	
Reference Stress	-	-	**240.0**	**psf**	
Min. Friction Angle (ϕ)	25.0	25.0	25.0	deg	Conservatively assumed based on typ. values
Min. Cohesion (c)	0.0	0.0	0.0	psf	Conservatively assumed based on typ. values
Slope Angle Beneath the Geom. (β)	-	-	11.31	deg	Design
Ht. of Slp. Meas. Along Geom. (H_L)	-	-	32.0	ft.	Design
Lng. of Slp. Meas. Along Geom. (L)	-	-	163.2	ft.	
Inter. Frict. Angle for DL & Geom. (δ)	-	-	**17.0**	deg	**Residual strength parameters for membrane to geocomposite from GRI database**
Adhesion for DL & Geom. (c_a)	-	-	**50.0**	psf	
Required Factor of Safety (FS_R)	-	-	**1.10**		**Min. req. FS**

Active Wedge Calculations

Determine the total weight of the active wedge (W_A),the effective force normal to the failure plan of the active wedge (N_A), the adhesive force between the cover soil of the active wedge and the geomembrane (C_a), and the interwedge force acting on the active wedge from the passive wedge (E_A) using the following eqs:

$$W_A = \gamma h^2\left(\frac{L}{h} - \frac{1}{\sin\beta} - \frac{\tan\beta}{2}\right) = \textbf{37,387 lbs.}$$

$$N_A = W_A\cos\beta = \textbf{36,661 lbs.}$$

$$C_a = c_a\left(L - \frac{h}{\sin\beta}\right) = \textbf{7,648 lbs.}$$

$$E_A = \frac{(FS)(W_A - N_A\cos\beta) - (N_A\tan\delta + C_a)\sin\beta}{\sin\beta(FS)} = \textbf{(9,810) lbs.}$$

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		SCALE	**NA**		

Passive Wedge Calculations

Determine the total weight of the passive wedge (W_P),the effective force normal to the failure plan of the passive wedge (N_P), the cohesive force along the failure plane (C), and the interwedge force acting on the passive wedge from the active wedge (E_P) using the following eqs:

$$W_P = \frac{\gamma h^2}{\sin 2\beta} = 1{,}273 \text{ lbs.}$$

$$C = \frac{ch}{\sin \beta} = - \text{ lbs.}$$

$$E_P = \frac{C + W_P \tan\phi}{\cos\beta(FS) - \sin\beta\tan\phi} = 601 \text{ lbs.}$$

$$N_P = W_P + E_P \sin\beta = 1{,}390 \text{ lbs.}$$

Static Factor of Safety for Residual Strength

Determine the calculated Factor of Safety (FS_A) using a quadratic equation relationship where the constants are defined as follows:

$$a = (W_A - N_A\cos\beta)\cos\beta = 1{,}410 \text{ lbs./ft.}$$

$$b = -\begin{bmatrix} (W_A - N_A\cos\beta)\sin\beta\tan\phi \\ +(N_A\tan\delta + C_a)\sin\beta\cos\beta \\ +\sin\beta(C + W_P\tan\phi) \end{bmatrix} = (3{,}874) \text{ lbs./ft.}$$

$$c = (N_A\tan\delta + C_a)\sin^2\beta\tan\phi = 338 \text{ lbs./ft.}$$

Allow Exceeds Resid. - OK

FS_R =	1.10	
FS_A =	2.66	
Min. Resid. δ	17.0	deg
Min. Resid. c_a	50.0	psf

Appendix B3

Final Cover Geocomposite System

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AECOM

Job	**Plant Scherer Ash Pond Closure**	Project No.	**60563110**	Sheet	**1** of **3**
Description	**Final Cover System**	Computed by	**APM**	Date	**10/29/18**
	Geocomposite Design	Checked by	**SCW**	Date	**08/30/21**

I. PURPOSE

The purpose of this analysis is to calculate the required transmissivity of the proposed alternative final cover system geocomposite. The following sections summarize the methodology, assumptions, and results of the alternative final cover system geocomposite design for the proposed Plant Scherer Ash Pond closure system located at Georgia Power's Plant Scherer. For further detail on the specific calculations performed, refer to the corresponding input/output data provided in the attachments.

II. METHODOLOGY

Slope geometry and cover system materials were established from the proposed permit design drawings and are summarized below.

The cap system will be installed at the final surface of the crest and sideslopes overlying the waste material. The proposed maximum sideslope angle for the proposed cap system is 5 Horizontal to 1 Vertical (5H:1V). However, for the proposed cap system's Geocomposite design, the governing condition on the site is a 10H:1V letdown slope that is approximately 250 feet long, with a storm water channel along the perimeter of the closure area. Water collected in the Geocomposite will be drained into the stormwater channels.

Layers and layer thicknesses for the alternative final cover system cap are anticipated as follows:

Table 1. Layer Summary for the Alternative Final Cover System

THICKNESS	LAYER
Final Cover	
6 in	Vegetative Cover Soil
18 in	Protective Cover Soil
n/a	Geocomposite Drainage Layer
n/a	Textured Geomembrane

n/a – thickness of layer is small (negligible)

The geocomposite must be designed to transmit the expected flow of water into the geocomposite through the overlying cover soil. It is assumed that the maximum flow into the geocomposite will occur when the overlying soil is saturated. The cover soil was modeled with a conservative long-term permeability (k_c) of 5x10^{-5} cm/sec. The following equation can be used to model the relationship between the average head level in the geocomposite (h_{avg}), the slope length (L) and angle (β), the permeability of the cover soil (k_c) and the required permeability of the geocomposite (k_d).:

$$h_{avg} = \frac{k_c L(\cos\beta)}{k_d(\sin\beta)} \qquad (1)$$

The minimum required transmissivity (T_{design}) of the geocomposite drainage layer is determined by limiting the average head (h_{avg}) on the drainage layer to the thickness of the drainage layer (t_d). For the purpose of calculations, a geocomposite thickness of 0.64 cm (0.3 in or 300 mils) was utilized. Limiting the average head to the approximate thickness of the drainage layer ensures drainage occurs within the drainage layer.

The minimum required transmissivity (T_{design}) of the geocomposite is calculated using the following equation (from “Designing with GRI Standard GC8,” Narejo and Richardson, 2003):

$$T_{design} = k_d t_d \qquad (2)$$

Where,

t_d = Thickness of the Drainage Layer

A factor of safety is then applied to T_{design} to obtain the allowable transmissivity (T_{allow}) (from “Designing with GRI Standard GC8,” Narejo and Richardson, 2003), as shown in the equation below:

$$FS = \frac{T_{allow}}{T_{design}} \qquad (3)$$

Reduction factors are then applied to the allowable transmissivity (T_{allow}), which represents long-term in-situ conditions. The decrease in flow capacity from the minimum required transmissivity (T_{spec}) to the long-term in-situ conditions is described by reduction factors (RF) as given in “GSI White Paper #4: Reduction Factors Used in Geosynthetic Design” (Koerner and Koerner, 2005). The equation below was used to determine T_{spec}:

$$T_{allow} = \frac{T_{spec}}{RF_{IN} RF_{CR} RF_{CC} RF_{BC}} \qquad (4a)$$

Substituting equation (3) and solving for T_{spec}:

$$T_{spec} = T_{design} FS \times RF_{IN} RF_{CR} RF_{CC} RF_{BC} \qquad (4b)$$

Typical values for reduction factors for landfill covers from Koerner and Koerner (2005) and Narejo and Richardson (2003) are included in **Attachment A**. Values chosen for reduction factors were taken from the range of values presented and are summarized below:

Table 2. Reduction Factor Summary

REDUCTION FACTOR	VALUE	COMMENTS
Intrusion, RF_{IN}	1.0	Boundary conditions during laboratory testing will account for intrusion; 1.0 recommended by Narejo (2004) – included in Attachment A
Creep, RF_{CR}	1.1	Low loading conditions from Koerner (2005)
Chemical Clogging, RF_{CC}	1.2	Potential for some precipitate from onsite cover soil (clay from weathered limestone)
Biological Clogging, RF_{BC}	2.3	Middle of range from Narejo (2004)
Drainage Factor of Safety, FS	2	Conventionally between 2 and 3 from Narejo (2004)

III. RESULTS OF ANALYSIS

As discussed in Section II, the geocomposite drainage layer must be selected with adequate transmissivity to limit the depth of flow to the thickness of the geocomposite. Conservative assumptions regarding factors of safety, reduction factors, and the assumed saturated hydraulic conductivity of the overlying soils are considered when calculating the specified minimum transmissivity of the alternative final cover system geocomposite.

The design drainage length is approximately 250 feet (length of longest slope) before daylighting into the perimeter channel. **The minimum transmissivity required to maintain drainage inside the geocomposite on the 10H:1V slopes is $\underline{2.31 \text{ x } 10^{-3} \text{ m}^2/\text{sec}}$. This is the minimum required value for testing and manufacturer's specifications, (T_{spec}).** Refer to **Attachment B** for supporting calculations.

IV. REFERENCES

Narejo, D. and Richardson, G. (2003), "Designing with GRI Standard GC8." *GFR*, vol. 21, no. 6, pp. 20–23.

Koerner, R. M. and Koerner, G. R. (2005), "GSI White Paper #4 Reduction Factors (RFs) Used in Geosynthetic Design." Geosynthetic Institute.

ATTACHMENT A

Application Area	Range of Reduction Factor Values			
	RF_{IN}	*RF_{CR}**	*RF_{CC}*	*RF_{BC}*
Sport fields	1.0 to 1.2	1.0 to 1.5	1.0 to 1.2	1.1 to 1.3
Capillary breaks	1.1 to 1.3	1.0 to 1.2	1.1 to 1.5	1.1 to 1.3
Roof and plaza decks	1.2 to 1.4	1.0 to 1.2	1.0 to 1.2	1.1 to 1.3
Retaining walls, seeping rock, and soil slopes	1.3 to 1.5	1.2 to 1.4	1.1 to 1.5	1.0 to 1.5
Drainage blankets	1.3 to 1.5	1.2 to 1.4	1.0 to 1.2	1.0 to 1.2
<u>Infiltrating water drainage for landfill covers</u>	<u>1.3 to 1.5</u>	<u>1.1 to 1.4</u>	<u>1.0 to 1.2</u>	<u>1.5 to 2.0</u>
Secondary leachate collection (landfills)	1.5 to 2.0	1.4 to 2.0	1.5 to 2.0	1.5 to 2.0
Primary leachate collection (landfills)	1.5 to 2.0	1.4 to 2.0	1.5 to 2.0	1.5 to 2.0
Wick Drains (PVDs)	1.5 to 2.5	1.0 to 2.5	1.0 to 1.2	1.0 to 1.2
Highway edge drains	1.2 to 1.8	1.5 to 3.0	1.1 to 5.0	1.0 to 1.2

From Koerner R., and Koerner G. (2005) "GSI White Paper #4: Reduction Factors Used in Geosynthetic Design." Geosynthetic Institute.

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LONG-TERM PERFORMANCE CONSIDERATIONS FOR GEONET DRAINAGE GEOCOMPOSITES

Dhani Narejo, GSE Lining Technology Inc., Houston, USA

ABSTRACT

Drainage geocomposites have gained increasing acceptance within the engineering community as the material of choice for the lateral conveyance of liquids and gases. The hydraulic performance of these materials is typically expressed as transmissivity or flow rate at site-specific gradient, normal stress and boundary conditions. However, since these materials are visco-elastic in nature, compressive creep can significantly affect their long-term hydraulic performance. In addition to creep, there is the potential for the chemical and biological clogging of the filter geotextile and the geonet drainage core. Over the last several years, significant progress has been made in characterizing the engineering properties of geonet drainage geocomposites and developing models to predict their long-term behaviour on the basis of short-term laboratory tests. Additional work is needed in the area of chemical and biological clogging to further supplement the current information. In addition, the impact of leachate recirculation and higher temperatures in bioreactor landfills on the long-term performance of geocomposites merits further study.

RÉSUMÉ

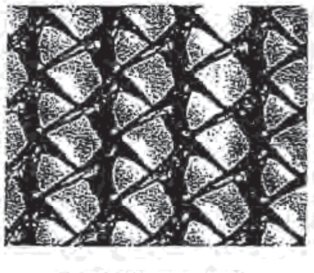
Drainage geocomposites have gained increasing acceptance within the engineering community as the material of choice for the lateral conveyance of liquids and gases. The hydraulic performance of these materials is typically expressed as transmissivity or flow rate at site-specific gradient, normal stress and boundary conditions. However, since these materials are visco-elastic in nature, compressive creep can significantly affect their long-term hydraulic performance. In addition to creep, there is the potential for the chemical and biological clogging of the filter geotextile and the geonet drainage core. Over the last several years, significant progress has been made in characterizing the engineering properties of geonet drainage geocomposites and developing models to predict their long-term behaviour on the basis of short-term laboratory tests. Additional work is needed in the area of chemical and biological clogging to further supplement the current information. In addition, the impact of leachate recirculation and higher temperatures in bioreactor landfills on the long-term performance of geocomposites merits further study.

1. INTRODUCTION

A geonet drainage geocomposite consists of a geonet core and a geotextile, where the geotextile is heat-laminated to one or both sides of the geonet. The geonet is made of extruded High Density Polyethylene (HDPE) in a manner that forms a relatively open structure ideal for the in-plane transmission of liquids and/or gases. The geotextile serves as a filter and separator, while the geonet core is intended to provide the lateral flow capacity. Geotextiles currently used for this purpose are almost exclusively of the nonwoven needlepunched type made from polypropylene (PP) or polyester (PE) resins. Geonet drainage geocomposites are differentiated primarily by the structure of the geonet as illustrated in Figures 1 (a) and (b).

Drainage geocomposites are used predominantly in environmental applications such as landfills and lagoons. However, there is growing interest in the use of these materials in such civil engineering applications as roadways, buildings, canals, etc. Landfills – the dominant market segment for these materials – are characterized by relatively large areas with slopes ranging from as low as 2% to as high as 33%. Specifically, there are four applications in landfills where drainage geocomposites are utilized: i) landfill cover drainage layer, ii) landfill gas vent layer, iii) landfill leachate collection and removal

(a) biplanar geonet



(a) triplanar geonet

Figure 1 Plan view of biplanar and triplanar geonets.

layer, and iv) landfill leakage detection layer. The design of each of these layer may involve the following performance properties of the drainage geocomposite: i) flow rate or transmissivity (heretofore referred to as transmissivity), ii) interface shear strength, and iii) filtration properties (including "filtration opening size" and permeability). This paper deals with only one of the above three performance characteristics, namely transmissivity.

The transmissivity of drainage geocomposites is a function of available pore-space as illustrated in Figure 2. Any mechanism that tends to reduce this pore space would decrease geocomposite transmissivity. Currently known factors include the following: i) geonet creep, ii) geotextile intrusion into the core structure, iii) chemical clogging within the core, and iv) biological clogging within the core. The reader should note that the concern with biological and chemical clogging of the drainage geocomposite core is differentiated here from a similar concern for the drainage geocomposite filter geotextile. Although mechanisms involved may be similar, the testing and design must be performed separately for the filter and drainage media.

Figure 2 Cross-section of a biplanar drainage geocomposite.

2. TRANSMISSIVITY AND REDUCTION FACTORS

Transmissivity is defined as the flow rate of water transmitted through a unit width of the product under a specific hydraulic gradient as measured in a laboratory test. The transmissivity test is performed using the type of equipment shown schematically in Figure 3. For the test to provide a transmissivity value that can be used in design, the specimen top and bottom boundaries as well as the gradient should be the same as in the field. The test is typically continued for a reasonably long enough time to include the effect of initial compression, and intrusion of geotextile into the geonet structure. The current state-of-the-practice in the US is represented by GRI GC8 which requires the test to be continued for 100 hours. The resulting value is then modified to include the effect of creep, chemical clogging and biological clogging as in Equation 1 (from GRI GC8, 2001):

$$\theta_{allow} = \frac{\theta_{100}}{RF_{cr} x RF_{cc} x RF_{bc}} \qquad [1]$$

where θ_{allow} = allowable transmissivity for the specific product being considered (m^2/sec), θ_{100} = 100-hour performance transmissivity from actual test, RF_{cr} = reduction factor for creep of the geonet core, RF_{cc} = reduction factor for chemical clogging, RF_{bc} = reduction factor for biological clogging.

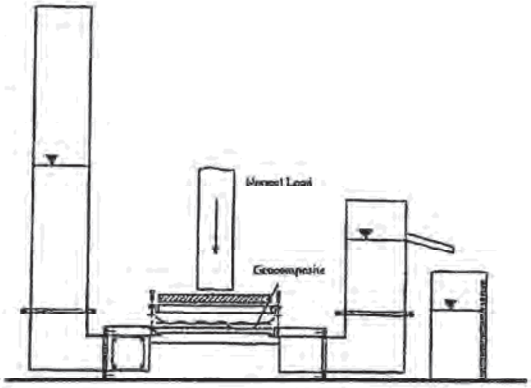


Figure 3 Schematics of the transmissivity test (Richardson et. al., 2000).

It must be noted here that certain versions of Equation 1 use such additional reduction factors as geotextile intrusion into the geonet structure and for "particulate clogging" of the geonet core. It is the author's opinion that a reduction factor for intrusion may not be necessary as the performance transmissivity test already includes this effect. The concern regarding particulate clogging of drainage core can, and should, be addressed by proper geotextile filter design so that fines do not pass the geotextile in the first place. This should then be supplemented with proper construction quality assurance (CQA) procedures that minimize infiltration of dust into the drainage core during the installation process.

The allowable value of transmissivity from Equation 1 must then be compared with "required transmissivity" to calculate a factor of safety as provided in the equation below:

$$FS = \frac{\theta_{allow}}{\theta_{req}} \qquad [2]$$

where FS = factor of safety for drainage, and θ_{req} = required transmissivity (m^2/sec) for a specific project.

The three reduction factors in the denominator of Equation 1 along with the performance transmissivity value (θ_{100}) determine whether a particular product is acceptable for a given project. It is recognized that this decision can be only as good as the quality of the data used to arrive at the reduction factors. The state-of-the-practice, limitations of current approach and the need for future research on reduction factors is discussed in the following sections.

2.1 Reduction Factor for Creep, RF_{cr}

Reduction factor for creep is intended to account for the time-dependent compression of the geonet core component of the geocomposite. It should be based on actual testing of the geonet core component of the geocomposite. Geonets can be tested for creep according to one of the two methods currently being used in the industry: a) conventional method, and b) accelerated method. The main difference between the two procedures is the test temperature. In conventional creep method, tests are performed at ambient temperature of around 20 degrees Celsius or any other site-specific temperature. In the accelerated procedure, the testing is performed at several elevated temperatures and the resulting data is then extrapolated to the ambient temperature through time-temperature superposition. Further details of creep testing and the associated calculations can be found in Narejo & Allen (2004). The advantage of the accelerated testing over conventional methods is that the required information can be obtained within hours versus the 14 months required by the conventional tests. Moreover, accelerated testing means that different product formulations and variations can be evaluated economically and within a reasonable time, and more data can be generated for statistical analysis.

Irrespective of whether accelerated or conventional creep testing is performed, the resulting information is of the form presented in Figure 4. For the product and test conditions represented by Figure 4, creep rate is constant at any given normal stress. However, the creep rate increases with an increase in normal stress. Since the creep rate is linear on a semi-log scale, the curves can be extended to obtain thickness at the design life of a project, say 50 years. This value of thickness can then be used to calculate the creep reduction factor, RF_{cr} (Narejo & Allen, 2004) for site-specific stress. Depending on the quality of the product, this creep reduction factor is typically around 1.1 to 1.2 for low stress (<50 kPa) but can be close to 2 for pressures higher than 700 kPa (Narejo & Allen, 2004).

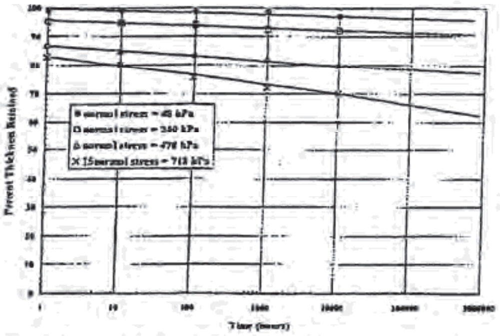


Figure 4 Typical creep response of biplanar geonets.

The creep of geonets is influenced significantly by the physical properties and structure of the geonet, including rib structure, mass, thickness, etc. As such, creep data for geonets is typically specific to products and its generalization is currently not possible.

2.2 Reduction Factor for Chemical Clogging, RF_{cc}

Chemical clogging of drainage materials in landfills results from chemical processes such as the precipitation of calcium carbonate, manganese carbonate and other insoluble substances (e.g., sulfides, chlorides and silicates). A reduction factor for chemical clogging, RF_{cr}, is intended to account for the influence of chemical clogging on the transmissivity of drainage geocomposites. Current industry practice, at least within the US, is to use reduction factors for chemical clogging proposed in the textbook *Designing with Geosynthetics* (Koerner, 1998) and GRI procedure GC8. The values are reproduced in Table 1.

Table 1 Chemical clogging reduction factors (*from* Koerner 1998 and GRI GC8).

Application	Reduction Factor for Chemical Clogging (RF_{cc})
Landfill covers	1.0 to 1.2
Primary leachate collection	1.5 to 2.0
Secondary leachate collection	1.1 to 1.5

2.3 Reduction Factor for Biological Clogging, RF_{bc}

Biological clogging refers to the growth of micro-organisms on and within the drainage media. Biological growth depends on the presence of a suitable bio-chemical environment and nutrients which sustain growth. The biomass growth within the drainage media would reduce the opening size and, hence transmissivity. A reduction factor for biological clogging, RF_{bc}, is used to account for the influence of the biological clogging on geocomposite transmissivity. Currently, the only sources of reference on biological clogging of drainage geocomposites are the geosynthetics textbook – *Designing with Geosynthetics* – and GRI GC8. Suggested reduction factors for biological clogging from these two sources are cited in Table 2.

Table 2 Biological clogging reduction factors (*from* Koerner, 1998, and GRI GC8).

Application	Reduction Factor for Biological Clogging (RF_{bc})
Landfill covers	1.2 to 3.5
Primary leachate collection	1.1 to 1.3
Secondary leachate collection	1.1 to 1.3

3. CRITIQUE OF REDUCTION FACTORS AND RECOMMENDATIONS FOR FURTHER RESEARCH

Reduction factor for creep can be tested in the laboratory with a reasonable degree of confidence as the site conditions can be conveniently modelled. The main variable in creep testing is normal stress, which is determined from the layout and the final contours of the site. As such geosynthetic manufacturers have been testing geonets for creep and a reasonable amount of data already exists. Unfortunately, creep results for geonets are product-specific and each commercially available geonet must be evaluated separately. The SIM Method offers a technique which can help generate a significant amount of data at a reasonable cost. However, manufacturers must demonstrate the validity of this method by performing comparable tests with the conventional technique.

Chemical and biological clogging is very difficult to model in the laboratory. The main reason for this is that the bio-chemical environment for each site may be different. Hence it is difficult to develop a test program the results of which can then be applied uniformly to the design process. It is for this reason that most of the published literature on this topic is of qualitative nature as far as its utilization during the design process is concerned. There is a need for more extensive testing that examines the basic process of clogging in what may be idealized or extreme conditions. This information may then be used to make an "educated guess" about a particular site based on anticipated waste stream and hydrologic conditions.

4. ELEVATED TEMPERATURES AND LEACHATE RECIRCULATION

Bioreactor landfills involve leachate recirculation to accelerate decomposition of the waste mass. Leachate recirculation poses two important challenges to the use of drainage geocomposites: i) elevated temperatures, and ii) higher flow requirements. Elevated temperatures would tend to increase reduction factors for creep, thus lowering the allowable transmissivity. However, the required transmissivity itself may need to be increased beyond that for conventional projects to account for a higher flow of liquid through the drainage layer. Not much is known at this time about the response of drainage geocomposites to leachate circulation. Much research needs to be done in this area to develop recommendations for the design purpose.

5. SUMMARY AND RECOMMENDATIONS

The long-term hydraulic performance of drainage geonets and geocomposites depends on many material as well as site characteristics. A performance transmissivity test provides a 100-hour transmissivity or flow-rate value which can then be further modified to account for site-specific and time-dependent factors. In this regard, there are three specific reductions factors of creep, chemical clogging and biological clogging. Geosynthetic manufacturers have been performing creep tests on their products to develop information on creep reduction factors. However, very limited information is available on biological clogging and chemical clogging of drainage materials. Manufacturers and academics should collaborate to develop further information in this regard. It must be recognized that a model that represents "general" application conditions is very difficult to develop. On the other hand, the tendency to use extremely aggressive conditions in the models provides little practical information for designer. Instead, it may be useful to perform idealized set of testing which can then be analyzed to develop general recommendations for the purpose of design.

6. REFERENCES

GRI GC8. 2001. Geosynthetic Research Institute. Standard guide for determination of the allowable flow rate of a drainage geocomposite.

Koerner, R., 1998. Designing with Geosynthetics. Fourth Edition. Prentice Hall, New Jersey, USA.

Narejo, D., and Allen, S., 2004. Using the Stepped Isothermal Method for geonet creep evaluation. Third European Geosynthetic Conference, 01-03 March 2004, Munich, Germany, pp. 539-544.

Richardson, G., Giroud, J., and Zhao, A. 2000. Tenax Corporation. Design of lateral drainage systems.

ATTACHMENT B

FINAL COVER SYSTEM
GEOCOMPOSITE DESIGN CALCULATIONS

Symbol	Description	Values	Units	US units	*Comments*
β	angle of slope	11.31	degrees	20.0 %	*input percent slope in US units cell*
L	slope length	4,877	cm	160 feet	*longest length between drainage outlets to be conservative*
$\mathbf{k_d}$	permeability of drainage layer	1.60E+00	cm/sec		*Value required to make* $h_{avg} = t_d$
$\mathbf{t_d}$	thickness of drainage layer	0.76	cm	0.25 inches	*minimum 250 mil geocomposite or as required*
$\mathbf{k_c}$	permeability of protective material	5.00E-05	cm/sec		*Conservative long term cover permeability*
$\mathbf{t_c}$	thickness of protective material	60.96	cm	2 feet	
$\mathbf{RF}_{IN}$	Reduction Factor for intrusion	1.00			*Narejo (2004)*
$\mathbf{RF}_{CR}$	Reduction Factor for creep	1.10			*Low loading conditions*
$\mathbf{RF_{CC}}$	Reduction Factor for chemical clogging	1.20			*Precipitate not anticipated*
$\mathbf{RF}_{BC}$	Reduction Factor for biological clogging	2.30			*Middle of range from Narejo (2004)*
FS	Factor of Safety	2.00			*Conservative, 2 is standard*
$\mathbf{T}_{design}$	Design/Minimum Transmissivity =kd*Td	1.22E-04	m^2/sec		
$\mathbf{T_{spec}}$	Spec./Lab Transmissivity =ΣRF*Tdesign*FS	7.40E-04	m^2/sec		

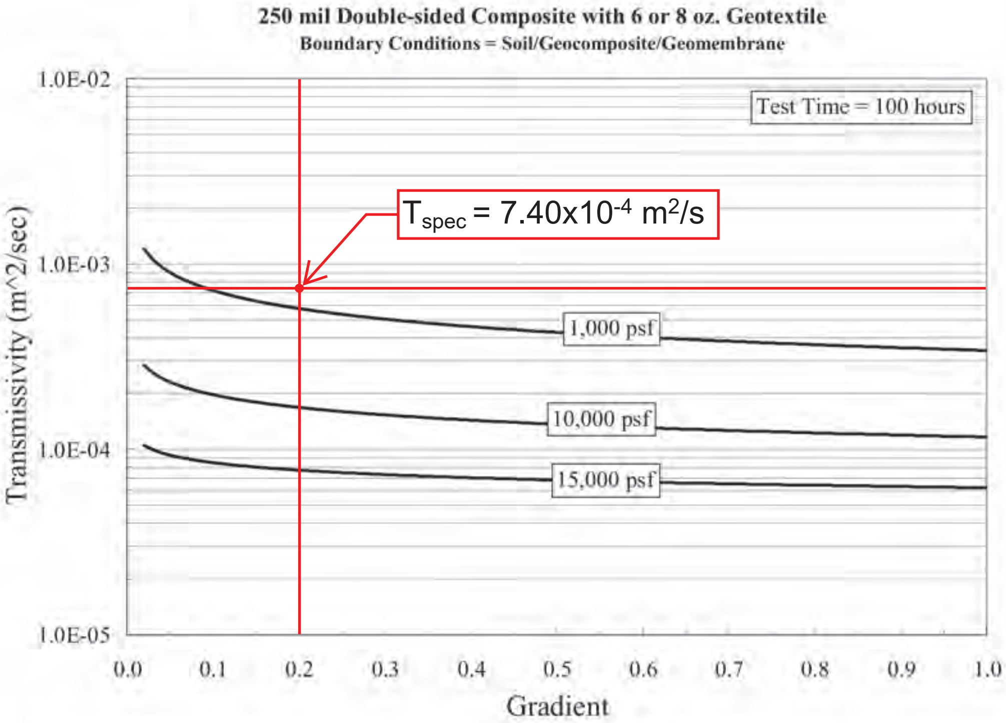


Figure A-6. Performance Transmissivity of a 250 mil GSE FabriNet HF geocomposite under Sand.

Appendix C

Stormwater System Analysis

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Appendix C1

Post Closure Stormwater Analysis

Job	Plant Scherer – Ash Pond Closure	**Project No.**	60563110	Sheet	**1 of 14**
Description	H&H Calculations	**Computed by**	NSF	Date	4/6/22
	Post-Closure Stormwater Calculations	**Checked by**	AJN	Date	4/15/22

I. Objective

This calculation package summarizes the findings and recommendations of AECOM's hydrologic and hydraulic (H&H) analysis of the post-closure conditions of the Plant Scherer Ash Pond (AP-1) at Georgia Power's Plant Scherer in Monroe County, Georgia (project site). Recommendations for the closure design stormwater features as well a summary of the downstream impacts on Berry Creek are included within this package.

II. Hydrologic Analysis

AECOM performed a hydrologic analysis of the post-closure conditions at the project site. The goal of the hydrologic analysis is to determine the peak discharge generated during the design storm and to assist with the hydraulic design of the various post-closure stormwater features at the project site. This analysis was completed based on the contours and features shown in the most recent revision of the Closure Plan Drawings. Recommendations and calculations may be revised as the design is changed and if alternative closure methods are selected.

Subcatchment Delineation

AECOM delineated a number of subcatchments both upstream and downstream of the existing AP-1 dam in order to analyze the stormwater runoff during post-closure conditions. Subcatchment delineation was completed using the United States Geological Survey (USGS) StreamStats (v4.2.0) web tool. The StreamStats web tool can be used to estimate subcatchments and flows for existing creeks, streams, and rivers across the United States. AutoCAD Civil 3D 2019 was used to verify and update the subcatchment delineations based on design topography and updated surveys.

Topographical data and features

AECOM's understanding of the project site's existing topography and features is based on aerial imagery and a number of site surveys. Aerial imagery was provided by Google Maps, dated 2019. Topographic information for the project site is based on USGS survey data, dated 1980. The USGS survey has been supplemented with a bathymetric survey completed by Metro Engineering in December 2015, a survey completed by Jordan Engineering, Inc. in April 2018, a topographic survey completed by Halis in August 2019, and a site feature survey completed by SCS Civil Field Services in August 2019. All existing topography was then overlain with the proposed design contours for all post-closure-conditions grading. Existing conditions for the closure design were considered to include the improvements made to the site delivery route and the northwest access road as a part of the Early Site Work Package (summarized in a separate memorandum, most recent revision January 2020).

Subcatchments upstream of the AP-1 dam (post-closure conditions)

Subcatchments upstream of the existing AP-1 dam have been delineated based on post-closure conditions and may be revised as the design is changed. There are three main subcatchments upstream of the AP-1 dam (post-closure conditions). Two of these subcatchments are on the closure cap, and one is to the north of the closure cap in the closure by removal area. All but one of these subcatchments will discharge to the east into Berry Creek. The western closure cap subcatchment will discharge through the southwest outlet channel to the Recycle Pond. **Table 1** below summarizes these subcatchments and their features.

Table 1. Subcatchments upstream of the AP-1 dam (post-closure conditions)

Subcatchment	Location	Area (acres)	Outfall Location
CE	Closure Cap (East)	150	Berry Creek

Subcatchment	Location	Area (acres)	Outfall Location
CW	Closure Cap (West)	235	Recycle Pond
CbR	Closure by Removal Area	410	Berry Creek

A subcatchment delineation figure is included on Figure A-1 in **Attachment A**. Each of these subcatchments have been split into several smaller subcatchments for a more detailed analysis of peak flows, velocities, and flow depths throughout the closure design. Details on these smaller subcatchments can be found in **Attachment B.**

Subcatchments downstream of the AP-1 dam (post-closure conditions)

Subcatchments downstream of the AP-1 dam have been delineated based on post-closure conditions; however, these subcatchments will not change compared to existing conditions. AECOM considers existing conditions to include the construction of proposed Cell Number 3 and its respective access road over Berry Creek. A Conditional Letter of Map Revisions (CLOMR) was submitted in December 2017 by Schnabel Engineering (CLOMR Study). The CLOMR Study included an analysis of how the construction of Cell Number 3 would impact the flood elevations in Berry Creek. In this analysis, Schnabel Engineering considered three subcatchments for Berry Creek: A1, A2, and A3. AECOM updated these subcatchments based on topographic data and split subcatchment A1 into two separate subcatchments: A1u and A1d. A1u is upstream of Cell Number 3's proposed access road over Berry Creek, and A1d is downstream of this access road. AECOM also slightly modified subcatchments A2 and A3, and added two additional subcatchments: A4 and A5 (both downstream of A2 and A3).

Table 2 below summarizes these subcatchments and their features.

Table 2. Subcatchments downstream of the existing AP-1 dam

Subcatchment	Location	Area (acres)
A1u	Subcatchment upstream of proposed Cell Number 3 access road over Berry Creek. Downstream of existing AP-1 dam.	250
A1d	Subcatchment upstream of existing landfill access road over Berry Creek. Downstream of proposed Cell Number 3 access road over Berry Creek.	40
A2r	Subcatchment downstream of existing landfill access road over Berry Creek.	356
A3r	Subcatchment for the existing I Pond, discharges into Berry Creek.	340
A4	Subcatchment downstream of the SR 87 culverts representing the tributary into Berry Creek.	1926
A5	Subcatchment downstream of the Y between Berry Creek and the tributary from Subcatchment A4.	183

Job	Plant Scherer – Ash Pond Closure	**Project No.**	60563110	Sheet	**3 of 14**
Description	H&H Calculations	**Computed by**	NSF	Date	4/6/22
	Post-Closure Stormwater Calculations	**Checked by**	AJN	Date	4/15/22

HydroCAD Modeling

AECOM used HydroCAD version 10.00-25 to model the post-closure stormwater conditions at the project site. HydroCAD is a modeling software that is used to calculate hydrologic inflows for a variety of design storms. HydroCAD allows the user to create a complex network of “nodes” to simulate how stormwater flows would be routed through a site’s stormwater features. AECOM created HydroCAD models to determine the peak inflows into Berry Creek and the various stormwater features of the closure design. The models were also used to determine the storage requirements for the three detention basins in the Closure by Removal area. The detailed output of the model includes a figure showing the model layout and all relevant hydrologic assumptions and notes. This can be found in **Attachment B**.

Design Storm

The 100-year, 24-hour duration storm event has been selected as the design storm for all portions of the AP-1 closure design based on discussions with and direction from Georgia Power Company and Southern Company (GPC/SCS). This exceeds the requirements of the Environmental Protection Agency’s (EPA’s) Final CCR Rule (40 CFR Part 257) and Georgia Rule 391-3-4-.07, both of which only require ash pond closure designs to safely pass stormwater flows resulting from the 25-year, 24-hour duration storm event. The 100-year, 24-hour storm event has been used to determine the required storage volumes for the detention basins and to determine the required dimensions and armoring for all channels and conveyance structures proposed as a part of the closure design.

AECOM designed the channel leading from the closure cap into Detention Basin A (Channels B0 and B1) and the box culverts upstream of this channel to safely pass flows resulting from the 1000-year, 24-hour storm as an added factor of safety. This larger design storm was selected since the failure of this structure/channel could result in a cascading failure throughout the closure cap. The 500-year, 24-hour storm event was also used to design auxiliary spillways for each of the three detention basins that are proposed as a part of the closure design.

Rainfall Data

Rainfall data for the design storm was obtained using precipitation estimates from National Oceanic and Atmospheric Administration (NOAA)’s Precipitation Frequency Data Server (PFDS) web tool. Estimates provided by this web tool are calculated using the NOAA Atlas 14 publication for storms with recurrence intervals ranging between 1 year and 1,000 years and durations ranging between 5 minutes and 60 days. Rainfall values for the 1/3 Probable Maximum Precipitation (PMP) storm event and the Full PMP storm event were determined using *Hydrometeorological Report No. 51* (HMR-51).

The National Resources Conservation Service (NRCS) Type II synthetic rainfall distribution (Type II Distribution) was used for temporal routing of the design storm throughout the site. The Type II distribution may be used for storms up to the 1,000-year, 24-hour duration storm event throughout most of the continental United States (including the project site). HEC-HMS was used to determine the approximate rainfall distribution for the 1/3 PMP and Full PMP storm events in accordance with *Hydrometeorological Report No. 52* (HMR-52). The tabulated hyetograph from this HEC-HMS model is included in **Attachment E**. The estimated rainfall for the various storm events analyzed in this hydrologic analysis is summarized below in **Table 3.**

Table 3. NOAA Rainfall Estimates

Recurrence Interval (years)	Duration (hours)	Rainfall (inches)	Distribution
2	24	3.77	NRCS Type II
25	24	6.36	NRCS Type II

100	24	8.13	NRCS Type II
500	24	10.40	NRCS Type II
1000	24	11.50	NRCS Type II
1/3 PMP	24	14.47	Custom (HMR-51/52)
Full PMP	24	43.41	Custom (HMR-51/52)

Time of Concentration and Flow length

AECOM estimated an appropriate time of concentration (T_c) for each subcatchment based on the NRCS publication Urban Hydrology for Small Watersheds, also known as Technical Release 55 (TR-55). TR-55 is used to calculate stormwater volumes, peak discharge, and hydrographs for subcatchments based on their unique characteristics. A higher T_c usually results in a lower peak discharge and velocity. Similarly, a lower T_c usually results in a higher peak discharge and velocity.

Water generally travels in three different phases: sheet flow, shallow concentrated flow, and open channel flow. TR-55 method calculates the T_c by summing the time it takes for water to travel through each phase. Sheet flow is assumed to last for a maximum of 100 feet. Shallow concentrated flow lasts until the flow begins to channelize, at which point open channel flow occurs. The equation for sheet flow requires an estimation of the 2-year, 24-hour duration precipitation event. The rainfall amount for the 2-year, 24-hour duration storm event at the project site can be found above in **Table 3**.

The T_c for all subcatchments involves a combination of sheet flow, shallow concentrated flow, and channel flow. Flow in these subcatchments traveled through a number of different defined flow paths which required separate T_c calculations. The T_c for each subcatchment was calculated along the longest hydrologic flow path in the subcatchment and calculating the travel time for each phase. These travel times were then summed to determine the total T_c for that subcatchment. The T_c varies for each subcatchment, and all T_c values were calculated in AECOM's HydroCAD model. Detailed T_c values and other hydrologic information can be found in **Attachment B**.

Rainfall Losses

AECOM selected an appropriate curve number (CN) for each subcatchment based on the NRCS Curve Number Method in TR-55. The two major factors that determine the appropriate curve number are the hydrologic soil group and the cover type. Site soil data used to determine the hydrologic soil group was obtained from the NRCS Web Soil Survey database. Land use data used to determine the cover type was delineated using aerial photography.

The curve numbers for the closure cap area will be substantially different compared to existing conditions. Engineered turf has been proposed for the closure cap and it is almost completely impervious, which results in a high CN for all closure cap subcatchments. A traditional soil cover system may be selected as an alternative cover option; however all hydrologic calculations for the closure cap will be completed using a CN of 95 (CN for engineered turf).

In addition, the curve number in the closure by removal area is assumed to increase compared to the existing conditions from grading and compaction of native soils. It is assumed that the hydrologic soil group will increase from Group B to Group C within the limits of grading, ultimately resulting in increased runoff. Weighted CN calculations are provided with the HydroCAD model output in **Attachment B**.

Hydrographs and Storage

AECOM created two Closure Area HydroCAD models: one that discharges to the east into Berry Creek and one that discharges to the West into the Recycle Pond. These models were created to determine the peak inflows into the various stormwater features of the proposed closure design. The models were also used to determine the storage requirements for the three detention basins. The detailed outputs of each model include a figure showing the model layout and all relevant hydrologic assumptions and notes. This can be found in **Attachment B**. A larger subcatchment figure is also included in **Attachment A**.

HydroCAD calculates an inflow hydrograph for each node in the model. The inflow hydrograph is calculated based on the characteristics of and flows through the nodes and subcatchments upstream of that node. This calculation provides a peak inflow value, a total inflow volume, and an inflow value for various times after the start of the design storm.

HydroCAD also calculates a discharge hydrograph for each node in the model. The discharge hydrograph is calculated using the information from the inflow hydrograph and accounts for storage, spillway elevations, and spillway discharge rating curves. Peak inflows from the design storm are attenuated and discharges are reduced based on the storage available in basins and channels in the model. HydroCAD calculates a peak WSE in basins based on flow attenuation and their respective spillway discharge rating curves. AECOM's HydroCAD model was used to calculate the required storage for the detention basins in the closure by removal area. This calculation was completed by revising the storage volume in several different iterations until a peak WSE and attenuated peak discharge was reached that maximized attenuation while minimizing the size of the detention basins. Each basin was designed with a minimum freeboard of 0.1 feet from the auxiliary spillway crest and 1.0 feet from the top of the basin berm after the 100-year, 24-hour storm event (in accordance with the GSMM). In addition, each basin was designed with a minimum freeboard of 0.1 feet from the top of the basin berm after the 500-year, 24-hour storm event. The detention basins were also sized to keep the maximum height and storage capacity below 25 feet and 100 acre-feet respectively to avoid being classified as a dam as defined by Georgia Rule 391-3-8-.02. A hydrologic summary of the three detention basins is provided below as **Table 4.** A detailed summary of AECOM's HydroCAD modeling is provided in **Attachment B**.

Table 4. Detention Basin Hydrologic Summary

Basin	Outlet Structure	Peak Inflow (cfs)		Peak Discharge (cfs)		Peak WSE (ft)		Top of Basin Berm (ft)[1]	Freeboard (ft)	
		100-year	500-year	100-year	500-year	100-year	500-year		100-year	500-year
Basin A	DR 17 IPS 42-in	1523	2028	126	274	449.2	450.6	451.0	1.8	0.4
Basin B	DR 7 IPS 18-in	455	659	9	23	461.9	462.9	463.0	1.1	0.1
Basin C	DR 7 IPS 18-in	387	579	10	43	464.7	465.6	466.0	1.3	0.4

1. *Note that the auxiliary spillway crest for each basin is 1 foot below the top of the basin.*

A figure showing the approximate flooding extents upstream of all detention basins and major structures/culverts throughout the closure design (after the 100-year, 24-hour storm event) is included in **Attachment A**. Armoring has only been proposed in the low flow channels of the detention basins; however, AECOM recommends grass cover be quickly and fully established up to the maximum flood elevation/limits shown in the aforementioned figure.

Berry Creek Analysis

AECOM created a third HydroCAD model to analyze the peak inflow into Berry Creek's various subcatchments. The pre-closure conditions of AP-1 discharges all stormwater within AP-1's drainage area towards the Recycle Pond. As a result of the proposed closure design, approximately 560 acres of AP-1's drainage area will discharge towards Berry Creek. The peak discharges for Basin A summarized above in **Table 4** summarize the additional approximate peak discharges from this 560 acres of AP-1 that will be sent towards Berry Creek after attenuation by each detention basin. The impacts of these additional stormwater flows have not been analyzed as a part of this memorandum/design. A separate memorandum (titled *Berry Creek HEC-RAS Modeling - State Route 87 Culverts*) was submitted to GPC/SCS on November 8, 2019 that analyzed the impacts of these additional flows on Berry Creek. The values used for the Berry Creek memorandum were based on the 60% design calculations and as such differ slightly from the values provided in this memorandum (which represent the 90% design calculations). AECOM recommends this analysis and memorandum be updated and resubmitted, although, AECOM expects the conclusions of the memorandum to largely remain the same. A summary of AECOM's HEC-RAS analysis of Berry Creek is included in **Attachment D**.

III. Hydraulic Analysis – Closure Design Features

AECOM performed a hydraulic analysis of the post-closure conditions at the project site. The goal of the hydraulic analysis is to determine the peak depth and velocities throughout the closure design and to design the various post-closure stormwater features at the project site to safely convey this discharge. This analysis was completed based on the contours and features shown Closure Plan Drawings. Recommendations and calculations may be revised as the design is changed and if alternative closure methods are selected.

Channel Design

The peak discharge flows resulting from the design storm (accounting for storage in the channels) as described above and as determined by AECOM's HydroCAD modeling were used to design all channel armoring within the proposed closure design. Georgia Department of Transportation (GDOT) Type 1 or Type 3 riprap or AASHTO No. 1 stone has been specified for use in all channels on the closure cap. Turf reinforced matting has been proposed to armor all channels within the closure by removal area. A minimum channel slope of 0.3% and 0.35% was proposed within the closure by removal area and the closure cap area respectively to minimize the amount of fill required while promoting positive drainage; however, most proposed channels have a slope between 0.5% and 3%.

Hydraulic Toolbox Version 4.4 was used to determine the stability of each channel proposed as a part of the closure design. Hydraulic Toolbox utilizes the methodology of *Hydraulic Engineering Circular No. 15* (HEC 15) to calculate the expected shear force, velocity, manning's n roughness values, Froude number, and stability of proposed armoring based on the channel geometry, minimum curve radius, and peak stormwater flows. The minimum stable stone size was selected to armor each channel proposed as a part of the closure design. A minimum armoring thickness of $1*D_{100}$ was proposed for all channel slopes shallower than 2%. A minimum armoring thickness of $1.5*D_{100}$ was proposed for all channel slopes of 2% or steeper. For TRM-lined channels, a vegetated and unvegetated shear and velocity was calculated. AECOM then proposed NAGreen Vmax P550 TRM based on the calculated maximum shear and velocities in accordance with the manufacturer's product specifications. A vegetation class of B was selected for all vegetated channel calculations, and a woven net was used for unvegetated channel calculations. All channels have been designed to have a minimum of 0.5 feet of freeboard during the design storm which meets the requirements of the GSMM and HEC-15.

A minimum curve radius was proposed for all riprap-lined channels that discharged perpendicularly into a downstream channel or otherwise varied from a straight line. The superelevation (higher WSE on the outer side of the channel) of each of these channels was also calculated. This additional depth was compared with and verified to be less than the minimum freeboard provided. The peak WSE upstream the concrete box culverts and the arch culvert on the closure cap was also compared with and verified to be less than the minimum armoring depth in the channels immediately upstream. A minimum turn radius was not proposed for TRM-lined channels in the closure by removal area.

A detailed summary of the proposed armoring and hydraulic design criteria for each channel can be found in **Attachment C**, and a stormwater armoring figure can be found in **Attachment A**.

Closure Cap Maximum Flow Length

AECOM also analyzed the maximum flow length on the closure cap to analyze the need for additional lateral/letdown channels on the north face of the closure cap (where there is a flat-graded face with no lateral/letdown channels). The manufacturer of the proposed engineered turf specified that the specified sand infill has a maximum shear strength of approximately 0.8 pound per square feet (psf). Typically infill erosion is an issue where there are significant grade changes such as the change from a 3% slope to a 5H:1V slope on the north face of the closure cap. The maximum flow length on the closure cap is approximately 800 feet on this north face with a peak discharge of approximately 280 cfs. This results in a maximum shear of approximately 0.14 psf on the 3% slope and approximately 0.34 psf on the 5H:1V slope. No additional channels have been proposed on the north face of the closure cap since the shear for the proposed design is well below the threshold for the specified sand infill material.

Critical Channel Design

There are two areas in the closure design where AECOM was concerned about the potential for erosion/scour due to rapidly varied or supercritical flow. The first is downstream of the steep channel leading into Detention Basin A, and the second is at the outfall where the closure design discharges into Berry Creek. These two channels are critical areas where erosion and channel failure may occur. Hydraulic Toolbox was used to analyze these two channels for several different design storms ranging from the 2-year, 24-hour storm event to the 1000-year, 24-hour storm event to determine if stilling basins would still be required. The steep channel into Detention Basin A was also analyzed with flows from the 1/3 PMP and the Full PMP storm events since this is a potential failure location for the closure cap. These storms were not analyzed for the channel discharging into Berry Creek since it is outside of the limits of AP-1. **Table 5** and **Table 6** below summarize the findings of these two channel analyses.

Table 5. Channel into Detention Basin A - Hydraulic Summary

Storm Event (24-hr)	Peak Flow (cfs)	Froude Number
2-year	456	0.55
10-year	680	0.57
25-year	832	0.58
100-year	1090	0.59
200-year	1233	0.60
500-year	1423	0.60
1000-year	1575	0.61
1/3 PMP	1026	0.59
Full PMP	3126	0.64

Table 6. Steep Channel to Berry Creek - Hydraulic Summary

Storm Event (24-hr)	Peak Flow (cfs)	Froude Number
2-year	108	0.72
10-year	130	0.73
25-year	147	0.74
100-year	178	0.75
200-year	196	0.76
500-year	290	0.78
1000-year	429	0.80

Stilling basins are typically used to prevent erosion/scour in locations where flows transition from supercritical (Froude Number > 1) to subcritical (Froude Number < 1). When flows transition from supercritical to subcritical, a hydraulic jump occurs resulting in significant turbulence and a large amount of energy being released. Hydraulic jumps can cause significant erosion and potential channel and nearby embankment failure if not controlled within a structure that is designed to contain the jump and withstand the resultant forces. Since the Froude number for both channels was less than 1 for all flows analyzed, a stilling basin was not designed for either channel. AECOM also calculated the Froude number for all other channels for the 100-year, 24-hour storm event (design storm) to ensure that the Froude number is less than 1 for all proposed channels when receiving flows resulting from the design storm. A detailed channel summary table is included in **Attachment C**.

A riprap basin has been proposed where the southwest outlet channel discharges into the Recycle Pond and where the northeast outlet channel discharges into Berry Creek. AECOM recommends that these basins be installed to minimize erosion/scour due to the high discharge flows and velocities at these locations. There is a higher potential for erosion/scour since these channels don’t discharge directly into a defined or armored channel. The dimensions of these riprap basins were calculated based on the 100-year peak discharge flows and based on the guidance provided in *Hydraulic Engineering Circular No. 14* (HEC 14). The dimensions for each basin differ and can be found in the Design Drawings and in **Attachment C.** The proposed length of the riprap basin where the northeast outlet channel discharges into Berry Creek is longer than the minimum length calculated due to minimal elevation changes in the shallow sloped section of the northeast channel downstream of the steeper section of the channel. The riprap basins proposed at each location have a downstream berm constructed entirely out of riprap. This allows the basins to drain completely after each storm event while also ensuring some tailwater on the downstream end of each berm.

Culvert Design

There are two major outlet structures that are proposed as a part of the closure design that are not within detention basins. The first outlet structure is upstream of the channel that discharges into Detention Basin A (Channels B0 and B1). This outlet structure consists of three 10-foot-span by 5-foot-rise concrete box culverts with an upstream and downstream headwall. The second outlet structure is within the southwest outlet channel and consists of a 65-foot-span by 22-foot-rise prefabricated arch culvert with modular block walls on the upstream and downstream side. Both culverts have been proposed to allow access over their respective outlet channels. **Table 7** below provides a hydraulic summary for each outlet structure.

Table 7. Outlet Structures - Hydraulic Summary

Culvert	Peak Discharge (cfs)		Peak WSE (ft)		Top of Road (ft)	Freeboard (ft)	
	100-year	1000-year	100-year	1000-year		100-year	1000-year
Three 10 x 5 ft box culverts upstream of Basin A	1090	1575	463.6	465.6	465	2.4	0.4
Arch culvert in Southwest Outlet Channel	1535	2264	484.2	485.8	520	35.8	34.2

A figure showing the approximate flooding extents upstream of all detention basins and major structures/culverts throughout the closure design (after the 100-year, 24-hour storm event) is included in **Attachment A**.

As mentioned above, the three box culverts and the channels immediately downstream were designed to safely convey the stormwater flows resulting from the 1000-year storm. Unlike the proposed arch culvert, the riprap from the channels upstream and downstream does not extend through the box culverts. This results in an increase in velocity through the concrete culverts that has the potential to erode or wash out the riprap downstream. AECOM analyzed these box culverts in HY-8 which is a program that uses Federal Highway Administration (FHWA) hydraulic analyses and protocols to model the flow through culverts considering various inlet and outlet control conditions. The inverts of the box culverts and the channels downstream have been designed to maintain subcritical flow through the box culverts and minimize the potential for downstream erosion. The summary of AECOM's HY-8 model is included in **Attachment C**. AECOM also analyzed the minimum recommended stone weight/size based on the box culvert outlet velocities using the Isbash formula graph provided in *Technical Supplement 14C of Part 654 of the NRCS's National Engineering Handbook*. With a maximum outlet velocity of approximately 10.6 feet per second this corresponds to a minimum stone weight of approximately 250 lbs. GDOT Type 1 riprap (which is proposed downstream of the box culverts) have a D50 of approximately this weight. This means that some stones in the graded riprap smaller than this median weight may be washed downstream if they are not weighed down by larger stones. AECOM expects the channels downstream to safely discharge the flows resulting from the 1000-year, 24-hour storm event; however, some maintenance immediately downstream of the culverts may be required after storms this large occur.

IV. Limitations

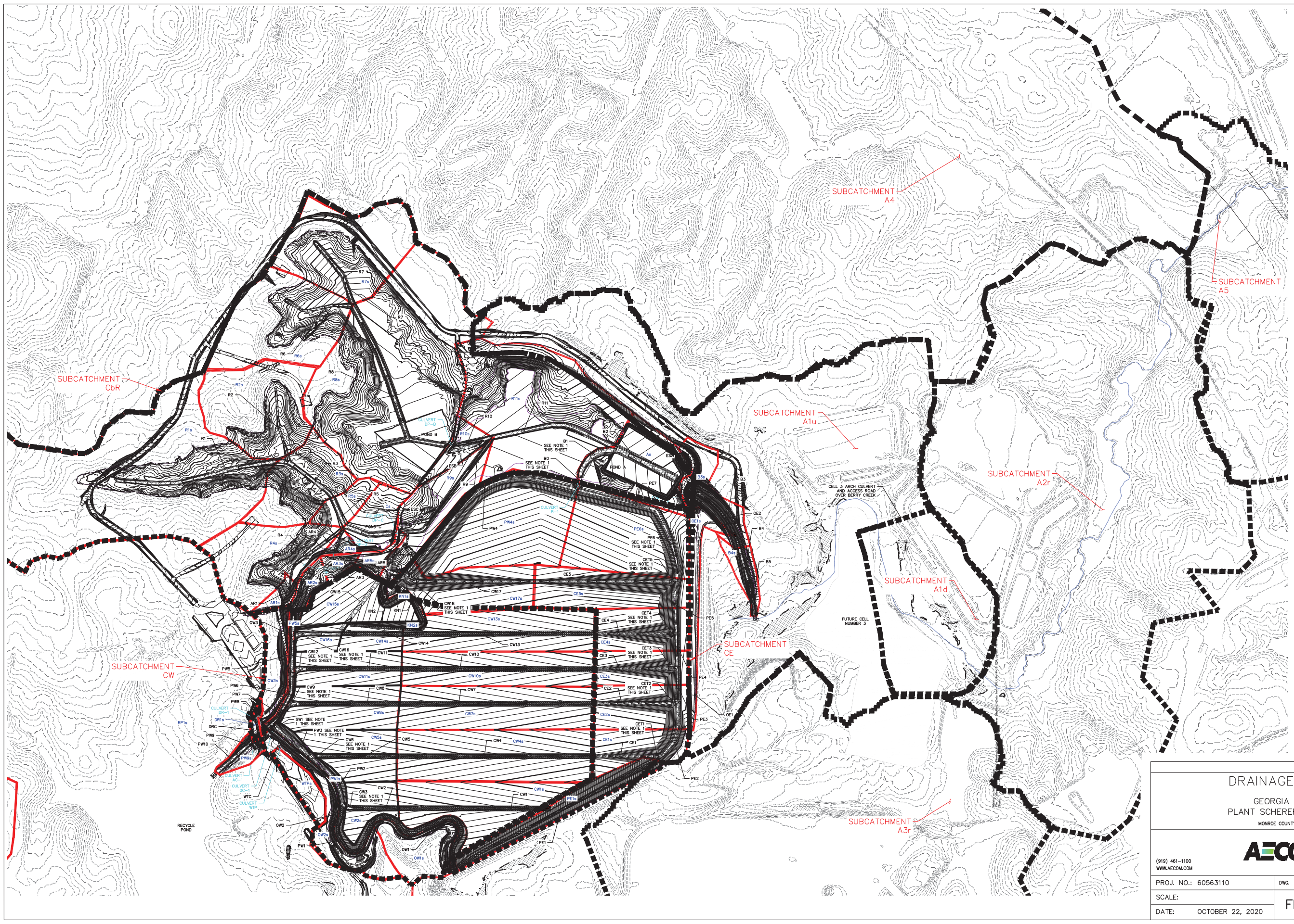
This calculation memorandum is considered to be at a 90% level and has been prepared based on the best information available to AECOM at the time of submittal. The results and recommendations of these calculations may change as the design progresses and as new information becomes available. AECOM does not recommend that this data is used for any other purposes. AECOM does not take responsibility for any other conclusions reached outside of this report.

Job	Plant Scherer – Ash Pond Closure	**Project No.**	60563110	Sheet	**10 of 14**
Description	H&H Calculations	**Computed by**	NSF	Date	4/6/22
	Post-Closure Stormwater Calculations	**Checked by**	AJN	Date	4/15/22

V. References

1. Atlanta Regional Commission (2016). Georgia Stormwater Management Manual Volume 2, Atlanta, GA.
2. National Oceanic and Atmospheric Administration (1978). Hydrometeorlogical Report 51:Probable Maximum Precipitation Estimates, United States East of the 105th Meridian. Washington, D.C.
3. National Oceanic and Atmospheric Administration (1984). Hydrometeorlogical Report 52:Probable Maximum Storm (Eastern United States), Washington, D.C.
4. National Resource Conservation Service (1986). Technical Release 55: Urban Hydrology for Small Watersheds. Washington, D.C.
5. National Resource Conservation Service (2007). National Engineering Handbook Part 654: Stream Restoration Design. Washington, D.C.
6. National Resource Conservation Service (2013). NRCS Web Soil Survey. Available from http://websoilsurvey.sc.egov.usda.gov/.
7. United States Army Corps of Engineers (1994). Hydraulic Design of Flood Control Channels, Engineer Manual No. 1110-2-1601. Washington, D.C.
8. United States Department of Transportation, Federal Highway Administration (2006). Hydraulic Engineering Circular No. 14. Washington, D.C.
9. United States Department of Transportation, Federal Highway Administration (2005). Hydraulic Engineering Circular No. 15. Washington, D.C.

Attachment A
Figures



NOTE:

1. LARGER RIPRAP PROPOSED AROUND CHANNEL BENDS UPSTREAM OF SMALLER RIPRAP TO CONTINUE THROUGH THE ENTIRE CHANNEL BEND UNTIL A STRAIGHT LENGTH OF CHANNEL IS REACHED. AFTER THE STRAIGHT LENGTH OF CHANNEL IS REACHED, TRANSITION TO SMALLER STONE SIZE.
2. ADDITIONAL DETAILS ON PROPOSED ARMORING CAN BE FOUND IN THE ENGINEERING REPORT AND THE ASSOCIATED H&H CALCULATION MEMORANDUM.

DRAINAGE FIGURE

GEORGIA POWER
PLANT SCHERER ASH POND
MONROE COUNTY, GEORGIA

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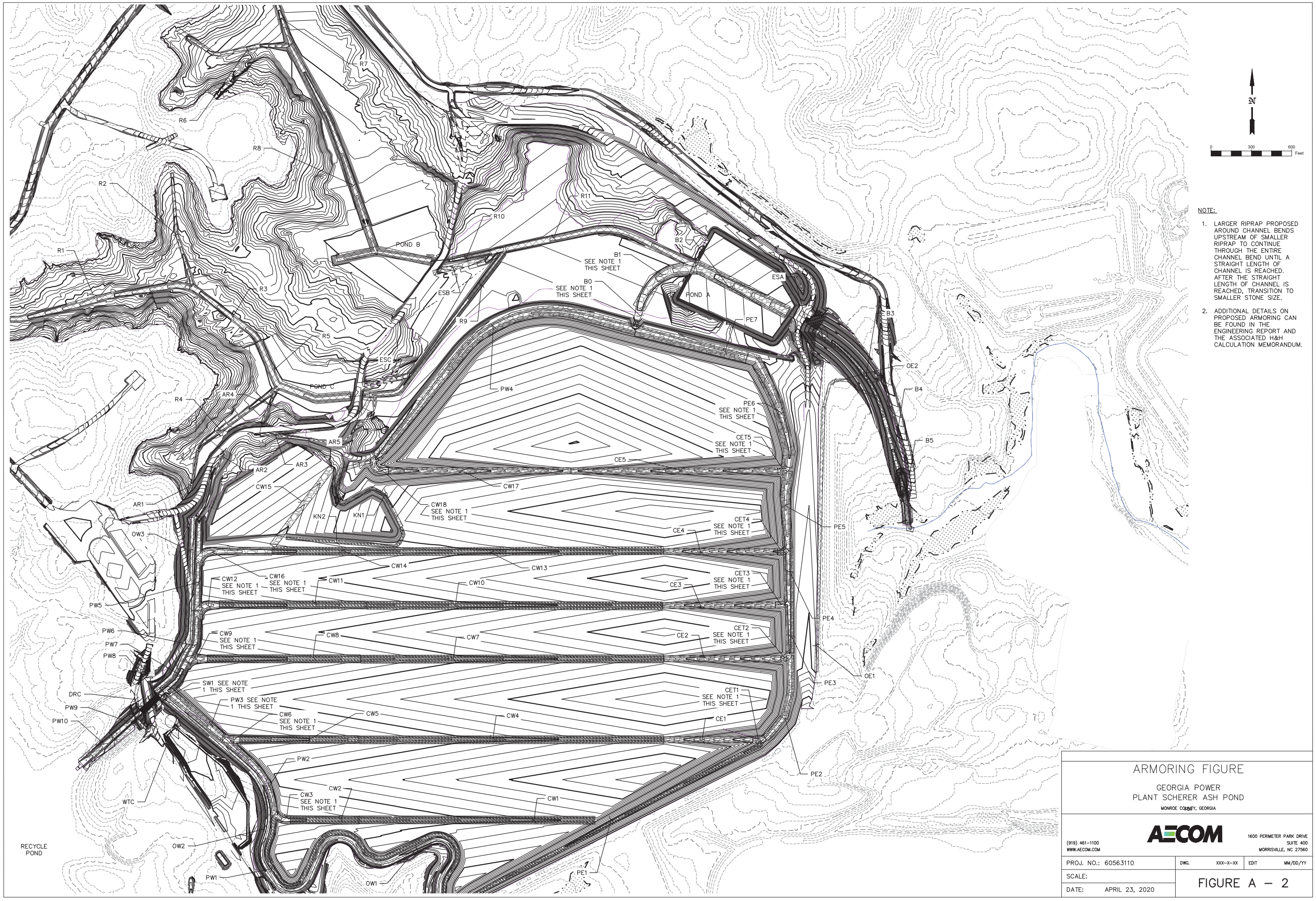
1600 PERIMETER PARK DRIVE
SUITE 400
MORRISVILLE, NC 27560

PROJ. NO.: 60563110	DWG. XXX-X-XX	EDIT MM/DD/YY
SCALE:	FIGURE A – 1	
DATE: OCTOBER 22, 2020		



NOTE:

1. LARGER RIPRAP PROPOSED AROUND CHANNEL BENDS UPSTREAM OF SMALLER RIPRAP TO CONTINUE THROUGH THE ENTIRE CHANNEL BEND UNTIL A STRAIGHT LENGTH OF CHANNEL IS REACHED. AFTER THE STRAIGHT LENGTH OF CHANNEL IS REACHED, TRANSITION TO SMALLER STONE SIZE.
2. ADDITIONAL DETAILS ON PROPOSED ARMORING CAN BE FOUND IN THE ENGINEERING REPORT AND THE ASSOCIATED H&H CALCULATION MEMORANDUM.

ARMORING FIGURE

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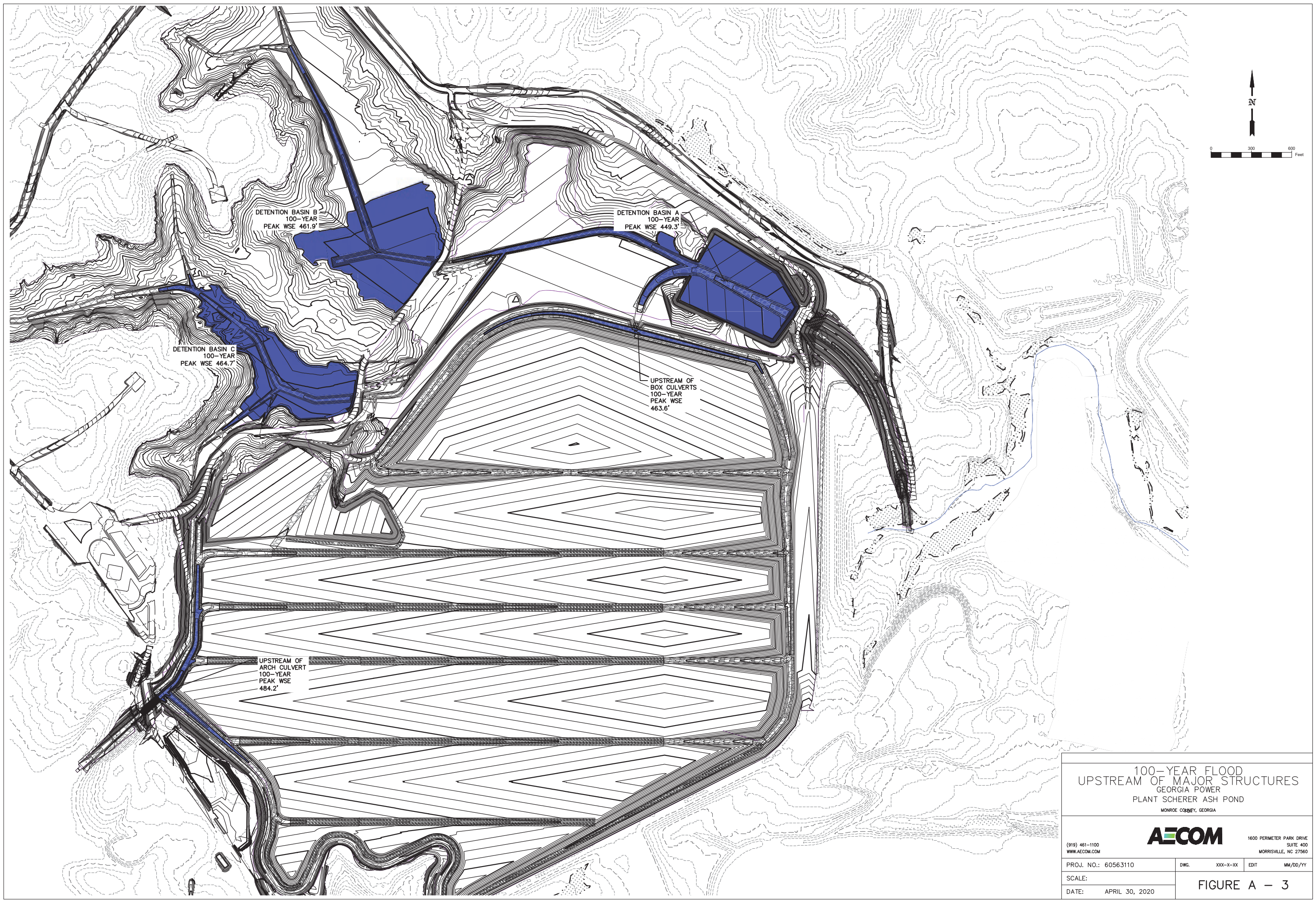
PROJ. NO.: 60563110	DWG. XXX-X-XX	EDIT MM/DD/YY
SCALE:	FIGURE A – 2	
DATE: APRIL 23, 2020		



100–YEAR FLOOD
UPSTREAM OF MAJOR STRUCTURES

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MONROE COUNTY, GEORGIA

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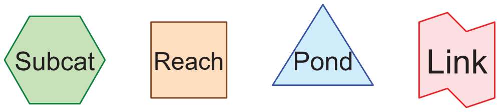
SUITE 400
MORRISVILLE, NC 27560

PROJ. NO.: 60563110
DWG. XXX–X–XX
EDIT MM/DD/YY
SCALE:
DATE: APRIL 30, 2020

FIGURE A – 3

Attachment B
HydroCAD Model Output



Routing Diagram for EAST Scherer AP-1 Closure Design-Upstream of Dam
Prepared by AECOM, Printed 4/30/2020
HydroCAD® 10.00-25 s/n 09114 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
26.900	95	(PE6s)
125.400	95	Closure Turf (CE1s, CE2s, CE3s, CE4s, CE5s, CW17s, KN1s, PE1s, PW4s)
1.500	96	Gravel surface, HSG C (B3s, B4s)
246.800	79	Pasture/grassland/range, Fair, HSG C (AR1s, AR2s, AR3s, AR5s, As, Cs, R10s, R11s, R1s, R2s, R3s, R4s, R5s, R6s, R7s, R8s, R9s)
7.100	61	Pasture/grassland/range, Good, HSG B (OE1s)
12.000	65	Woods/grass comb., Fair, HSG B (B3s, B4s)
159.950	58	Woods/grass comb., Good, HSG B (AR1s, R1s, R2s, R3s, R4s, R6s, R7s, R8s)
579.650	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
179.050	HSG B	AR1s, B3s, B4s, OE1s, R1s, R2s, R3s, R4s, R6s, R7s, R8s
248.300	HSG C	AR1s, AR2s, AR3s, AR5s, As, B3s, B4s, Cs, R10s, R11s, R1s, R2s, R3s, R4s, R5s, R6s, R7s, R8s, R9s
0.000	HSG D	
152.300	Other	CE1s, CE2s, CE3s, CE4s, CE5s, CW17s, KN1s, PE1s, PE6s, PW4s
579.650		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	26.900	26.900		PE6s
0.000	0.000	0.000	0.000	125.400	125.400	Closure Turf	CE1s, CE2s, CE3s, CE4s, CE5s, CW17s, KN1s, PE1s, PW4s
0.000	0.000	1.500	0.000	0.000	1.500	Gravel surface	B3s, B4s
0.000	0.000	246.800	0.000	0.000	246.800	Pasture/grassland/range, Fair	AR1s, AR2s, AR3s, AR5s, As, Cs, R10s, R11s, R1s, R2s, R3s, R4s,

Ground Covers (all nodes) (continued)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	7.100	0.000	0.000	0.000	7.100	Pasture/grassland/range, Good	OE1s
0.000	12.000	0.000	0.000	0.000	12.000	Woods/grass comb., Fair	B3s, B4s
0.000	159.950	0.000	0.000	0.000	159.950	Woods/grass comb., Good	AR1s, R1s, R2s, R3s, R4s, R6s, R7s, R8s
0.000	**179.050**	**248.300**	**0.000**	**152.300**	**579.650**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	A	432.00	430.50	270.0	0.0056	0.013	36.7	0.0	0.0
2	B	451.00	450.00	150.0	0.0067	0.013	12.6	0.0	0.0
3	B-1	458.00	457.90	40.0	0.0025	0.013	120.0	60.0	0.0
4	C	453.00	452.00	150.0	0.0067	0.013	12.6	0.0	0.0
5	DP-1	480.00	476.00	140.0	0.0286	0.013	21.0	0.0	0.0
6	DP-2	479.00	469.00	100.0	0.1000	0.013	21.0	0.0	0.0

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment AR1s: Access Road Channel Runoff Area=2.100 ac 0.00% Impervious Runoff Depth=4.69"
Flow Length=300' Tc=17.1 min CN=71 Runoff=11.95 cfs 0.821 af

Subcatchment AR2s: Access Road Channel Runoff Area=2.850 ac 0.00% Impervious Runoff Depth=5.63"
Flow Length=100' Slope=0.1850 '/' Tc=5.4 min CN=79 Runoff=28.11 cfs 1.337 af

Subcatchment AR3s: Access Road Channel Runoff Area=1.900 ac 0.00% Impervious Runoff Depth=5.63"
Flow Length=100' Slope=0.1500 '/' Tc=5.9 min CN=79 Runoff=18.42 cfs 0.891 af

Subcatchment AR5s: Access Road Channel Runoff Area=2.300 ac 0.00% Impervious Runoff Depth=5.63"
Flow Length=220' Slope=0.1700 '/' Tc=6.3 min CN=79 Runoff=21.99 cfs 1.079 af

Subcatchment As: Detention Basin A Runoff Area=19.500 ac 0.00% Impervious Runoff Depth=5.63"
Flow Length=150' Slope=0.0130 '/' Tc=16.6 min CN=79 Runoff=133.31 cfs 9.147 af

Subcatchment B3s: NE Outlet Channel Runoff Area=9.600 ac 0.00% Impervious Runoff Depth=4.23"
Flow Length=430' Tc=29.3 min CN=67 Runoff=35.65 cfs 3.384 af

Subcatchment B4s: NE Outlet Channel Runoff Area=3.900 ac 0.00% Impervious Runoff Depth=4.69"
Flow Length=300' Slope=0.0450 '/' Tc=17.4 min CN=71 Runoff=21.98 cfs 1.525 af

Subcatchment CE1s: Eastern Cap Runoff Area=9.800 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=300' Slope=0.0300 '/' Tc=13.1 min CN=95 Runoff=90.12 cfs 6.150 af

Subcatchment CE2s: Eastern Cap Runoff Area=12.500 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=300' Slope=0.0300 '/' Tc=13.1 min CN=95 Runoff=114.94 cfs 7.845 af

Subcatchment CE3s: Eastern Cap Runoff Area=10.000 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=300' Slope=0.0300 '/' Tc=13.1 min CN=95 Runoff=91.96 cfs 6.276 af

Subcatchment CE4s: Eastern Cap Runoff Area=12.000 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=300' Slope=0.0300 '/' Tc=13.1 min CN=95 Runoff=110.35 cfs 7.531 af

Subcatchment CE5s: Eastern Cap Runoff Area=17.000 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=300' Slope=0.0300 '/' Tc=13.1 min CN=95 Runoff=156.32 cfs 10.669 af

Subcatchment Cs: Detention Basin C Subcat Runoff Area=7.800 ac 0.00% Impervious Runoff Depth=5.63"
Flow Length=500' Tc=19.4 min CN=79 Runoff=49.07 cfs 3.659 af

Subcatchment CW17s: Western Cap Runoff Area=16.400 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=300' Slope=0.0300 '/' Tc=13.1 min CN=95 Runoff=150.81 cfs 10.292 af

Subcatchment KN1s: North Face of Knob Runoff Area=1.700 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=50' Slope=0.2000 '/' Tc=2.1 min CN=95 Runoff=22.03 cfs 1.067 af

Subcatchment OE1s: Offsite East Channel Runoff Area=7.100 ac 0.00% Impervious Runoff Depth=3.54"
Flow Length=100' Slope=0.0500 '/' Tc=9.1 min CN=61 Runoff=40.10 cfs 2.097 af

Subcatchment PE1s: Eastern Cap Runoff Area=11.000 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=100' Slope=0.2000 '/' Tc=2.8 min CN=95 Runoff=139.69 cfs 6.903 af

Subcatchment PE6s: Northeast Cap Face Runoff Area=26.900 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=850' Slope=0.0300 '/' Tc=18.0 min CN=95 Runoff=214.60 cfs 16.882 af

Subcatchment PW4s: Northwest Cap Face Runoff Area=35.000 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=850' Slope=0.0300 '/' Tc=20.7 min CN=95 Runoff=259.90 cfs 21.965 af

Subcatchment R10s: Closure by removal Runoff Area=4.300 ac 0.00% Impervious Runoff Depth=5.63"
Flow Length=450' Slope=0.0100 '/' Tc=20.2 min CN=79 Runoff=26.47 cfs 2.017 af

Subcatchment R11s: Closure by removal Runoff Area=50.500 ac 0.00% Impervious Runoff Depth=5.63"
Flow Length=900' Tc=22.1 min CN=79 Runoff=295.81 cfs 23.689 af

Subcatchment R1s: Closure by removal Runoff Area=91.100 ac 0.00% Impervious Runoff Depth=3.66"
Flow Length=1,600' Slope=0.0320 '/' Tc=44.4 min CN=62 Runoff=216.33 cfs 27.766 af

Subcatchment R2s: Closure by removal Runoff Area=25.800 ac 0.00% Impervious Runoff Depth=4.11"
Flow Length=800' Tc=46.2 min CN=66 Runoff=67.99 cfs 8.846 af

Subcatchment R3s: Closure by removal Runoff Area=17.300 ac 0.00% Impervious Runoff Depth=5.04"
Flow Length=800' Tc=21.6 min CN=74 Runoff=92.63 cfs 7.269 af

Subcatchment R4s: Closure by removal Runoff Area=21.600 ac 0.00% Impervious Runoff Depth=4.11"
Flow Length=900' Tc=18.5 min CN=66 Runoff=103.33 cfs 7.406 af

Subcatchment R5s: Closure by removal area Runoff Area=4.800 ac 0.00% Impervious Runoff Depth=5.63"
Flow Length=500' Tc=19.4 min CN=79 Runoff=30.20 cfs 2.252 af

Subcatchment R6s: Closure by removal Runoff Area=29.000 ac 0.00% Impervious Runoff Depth=4.11"
Flow Length=1,100' Tc=40.8 min CN=66 Runoff=83.70 cfs 9.943 af

Subcatchment R7s: Closure by removal Runoff Area=29.300 ac 0.00% Impervious Runoff Depth=4.34"
Flow Length=800' Slope=0.0150 '/' Tc=41.3 min CN=68 Runoff=88.48 cfs 10.608 af

Subcatchment R8s: Closure by removal Runoff Area=82.300 ac 0.00% Impervious Runoff Depth=5.04"
Flow Length=1,100' Tc=34.8 min CN=74 Runoff=326.49 cfs 34.580 af

Subcatchment R9s: Closure by removal Runoff Area=14.300 ac 0.00% Impervious Runoff Depth=5.63"
Flow Length=580' Tc=18.9 min CN=79 Runoff=91.29 cfs 6.708 af

Reach AR1: Access Road Channel Avg. Flow Depth=0.61' Max Vel=4.43 fps Inflow=11.95 cfs 0.821 af
n=0.045 L=310.0' S=0.0645 '/' Capacity=176.75 cfs Outflow=11.87 cfs 0.821 af

Reach AR2: Access Road Channel Avg. Flow Depth=1.13' Max Vel=3.64 fps Inflow=28.11 cfs 1.337 af
n=0.045 L=465.0' S=0.0215 '/' Capacity=102.05 cfs Outflow=26.81 cfs 1.337 af

Reach AR3: Access Road Channel Avg. Flow Depth=0.80' Max Vel=4.37 fps Inflow=18.42 cfs 0.891 af
n=0.045 L=260.0' S=0.0462 '/' Capacity=149.50 cfs Outflow=18.20 cfs 0.891 af

Reach AR4: Access Road Channel Avg. Flow Depth=0.76' Max Vel=4.69 fps Inflow=18.20 cfs 0.891 af
n=0.045 L=250.0' S=0.0560 '/' Capacity=164.67 cfs Outflow=18.03 cfs 0.891 af

Reach AR5: Access Road Channel Avg. Flow Depth=0.84' Max Vel=4.67 fps Inflow=21.99 cfs 1.079 af
n=0.045 L=590.0' S=0.0497 '/' Capacity=155.07 cfs Outflow=21.08 cfs 1.079 af

Reach B0: Main letdown leading to Avg. Flow Depth=3.33' Max Vel=6.35 fps Inflow=1,090.99 cfs 95.579 af
n=0.043 L=50.0' S=0.0100 '/' Capacity=2,384.81 cfs Outflow=1,090.93 cfs 95.579 af

Reach B1: Main letdown leading to Avg. Flow Depth=2.67' Max Vel=8.40 fps Inflow=1,090.93 cfs 95.579 af
n=0.043 L=600.0' S=0.0223 '/' Capacity=3,563.94 cfs Outflow=1,086.11 cfs 95.579 af

Reach B3: Channel to Berry Creek Avg. Flow Depth=1.89' Max Vel=3.84 fps Inflow=150.43 cfs 195.572 af
n=0.035 L=800.0' S=0.0050 '/' Capacity=4,336.61 cfs Outflow=149.72 cfs 195.403 af

Reach B4: Channel to Berry Creek Avg. Flow Depth=1.23' Max Vel=7.77 fps Inflow=178.23 cfs 199.025 af
n=0.036 L=600.0' S=0.0350 '/' Capacity=11,154.88 cfs Outflow=178.08 cfs 198.956 af

Reach B5: Channel to Berry Creek Avg. Flow Depth=1.74' Max Vel=5.05 fps Inflow=178.08 cfs 198.956 af
n=0.036 L=250.0' S=0.0100 '/' Capacity=5,962.53 cfs Outflow=178.02 cfs 198.914 af

Reach CE1: East Letdown Channel Avg. Flow Depth=0.98' Max Vel=7.03 fps Inflow=90.12 cfs 6.150 af
n=0.027 L=800.0' S=0.0262 '/' Capacity=2,920.83 cfs Outflow=88.35 cfs 6.150 af

Reach CE2: East Letdown Channel Avg. Flow Depth=1.12' Max Vel=7.37 fps Inflow=114.94 cfs 7.845 af
n=0.027 L=950.0' S=0.0248 '/' Capacity=2,841.42 cfs Outflow=112.13 cfs 7.845 af

Reach CE3: East Letdown Channel Avg. Flow Depth=0.98' Max Vel=7.09 fps Inflow=91.96 cfs 6.276 af
n=0.027 L=960.0' S=0.0266 '/' Capacity=2,938.17 cfs Outflow=89.53 cfs 6.276 af

Reach CE4: East Letdown Channel Avg. Flow Depth=1.06' Max Vel=7.62 fps Inflow=110.35 cfs 7.531 af
n=0.027 L=960.0' S=0.0281 '/' Capacity=3,023.35 cfs Outflow=107.76 cfs 7.531 af

Reach CE5: East Letdown Channel Avg. Flow Depth=1.38' Max Vel=7.18 fps Inflow=156.32 cfs 10.669 af
n=0.027 L=1,500.0' S=0.0187 '/' Capacity=2,463.06 cfs Outflow=147.67 cfs 10.669 af

Reach CW17: Western Letdown Avg. Flow Depth=1.33' Max Vel=6.58 fps Inflow=150.81 cfs 10.292 af
n=0.035 L=960.0' S=0.0260 '/' Capacity=2,421.08 cfs Outflow=146.26 cfs 10.292 af

Reach CW18: West letdown channel Avg. Flow Depth=2.01' Max Vel=3.61 fps Inflow=146.26 cfs 10.292 af
n=0.086 L=200.0' S=0.0300 '/' Capacity=1,057.56 cfs Outflow=145.57 cfs 10.292 af

Reach ESA: Emergency spillway Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.036 L=240.0' S=0.0604 '/' Capacity=4,006.80 cfs Outflow=0.00 cfs 0.000 af

Reach ESB: Emergency spillway Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.036 L=510.0' S=0.0269 '/' Capacity=2,671.74 cfs Outflow=0.00 cfs 0.000 af

Reach ESC: Emergency spillway Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.036 L=350.0' S=0.0429 '/' Capacity=3,374.66 cfs Outflow=0.00 cfs 0.000 af

Reach KN1: Channel North of Knob Avg. Flow Depth=0.57' Max Vel=4.18 fps Inflow=22.03 cfs 1.067 af
n=0.035 L=1,130.0' S=0.0312 '/' Capacity=2,171.25 cfs Outflow=18.85 cfs 1.067 af

Reach OE1: Offsite East Channel Avg. Flow Depth=0.61' Max Vel=2.46 fps Inflow=40.10 cfs 2.097 af
n=0.045 L=2,000.0' S=0.0125 '/' Capacity=5,333.05 cfs Outflow=25.12 cfs 2.097 af

Reach OE2: Offsite East Channel Avg. Flow Depth=0.37' Max Vel=4.08 fps Inflow=25.12 cfs 2.097 af
n=0.045 L=550.0' S=0.0618 '/' Capacity=11,859.84 cfs Outflow=24.60 cfs 2.097 af

Reach PE1: East Perimeter Channel Avg. Flow Depth=1.87' Max Vel=3.19 fps Inflow=139.69 cfs 6.903 af
n=0.035 L=2,460.0' S=0.0049 '/' Capacity=857.99 cfs Outflow=86.06 cfs 6.903 af

Reach PE2: East Perimeter Channel Avg. Flow Depth=2.18' Max Vel=3.50 fps Inflow=165.48 cfs 13.053 af
n=0.035 L=610.0' S=0.0043 '/' Capacity=979.48 cfs Outflow=159.74 cfs 13.053 af

Reach PE3: East Perimeter Channel Avg. Flow Depth=2.78' Max Vel=4.04 fps Inflow=271.83 cfs 20.898 af
n=0.035 L=390.0' S=0.0044 '/' Capacity=990.53 cfs Outflow=268.62 cfs 20.898 af

Reach PE4: East Perimeter Channel Avg. Flow Depth=3.17' Max Vel=4.30 fps Inflow=357.46 cfs 27.174 af
n=0.035 L=400.0' S=0.0042 '/' Capacity=978.07 cfs Outflow=353.35 cfs 27.174 af

Reach PE5: East Perimeter Channel Avg. Flow Depth=3.04' Max Vel=5.92 fps Inflow=457.91 cfs 34.705 af
n=0.035 L=580.0' S=0.0084 '/' Capacity=1,378.98 cfs Outflow=452.05 cfs 34.705 af

Reach PE6: East Perimeter Channel Avg. Flow Depth=3.74' Max Vel=7.41 fps Inflow=810.56 cfs 62.255 af
n=0.035 L=860.0' S=0.0105 '/' Capacity=1,534.78 cfs Outflow=796.57 cfs 62.255 af

Reach PE7: Channel 4b on northeast Avg. Flow Depth=4.46' Max Vel=5.35 fps Inflow=796.57 cfs 62.255 af
n=0.035 L=900.0' S=0.0044 '/' Capacity=1,000.19 cfs Outflow=770.91 cfs 62.255 af

Reach PW4: Western Perimeter Avg. Flow Depth=3.18' Max Vel=3.97 fps Inflow=406.01 cfs 33.324 af
n=0.035 L=2,500.0' S=0.0036 '/' Capacity=4,680.15 cfs Outflow=327.22 cfs 33.324 af

Reach R1: Closure by removal area Avg. Flow Depth=1.61' Max Vel=4.89 fps Inflow=216.33 cfs 27.766 af
n=0.045 L=2,000.0' S=0.0158 '/' Capacity=8,078.36 cfs Outflow=208.66 cfs 27.766 af

Reach R10: Closure by removal area Avg. Flow Depth=2.19' Max Vel=0.96 fps Inflow=31.99 cfs 29.056 af
n=0.120 L=400.0' S=0.0042 '/' Capacity=1,082.70 cfs Outflow=29.04 cfs 28.945 af

Reach R11: Closure by removal area Avg. Flow Depth=3.31' Max Vel=3.21 fps Inflow=392.22 cfs 88.031 af
n=0.045 L=1,400.0' S=0.0031 '/' Capacity=3,567.41 cfs Outflow=352.80 cfs 87.583 af

Reach R2: Closure by removal area Avg. Flow Depth=0.93' Max Vel=5.29 fps Inflow=67.99 cfs 8.846 af
n=0.045 L=800.0' S=0.0394 '/' Capacity=10,093.86 cfs Outflow=67.66 cfs 8.846 af

Reach R3: Closure by removal area Avg. Flow Depth=1.93' Max Vel=5.68 fps Inflow=304.97 cfs 43.881 af
n=0.045 L=750.0' S=0.0173 '/' Capacity=8,474.69 cfs Outflow=304.13 cfs 43.881 af

Reach R4: Closure by removal area Avg. Flow Depth=1.46' Max Vel=5.34 fps Inflow=125.81 cfs 9.564 af
n=0.045 L=875.0' S=0.0246 '/' Capacity=7,973.74 cfs Outflow=123.34 cfs 9.564 af

```
Reach R6: Closure by removal area   Avg. Flow Depth=1.05'  Max Vel=5.57 fps  Inflow=83.70 cfs  9.943 af
                     n=0.045  L=950.0'  S=0.0384 '/'  Capacity=9,970.84 cfs  Outflow=82.80 cfs  9.943 af

Reach R7: Closure by removal area   Avg. Flow Depth=0.95'  Max Vel=5.87 fps  Inflow=88.48 cfs  10.608 af
                   n=0.045  L=800.0'  S=0.0456 '/'  Capacity=11,435.14 cfs  Outflow=88.07 cfs  10.608 af

Reach R8: Closure by removal area   Avg. Flow Depth=3.72'  Max Vel=4.55 fps  Inflow=486.88 cfs  55.132 af
                  n=0.045  L=2,050.0'  S=0.0061 '/'  Capacity=4,180.40 cfs  Outflow=455.45 cfs  55.132 af

Reach R9: Closure by removal area   Avg. Flow Depth=3.24'  Max Vel=1.27 fps  Inflow=107.60 cfs  35.783 af
                   n=0.090  L=1,400.0'  S=0.0026 '/'  Capacity=1,138.38 cfs  Outflow=73.89 cfs  35.397 af

Pond A: Detention Pond A          Peak Elev=449.22'  Storage=2,908,812 cf  Inflow=1,523.26 cfs  192.309 af
Primary=126.32 cfs  192.188 af  Secondary=0.00 cfs  0.000 af  Tertiary=0.00 cfs  0.000 af  Outflow=126.32 cfs  192.188 af

Pond B: Detention Pond B              Peak Elev=461.92'  Storage=44.694 af  Inflow=455.45 cfs  55.132 af
                      Primary=9.10 cfs  27.039 af  Secondary=0.00 cfs  0.000 af  Outflow=9.10 cfs  27.039 af

Pond B-1: Upstream of Main Letdown Channel             Peak Elev=463.57'  Inflow=1,090.99 cfs  95.579 af
               Primary=1,090.99 cfs  95.579 af  Secondary=0.00 cfs  0.000 af  Outflow=1,090.99 cfs  95.579 af

Pond C: Detention Pond C              Peak Elev=464.70'  Storage=49.514 af  Inflow=386.72 cfs  60.246 af
                      Primary=9.44 cfs  27.996 af  Secondary=0.00 cfs  0.000 af  Outflow=9.44 cfs  27.996 af

Pond DP-1: Culvert Under DP Roadway                        Peak Elev=482.21'  Inflow=26.81 cfs  1.337 af
                     21.0"  Round Culvert x 2.00  n=0.013  L=140.0'  S=0.0286 '/'  Outflow=26.81 cfs  1.337 af

Pond DP-2: Culvert Under DP Roadway                        Peak Elev=480.49'  Inflow=18.20 cfs  0.891 af
                     21.0"  Round Culvert x 2.00  n=0.013  L=100.0'  S=0.1000 '/'  Outflow=18.20 cfs  0.891 af

Link CREEK: Berry Creek                                                     Inflow=178.02 cfs  198.914 af
                                                                           Primary=178.02 cfs  198.914 af

       Total Runoff Area = 579.650 ac   Runoff Volume = 260.602 af   Average Runoff Depth = 5.40"
                                      100.00% Pervious = 579.650 ac     0.00% Impervious = 0.000 ac
```

Summary for Subcatchment AR1s: Access Road Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

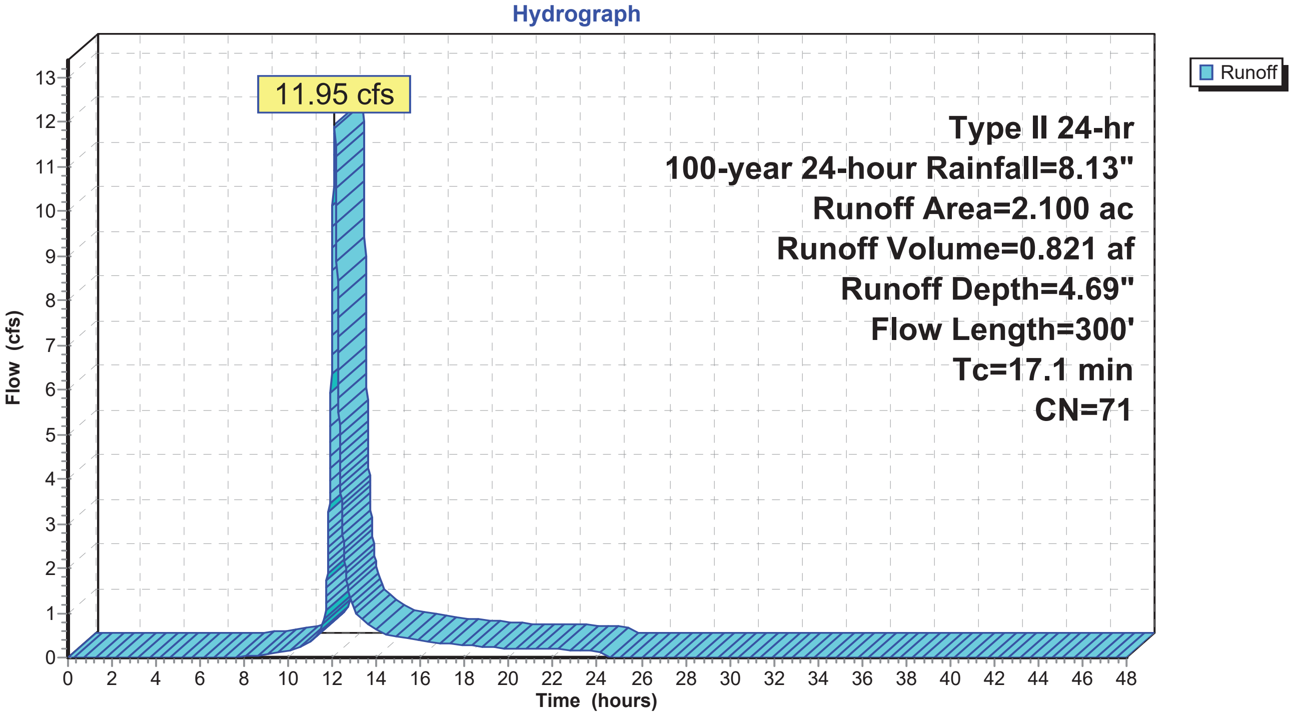
Runoff = 11.95 cfs @ 12.10 hrs, Volume= 0.821 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
0.850	58	Woods/grass comb., Good, HSG B
1.250	79	Pasture/grassland/range, Fair, HSG C
2.100	71	Weighted Average
2.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0400	0.11		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
0.7	40	0.0400	1.00		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
1.4	160	0.1500	1.94		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
17.1	300	Total			

Subcatchment AR1s: Access Road Channel Subcat



Summary for Subcatchment AR2s: Access Road Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

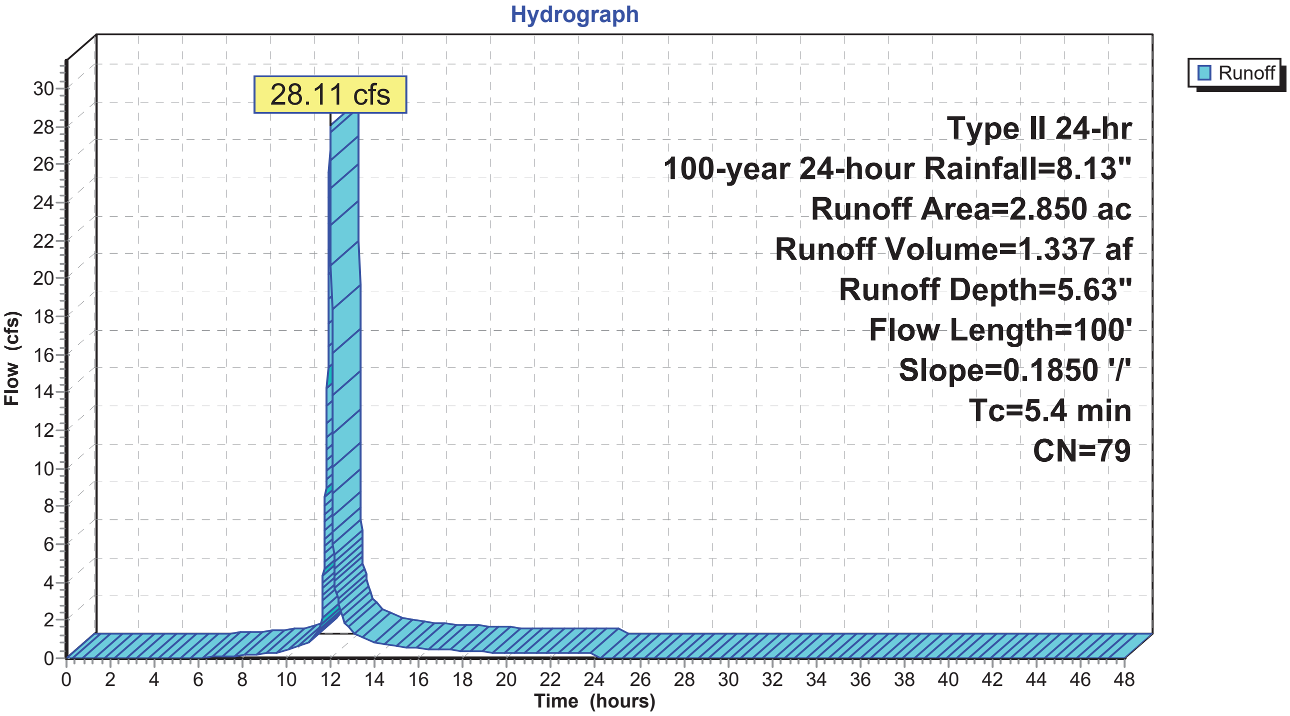
Runoff = 28.11 cfs @ 11.96 hrs, Volume= 1.337 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
2.850	79	Pasture/grassland/range, Fair, HSG C
2.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.1850	0.31		**Sheet Flow, sheet flow** Grass: Dense n= 0.240 P2= 3.77"

Subcatchment AR2s: Access Road Channel Subcat



Summary for Subcatchment AR3s: Access Road Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

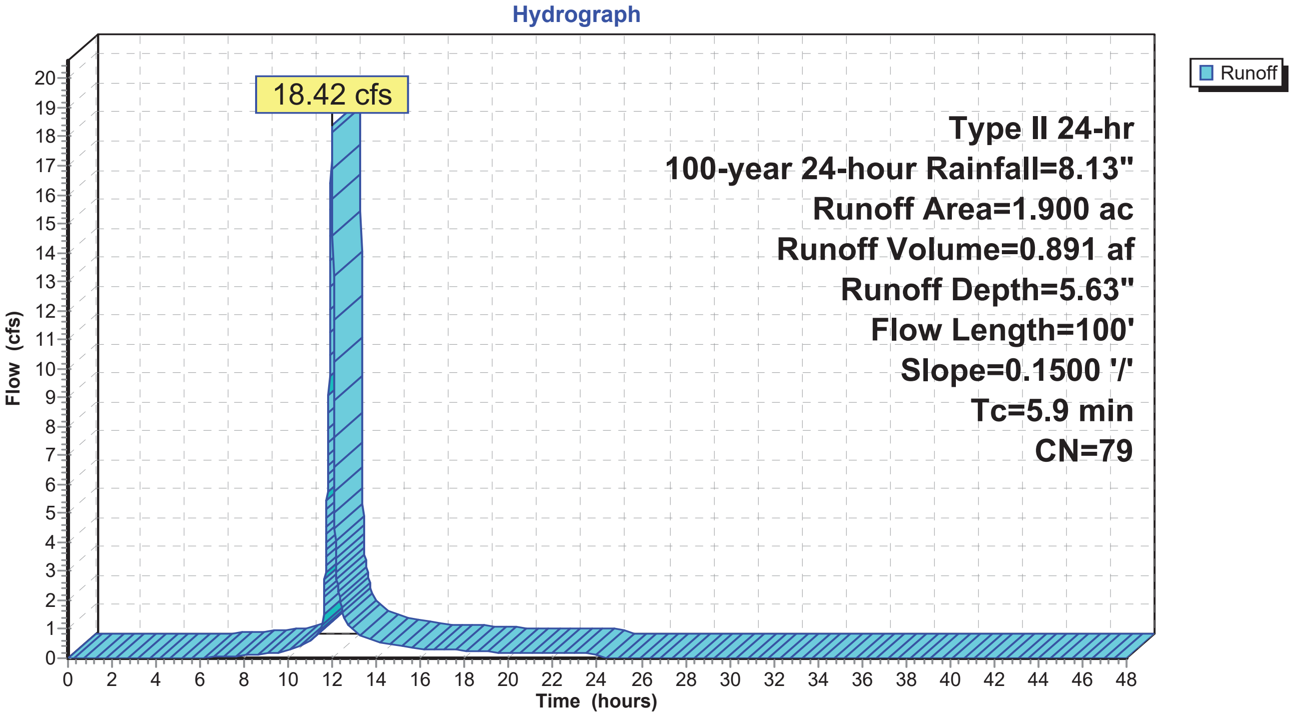
Runoff = 18.42 cfs @ 11.97 hrs, Volume= 0.891 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
1.900	79	Pasture/grassland/range, Fair, HSG C
1.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	100	0.1500	0.28		**Sheet Flow, sheet flow** Grass: Dense n= 0.240 P2= 3.77"

Subcatchment AR3s: Access Road Channel Subcat



Summary for Subcatchment AR5s: Access Road Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

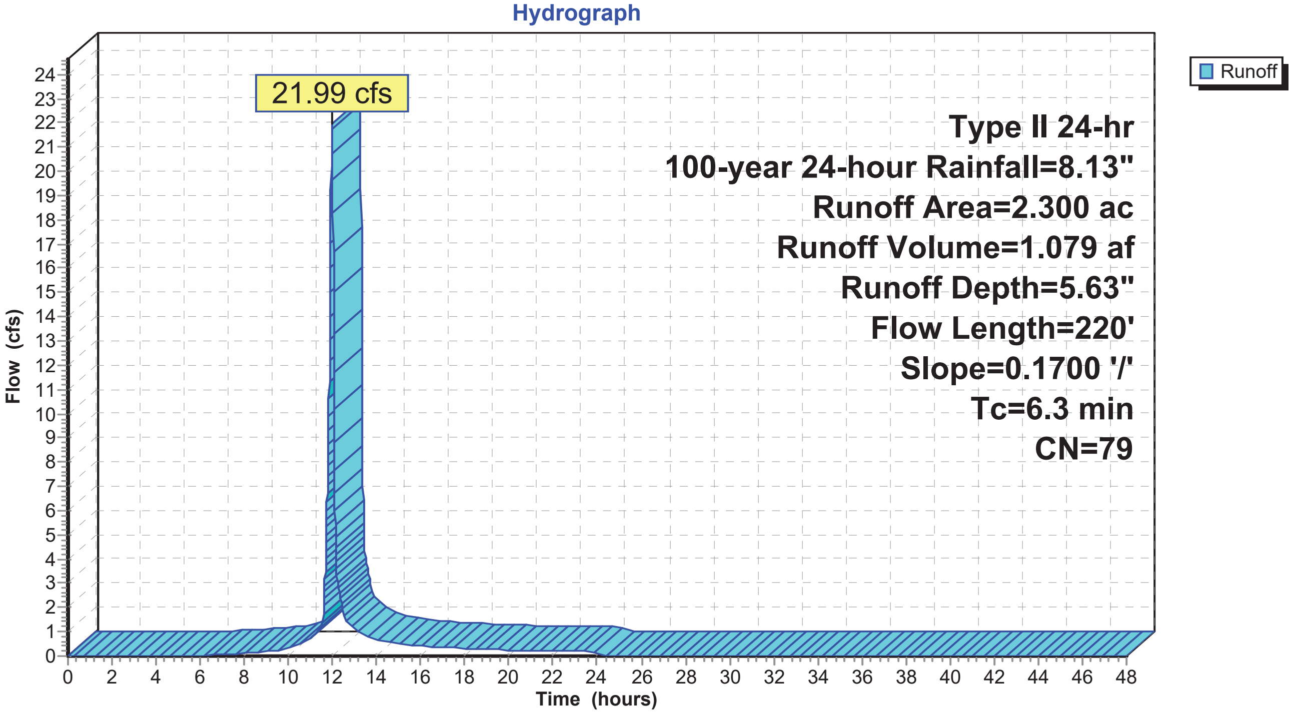
Runoff = 21.99 cfs @ 11.97 hrs, Volume= 1.079 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
2.300	79	Pasture/grassland/range, Fair, HSG C
2.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	100	0.1700	0.30		**Sheet Flow, sheet flow** Grass: Dense n= 0.240 P2= 3.77"
0.7	120	0.1700	2.89		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
6.3	220	Total			

Subcatchment AR5s: Access Road Channel Subcat



Summary for Subcatchment As: Detention Basin A Subcatchment

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

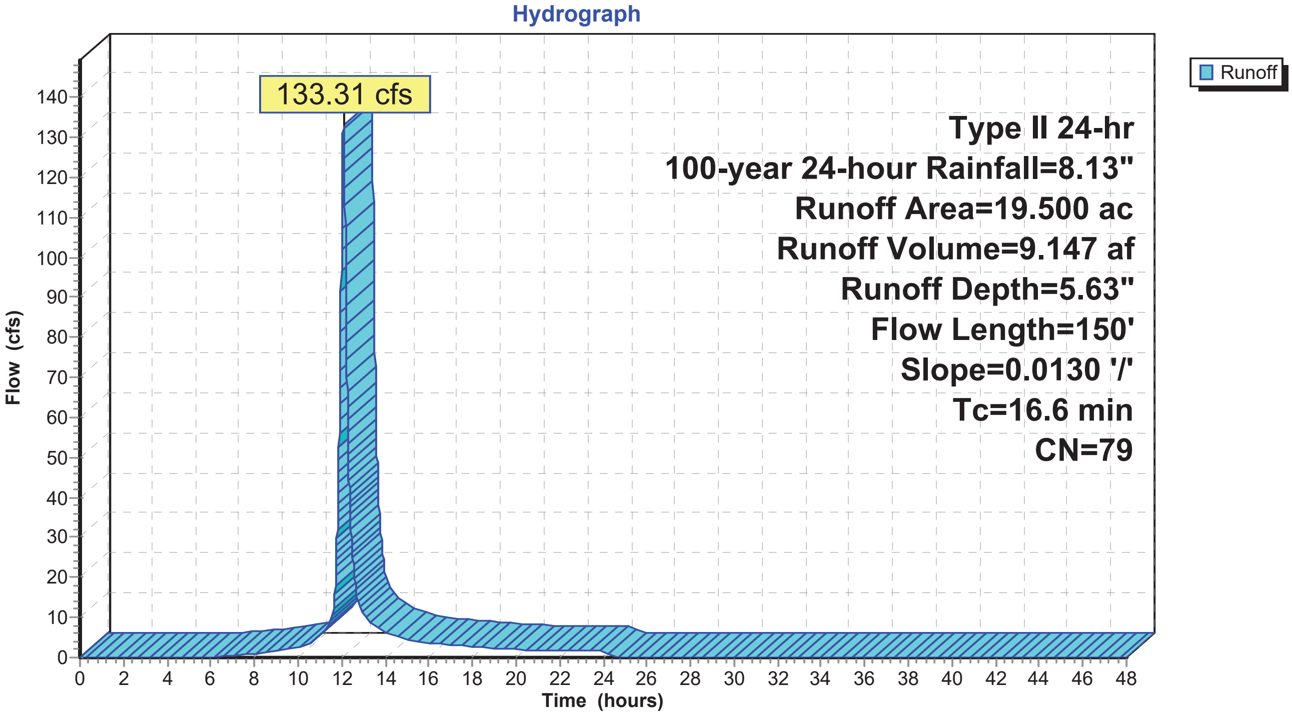
Runoff = 133.31 cfs @ 12.08 hrs, Volume= 9.147 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
19.500	79	Pasture/grassland/range, Fair, HSG C
19.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.6	100	0.0130	0.11		**Sheet Flow, sheet flow** Grass: Dense n= 0.240 P2= 3.77"
1.0	50	0.0130	0.80		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
16.6	150	Total			

Subcatchment As: Detention Basin A Subcatchment



Summary for Subcatchment B3s: NE Outlet Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

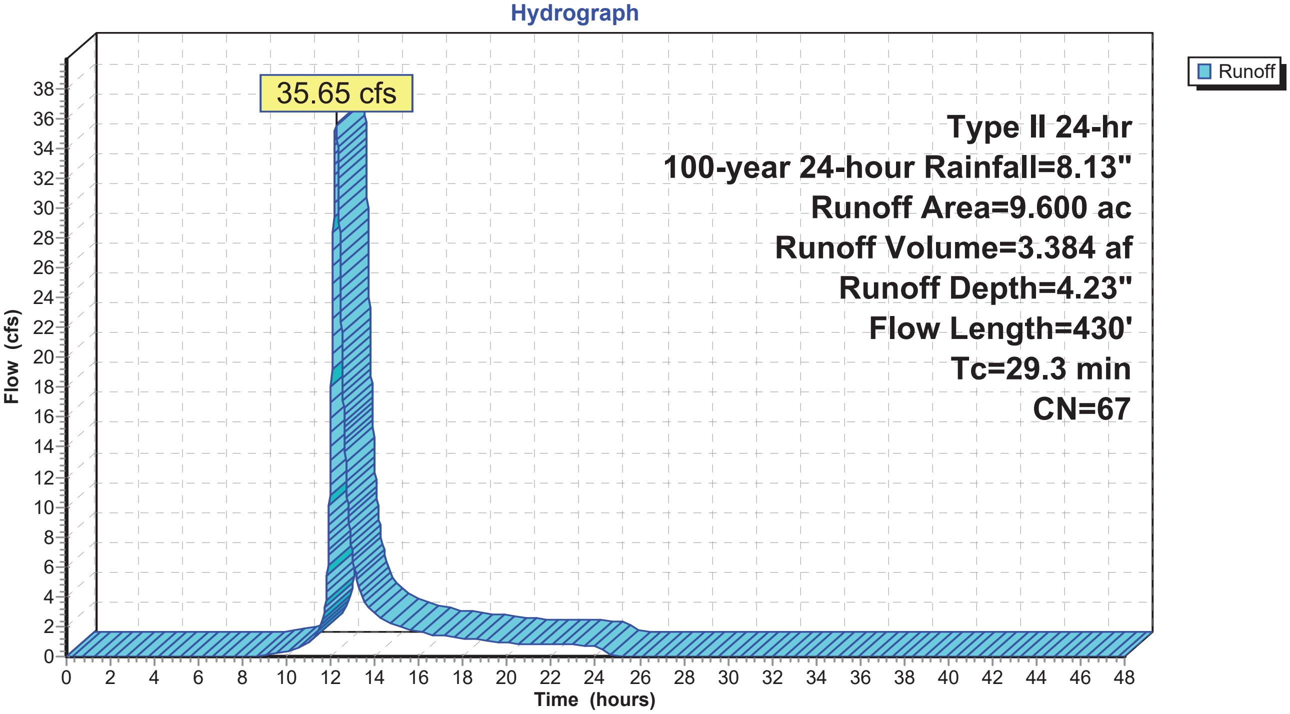
Runoff = 35.65 cfs @ 12.24 hrs, Volume= 3.384 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
8.900	65	Woods/grass comb., Fair, HSG B
0.700	96	Gravel surface, HSG C
9.600	67	Weighted Average
9.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	100	0.0300	0.10		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
12.1	230	0.0040	0.32		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
0.4	100	0.3300	4.02		**Shallow Concentrated Flow, shallow** Short Grass Pasture Kv= 7.0 fps
29.3	430	Total			

Subcatchment B3s: NE Outlet Channel Subcat



Summary for Subcatchment B4s: NE Outlet Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

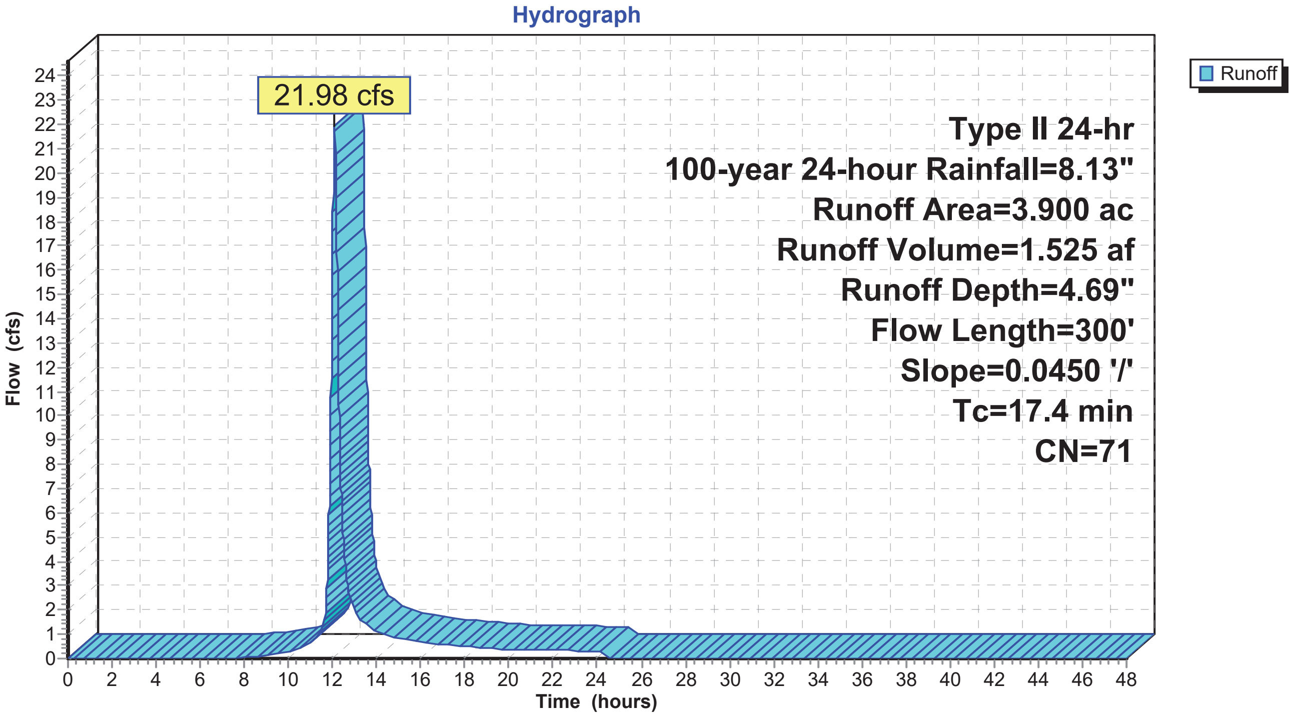
Runoff = 21.98 cfs @ 12.10 hrs, Volume= 1.525 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
3.100	65	Woods/grass comb., Fair, HSG B
0.800	96	Gravel surface, HSG C
3.900	71	Weighted Average
3.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	100	0.0450	0.12		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
3.1	200	0.0450	1.06		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
17.4	300	Total			

Subcatchment B4s: NE Outlet Channel Subcat



Summary for Subcatchment CE1s: Eastern Cap Subcatchment

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

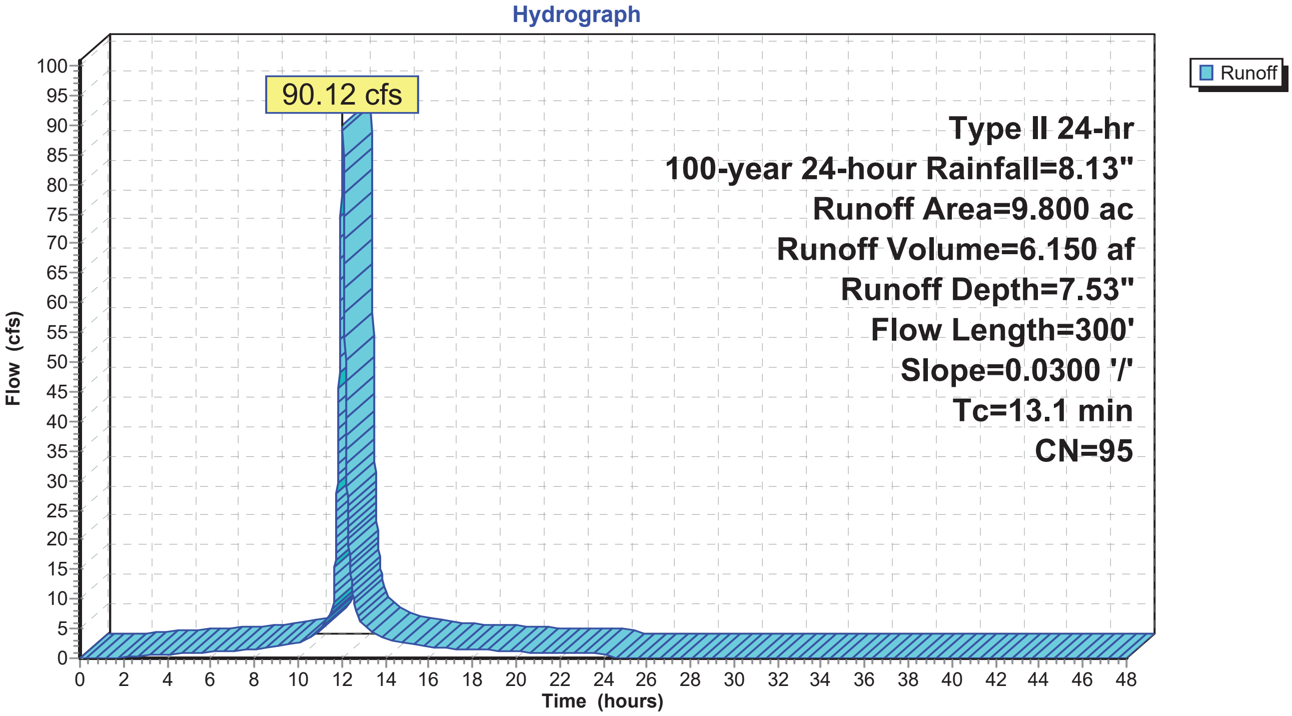
Runoff = 90.12 cfs @ 12.04 hrs, Volume= 6.150 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	9.800	95	Closure Turf
	9.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet flow** n= 0.220 P2= 3.77"
2.7	200	0.0300	1.21		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
13.1	300	Total			

Subcatchment CE1s: Eastern Cap Subcatchment



Summary for Subcatchment CE2s: Eastern Cap Subcatchment

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

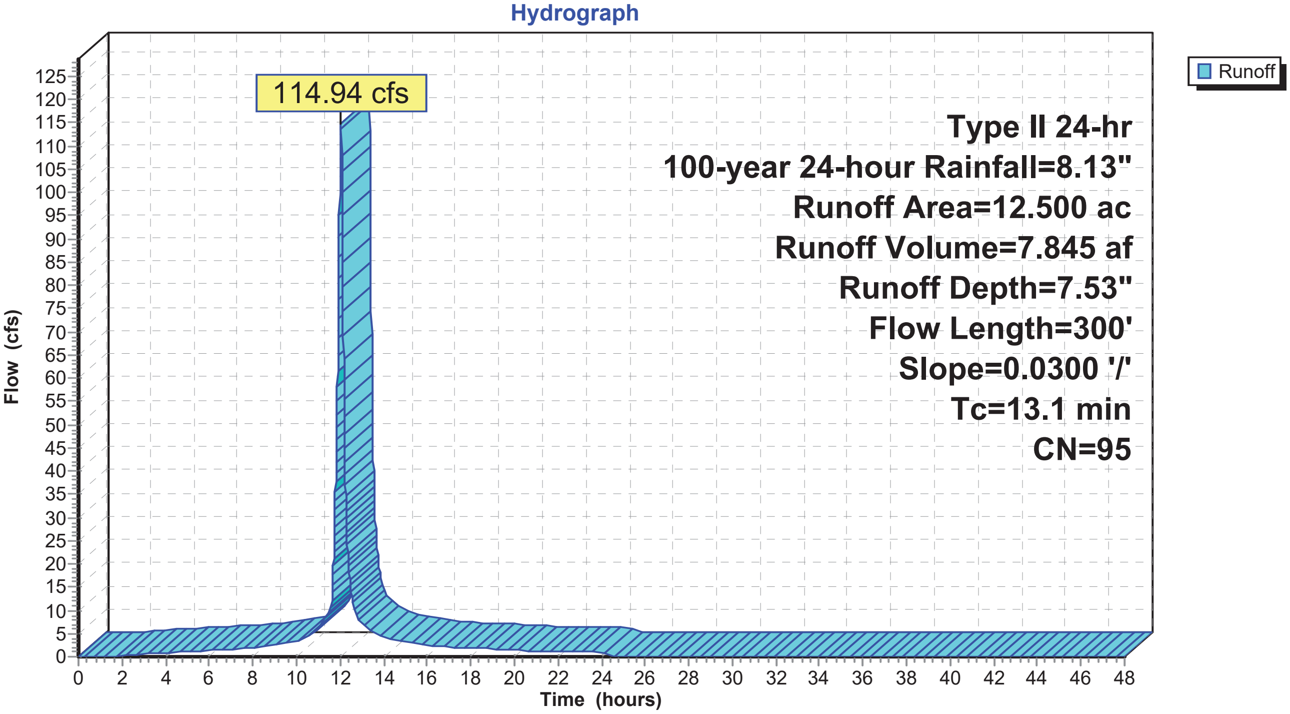
Runoff = 114.94 cfs @ 12.04 hrs, Volume= 7.845 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	12.500	95	Closure Turf
	12.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet flow** n= 0.220 P2= 3.77"
2.7	200	0.0300	1.21		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
13.1	300	Total			

Subcatchment CE2s: Eastern Cap Subcatchment



Summary for Subcatchment CE3s: Eastern Cap Subcatchment

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

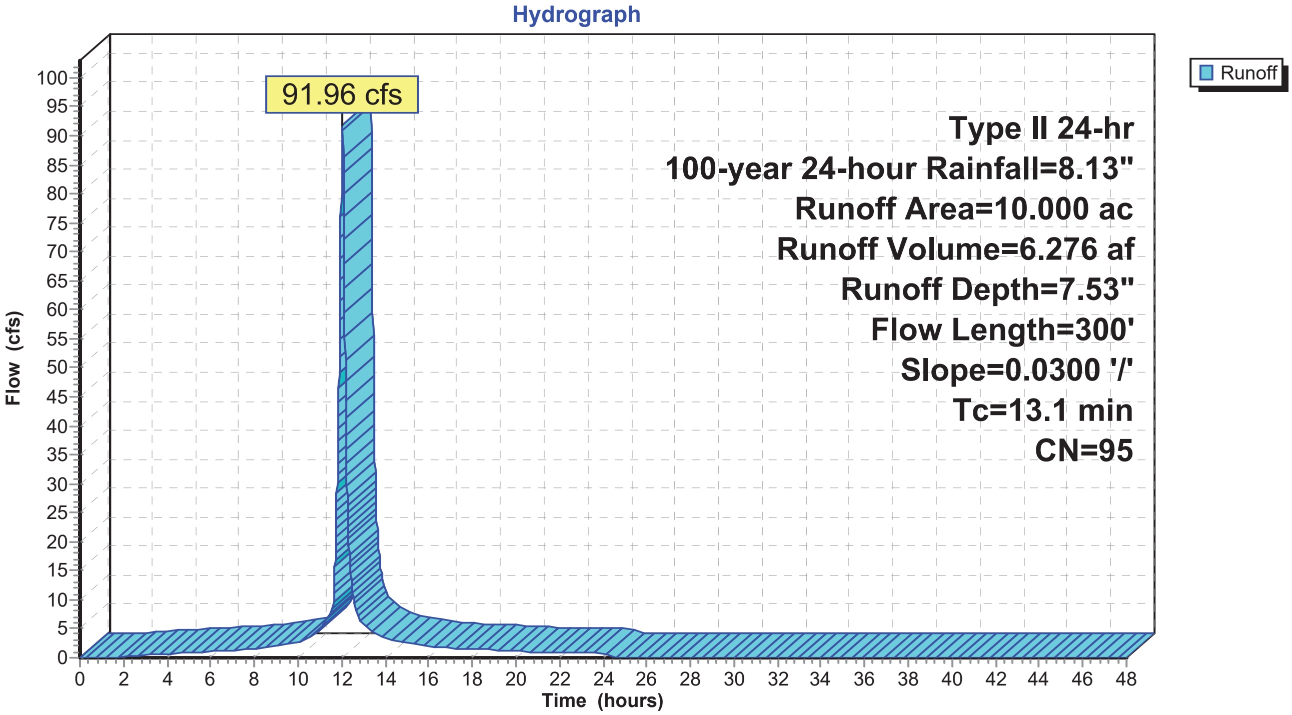
Runoff = 91.96 cfs @ 12.04 hrs, Volume= 6.276 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	10.000	95	Closure Turf
	10.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet flow** n= 0.220 P2= 3.77"
2.7	200	0.0300	1.21		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
13.1	300	Total			

Subcatchment CE3s: Eastern Cap Subcatchment



Summary for Subcatchment CE4s: Eastern Cap Subcatchment

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

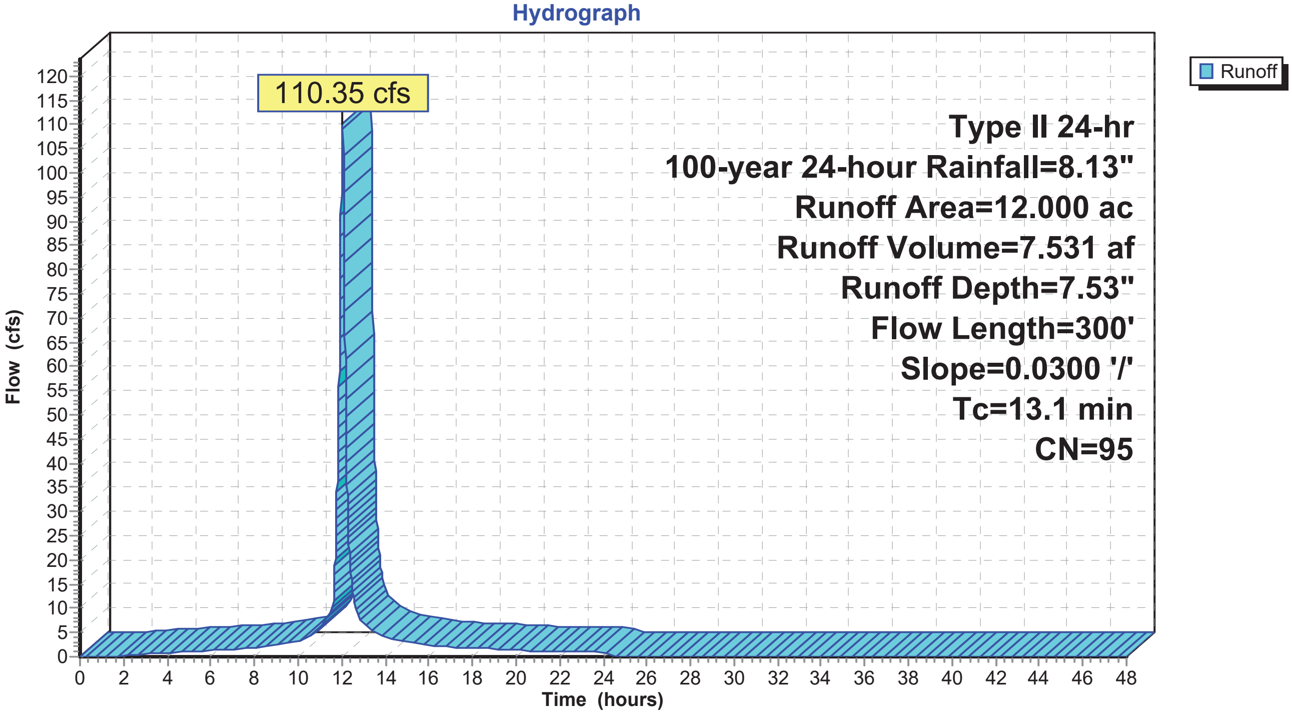
Runoff = 110.35 cfs @ 12.04 hrs, Volume= 7.531 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	12.000	95	Closure Turf
	12.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet flow** n= 0.220 P2= 3.77"
2.7	200	0.0300	1.21		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
13.1	300	Total			

Subcatchment CE4s: Eastern Cap Subcatchment



Summary for Subcatchment CE5s: Eastern Cap Subcatchment

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

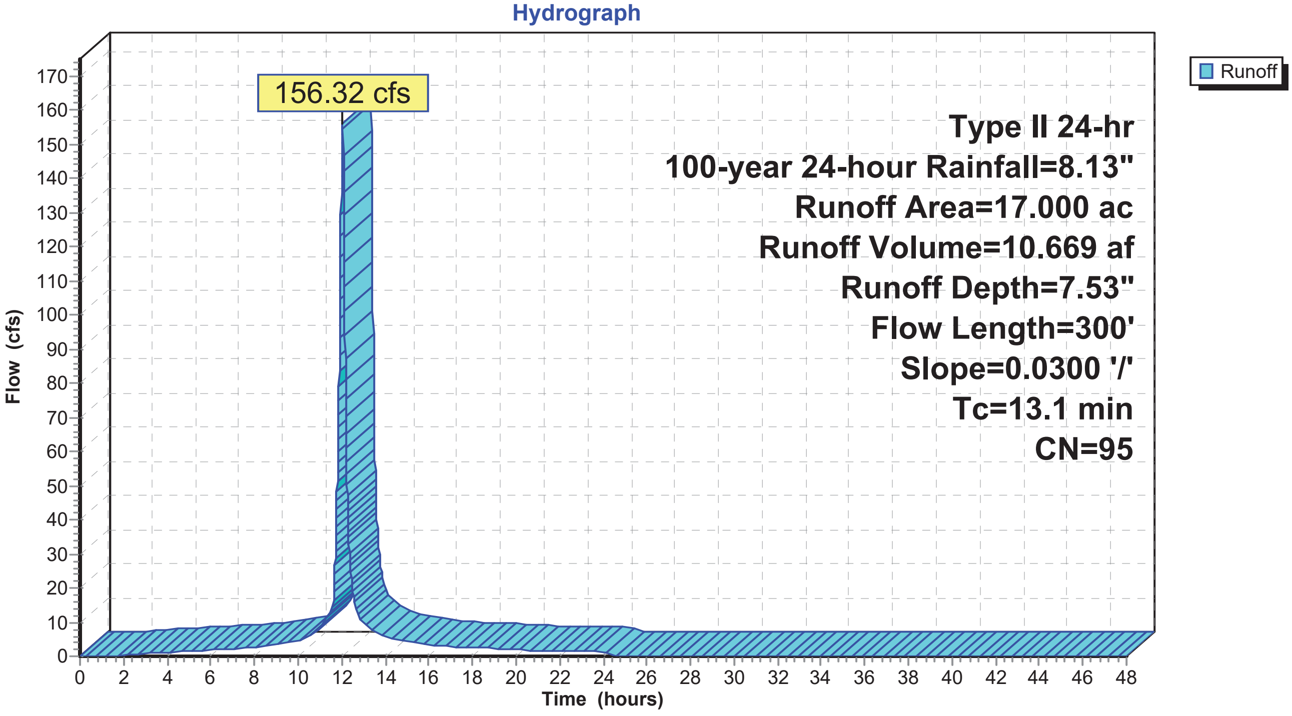
Runoff = 156.32 cfs @ 12.04 hrs, Volume= 10.669 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	17.000	95	Closure Turf
	17.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet flow** n= 0.220 P2= 3.77"
2.7	200	0.0300	1.21		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
13.1	300	Total			

Subcatchment CE5s: Eastern Cap Subcatchment



Summary for Subcatchment Cs: Detention Basin C Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

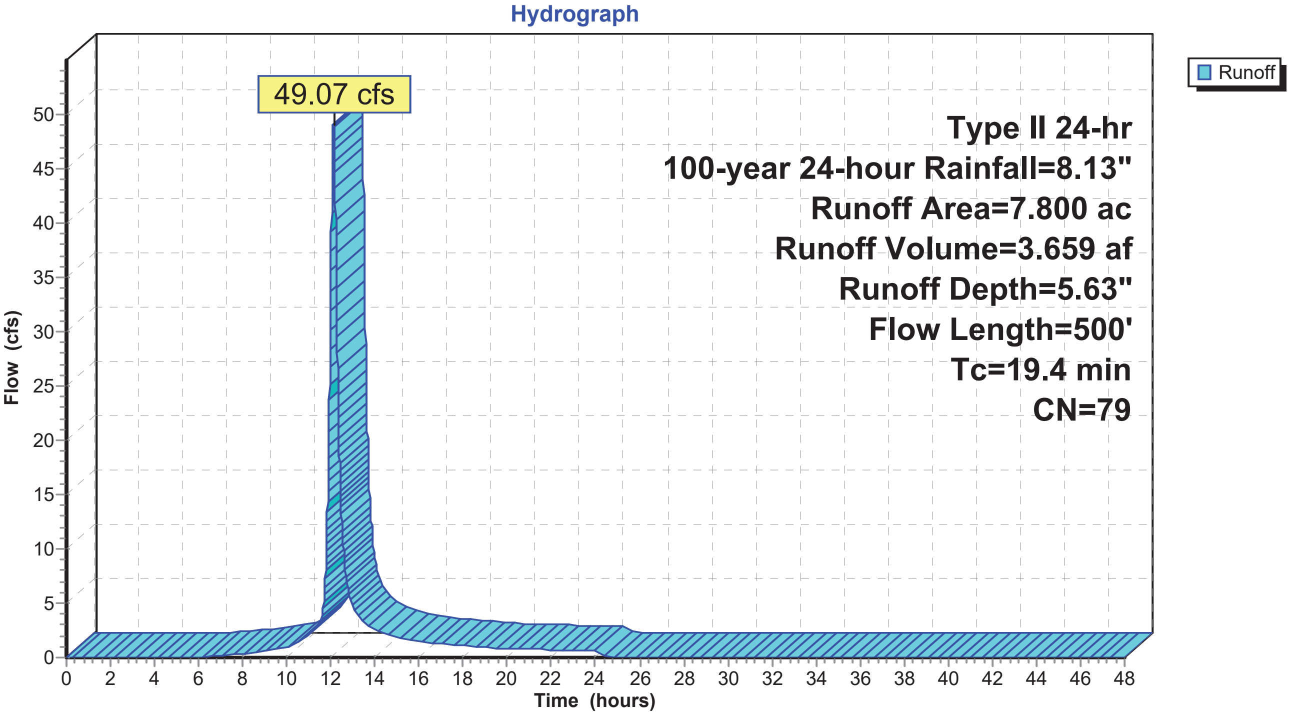
Runoff = 49.07 cfs @ 12.11 hrs, Volume= 3.659 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
7.800	79	Pasture/grassland/range, Fair, HSG C
7.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0550	0.13		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
2.8	200	0.0550	1.17		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
3.4	200	0.0200	0.99		**Shallow Concentrated Flow, shallow** Short Grass Pasture Kv= 7.0 fps
19.4	500	Total			

Subcatchment Cs: Detention Basin C Subcat



Summary for Subcatchment CW17s: Western Cap Subcatchment

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

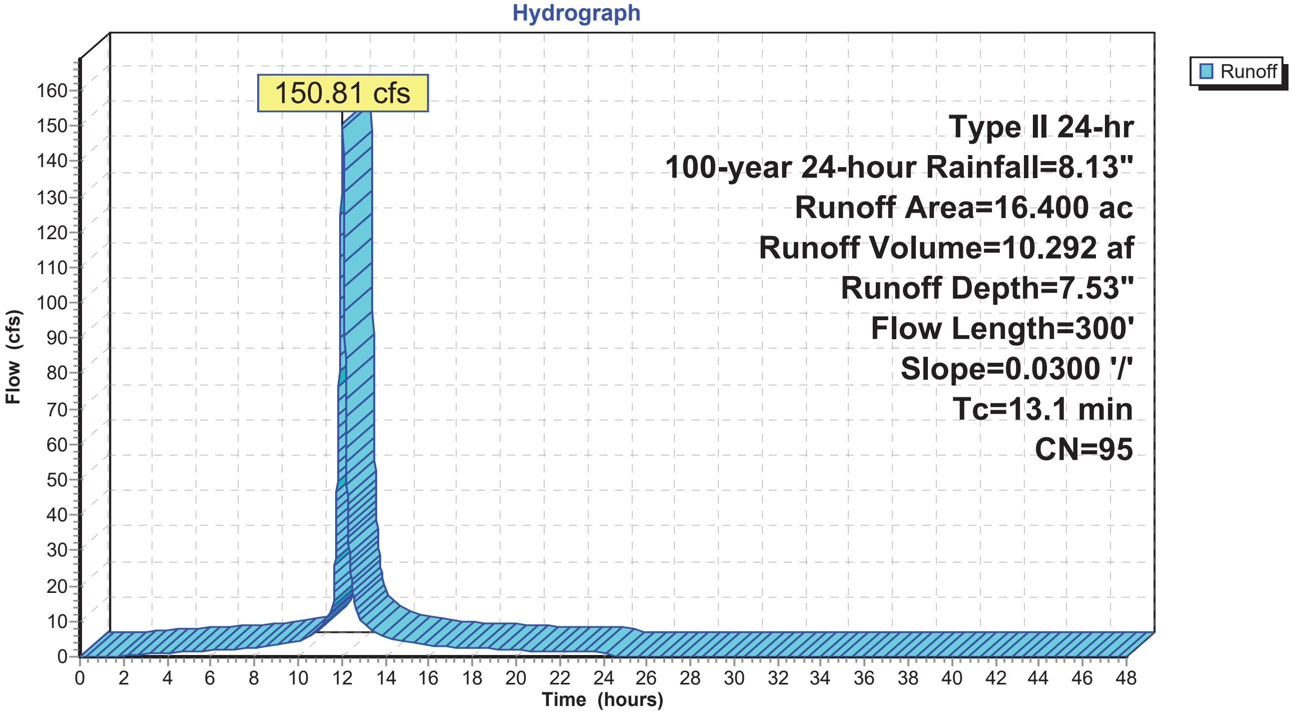
Runoff = 150.81 cfs @ 12.04 hrs, Volume= 10.292 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	16.400	95	Closure Turf
	16.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
2.7	200	0.0300	1.21		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
13.1	300	Total			

Subcatchment CW17s: Western Cap Subcatchment



Summary for Subcatchment KN1s: North Face of Knob Area

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

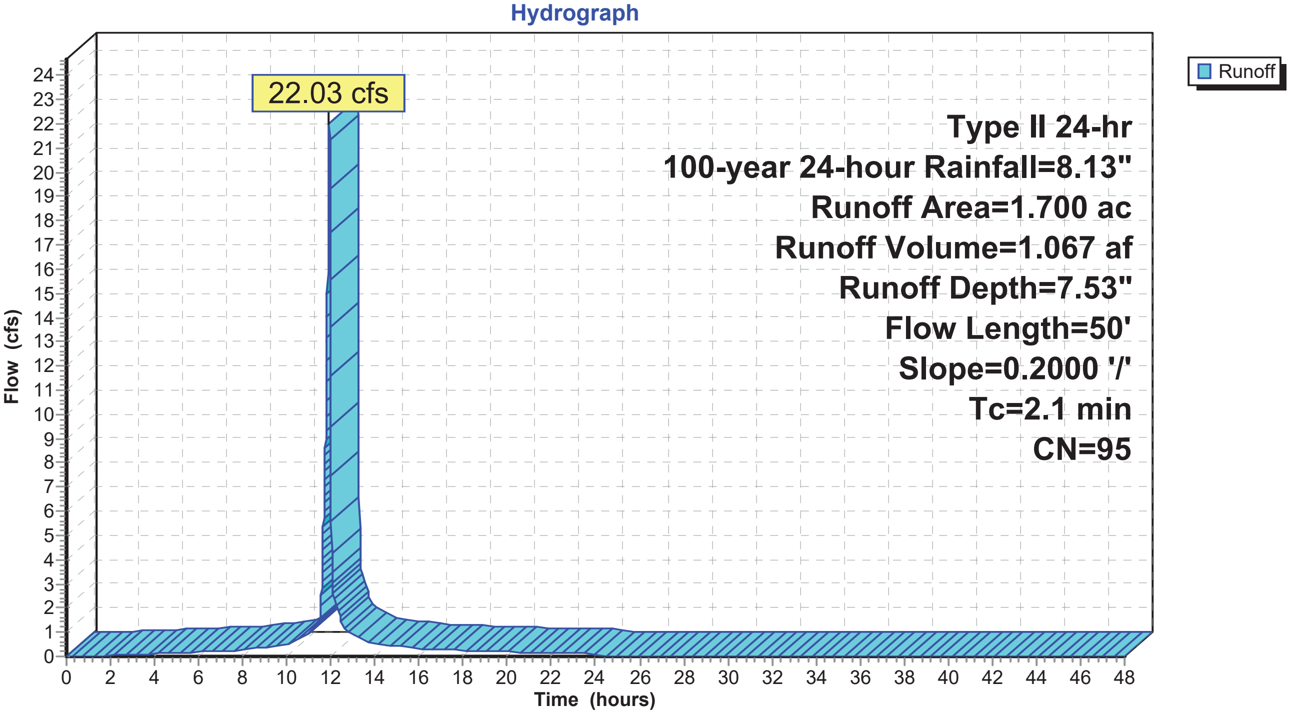
Runoff = 22.03 cfs @ 11.92 hrs, Volume= 1.067 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	1.700	95	Closure Turf
	1.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	50	0.2000	0.40		**Sheet Flow, sheet** Grass: Short n= 0.150 P2= 3.77"

Subcatchment KN1s: North Face of Knob Area



Summary for Subcatchment OE1s: Offsite East Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

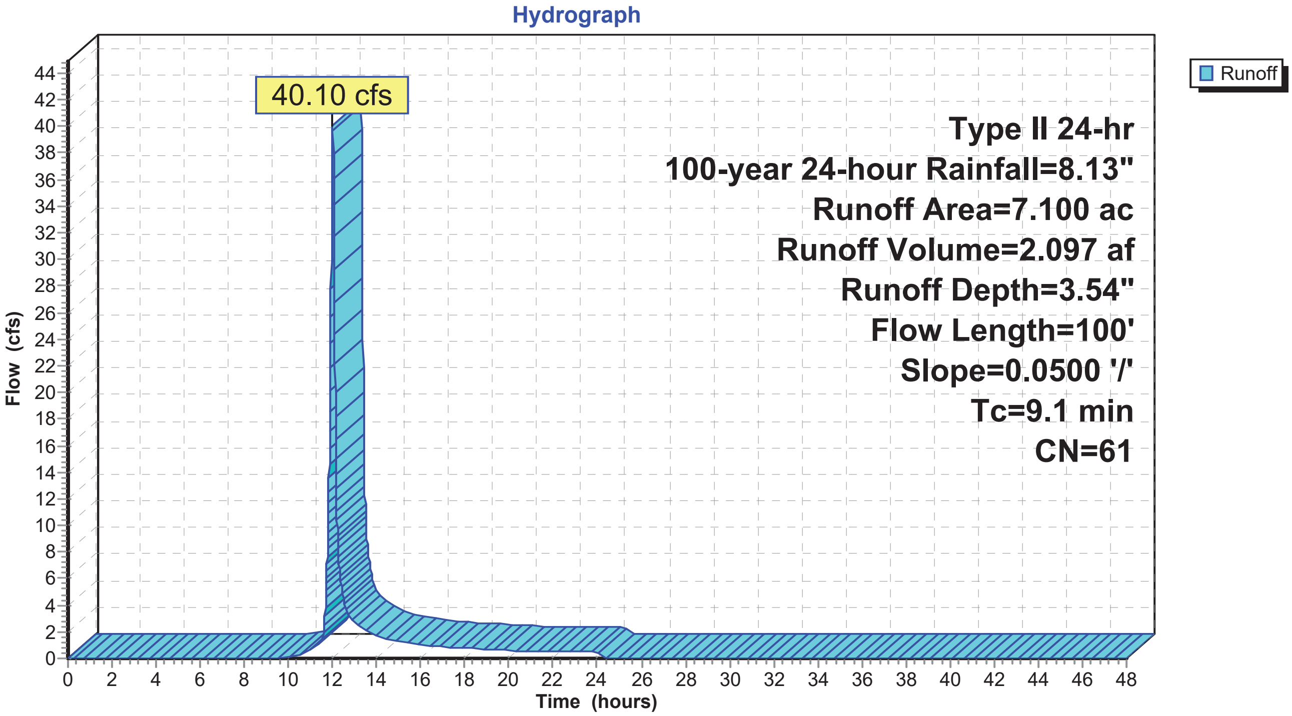
Runoff = 40.10 cfs @ 12.01 hrs, Volume= 2.097 af, Depth= 3.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
7.100	61	Pasture/grassland/range, Good, HSG B
7.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.0500	0.18		**Sheet Flow, sheet** Grass: Dense n= 0.240 P2= 3.77"

Subcatchment OE1s: Offsite East Channel Subcat



Summary for Subcatchment PE1s: Eastern Cap Subcatchment

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

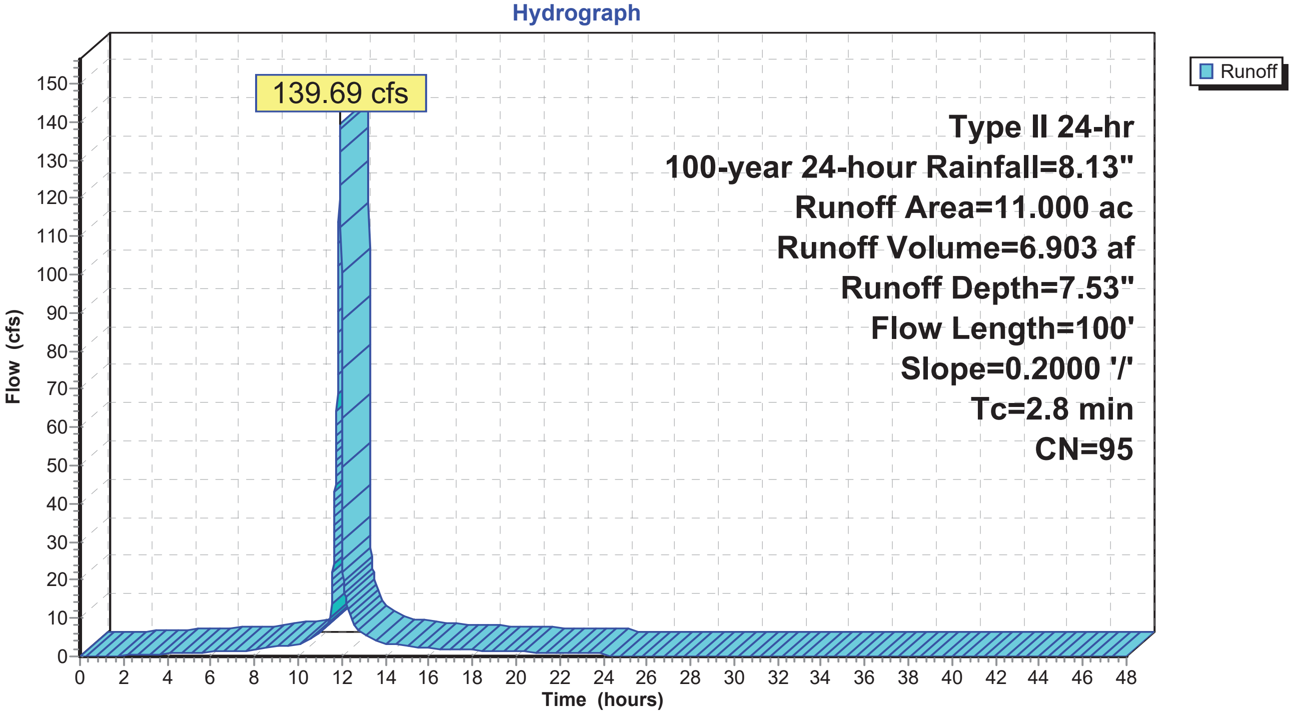
Runoff = 139.69 cfs @ 11.93 hrs, Volume= 6.903 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	11.000	95	Closure Turf
	11.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	100	0.2000	0.59		**Sheet Flow, sheet flow** n= 0.110 P2= 3.77"

Subcatchment PE1s: Eastern Cap Subcatchment



Summary for Subcatchment PE6s: Northeast Cap Face

Assumed a maximum spacing of 500 feet instead of 250 as shown on the drawings. The spacing may be increased if Closure Turf is selected. Spacing could be up to 800 feet based on the Closure Turf Design Manual.

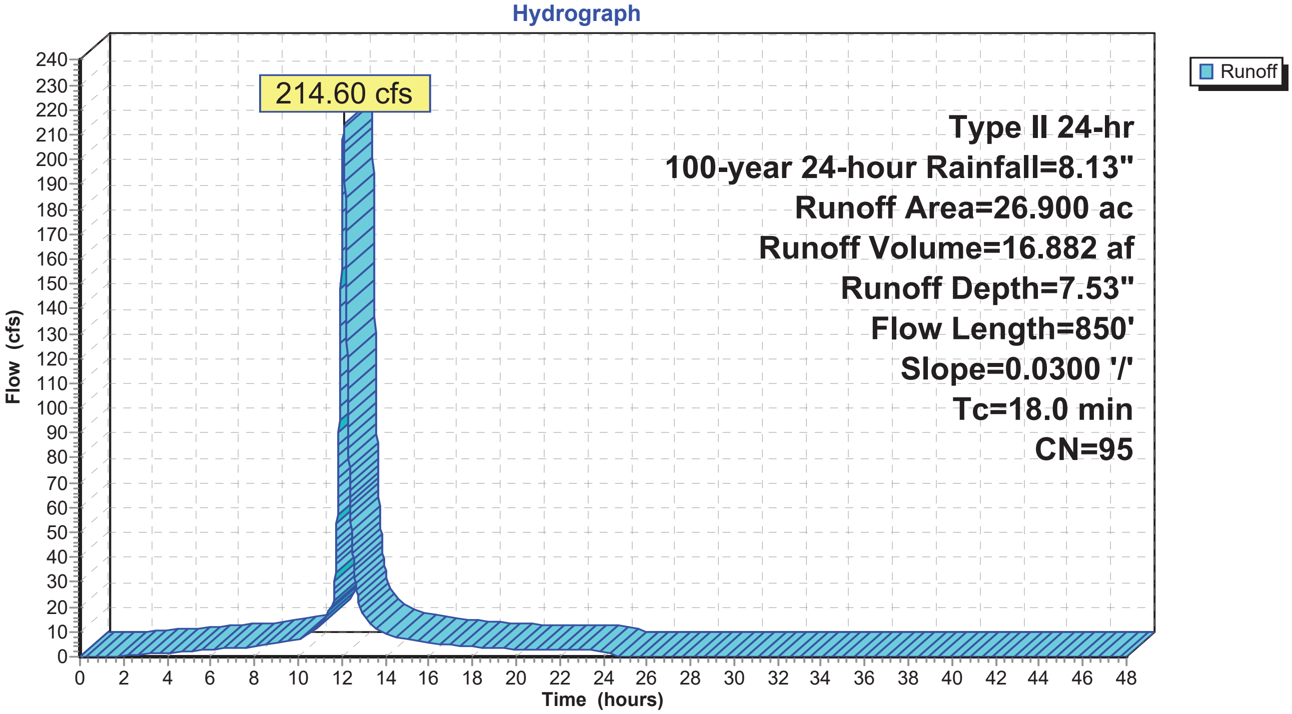
Runoff = 214.60 cfs @ 12.10 hrs, Volume= 16.882 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	26.900	95	
	26.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	100	0.0300	0.22		**Sheet Flow, sheet** Grass: Short n= 0.150 P2= 3.77"
10.3	750	0.0300	1.21		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
18.0	850	Total			

Subcatchment PE6s: Northeast Cap Face



Summary for Subcatchment PW4s: Northwest Cap Face

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

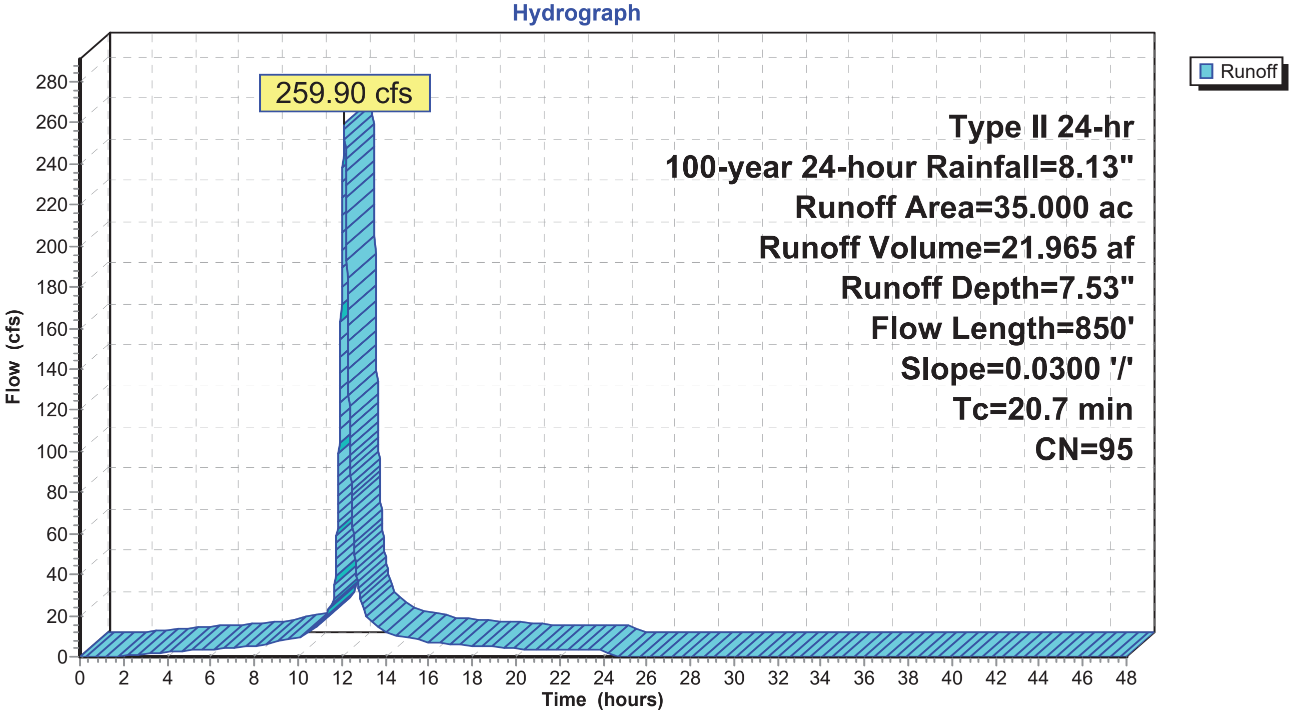
Runoff = 259.90 cfs @ 12.12 hrs, Volume= 21.965 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	35.000	95	Closure Turf
	35.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
10.3	750	0.0300	1.21		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
20.7	850	Total			

Subcatchment PW4s: Northwest Cap Face



Summary for Subcatchment R10s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

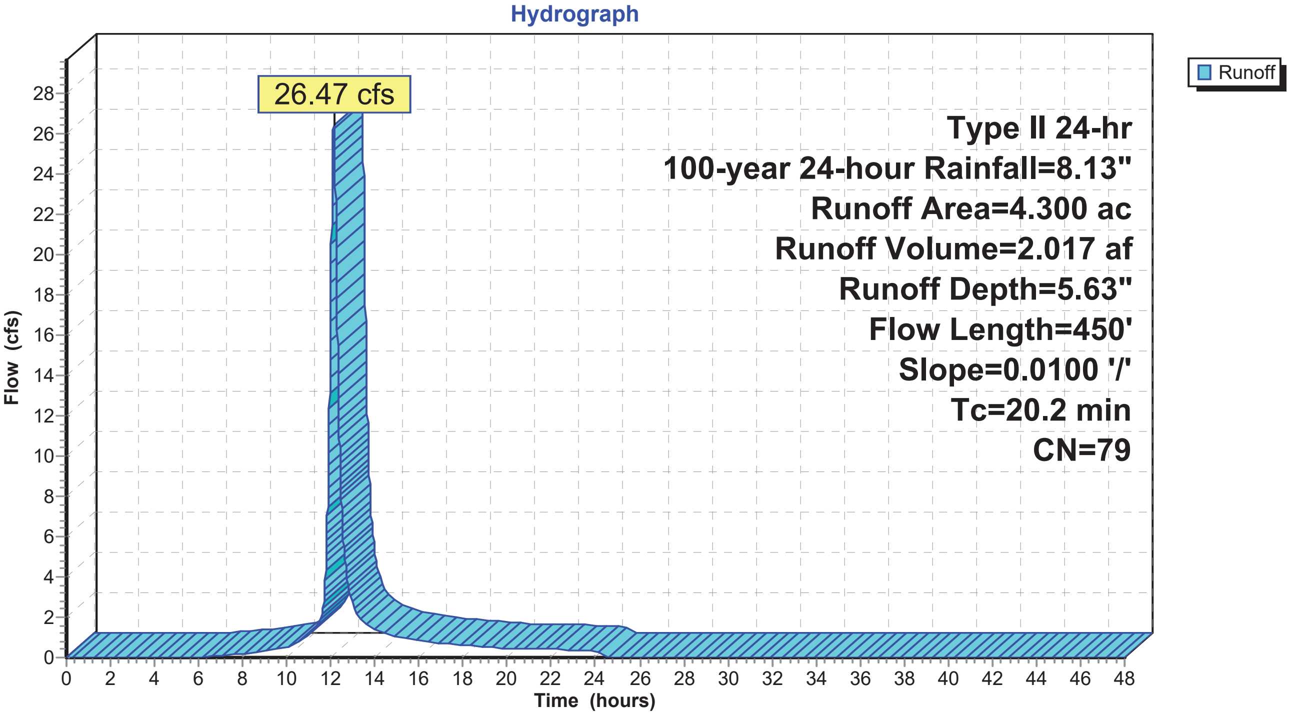
Runoff = 26.47 cfs @ 12.12 hrs, Volume= 2.017 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
4.300	79	Pasture/grassland/range, Fair, HSG C
4.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	100	0.0100	0.14		**Sheet Flow, sheet flow** Grass: Short n= 0.150 P2= 3.77"
8.3	350	0.0100	0.70		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
20.2	450	Total			

Subcatchment R10s: Closure by removal area channel Subcat



Summary for Subcatchment R11s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

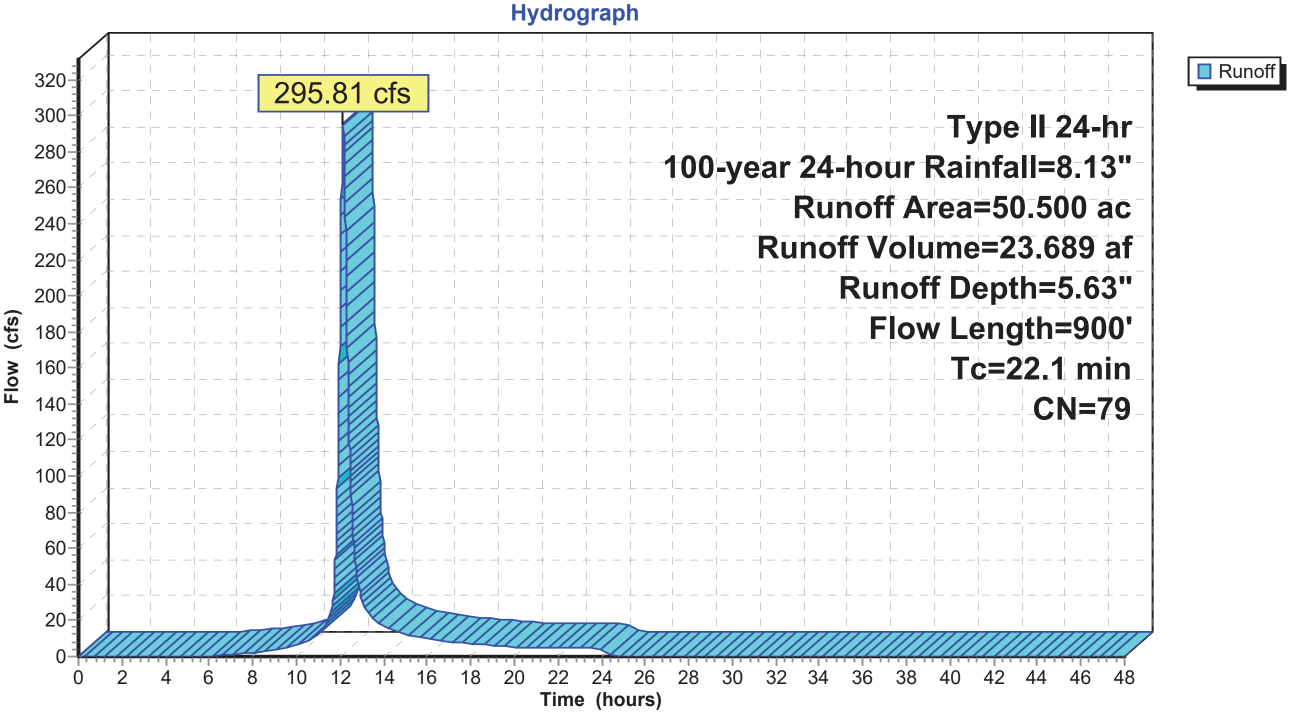
Runoff = 295.81 cfs @ 12.15 hrs, Volume= 23.689 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
50.500	79	Pasture/grassland/range, Fair, HSG C
50.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0800	0.22		**Sheet Flow, sheet flow** Grass: Dense n= 0.240 P2= 3.77"
3.6	300	0.0400	1.40		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
10.9	500	0.0120	0.77		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
22.1	900	Total			

Subcatchment R11s: Closure by removal area channel Subcat



Summary for Subcatchment R1s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

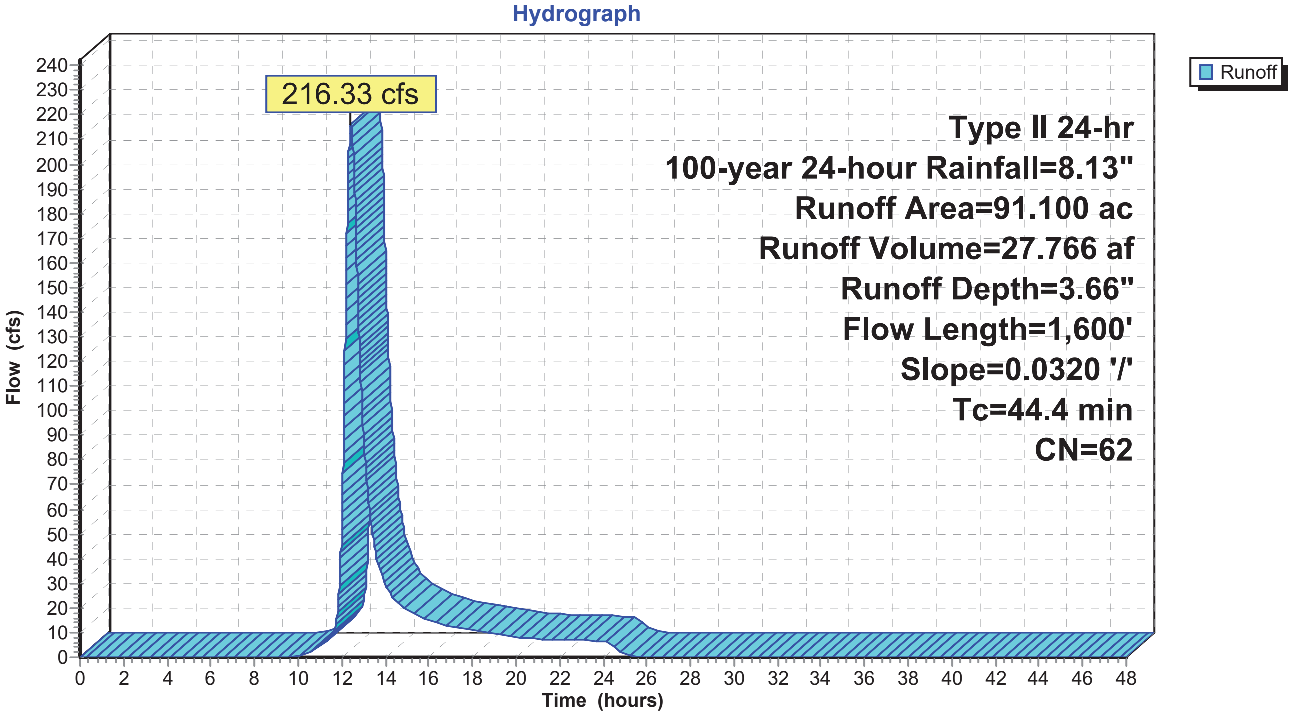
Runoff = 216.33 cfs @ 12.43 hrs, Volume= 27.766 af, Depth= 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
72.300	58	Woods/grass comb., Good, HSG B
18.800	79	Pasture/grassland/range, Fair, HSG C
91.100	62	Weighted Average
91.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0320	0.10		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
28.0	1,500	0.0320	0.89		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
44.4	1,600	Total			

Subcatchment R1s: Closure by removal area channel Subcat



Summary for Subcatchment R2s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

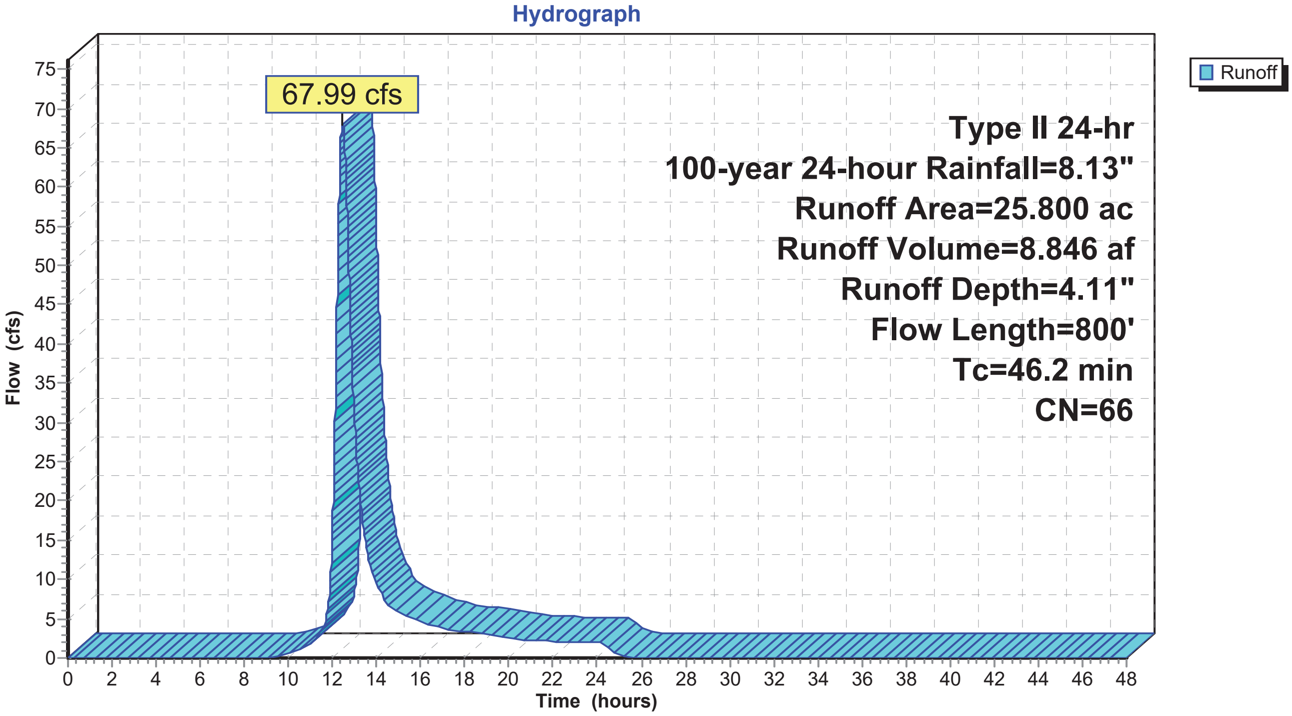
Runoff = 67.99 cfs @ 12.47 hrs, Volume= 8.846 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
15.600	58	Woods/grass comb., Good, HSG B
10.200	79	Pasture/grassland/range, Fair, HSG C
25.800	66	Weighted Average
25.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.0	100	0.0060	0.05		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
10.8	250	0.0060	0.39		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
2.1	200	0.1000	1.58		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
1.3	250	0.2100	3.21		**Shallow Concentrated Flow, shallow** Short Grass Pasture Kv= 7.0 fps
46.2	800	Total			

Subcatchment R2s: Closure by removal area channel Subcat



Summary for Subcatchment R3s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

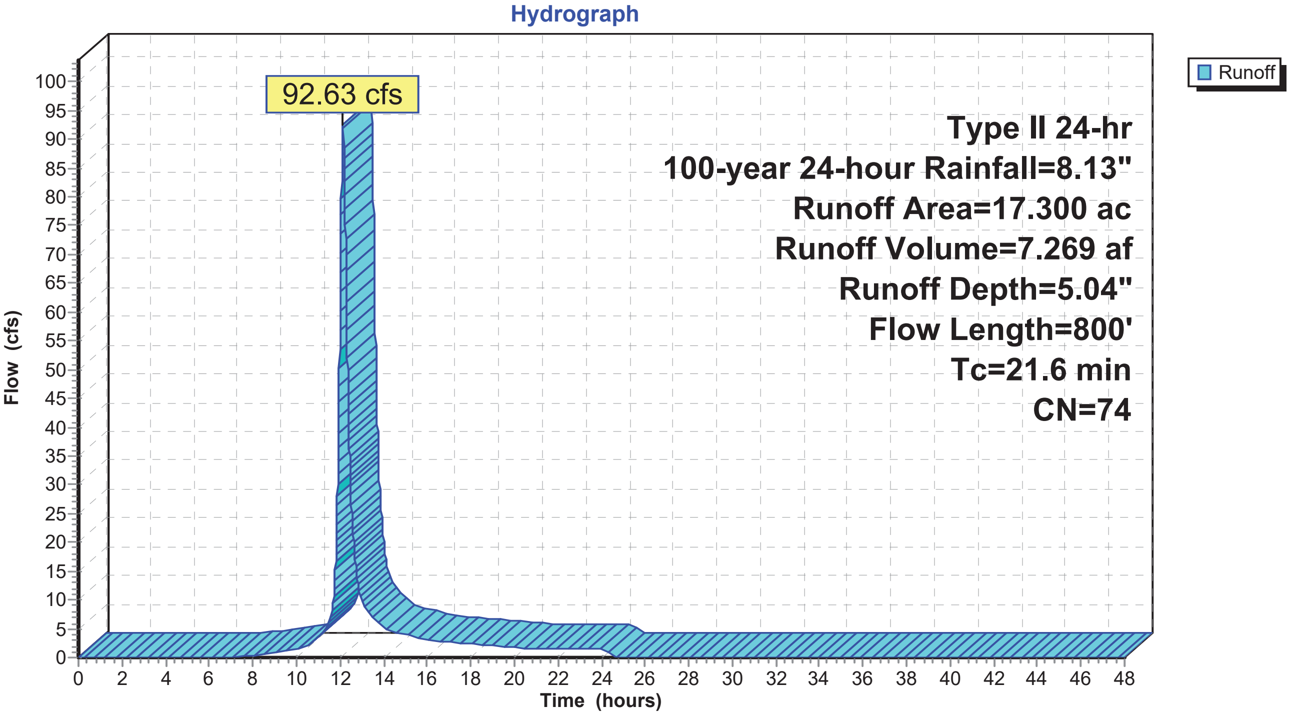
Runoff = 92.63 cfs @ 12.14 hrs, Volume= 7.269 af, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
3.900	58	Woods/grass comb., Good, HSG B
13.400	79	Pasture/grassland/range, Fair, HSG C
17.300	74	Weighted Average
17.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
6.0	400	0.0500	1.12		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
1.9	300	0.1400	2.62		**Shallow Concentrated Flow, shallow** Short Grass Pasture Kv= 7.0 fps
21.6	800	Total			

Subcatchment R3s: Closure by removal area channel Subcat



Summary for Subcatchment R4s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

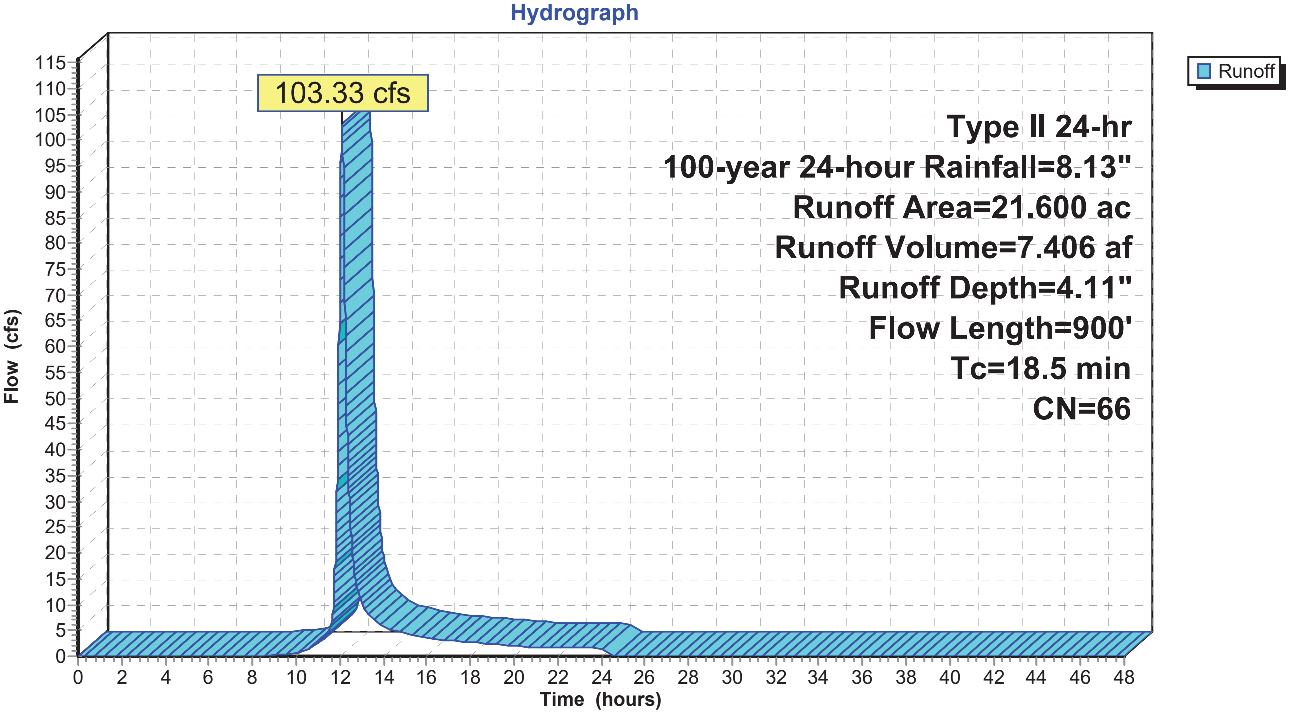
Runoff = 103.33 cfs @ 12.11 hrs, Volume= 7.406 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
13.200	58	Woods/grass comb., Good, HSG B
8.400	79	Pasture/grassland/range, Fair, HSG C
21.600	66	Weighted Average
21.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
4.7	450	0.1000	1.58		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
3.4	350	0.0600	1.71		**Shallow Concentrated Flow, shallow** Short Grass Pasture Kv= 7.0 fps
18.5	900	Total			

Subcatchment R4s: Closure by removal area channel Subcat



Summary for Subcatchment R5s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

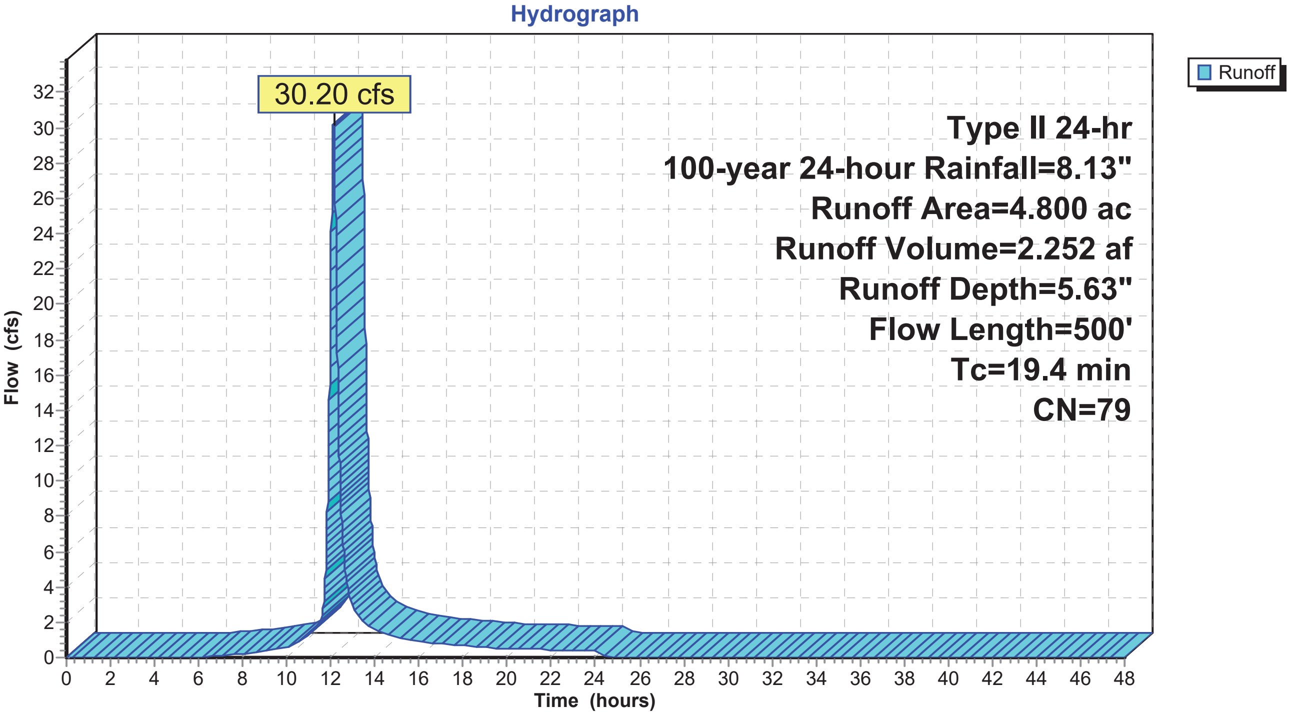
Runoff = 30.20 cfs @ 12.11 hrs, Volume= 2.252 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
4.800	79	Pasture/grassland/range, Fair, HSG C
4.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	100	0.0550	0.13		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
2.8	200	0.0550	1.17		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
3.4	200	0.0200	0.99		**Shallow Concentrated Flow, shallow** Short Grass Pasture Kv= 7.0 fps
19.4	500	Total			

Subcatchment R5s: Closure by removal area channel Subcat



Summary for Subcatchment R6s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

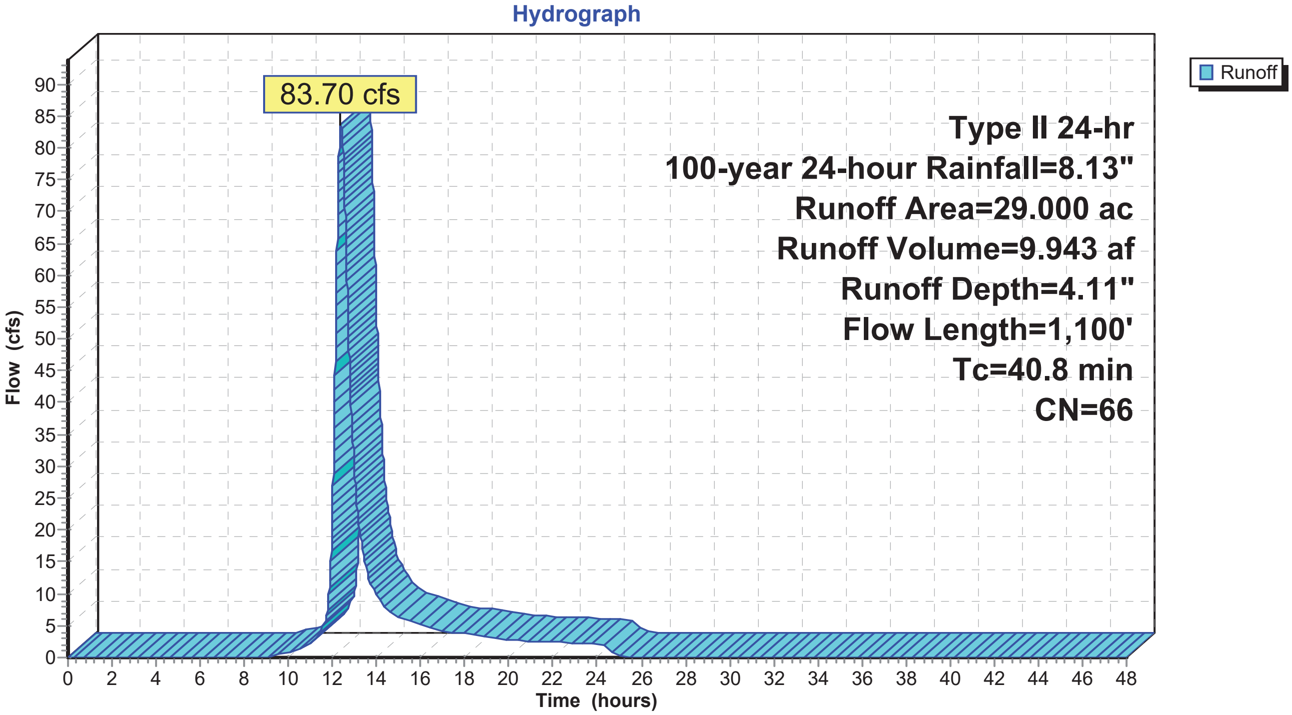
Runoff = 83.70 cfs @ 12.38 hrs, Volume= 9.943 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
17.300	58	Woods/grass comb., Good, HSG B
11.700	79	Pasture/grassland/range, Fair, HSG C
29.000	66	Weighted Average
29.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0400	0.11		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
11.7	700	0.0400	1.00		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
14.1	300	0.0050	0.35		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
40.8	1,100	Total			

Subcatchment R6s: Closure by removal area channel Subcat



Summary for Subcatchment R7s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

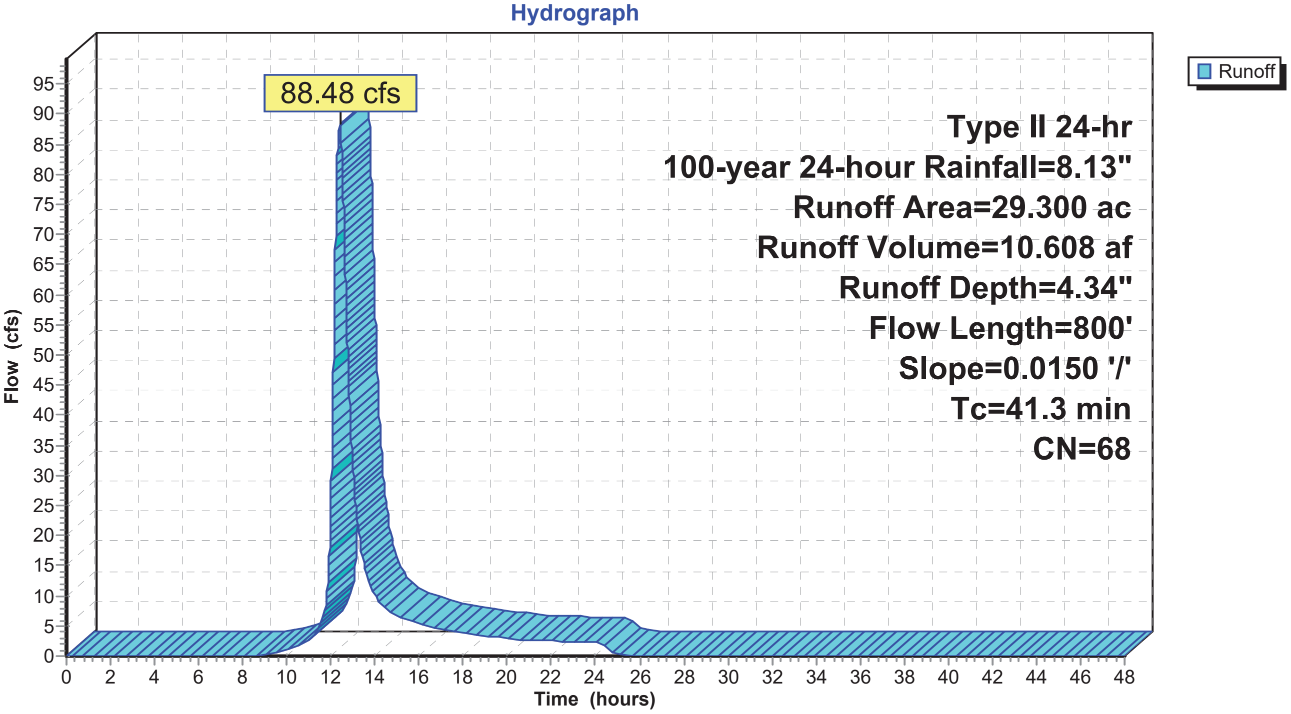
Runoff = 88.48 cfs @ 12.39 hrs, Volume= 10.608 af, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
15.800	58	Woods/grass comb., Good, HSG B
13.500	79	Pasture/grassland/range, Fair, HSG C
29.300	68	Weighted Average
29.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.2	100	0.0150	0.08		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
19.1	700	0.0150	0.61		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
41.3	800	Total			

Subcatchment R7s: Closure by removal area channel Subcat



Summary for Subcatchment R8s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

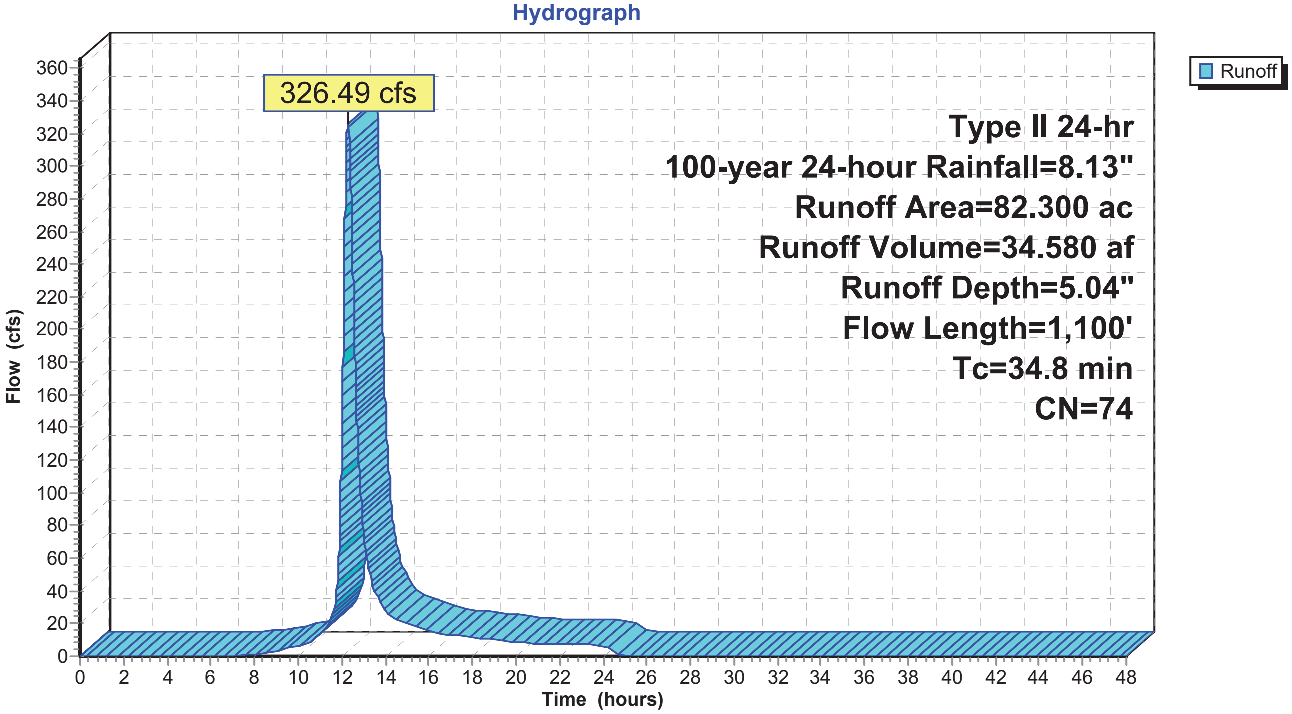
Runoff = 326.49 cfs @ 12.30 hrs, Volume= 34.580 af, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
21.000	58	Woods/grass comb., Good, HSG B
61.300	79	Pasture/grassland/range, Fair, HSG C
82.300	74	Weighted Average
82.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	100	0.0300	0.10		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
9.6	500	0.0300	0.87		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
1.3	200	0.1400	2.62		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
7.1	300	0.0100	0.70		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
34.8	1,100	Total			

Subcatchment R8s: Closure by removal area channel Subcat



Summary for Subcatchment R9s: Closure by removal area channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

Assume Type C for the ash area assuming this area will be graded and compacted.

Assumption that area outside of closure by removal portion will be woods/grass combination.

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

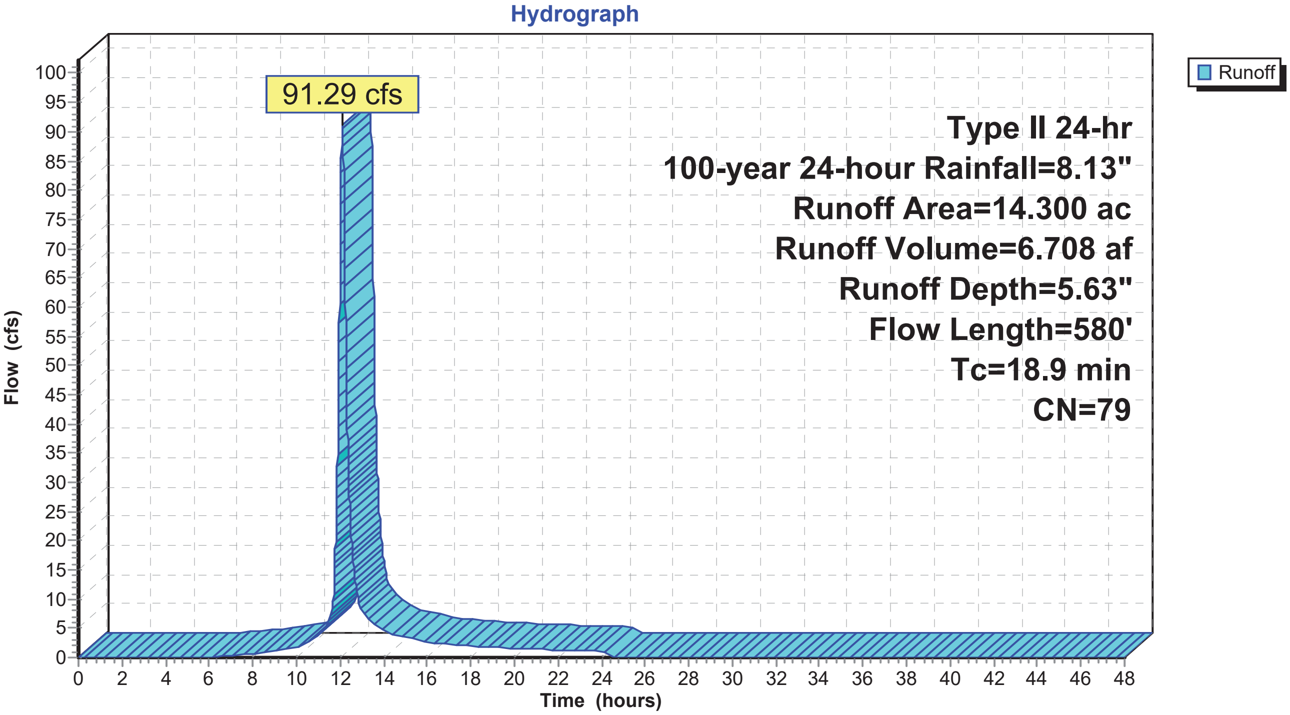
Runoff = 91.29 cfs @ 12.11 hrs, Volume= 6.708 af, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
14.300	79	Pasture/grassland/range, Fair, HSG C
14.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0500	0.12		**Sheet Flow, sheet flow** Woods: Light underbrush n= 0.400 P2= 3.77"
2.2	300	0.1100	2.32		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
3.0	180	0.0200	0.99		**Shallow Concentrated Flow, shallow conc** Short Grass Pasture Kv= 7.0 fps
18.9	580	Total			

Subcatchment R9s: Closure by removal area channel Subcat



Summary for Reach AR1: Access Road Channel

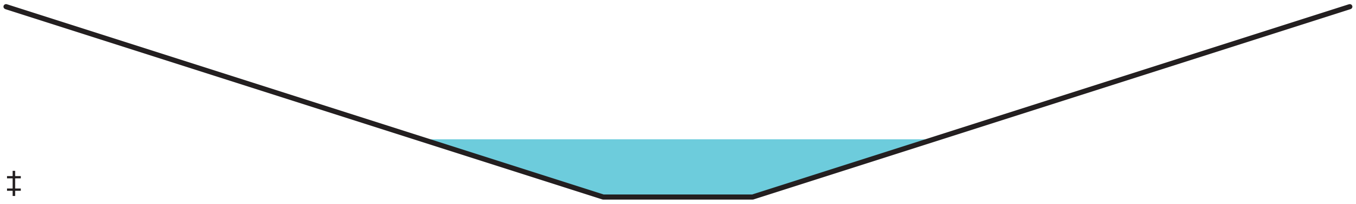
Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =         2.100 ac,    0.00% Impervious,  Inflow Depth =   4.69"    for  100-year 24-hour event
Inflow      =        11.95 cfs @   12.10 hrs,  Volume=            0.821 af
Outflow     =        11.87 cfs @   12.11 hrs,  Volume=            0.821 af,  Atten= 1%,  Lag= 0.7 min
```

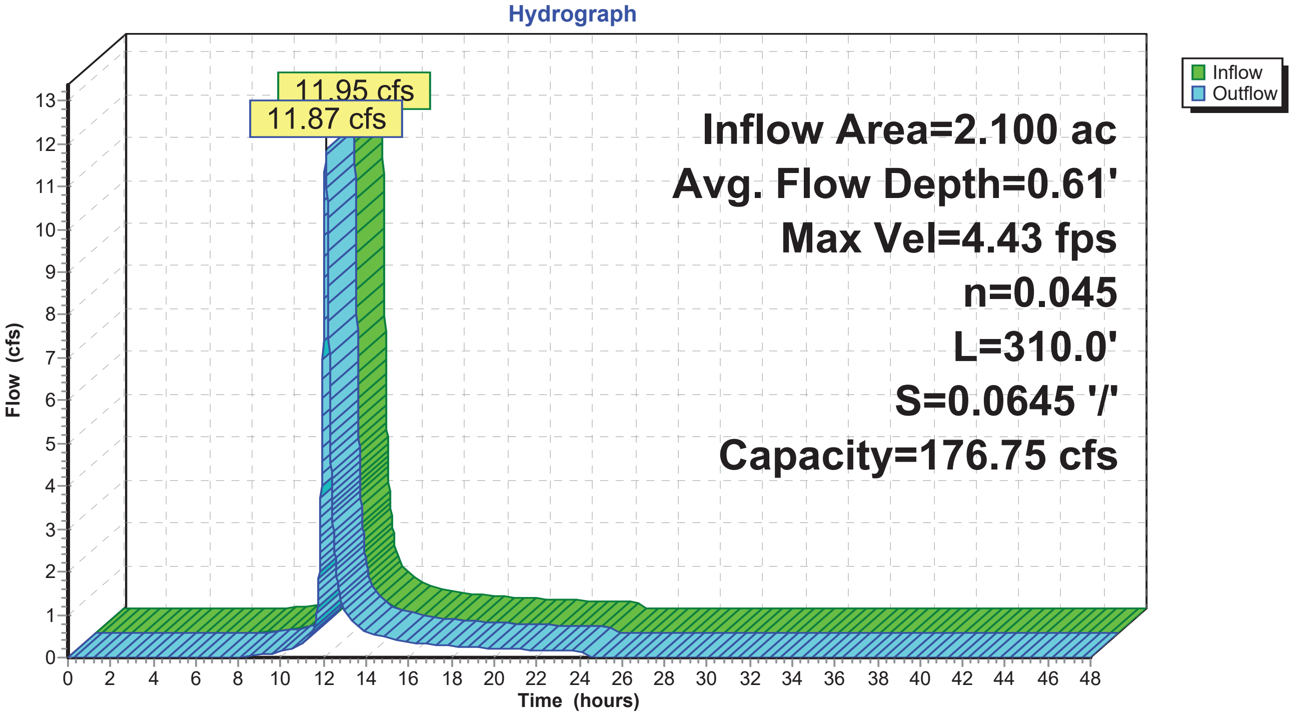
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.43 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.44 fps, Avg. Travel Time= 3.6 min

Peak Storage= 831 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.61'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 176.75 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 310.0' Slope= 0.0645 '/'
Inlet Invert= 496.00', Outlet Invert= 476.00'



Reach AR1: Access Road Channel



Summary for Reach AR2: Access Road Channel

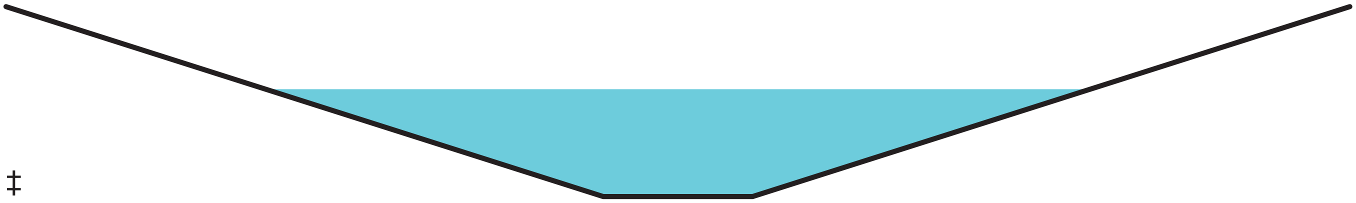
Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =         2.850 ac,    0.00% Impervious,  Inflow Depth =   5.63"    for  100-year 24-hour event
Inflow      =        28.11 cfs @   11.96 hrs,  Volume=            1.337 af
Outflow     =        26.81 cfs @   11.99 hrs,  Volume=            1.337 af,  Atten= 5%,  Lag= 1.3 min
```

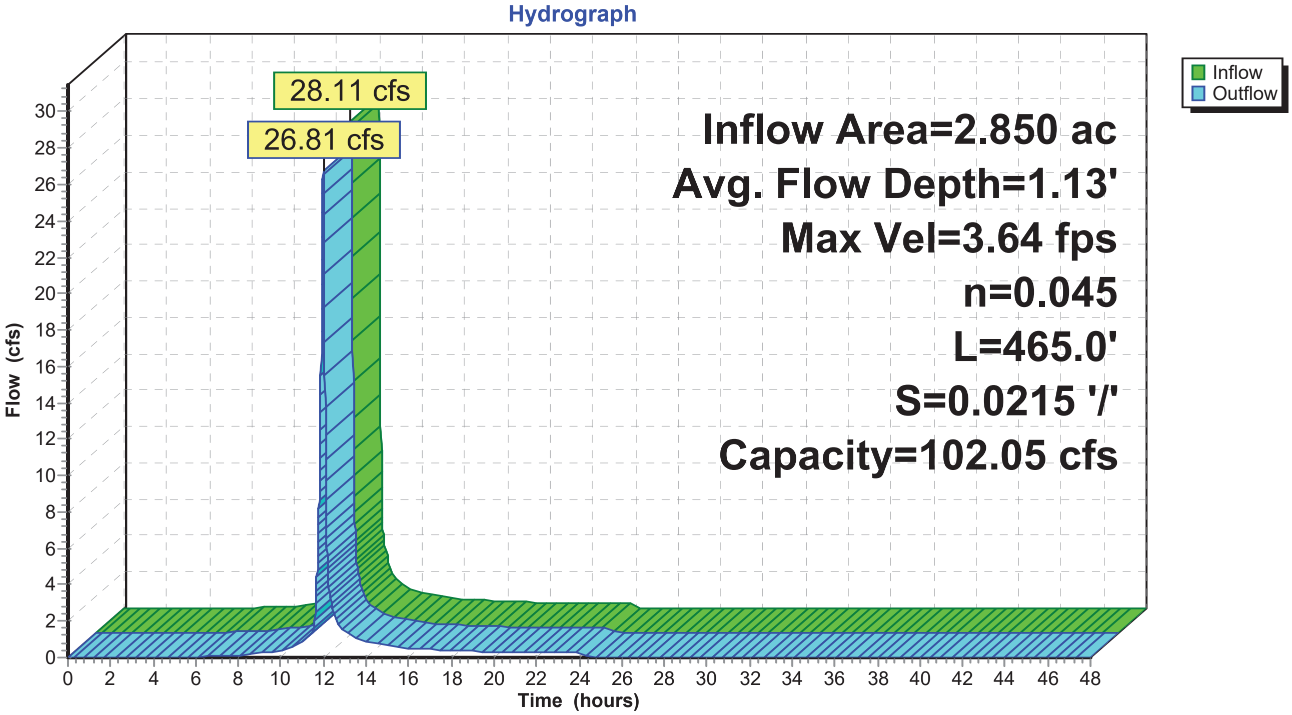
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.64 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.05 fps, Avg. Travel Time= 7.4 min

Peak Storage= 3,427 cf @ 11.99 hrs
Average Depth at Peak Storage= 1.13'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 102.05 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 465.0' Slope= 0.0215 '/'
Inlet Invert= 490.00', Outlet Invert= 480.00'



Reach AR2: Access Road Channel



Summary for Reach AR3: Access Road Channel

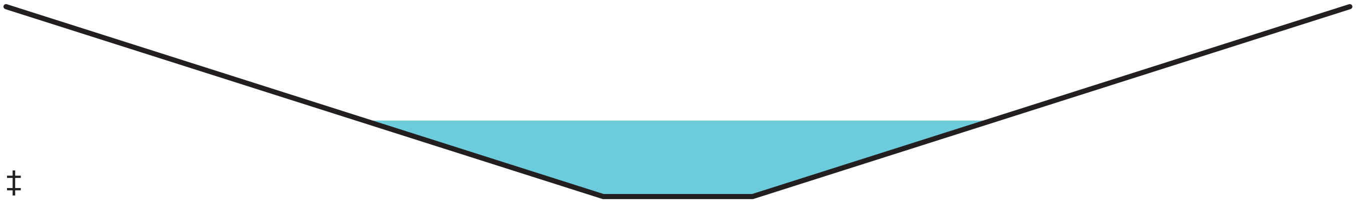
Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =         1.900 ac,    0.00% Impervious,  Inflow Depth =   5.63"    for  100-year 24-hour event
Inflow      =        18.42 cfs @   11.97 hrs,  Volume=            0.891 af
Outflow     =        18.20 cfs @   11.98 hrs,  Volume=            0.891 af,  Atten= 1%,  Lag= 0.7 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.37 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 3.4 min

Peak Storage= 1,082 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.80'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 149.50 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 260.0' Slope= 0.0462 '/'
Inlet Invert= 491.00', Outlet Invert= 479.00'



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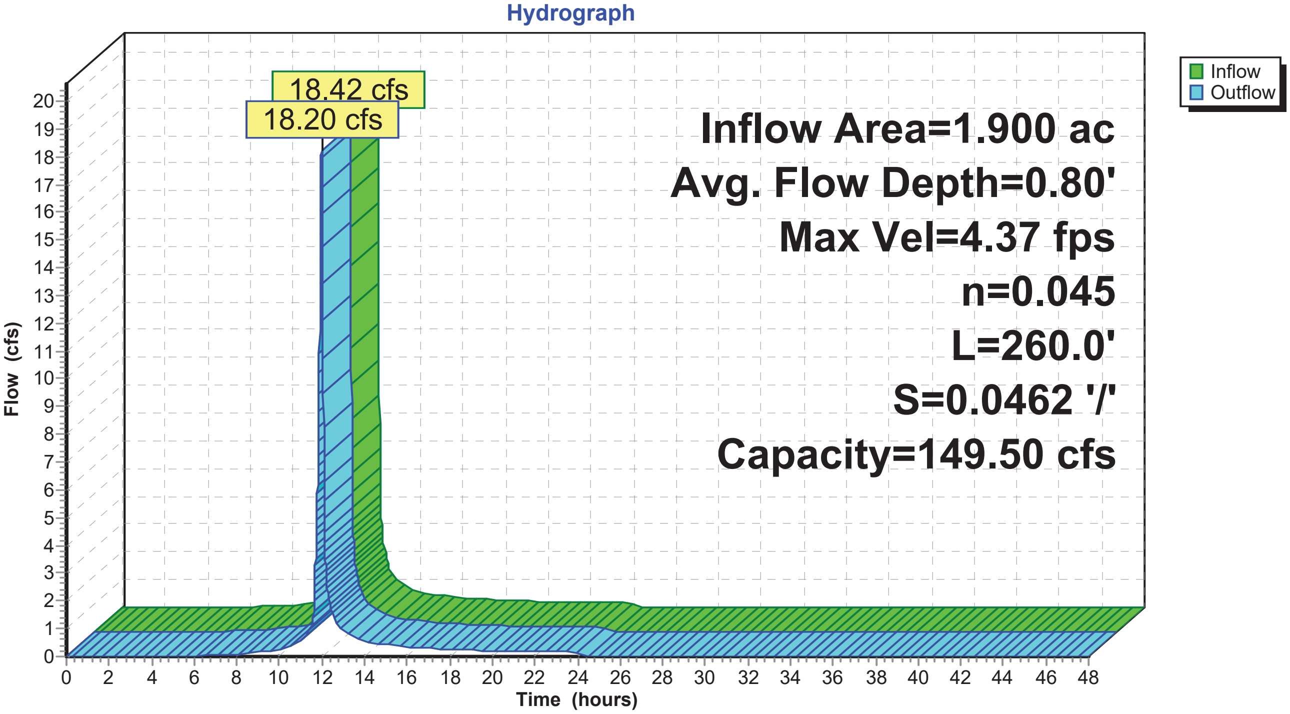
Reach AR3: Access Road Channel



Summary for Reach AR4: Access Road Channel

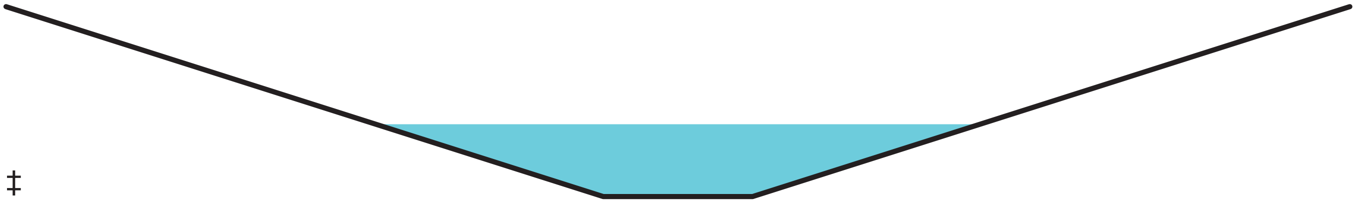
Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =         1.900 ac,    0.00% Impervious,  Inflow Depth =   5.63"    for  100-year 24-hour event
Inflow      =        18.20 cfs @   11.98 hrs,  Volume=            0.891 af
Outflow     =        18.03 cfs @   11.99 hrs,  Volume=            0.891 af,  Atten= 1%,  Lag= 0.6 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.69 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.35 fps, Avg. Travel Time= 3.1 min

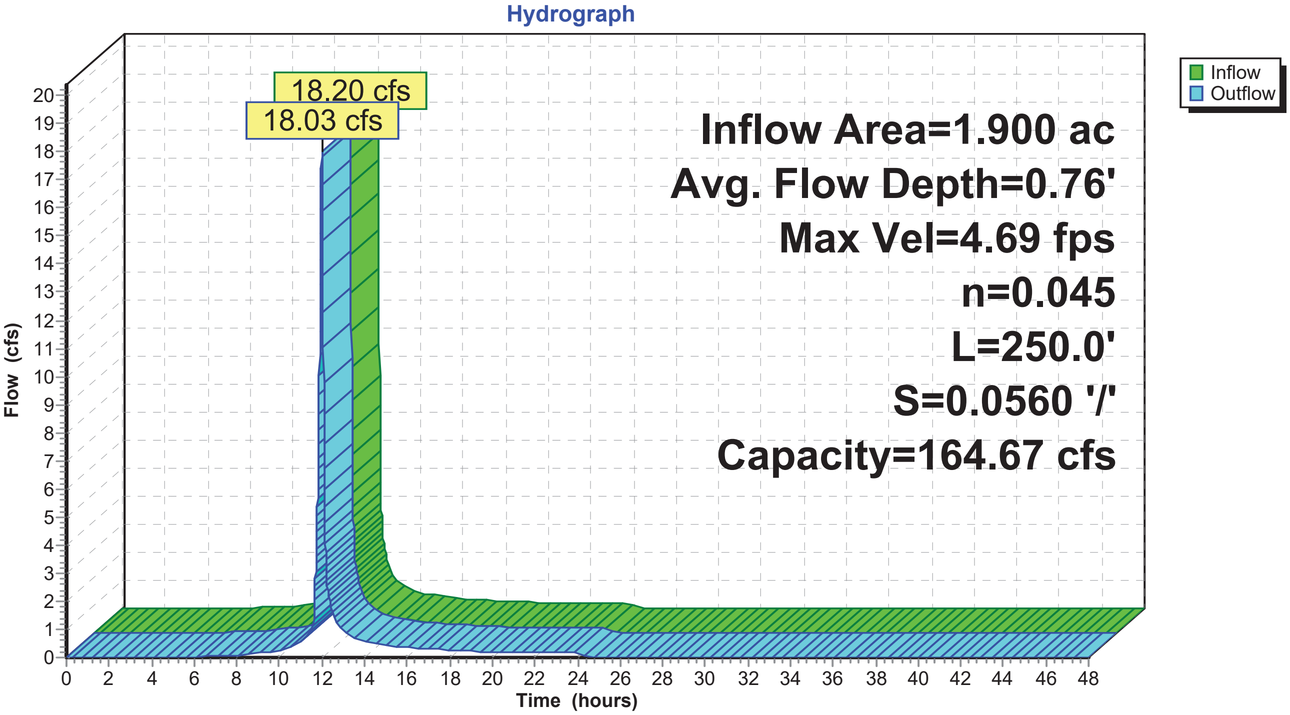
Peak Storage= 962 cf @ 11.99 hrs
Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 164.67 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 250.0' Slope= 0.0560 '/'
Inlet Invert= 469.00', Outlet Invert= 455.00'



‡

Reach AR4: Access Road Channel



Summary for Reach AR5: Access Road Channel

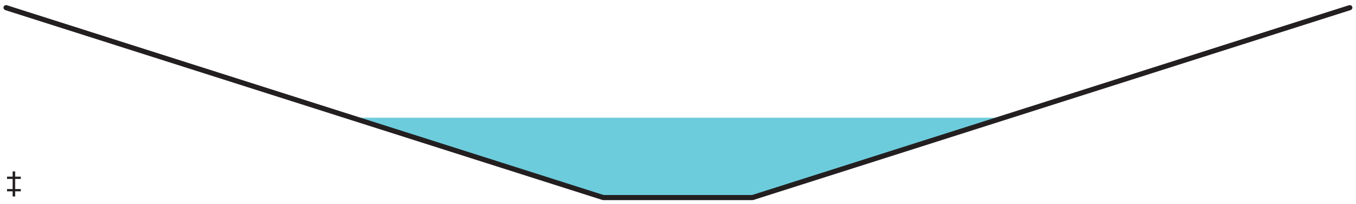
Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =         2.300 ac,    0.00% Impervious,  Inflow Depth =   5.63"    for  100-year 24-hour event
Inflow      =       21.99 cfs @   11.97 hrs,  Volume=            1.079 af
Outflow     =       21.08 cfs @   12.00 hrs,  Volume=            1.079 af,  Atten= 4%,  Lag= 1.3 min
```

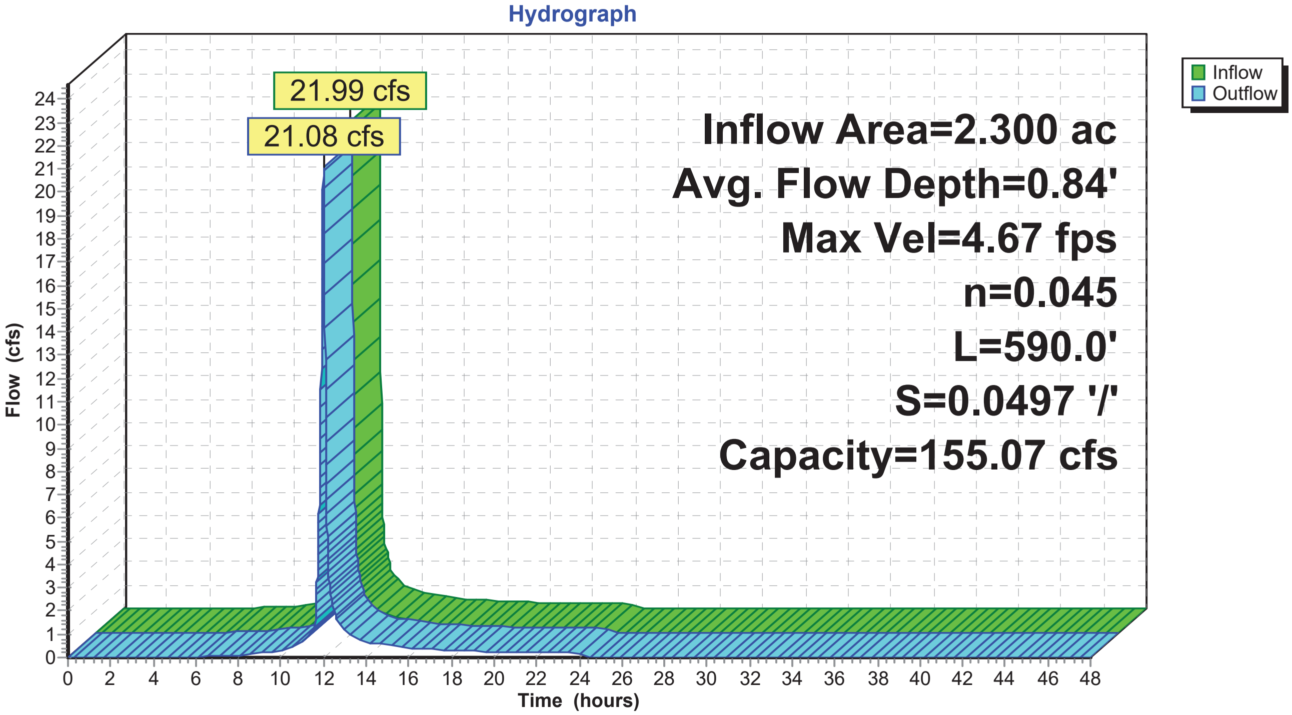
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.67 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.34 fps, Avg. Travel Time= 7.4 min

Peak Storage= 2,664 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.84'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 155.07 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 18.00'
Length= 590.0' Slope= 0.0497 '/'
Inlet Invert= 482.00', Outlet Invert= 452.70'



Reach AR5: Access Road Channel



Summary for Reach B0: Main letdown leading to detention pond

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

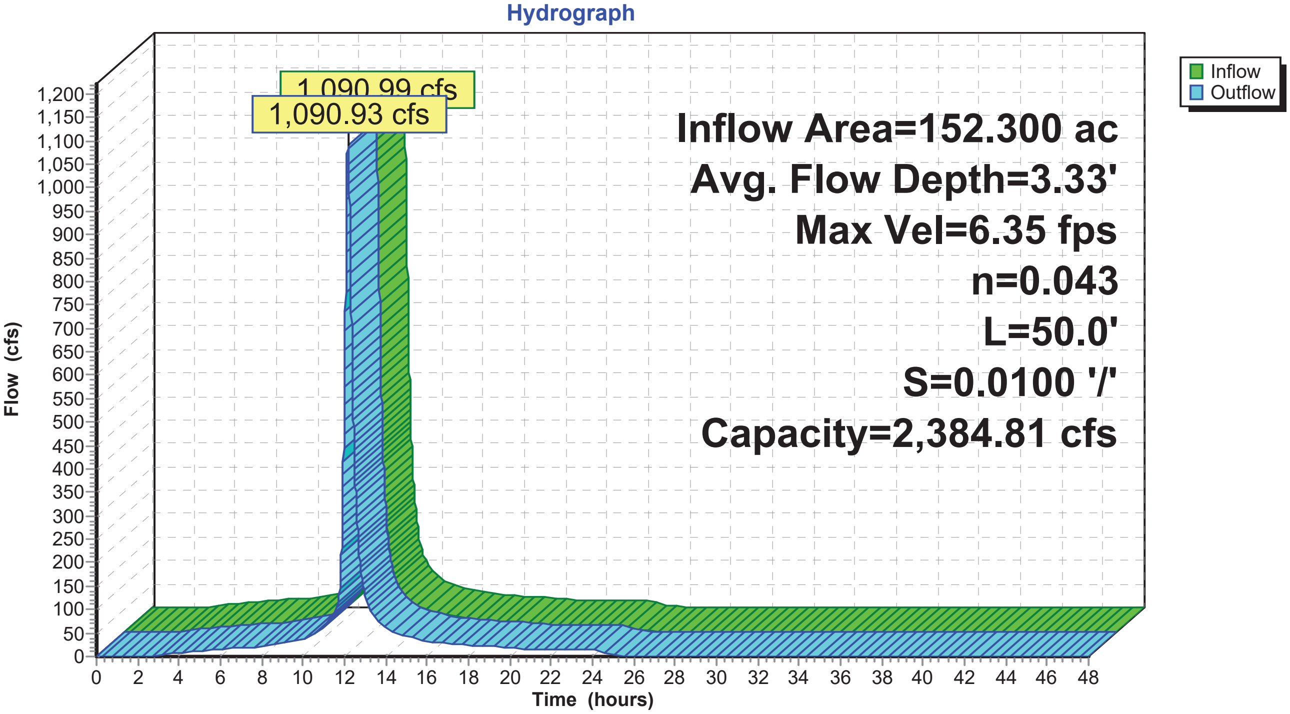
```
Inflow Area =      152.300 ac,   0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =   1,090.99 cfs @   12.17 hrs,  Volume=          95.579 af
Outflow      =   1,090.93 cfs @   12.17 hrs,  Volume=          95.579 af,  Atten= 0%,  Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 6.35 fps,  Min. Travel Time= 0.1 min
Avg. Velocity = 1.24 fps,  Avg. Travel Time= 0.7 min

Peak Storage= 8,587 cf @ 12.17 hrs
Average Depth at Peak Storage= 3.33'
Bank-Full Depth= 5.00'  Flow Area= 300.0 sf,  Capacity= 2,384.81 cfs

35.00'  x  5.00'  deep channel,  n= 0.043
Side Slope Z-value= 5.0 '/'   Top Width= 85.00'
Length= 50.0'   Slope= 0.0100 '/'
Inlet Invert= 457.90',  Outlet Invert= 457.40'
```

Reach B0: Main letdown leading to detention pond



Summary for Reach B1: Main letdown leading to detention pond

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

```
[61] Hint: Exceeded Reach B0 outlet invert by 2.67' @ 12.18 hrs

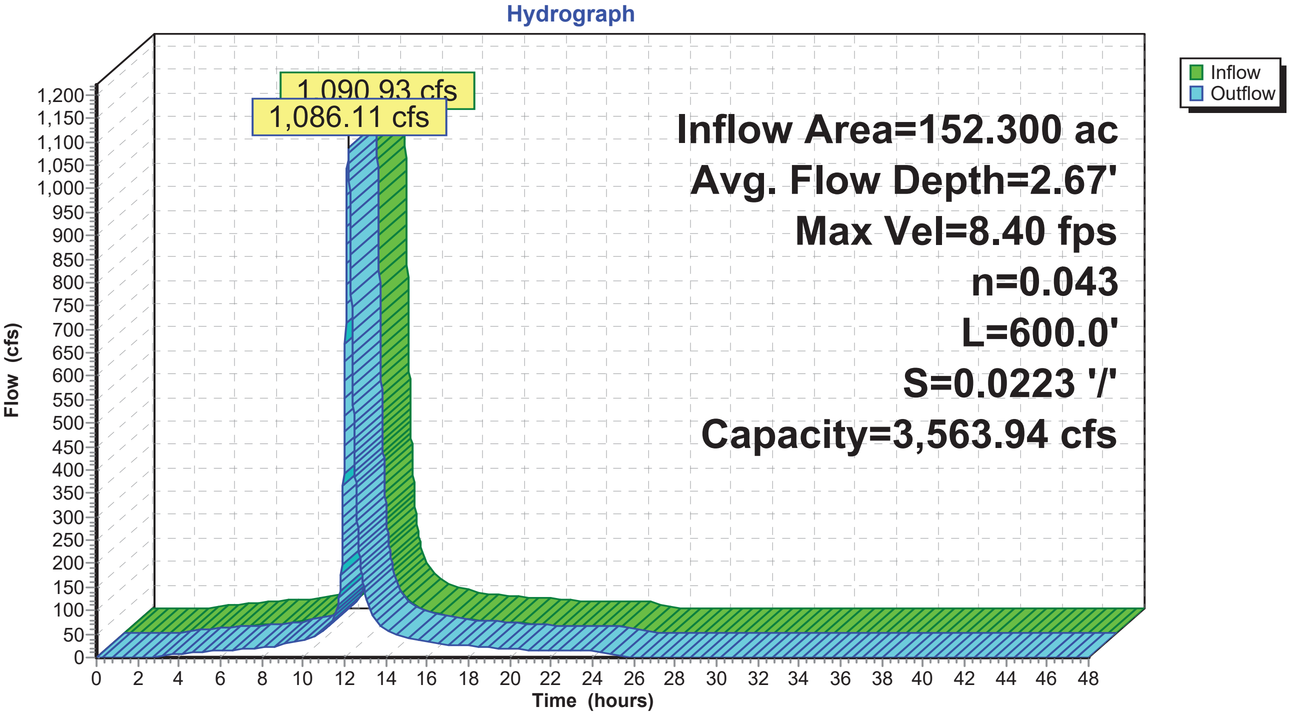
Inflow Area =      152.300 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =   1,090.93 cfs @   12.17 hrs,  Volume=          95.579 af
Outflow      =   1,086.11 cfs @   12.18 hrs,  Volume=          95.579 af,  Atten= 0%,  Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 8.40 fps,  Min. Travel Time= 1.2 min
Avg. Velocity = 1.65 fps,  Avg. Travel Time= 6.0 min

Peak Storage= 77,536 cf @ 12.18 hrs
Average Depth at Peak Storage= 2.67'
Bank-Full Depth= 5.00'  Flow Area= 300.0 sf,  Capacity= 3,563.94 cfs

35.00'  x  5.00'  deep channel,  n= 0.043
Side Slope Z-value= 5.0 '/'   Top Width= 85.00'
Length= 600.0'   Slope= 0.0223 '/'
Inlet Invert= 457.40',  Outlet Invert= 444.00'
```

Reach B1: Main letdown leading to detention pond



Summary for Reach B3: Channel to Berry Creek (shallow slope)

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

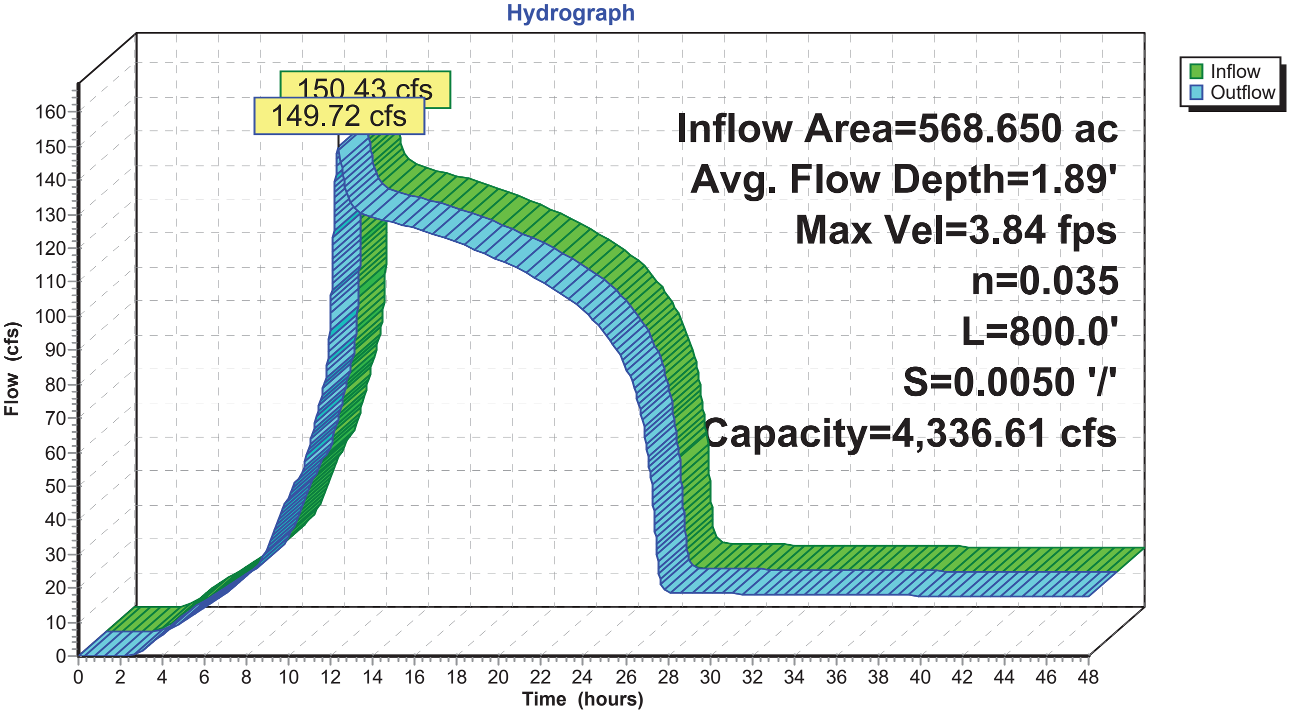
```
Inflow Area =      568.650 ac,    0.00% Impervious,  Inflow Depth >   4.13"    for  100-year 24-hour event
Inflow      =      150.43 cfs @   12.30 hrs,  Volume=         195.572 af
Outflow     =      149.72 cfs @   12.35 hrs,  Volume=         195.403 af,  Atten= 0%,  Lag= 2.9 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.84 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 2.43 fps, Avg. Travel Time= 5.5 min

Peak Storage= 31,178 cf @ 12.35 hrs
Average Depth at Peak Storage= 1.89'
Bank-Full Depth= 10.00' Flow Area= 450.0 sf, Capacity= 4,336.61 cfs

15.00' x 10.00' deep channel, n= 0.035
Side Slope Z-value= 3.0 '/' Top Width= 75.00'
Length= 800.0' Slope= 0.0050 '/'
Inlet Invert= 430.50', Outlet Invert= 426.50'

Reach B3: Channel to Berry Creek (shallow slope)



Summary for Reach B4: Channel to Berry Creek (steep slope)

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[61] Hint: Exceeded Reach B3 outlet invert by 1.23' @ 12.23 hrs

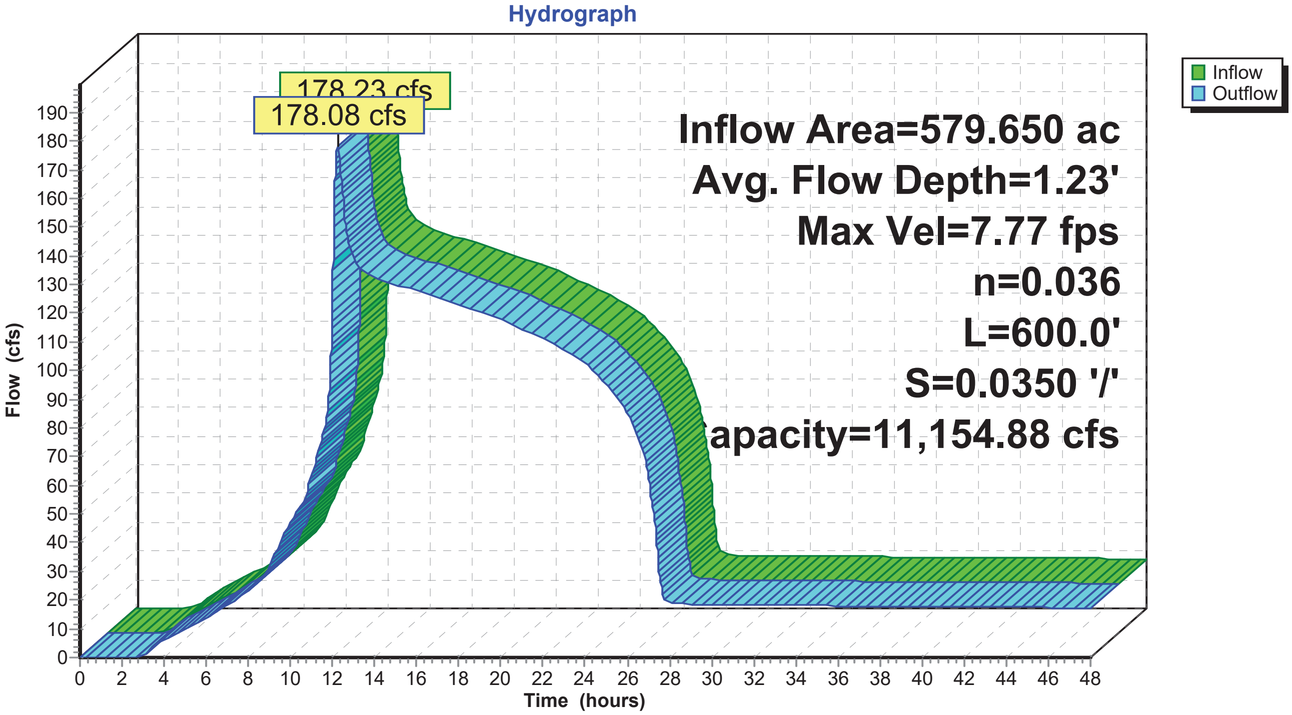
Inflow Area =       579.650 ac,    0.00% Impervious,  Inflow Depth >   4.12"    for  100-year 24-hour event
Inflow       =      178.23 cfs @   12.21 hrs,  Volume=         199.025 af
Outflow      =      178.08 cfs @   12.23 hrs,  Volume=         198.956 af,  Atten= 0%,  Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 7.77 fps,  Min. Travel Time= 1.3 min
Avg. Velocity = 4.58 fps,  Avg. Travel Time= 2.2 min

Peak Storage= 13,760 cf @ 12.23 hrs
Average Depth at Peak Storage= 1.23'
Bank-Full Depth= 10.00'  Flow Area= 450.0 sf,  Capacity= 11,154.88 cfs

15.00'  x  10.00'  deep channel,  n= 0.036
Side Slope Z-value= 3.0 '/'   Top Width= 75.00'
Length= 600.0'   Slope= 0.0350 '/'
Inlet Invert= 426.50',  Outlet Invert= 405.50'
```

Reach B4: Channel to Berry Creek (steep slope)



Summary for Reach B5: Channel to Berry Creek (downstream of steep slope)

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach B4 OUTLET depth by 0.51' @ 12.26 hrs

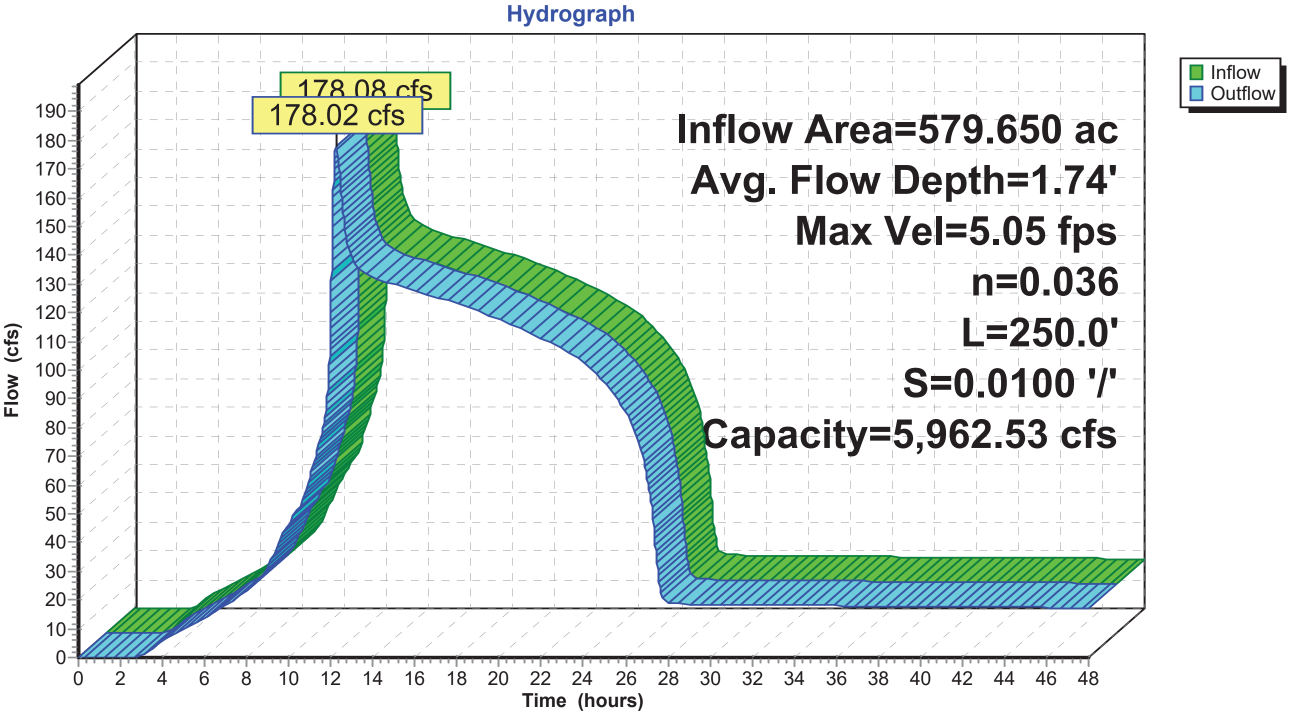
Inflow Area =      579.650 ac,    0.00% Impervious,  Inflow Depth >   4.12"    for  100-year 24-hour event
Inflow       =      178.08 cfs @   12.23 hrs,  Volume=         198.956 af
Outflow      =      178.02 cfs @   12.24 hrs,  Volume=         198.914 af,  Atten= 0%,  Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 5.05 fps,  Min. Travel Time= 0.8 min
Avg. Velocity = 3.03 fps,  Avg. Travel Time= 1.4 min

Peak Storage= 8,806 cf @ 12.24 hrs
Average Depth at Peak Storage= 1.74'
Bank-Full Depth= 10.00'  Flow Area= 450.0 sf,  Capacity= 5,962.53 cfs

15.00'  x  10.00'  deep channel,  n= 0.036
Side Slope Z-value= 3.0 '/'   Top Width= 75.00'
Length= 250.0'   Slope= 0.0100 '/'
Inlet Invert= 405.50',  Outlet Invert= 403.00'
```

Reach B5: Channel to Berry Creek (downstream of steep slope)



Summary for Reach CE1: East Letdown Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

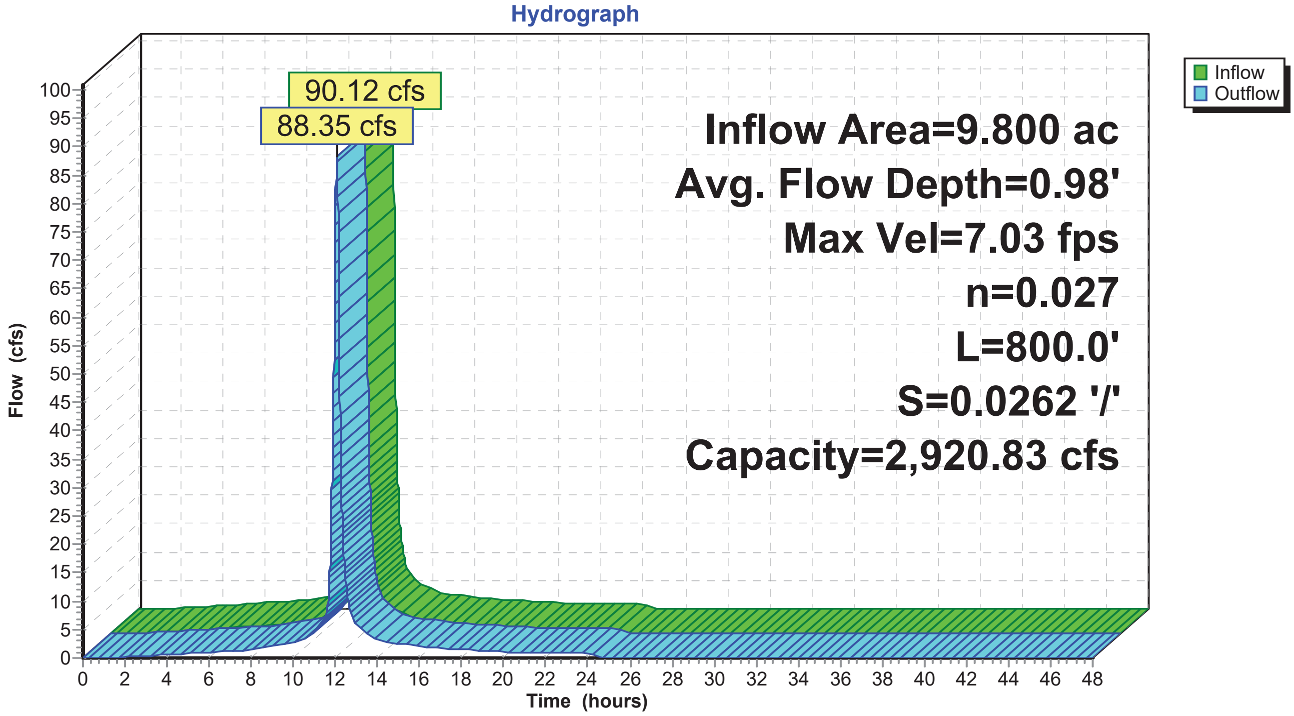
```
Inflow Area =         9.800 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =       90.12 cfs @   12.04 hrs,  Volume=            6.150 af
Outflow      =       88.35 cfs @   12.06 hrs,  Volume=            6.150 af,  Atten= 2%,  Lag= 1.3 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 7.03 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.94 fps, Avg. Travel Time= 6.9 min

Peak Storage= 10,051 cf @ 12.06 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 5.00' Flow Area= 165.0 sf, Capacity= 2,920.83 cfs

8.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 58.00'
Length= 800.0' Slope= 0.0262 '/'
Inlet Invert= 504.00', Outlet Invert= 483.00'

Reach CE1: East Letdown Channel



Summary for Reach CE2: East Letdown Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

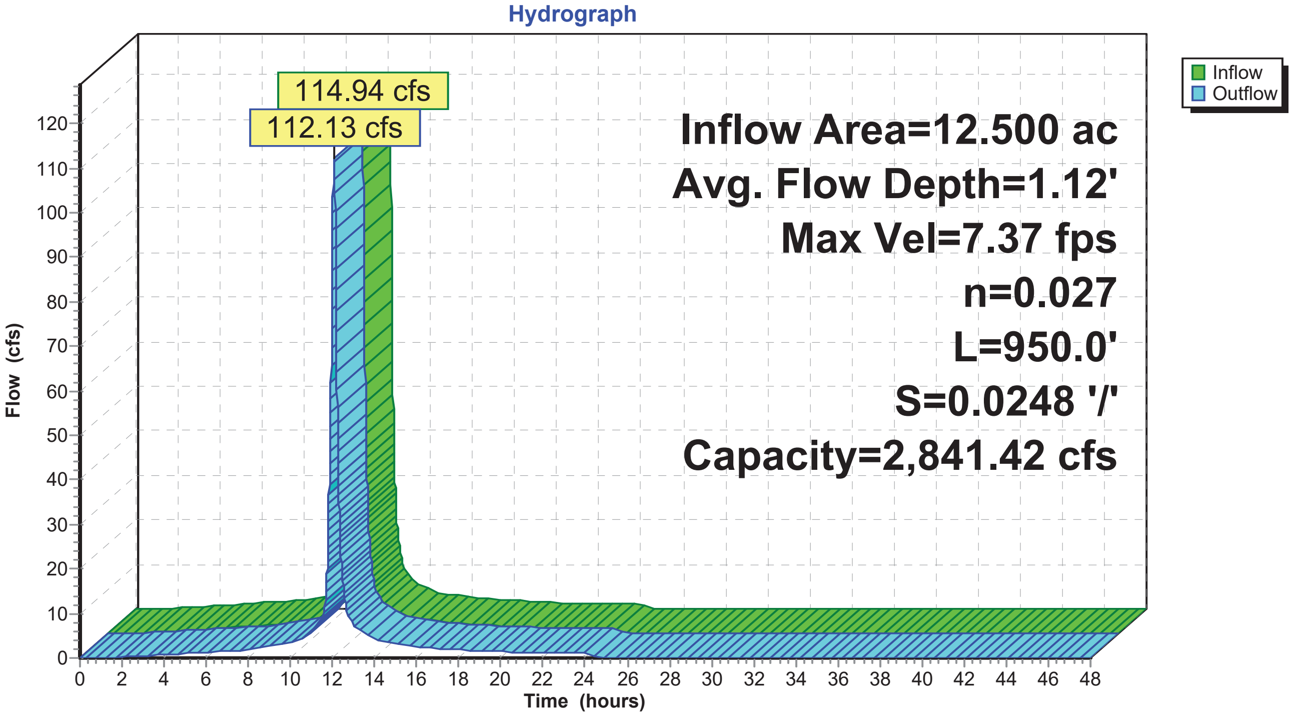
```
Inflow Area =        12.500 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      114.94 cfs @   12.04 hrs,  Volume=            7.845 af
Outflow      =      112.13 cfs @   12.07 hrs,  Volume=            7.845 af,  Atten= 2%,  Lag= 1.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 7.37 fps,  Min. Travel Time= 2.1 min
Avg. Velocity = 2.04 fps,  Avg. Travel Time= 7.8 min

Peak Storage= 14,446 cf @ 12.07 hrs
Average Depth at Peak Storage= 1.12'
Bank-Full Depth= 5.00'  Flow Area= 165.0 sf,  Capacity= 2,841.42 cfs

8.00'  x  5.00'  deep channel,  n= 0.027
Side Slope Z-value= 5.0 '/'   Top Width= 58.00'
Length= 950.0'   Slope= 0.0248 '/'
Inlet Invert= 504.00',  Outlet Invert= 480.40'
```

Reach CE2: East Letdown Channel



Summary for Reach CE3: East Letdown Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

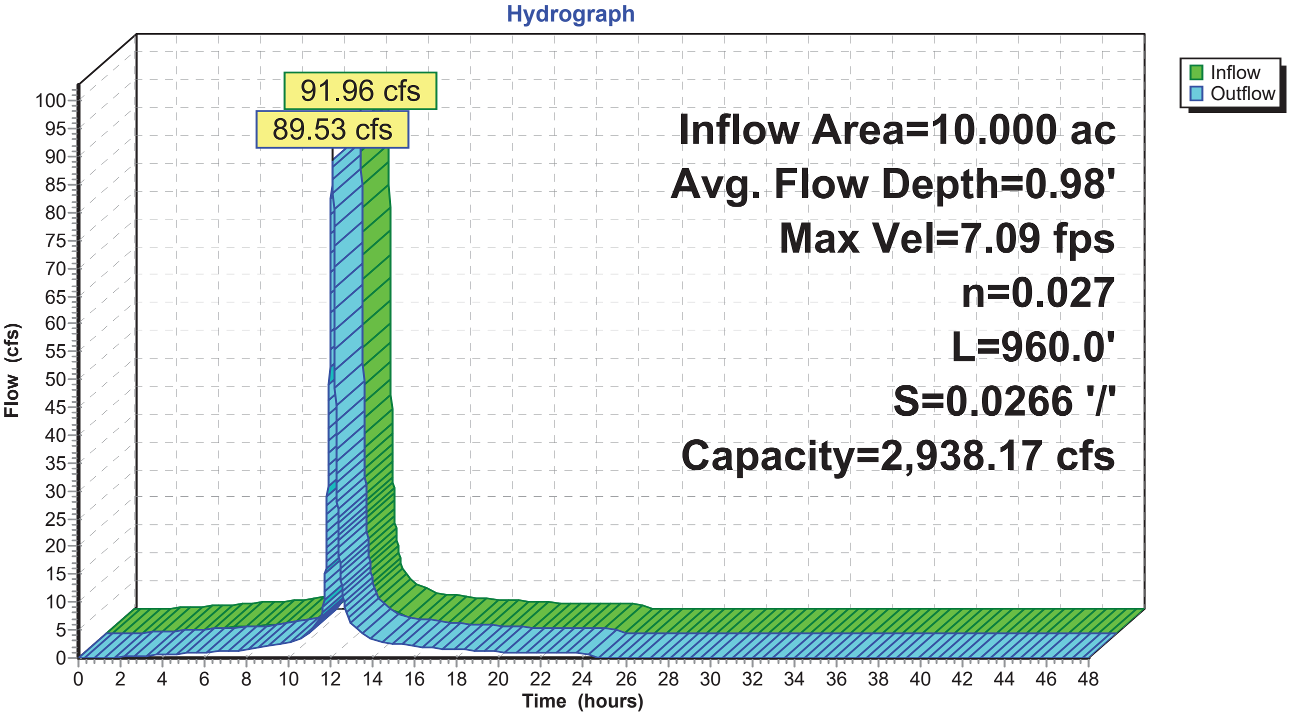
```
Inflow Area =        10.000 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =        91.96 cfs @   12.04 hrs,  Volume=             6.276 af
Outflow      =        89.53 cfs @   12.07 hrs,  Volume=             6.276 af,  Atten= 3%,  Lag= 1.5 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 7.09 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.95 fps, Avg. Travel Time= 8.2 min

Peak Storage= 12,125 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 5.00' Flow Area= 165.0 sf, Capacity= 2,938.17 cfs

8.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 58.00'
Length= 960.0' Slope= 0.0266 '/'
Inlet Invert= 504.00', Outlet Invert= 478.50'

Reach CE3: East Letdown Channel



Summary for Reach CE4: East Letdown Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

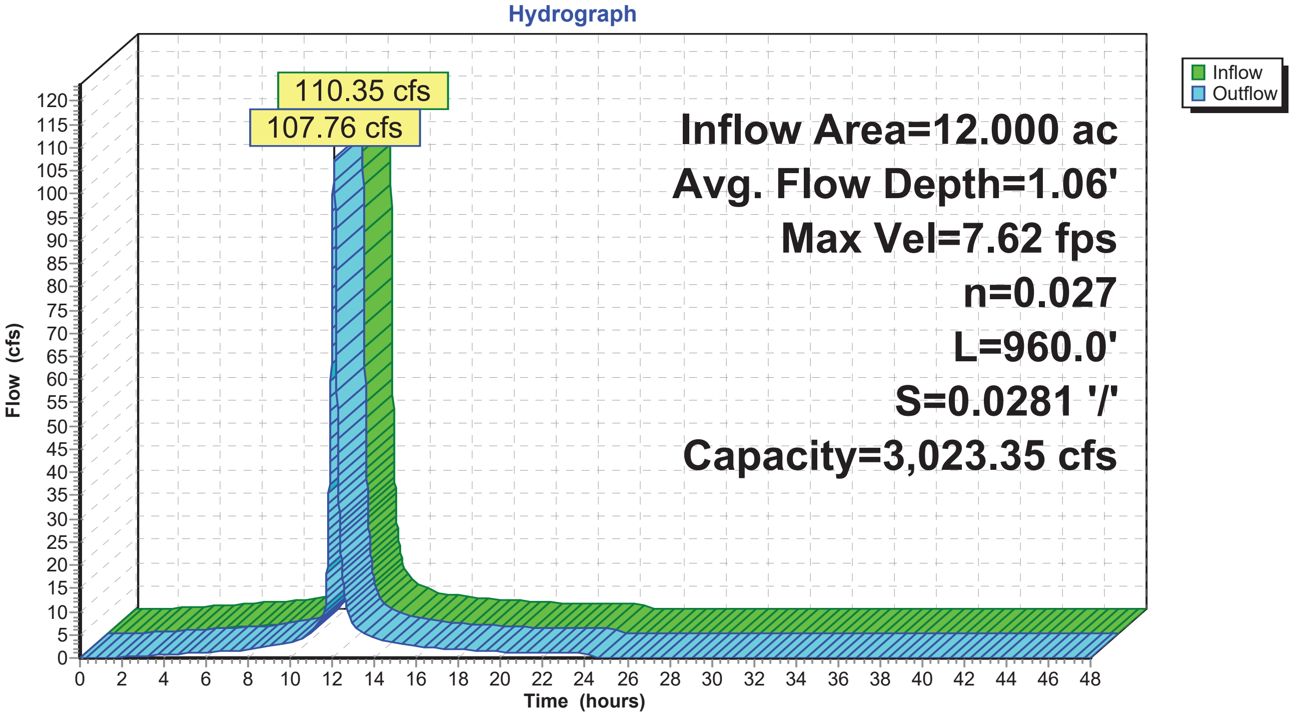
```
Inflow Area =        12.000 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      110.35 cfs @   12.04 hrs,  Volume=            7.531 af
Outflow      =      107.76 cfs @   12.07 hrs,  Volume=            7.531 af,  Atten= 2%,  Lag= 1.5 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 7.62 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 2.10 fps, Avg. Travel Time= 7.6 min

Peak Storage= 13,568 cf @ 12.07 hrs
Average Depth at Peak Storage= 1.06'
Bank-Full Depth= 5.00' Flow Area= 165.0 sf, Capacity= 3,023.35 cfs

8.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 58.00'
Length= 960.0' Slope= 0.0281 '/'
Inlet Invert= 504.00', Outlet Invert= 477.00'

Reach CE4: East Letdown Channel



Summary for Reach CE5: East Letdown Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

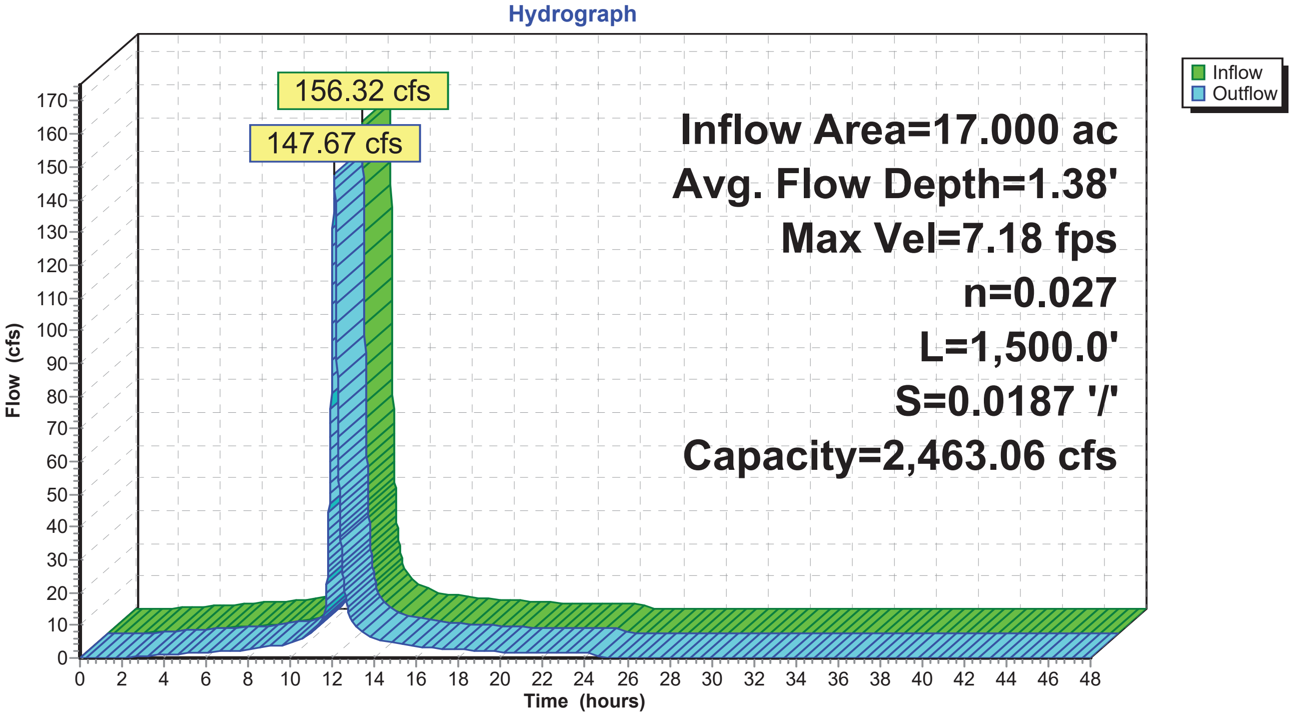
```
Inflow Area =        17.000 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow      =      156.32 cfs @   12.04 hrs,  Volume=          10.669 af
Outflow     =      147.67 cfs @   12.08 hrs,  Volume=          10.669 af,  Atten= 6%,  Lag= 2.3 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 7.18 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 1.98 fps, Avg. Travel Time= 12.6 min

Peak Storage= 30,869 cf @ 12.08 hrs
Average Depth at Peak Storage= 1.38'
Bank-Full Depth= 5.00' Flow Area= 165.0 sf, Capacity= 2,463.06 cfs

8.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 58.00'
Length= 1,500.0' Slope= 0.0187 '/'
Inlet Invert= 501.00', Outlet Invert= 473.00'

Reach CE5: East Letdown Channel



Summary for Reach CW17: Western Letdown Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

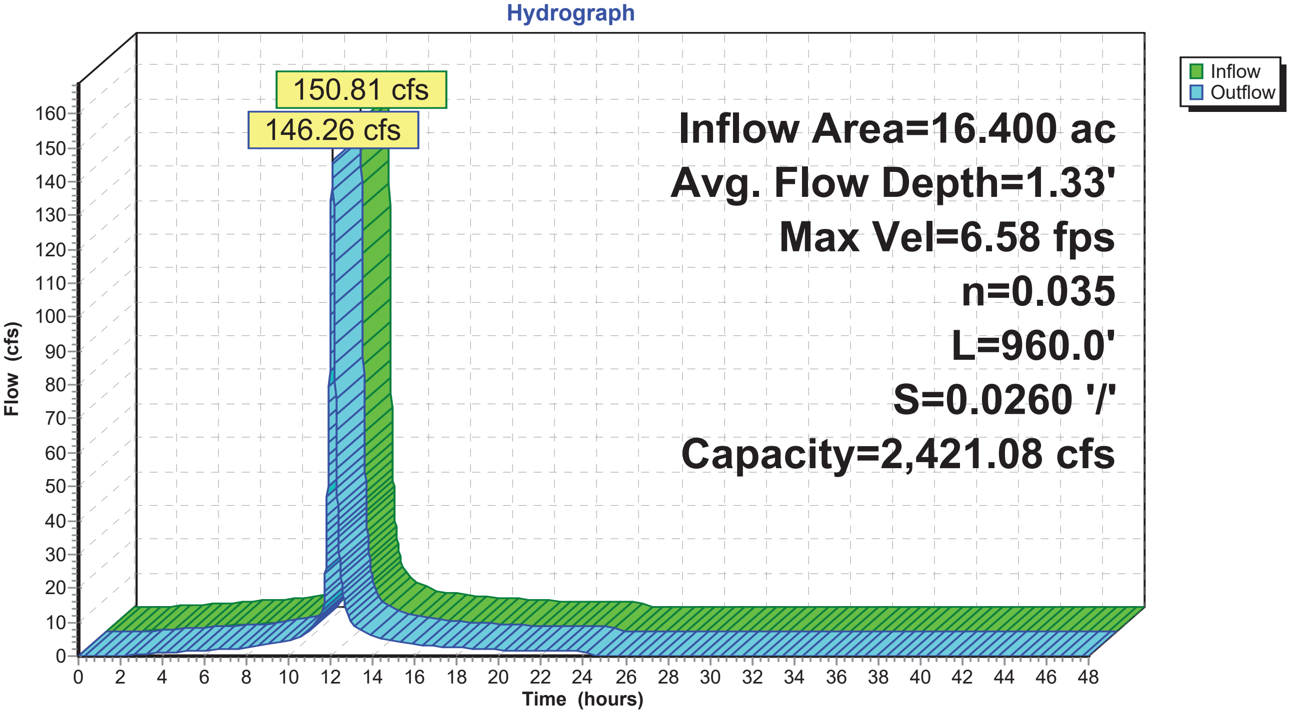
```
Inflow Area =        16.400 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      150.81 cfs @   12.04 hrs,  Volume=           10.292 af
Outflow      =      146.26 cfs @   12.07 hrs,  Volume=           10.292 af,  Atten= 3%,  Lag= 1.7 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 6.58 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 9.1 min

Peak Storage= 21,329 cf @ 12.07 hrs
Average Depth at Peak Storage= 1.33'
Bank-Full Depth= 5.00' Flow Area= 175.0 sf, Capacity= 2,421.08 cfs

10.00' x 5.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 60.00'
Length= 960.0' Slope= 0.0260 '/'
Inlet Invert= 501.00', Outlet Invert= 476.00'

Reach CW17: Western Letdown Channel



Summary for Reach CW18: West letdown channel turn

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

---

[62] Hint: Exceeded Reach CW17 OUTLET depth by 0.69' @ 12.10 hrs

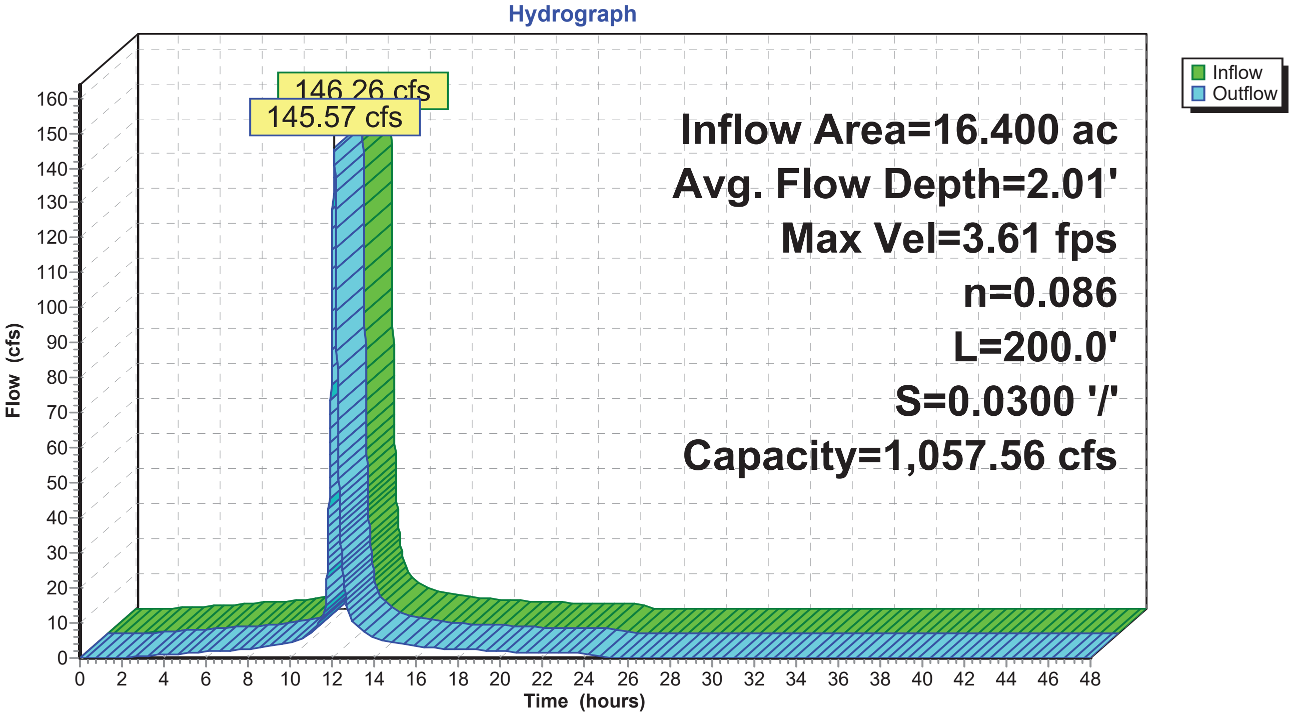
```
Inflow Area =        16.400 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      146.26 cfs @   12.07 hrs,  Volume=          10.292 af
Outflow      =      145.57 cfs @   12.08 hrs,  Volume=          10.292 af,  Atten= 0%,  Lag= 0.7 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.61 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 3.3 min

Peak Storage= 8,073 cf @ 12.08 hrs
Average Depth at Peak Storage= 2.01'
Bank-Full Depth= 5.00' Flow Area= 175.0 sf, Capacity= 1,057.56 cfs

10.00' x 5.00' deep channel, n= 0.086
Side Slope Z-value= 5.0 '/' Top Width= 60.00'
Length= 200.0' Slope= 0.0300 '/'
Inlet Invert= 476.00', Outlet Invert= 470.00'

Reach CW18: West letdown channel turn



Summary for Reach ESA: Emergency spillway channel

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

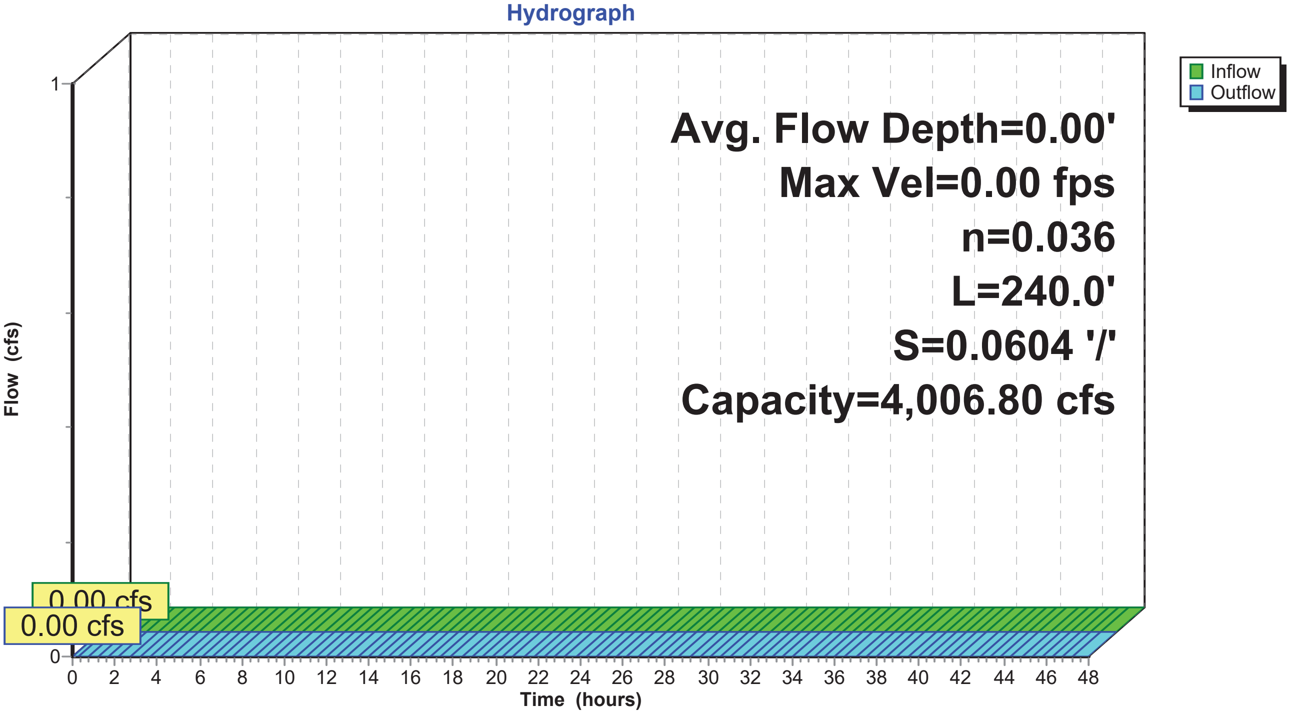
```
Inflow    =     0.00 cfs @    0.00 hrs,  Volume=          0.000 af
Outflow   =     0.00 cfs @    0.00 hrs,  Volume=          0.000 af,  Atten= 0%,  Lag= 0.0 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 5.00' Flow Area= 175.0 sf, Capacity= 4,006.80 cfs

20.00' x 5.00' deep channel, n= 0.036
Side Slope Z-value= 3.0 '/' Top Width= 50.00'
Length= 240.0' Slope= 0.0604 '/'
Inlet Invert= 449.50', Outlet Invert= 435.00'

Reach ESA: Emergency spillway channel



Summary for Reach ESB: Emergency spillway channel

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

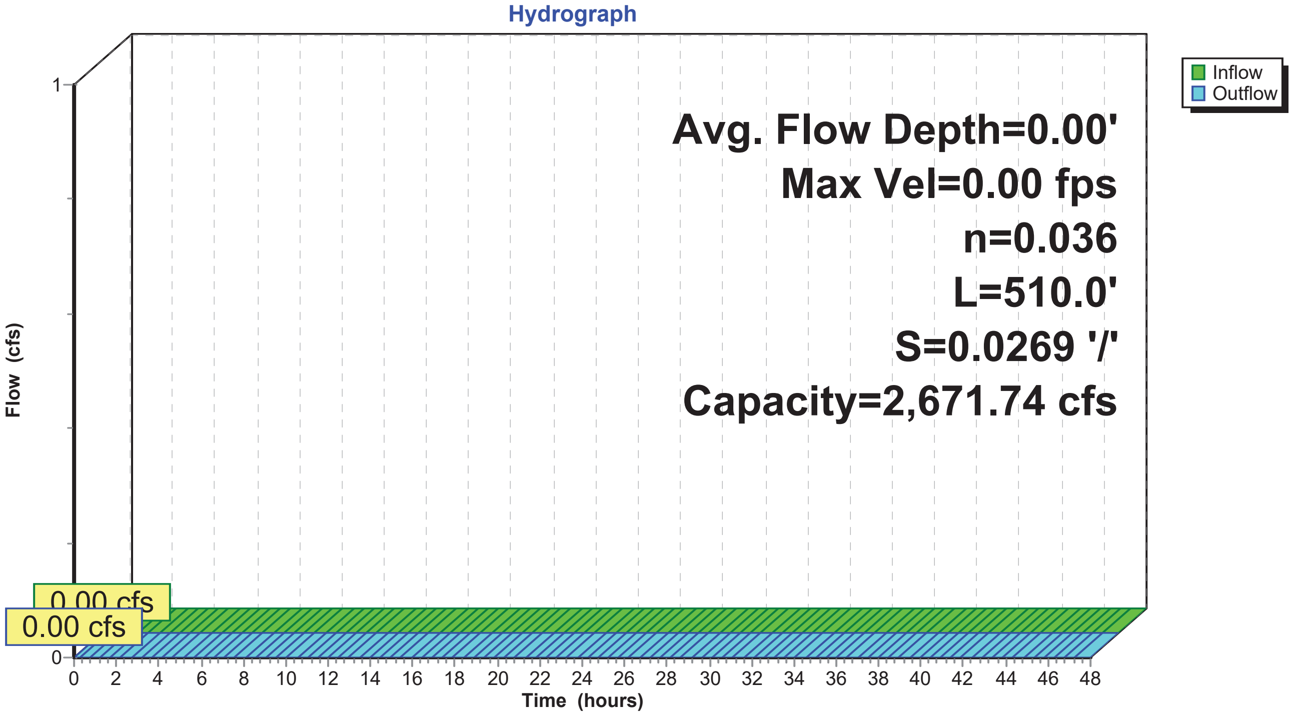
```
Inflow    =     0.00 cfs @   0.00 hrs,  Volume=        0.000 af
Outflow   =     0.00 cfs @   0.00 hrs,  Volume=        0.000 af,  Atten= 0%,  Lag= 0.0 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 5.00' Flow Area= 175.0 sf, Capacity= 2,671.74 cfs

20.00' x 5.00' deep channel, n= 0.036
Side Slope Z-value= 3.0 '/' Top Width= 50.00'
Length= 510.0' Slope= 0.0269 '/'
Inlet Invert= 462.50', Outlet Invert= 448.80'

Reach ESB: Emergency spillway channel



Summary for Reach ESC: Emergency spillway channel

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

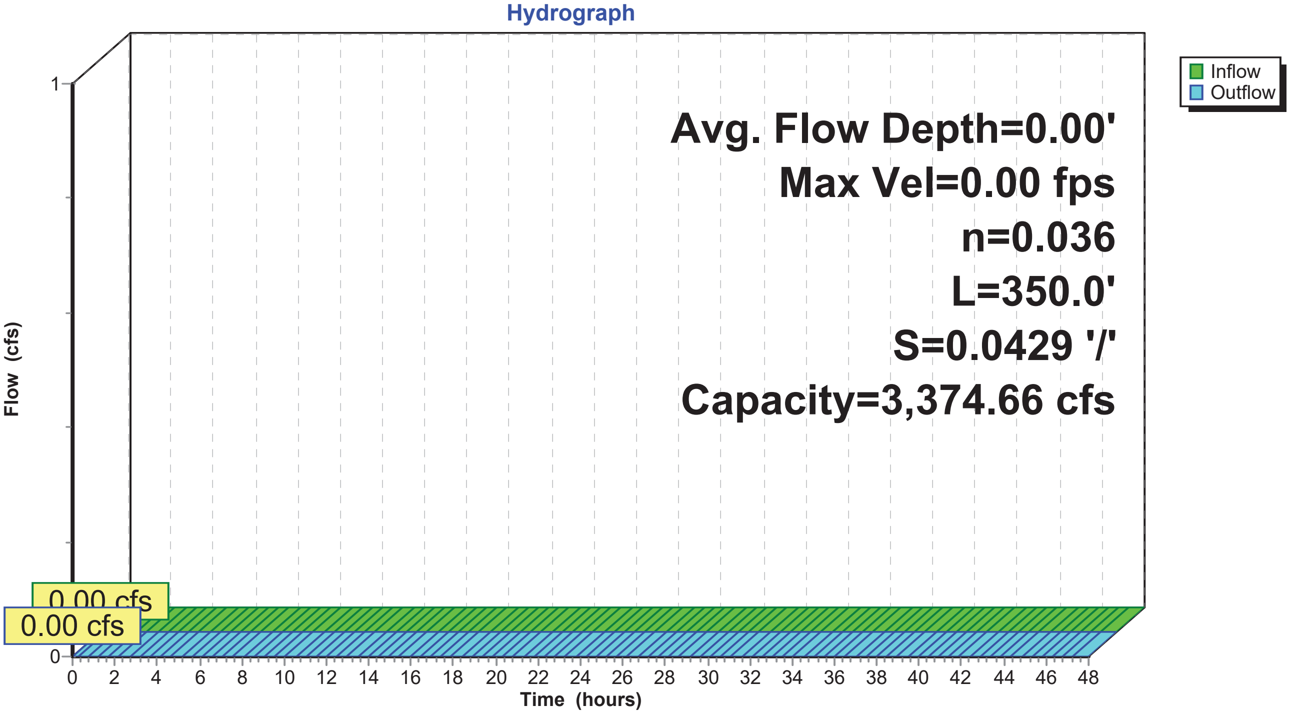
```
Inflow       =         0.00 cfs @     0.00 hrs,  Volume=             0.000 af
Outflow      =         0.00 cfs @     0.00 hrs,  Volume=             0.000 af,  Atten= 0%,  Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.00 fps,  Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps,  Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 5.00'  Flow Area= 175.0 sf,  Capacity= 3,374.66 cfs

20.00'  x  5.00'  deep channel,  n= 0.036
Side Slope Z-value= 3.0 '/'   Top Width= 50.00'
Length= 350.0'   Slope= 0.0429 '/'
Inlet Invert= 465.00',  Outlet Invert= 450.00'
```

Reach ESC: Emergency spillway channel



Summary for Reach KN1: Channel North of Knob Area

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

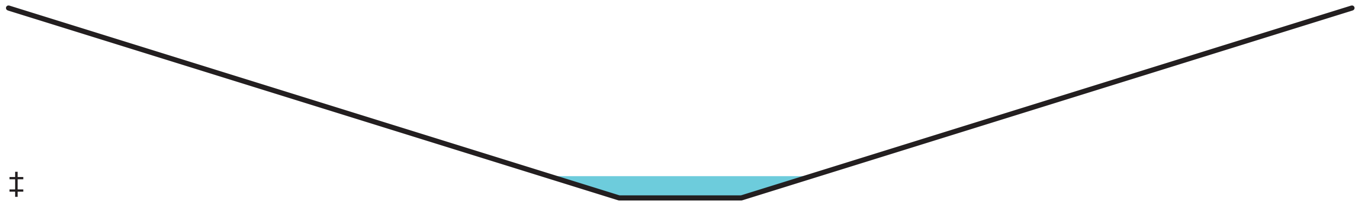
Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =         1.700 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =       22.03 cfs @   11.92 hrs,  Volume=           1.067 af
Outflow      =       18.85 cfs @   11.95 hrs,  Volume=           1.067 af,  Atten= 14%,  Lag= 1.8 min
```

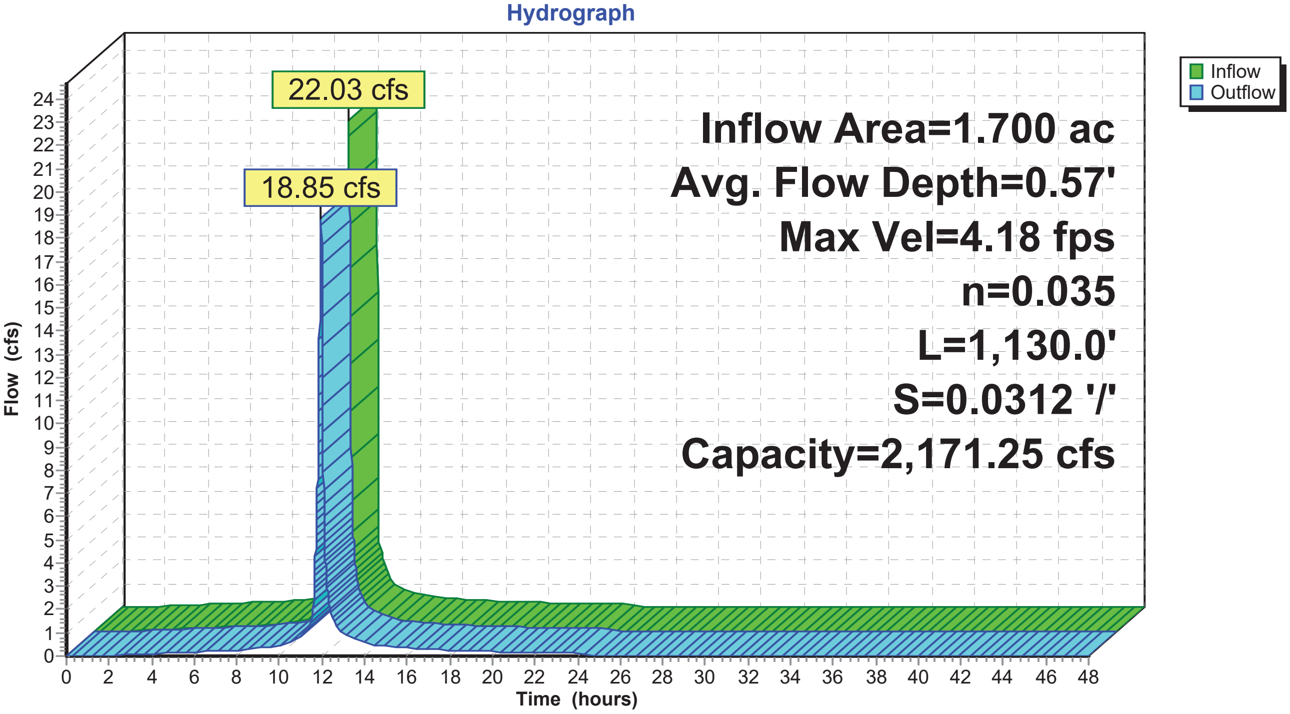
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.18 fps, Min. Travel Time= 4.5 min
Avg. Velocity = 1.16 fps, Avg. Travel Time= 16.2 min

Peak Storage= 5,092 cf @ 11.95 hrs
Average Depth at Peak Storage= 0.57'
Bank-Full Depth= 5.00' Flow Area= 150.0 sf, Capacity= 2,171.25 cfs

5.00' x 5.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 55.00'
Length= 1,130.0' Slope= 0.0312 '/'
Inlet Invert= 505.30', Outlet Invert= 470.00'



Reach KN1: Channel North of Knob Area



Summary for Reach OE1: Offsite East Channel

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

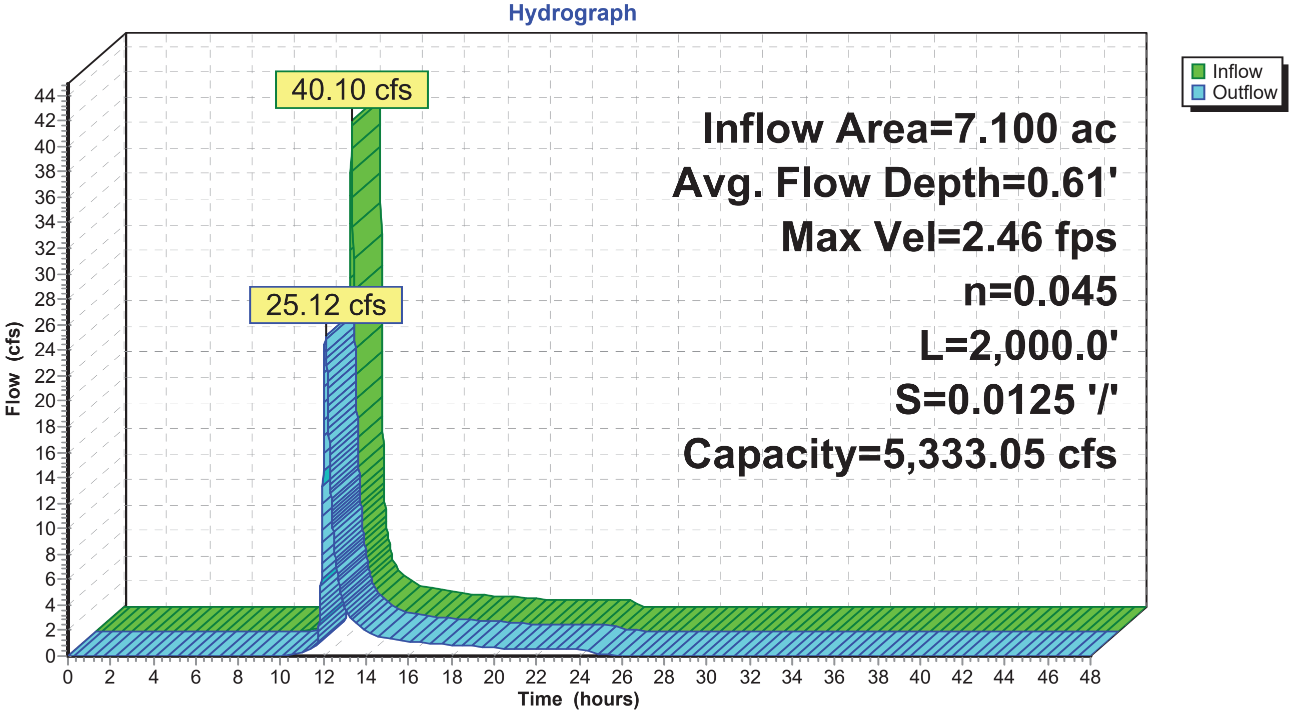
```
Inflow Area =         7.100 ac,    0.00% Impervious,  Inflow Depth =   3.54"    for  100-year 24-hour event
Inflow      =        40.10 cfs @   12.01 hrs,  Volume=            2.097 af
Outflow     =        25.12 cfs @   12.10 hrs,  Volume=            2.097 af,  Atten= 37%,  Lag= 5.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.46 fps,  Min. Travel Time= 13.6 min
Avg. Velocity = 0.86 fps,  Avg. Travel Time= 38.7 min

Peak Storage= 20,439 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.61'
Bank-Full Depth= 10.00'  Flow Area= 450.0 sf,  Capacity= 5,333.05 cfs

15.00'  x  10.00'  deep channel,  n= 0.045
Side Slope Z-value= 3.0 '/'   Top Width= 75.00'
Length= 2,000.0'   Slope= 0.0125 '/'
Inlet Invert= 490.00',  Outlet Invert= 465.00'
```

Reach OE1: Offsite East Channel



Summary for Reach OE2: Offsite East Channel

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[61] Hint: Exceeded Reach OE1 outlet invert by 0.37' @ 12.12 hrs

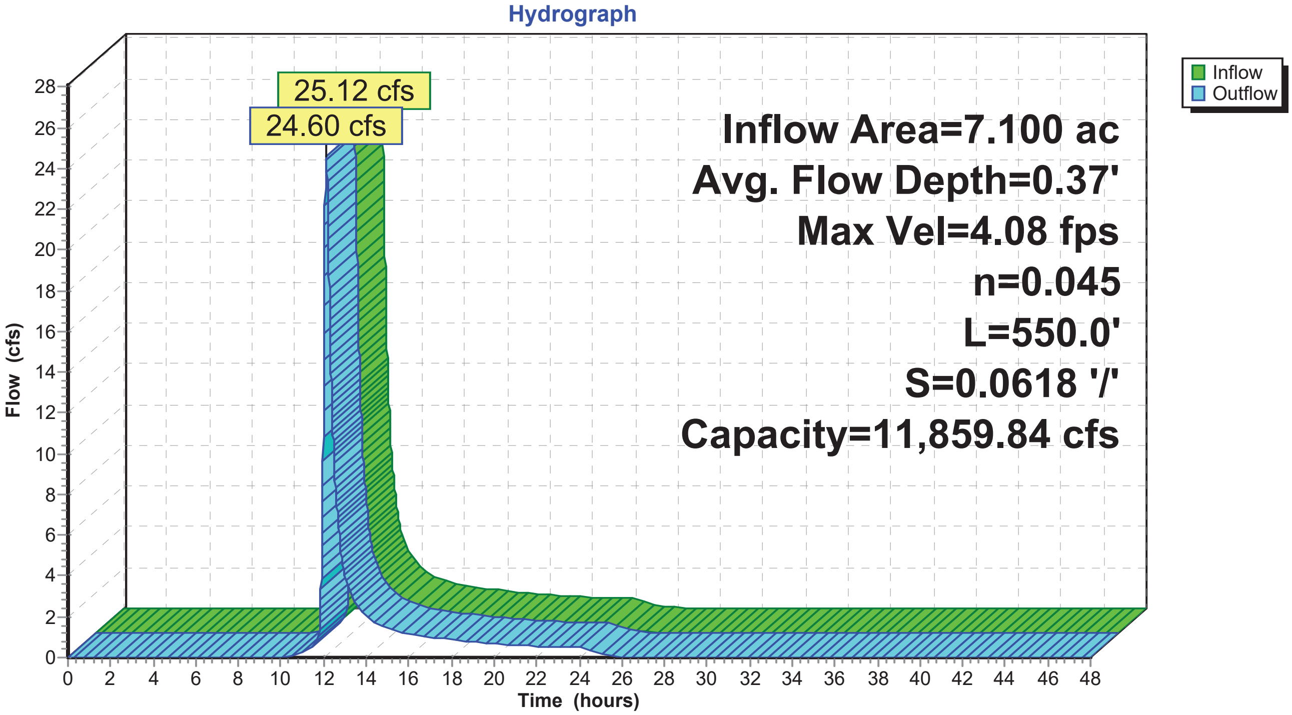
Inflow Area =        7.100 ac,    0.00% Impervious,  Inflow Depth =   3.54"    for  100-year 24-hour event
Inflow       =       25.12 cfs @   12.10 hrs,  Volume=            2.097 af
Outflow      =       24.60 cfs @   12.12 hrs,  Volume=            2.097 af,  Atten= 2%,  Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.08 fps,  Min. Travel Time= 2.2 min
Avg. Velocity = 1.81 fps,  Avg. Travel Time= 5.1 min

Peak Storage= 3,314 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 10.00'  Flow Area= 450.0 sf,  Capacity= 11,859.84 cfs

15.00'  x  10.00'  deep channel,  n= 0.045
Side Slope Z-value= 3.0 '/'   Top Width= 75.00'
Length= 550.0'   Slope= 0.0618 '/'
Inlet Invert= 465.00',  Outlet Invert= 431.00'
```

Reach OE2: Offsite East Channel



Summary for Reach PE1: East Perimeter Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

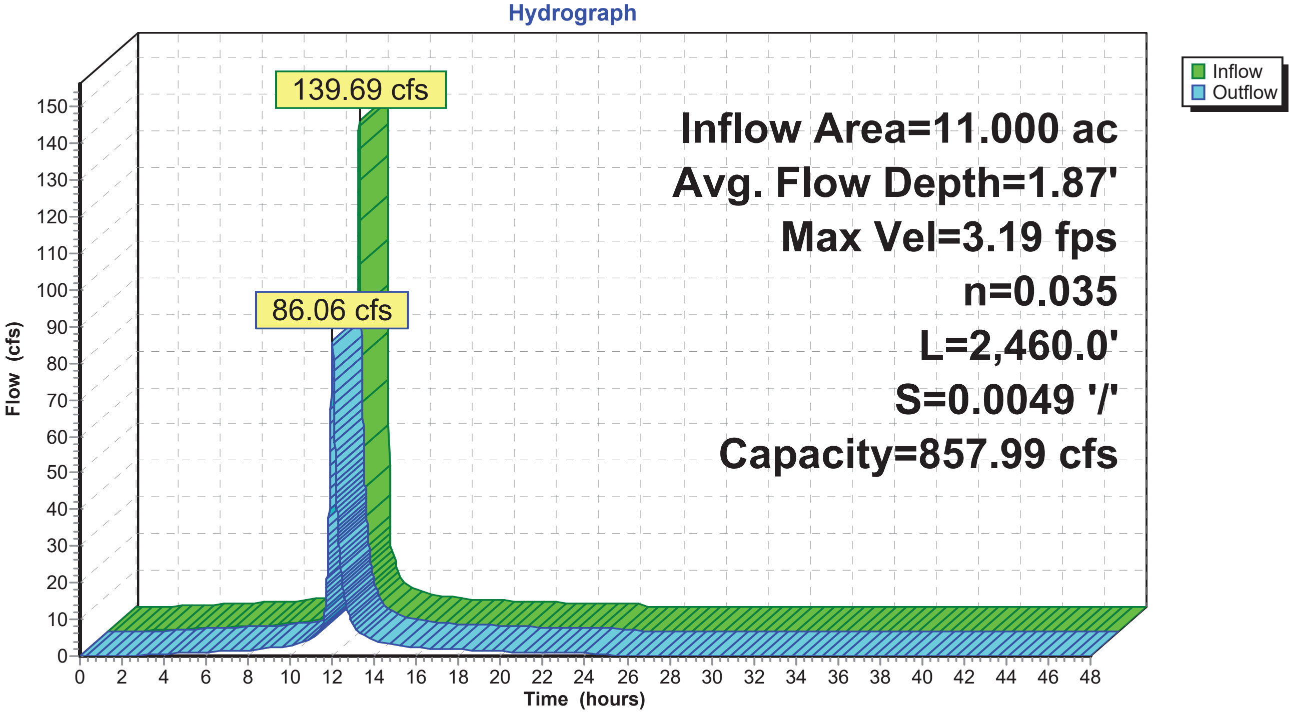
```
Inflow Area =        11.000 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      139.69 cfs @   11.93 hrs,  Volume=             6.903 af
Outflow      =        86.06 cfs @   11.99 hrs,  Volume=             6.903 af,  Atten= 38%,  Lag= 3.6 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.19 fps, Min. Travel Time= 12.8 min
Avg. Velocity = 0.82 fps, Avg. Travel Time= 50.3 min

Peak Storage= 66,299 cf @ 11.99 hrs
Average Depth at Peak Storage= 1.87'
Bank-Full Depth= 5.00' Flow Area= 150.0 sf, Capacity= 857.99 cfs

5.00' x 5.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 55.00'
Length= 2,460.0' Slope= 0.0049 '/'
Inlet Invert= 495.00', Outlet Invert= 483.00'

Reach PE1: East Perimeter Channel



Summary for Reach PE2: East Perimeter Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach CE1 OUTLET depth by 1.21' @ 12.06 hrs
[62] Hint: Exceeded Reach PE1 OUTLET depth by 0.56' @ 12.13 hrs

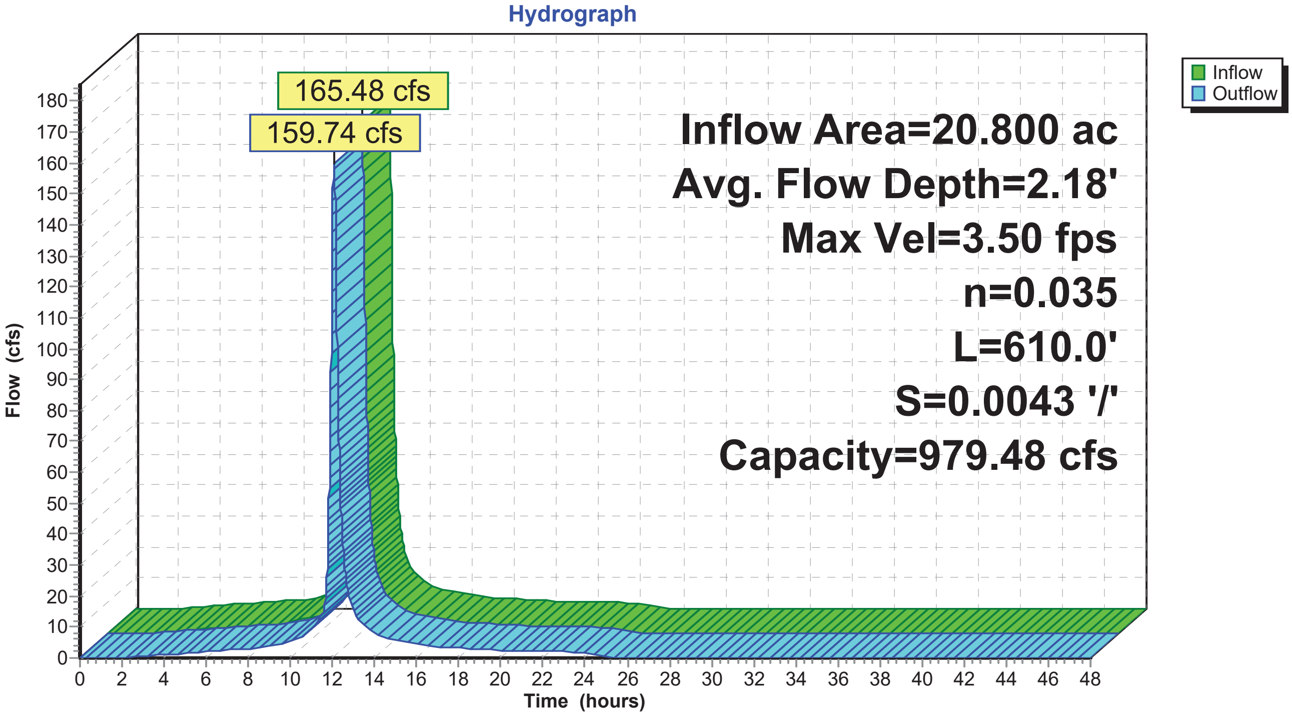
Inflow Area =        20.800 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      165.48 cfs @   12.03 hrs,  Volume=           13.053 af
Outflow      =      159.74 cfs @   12.06 hrs,  Volume=           13.053 af,  Atten= 3%,  Lag= 2.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.50 fps,  Min. Travel Time= 2.9 min
Avg. Velocity = 0.81 fps,  Avg. Travel Time= 12.5 min

Peak Storage= 27,877 cf @ 12.06 hrs
Average Depth at Peak Storage= 2.18'
Bank-Full Depth= 5.00'  Flow Area= 175.0 sf,  Capacity= 979.48 cfs

10.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 60.00'
Length= 610.0'   Slope= 0.0043 '/'
Inlet Invert= 483.00',  Outlet Invert= 480.40'
```

Reach PE2: East Perimeter Channel



Summary for Reach PE3: East Perimeter Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach CE2 OUTLET depth by 1.68' @ 12.11 hrs
[62] Hint: Exceeded Reach PE2 OUTLET depth by 0.63' @ 12.12 hrs

Inflow Area =        33.300 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow      =      271.83 cfs @   12.06 hrs,  Volume=          20.898 af
Outflow     =      268.62 cfs @   12.08 hrs,  Volume=          20.898 af,  Atten= 1%,  Lag= 1.2 min

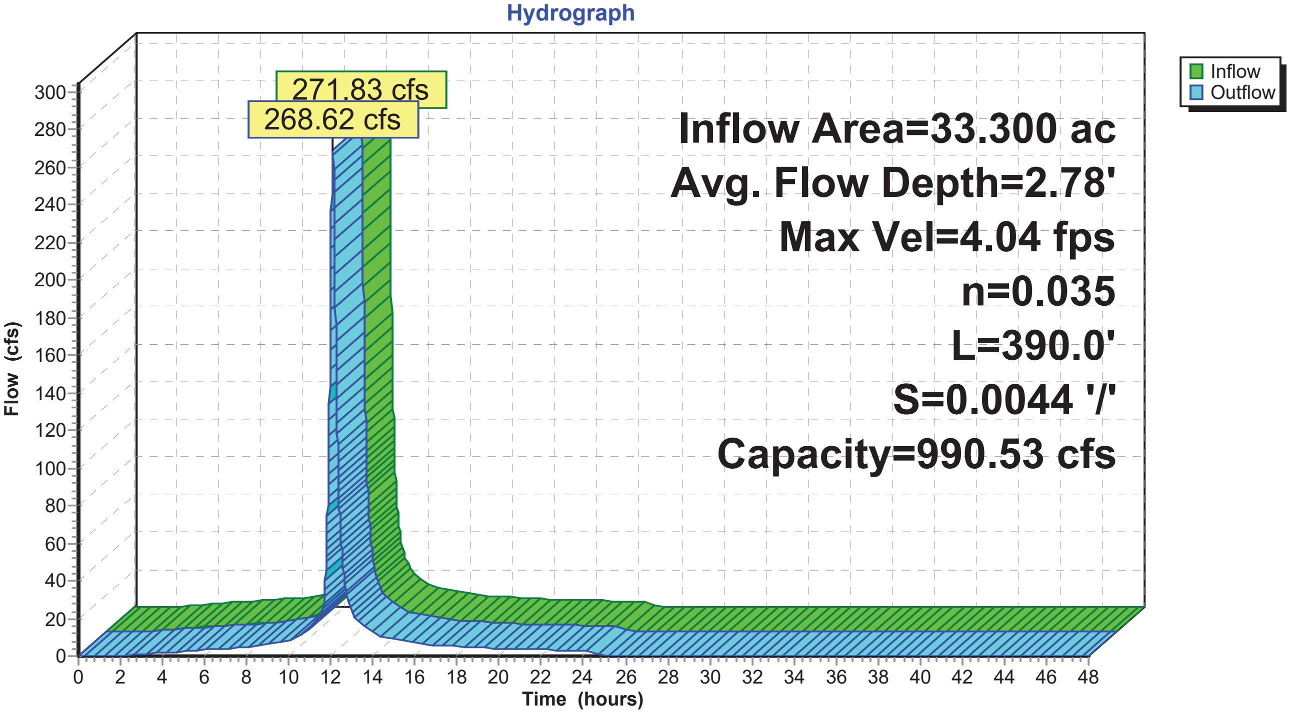
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.04 fps,  Min. Travel Time= 1.6 min
Avg. Velocity = 0.93 fps,  Avg. Travel Time= 7.0 min

Peak Storage= 25,909 cf @ 12.08 hrs
Average Depth at Peak Storage= 2.78'
Bank-Full Depth= 5.00'  Flow Area= 175.0 sf,  Capacity= 990.53 cfs

10.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 60.00'
Length= 390.0'   Slope= 0.0044 '/'
Inlet Invert= 480.40',  Outlet Invert= 478.70'
```

‡

Reach PE3: East Perimeter Channel



Summary for Reach PE4: East Perimeter Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach CE3 OUTLET depth by 2.43' @ 12.12 hrs
[62] Hint: Exceeded Reach PE3 OUTLET depth by 0.43' @ 12.16 hrs

Inflow Area =      43.300 ac,   0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow      =     357.46 cfs @   12.08 hrs,  Volume=          27.174 af
Outflow     =     353.35 cfs @   12.10 hrs,  Volume=          27.174 af,  Atten= 1%,  Lag= 1.2 min

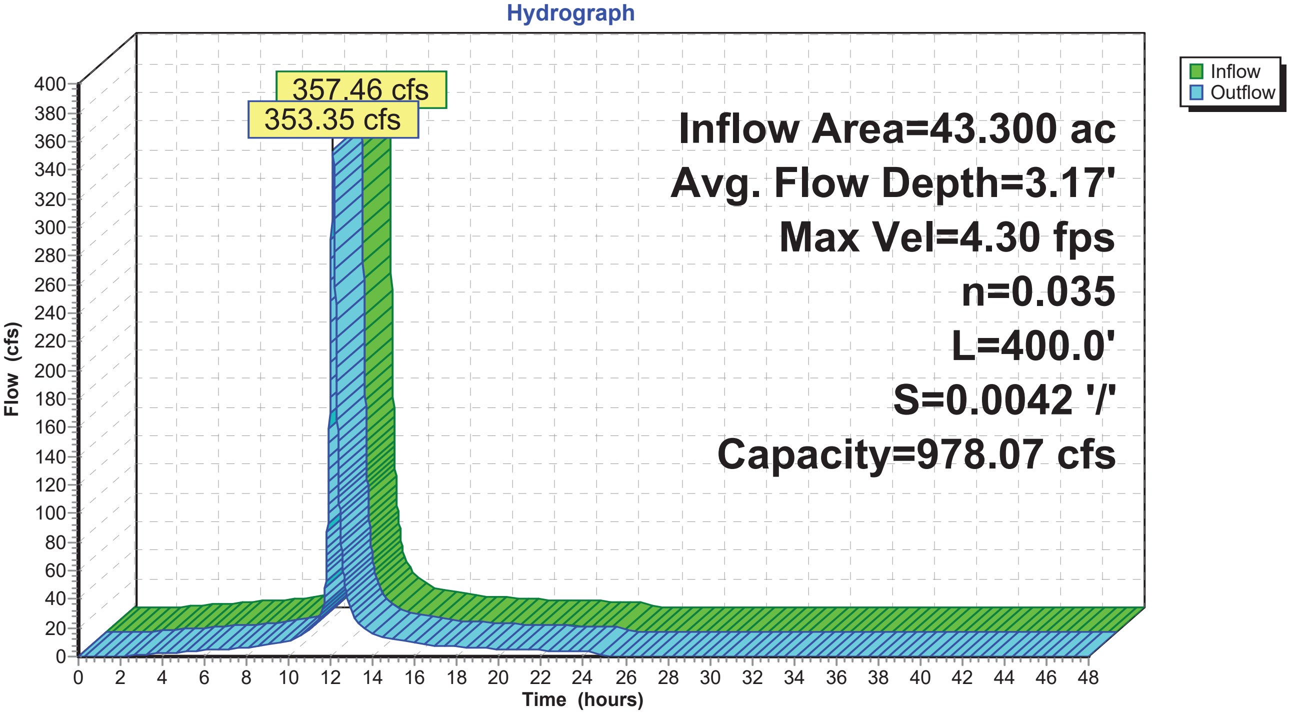
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.30 fps,  Min. Travel Time= 1.5 min
Avg. Velocity = 0.98 fps,  Avg. Travel Time= 6.8 min

Peak Storage= 32,849 cf @ 12.10 hrs
Average Depth at Peak Storage= 3.17'
Bank-Full Depth= 5.00'  Flow Area= 175.0 sf,  Capacity= 978.07 cfs

10.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 60.00'
Length= 400.0'   Slope= 0.0042 '/'
Inlet Invert= 478.70',  Outlet Invert= 477.00'
```

‡

Reach PE4: East Perimeter Channel



Summary for Reach PE5: East Perimeter Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach CE4 OUTLET depth by 2.04' @ 12.14 hrs
[61] Hint: Exceeded Reach PE4 outlet invert by 3.04' @ 12.11 hrs

Inflow Area =        55.300 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow      =      457.91 cfs @   12.09 hrs,  Volume=          34.705 af
Outflow     =      452.05 cfs @   12.11 hrs,  Volume=          34.705 af,  Atten= 1%,  Lag= 1.2 min

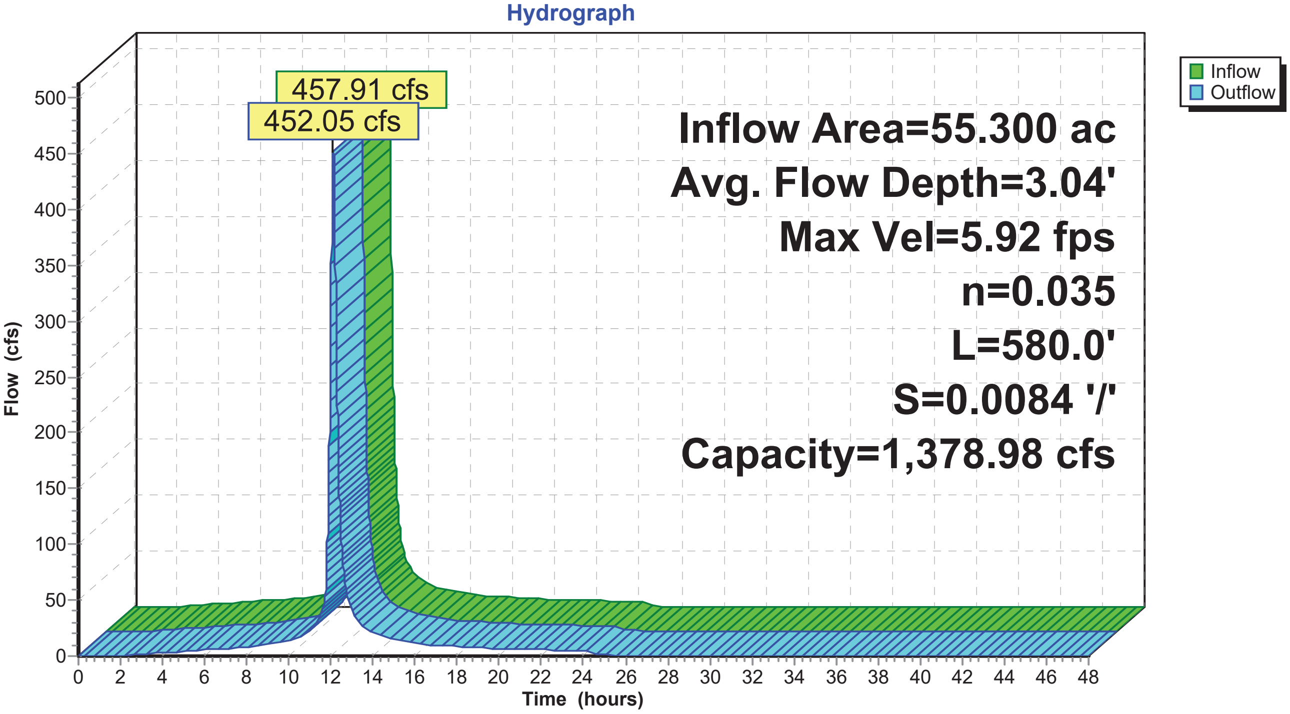
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 5.92 fps,  Min. Travel Time= 1.6 min
Avg. Velocity = 1.35 fps,  Avg. Travel Time= 7.1 min

Peak Storage= 44,326 cf @ 12.11 hrs
Average Depth at Peak Storage= 3.04'
Bank-Full Depth= 5.00'  Flow Area= 175.0 sf,  Capacity= 1,378.98 cfs

10.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 60.00'
Length= 580.0'   Slope= 0.0084 '/'
Inlet Invert= 477.00',  Outlet Invert= 472.10'
```

‡

Reach PE5: East Perimeter Channel



Summary for Reach PE6: East Perimeter Channel

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

```
[62] Hint: Exceeded Reach CE5 OUTLET depth by 0.44' @ 12.15 hrs
[61] Hint: Exceeded Reach PE5 outlet invert by 2.64' @ 12.12 hrs

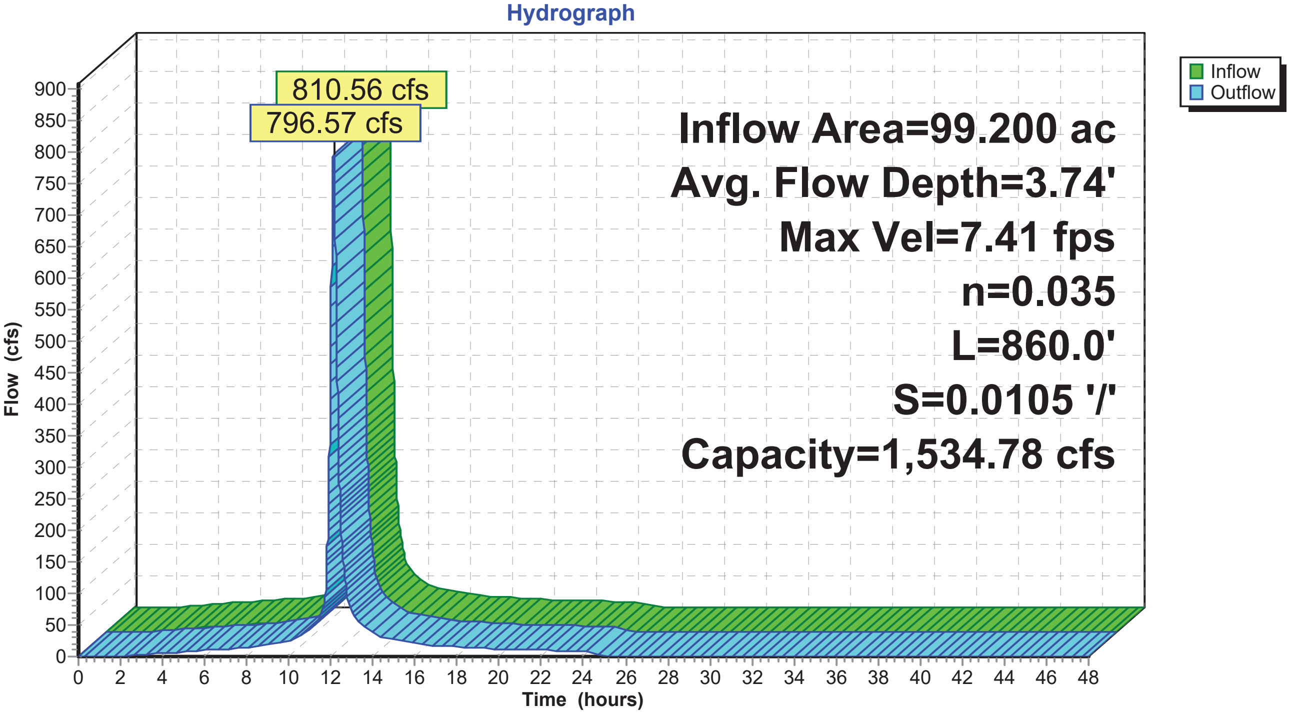
Inflow Area =      99.200 ac,   0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow      =     810.56 cfs @   12.10 hrs,  Volume=          62.255 af
Outflow     =     796.57 cfs @   12.12 hrs,  Volume=          62.255 af,  Atten= 2%,  Lag= 1.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 7.41 fps,  Min. Travel Time= 1.9 min
Avg. Velocity = 1.71 fps,  Avg. Travel Time= 8.4 min

Peak Storage= 92,386 cf @ 12.12 hrs
Average Depth at Peak Storage= 3.74'
Bank-Full Depth= 5.00'  Flow Area= 175.0 sf,  Capacity= 1,534.78 cfs

10.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 60.00'
Length= 860.0'   Slope= 0.0105 '/'
Inlet Invert= 471.00',  Outlet Invert= 462.00'
```

Reach PE6: East Perimeter Channel



Summary for Reach PE7: Channel 4b on northeast of Cap

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

```
[62] Hint: Exceeded Reach PE6 OUTLET depth by 0.93' @ 12.26 hrs

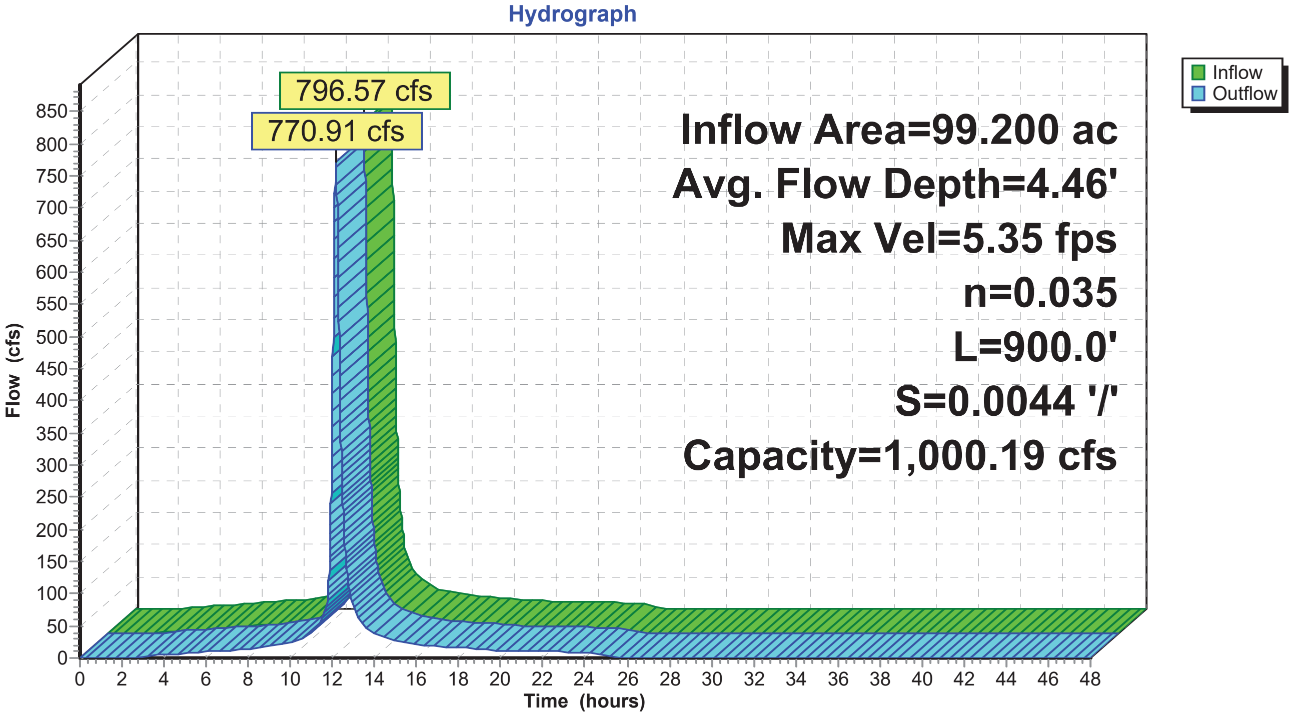
Inflow Area =      99.200 ac,   0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow      =     796.57 cfs @   12.12 hrs,  Volume=          62.255 af
Outflow     =     770.91 cfs @   12.16 hrs,  Volume=          62.255 af,  Atten= 3%,  Lag= 2.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 5.35 fps,  Min. Travel Time= 2.8 min
Avg. Velocity = 1.22 fps,  Avg. Travel Time= 12.3 min

Peak Storage= 129,730 cf @ 12.16 hrs
Average Depth at Peak Storage= 4.46'
Bank-Full Depth= 5.00'  Flow Area= 175.0 sf,  Capacity= 1,000.19 cfs

10.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 60.00'
Length= 900.0'   Slope= 0.0044 '/'
Inlet Invert= 462.00',  Outlet Invert= 458.00'
```

Reach PE7: Channel 4b on northeast of Cap



Summary for Reach PW4: Western Perimeter Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

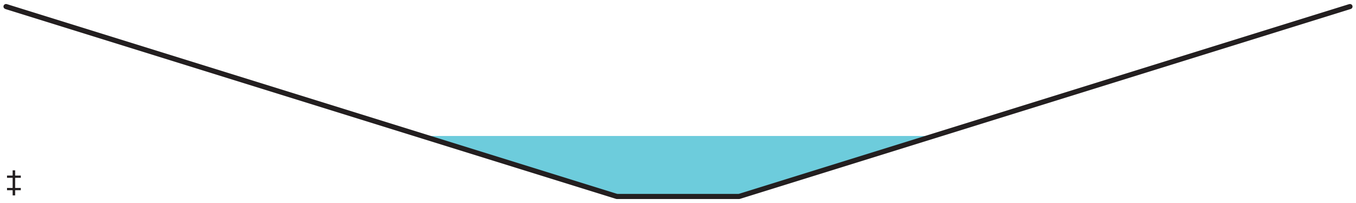
```
[61] Hint: Exceeded Reach CW18 outlet invert by 0.18' @ 12.20 hrs
[61] Hint: Exceeded Reach KN1 outlet invert by 0.18' @ 12.20 hrs

Inflow Area =       53.100 ac,   0.00% Impervious,  Inflow Depth =   7.53"   for  100-year 24-hour event
Inflow      =      406.01 cfs @   12.10 hrs,  Volume=          33.324 af
Outflow     =      327.22 cfs @   12.20 hrs,  Volume=          33.324 af,  Atten= 19%,  Lag= 6.0 min

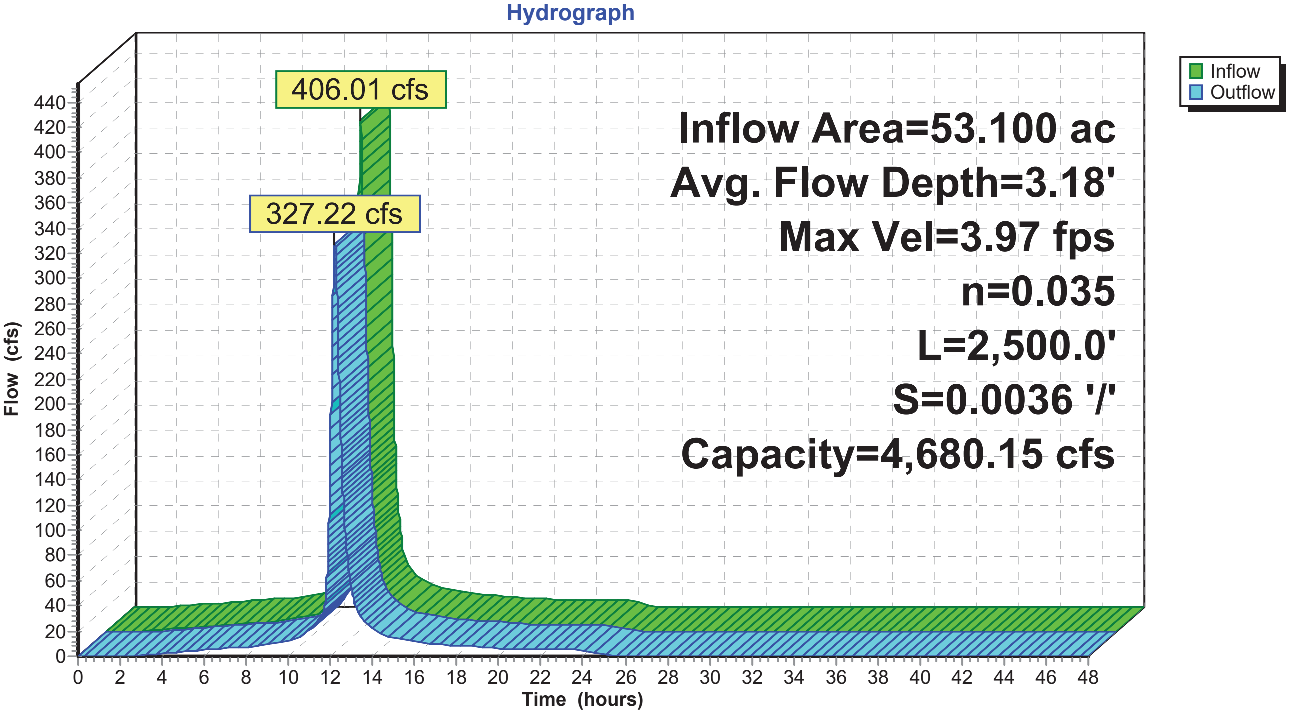
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.97 fps,  Min. Travel Time= 10.5 min
Avg. Velocity = 1.11 fps,  Avg. Travel Time= 37.7 min

Peak Storage= 206,234 cf @ 12.20 hrs
Average Depth at Peak Storage= 3.18'
Bank-Full Depth= 10.00'  Flow Area= 600.0 sf,  Capacity= 4,680.15 cfs

10.00'  x  10.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 110.00'
Length= 2,500.0'   Slope= 0.0036 '/'
Inlet Invert= 467.00',  Outlet Invert= 458.00'
```



Reach PW4: Western Perimeter Channel



Summary for Reach R1: Closure by removal area Channel

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

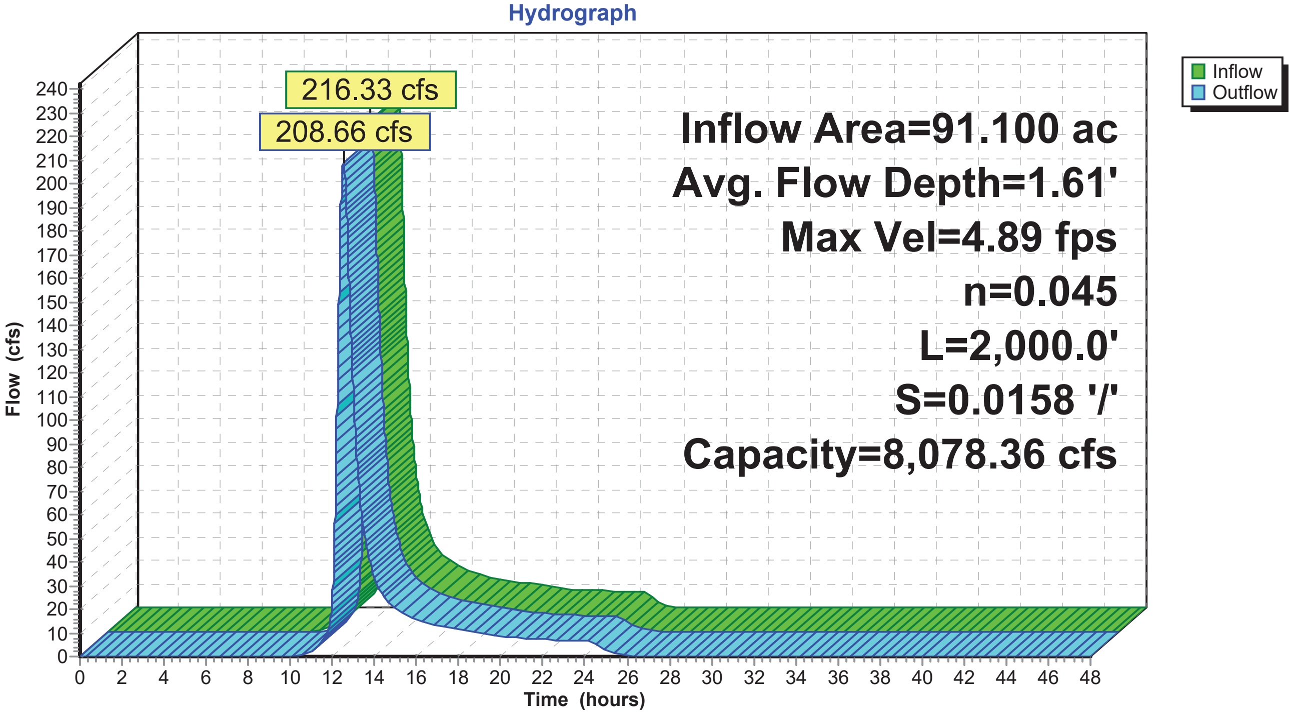
```
Inflow Area =        91.100 ac,    0.00% Impervious,  Inflow Depth =   3.66"    for  100-year 24-hour event
Inflow       =      216.33 cfs @   12.43 hrs,  Volume=          27.766 af
Outflow      =      208.66 cfs @   12.52 hrs,  Volume=          27.766 af,  Atten= 4%,  Lag= 5.2 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.89 fps, Min. Travel Time= 6.8 min
Avg. Velocity = 1.59 fps, Avg. Travel Time= 21.0 min

Peak Storage= 85,341 cf @ 12.52 hrs
Average Depth at Peak Storage= 1.61'
Bank-Full Depth= 10.00' Flow Area= 600.0 sf, Capacity= 8,078.36 cfs

20.00' x 10.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 100.00'
Length= 2,000.0' Slope= 0.0158 '/'
Inlet Invert= 500.00', Outlet Invert= 468.50'

Reach R1: Closure by removal area Channel



Summary for Reach R10: Closure by removal area Channel

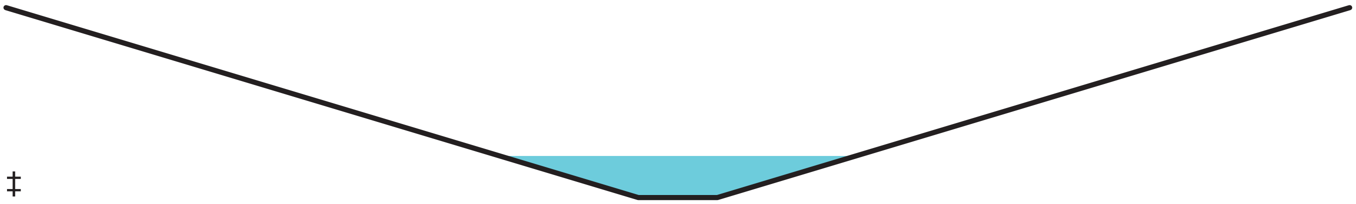
Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =      144.900 ac,    0.00% Impervious,  Inflow Depth >   2.41"    for  100-year 24-hour event
Inflow       =        31.99 cfs @   12.12 hrs,  Volume=          29.056 af
Outflow      =        29.04 cfs @   12.20 hrs,  Volume=          28.945 af,  Atten= 9%,  Lag= 4.7 min
```

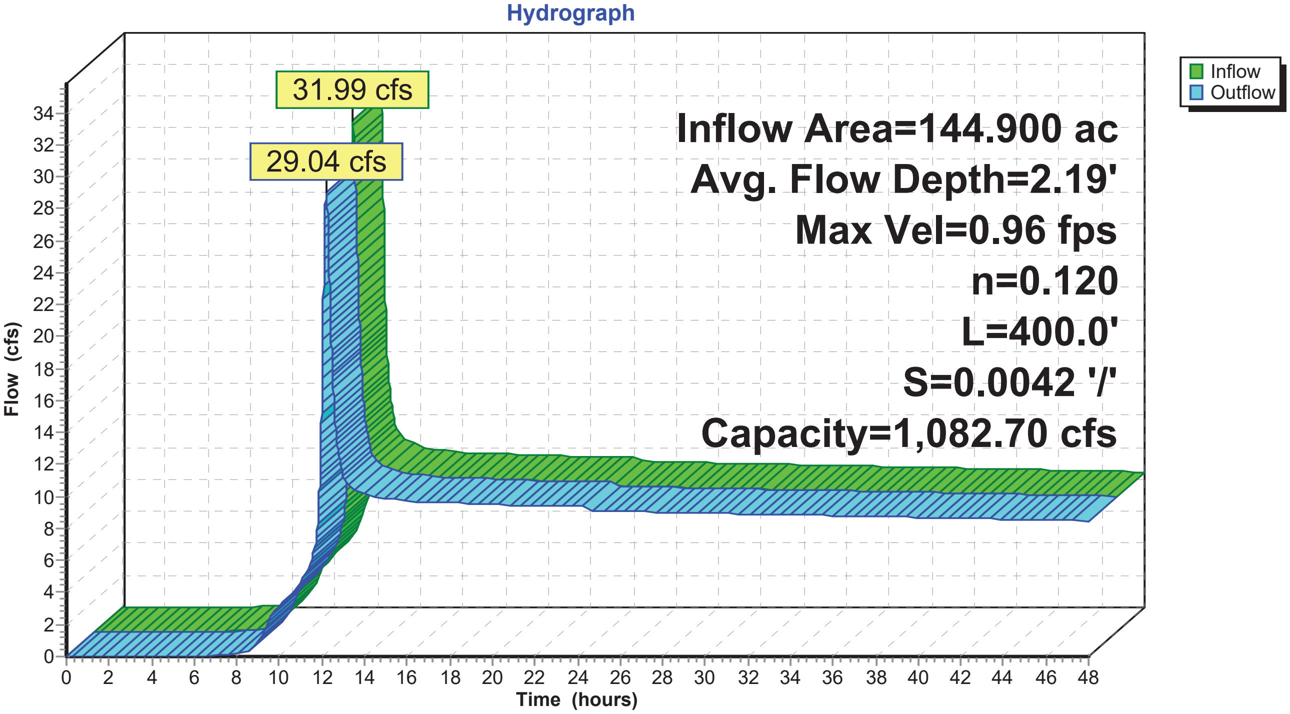
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 0.96 fps, Min. Travel Time= 6.9 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 10.1 min

Peak Storage= 12,039 cf @ 12.20 hrs
Average Depth at Peak Storage= 2.19'
Bank-Full Depth= 10.00' Flow Area= 450.0 sf, Capacity= 1,082.70 cfs

5.00' x 10.00' deep channel, n= 0.120
Side Slope Z-value= 4.0 '/' Top Width= 85.00'
Length= 400.0' Slope= 0.0042 '/'
Inlet Invert= 450.50', Outlet Invert= 448.80'



Reach R10: Closure by removal area Channel



Summary for Reach R11: Closure by removal area Channel

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

---

[62] Hint: Exceeded Reach ESB OUTLET depth by 3.31' @ 12.24 hrs
[62] Hint: Exceeded Reach R10 OUTLET depth by 1.15' @ 12.28 hrs
[62] Hint: Exceeded Reach R9 OUTLET depth by 0.07' @ 12.25 hrs

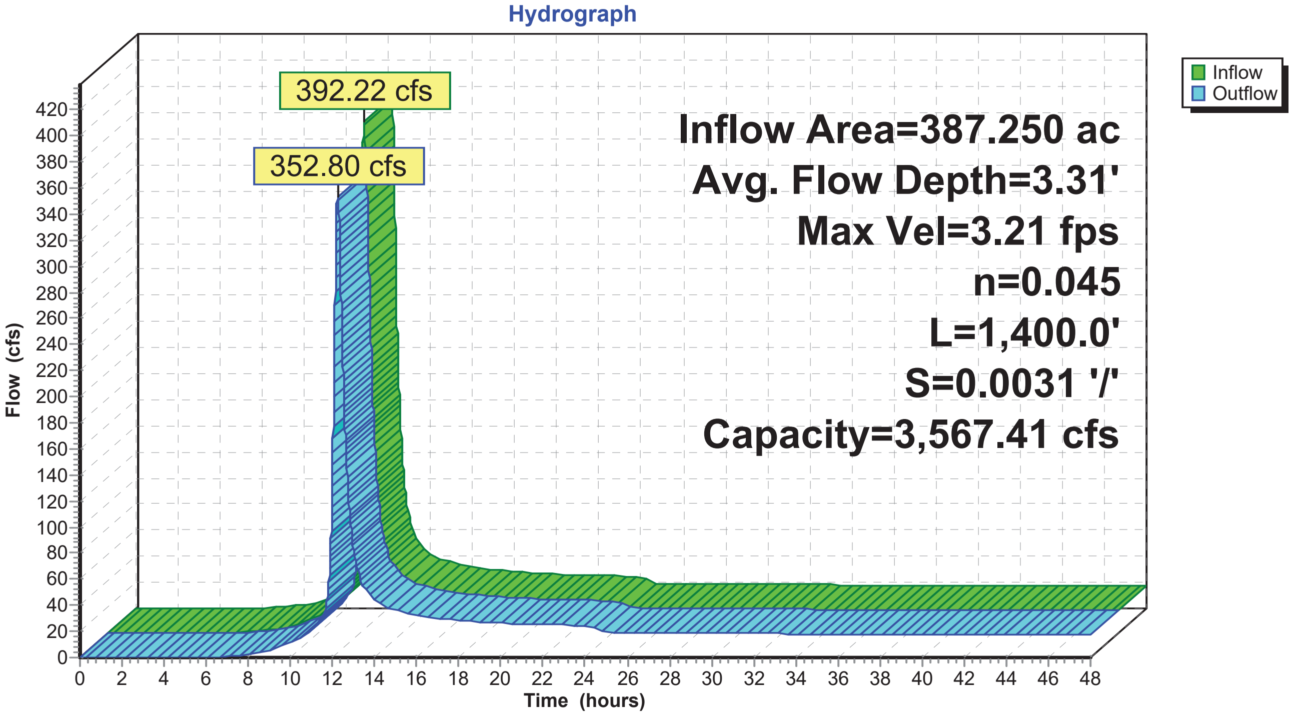
```
Inflow Area =      387.250 ac,    0.00% Impervious,  Inflow Depth >   2.73"    for  100-year 24-hour event
Inflow       =      392.22 cfs @   12.16 hrs,  Volume=          88.031 af
Outflow      =      352.80 cfs @   12.24 hrs,  Volume=          87.583 af,  Atten= 10%,  Lag= 5.1 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 3.21 fps, Min. Travel Time= 7.3 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 18.1 min

Peak Storage= 153,806 cf @ 12.24 hrs
Average Depth at Peak Storage= 3.31'
Bank-Full Depth= 10.00' Flow Area= 600.0 sf, Capacity= 3,567.41 cfs

20.00' x 10.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 100.00'
Length= 1,400.0' Slope= 0.0031 '/'
Inlet Invert= 448.80', Outlet Invert= 444.50'

Reach R11: Closure by removal area Channel



Summary for Reach R2: Closure by removal area Channel

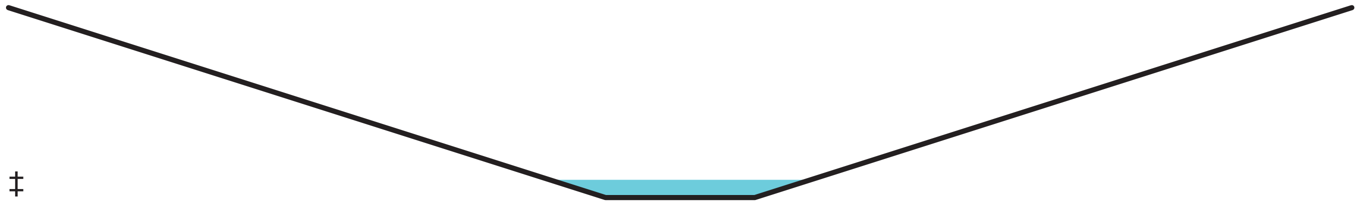
Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =        25.800 ac,    0.00% Impervious,  Inflow Depth =   4.11"    for  100-year 24-hour event
Inflow      =        67.99 cfs @   12.47 hrs,  Volume=             8.846 af
Outflow     =        67.66 cfs @   12.48 hrs,  Volume=             8.846 af,  Atten= 0%,  Lag= 1.0 min

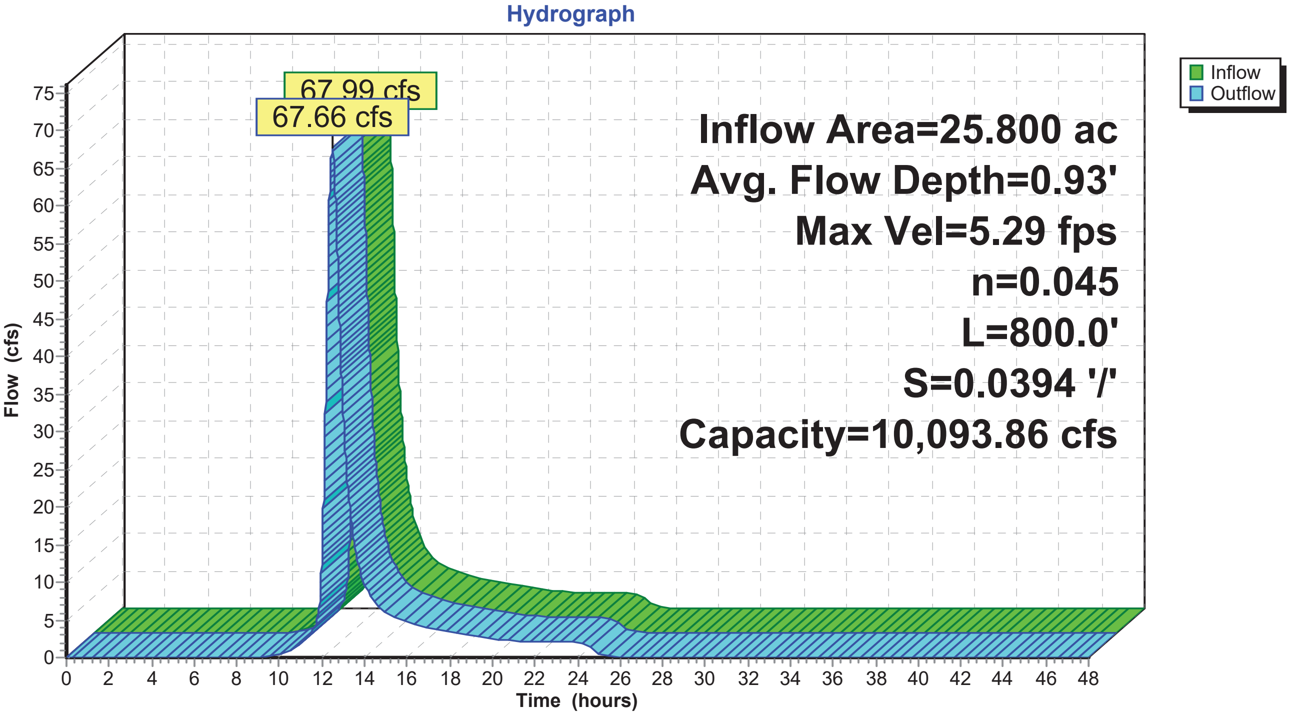
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 5.29 fps,  Min. Travel Time= 2.5 min
Avg. Velocity = 2.00 fps,  Avg. Travel Time= 6.7 min

Peak Storage= 10,238 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.93'
Bank-Full Depth= 10.00'  Flow Area= 500.0 sf,  Capacity= 10,093.86 cfs

10.00'  x  10.00'  deep channel,  n= 0.045
Side Slope Z-value= 4.0 '/'   Top Width= 90.00'
Length= 800.0'   Slope= 0.0394 '/'
Inlet Invert= 500.00',  Outlet Invert= 468.50'
```



Reach R2: Closure by removal area Channel



Summary for Reach R3: Closure by removal area Channel

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

---

[62] Hint: Exceeded Reach R1 OUTLET depth by 0.55' @ 12.14 hrs
[62] Hint: Exceeded Reach R2 OUTLET depth by 1.00' @ 12.53 hrs

```
Inflow Area =      134.200 ac,    0.00% Impervious,  Inflow Depth =   3.92"    for  100-year 24-hour event
Inflow      =      304.97 cfs @   12.48 hrs,  Volume=          43.881 af
Outflow     =      304.13 cfs @   12.51 hrs,  Volume=          43.881 af,  Atten= 0%,  Lag= 1.3 min
```

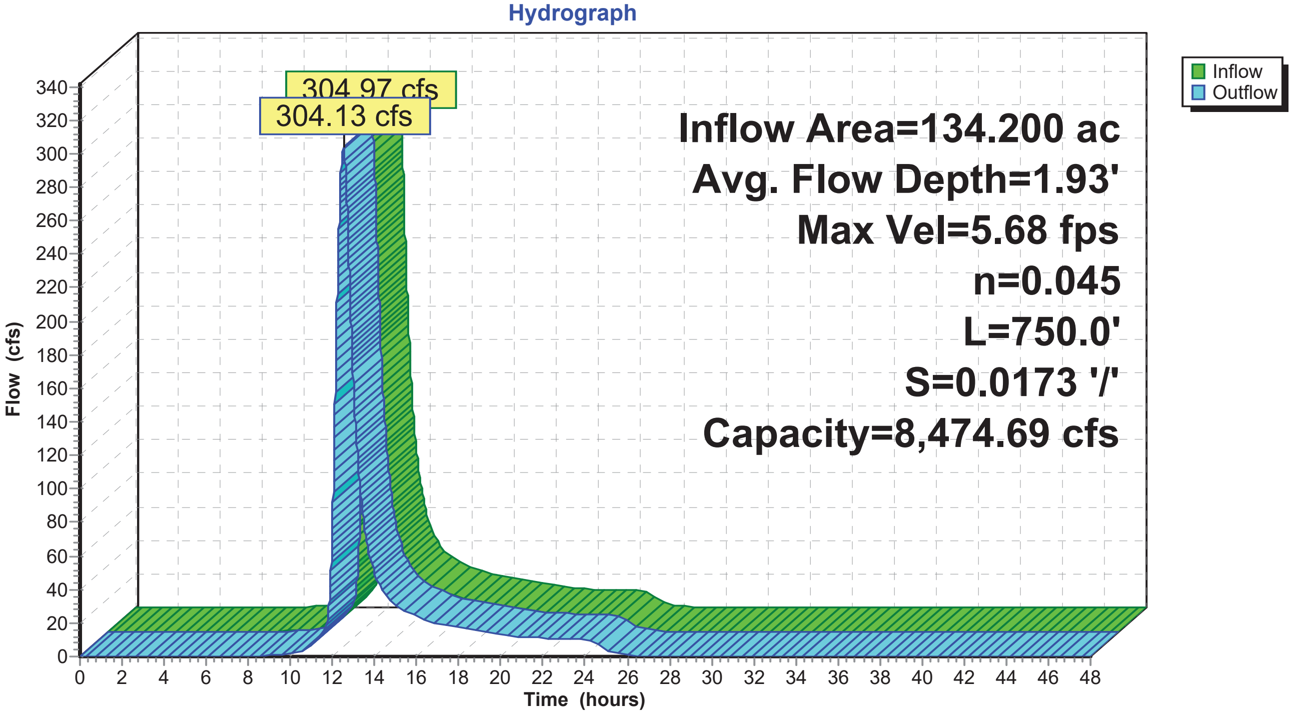
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 5.68 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 7.1 min

Peak Storage= 40,187 cf @ 12.51 hrs
Average Depth at Peak Storage= 1.93'
Bank-Full Depth= 10.00' Flow Area= 600.0 sf, Capacity= 8,474.69 cfs

20.00' x 10.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 100.00'
Length= 750.0' Slope= 0.0173 '/'
Inlet Invert= 468.50', Outlet Invert= 455.50'

‡

Reach R3: Closure by removal area Channel



Summary for Reach R4: Closure by removal area Channel

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

---

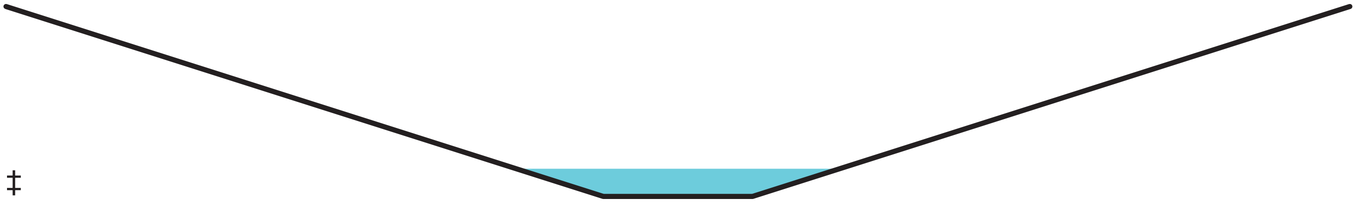
[62] Hint: Exceeded Reach AR1 OUTLET depth by 0.85' @ 12.14 hrs

```
Inflow Area =        26.550 ac,    0.00% Impervious,  Inflow Depth =   4.32"    for  100-year 24-hour event
Inflow       =      125.81 cfs @   12.09 hrs,  Volume=             9.564 af
Outflow      =      123.34 cfs @   12.12 hrs,  Volume=             9.564 af,  Atten= 2%,  Lag= 1.9 min
```

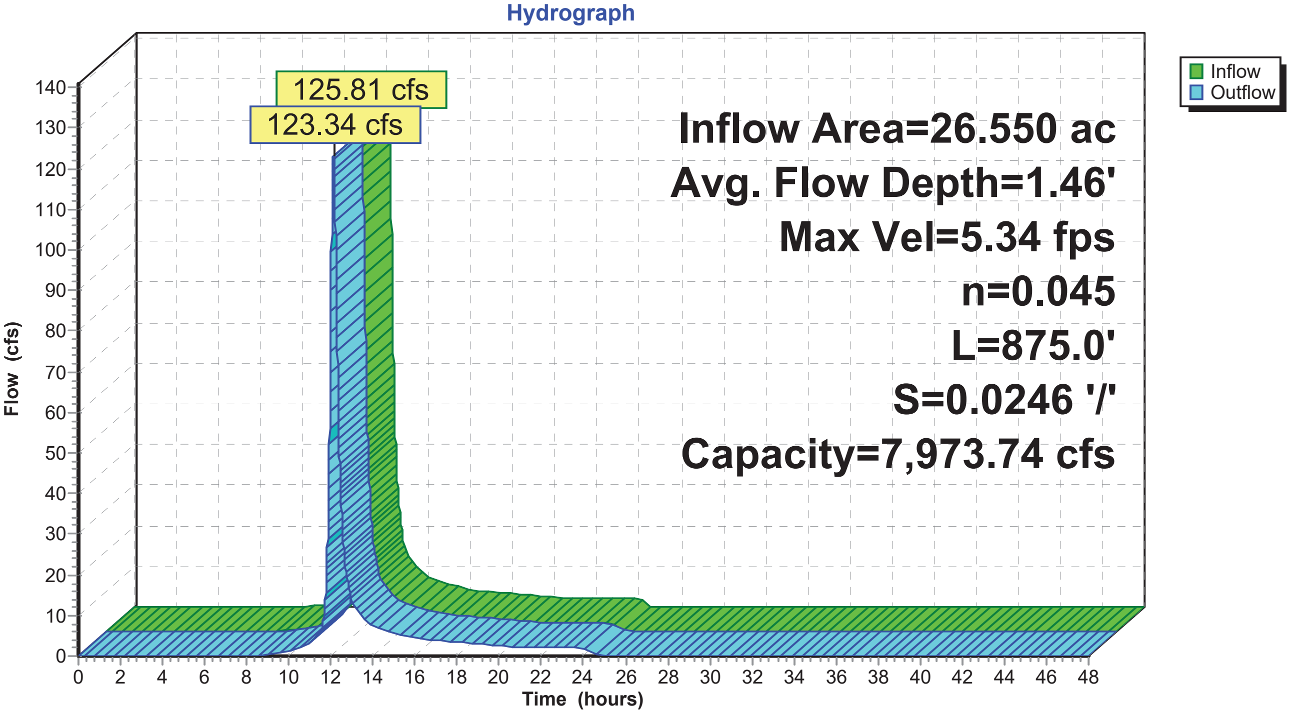
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 5.34 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 1.62 fps, Avg. Travel Time= 9.0 min

Peak Storage= 20,195 cf @ 12.12 hrs
Average Depth at Peak Storage= 1.46'
Bank-Full Depth= 10.00' Flow Area= 500.0 sf, Capacity= 7,973.74 cfs

10.00' x 10.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 90.00'
Length= 875.0' Slope= 0.0246 '/'
Inlet Invert= 476.00', Outlet Invert= 454.50'



Reach R4: Closure by removal area Channel



Summary for Reach R6: Closure by removal area Channel

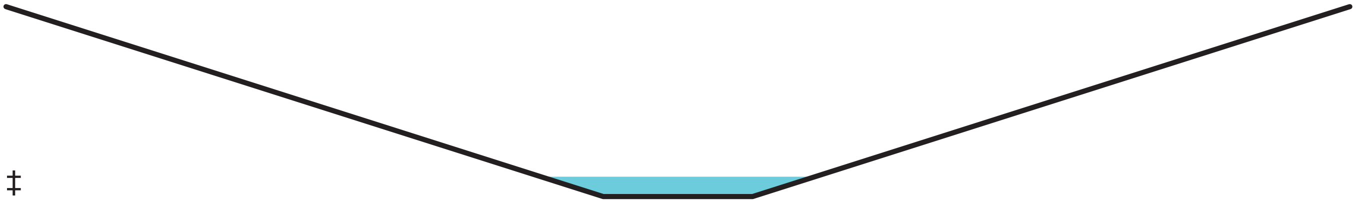
Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =        29.000 ac,    0.00% Impervious,  Inflow Depth =   4.11"    for  100-year 24-hour event
Inflow      =        83.70 cfs @   12.38 hrs,  Volume=            9.943 af
Outflow     =        82.80 cfs @   12.41 hrs,  Volume=            9.943 af,  Atten= 1%,  Lag= 2.1 min
```

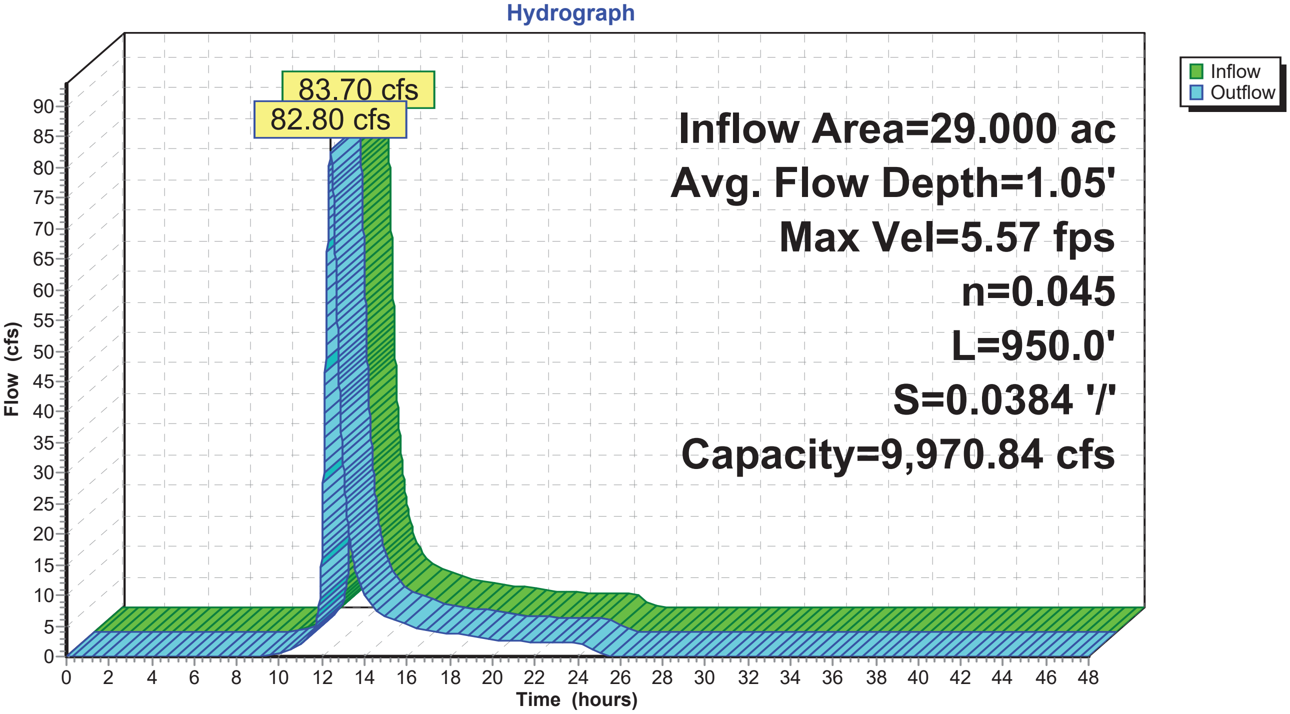
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 5.57 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 2.05 fps, Avg. Travel Time= 7.7 min

Peak Storage= 14,118 cf @ 12.41 hrs
Average Depth at Peak Storage= 1.05'
Bank-Full Depth= 10.00' Flow Area= 500.0 sf, Capacity= 9,970.84 cfs

10.00' x 10.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 90.00'
Length= 950.0' Slope= 0.0384 '/'
Inlet Invert= 500.00', Outlet Invert= 463.50'



Reach R6: Closure by removal area Channel



Summary for Reach R7: Closure by removal area Channel

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

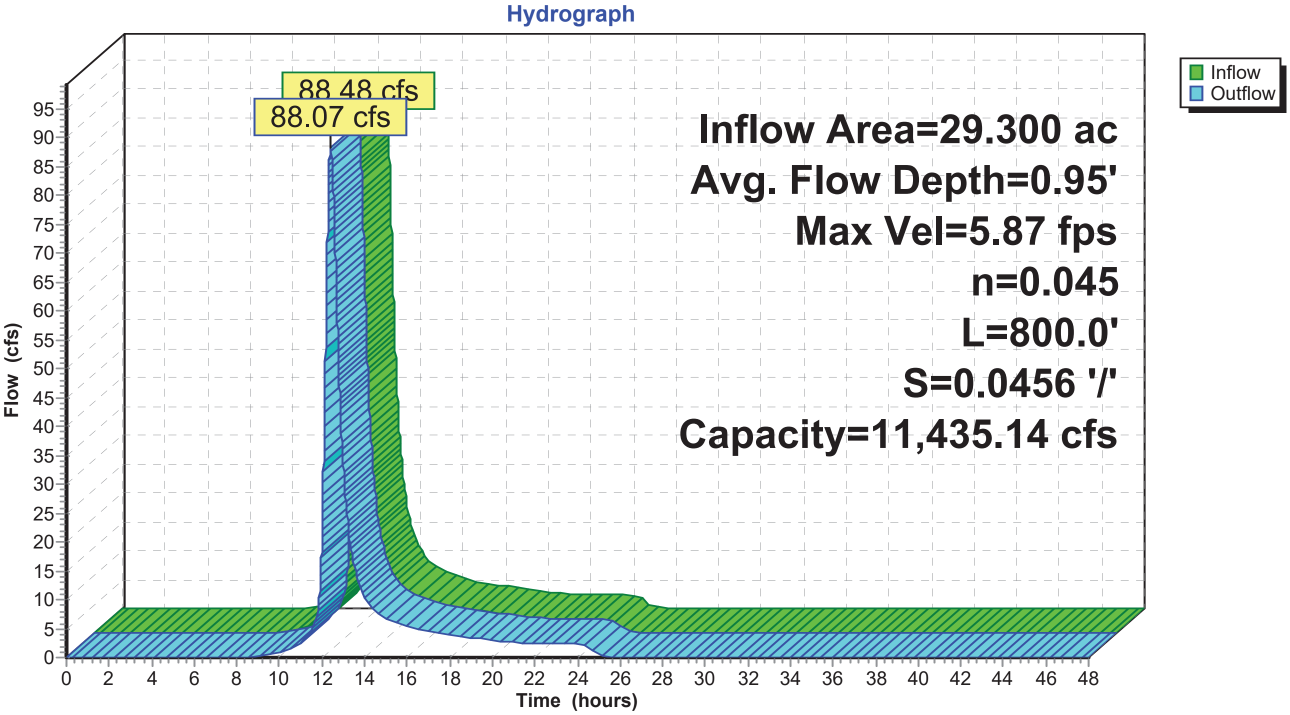
```
Inflow Area =        29.300 ac,    0.00% Impervious,  Inflow Depth =   4.34"    for  100-year 24-hour event
Inflow      =        88.48 cfs @   12.39 hrs,  Volume=          10.608 af
Outflow     =        88.07 cfs @   12.41 hrs,  Volume=          10.608 af,  Atten= 0%,  Lag= 1.4 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 5.87 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 2.11 fps, Avg. Travel Time= 6.3 min

Peak Storage= 12,012 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.95'
Bank-Full Depth= 10.00' Flow Area= 520.0 sf, Capacity= 11,435.14 cfs

12.00' x 10.00' deep channel, n= 0.045
Side Slope Z-value= 4.0 '/' Top Width= 92.00'
Length= 800.0' Slope= 0.0456 '/'
Inlet Invert= 500.00', Outlet Invert= 463.50'

Reach R7: Closure by removal area Channel



Summary for Reach R8: Closure by removal area Channel

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach R6 OUTLET depth by 2.68' @ 12.44 hrs
[62] Hint: Exceeded Reach R7 OUTLET depth by 2.77' @ 12.44 hrs

Inflow Area =     140.600 ac,   0.00% Impervious,  Inflow Depth =   4.71"   for  100-year 24-hour event
Inflow       =     486.88 cfs @   12.33 hrs,  Volume=           55.132 af
Outflow      =     455.45 cfs @   12.43 hrs,  Volume=           55.132 af,  Atten= 6%,  Lag= 5.9 min

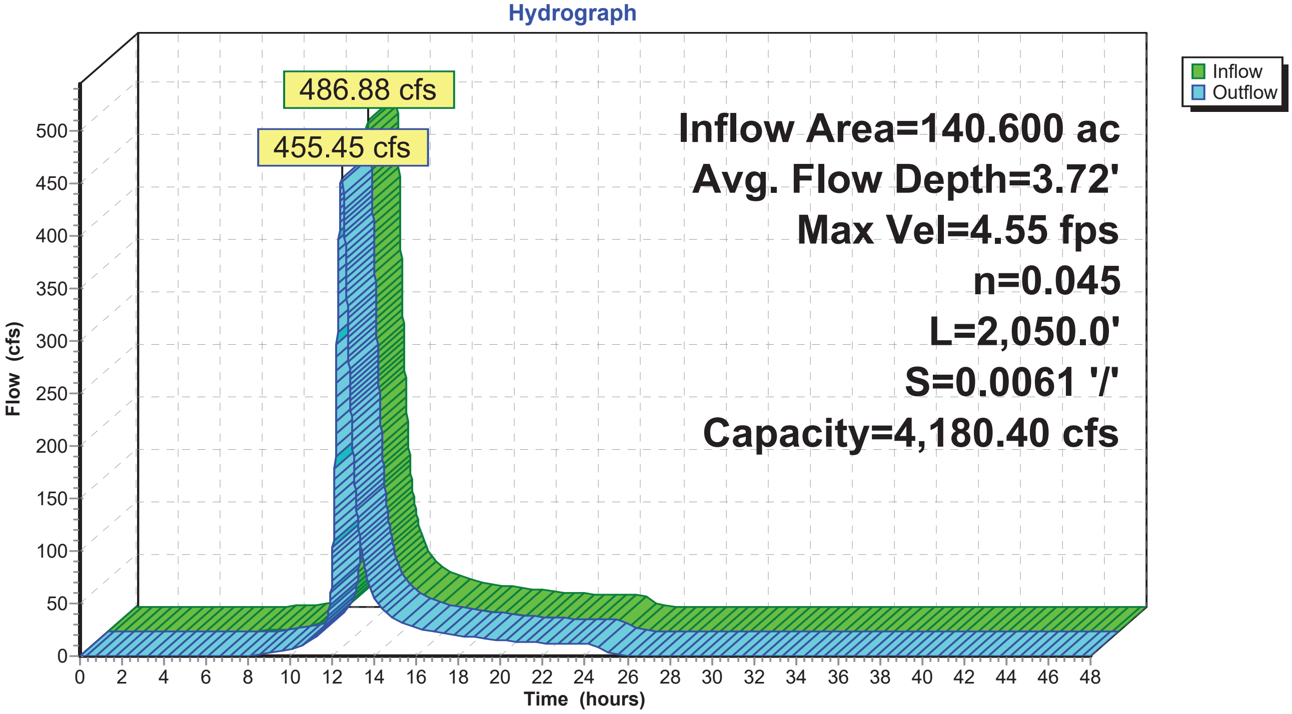
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.55 fps,  Min. Travel Time= 7.5 min
Avg. Velocity = 1.32 fps,  Avg. Travel Time= 25.9 min

Peak Storage= 205,169 cf @ 12.43 hrs
Average Depth at Peak Storage= 3.72'
Bank-Full Depth= 10.00'  Flow Area= 520.0 sf,  Capacity= 4,180.40 cfs

12.00'  x  10.00'  deep channel,  n= 0.045
Side Slope Z-value= 4.0 '/'   Top Width= 92.00'
Length= 2,050.0'   Slope= 0.0061 '/'
Inlet Invert= 463.50',  Outlet Invert= 451.00'
```

‡

Reach R8: Closure by removal area Channel



Summary for Reach R9: Closure by removal area Channel

Assumption that closure by removal will be graded with native material to drain to the north channel and planted with grass. Slopes based on the grading included in the most recent revision of the Design Drawings.

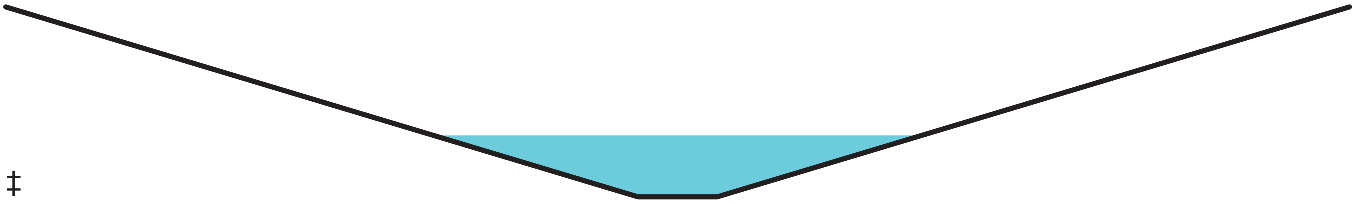
```
[62] Hint: Exceeded Reach AR5 OUTLET depth by 2.69' @ 12.26 hrs
[62] Hint: Exceeded Reach ESC OUTLET depth by 5.74' @ 12.24 hrs

Inflow Area =      191.850 ac,    0.00% Impervious,  Inflow Depth >   2.24"    for  100-year 24-hour event
Inflow      =      107.60 cfs @   12.08 hrs,  Volume=           35.783 af
Outflow     =        73.89 cfs @   12.24 hrs,  Volume=           35.397 af,  Atten= 31%,  Lag= 9.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 1.27 fps,  Min. Travel Time= 18.3 min
Avg. Velocity = 0.72 fps,  Avg. Travel Time= 32.5 min

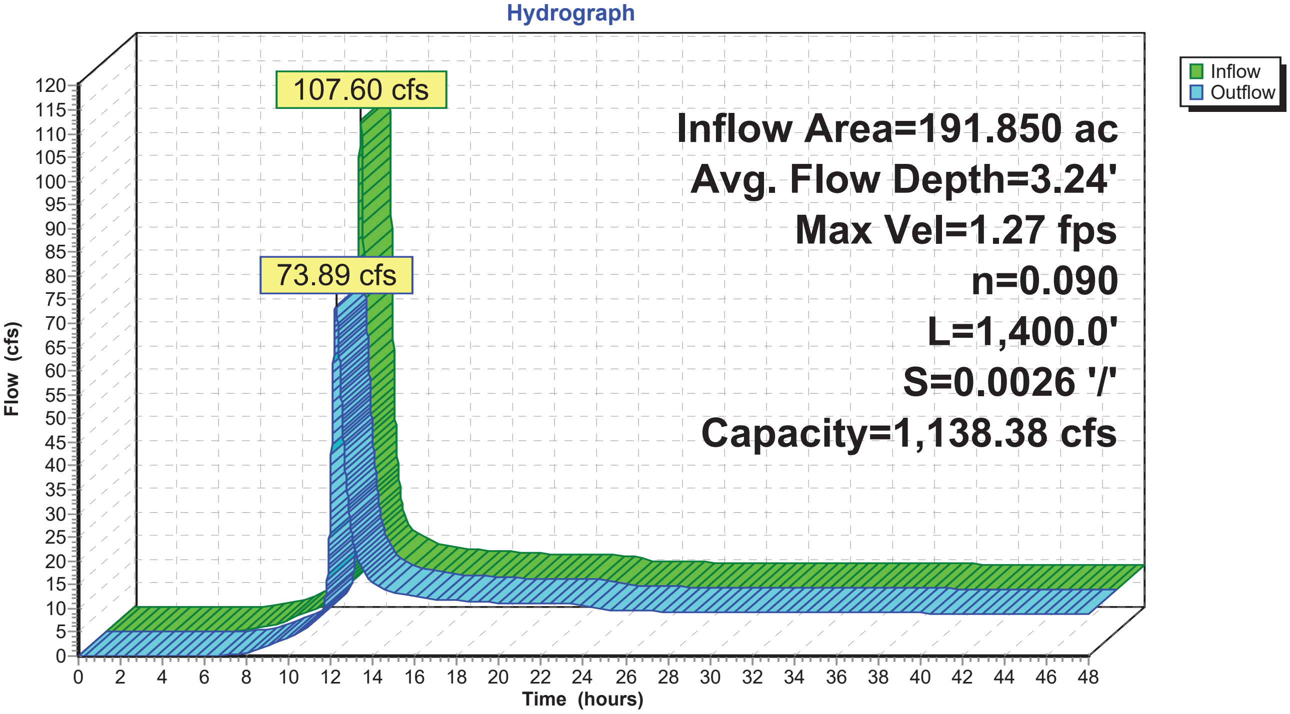
Peak Storage= 81,348 cf @ 12.24 hrs
Average Depth at Peak Storage= 3.24'
Bank-Full Depth= 10.00'  Flow Area= 450.0 sf,  Capacity= 1,138.38 cfs

5.00'  x  10.00'  deep channel,  n= 0.090
Side Slope Z-value= 4.0 '/'   Top Width= 85.00'
Length= 1,400.0'   Slope= 0.0026 '/'
Inlet Invert= 452.50',  Outlet Invert= 448.80'
```



‡

Reach R9: Closure by removal area Channel



Summary for Pond A: Detention Pond A

Slopes and other pond characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach B1 OUTLET depth by 4.69' @ 14.16 hrs
[62] Hint: Exceeded Reach R11 OUTLET depth by 3.65' @ 14.23 hrs

Inflow Area =      559.050 ac,   0.00% Impervious,  Inflow Depth >   4.13"   for  100-year 24-hour event
Inflow      =   1,523.26 cfs @   12.18 hrs,  Volume=        192.309 af
Outflow     =     126.32 cfs @   13.73 hrs,  Volume=        192.188 af,  Atten= 92%,  Lag= 92.7 min
Primary     =     126.32 cfs @   13.73 hrs,  Volume=        192.188 af
Secondary   =       0.00 cfs @    0.00 hrs,  Volume=          0.000 af
Tertiary    =       0.00 cfs @    0.00 hrs,  Volume=          0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 449.22' @ 13.73 hrs   Surf.Area= 560,930 sf   Storage= 2,908,812 cf

Plug-Flow detention time= 182.8 min calculated for 192.188 af (100% of inflow)
Center-of-Mass det. time= 181.7 min ( 1,256.7 - 1,075.0 )

Volume      Invert    Avail.Storage   Storage Description
  #1       432.00'     4,896,600 cf   Custom Stage Data (Prismatic)Listed below (Recalc)

 Elevation        Surf.Area        Inc.Store         Cum.Store
    (feet)          (sq-ft)     (cubic-feet)      (cubic-feet)
    432.00                0                0                 0
    434.00            7,000            7,000             7,000
    436.00           17,000           24,000            31,000
    438.00           34,000           51,000            82,000
    440.00           85,000          119,000           201,000
    442.00          156,400          241,400           442,400
    444.00          244,700          401,100           843,500
    446.00          355,500          600,200         1,443,700
    448.00          477,700          833,200         2,276,900
    450.00          614,500        1,092,200         3,369,100
    452.00          913,000        1,527,500         4,896,600

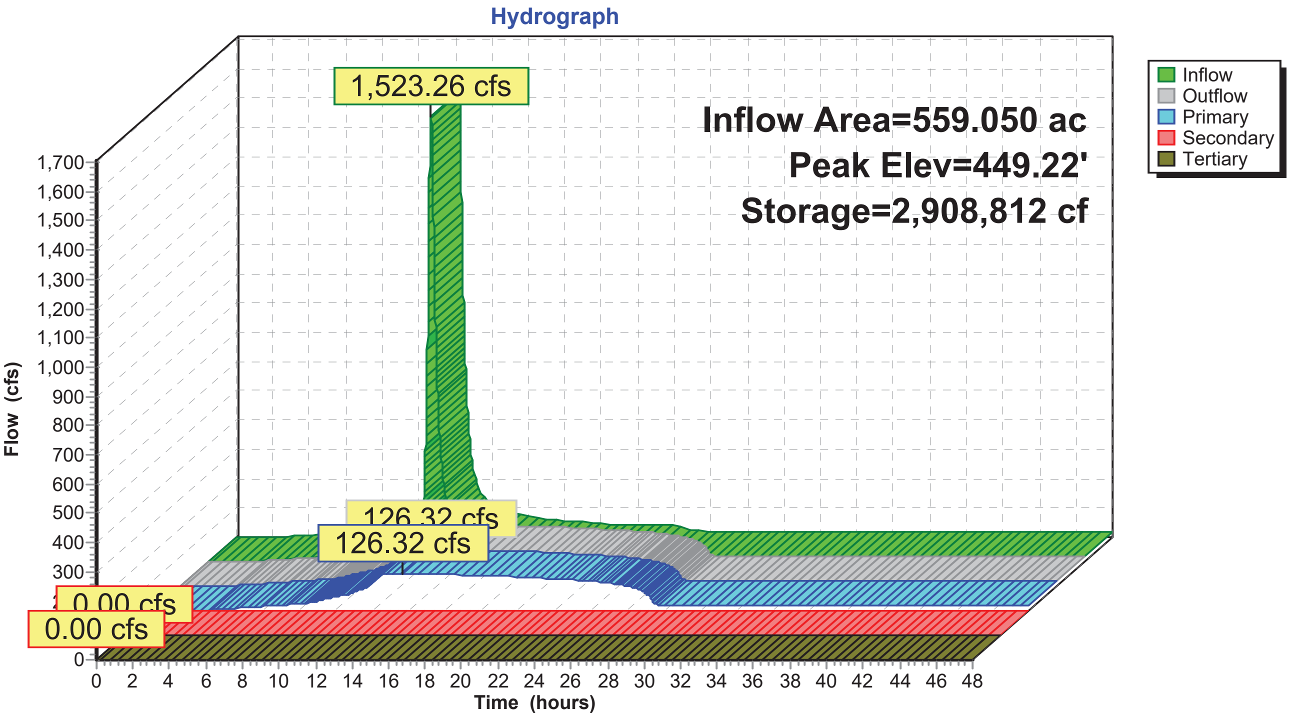
Device   Routing        Invert   Outlet Devices
  #1     Primary       432.00'   36.7"  Round DR 17 IPS 42-inch culvert
                                 L= 270.0'   CPP, square edge headwall,  Ke= 0.500
                                 Inlet / Outlet Invert= 432.00' / 430.50'   S= 0.0056 '/'   Cc= 0.900
                                 n= 0.013  Corrugated PE, smooth interior,  Flow Area= 7.35 sf
  #2     Secondary     450.00'   Emergency Spillway Weir, Cv= 2.62 (C= 3.28)
                                 Head (feet)  0.00  1.00  5.00
                                 Width (feet)  100.00  120.00  200.00
  #3     Tertiary      451.00'   250.0' long  x 15.0' breadth Top of berm
                                 Head (feet)  0.20  0.40  0.60  0.80  1.00  1.20  1.40  1.60
                                 Coef. (English)  2.68  2.70  2.70  2.64  2.63  2.64  2.64  2.63
```

Primary OutFlow Max=126.32 cfs @ 13.73 hrs HW=449.22' TW=432.24' (Dynamic Tailwater)
↑—**1=DR 17 IPS 42-inch culvert** (Barrel Controls 126.32 cfs @ 17.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=432.00' TW=449.50' (Dynamic Tailwater)
↑—**2=Emergency Spillway Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=432.00' TW=430.50' (Dynamic Tailwater)
↑—**3=Top of berm** (Controls 0.00 cfs)

Pond A: Detention Pond A



Summary for Pond B: Detention Pond B

[62] Hint: Exceeded Reach R8 OUTLET depth by 10.77' @ 26.47 hrs

Inflow Area =	140.600 ac,	0.00% Impervious,	Inflow Depth = 4.71"	for 100-year 24-hour event
Inflow =	455.45 cfs @	12.43 hrs, Volume=	55.132 af	
Outflow =	9.10 cfs @	24.70 hrs, Volume=	27.039 af,	Atten= 98%, Lag= 735.8 min
Primary =	9.10 cfs @	24.70 hrs, Volume=	27.039 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 461.92' @ 24.53 hrs Surf.Area= 14.527 ac Storage= 44.694 af

Plug-Flow detention time= 1,024.6 min calculated for 27.039 af (49% of inflow)
Center-of-Mass det. time= 899.4 min (1,760.9 - 861.5)

Volume	Invert	Avail.Storage	Storage Description
#1	451.00'	165.785 af	**Custom Stage Data (Prismatic)**Listed below

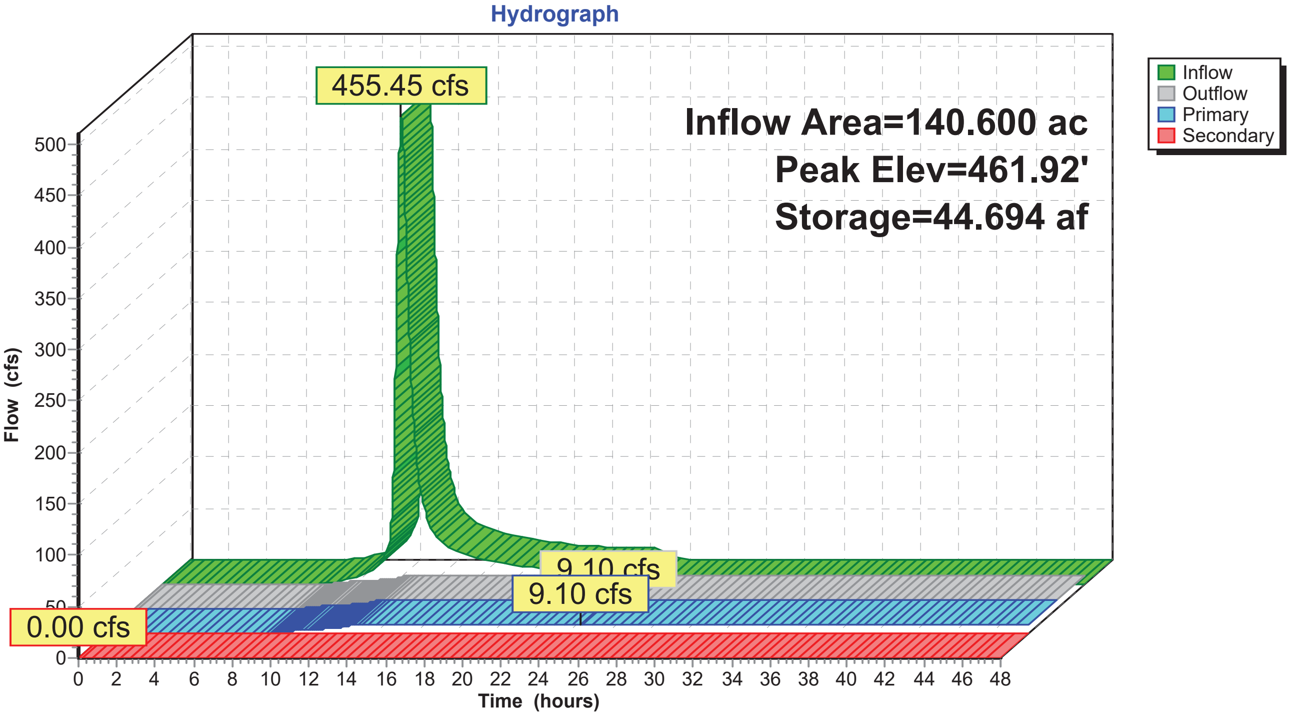
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
451.00	0.000	0.000	0.000
452.00	0.310	0.155	0.155
454.00	0.780	1.090	1.245
456.00	1.410	2.190	3.435
458.00	4.150	5.560	8.995
460.00	8.860	13.010	22.005
462.00	14.760	23.620	45.625
464.00	18.530	33.290	78.915
466.00	21.620	40.150	119.065
468.00	25.100	46.720	165.785

Device	Routing	Invert	Outlet Devices
#1	Primary	451.00'	**12.6" Round DR-7 IPS 18-inch culvert** L= 150.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 451.00' / 450.00' S= 0.0067 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.87 sf
#2	Secondary	462.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 2.00 Width (feet) 20.00 60.00

Primary OutFlow Max=9.10 cfs @ 24.70 hrs HW=461.92' TW=451.77' (Dynamic Tailwater)
↑—**1=DR-7 IPS 18-inch culvert** (Outlet Controls 9.10 cfs @ 10.51 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=451.00' TW=462.50' (Dynamic Tailwater)
↑—**2=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond B: Detention Pond B



Summary for Pond B-1: Upstream of Main Letdown Channel

[57] Hint: Peaked at 463.57' (Flood elevation advised)
[62] Hint: Exceeded Reach PE7 OUTLET depth by 1.11' @ 12.18 hrs
[62] Hint: Exceeded Reach PW4 OUTLET depth by 2.42' @ 12.15 hrs

```
Inflow Area =      152.300 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =   1,090.99 cfs @   12.17 hrs,  Volume=          95.579 af
Outflow      =   1,090.99 cfs @   12.17 hrs,  Volume=          95.579 af,  Atten= 0%,  Lag= 0.0 min
Primary      =   1,090.99 cfs @   12.17 hrs,  Volume=          95.579 af
Secondary =           0.00 cfs @     0.00 hrs,  Volume=            0.000 af
```

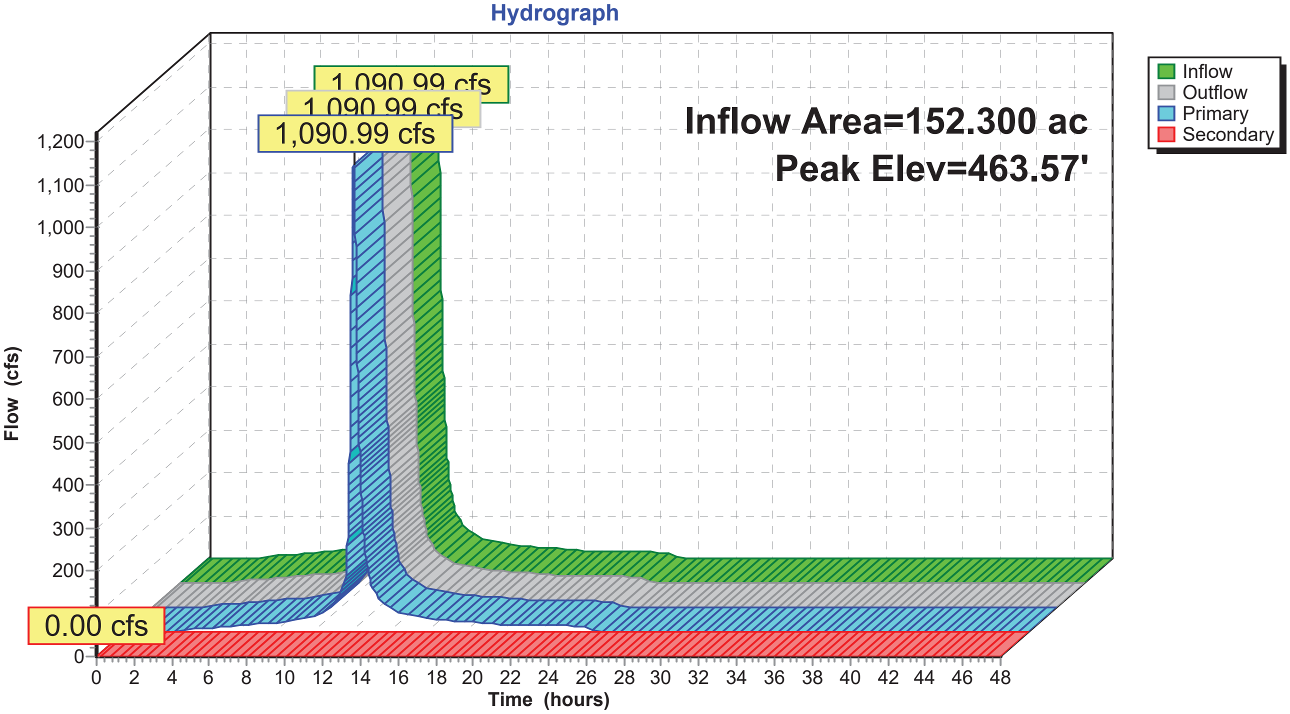
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 463.57' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	458.00'	**120.0" W x 60.0" H Box Culvert X 3.00** L= 40.0' Box, headwall w/3 rounded edges, Ke= 0.200 Inlet / Outlet Invert= 458.00' / 457.90' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 50.00 sf
#2	Secondary	465.00'	**90.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1,090.42 cfs @ 12.17 hrs HW=463.56' TW=461.23' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1,090.42 cfs @ 8.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=458.00' TW=457.90' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B-1: Upstream of Main Letdown Channel



Summary for Pond C: Detention Pond C

[62] Hint: Exceeded Reach AR4 OUTLET depth by 9.70' @ 24.69 hrs
[62] Hint: Exceeded Reach R3 OUTLET depth by 9.09' @ 26.13 hrs
[62] Hint: Exceeded Reach R4 OUTLET depth by 10.18' @ 25.00 hrs

Inflow Area = 175.250 ac, 0.00% Impervious, Inflow Depth = 4.13" for 100-year 24-hour event
Inflow = 386.72 cfs @ 12.20 hrs, Volume= 60.246 af
Outflow = 9.44 cfs @ 25.01 hrs, Volume= 27.996 af, Atten= 98%, Lag= 769.0 min
Primary = 9.44 cfs @ 25.01 hrs, Volume= 27.996 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 464.70' @ 24.45 hrs Surf.Area= 11.872 ac Storage= 49.514 af

Plug-Flow detention time= 1,030.1 min calculated for 27.990 af (46% of inflow)
Center-of-Mass det. time= 897.7 min (1,761.7 - 864.0)

Volume	Invert	Avail.Storage	Storage Description
#1	453.00'	125.750 af	**Custom Stage Data (Prismatic)**Listed below

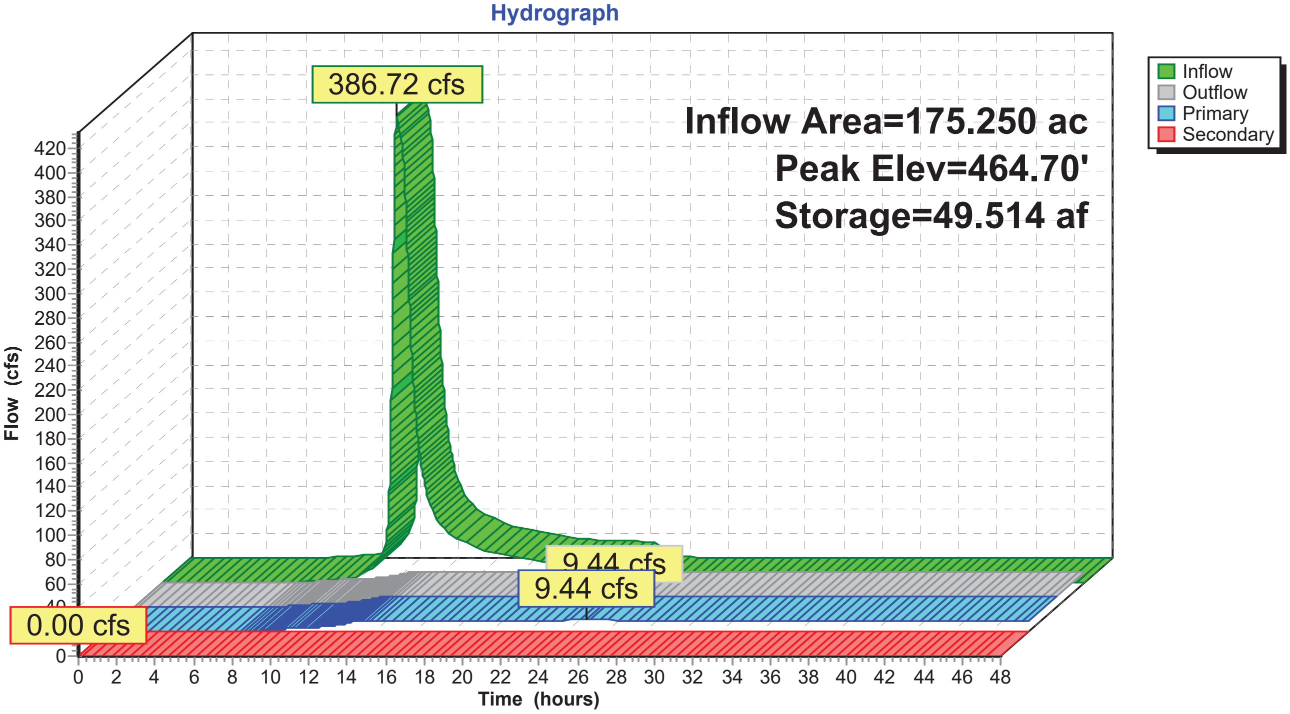
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
453.00	0.000	0.000	0.000
454.00	0.180	0.090	0.090
456.00	0.800	0.980	1.070
458.00	1.430	2.230	3.300
460.00	4.300	5.730	9.030
462.00	8.260	12.560	21.590
464.00	11.100	19.360	40.950
466.00	13.300	24.400	65.350
468.00	15.100	28.400	93.750
470.00	16.900	32.000	125.750

Device	Routing	Invert	Outlet Devices
#1	Primary	453.00'	**12.6" Round DR-7 IPS 18-inch culvert** L= 150.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 453.00' / 452.00' S= 0.0067 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.87 sf
#2	Secondary	465.00'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 2.00 Width (feet) 20.00 60.00

Primary OutFlow Max=9.44 cfs @ 25.01 hrs HW=464.69' TW=453.77' (Dynamic Tailwater)
└─**1=DR-7 IPS 18-inch culvert** (Outlet Controls 9.44 cfs @ 10.90 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=453.00' TW=465.00' (Dynamic Tailwater)
└─**2=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond C: Detention Pond C



Summary for Pond DP-1: Culvert Under DP Roadway

[57] Hint: Peaked at 482.21' (Flood elevation advised)
[62] Hint: Exceeded Reach AR2 OUTLET depth by 1.08' @ 11.99 hrs

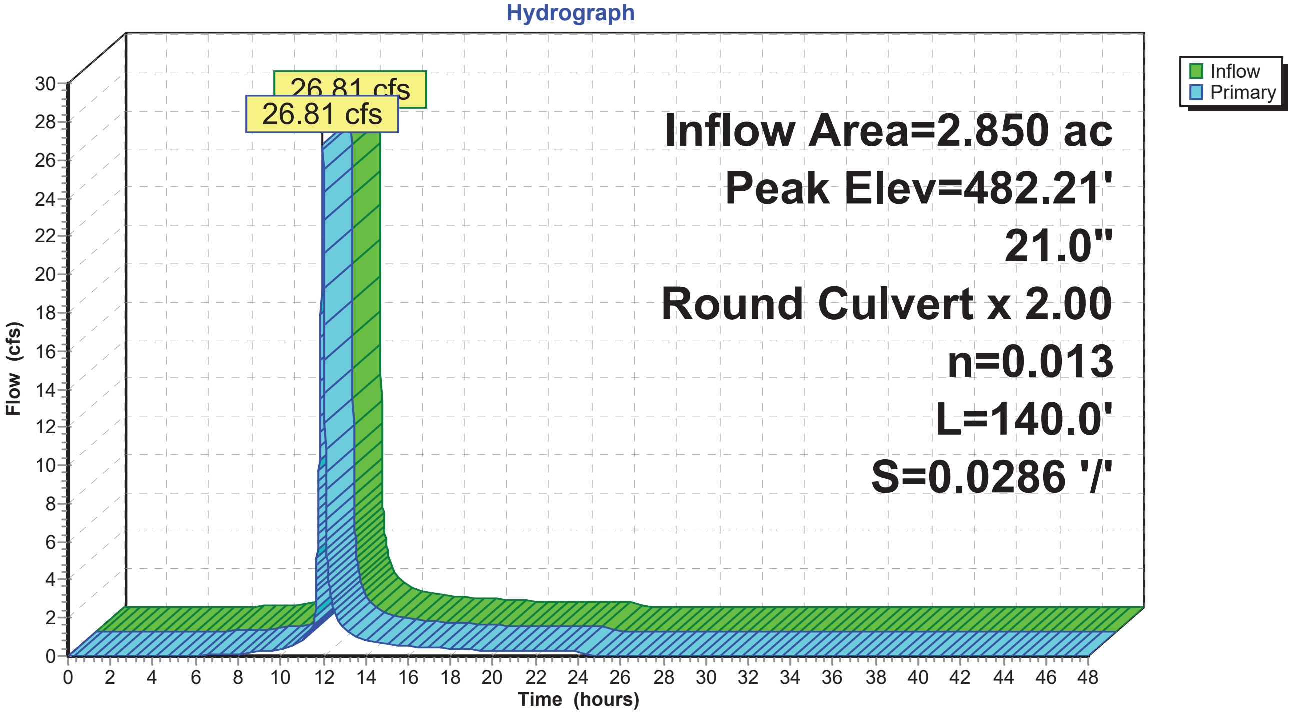
```
Inflow Area =       2.850 ac,   0.00% Impervious,  Inflow Depth =   5.63"   for  100-year 24-hour event
Inflow      =      26.81 cfs @   11.99 hrs,  Volume=          1.337 af
Outflow     =      26.81 cfs @   11.99 hrs,  Volume=          1.337 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      26.81 cfs @   11.99 hrs,  Volume=          1.337 af
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.21' @ 11.99 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	480.00'	**21.0" Round DR-17 24-inch HDPE X 2.00** L= 140.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 480.00' / 476.00' S= 0.0286 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf

Primary OutFlow Max=26.75 cfs @ 11.99 hrs HW=482.21' TW=477.18' (Dynamic Tailwater)
↑—**1=DR-17 24-inch HDPE** (Inlet Controls 26.75 cfs @ 5.56 fps)

Pond DP-1: Culvert Under DP Roadway



Summary for Pond DP-2: Culvert Under DP Roadway

[57] Hint: Peaked at 480.49' (Flood elevation advised)
[62] Hint: Exceeded Reach AR3 OUTLET depth by 0.69' @ 11.98 hrs

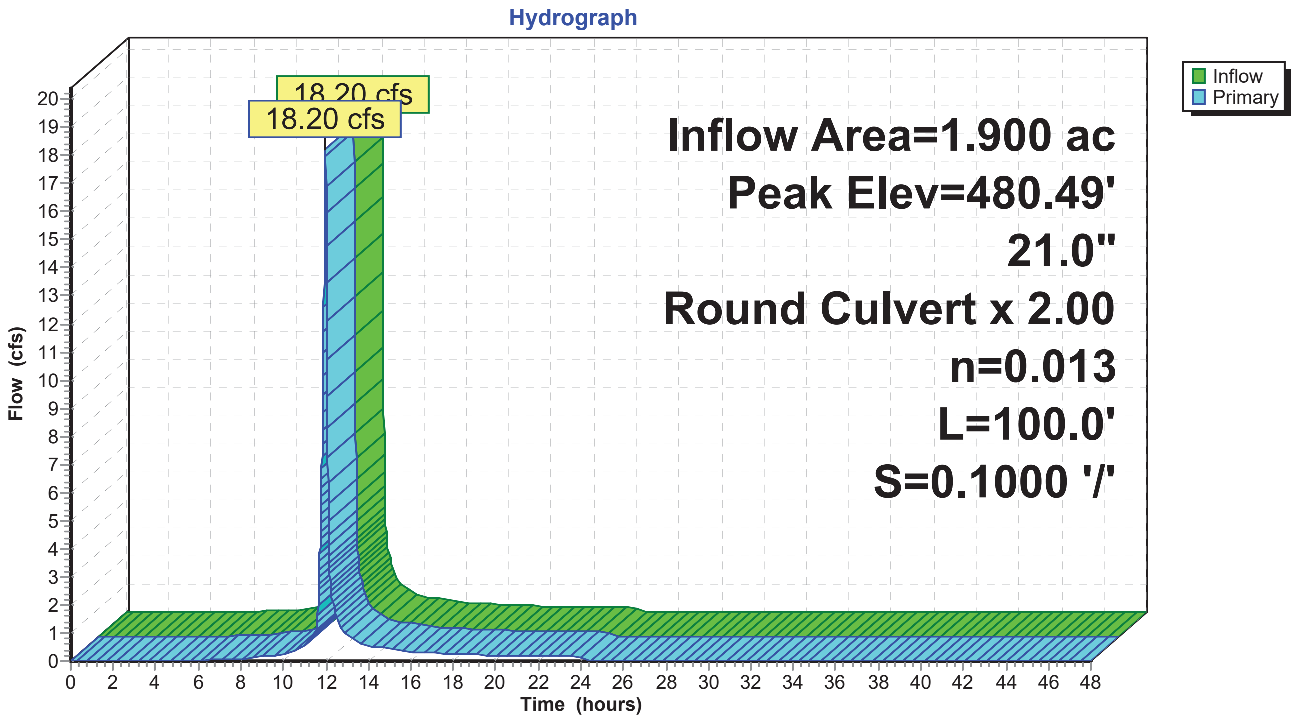
```
Inflow Area =       1.900 ac,   0.00% Impervious,  Inflow Depth =   5.63"    for  100-year 24-hour event
Inflow      =      18.20 cfs @   11.98 hrs,  Volume=           0.891 af
Outflow     =      18.20 cfs @   11.98 hrs,  Volume=           0.891 af,  Atten= 0%,  Lag= 0.0 min
Primary     =      18.20 cfs @   11.98 hrs,  Volume=           0.891 af
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 480.49' @ 11.98 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	479.00'	**21.0" Round DR-17 24" HDPE X 2.00** L= 100.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 479.00' / 469.00' S= 0.1000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 2.41 sf

Primary OutFlow Max=18.19 cfs @ 11.98 hrs HW=480.49' TW=469.76' (Dynamic Tailwater)
↑—**1=DR-17 24" HDPE** (Inlet Controls 18.19 cfs @ 4.16 fps)

Pond DP-2: Culvert Under DP Roadway

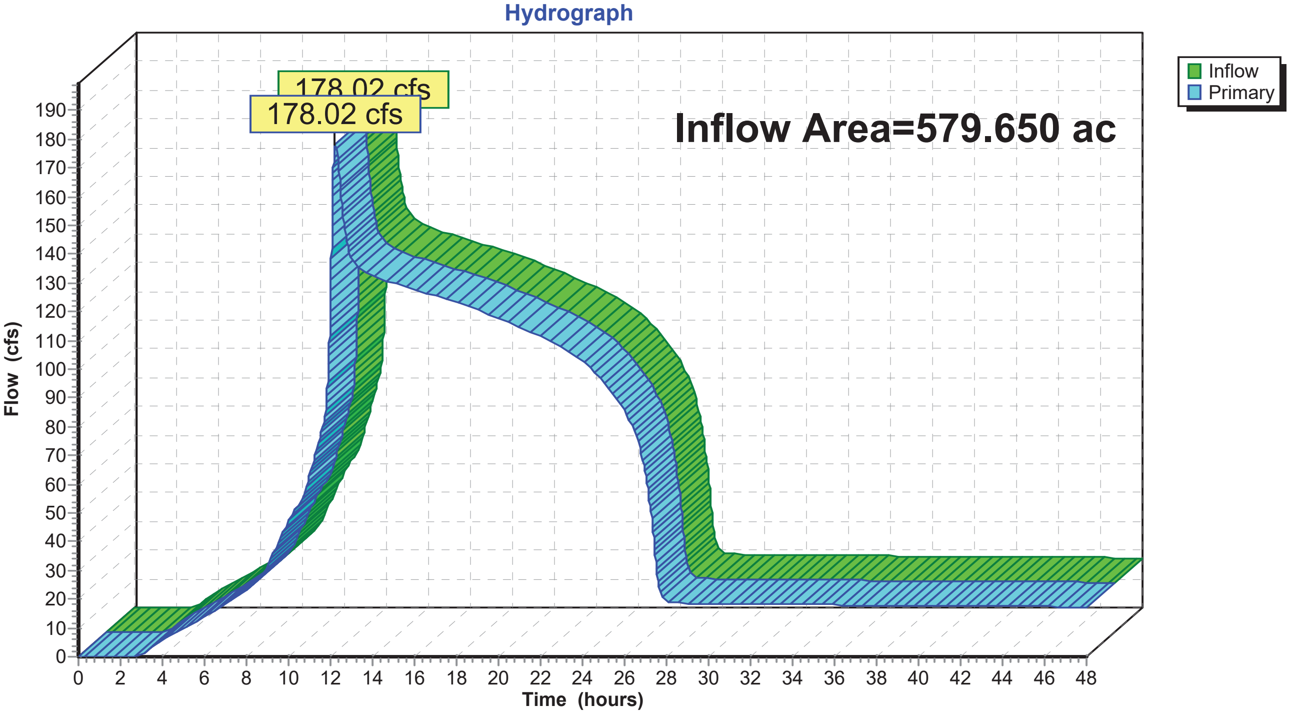


Summary for Link CREEK: Berry Creek

Inflow Area = 579.650 ac, 0.00% Impervious, Inflow Depth > 4.12" for 100-year 24-hour event
Inflow = 178.02 cfs @ 12.24 hrs, Volume= 198.914 af
Primary = 178.02 cfs @ 12.24 hrs, Volume= 198.914 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Link CREEK: Berry Creek



Routing Diagram for EAST Scherer AP-1 Closure Design-Upstream of Dam
Prepared by AECOM, Printed 4/30/2020
HydroCAD® 10.00-25 s/n 09114 © 2019 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.000	**0**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.000		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	A	432.00	430.50	270.0	0.0056	0.013	36.7	0.0	0.0
2	B	451.00	450.00	150.0	0.0067	0.013	12.6	0.0	0.0
3	B-1	458.00	457.90	40.0	0.0025	0.013	120.0	60.0	0.0
4	C	453.00	452.00	150.0	0.0067	0.013	12.6	0.0	0.0

```
                    Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
                    Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
         Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Reach B0: Main letdown leading    Avg. Flow Depth=3.83'   Max Vel=6.87 fps   Inflow=1,423.97 cfs  124.302 af
                    n=0.043   L=50.0'   S=0.0100 '/'   Capacity=2,384.81 cfs   Outflow=1,423.91 cfs  124.302 af

Reach B1: Main letdown leading    Avg. Flow Depth=3.09'   Max Vel=9.11 fps   Inflow=1,423.91 cfs  124.302 af
                    n=0.043   L=600.0'   S=0.0223 '/'   Capacity=3,563.94 cfs   Outflow=1,418.29 cfs  124.302 af

Pond A: Detention Pond A               Peak Elev=450.60'  Storage=3,764,434 cf   Inflow=2,027.79 cfs  271.185 af
Primary=131.78 cfs  254.160 af   Secondary=142.59 cfs  16.897 af   Tertiary=0.00 cfs  0.000 af   Outflow=274.37 cfs  271.058 af

Pond B: Detention Pond B                    Peak Elev=462.88'  Storage=60.199 af   Inflow=658.64 cfs  78.852 af
                    Primary=9.49 cfs  28.893 af   Secondary=13.58 cfs  9.903 af   Outflow=23.07 cfs  38.796 af

Pond B-1: Upstream of Main Letdown Channel          Peak Elev=464.72'   Inflow=1,423.97 cfs  124.302 af
             Primary=1,423.97 cfs  124.302 af   Secondary=0.00 cfs  0.000 af   Outflow=1,423.97 cfs  124.302 af

Pond C: Detention Pond C                    Peak Elev=465.63'  Storage=60.795 af   Inflow=579.42 cfs  88.312 af
                   Primary=9.57 cfs  29.081 af   Secondary=34.11 cfs  21.085 af   Outflow=43.35 cfs  50.167 af
```

Summary for Reach B0: Main letdown leading to detention pond

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

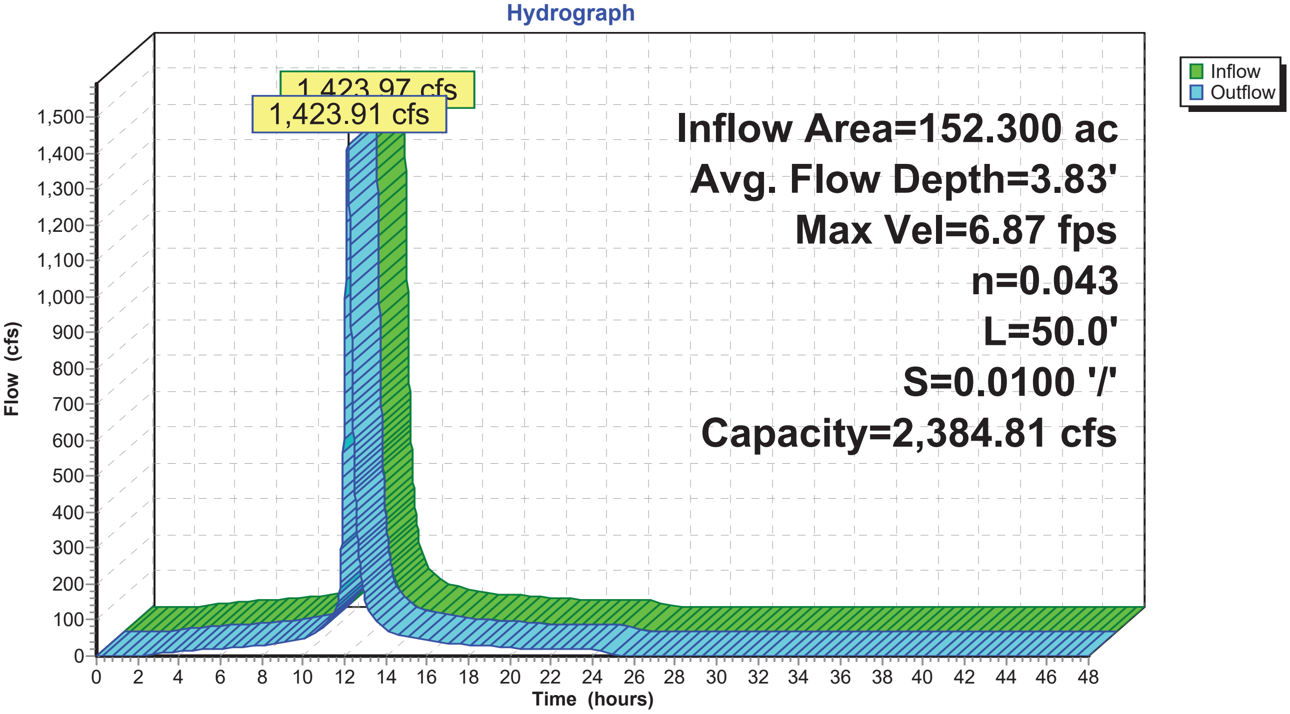
```
Inflow Area =      152.300 ac,    0.00% Impervious,  Inflow Depth =   9.79"    for  500-year 24-hour event
Inflow       =   1,423.97 cfs @   12.16 hrs,  Volume=         124.302 af
Outflow      =   1,423.91 cfs @   12.16 hrs,  Volume=         124.302 af,  Atten= 0%,  Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 6.87 fps,  Min. Travel Time= 0.1 min
Avg. Velocity = 1.35 fps,  Avg. Travel Time= 0.6 min

Peak Storage= 10,369 cf @ 12.16 hrs
Average Depth at Peak Storage= 3.83'
Bank-Full Depth= 5.00'  Flow Area= 300.0 sf,  Capacity= 2,384.81 cfs

35.00'  x  5.00'  deep channel,  n= 0.043
Side Slope Z-value= 5.0 '/'   Top Width= 85.00'
Length= 50.0'   Slope= 0.0100 '/'
Inlet Invert= 457.90',  Outlet Invert= 457.40'
```

Reach B0: Main letdown leading to detention pond



Summary for Reach B1: Main letdown leading to detention pond

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

```
[61] Hint: Exceeded Reach B0 outlet invert by 3.09' @ 12.17 hrs

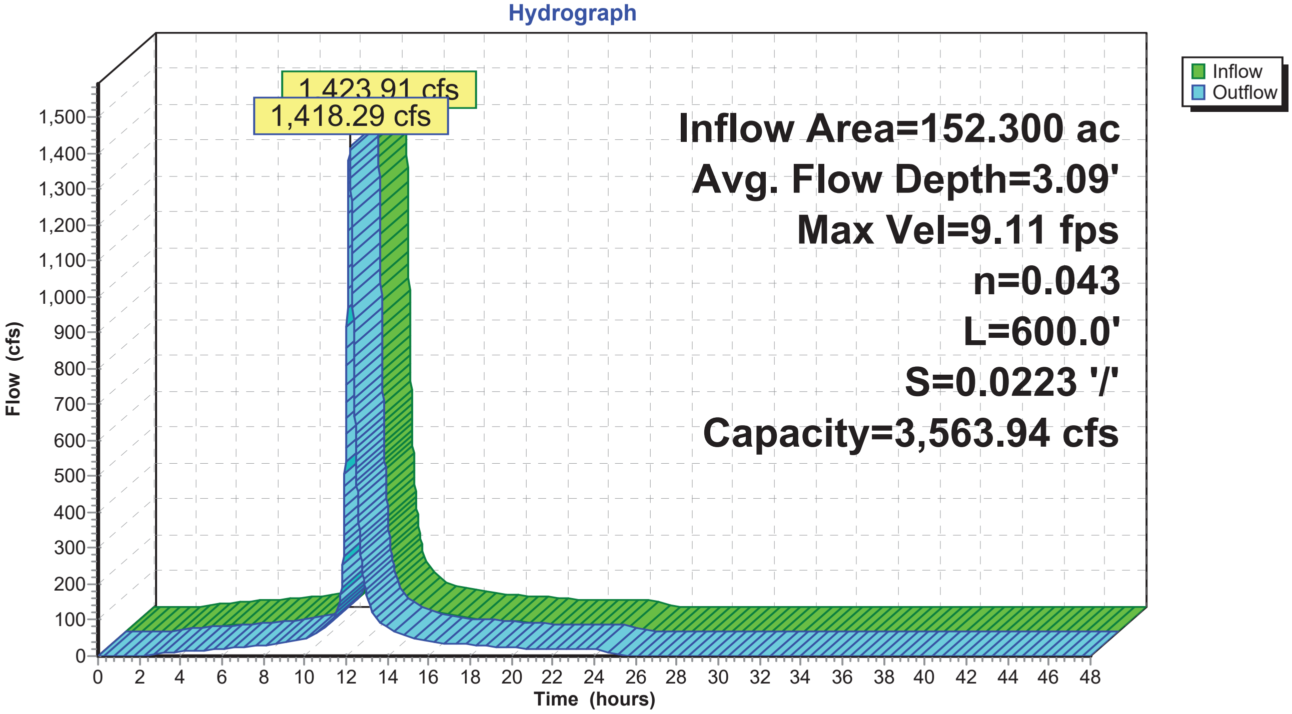
Inflow Area =      152.300 ac,    0.00% Impervious,  Inflow Depth =   9.79"    for  500-year 24-hour event
Inflow       =   1,423.91 cfs @   12.16 hrs,  Volume=         124.302 af
Outflow      =   1,418.29 cfs @   12.17 hrs,  Volume=         124.302 af,  Atten= 0%,  Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 9.11 fps,  Min. Travel Time= 1.1 min
Avg. Velocity = 1.79 fps,  Avg. Travel Time= 5.6 min

Peak Storage= 93,428 cf @ 12.17 hrs
Average Depth at Peak Storage= 3.09'
Bank-Full Depth= 5.00'  Flow Area= 300.0 sf,  Capacity= 3,563.94 cfs

35.00'  x  5.00'  deep channel,  n= 0.043
Side Slope Z-value= 5.0 '/'   Top Width= 85.00'
Length= 600.0'   Slope= 0.0223 '/'
Inlet Invert= 457.40',  Outlet Invert= 444.00'
```

Reach B1: Main letdown leading to detention pond



Summary for Pond A: Detention Pond A

Slopes and other pond characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach B1 OUTLET depth by 5.80' @ 13.42 hrs
[63] Warning: Exceeded Reach R11 INLET depth by 0.35' @ 13.60 hrs

Inflow Area =      559.050 ac,    0.00% Impervious,  Inflow Depth >   5.82"    for  500-year 24-hour event
Inflow      =   2,027.79 cfs @   12.18 hrs,  Volume=        271.185 af
Outflow     =     274.37 cfs @   13.02 hrs,  Volume=        271.058 af,  Atten= 86%,  Lag= 50.8 min
Primary     =     131.78 cfs @   13.02 hrs,  Volume=        254.160 af
Secondary   =     142.59 cfs @   13.02 hrs,  Volume=         16.897 af
Tertiary    =       0.00 cfs @    0.00 hrs,  Volume=          0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 450.60' @ 13.02 hrs   Surf.Area= 704,001 sf   Storage= 3,764,434 cf

Plug-Flow detention time= 247.5 min calculated for 271.001 af (100% of inflow)
Center-of-Mass det. time= 246.6 min ( 1,286.9 - 1,040.3 )
```

Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	4,896,600 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
434.00	7,000	7,000	7,000
436.00	17,000	24,000	31,000
438.00	34,000	51,000	82,000
440.00	85,000	119,000	201,000
442.00	156,400	241,400	442,400
444.00	244,700	401,100	843,500
446.00	355,500	600,200	1,443,700
448.00	477,700	833,200	2,276,900
450.00	614,500	1,092,200	3,369,100
452.00	913,000	1,527,500	4,896,600

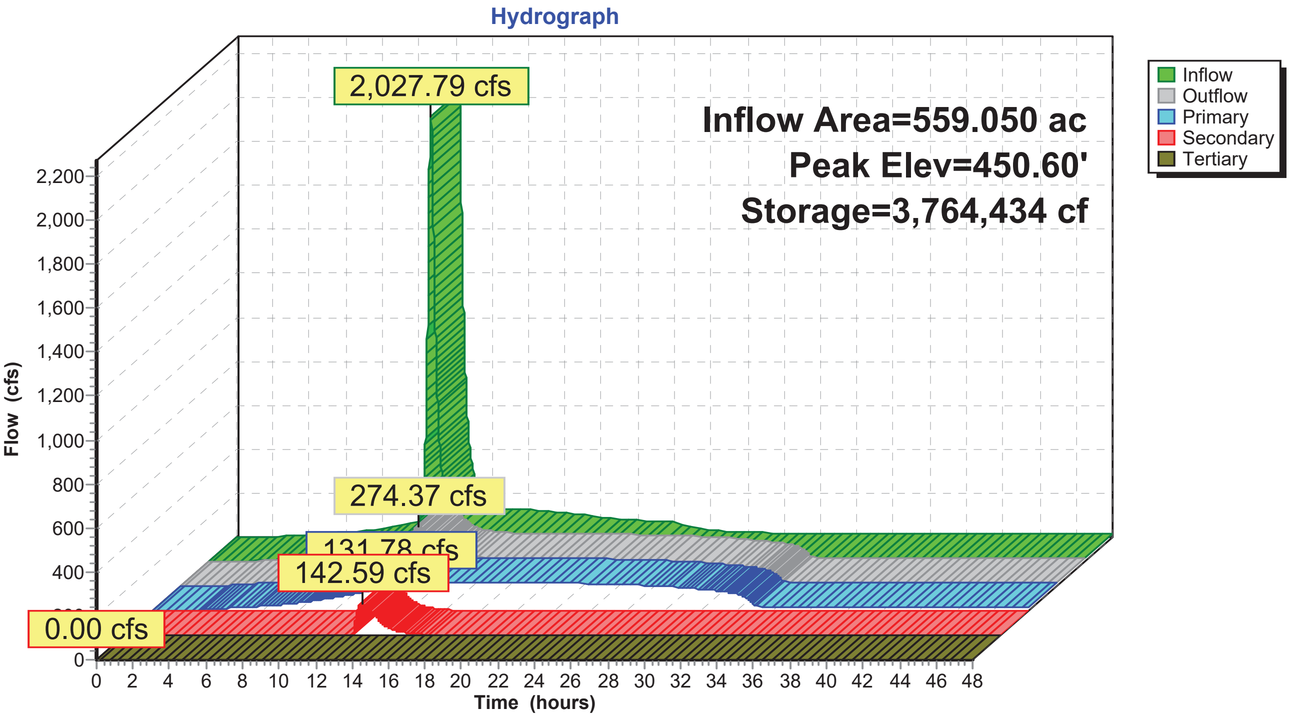
Device	Routing	Invert	Outlet Devices
#1	Primary	432.00'	**36.7" Round DR 17 IPS 42-inch culvert** L= 270.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 432.00' / 430.50' S= 0.0056 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.35 sf
#2	Secondary	450.00'	**Emergency Spillway Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 5.00 Width (feet) 100.00 120.00 200.00
#3	Tertiary	451.00'	**250.0' long x 15.0' breadth Top of berm** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=131.78 cfs @ 13.02 hrs HW=450.60' TW=433.16' (Dynamic Tailwater)
↑—**1=DR 17 IPS 42-inch culvert** (Barrel Controls 131.78 cfs @ 17.94 fps)

Secondary OutFlow Max=142.59 cfs @ 13.02 hrs HW=450.60' TW=450.29' (Dynamic Tailwater)
↑—**2=Emergency Spillway Weir** (Weir Controls 142.59 cfs @ 2.24 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=432.00' TW=430.50' (Dynamic Tailwater)
↑—**3=Top of berm** (Controls 0.00 cfs)

Pond A: Detention Pond A



Summary for Pond B: Detention Pond B

[62] Hint: Exceeded Reach R8 OUTLET depth by 11.60' @ 26.54 hrs

Inflow Area = 140.600 ac, 0.00% Impervious, Inflow Depth = 6.73" for 500-year 24-hour event
Inflow = 658.64 cfs @ 12.42 hrs, Volume= 78.852 af
Outflow = 23.07 cfs @ 19.03 hrs, Volume= 38.796 af, Atten= 96%, Lag= 396.8 min
Primary = 9.49 cfs @ 19.49 hrs, Volume= 28.893 af
Secondary = 13.58 cfs @ 19.03 hrs, Volume= 9.903 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 462.88' @ 19.04 hrs Surf.Area= 16.411 ac Storage= 60.199 af

Plug-Flow detention time= 883.3 min calculated for 38.788 af (49% of inflow)
Center-of-Mass det. time= 761.6 min (1,611.7 - 850.1)

Volume	Invert	Avail.Storage	Storage Description
#1	451.00'	165.785 af	**Custom Stage Data (Prismatic)**Listed below

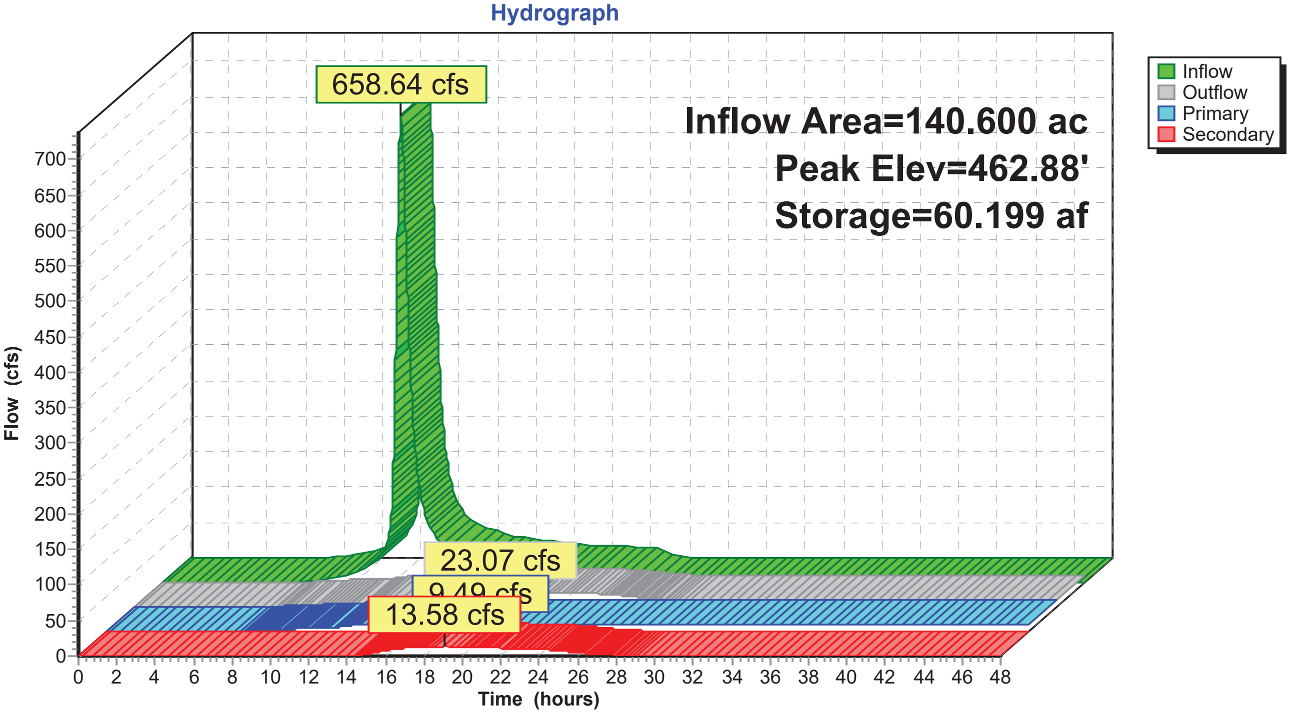
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
451.00	0.000	0.000	0.000
452.00	0.310	0.155	0.155
454.00	0.780	1.090	1.245
456.00	1.410	2.190	3.435
458.00	4.150	5.560	8.995
460.00	8.860	13.010	22.005
462.00	14.760	23.620	45.625
464.00	18.530	33.290	78.915
466.00	21.620	40.150	119.065
468.00	25.100	46.720	165.785

Device	Routing	Invert	Outlet Devices
#1	Primary	451.00'	**12.6" Round DR-7 IPS 18-inch culvert** L= 150.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 451.00' / 450.00' S= 0.0067 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.87 sf
#2	Secondary	462.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 2.00 Width (feet) 20.00 60.00

Primary OutFlow Max=9.49 cfs @ 19.49 hrs HW=462.87' TW=451.84' (Dynamic Tailwater)
↳**1=DR-7 IPS 18-inch culvert** (Outlet Controls 9.49 cfs @ 10.96 fps)

Secondary OutFlow Max=13.58 cfs @ 19.03 hrs HW=462.88' TW=462.75' (Dynamic Tailwater)
↳**2=Custom Weir/Orifice** (Weir Controls 13.58 cfs @ 1.52 fps)

Pond B: Detention Pond B



Summary for Pond B-1: Upstream of Main Letdown Channel

```
[57] Hint: Peaked at 464.72' (Flood elevation advised)
[62] Hint: Exceeded Reach PE7 OUTLET depth by 1.71' @ 12.16 hrs
[62] Hint: Exceeded Reach PW4 OUTLET depth by 3.15' @ 12.16 hrs

Inflow Area =      152.300 ac,    0.00% Impervious,  Inflow Depth =   9.79"    for  500-year 24-hour event
Inflow      =   1,423.97 cfs @   12.16 hrs,  Volume=        124.302 af
Outflow     =   1,423.97 cfs @   12.16 hrs,  Volume=        124.302 af,  Atten= 0%,  Lag= 0.0 min
Primary     =   1,423.97 cfs @   12.16 hrs,  Volume=        124.302 af
Secondary =         0.00 cfs @    0.00 hrs,  Volume=          0.000 af

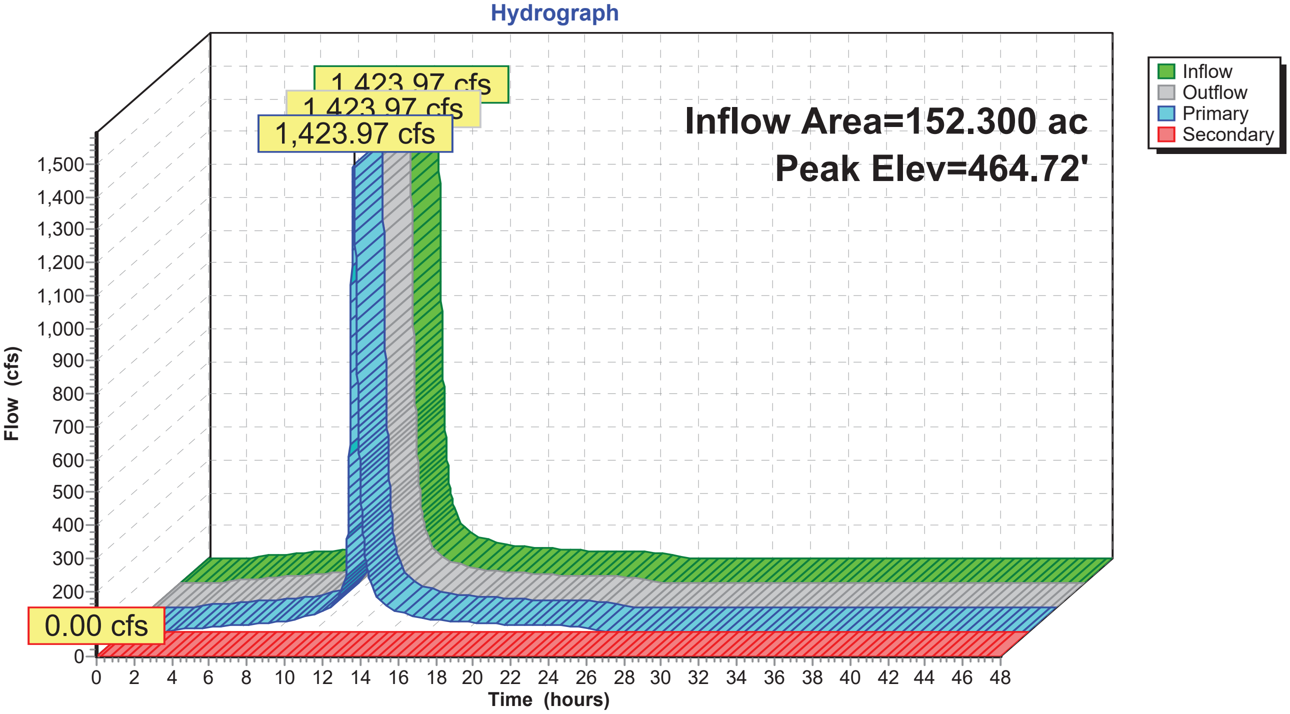
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 464.72' @ 12.16 hrs

Device  Routing          Invert   Outlet Devices
   #1   Primary         458.00'   120.0" W x 60.0" H  Box Culvert X 3.00
                                  L= 40.0'   Box, headwall w/3 rounded edges,  Ke= 0.200
                                  Inlet / Outlet Invert= 458.00' / 457.90'   S= 0.0025 '/'   Cc= 0.900
                                  n= 0.013,  Flow Area= 50.00 sf
   #2   Secondary       465.00'   90.0' long  x 20.0' breadth Broad-Crested Rectangular Weir
                                  Head (feet)  0.20  0.40  0.60  0.80  1.00  1.20  1.40  1.60
                                  Coef. (English)  2.68  2.70  2.70  2.64  2.63  2.64  2.64  2.63

Primary OutFlow  Max=1,422.36 cfs @ 12.16 hrs  HW=464.72'  TW=461.73'   (Dynamic Tailwater)
└─1=Culvert  (Barrel Controls 1,422.36 cfs @ 9.48 fps)

Secondary OutFlow  Max=0.00 cfs @ 0.00 hrs  HW=458.00'  TW=457.90'   (Dynamic Tailwater)
└─2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)
```

Pond B-1: Upstream of Main Letdown Channel



Summary for Pond C: Detention Pond C

```
[62] Hint: Exceeded Reach AR4 OUTLET depth by 10.51' @ 16.15 hrs
[62] Hint: Exceeded Reach R3 OUTLET depth by 9.63' @ 25.42 hrs
[62] Hint: Exceeded Reach R4 OUTLET depth by 10.87' @ 16.40 hrs

Inflow Area =    175.250 ac,   0.00% Impervious,  Inflow Depth =   6.05"   for  500-year 24-hour event
Inflow      =    579.42 cfs @  12.20 hrs,  Volume=        88.312 af
Outflow     =     43.35 cfs @  15.96 hrs,  Volume=        50.167 af,  Atten= 93%,  Lag= 225.2 min
Primary     =      9.57 cfs @  28.30 hrs,  Volume=        29.081 af
Secondary =       34.11 cfs @  15.96 hrs,  Volume=        21.085 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 465.63' @ 15.96 hrs   Surf.Area= 12.889 ac   Storage= 60.795 af

Plug-Flow detention time= 750.2 min calculated for 50.156 af (57% of inflow)
Center-of-Mass det. time= 631.0 min ( 1,483.6 - 852.6 )

Volume       Invert   Avail.Storage   Storage Description
   #1       453.00'      125.750 af   Custom Stage Data (Prismatic)Listed below

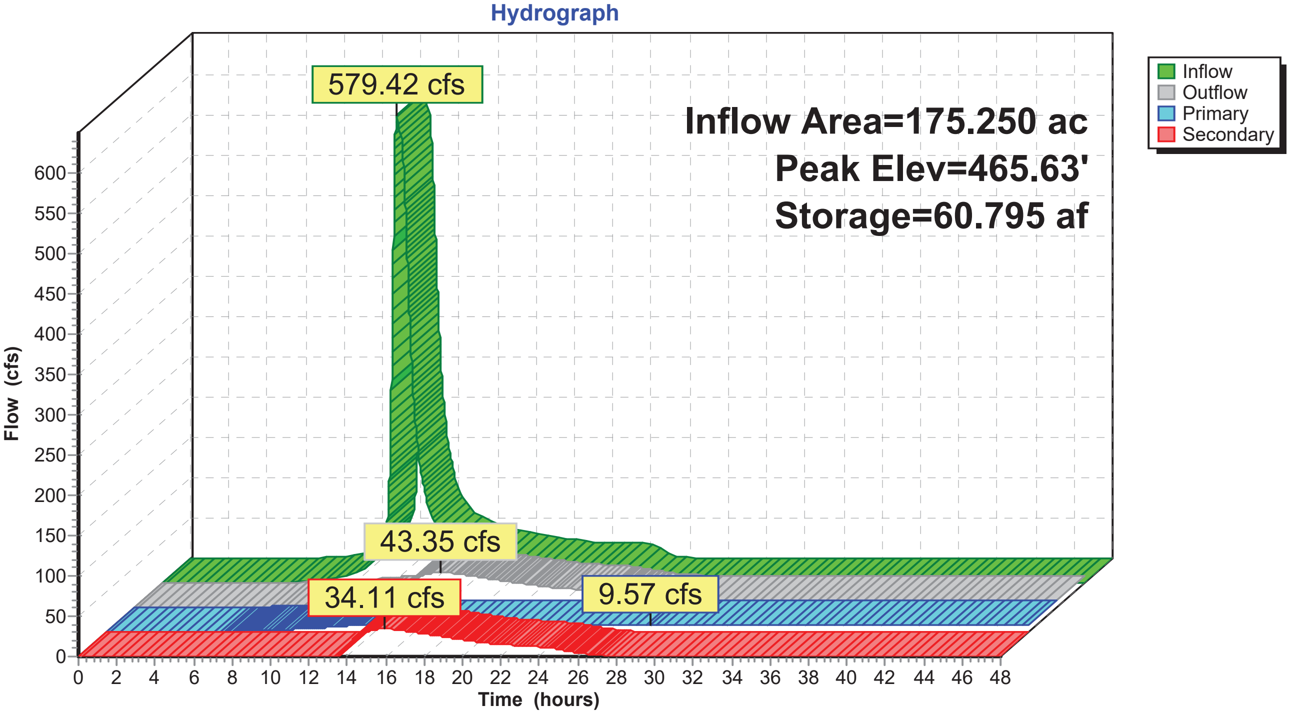
 Elevation      Surf.Area        Inc.Store       Cum.Store
    (feet)        (acres)      (acre-feet)     (acre-feet)
    453.00          0.000            0.000           0.000
    454.00          0.180            0.090           0.090
    456.00          0.800            0.980           1.070
    458.00          1.430            2.230           3.300
    460.00          4.300            5.730           9.030
    462.00          8.260           12.560          21.590
    464.00         11.100           19.360          40.950
    466.00         13.300           24.400          65.350
    468.00         15.100           28.400          93.750
    470.00         16.900           32.000         125.750

Device   Routing         Invert   Outlet Devices
  #1     Primary        453.00'   12.6"  Round DR-7 IPS 18-inch culvert
                                  L= 150.0'   CPP, end-section conforming to fill,  Ke= 0.500
                                  Inlet / Outlet Invert= 453.00' / 452.00'   S= 0.0067 '/'   Cc= 0.900
                                  n= 0.013  Corrugated PE, smooth interior,  Flow Area= 0.87 sf
  #2     Secondary      465.00'   Custom Weir/Orifice, Cv= 2.62 (C= 3.28)
                                  Head (feet)  0.00  2.00
                                  Width (feet)  20.00  60.00

Primary OutFlow  Max=9.57 cfs @ 28.30 hrs  HW=465.01'  TW=453.80'   (Dynamic Tailwater)
  1=DR-7 IPS 18-inch culvert (Outlet Controls 9.57 cfs @ 11.05 fps)

Secondary OutFlow  Max=34.11 cfs @ 15.96 hrs  HW=465.63'  TW=465.38'   (Dynamic Tailwater)
  2=Custom Weir/Orifice (Weir Controls 34.11 cfs @ 2.07 fps)
```

Pond C: Detention Pond C



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Reach B0: Main letdown leading Avg. Flow Depth=4.05' Max Vel=7.08 fps Inflow=1,585.33 cfs 138.233 af
n=0.043 L=50.0' S=0.0100 '/' Capacity=2,384.81 cfs Outflow=1,585.28 cfs 138.233 af

Reach B1: Main letdown leading Avg. Flow Depth=3.27' Max Vel=9.40 fps Inflow=1,585.28 cfs 138.233 af
n=0.043 L=600.0' S=0.0223 '/' Capacity=3,563.94 cfs Outflow=1,579.39 cfs 138.233 af

Pond A: Detention Pond A Peak Elev=450.99' Storage=4,049,576 cf Inflow=2,273.03 cfs 318.415 af
Primary=132.85 cfs 269.281 af Secondary=272.14 cfs 49.007 af Tertiary=0.00 cfs 0.000 af Outflow=404.66 cfs 318.288 af

Pond B: Detention Pond B Peak Elev=463.10' Storage=63.944 af Inflow=758.85 cfs 90.662 af
Primary=9.58 cfs 29.272 af Secondary=29.85 cfs 20.919 af Outflow=39.43 cfs 50.191 af

Pond B-1: Upstream of Main Letdown Channel Peak Elev=465.12' Inflow=1,585.33 cfs 138.233 af
Primary=1,574.69 cfs 138.192 af Secondary=10.65 cfs 0.041 af Outflow=1,585.33 cfs 138.233 af

Pond C: Detention Pond C Peak Elev=465.95' Storage=64.733 af Inflow=676.11 cfs 102.433 af
Primary=9.57 cfs 29.269 af Secondary=70.28 cfs 34.815 af Outflow=79.33 cfs 64.084 af

Summary for Reach B0: Main letdown leading to detention pond

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

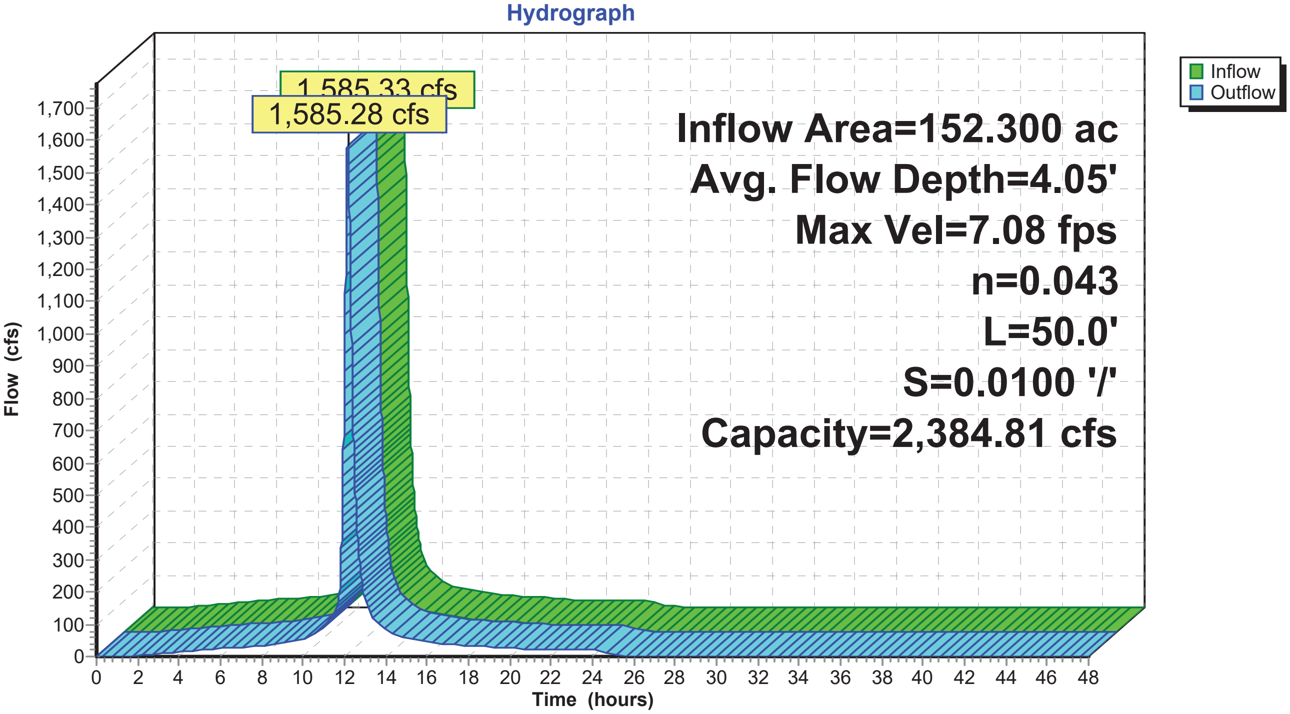
```
Inflow Area =      152.300 ac,    0.00% Impervious,  Inflow Depth = 10.89"    for  1000-year 24-hour event
Inflow       =   1,585.33 cfs @   12.16 hrs,  Volume=         138.233 af
Outflow      =   1,585.28 cfs @   12.16 hrs,  Volume=         138.233 af,  Atten= 0%,  Lag= 0.1 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 7.08 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.40 fps, Avg. Travel Time= 0.6 min

Peak Storage= 11,193 cf @ 12.16 hrs
Average Depth at Peak Storage= 4.05'
Bank-Full Depth= 5.00' Flow Area= 300.0 sf, Capacity= 2,384.81 cfs

35.00' x 5.00' deep channel, n= 0.043
Side Slope Z-value= 5.0 '/' Top Width= 85.00'
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 457.90', Outlet Invert= 457.40'

Reach B0: Main letdown leading to detention pond



Summary for Reach B1: Main letdown leading to detention pond

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

Mannings n value used for GDOT Type 1 riprap. This may be updated based on future hydraulic calculations.

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[61] Hint: Exceeded Reach B0 outlet invert by 3.27' @ 12.17 hrs

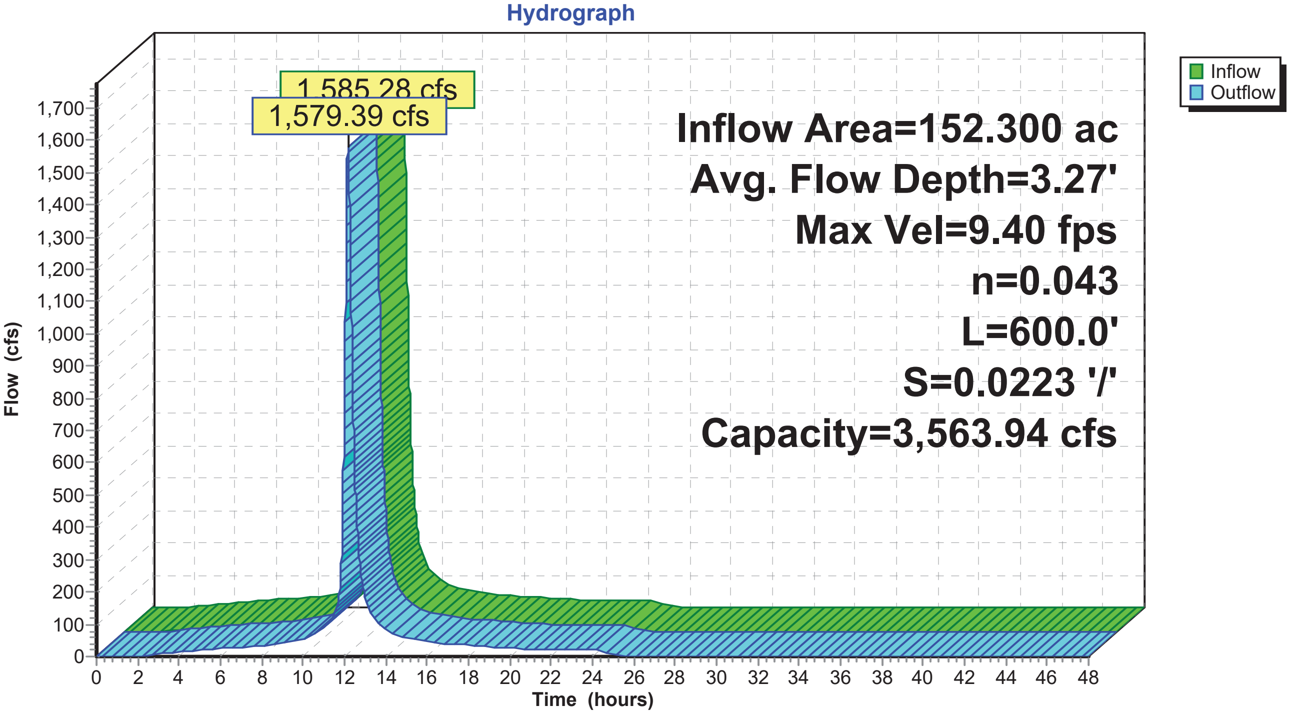
```
Inflow Area =      152.300 ac,    0.00% Impervious,  Inflow Depth = 10.89"    for  1000-year 24-hour event
Inflow       =    1,585.28 cfs @   12.16 hrs,  Volume=         138.233 af
Outflow      =    1,579.39 cfs @   12.17 hrs,  Volume=         138.233 af,  Atten= 0%,  Lag= 0.8 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 9.40 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.86 fps, Avg. Travel Time= 5.4 min

Peak Storage= 100,768 cf @ 12.17 hrs
Average Depth at Peak Storage= 3.27'
Bank-Full Depth= 5.00' Flow Area= 300.0 sf, Capacity= 3,563.94 cfs

35.00' x 5.00' deep channel, n= 0.043
Side Slope Z-value= 5.0 '/' Top Width= 85.00'
Length= 600.0' Slope= 0.0223 '/'
Inlet Invert= 457.40', Outlet Invert= 444.00'

Reach B1: Main letdown leading to detention pond



Summary for Pond A: Detention Pond A

Slopes and other pond characteristics are based on the grading included in the most recent revision of the Design Drawings.

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[62] Hint: Exceeded Reach B1 OUTLET depth by 6.01' @ 13.16 hrs
[63] Warning: Exceeded Reach R11 INLET depth by 0.44' @ 13.20 hrs

Inflow Area = 559.050 ac, 0.00% Impervious, Inflow Depth > 6.83" for 1000-year 24-hour event
Inflow = 2,273.03 cfs @ 12.17 hrs, Volume= 318.415 af
Outflow = 404.66 cfs @ 12.84 hrs, Volume= 318.288 af, Atten= 82%, Lag= 39.7 min
Primary = 132.85 cfs @ 12.63 hrs, Volume= 269.281 af
Secondary = 272.14 cfs @ 12.84 hrs, Volume= 49.007 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 450.99' @ 12.83 hrs Surf.Area= 762,058 sf Storage= 4,049,576 cf

Plug-Flow detention time= 237.8 min calculated for 318.222 af (100% of inflow)
Center-of-Mass det. time= 237.0 min (1,256.4 - 1,019.5)

Volume	Invert	Avail.Storage	Storage Description
#1	432.00'	4,896,600 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
432.00	0	0	0
434.00	7,000	7,000	7,000
436.00	17,000	24,000	31,000
438.00	34,000	51,000	82,000
440.00	85,000	119,000	201,000
442.00	156,400	241,400	442,400
444.00	244,700	401,100	843,500
446.00	355,500	600,200	1,443,700
448.00	477,700	833,200	2,276,900
450.00	614,500	1,092,200	3,369,100
452.00	913,000	1,527,500	4,896,600

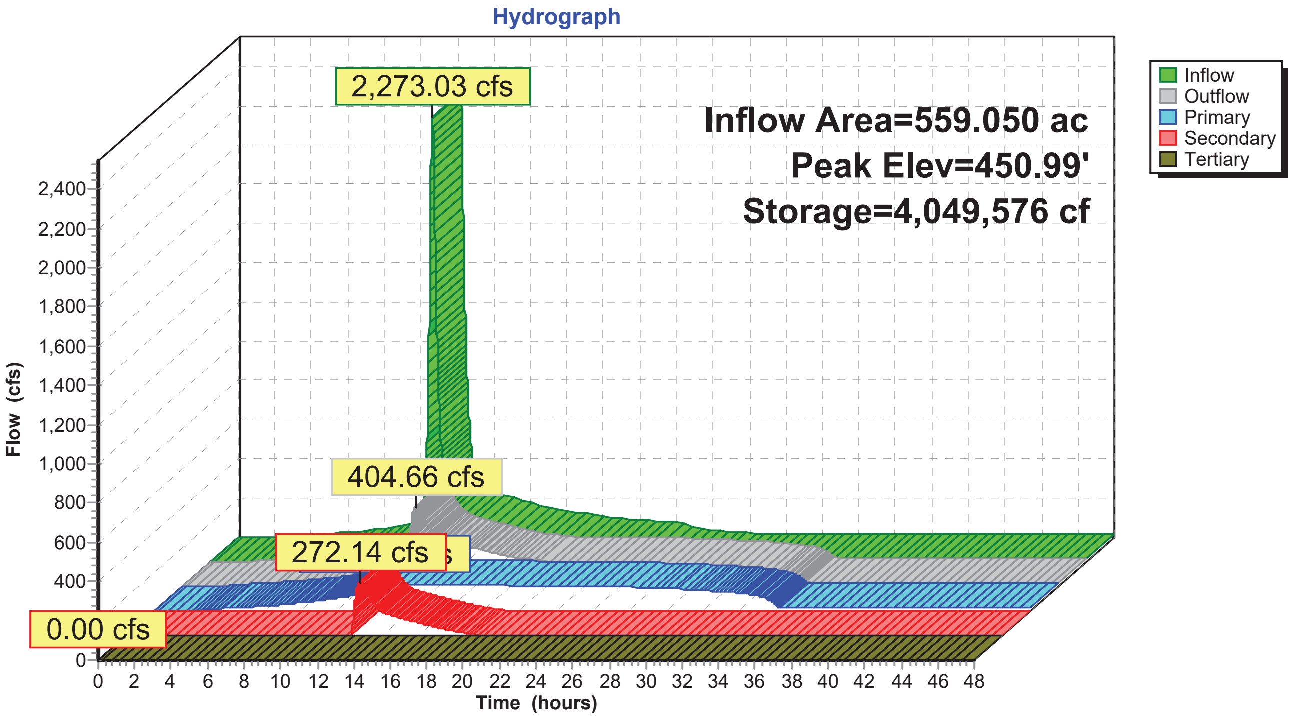
Device	Routing	Invert	Outlet Devices
#1	Primary	432.00'	**36.7" Round DR 17 IPS 42-inch culvert** L= 270.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 432.00' / 430.50' S= 0.0056 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.35 sf
#2	Secondary	450.00'	**Emergency Spillway Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 5.00 Width (feet) 100.00 120.00 200.00
#3	Tertiary	451.00'	**250.0' long x 15.0' breadth Top of berm** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=132.86 cfs @ 12.63 hrs HW=450.88' TW=433.56' (Dynamic Tailwater)
↑—**1=DR 17 IPS 42-inch culvert** (Barrel Controls 132.86 cfs @ 18.09 fps)

Secondary OutFlow Max=272.18 cfs @ 12.84 hrs HW=450.99' TW=450.65' (Dynamic Tailwater)
↑—**2=Emergency Spillway Weir** (Weir Controls 272.18 cfs @ 2.51 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=432.00' TW=430.50' (Dynamic Tailwater)
↑—**3=Top of berm** (Controls 0.00 cfs)

Pond A: Detention Pond A



Summary for Pond B: Detention Pond B

[62] Hint: Exceeded Reach R8 OUTLET depth by 11.63' @ 26.44 hrs

Inflow Area =	140.600 ac,	0.00% Impervious, Inflow Depth = 7.74"	for 1000-year 24-hour event
Inflow =	758.85 cfs @	12.41 hrs, Volume=	90.662 af
Outflow =	39.43 cfs @	16.23 hrs, Volume=	50.191 af, Atten= 95%, Lag= 228.9 min
Primary =	9.58 cfs @	16.49 hrs, Volume=	29.272 af
Secondary =	29.85 cfs @	16.23 hrs, Volume=	20.919 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 463.10' @ 16.24 hrs Surf.Area= 16.835 ac Storage= 63.944 af

Plug-Flow detention time= 755.5 min calculated for 50.181 af (55% of inflow)
Center-of-Mass det. time= 639.7 min (1,485.4 - 845.7)

Volume	Invert	Avail.Storage	Storage Description
#1	451.00'	165.785 af	**Custom Stage Data (Prismatic)**Listed below

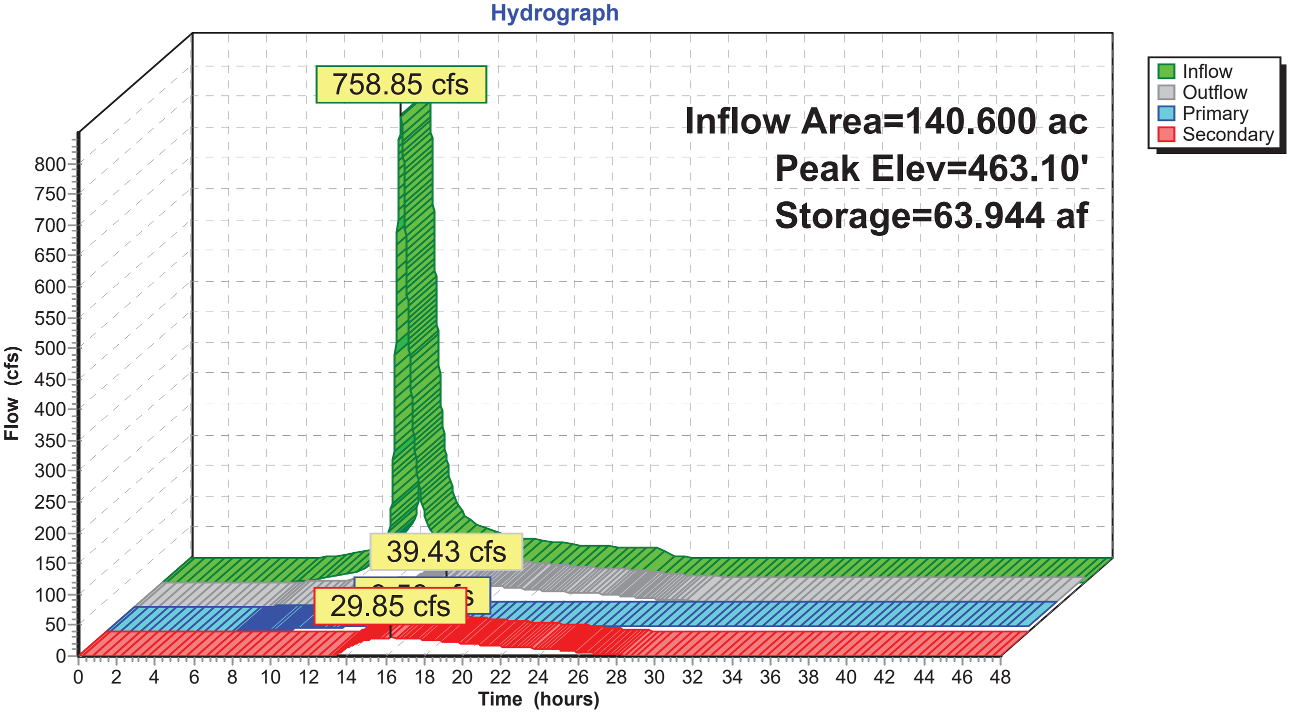
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
451.00	0.000	0.000	0.000
452.00	0.310	0.155	0.155
454.00	0.780	1.090	1.245
456.00	1.410	2.190	3.435
458.00	4.150	5.560	8.995
460.00	8.860	13.010	22.005
462.00	14.760	23.620	45.625
464.00	18.530	33.290	78.915
466.00	21.620	40.150	119.065
468.00	25.100	46.720	165.785

Device	Routing	Invert	Outlet Devices
#1	Primary	451.00'	**12.6" Round DR-7 IPS 18-inch culvert** L= 150.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 451.00' / 450.00' S= 0.0067 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.87 sf
#2	Secondary	462.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 2.00 Width (feet) 20.00 60.00

Primary OutFlow Max=9.58 cfs @ 16.49 hrs HW=463.10' TW=451.87' (Dynamic Tailwater)
↑—**1=DR-7 IPS 18-inch culvert** (Outlet Controls 9.58 cfs @ 11.06 fps)

Secondary OutFlow Max=29.85 cfs @ 16.23 hrs HW=463.10' TW=462.90' (Dynamic Tailwater)
↑—**2=Custom Weir/Orifice** (Weir Controls 29.85 cfs @ 1.91 fps)

Pond B: Detention Pond B



Summary for Pond B-1: Upstream of Main Letdown Channel

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[57] Hint: Peaked at 465.12' (Flood elevation advised)
[62] Hint: Exceeded Reach PE7 OUTLET depth by 1.89' @ 12.19 hrs
[62] Hint: Exceeded Reach PW4 OUTLET depth by 3.40' @ 12.14 hrs

Inflow Area =      152.300 ac,    0.00% Impervious,  Inflow Depth = 10.89"    for  1000-year 24-hour event
Inflow      =   1,585.33 cfs @   12.16 hrs,  Volume=         138.233 af
Outflow     =   1,585.33 cfs @   12.16 hrs,  Volume=         138.233 af,  Atten= 0%,  Lag= 0.0 min
Primary     =   1,574.69 cfs @   12.16 hrs,  Volume=         138.192 af
Secondary =        10.65 cfs @   12.16 hrs,  Volume=           0.041 af

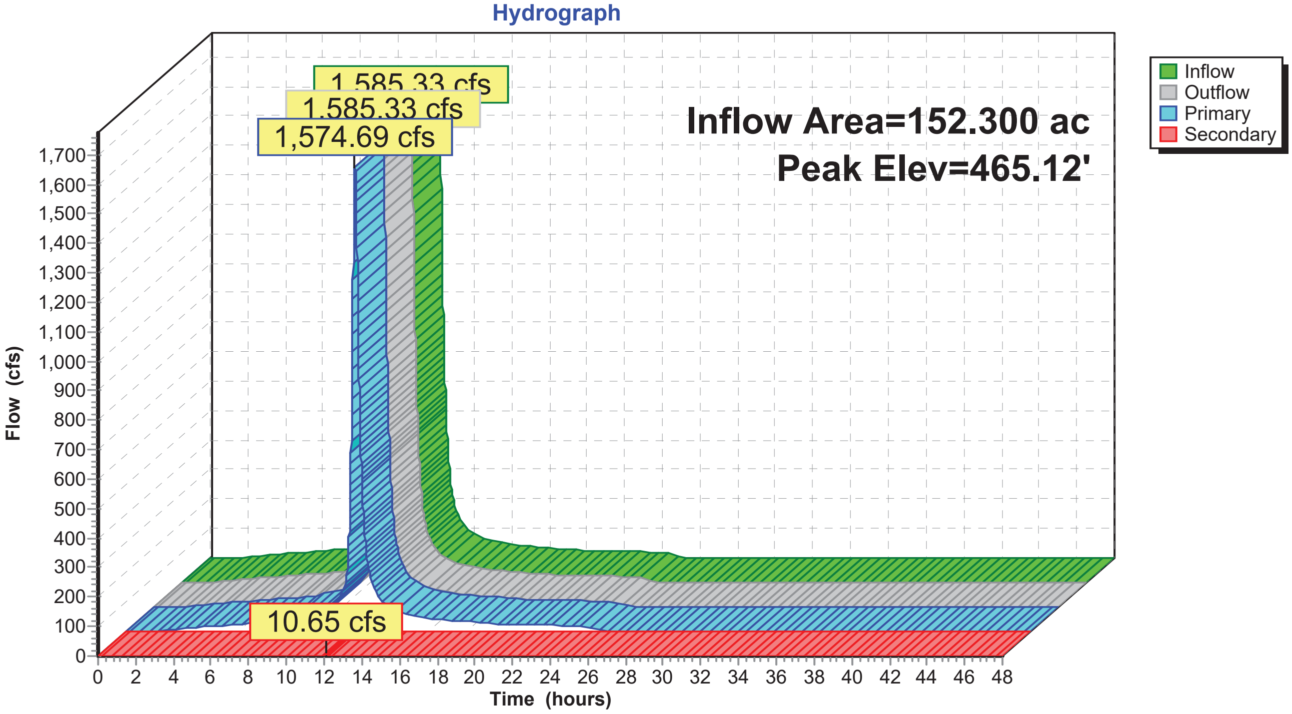
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 465.12' @ 12.16 hrs

Device  Routing           Invert  Outlet Devices
   #1   Primary          458.00'  120.0" W x 60.0" H  Box Culvert X 3.00
                                  L= 40.0'   Box, headwall w/3 rounded edges,  Ke= 0.200
                                  Inlet / Outlet Invert= 458.00' / 457.90'   S= 0.0025 '/'   Cc= 0.900
                                  n= 0.013,  Flow Area= 50.00 sf
   #2   Secondary        465.00'  90.0' long  x 20.0' breadth Broad-Crested Rectangular Weir
                                  Head (feet)  0.20  0.40  0.60  0.80  1.00  1.20  1.40  1.60
                                  Coef. (English)  2.68  2.70  2.70  2.64  2.63  2.64  2.64  2.63

Primary OutFlow  Max=1,574.13 cfs @ 12.16 hrs  HW=465.12'  TW=461.95'   (Dynamic Tailwater)
└─1=Culvert  (Barrel Controls 1,574.13 cfs @ 10.49 fps)

Secondary OutFlow  Max=10.45 cfs @ 12.16 hrs  HW=465.12'  TW=461.95'   (Dynamic Tailwater)
└─2=Broad-Crested Rectangular Weir (Weir Controls 10.45 cfs @ 0.94 fps)
```

Pond B-1: Upstream of Main Letdown Channel



Summary for Pond C: Detention Pond C

[62] Hint: Exceeded Reach AR4 OUTLET depth by 10.80' @ 14.39 hrs
[62] Hint: Exceeded Reach R3 OUTLET depth by 9.74' @ 15.24 hrs
[62] Hint: Exceeded Reach R4 OUTLET depth by 11.09' @ 14.53 hrs

Inflow Area = 175.250 ac, 0.00% Impervious, Inflow Depth = 7.01" for 1000-year 24-hour event
Inflow = 676.11 cfs @ 12.21 hrs, Volume= 102.433 af
Outflow = 79.33 cfs @ 14.33 hrs, Volume= 64.084 af, Atten= 88%, Lag= 127.3 min
Primary = 9.57 cfs @ 28.58 hrs, Volume= 29.269 af
Secondary = 70.28 cfs @ 14.33 hrs, Volume= 34.815 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 465.95' @ 14.33 hrs Surf.Area= 13.244 ac Storage= 64.733 af

Plug-Flow detention time= 632.1 min calculated for 64.071 af (63% of inflow)
Center-of-Mass det. time= 519.9 min (1,368.2 - 848.3)

Volume	Invert	Avail.Storage	Storage Description
#1	453.00'	125.750 af	**Custom Stage Data (Prismatic)**Listed below

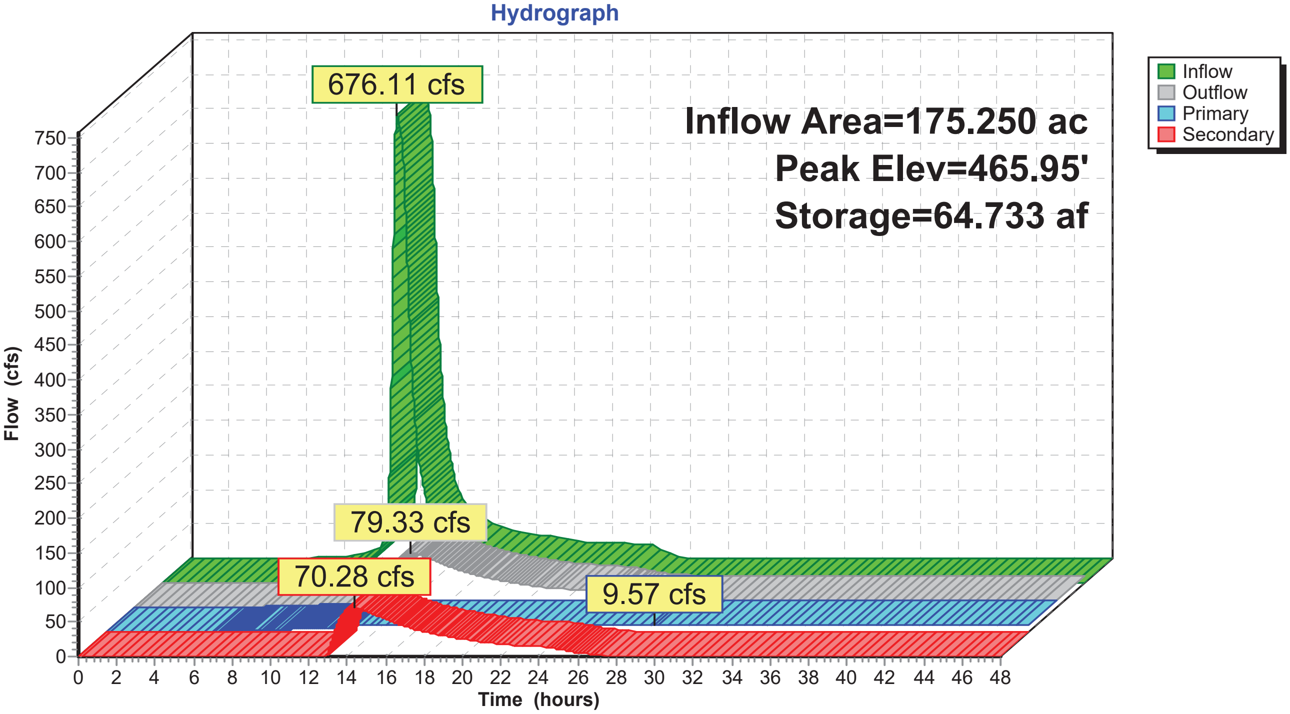
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
453.00	0.000	0.000	0.000
454.00	0.180	0.090	0.090
456.00	0.800	0.980	1.070
458.00	1.430	2.230	3.300
460.00	4.300	5.730	9.030
462.00	8.260	12.560	21.590
464.00	11.100	19.360	40.950
466.00	13.300	24.400	65.350
468.00	15.100	28.400	93.750
470.00	16.900	32.000	125.750

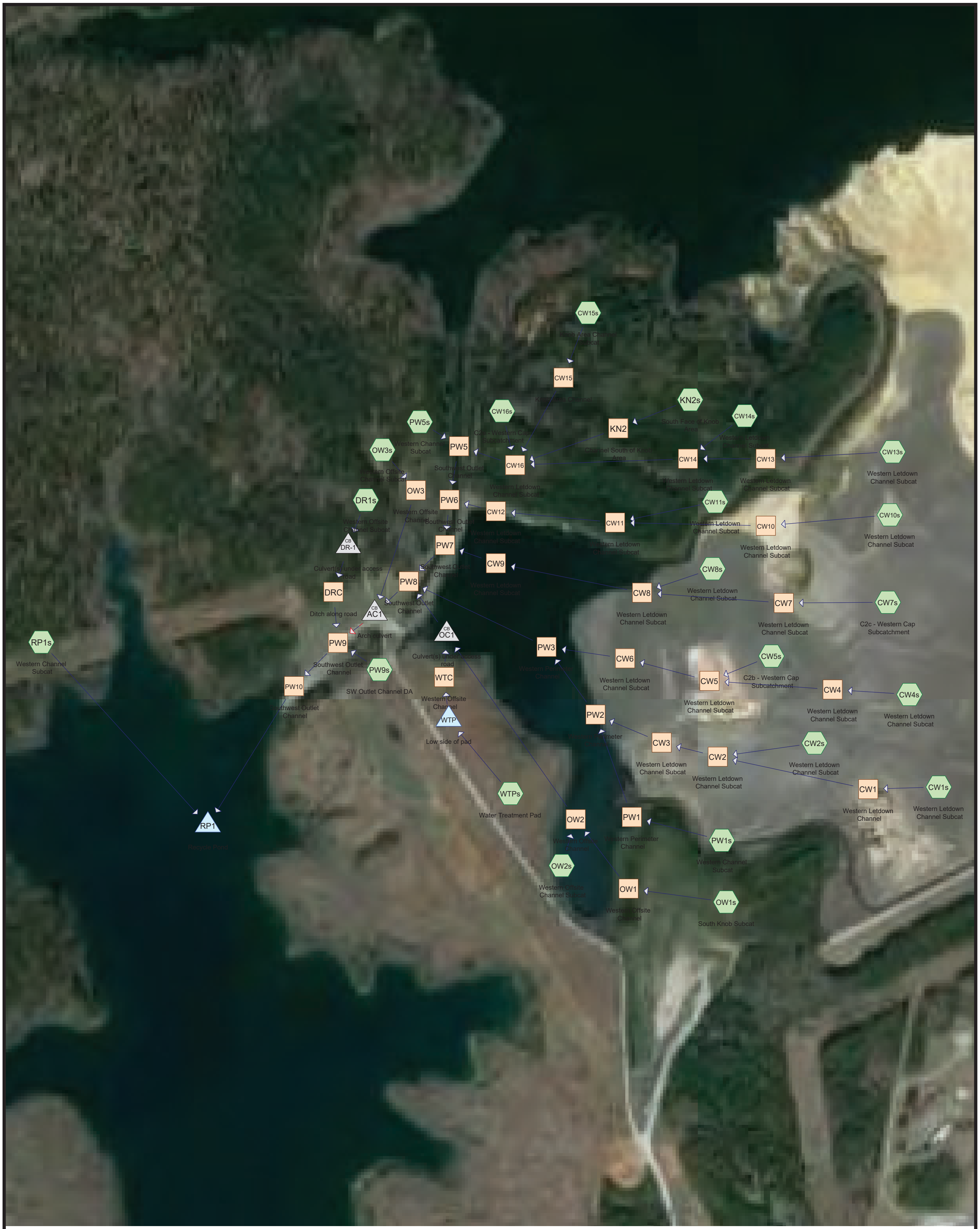
Device	Routing	Invert	Outlet Devices
#1	Primary	453.00'	**12.6" Round DR-7 IPS 18-inch culvert** L= 150.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 453.00' / 452.00' S= 0.0067 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.87 sf
#2	Secondary	465.00'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 2.00 Width (feet) 20.00 60.00

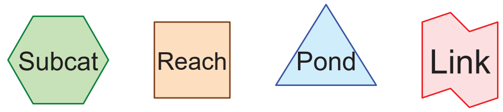
Primary OutFlow Max=9.57 cfs @ 28.58 hrs HW=465.01' TW=453.80' (Dynamic Tailwater)
↑—**1=DR-7 IPS 18-inch culvert** (Outlet Controls 9.57 cfs @ 11.05 fps)

Secondary OutFlow Max=70.28 cfs @ 14.33 hrs HW=465.95' TW=465.58' (Dynamic Tailwater)
↑—**2=Custom Weir/Orifice** (Weir Controls 70.28 cfs @ 2.51 fps)

Pond C: Detention Pond C







Routing Diagram for WEST Scherer AP-1 Closure Design-Upstream of Dam
Prepared by AECOM, Printed 4/30/2020
HydroCAD® 10.00-25 s/n 09114 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
14.600	69	50-75% Grass cover, Fair, HSG B (OW2s, PW9s)
196.920	95	Closure Turf (CW10s, CW11s, CW13s, CW14s, CW15s, CW16s, CW1s, CW2s, CW4s, CW5s, CW7s, CW8s, KN2s, PW1s, PW5s)
4.700	85	Gravel roads, HSG B (WTPs)
0.930	89	Gravel roads, HSG C (DR1s)
215.000	98	Water Surface, HSG A (RP1s)
425.000	65	Woods/grass comb., Fair, HSG B (RP1s)
7.500	58	Woods/grass comb., Good, HSG B (OW3s)
10.000	73	Woods/grass comb., Poor, HSG B (OW1s)
874.650	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
215.000	HSG A	RP1s
461.800	HSG B	OW1s, OW2s, OW3s, PW9s, RP1s, WTPs
0.930	HSG C	DR1s
0.000	HSG D	
196.920	Other	CW10s, CW11s, CW13s, CW14s, CW15s, CW16s, CW1s, CW2s, CW4s, CW5s, CW7s, CW8s, KN2s, PW1s, PW5s
874.650		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	14.600	0.000	0.000	0.000	14.600	50-75% Grass cover, Fair	OW2s, PW9s
0.000	0.000	0.000	0.000	196.920	196.920	Closure Turf	CW10s, CW11s, CW13s, CW14s, CW15s, CW16s, CW1s, CW2s, CW4s, CW5s, CW7s, CW8s, KN2s, PW1s, PW5s
0.000	4.700	0.930	0.000	0.000	5.630	Gravel roads	DR1s, WTPs
215.000	0.000	0.000	0.000	0.000	215.000	Water Surface	RP1s
0.000	425.000	0.000	0.000	0.000	425.000	Woods/grass comb., Fair	RP1s
0.000	7.500	0.000	0.000	0.000	7.500	Woods/grass comb., Good	OW3s
0.000	10.000	0.000	0.000	0.000	10.000	Woods/grass comb., Poor	OW1s
215.000	**461.800**	**0.930**	**0.000**	**196.920**	**874.650**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	DR-1	505.00	500.00	80.0	0.0625	0.013	18.0	0.0	0.0
2	OC1	483.00	482.00	50.0	0.0200	0.013	60.0	36.0	0.0
3	WTP	507.80	507.00	40.0	0.0200	0.013	18.0	0.0	0.0

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment CW10s: Western Letdown Runoff Area=20.000 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=300' Slope=0.0300 '/' Tc=11.7 min CN=95 Runoff=191.88 cfs 12.551 af

Subcatchment CW11s: Western Letdown Runoff Area=11.000 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=300' Slope=0.0300 '/' Tc=11.7 min CN=95 Runoff=105.53 cfs 6.903 af

Subcatchment CW13s: Western Letdown Runoff Area=22.300 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=280' Slope=0.0300 '/' Tc=11.6 min CN=95 Runoff=214.63 cfs 13.995 af

Subcatchment CW14s: Western Letdown Runoff Area=4.900 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=280' Slope=0.0300 '/' Tc=11.6 min CN=95 Runoff=47.16 cfs 3.075 af

Subcatchment CW15s: Knob Area Channel Runoff Area=12.400 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=250' Slope=0.0300 '/' Tc=11.4 min CN=95 Runoff=120.13 cfs 7.782 af

Subcatchment CW16s: C2e - Western Cap Runoff Area=3.500 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=280' Slope=0.0300 '/' Tc=11.6 min CN=95 Runoff=33.69 cfs 2.196 af

Subcatchment CW1s: Western Letdown Runoff Area=21.100 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=400' Slope=0.0300 '/' Tc=12.3 min CN=95 Runoff=198.67 cfs 13.242 af

Subcatchment CW2s: Western Letdown Runoff Area=6.800 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=270' Slope=0.0300 '/' Tc=11.5 min CN=95 Runoff=65.66 cfs 4.267 af

Subcatchment CW4s: Western Letdown Runoff Area=30.300 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=300' Slope=0.0300 '/' Tc=11.7 min CN=95 Runoff=290.70 cfs 19.015 af

Subcatchment CW5s: C2b - Western Cap Runoff Area=12.500 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=250' Slope=0.0300 '/' Tc=11.4 min CN=95 Runoff=121.10 cfs 7.845 af

Subcatchment CW7s: C2c - Western Cap Runoff Area=25.500 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=275' Slope=0.0300 '/' Tc=11.5 min CN=95 Runoff=246.21 cfs 16.003 af

Subcatchment CW8s: Western Letdown Runoff Area=15.000 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=275' Slope=0.0300 '/' Tc=11.5 min CN=95 Runoff=144.83 cfs 9.414 af

Subcatchment DR1s: Western Offsite Runoff Area=0.930 ac 0.00% Impervious Runoff Depth=6.81"
Flow Length=50' Slope=0.3300 '/' Tc=3.7 min CN=89 Runoff=11.02 cfs 0.528 af

Subcatchment KN2s: South Face of Knob Runoff Area=0.870 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=50' Slope=0.2000 '/' Tc=2.1 min CN=95 Runoff=11.27 cfs 0.546 af

Subcatchment OW1s: South Knob Subcat Runoff Area=10.000 ac 0.00% Impervious Runoff Depth=4.93"
Flow Length=630' Tc=56.9 min CN=73 Runoff=27.48 cfs 4.104 af

Subcatchment OW2s: Western Offsite Runoff Area=11.900 ac 0.00% Impervious Runoff Depth=4.46"
Flow Length=460' Tc=38.3 min CN=69 Runoff=38.99 cfs 4.423 af

Subcatchment OW3s: Western Offsite Runoff Area=7.500 ac 0.00% Impervious Runoff Depth=3.21"
Flow Length=235' Tc=12.6 min CN=58 Runoff=33.49 cfs 2.004 af

Subcatchment PW1s: Western Channel Runoff Area=8.200 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=100' Slope=0.0200 '/' Tc=7.0 min CN=95 Runoff=91.23 cfs 5.146 af

Subcatchment PW5s: Western Channel Runoff Area=2.550 ac 0.00% Impervious Runoff Depth=7.53"
Flow Length=100' Slope=0.2000 '/' Tc=3.6 min CN=95 Runoff=31.60 cfs 1.600 af

Subcatchment PW9s: SW Outlet Channel DA Runoff Area=2.700 ac 0.00% Impervious Runoff Depth=4.46"
Flow Length=150' Slope=0.2500 '/' Tc=10.0 min CN=69 Runoff=18.51 cfs 1.004 af

Subcatchment RP1s: Western Channel Runoff Area=640.000 ac 33.59% Impervious Runoff Depth=5.28"
Flow Length=5,100' Tc=23.3 min CN=76 Runoff=3,418.46 cfs 281.405 af

Subcatchment WTPs: Water Treatment Pad Runoff Area=4.700 ac 0.00% Impervious Runoff Depth=6.34"
Flow Length=400' Slope=0.0400 '/' Tc=3.0 min CN=85 Runoff=54.58 cfs 2.483 af

Reach CW1: Western Letdown Avg. Flow Depth=2.40' Max Vel=3.31 fps Inflow=198.67 cfs 13.242 af
n=0.041 L=1,700.0' S=0.0049 '/' Capacity=834.52 cfs Outflow=159.39 cfs 13.242 af

Reach CW10: Western Letdown Avg. Flow Depth=1.91' Max Vel=4.66 fps Inflow=191.88 cfs 12.551 af
n=0.027 L=2,200.0' S=0.0055 '/' Capacity=1,336.97 cfs Outflow=156.85 cfs 12.551 af

Reach CW11: Western Letdown Avg. Flow Depth=1.92' Max Vel=4.83 fps Inflow=251.77 cfs 19.455 af
n=0.027 L=1,100.0' S=0.0050 '/' Capacity=1,681.60 cfs Outflow=237.89 cfs 19.455 af

Reach CW12: Western Letdown Avg. Flow Depth=1.37' Max Vel=7.58 fps Inflow=237.89 cfs 19.455 af
n=0.035 L=180.0' S=0.0300 '/' Capacity=3,177.56 cfs Outflow=237.74 cfs 19.455 af

Reach CW13: Western Letdown Avg. Flow Depth=2.02' Max Vel=4.83 fps Inflow=214.63 cfs 13.995 af
n=0.027 L=2,200.0' S=0.0055 '/' Capacity=1,342.49 cfs Outflow=176.78 cfs 13.995 af

Reach CW14: Western Letdown Avg. Flow Depth=1.80' Max Vel=4.72 fps Inflow=217.54 cfs 17.070 af
n=0.027 L=700.0' S=0.0051 '/' Capacity=1,705.45 cfs Outflow=212.02 cfs 17.070 af

Reach CW15: Knob Area Channel Avg. Flow Depth=1.43' Max Vel=5.36 fps Inflow=120.13 cfs 7.782 af
n=0.027 L=725.0' S=0.0100 '/' Capacity=1,802.78 cfs Outflow=116.50 cfs 7.782 af

Reach CW16: Western Letdown Avg. Flow Depth=2.46' Max Vel=7.09 fps Inflow=355.37 cfs 27.594 af
n=0.027 L=500.0' S=0.0096 '/' Capacity=1,766.35 cfs Outflow=352.96 cfs 27.594 af

Reach CW2: Western Letdown Avg. Flow Depth=1.80' Max Vel=4.66 fps Inflow=213.63 cfs 17.509 af
n=0.027 L=560.0' S=0.0050 '/' Capacity=1,681.60 cfs Outflow=210.19 cfs 17.509 af

Reach CW3: Western Letdown Avg. Flow Depth=1.31' Max Vel=7.13 fps Inflow=210.19 cfs 17.509 af
n=0.035 L=100.0' S=0.0280 '/' Capacity=3,069.81 cfs Outflow=210.15 cfs 17.509 af

Reach CW4: Western Letdown Avg. Flow Depth=2.34' Max Vel=5.31 fps Inflow=290.70 cfs 19.015 af
n=0.027 L=2,200.0' S=0.0057 '/' Capacity=1,358.89 cfs Outflow=244.89 cfs 19.015 af

Reach CW5: Western Letdown Avg. Flow Depth=2.30' Max Vel=5.44 fps Inflow=352.38 cfs 26.860 af
n=0.027 L=750.0' S=0.0052 '/' Capacity=1,714.90 cfs Outflow=344.02 cfs 26.860 af

Reach CW6: Western Letdown Avg. Flow Depth=1.70' Max Vel=8.26 fps Inflow=344.02 cfs 26.860 af
n=0.035 L=110.0' S=0.0282 '/' Capacity=3,079.76 cfs Outflow=343.95 cfs 26.860 af

Reach CW7: Western Letdown Avg. Flow Depth=2.16' Max Vel=5.02 fps Inflow=246.21 cfs 16.003 af
n=0.027 L=2,200.0' S=0.0055 '/' Capacity=1,342.49 cfs Outflow=204.43 cfs 16.003 af

Reach CW8: Western Letdown Avg. Flow Depth=2.24' Max Vel=5.27 fps Inflow=336.08 cfs 25.417 af
n=0.027 L=1,050.0' S=0.0050 '/' Capacity=1,689.59 cfs Outflow=320.59 cfs 25.417 af

Reach CW9: Western Letdown Avg. Flow Depth=1.62' Max Vel=8.23 fps Inflow=320.59 cfs 25.417 af
n=0.035 L=220.0' S=0.0295 '/' Capacity=3,153.40 cfs Outflow=320.32 cfs 25.417 af

Reach DRC: Ditch along road Avg. Flow Depth=0.36' Max Vel=5.02 fps Inflow=11.02 cfs 0.528 af
n=0.045 L=200.0' S=0.1150 '/' Capacity=285.35 cfs Outflow=10.95 cfs 0.528 af

Reach KN2: Channel South of Knob Avg. Flow Depth=0.54' Max Vel=1.99 fps Inflow=11.27 cfs 0.546 af
n=0.027 L=1,000.0' S=0.0045 '/' Capacity=1,068.25 cfs Outflow=8.21 cfs 0.546 af

Reach OW1: Western Offsite Channel Avg. Flow Depth=1.05' Max Vel=2.38 fps Inflow=27.48 cfs 4.104 af
n=0.035 L=1,630.0' S=0.0052 '/' Capacity=887.11 cfs Outflow=25.57 cfs 4.104 af

Reach OW2: Western Offsite Channel Avg. Flow Depth=1.46' Max Vel=2.76 fps Inflow=55.13 cfs 8.528 af
n=0.035 L=2,275.0' S=0.0048 '/' Capacity=250.89 cfs Outflow=49.57 cfs 8.528 af

Reach OW3: Western Offsite Channel Avg. Flow Depth=0.99' Max Vel=2.48 fps Inflow=33.49 cfs 2.004 af
n=0.045 L=1,500.0' S=0.0100 '/' Capacity=110.70 cfs Outflow=24.35 cfs 2.004 af

Reach PW1: Western Perimeter Avg. Flow Depth=1.23' Max Vel=2.69 fps Inflow=91.23 cfs 5.146 af
n=0.035 L=2,750.0' S=0.0047 '/' Capacity=1,031.52 cfs Outflow=53.44 cfs 5.146 af

Reach PW10: Southwest Outlet Avg. Flow Depth=4.07' Max Vel=11.78 fps Inflow=1,544.93 cfs 137.733 af
n=0.036 L=300.0' S=0.0200 '/' Capacity=4,543.12 cfs Outflow=1,543.87 cfs 137.733 af

Reach PW2: Western Perimeter Avg. Flow Depth=2.51' Max Vel=4.48 fps Inflow=261.83 cfs 22.655 af
n=0.035 L=750.0' S=0.0060 '/' Capacity=1,162.12 cfs Outflow=254.20 cfs 22.655 af

Reach PW3: Western Perimeter Avg. Flow Depth=3.75' Max Vel=5.43 fps Inflow=592.45 cfs 49.515 af
n=0.035 L=500.0' S=0.0056 '/' Capacity=1,122.71 cfs Outflow=586.48 cfs 49.515 af

Reach PW5: Southwest Outlet Avg. Flow Depth=2.45' Max Vel=4.49 fps Inflow=357.88 cfs 29.194 af
n=0.035 L=375.0' S=0.0053 '/' Capacity=35,989.17 cfs Outflow=355.21 cfs 29.194 af

Reach PW6: Southwest Outlet Avg. Flow Depth=3.23' Max Vel=5.05 fps Inflow=592.76 cfs 48.649 af
n=0.035 L=350.0' S=0.0049 '/' Capacity=34,720.43 cfs Outflow=589.53 cfs 48.649 af

Reach PW7: Southwest Outlet Avg. Flow Depth=3.98' Max Vel=5.71 fps Inflow=907.78 cfs 74.066 af
n=0.035 L=300.0' S=0.0050 '/' Capacity=35,021.91 cfs Outflow=904.78 cfs 74.066 af

Reach PW8: Southwest Outlet Avg. Flow Depth=5.08' Max Vel=6.54 fps Inflow=1,512.40 cfs 134.197 af
n=0.035 L=200.0' S=0.0050 '/' Capacity=35,021.91 cfs Outflow=1,510.78 cfs 134.197 af

Reach PW9: Southwest Outlet Avg. Flow Depth=5.79' Max Vel=7.13 fps Inflow=1,546.24 cfs 137.733 af
n=0.036 L=200.0' S=0.0050 '/' Capacity=2,271.56 cfs Outflow=1,544.93 cfs 137.733 af

Reach WTC: Western Offsite Channel Avg. Flow Depth=0.25' Max Vel=5.57 fps Inflow=7.85 cfs 2.089 af
n=0.035 L=180.0' S=0.1333 '/' Capacity=946.26 cfs Outflow=7.85 cfs 2.089 af

Pond AC1: Arch culvert Peak Elev=484.15' Inflow=1,535.11 cfs 136.201 af
Outflow=1,535.11 cfs 136.201 af

Pond DR-1: Culvert(s) under access road Peak Elev=507.90' Inflow=11.02 cfs 0.528 af
18.0" Round Culvert n=0.013 L=80.0' S=0.0625 '/' Outflow=11.02 cfs 0.528 af

Pond OC1: Culvert(s) under access road Peak Elev=485.32' Inflow=56.81 cfs 10.616 af
60.0" x 36.0" Box Culvert n=0.013 L=50.0' S=0.0200 '/' Outflow=56.81 cfs 10.616 af

Pond RP1: Recycle Pond Peak Elev=470.91' Storage=419.137 af Inflow=4,956.18 cfs 419.137 af
Outflow=0.00 cfs 0.000 af

Pond WTP: Low side of pad Peak Elev=509.64' Storage=57,488 cf Inflow=54.58 cfs 2.483 af
18.0" Round Culvert n=0.013 L=40.0' S=0.0200 '/' Outflow=7.85 cfs 2.089 af

Total Runoff Area = 874.650 ac Runoff Volume = 419.531 af Average Runoff Depth = 5.76"
75.42% Pervious = 659.650 ac 24.58% Impervious = 215.000 ac

Summary for Subcatchment CW10s: Western Letdown Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

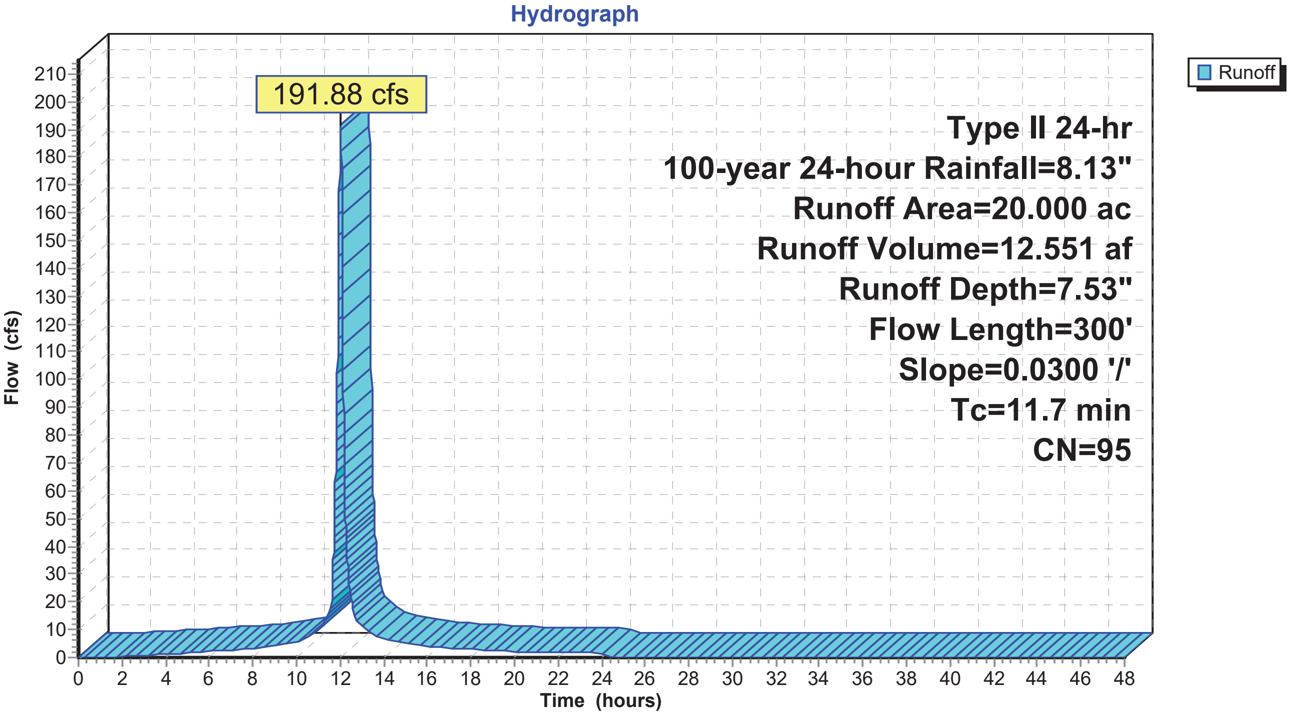
Runoff = 191.88 cfs @ 12.03 hrs, Volume= 12.551 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	20.000	95	Closure Turf
	20.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.3	200	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.7	300	Total			

Subcatchment CW10s: Western Letdown Channel Subcat



Summary for Subcatchment CW11s: Western Letdown Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

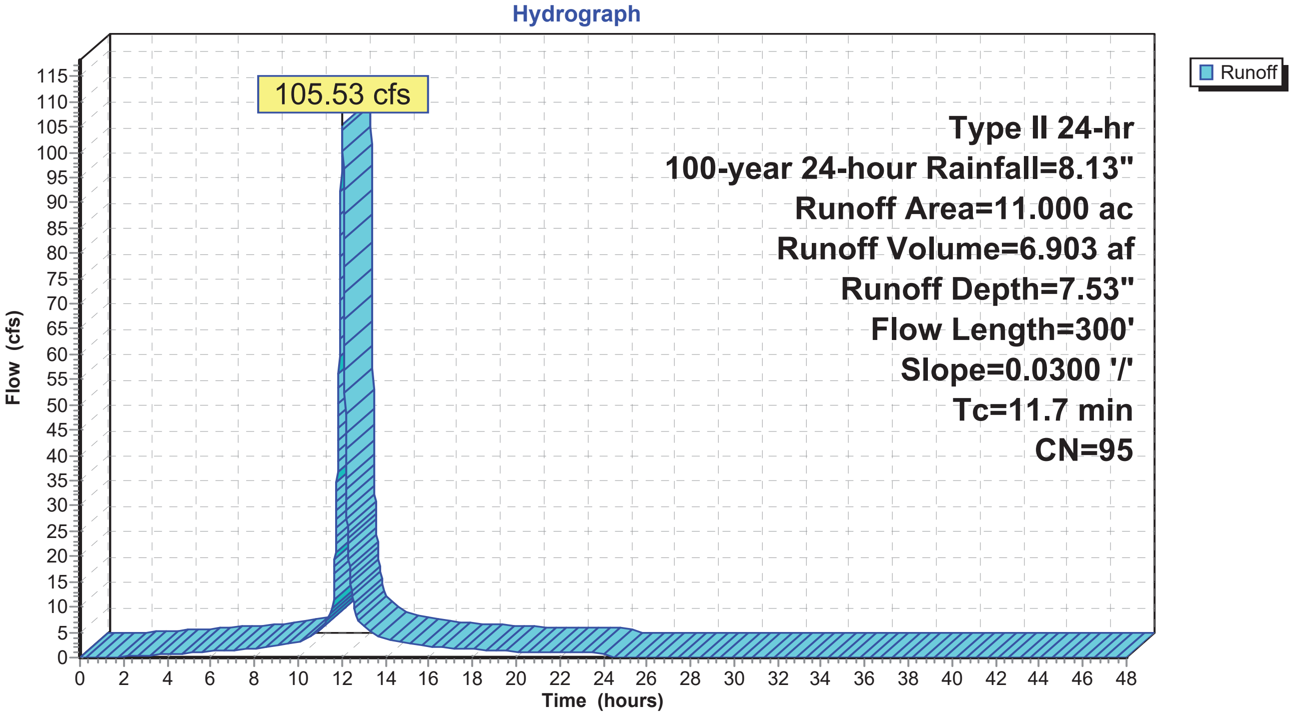
Runoff = 105.53 cfs @ 12.03 hrs, Volume= 6.903 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	11.000	95	Closure Turf
	11.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.3	200	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.7	300	Total			

Subcatchment CW11s: Western Letdown Channel Subcat



Summary for Subcatchment CW13s: Western Letdown Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

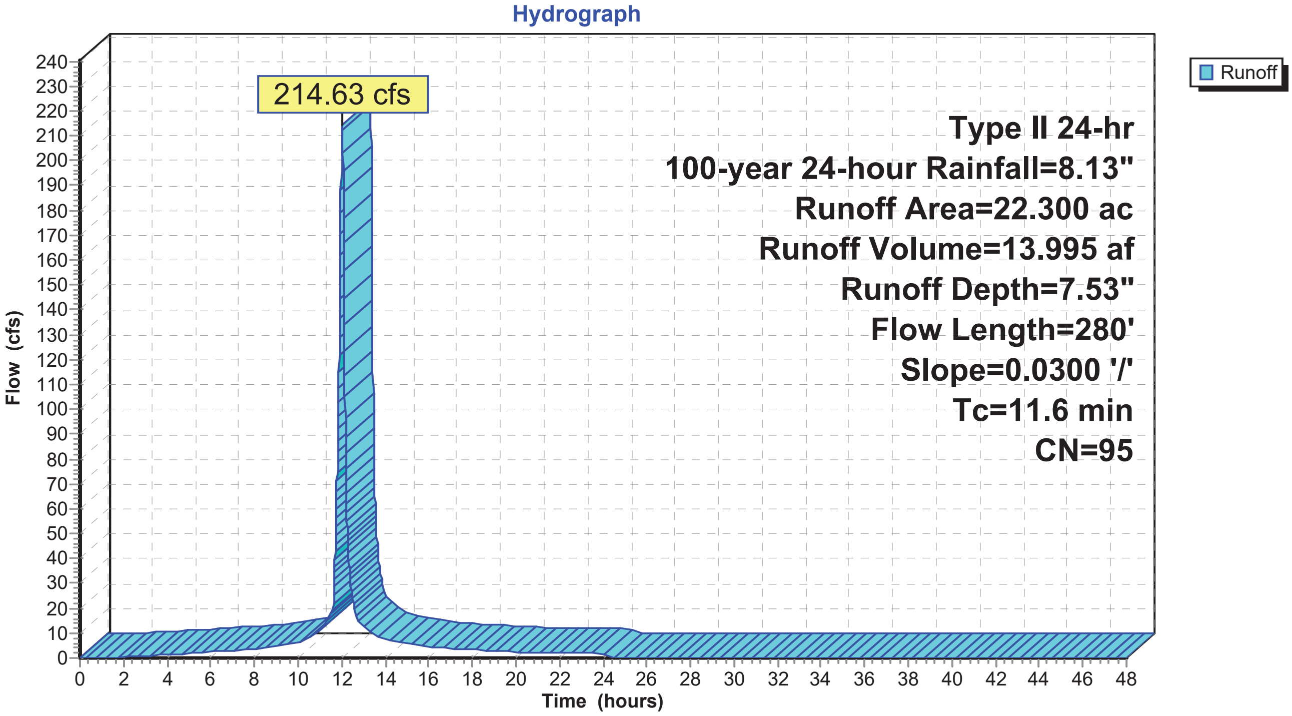
```
Runoff     =    214.63 cfs @   12.03 hrs,  Volume=        13.995 af,  Depth=  7.53"
```

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	22.300	95	Closure Turf
	22.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.2	180	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.6	280	Total			

Subcatchment CW13s: Western Letdown Channel Subcat



Summary for Subcatchment CW14s: Western Letdown Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

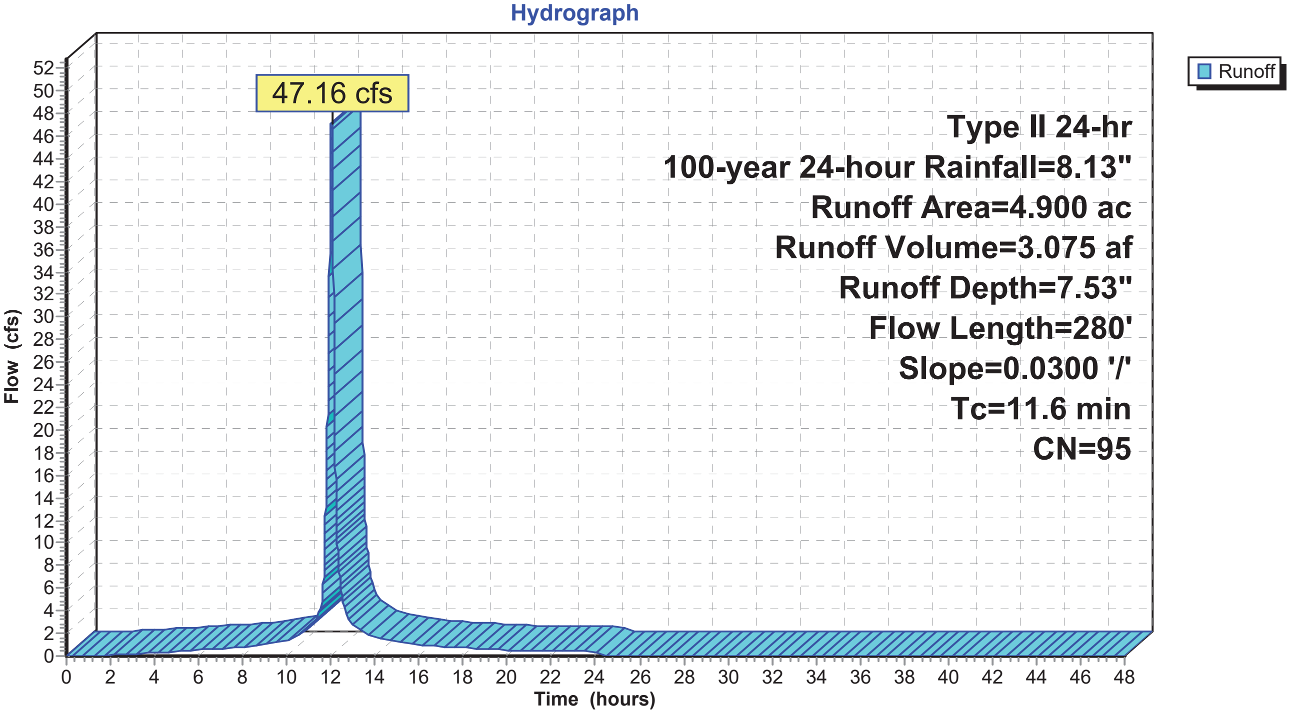
Runoff = 47.16 cfs @ 12.03 hrs, Volume= 3.075 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	4.900	95	Closure Turf
	4.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.2	180	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.6	280	Total			

Subcatchment CW14s: Western Letdown Channel Subcat



Summary for Subcatchment CW15s: Knob Area Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

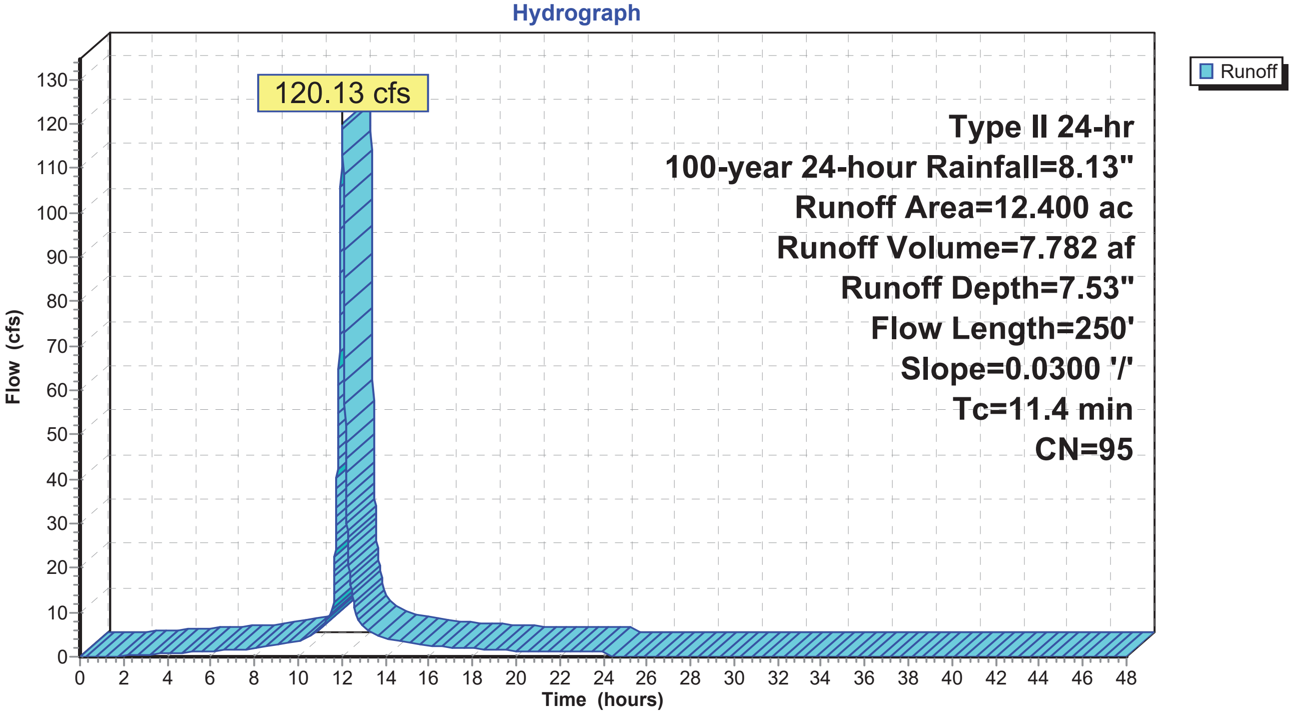
Runoff = 120.13 cfs @ 12.02 hrs, Volume= 7.782 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	12.400	95	Closure Turf
	12.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.0	150	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.4	250	Total			

Subcatchment CW15s: Knob Area Channel Subcat



Summary for Subcatchment CW16s: C2e - Western Cap Subcatchment

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

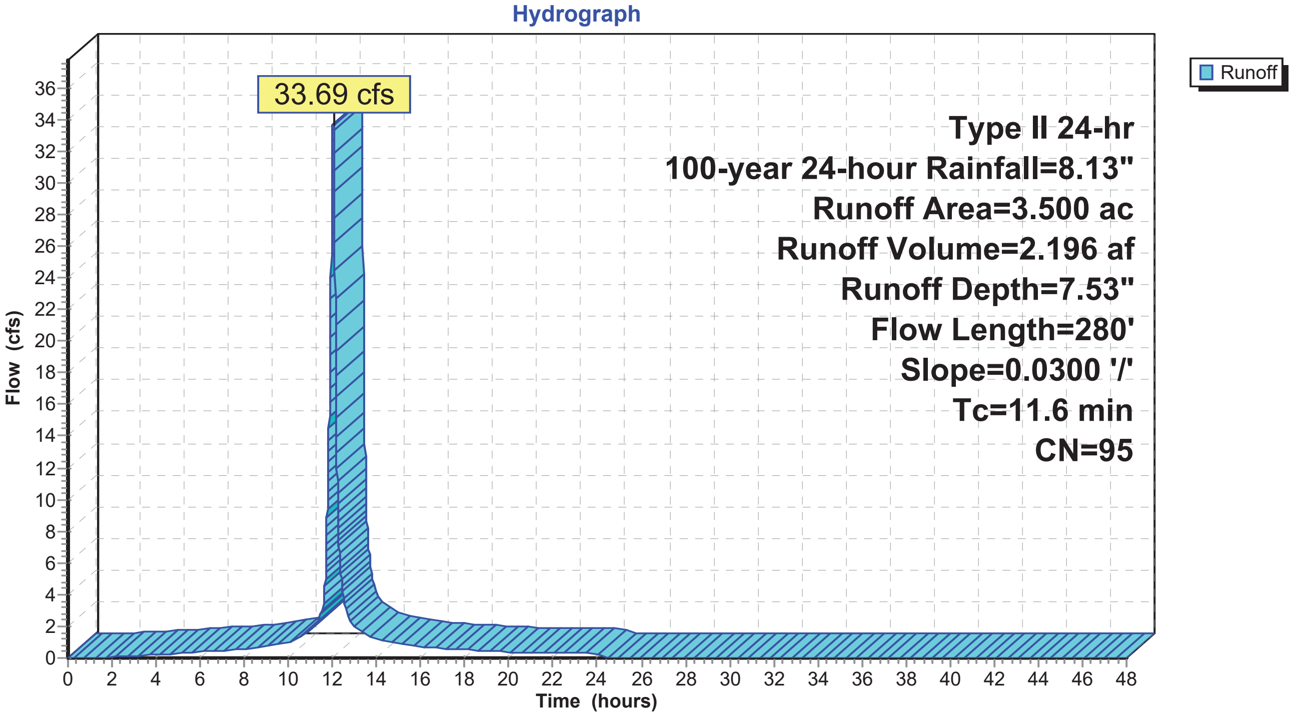
Runoff = 33.69 cfs @ 12.03 hrs, Volume= 2.196 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	3.500	95	Closure Turf
	3.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.2	180	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.6	280	Total			

Subcatchment CW16s: C2e - Western Cap Subcatchment



Summary for Subcatchment CW1s: Western Letdown Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

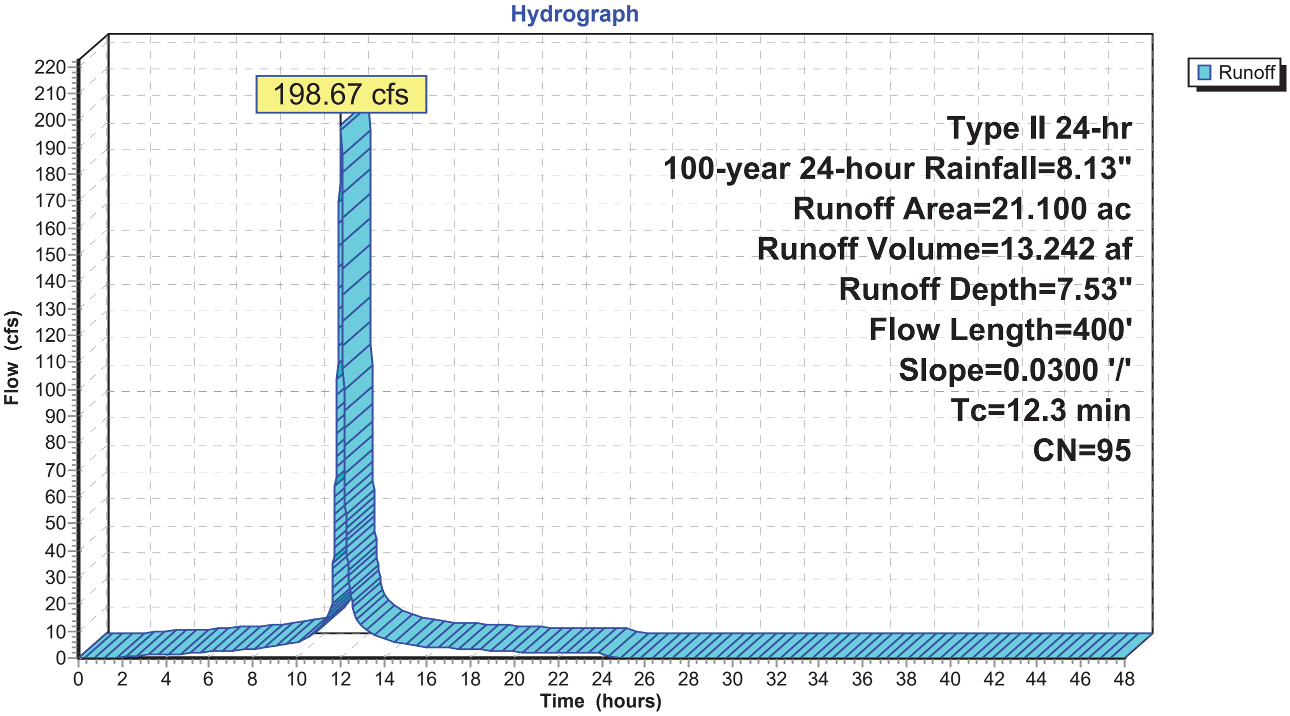
Runoff = 198.67 cfs @ 12.03 hrs, Volume= 13.242 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	21.100	95	Closure Turf
	21.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.9	300	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
12.3	400	Total			

Subcatchment CW1s: Western Letdown Channel Subcat



Summary for Subcatchment CW2s: Western Letdown Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

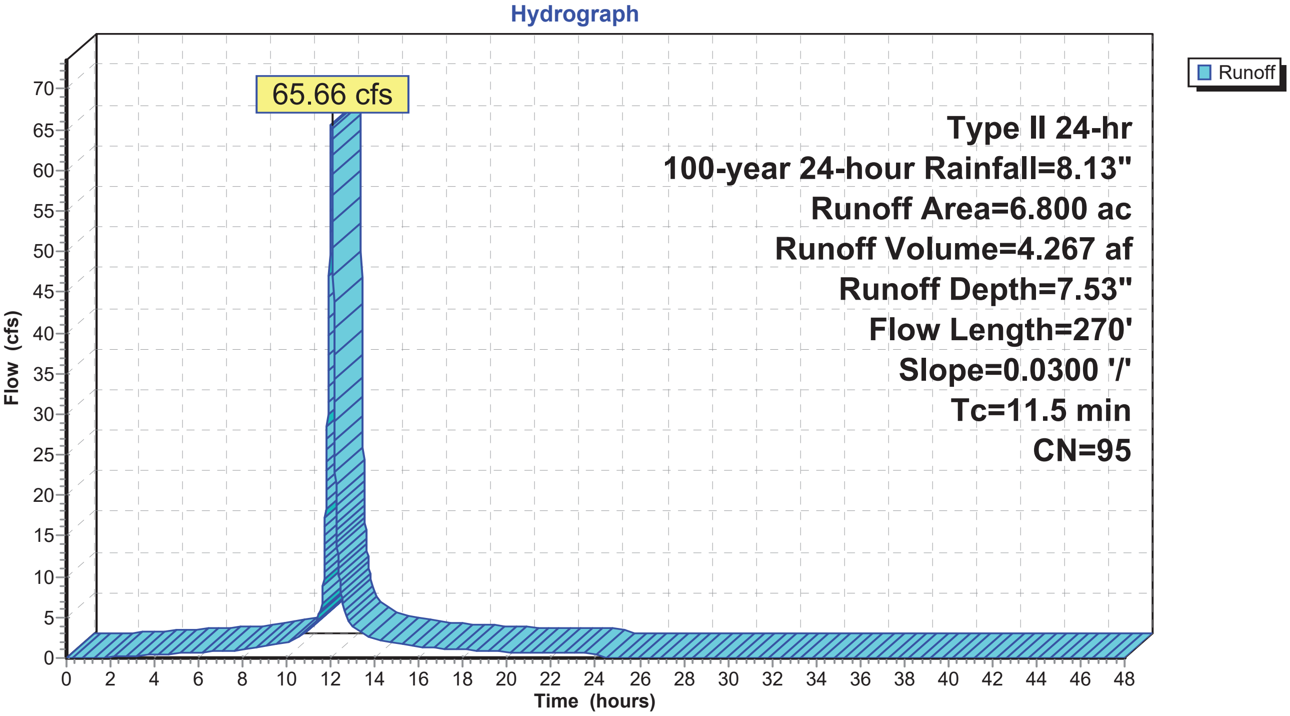
Runoff = 65.66 cfs @ 12.02 hrs, Volume= 4.267 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	6.800	95	Closure Turf
	6.800		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.1	170	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.5	270	Total			

Subcatchment CW2s: Western Letdown Channel Subcat



Summary for Subcatchment CW4s: Western Letdown Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

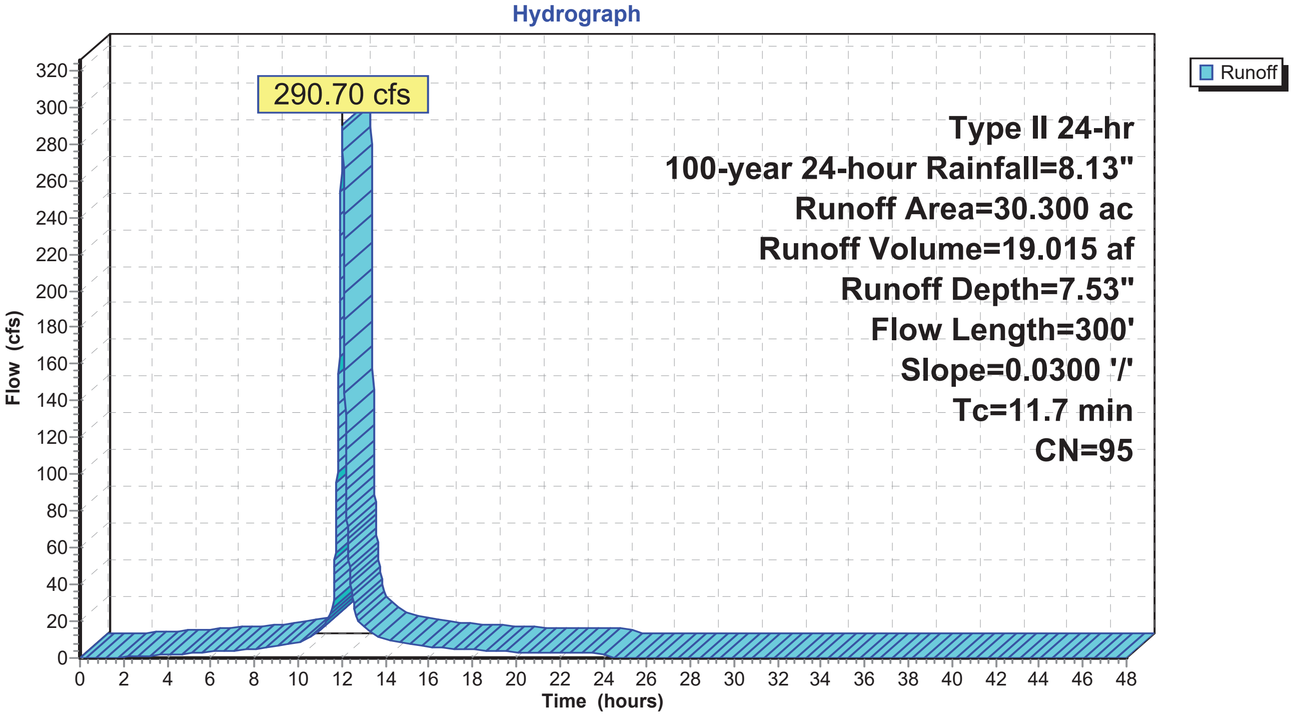
Runoff = 290.70 cfs @ 12.03 hrs, Volume= 19.015 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	30.300	95	Closure Turf
	30.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.3	200	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.7	300	Total			

Subcatchment CW4s: Western Letdown Channel Subcat



Summary for Subcatchment CW5s: C2b - Western Cap Subcatchment

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

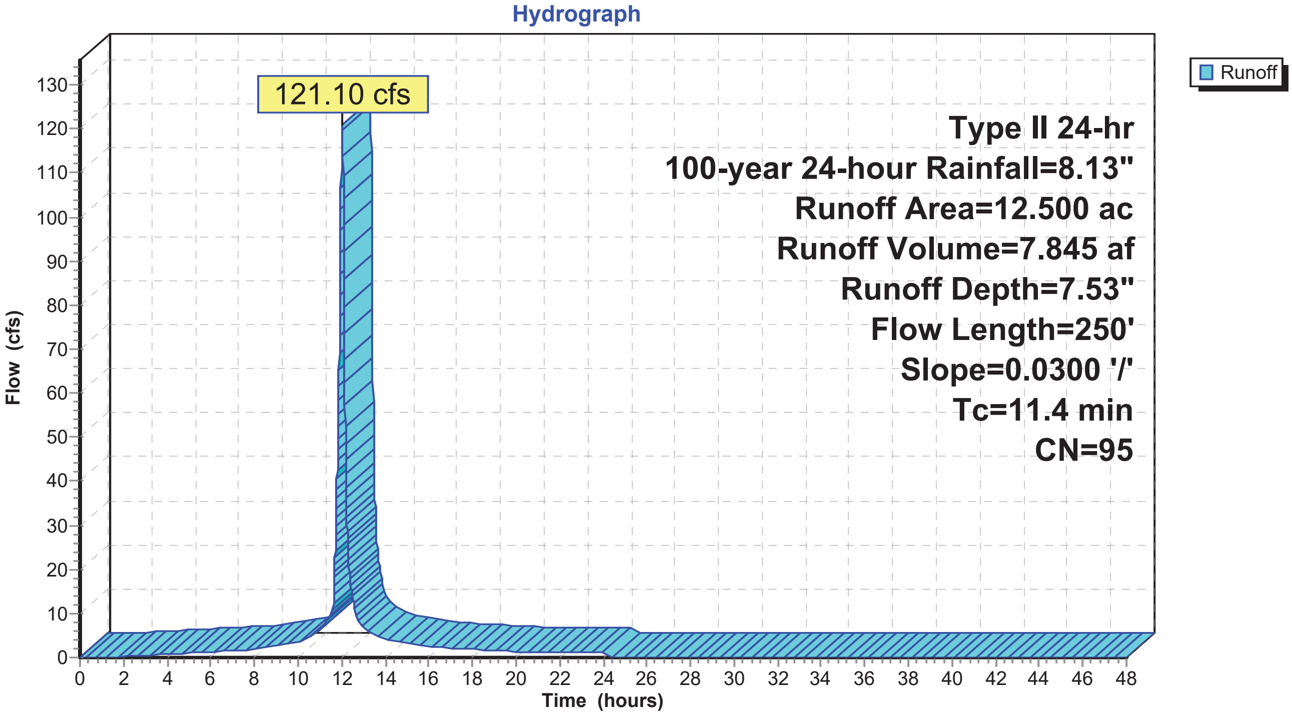
Runoff = 121.10 cfs @ 12.02 hrs, Volume= 7.845 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	12.500	95	Closure Turf
	12.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.0	150	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.4	250	Total			

Subcatchment CW5s: C2b - Western Cap Subcatchment



Summary for Subcatchment CW7s: C2c - Western Cap Subcatchment

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

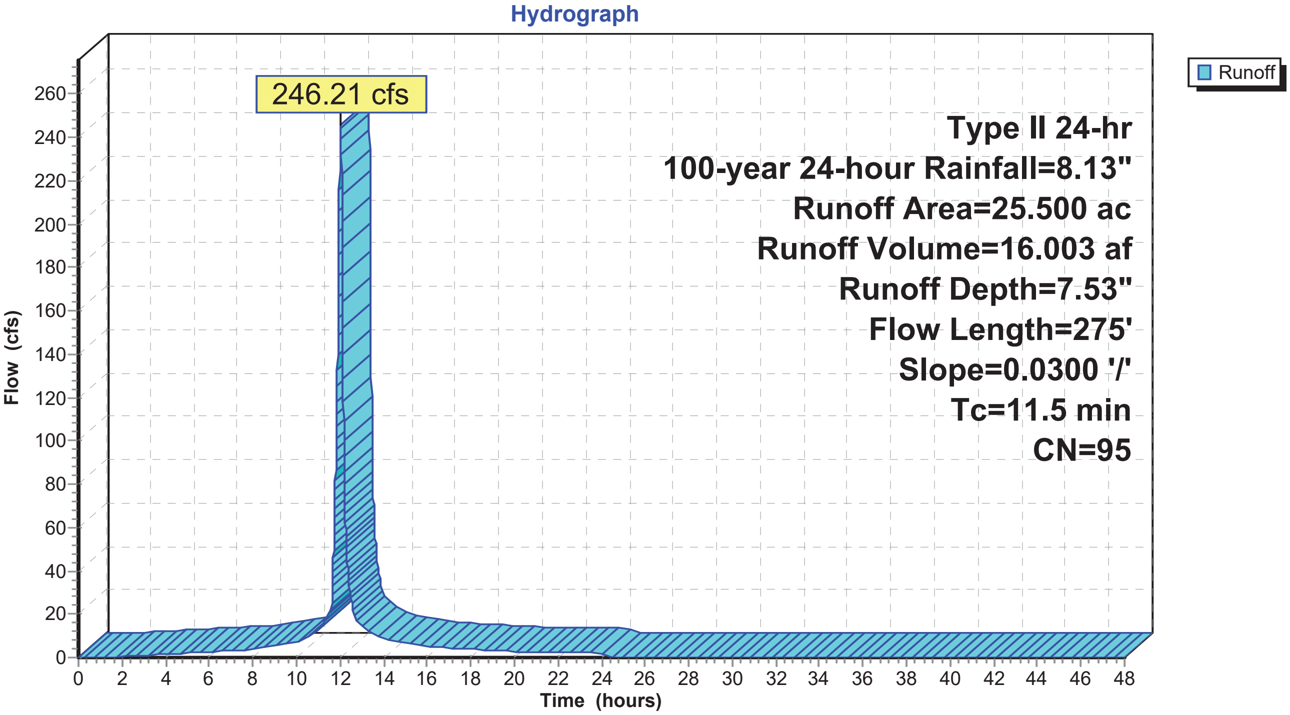
Runoff = 246.21 cfs @ 12.02 hrs, Volume= 16.003 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	25.500	95	Closure Turf
	25.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.1	175	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.5	275	Total			

Subcatchment CW7s: C2c - Western Cap Subcatchment



Summary for Subcatchment CW8s: Western Letdown Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

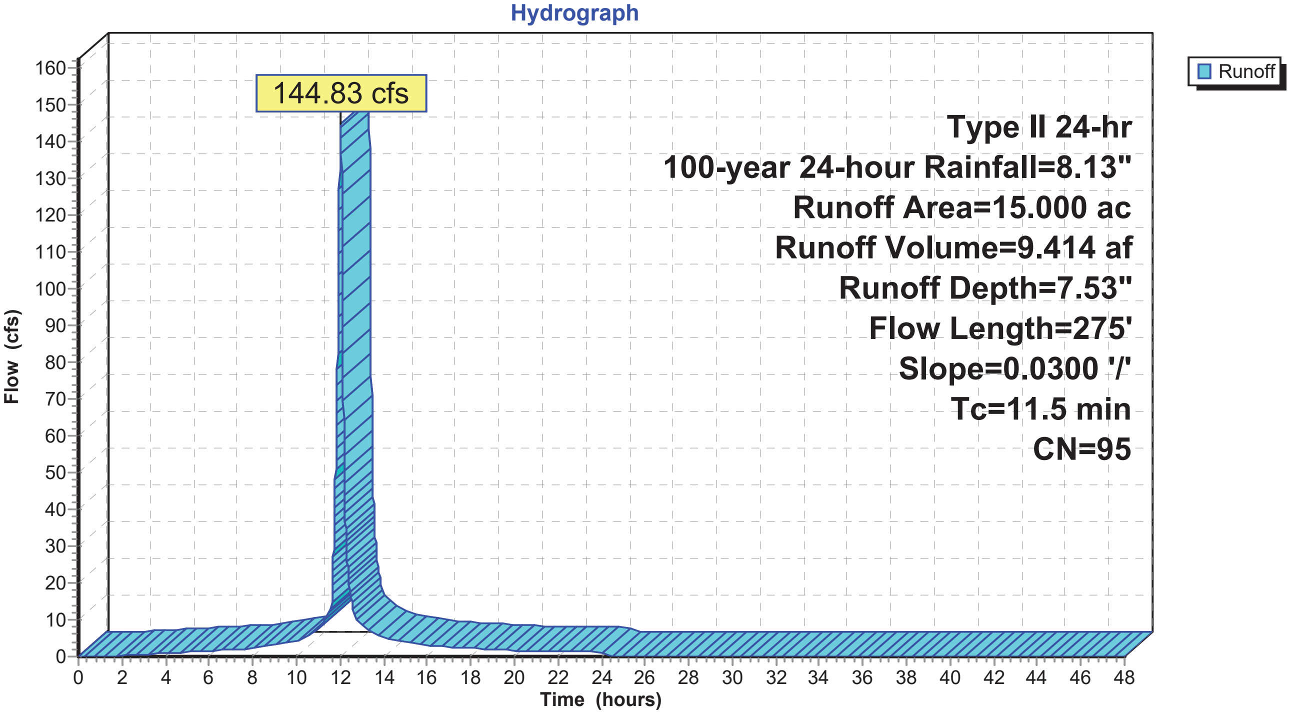
Runoff = 144.83 cfs @ 12.02 hrs, Volume= 9.414 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	15.000	95	Closure Turf
	15.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.0300	0.16		**Sheet Flow, sheet** n= 0.220 P2= 3.77"
1.1	175	0.0300	2.60		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
11.5	275	Total			

Subcatchment CW8s: Western Letdown Channel Subcat



Summary for Subcatchment DR1s: Western Offsite Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

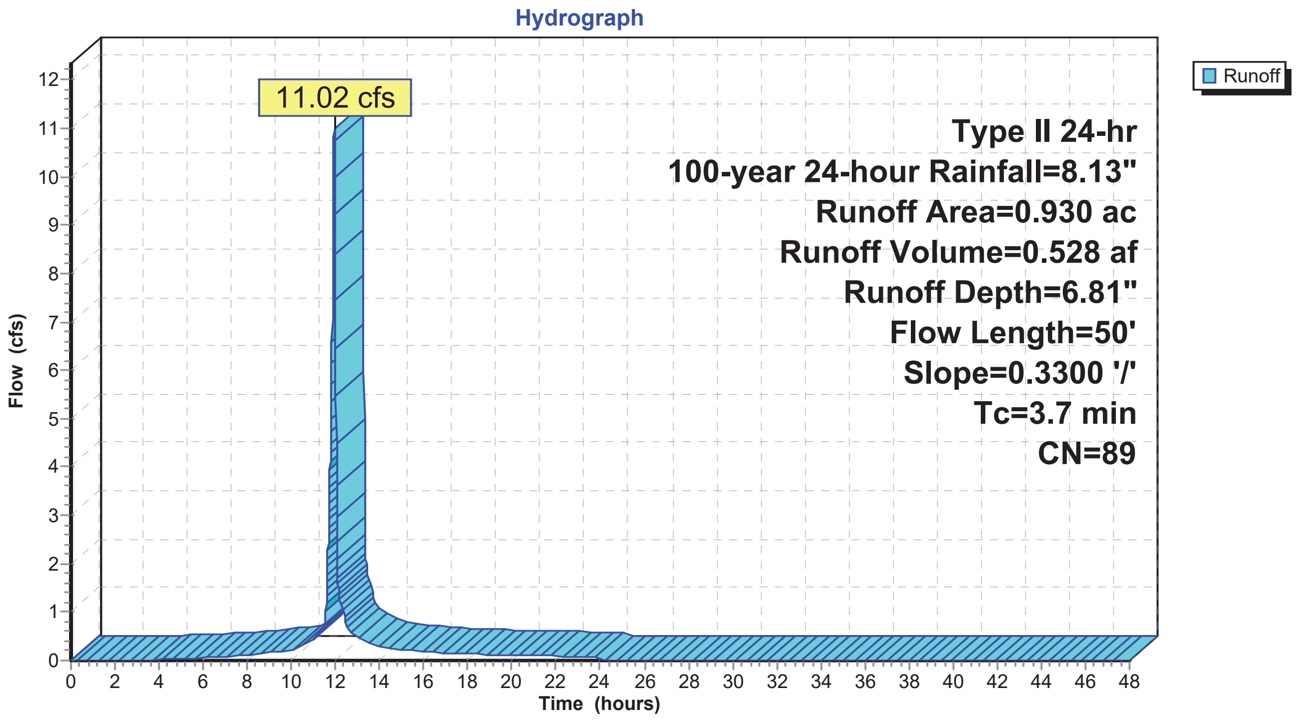
Runoff = 11.02 cfs @ 11.94 hrs, Volume= 0.528 af, Depth= 6.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
0.930	89	Gravel roads, HSG C
0.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.3300	0.23		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"

Subcatchment DR1s: Western Offsite Channel Subcat



Summary for Subcatchment KN2s: South Face of Knob Area

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

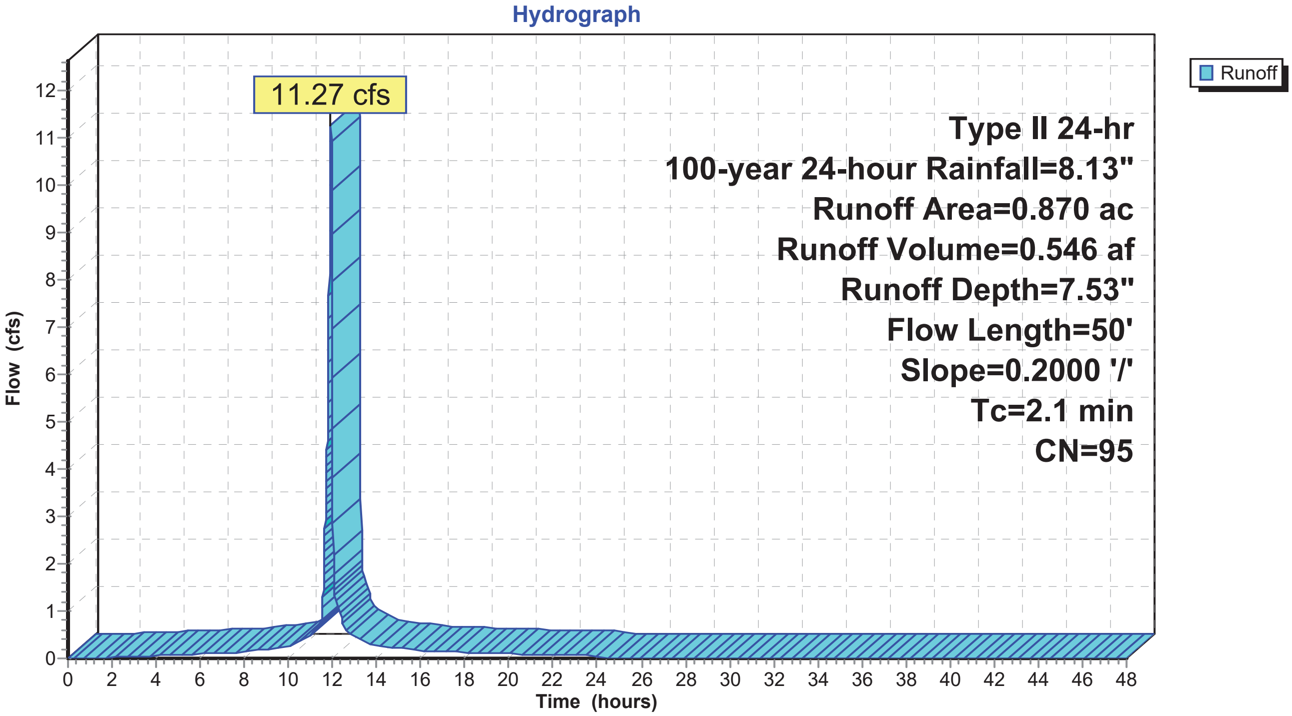
Runoff = 11.27 cfs @ 11.92 hrs, Volume= 0.546 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	0.870	95	Closure Turf
	0.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	50	0.2000	0.40		**Sheet Flow, sheet** Grass: Short n= 0.150 P2= 3.77"

Subcatchment KN2s: South Face of Knob Area



Summary for Subcatchment OW1s: South Knob Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

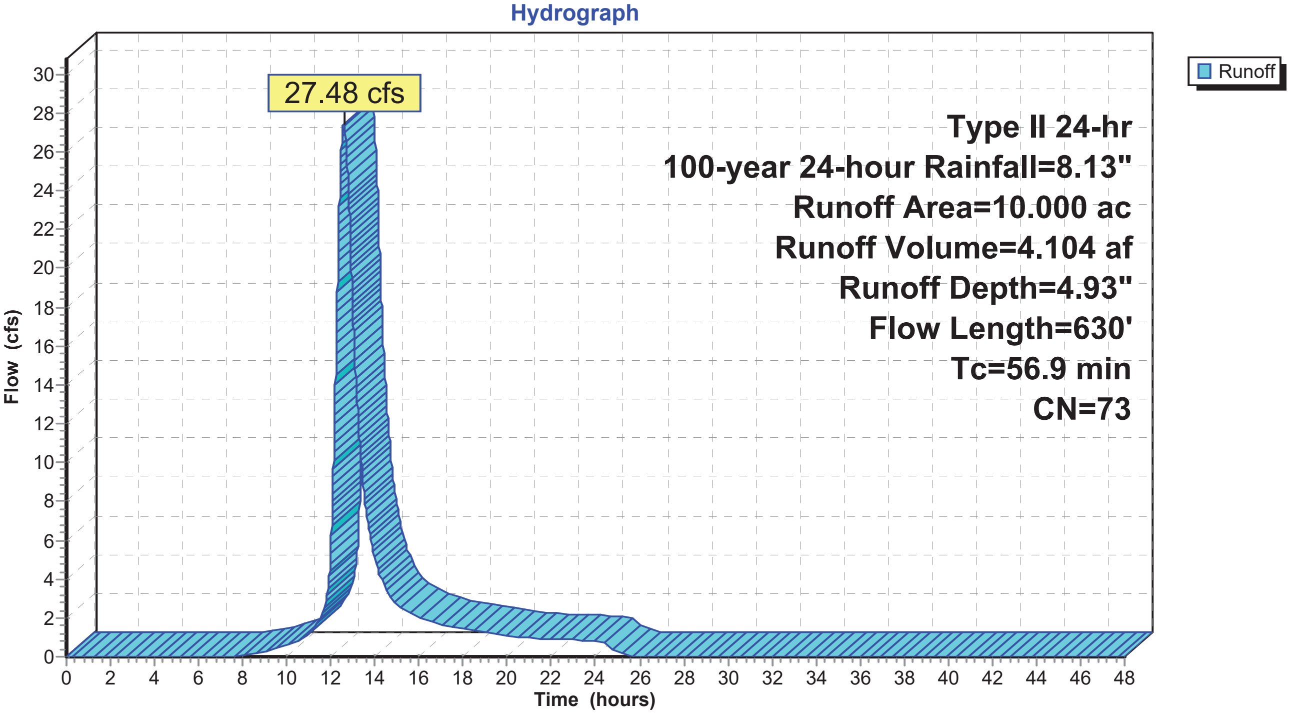
Runoff = 27.48 cfs @ 12.58 hrs, Volume= 4.104 af, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
10.000	73	Woods/grass comb., Poor, HSG B
10.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
49.7	100	0.0020	0.03		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
7.2	530	0.0600	1.22		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
56.9	630	Total			

Subcatchment OW1s: South Knob Subcat



Summary for Subcatchment OW2s: Western Offsite Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

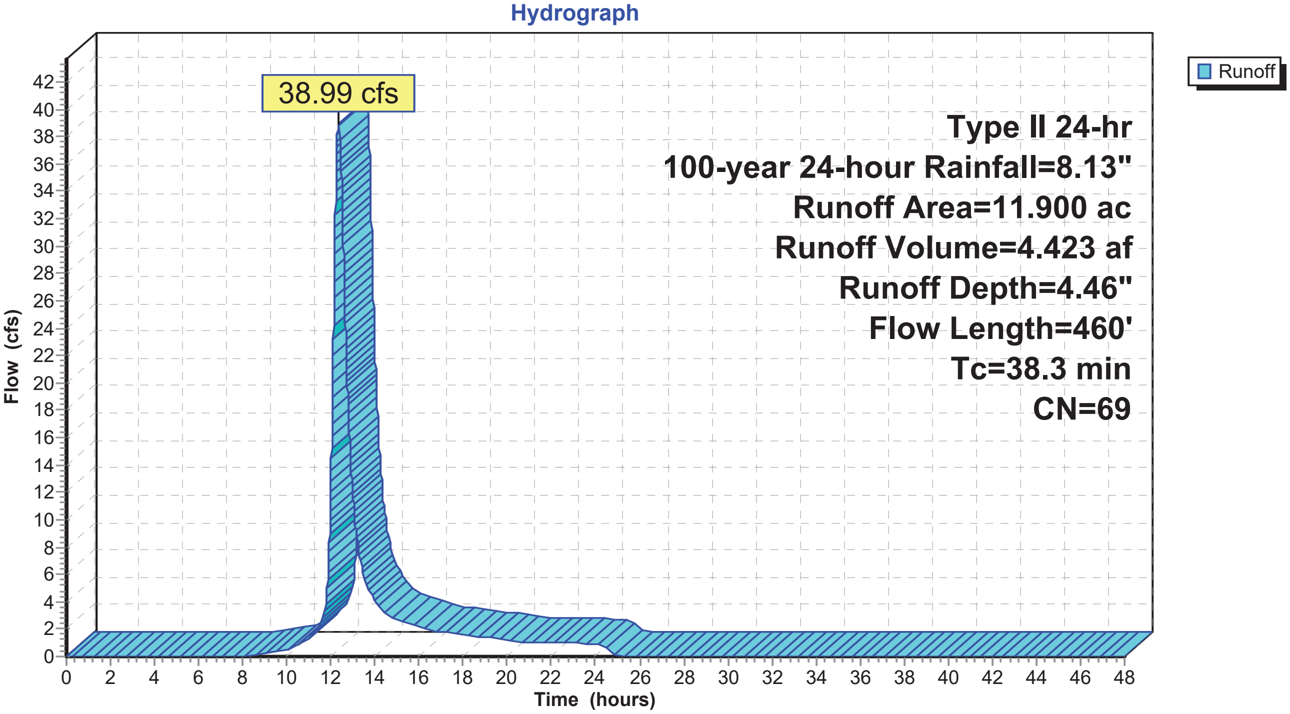
Runoff = 38.99 cfs @ 12.34 hrs, Volume= 4.423 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
11.900	69	50-75% Grass cover, Fair, HSG B
11.900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.0	100	0.0060	0.05		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
4.3	100	0.0060	0.39		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
1.0	130	0.1900	2.18		**Shallow Concentrated Flow, shallow** Woodland Kv= 5.0 fps
1.0	130	0.0900	2.10		**Shallow Concentrated Flow, shallow** Short Grass Pasture Kv= 7.0 fps
38.3	460	Total			

Subcatchment OW2s: Western Offsite Channel Subcat



Summary for Subcatchment OW3s: Western Offsite Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

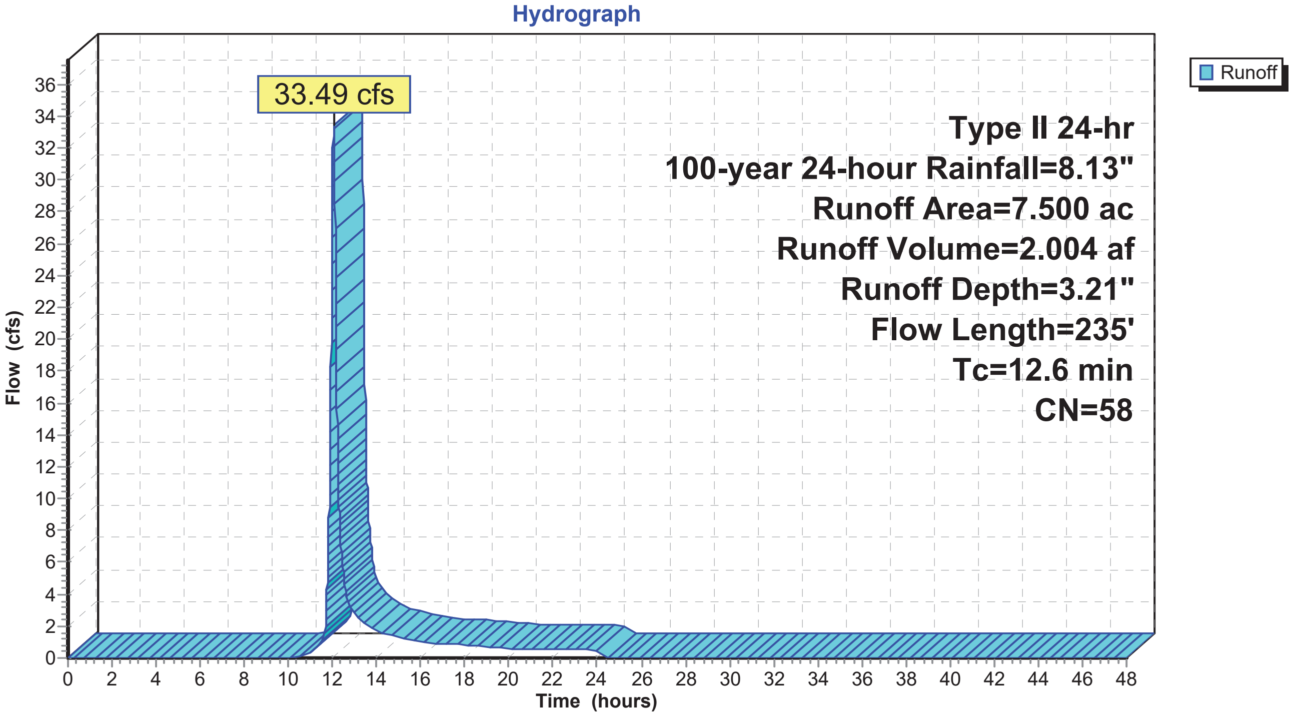
Runoff = 33.49 cfs @ 12.05 hrs, Volume= 2.004 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
7.500	58	Woods/grass comb., Good, HSG B
7.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.0870	0.15		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
1.3	70	0.0300	0.87		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
0.3	65	0.3300	4.02		**Shallow Concentrated Flow, shallow** Short Grass Pasture Kv= 7.0 fps
12.6	235	Total			

Subcatchment OW3s: Western Offsite Channel Subcat



Summary for Subcatchment PW1s: Western Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

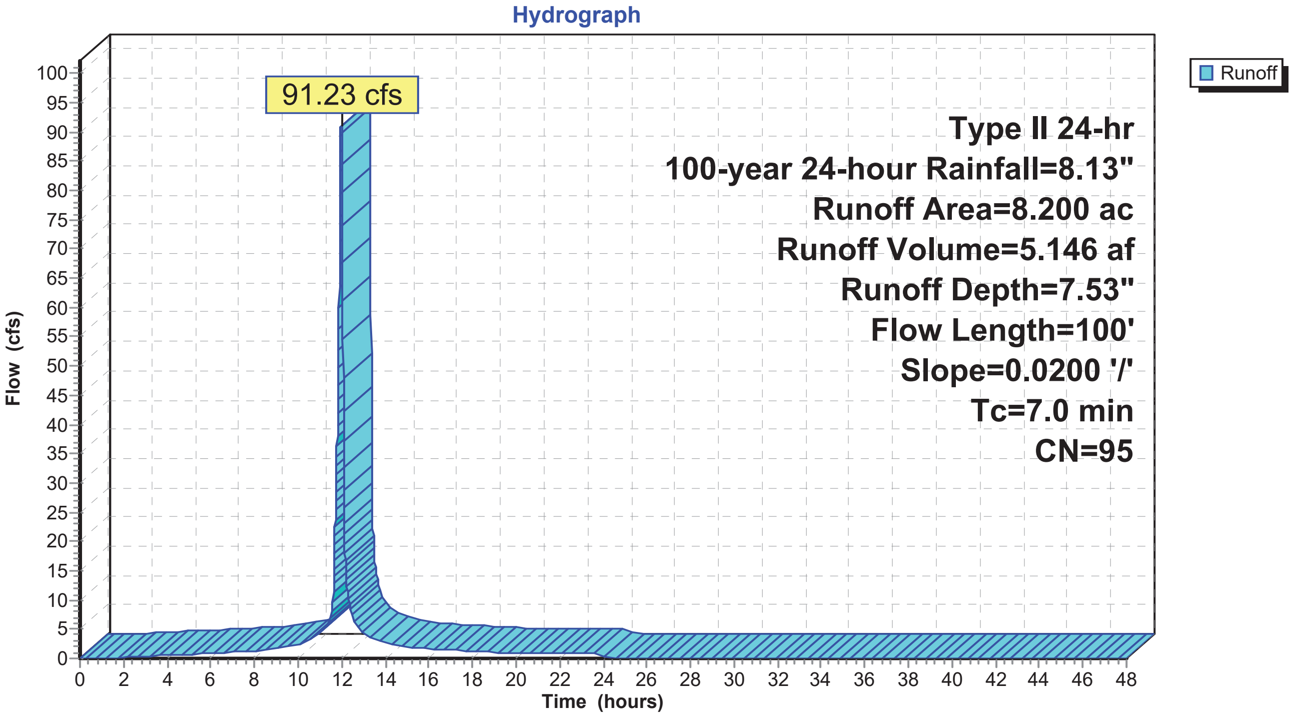
Runoff = 91.23 cfs @ 11.98 hrs, Volume= 5.146 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	8.200	95	Closure Turf
	8.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	100	0.0200	0.24		**Sheet Flow, sheet** n= 0.110 P2= 3.77"

Subcatchment PW1s: Western Channel Subcat



Summary for Subcatchment PW5s: Western Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

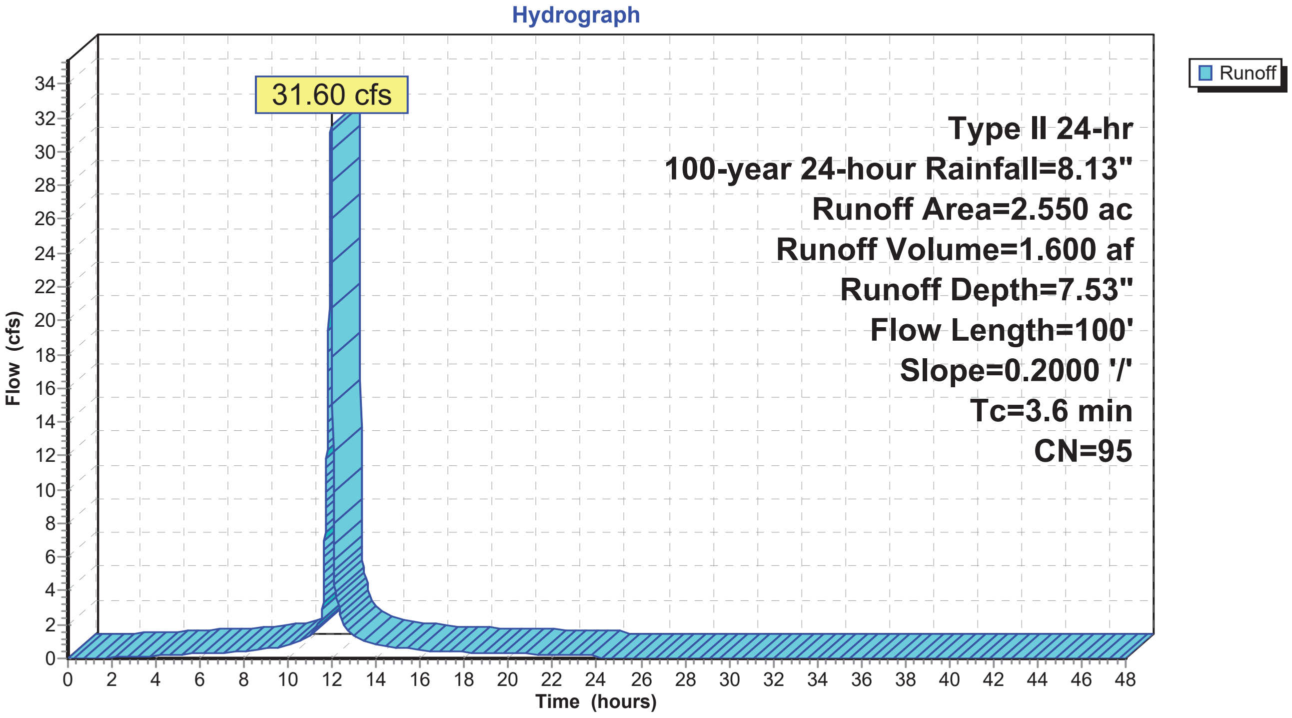
Runoff = 31.60 cfs @ 11.94 hrs, Volume= 1.600 af, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

	Area (ac)	CN	Description
*	2.550	95	Closure Turf
	2.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.2000	0.46		**Sheet Flow, sheet** Grass: Short n= 0.150 P2= 3.77"

Subcatchment PW5s: Western Channel Subcat



Summary for Subcatchment PW9s: SW Outlet Channel DA

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

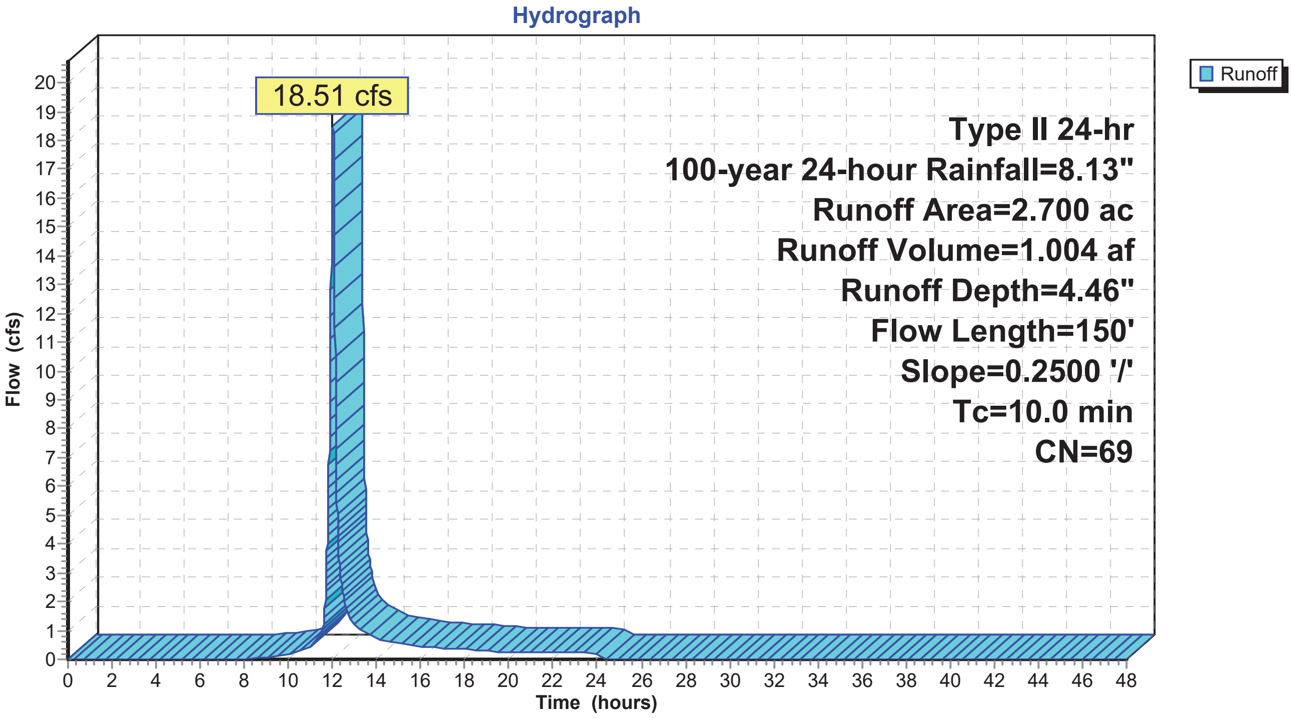
Runoff = 18.51 cfs @ 12.02 hrs, Volume= 1.004 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
2.700	69	50-75% Grass cover, Fair, HSG B
2.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	150	0.2500	0.25		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"

Subcatchment PW9s: SW Outlet Channel DA



Summary for Subcatchment RP1s: Western Channel Subcat

Hydrologic Soil Type B from NRCS web soil survey.

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

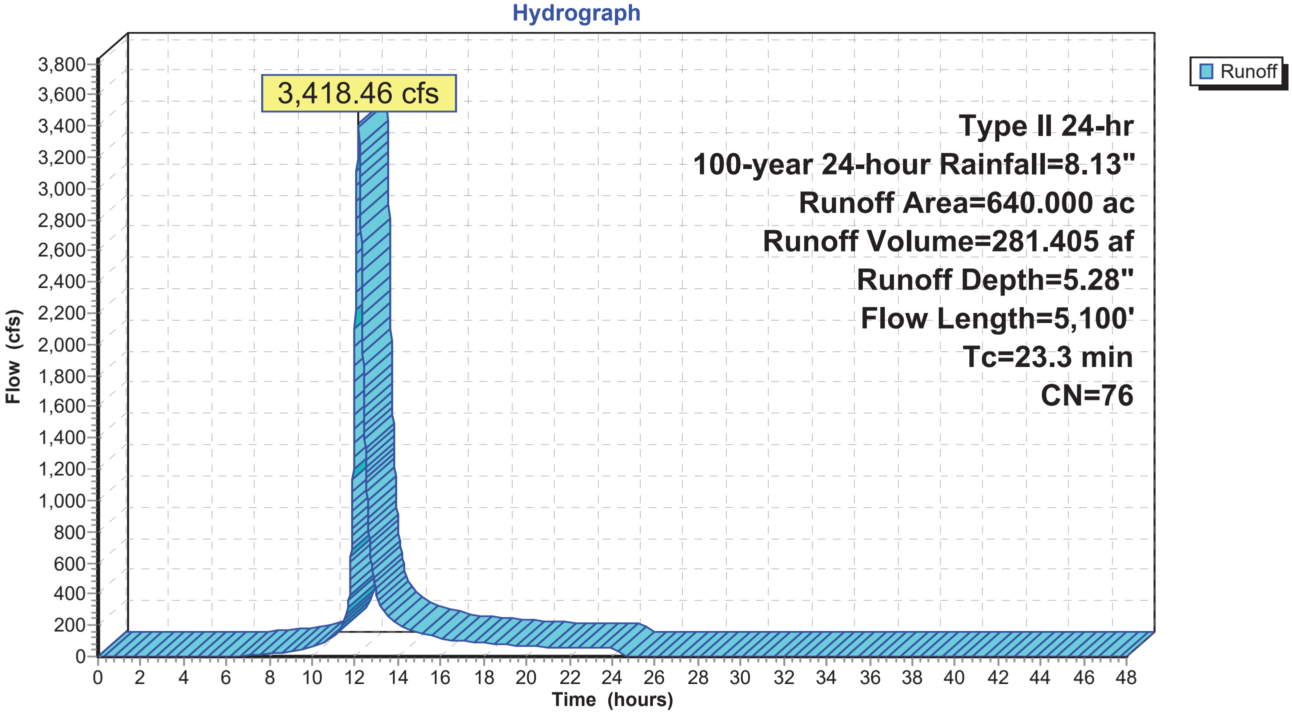
Runoff = 3,418.46 cfs @ 12.16 hrs, Volume= 281.405 af, Depth= 5.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
425.000	65	Woods/grass comb., Fair, HSG B
215.000	98	Water Surface, HSG A
640.000	76	Weighted Average
425.000		66.41% Pervious Area
215.000		33.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	100	0.0300	0.10		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
2.3	500	0.0600	3.67		**Shallow Concentrated Flow, shallow conc** Grassed Waterway Kv= 15.0 fps
4.2	4,500		17.94		**Lake or Reservoir, pond** Mean Depth= 10.00'
23.3	5,100	Total			

Subcatchment RP1s: Western Channel Subcat



Summary for Subcatchment WTPs: Water Treatment Pad

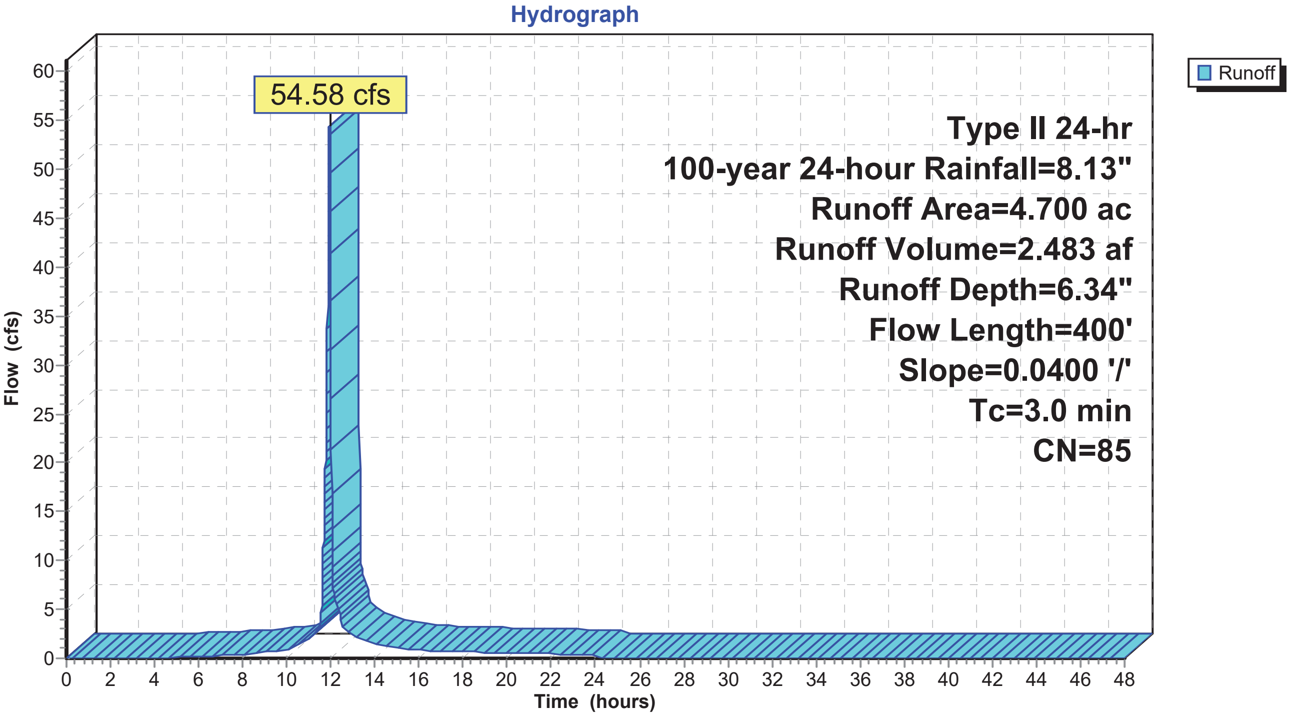
Runoff = 54.58 cfs @ 11.93 hrs, Volume= 2.483 af, Depth= 6.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
4.700	85	Gravel roads, HSG B
4.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0400	1.22		**Sheet Flow, sheet** n= 0.020 P2= 3.77"
1.6	300	0.0400	3.22		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
3.0	400	Total			

Subcatchment WTPs: Water Treatment Pad



Summary for Reach CW1: Western Letdown Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

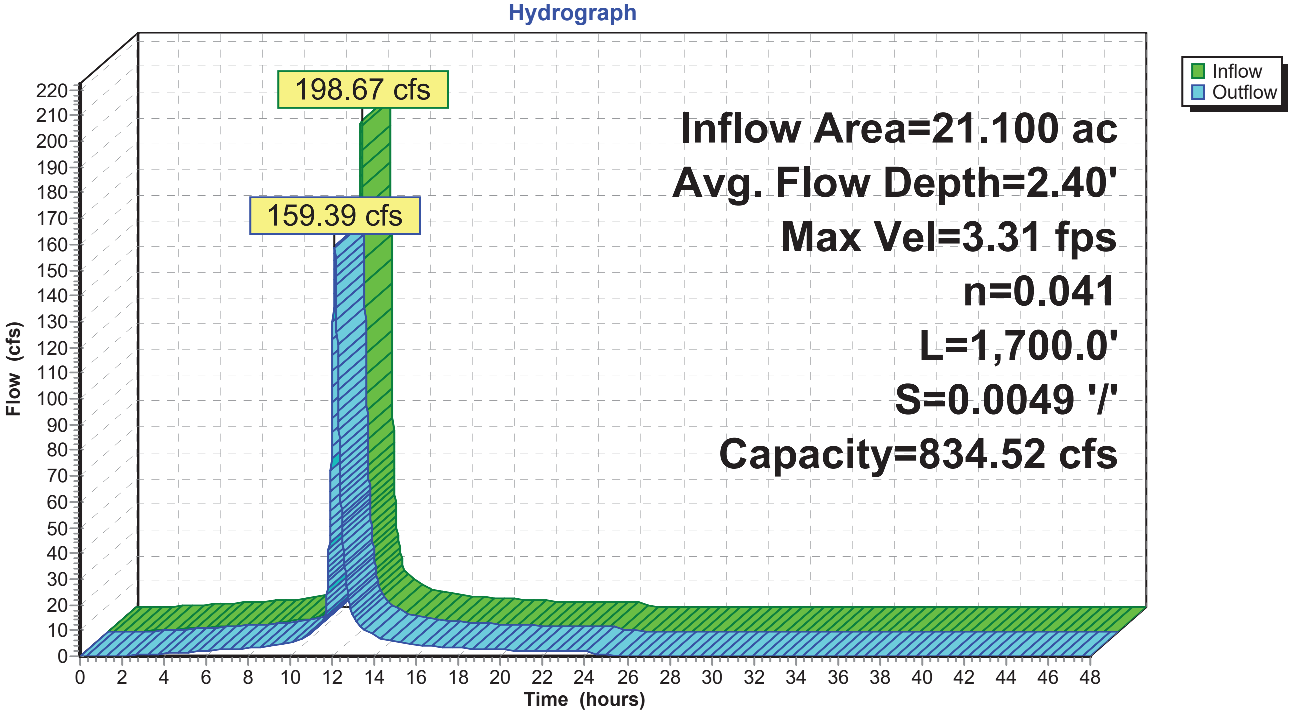
```
Inflow Area =        21.100 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      198.67 cfs @   12.03 hrs,  Volume=          13.242 af
Outflow      =      159.39 cfs @   12.11 hrs,  Volume=          13.242 af,  Atten= 20%,  Lag= 4.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.31 fps,  Min. Travel Time= 8.6 min
Avg. Velocity = 0.84 fps,  Avg. Travel Time= 33.9 min

Peak Storage= 81,869 cf @ 12.11 hrs
Average Depth at Peak Storage= 2.40'
Bank-Full Depth= 5.00'  Flow Area= 165.0 sf,  Capacity= 834.52 cfs

8.00'  x  5.00'  deep channel,  n= 0.041
Side Slope Z-value= 5.0 '/'   Top Width= 58.00'
Length= 1,700.0'   Slope= 0.0049 '/'
Inlet Invert= 501.00',  Outlet Invert= 492.60'
```

Reach CW1: Western Letdown Channel



Summary for Reach CW10: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

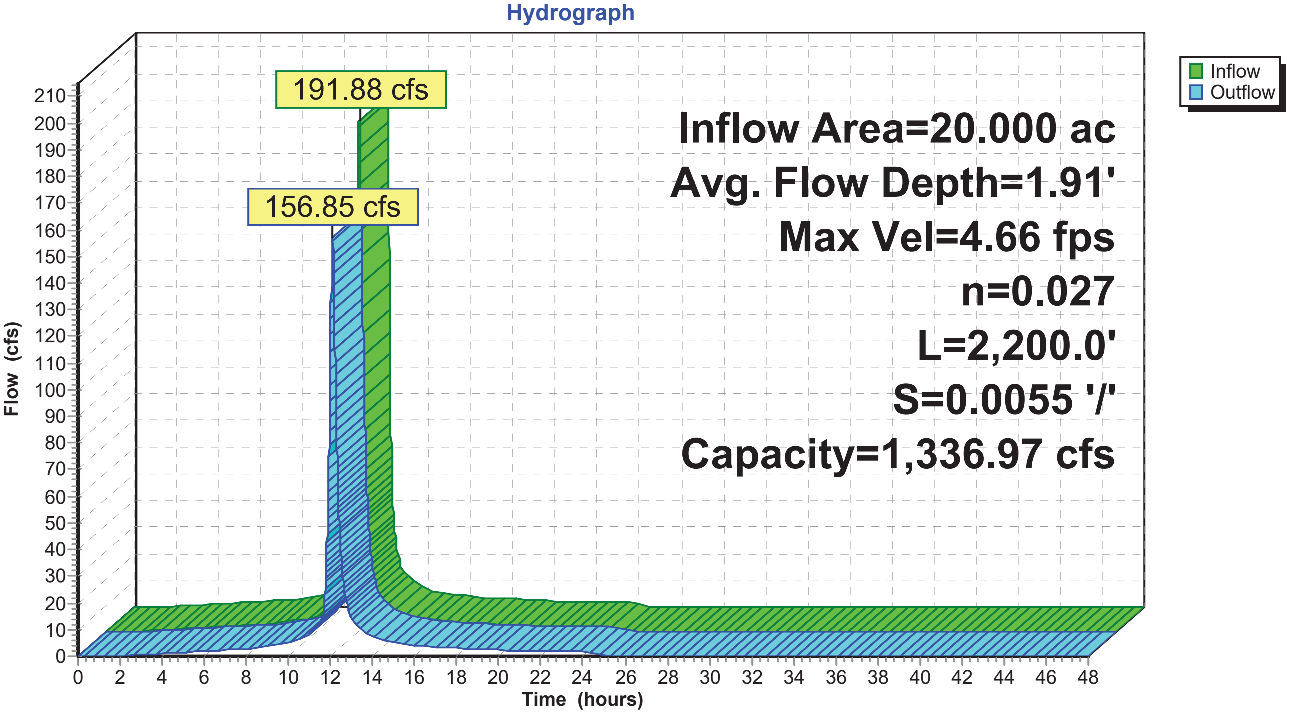
```
Inflow Area =       20.000 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      191.88 cfs @   12.03 hrs,  Volume=           12.551 af
Outflow      =      156.85 cfs @   12.09 hrs,  Volume=           12.551 af,  Atten= 18%,  Lag= 4.0 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.66 fps, Min. Travel Time= 7.9 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 30.4 min

Peak Storage= 73,966 cf @ 12.09 hrs
Average Depth at Peak Storage= 1.91'
Bank-Full Depth= 5.00' Flow Area= 165.0 sf, Capacity= 1,336.97 cfs

8.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 58.00'
Length= 2,200.0' Slope= 0.0055 '/'
Inlet Invert= 505.00', Outlet Invert= 492.90'

Reach CW10: Western Letdown Channel Subcat



Summary for Reach CW11: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach CW10 OUTLET depth by 0.04' @ 12.20 hrs

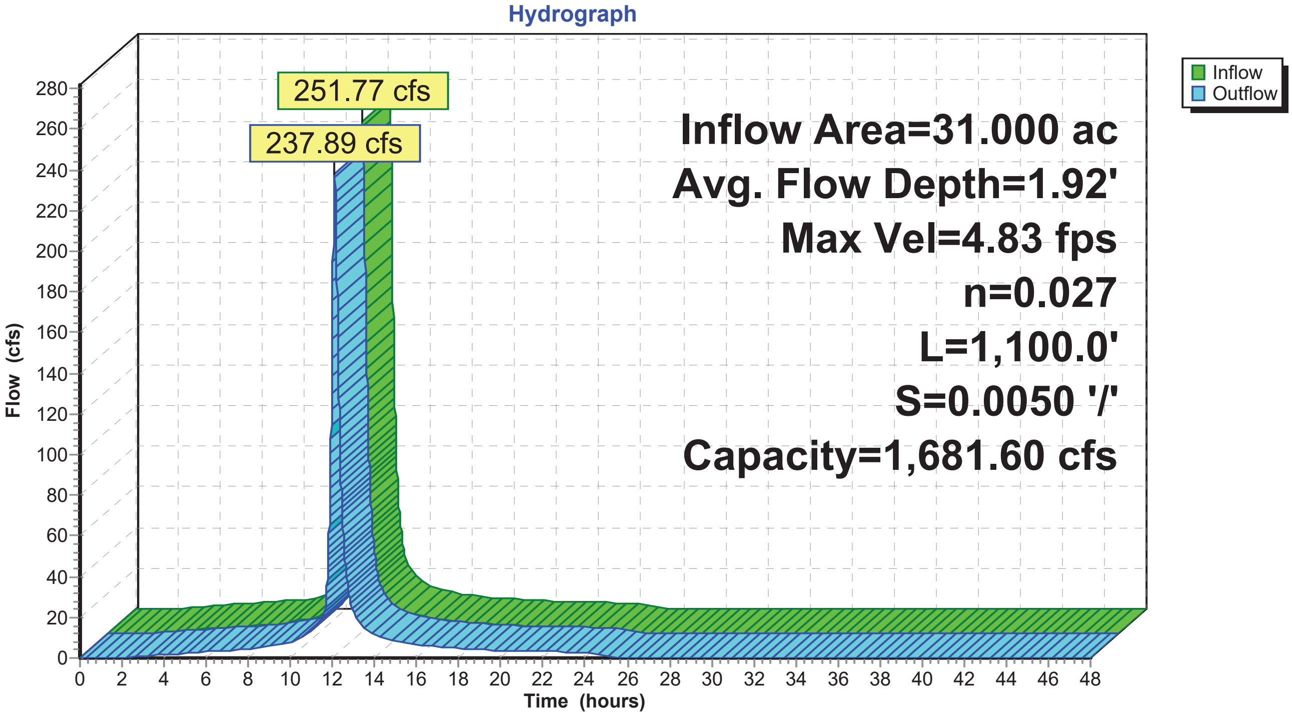
Inflow Area =      31.000 ac,   0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow      =     251.77 cfs @   12.06 hrs,  Volume=          19.455 af
Outflow     =     237.89 cfs @   12.10 hrs,  Volume=          19.455 af,  Atten= 6%,  Lag= 2.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.83 fps,  Min. Travel Time= 3.8 min
Avg. Velocity = 1.12 fps,  Avg. Travel Time= 16.3 min

Peak Storage= 54,166 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.92'
Bank-Full Depth= 5.00'  Flow Area= 205.0 sf,  Capacity= 1,681.60 cfs

16.00'  x  5.00'  deep channel,  n= 0.027
Side Slope Z-value= 5.0 '/'   Top Width= 66.00'
Length= 1,100.0'   Slope= 0.0050 '/'
Inlet Invert= 492.90',  Outlet Invert= 487.40'
```

Reach CW11: Western Letdown Channel Subcat



Summary for Reach CW12: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

---

[61] Hint: Exceeded Reach CW11 outlet invert by 1.37' @ 12.11 hrs

```
Inflow Area =        31.000 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      237.89 cfs @   12.10 hrs,  Volume=           19.455 af
Outflow      =      237.74 cfs @   12.11 hrs,  Volume=           19.455 af,  Atten= 0%,  Lag= 0.3 min
```

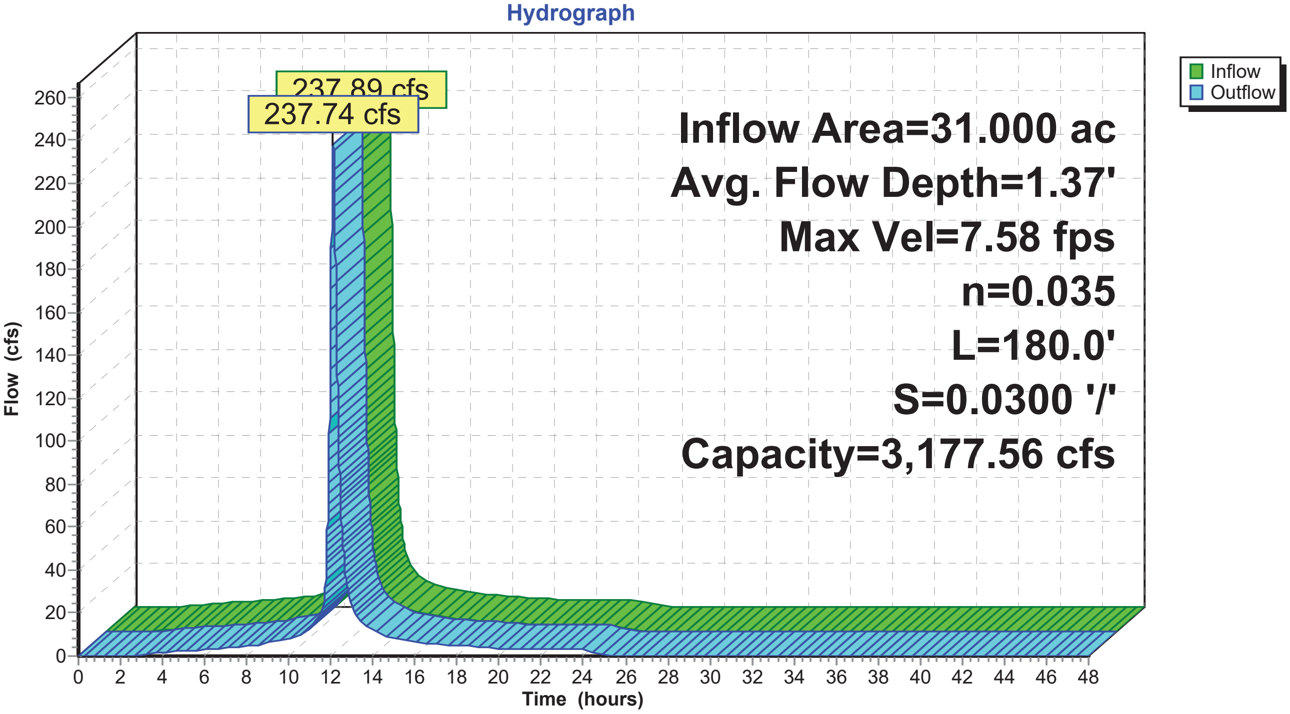
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 7.58 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 1.7 min

Peak Storage= 5,647 cf @ 12.11 hrs
Average Depth at Peak Storage= 1.37'
Bank-Full Depth= 5.00' Flow Area= 205.0 sf, Capacity= 3,177.56 cfs

16.00' x 5.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 66.00'
Length= 180.0' Slope= 0.0300 '/'
Inlet Invert= 487.40', Outlet Invert= 482.00'

‡

Reach CW12: Western Letdown Channel Subcat



Summary for Reach CW13: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

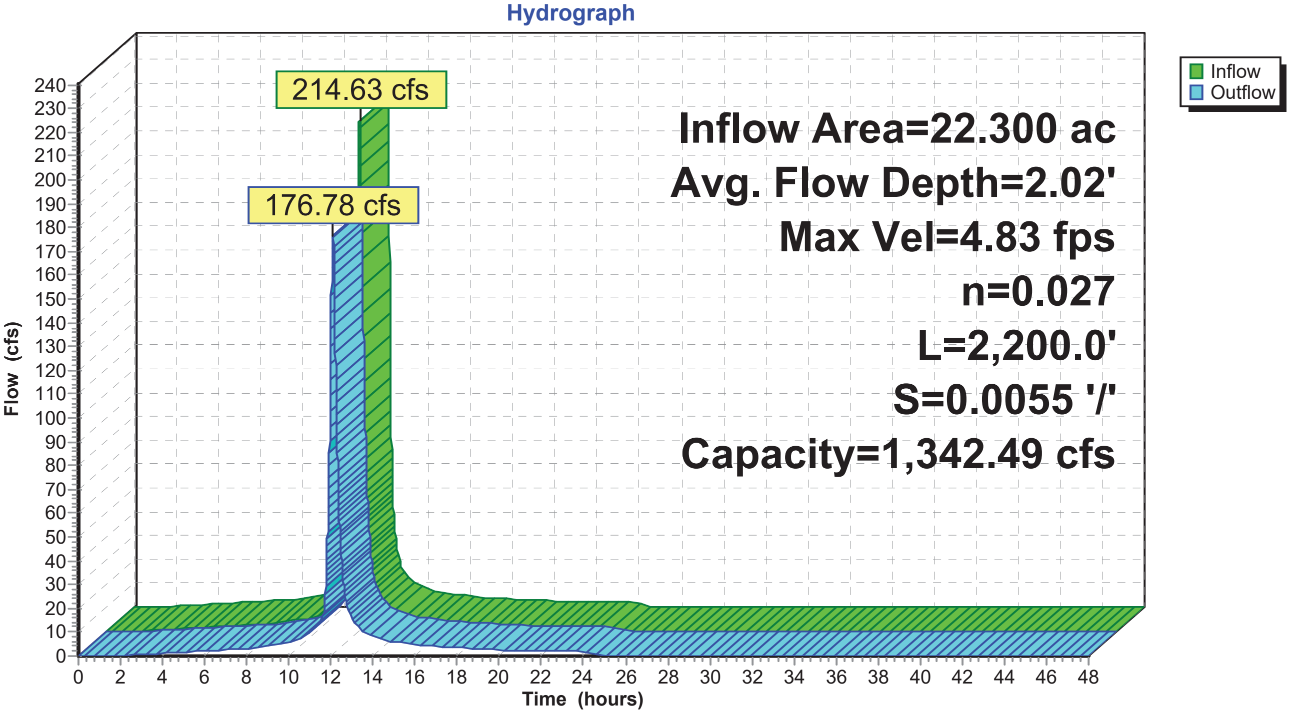
```
Inflow Area =        22.300 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      214.63 cfs @   12.03 hrs,  Volume=           13.995 af
Outflow      =      176.78 cfs @   12.09 hrs,  Volume=           13.995 af,  Atten= 18%,  Lag= 3.9 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.83 fps, Min. Travel Time= 7.6 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 29.4 min

Peak Storage= 80,522 cf @ 12.09 hrs
Average Depth at Peak Storage= 2.02'
Bank-Full Depth= 5.00' Flow Area= 165.0 sf, Capacity= 1,342.49 cfs

8.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 58.00'
Length= 2,200.0' Slope= 0.0055 '/'
Inlet Invert= 505.00', Outlet Invert= 492.80'

Reach CW13: Western Letdown Channel Subcat



Summary for Reach CW14: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[61] Hint: Exceeded Reach CW13 outlet invert by 1.80' @ 12.10 hrs

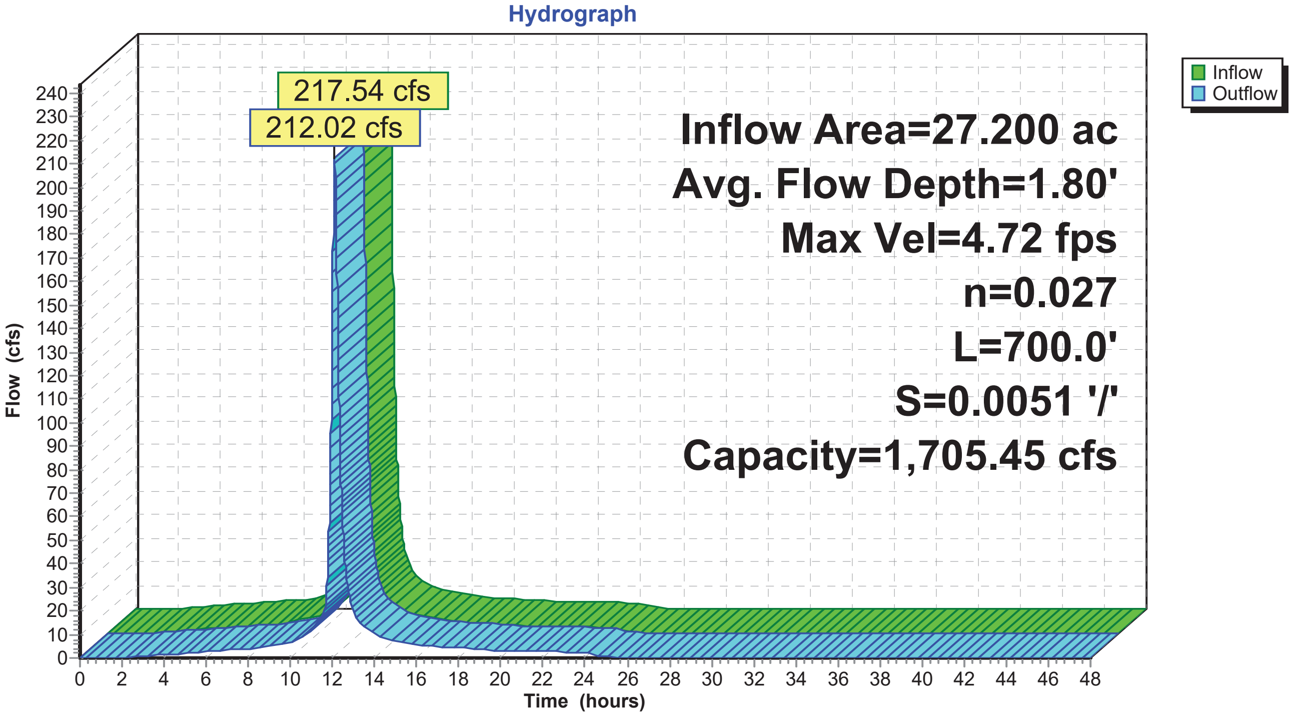
Inflow Area =        27.200 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      217.54 cfs @   12.07 hrs,  Volume=          17.070 af
Outflow      =      212.02 cfs @   12.10 hrs,  Volume=          17.070 af,  Atten= 3%,  Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.72 fps,  Min. Travel Time= 2.5 min
Avg. Velocity = 1.10 fps,  Avg. Travel Time= 10.6 min

Peak Storage= 31,436 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.80'
Bank-Full Depth= 5.00'  Flow Area= 205.0 sf,  Capacity= 1,705.45 cfs

16.00'  x  5.00'  deep channel,  n= 0.027
Side Slope Z-value= 5.0 '/'   Top Width= 66.00'
Length= 700.0'   Slope= 0.0051 '/'
Inlet Invert= 492.80',  Outlet Invert= 489.20'
```

Reach CW14: Western Letdown Channel Subcat



Summary for Reach CW15: Knob Area Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =        12.400 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      120.13 cfs @   12.02 hrs,  Volume=            7.782 af
Outflow      =      116.50 cfs @   12.05 hrs,  Volume=            7.782 af,  Atten= 3%,  Lag= 1.6 min
```

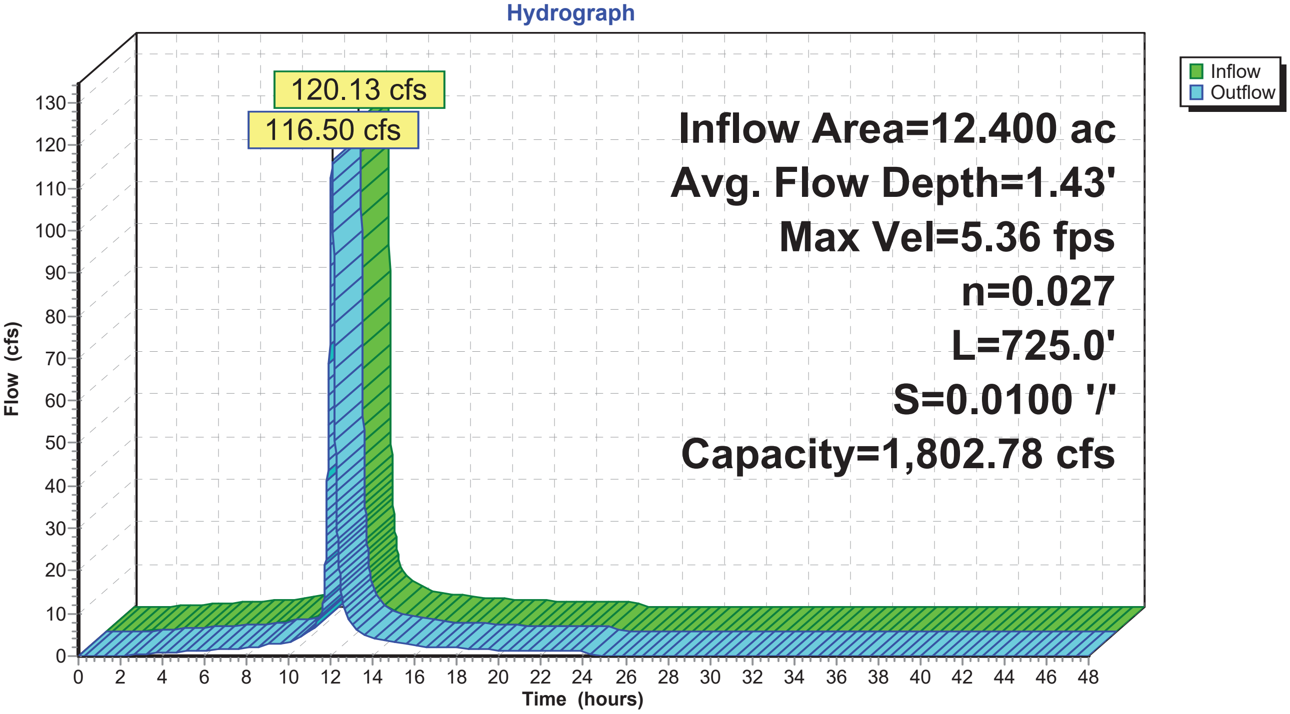
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.36 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.48 fps, Avg. Travel Time= 8.2 min

Peak Storage= 15,757 cf @ 12.05 hrs
Average Depth at Peak Storage= 1.43'
Bank-Full Depth= 5.00' Flow Area= 165.0 sf, Capacity= 1,802.78 cfs

8.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 58.00'
Length= 725.0' Slope= 0.0100 '/'
Inlet Invert= 505.00', Outlet Invert= 497.75'

‡

Reach CW15: Knob Area Channel



Summary for Reach CW16: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

---

[62] Hint: Exceeded Reach CW14 OUTLET depth by 0.69' @ 12.04 hrs

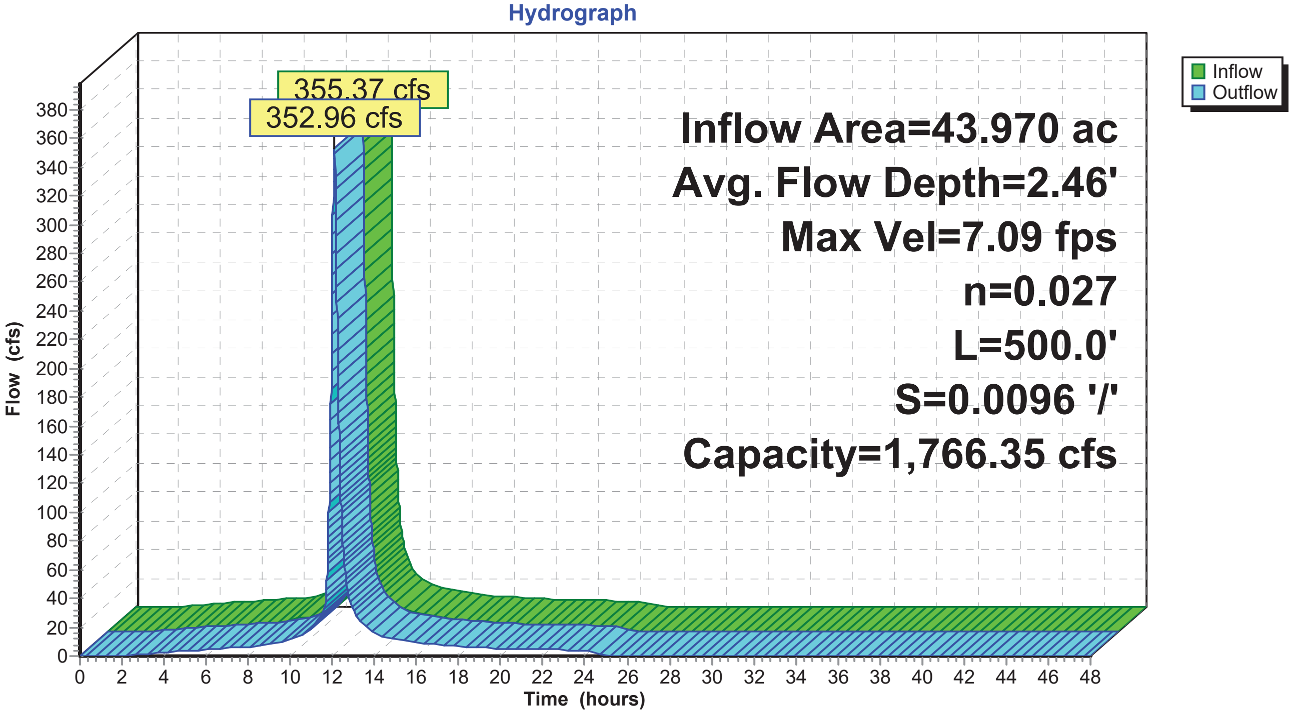
```
Inflow Area =        43.970 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      355.37 cfs @   12.07 hrs,  Volume=           27.594 af
Outflow      =      352.96 cfs @   12.09 hrs,  Volume=           27.594 af,  Atten= 1%,  Lag= 0.9 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 7.09 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.83 fps, Avg. Travel Time= 4.5 min

Peak Storage= 24,897 cf @ 12.09 hrs
Average Depth at Peak Storage= 2.46'
Bank-Full Depth= 5.00' Flow Area= 165.0 sf, Capacity= 1,766.35 cfs

8.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 58.00'
Length= 500.0' Slope= 0.0096 '/'
Inlet Invert= 489.20', Outlet Invert= 484.40'

Reaction CW16: Western Letdown Channel Subcat



Summary for Reach CW2: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[61] Hint: Exceeded Reach CW1 outlet invert by 1.80' @ 12.10 hrs

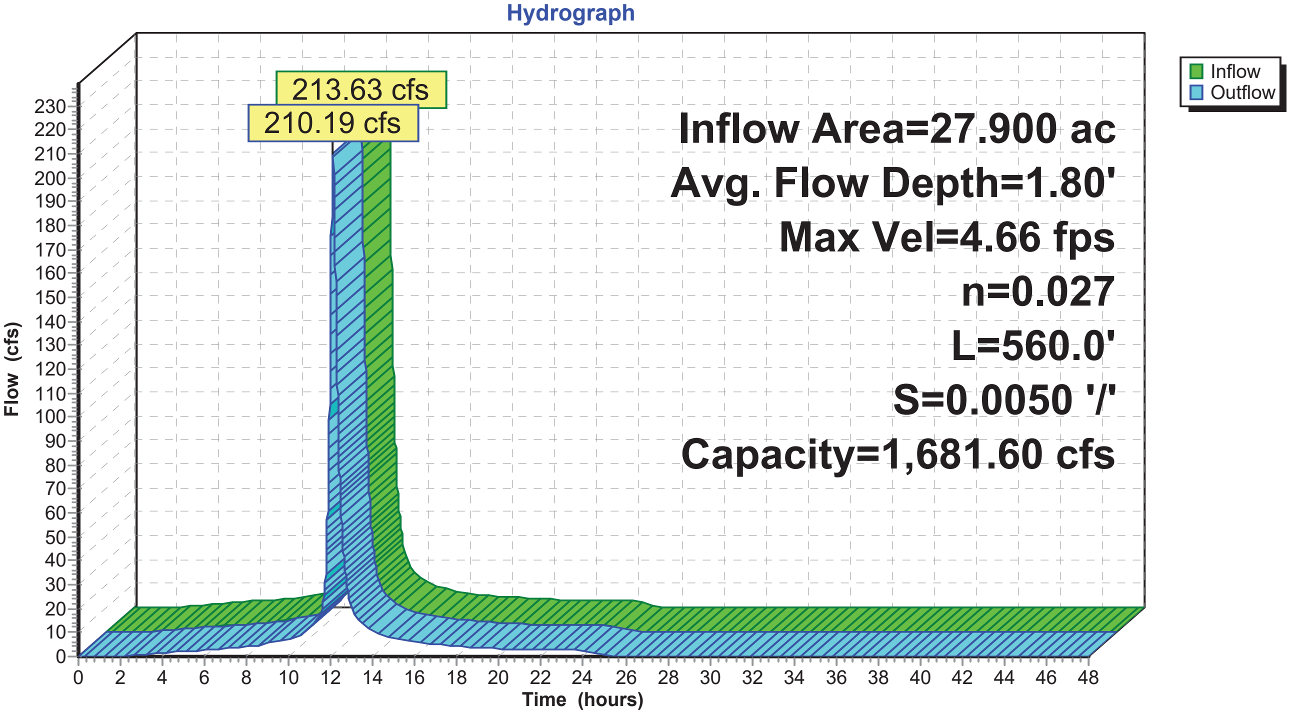
Inflow Area =      27.900 ac,   0.00% Impervious,  Inflow Depth =  7.53"   for  100-year 24-hour event
Inflow      =     213.63 cfs @   12.07 hrs,  Volume=         17.509 af
Outflow     =     210.19 cfs @   12.10 hrs,  Volume=         17.509 af,  Atten= 2%,  Lag= 1.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.66 fps,  Min. Travel Time= 2.0 min
Avg. Velocity = 1.06 fps,  Avg. Travel Time= 8.8 min

Peak Storage= 25,246 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.80'
Bank-Full Depth= 5.00'  Flow Area= 205.0 sf,  Capacity= 1,681.60 cfs

16.00'  x  5.00'  deep channel,  n= 0.027
Side Slope Z-value= 5.0 '/'   Top Width= 66.00'
Length= 560.0'   Slope= 0.0050 '/'
Inlet Invert= 492.60',  Outlet Invert= 489.80'
```

Reach CW2: Western Letdown Channel Subcat



Summary for Reach CW3: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[61] Hint: Exceeded Reach CW2 outlet invert by 1.31' @ 12.10 hrs

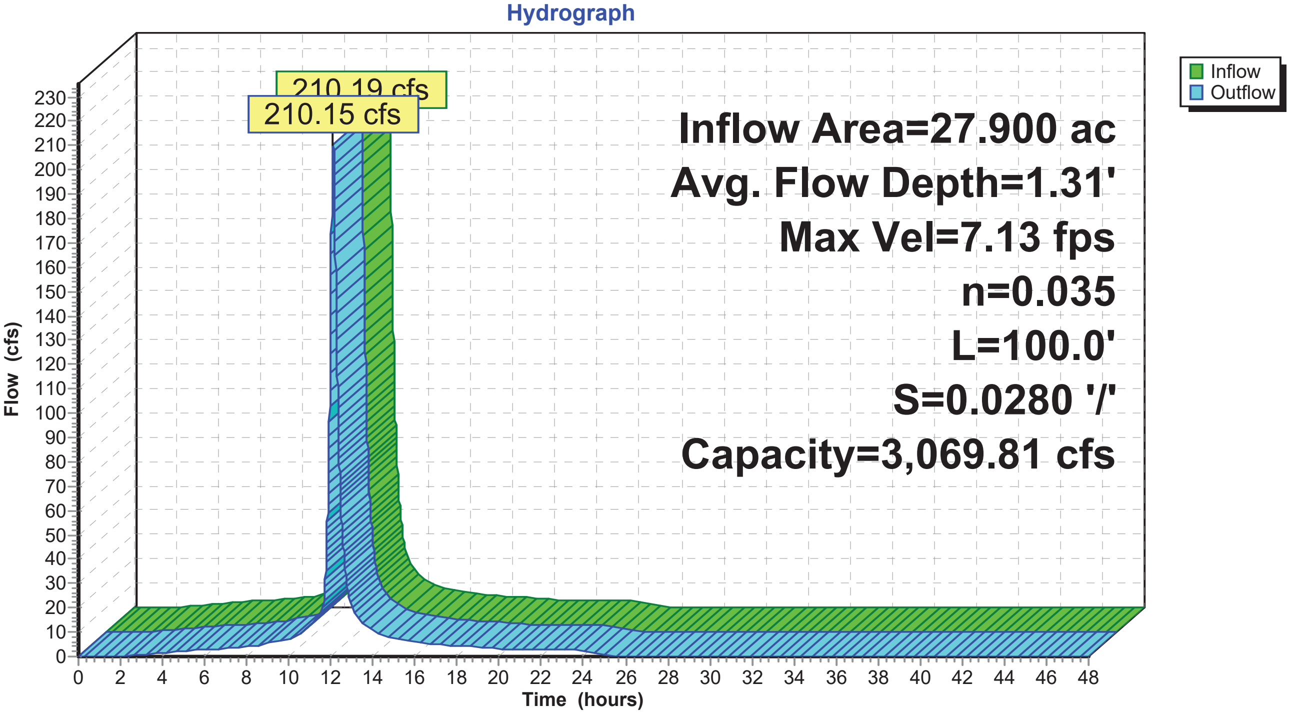
Inflow Area =        27.900 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      210.19 cfs @   12.10 hrs,  Volume=           17.509 af
Outflow      =      210.15 cfs @   12.10 hrs,  Volume=           17.509 af,  Atten= 0%,  Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 7.13 fps,  Min. Travel Time= 0.2 min
Avg. Velocity = 1.65 fps,  Avg. Travel Time= 1.0 min

Peak Storage= 2,948 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.31'
Bank-Full Depth= 5.00'  Flow Area= 205.0 sf,  Capacity= 3,069.81 cfs

16.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 66.00'
Length= 100.0'   Slope= 0.0280 '/'
Inlet Invert= 489.80',  Outlet Invert= 487.00'
```

Reach CW3: Western Letdown Channel Subcat



Summary for Reach CW4: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

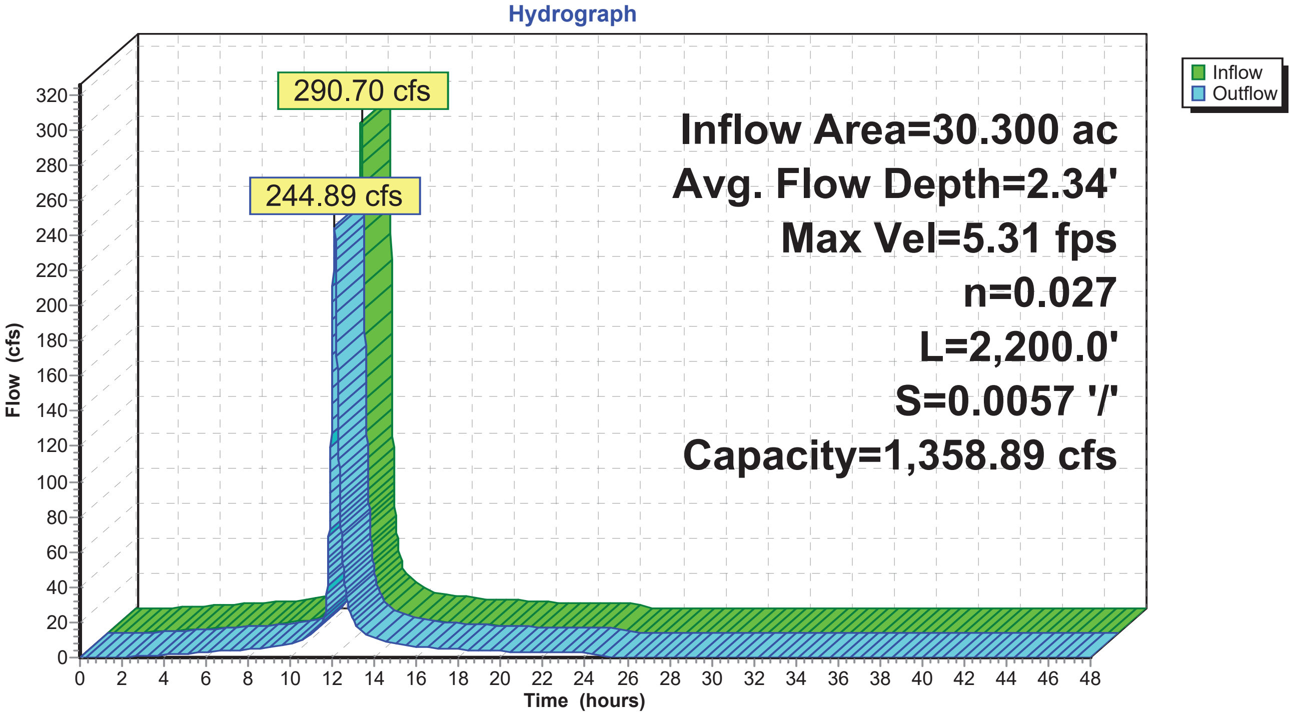
```
Inflow Area =        30.300 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      290.70 cfs @   12.03 hrs,  Volume=          19.015 af
Outflow      =      244.89 cfs @   12.09 hrs,  Volume=          19.015 af,  Atten= 16%,  Lag= 3.7 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.31 fps, Min. Travel Time= 6.9 min
Avg. Velocity = 1.37 fps, Avg. Travel Time= 26.7 min

Peak Storage= 101,493 cf @ 12.09 hrs
Average Depth at Peak Storage= 2.34'
Bank-Full Depth= 5.00' Flow Area= 165.0 sf, Capacity= 1,358.89 cfs

8.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 58.00'
Length= 2,200.0' Slope= 0.0057 '/'
Inlet Invert= 505.00', Outlet Invert= 492.50'

Reach CW4: Western Letdown Channel Subcat



Summary for Reach CW5: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

---

[61] Hint: Exceeded Reach CW4 outlet invert by 2.30' @ 12.09 hrs

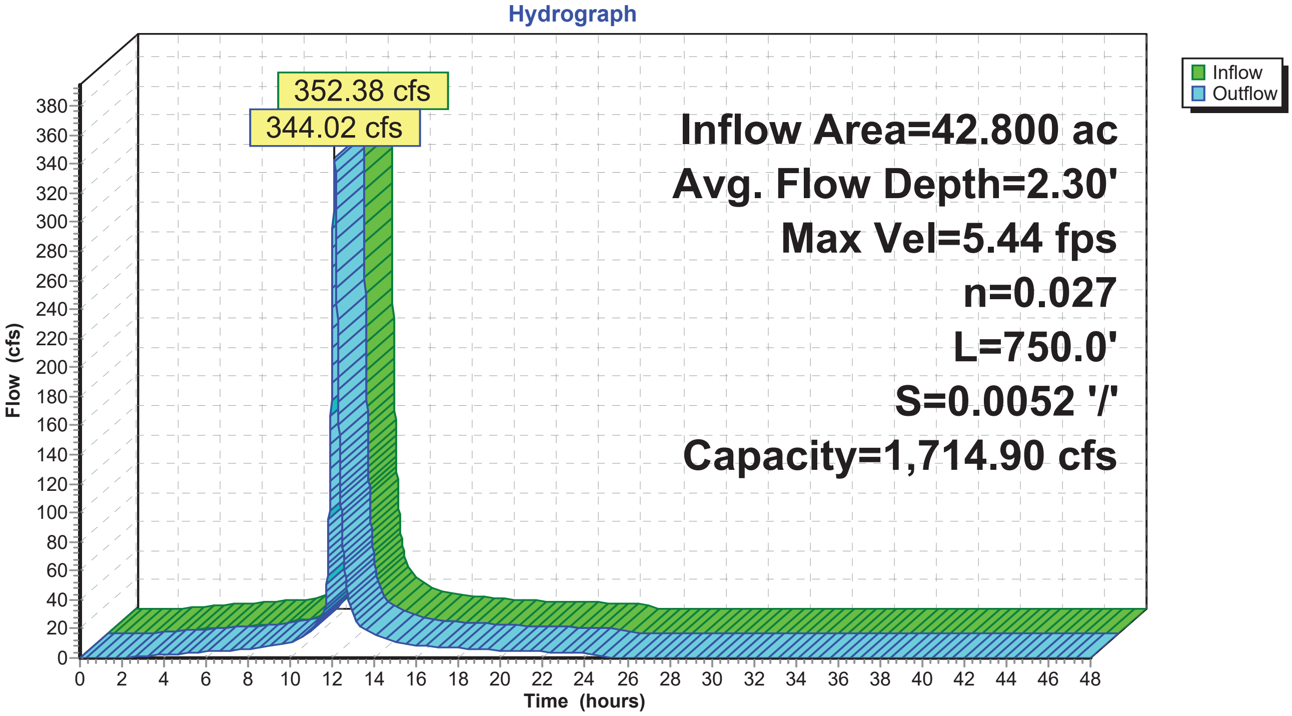
```
Inflow Area =        42.800 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      352.38 cfs @   12.06 hrs,  Volume=           26.860 af
Outflow      =      344.02 cfs @   12.09 hrs,  Volume=           26.860 af,  Atten= 2%,  Lag= 1.6 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.44 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.26 fps, Avg. Travel Time= 9.9 min

Peak Storage= 47,455 cf @ 12.09 hrs
Average Depth at Peak Storage= 2.30'
Bank-Full Depth= 5.00' Flow Area= 205.0 sf, Capacity= 1,714.90 cfs

16.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 66.00'
Length= 750.0' Slope= 0.0052 '/'
Inlet Invert= 492.50', Outlet Invert= 488.60'

Reach CW5: Western Letdown Channel Subcat



Summary for Reach CW6: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

---

[61] Hint: Exceeded Reach CW5 outlet invert by 1.70' @ 12.09 hrs

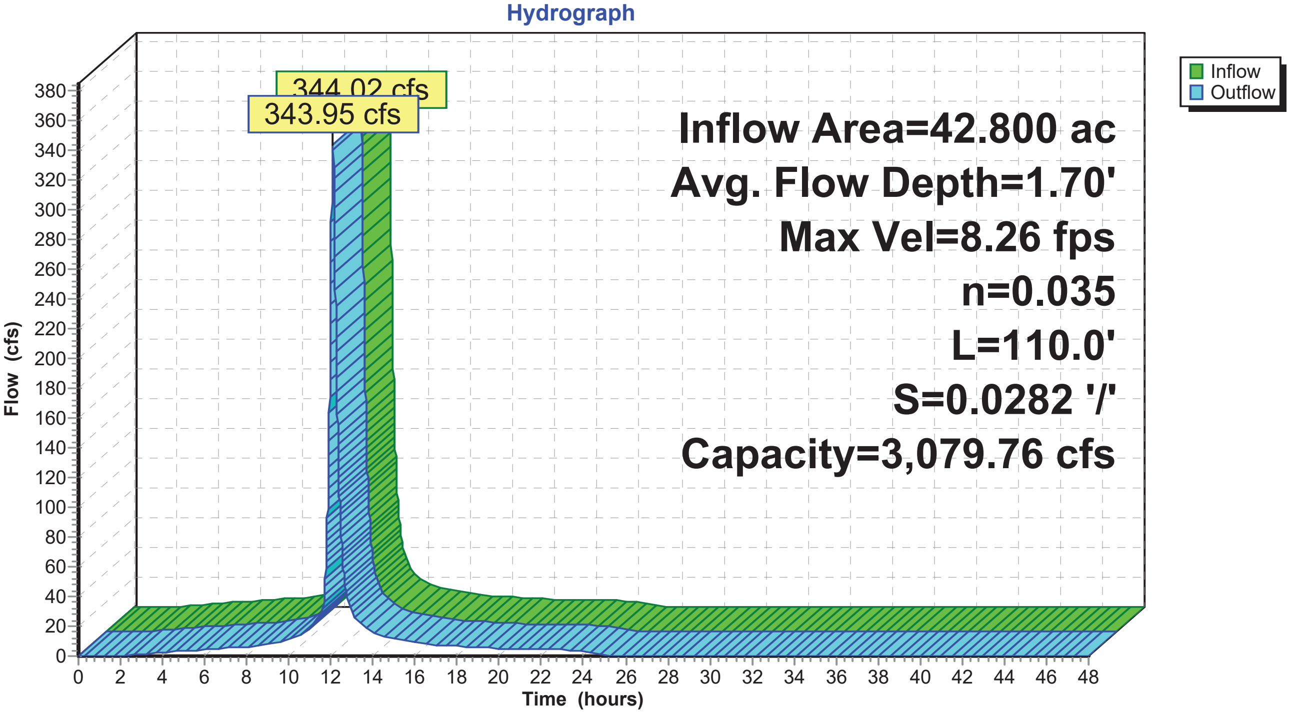
```
Inflow Area =        42.800 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      344.02 cfs @   12.09 hrs,  Volume=           26.860 af
Outflow      =      343.95 cfs @   12.09 hrs,  Volume=           26.860 af,  Atten= 0%,  Lag= 0.2 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 8.26 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.92 fps, Avg. Travel Time= 1.0 min

Peak Storage= 4,578 cf @ 12.09 hrs
Average Depth at Peak Storage= 1.70'
Bank-Full Depth= 5.00' Flow Area= 205.0 sf, Capacity= 3,079.76 cfs

16.00' x 5.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 66.00'
Length= 110.0' Slope= 0.0282 '/'
Inlet Invert= 488.60', Outlet Invert= 485.50'

Reach CW6: Western Letdown Channel Subcat



Summary for Reach CW7: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =       25.500 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      246.21 cfs @   12.02 hrs,  Volume=          16.003 af
Outflow      =      204.43 cfs @   12.09 hrs,  Volume=          16.003 af,  Atten= 17%,  Lag= 3.8 min

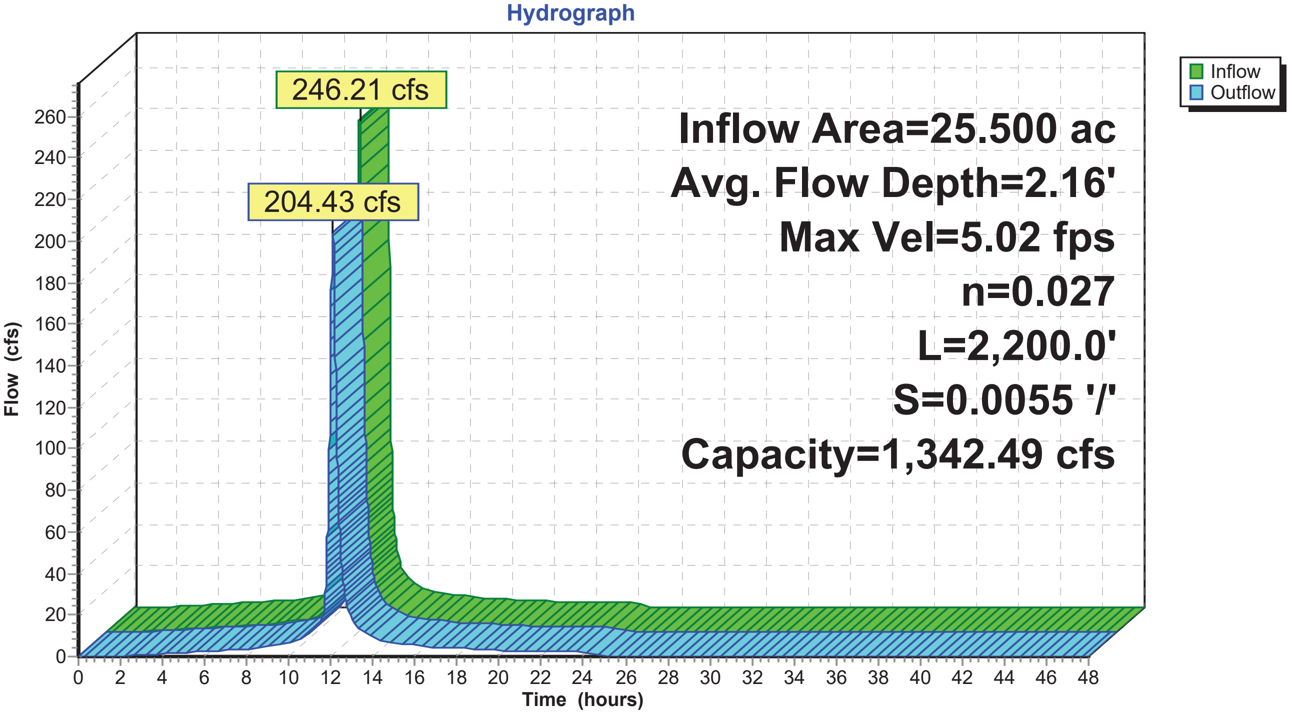
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.02 fps,  Min. Travel Time= 7.3 min
Avg. Velocity = 1.30 fps,  Avg. Travel Time= 28.3 min

Peak Storage= 89,625 cf @ 12.09 hrs
Average Depth at Peak Storage= 2.16'
Bank-Full Depth= 5.00'  Flow Area= 165.0 sf,  Capacity= 1,342.49 cfs

8.00'  x  5.00'  deep channel,  n= 0.027
Side Slope Z-value= 5.0 '/'   Top Width= 58.00'
Length= 2,200.0'   Slope= 0.0055 '/'
Inlet Invert= 505.00',  Outlet Invert= 492.80'
```

‡

Reach CW7: Western Letdown Channel Subcat



Summary for Reach CW8: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

---

[62] Hint: Exceeded Reach CW7 OUTLET depth by 0.08' @ 12.14 hrs

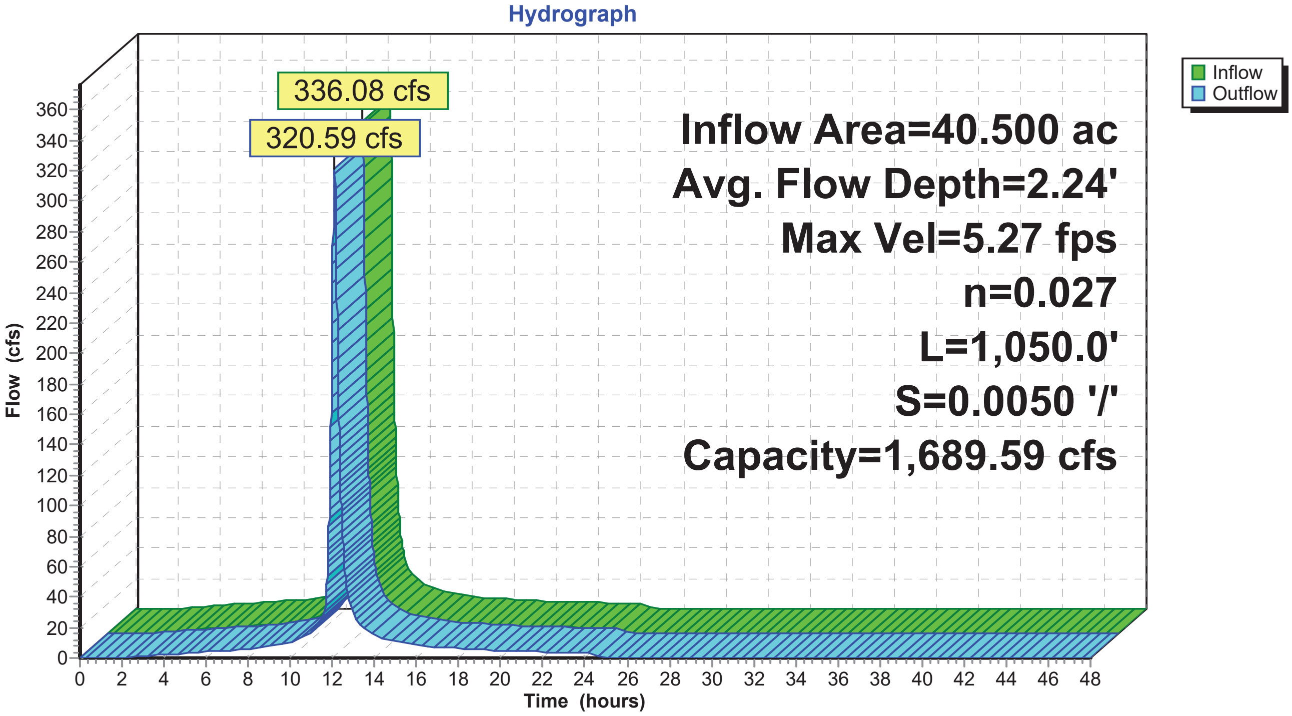
```
Inflow Area =        40.500 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      336.08 cfs @   12.06 hrs,  Volume=           25.417 af
Outflow      =      320.59 cfs @   12.09 hrs,  Volume=           25.417 af,  Atten= 5%,  Lag= 2.3 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.27 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 1.22 fps, Avg. Travel Time= 14.3 min

Peak Storage= 63,825 cf @ 12.09 hrs
Average Depth at Peak Storage= 2.24'
Bank-Full Depth= 5.00' Flow Area= 205.0 sf, Capacity= 1,689.59 cfs

16.00' x 5.00' deep channel, n= 0.027
Side Slope Z-value= 5.0 '/' Top Width= 66.00'
Length= 1,050.0' Slope= 0.0050 '/'
Inlet Invert= 492.80', Outlet Invert= 487.50'

Reach CW8: Western Letdown Channel Subcat



Summary for Reach CW9: Western Letdown Channel Subcat

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[61] Hint: Exceeded Reach CW8 outlet invert by 1.62' @ 12.10 hrs

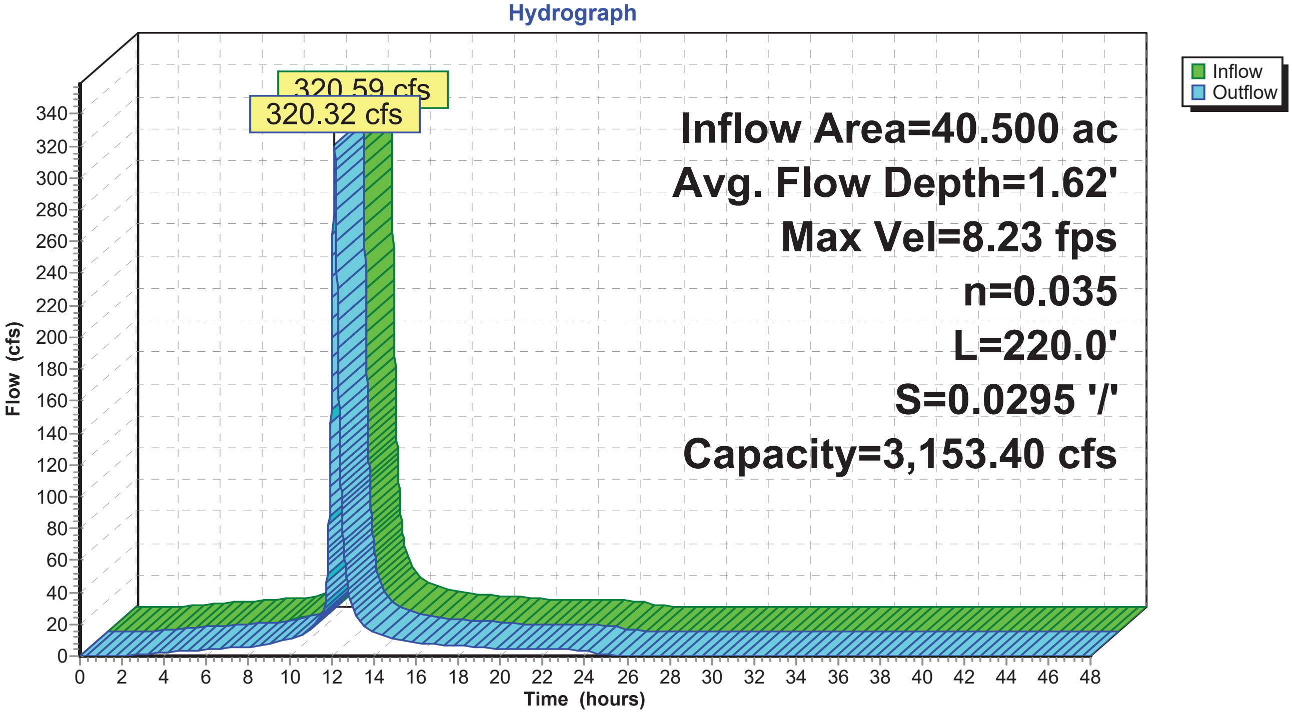
Inflow Area =      40.500 ac,   0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow      =     320.59 cfs @   12.09 hrs,  Volume=         25.417 af
Outflow     =     320.32 cfs @   12.10 hrs,  Volume=         25.417 af,  Atten= 0%,  Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 8.23 fps,  Min. Travel Time= 0.4 min
Avg. Velocity = 1.91 fps,  Avg. Travel Time= 1.9 min

Peak Storage= 8,560 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.62'
Bank-Full Depth= 5.00'  Flow Area= 205.0 sf,  Capacity= 3,153.40 cfs

16.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 66.00'
Length= 220.0'   Slope= 0.0295 '/'
Inlet Invert= 487.50',  Outlet Invert= 481.00'
```

Reach CW9: Western Letdown Channel Subcat



Summary for Reach DRC: Ditch along road

Inflow Area = 0.930 ac, 0.00% Impervious, Inflow Depth = 6.81" for 100-year 24-hour event
Inflow = 11.02 cfs @ 11.94 hrs, Volume= 0.528 af
Outflow = 10.95 cfs @ 11.95 hrs, Volume= 0.528 af, Atten= 1%, Lag= 0.4 min

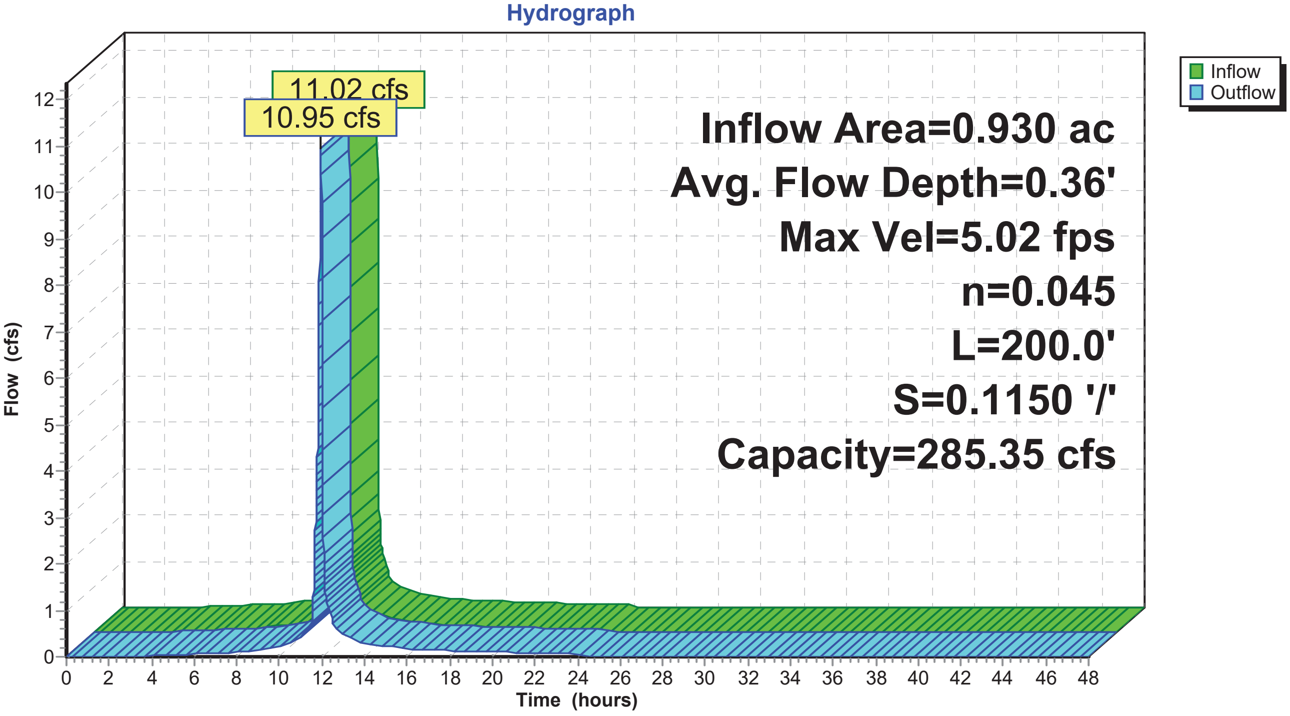
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.02 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.12 fps, Avg. Travel Time= 3.0 min

Peak Storage= 436 cf @ 11.95 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 285.35 cfs

5.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 17.00'
Length= 200.0' Slope= 0.1150 '/'
Inlet Invert= 500.00', Outlet Invert= 477.00'

‡

Reach DRC: Ditch along road



Summary for Reach KN2: Channel South of Knob Area

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

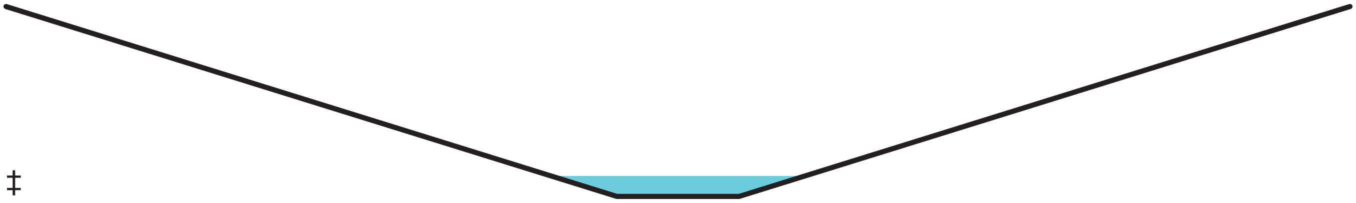
Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =          0.870 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =        11.27 cfs @   11.92 hrs,  Volume=            0.546 af
Outflow      =          8.21 cfs @   11.97 hrs,  Volume=            0.546 af,  Atten= 27%,  Lag= 2.7 min

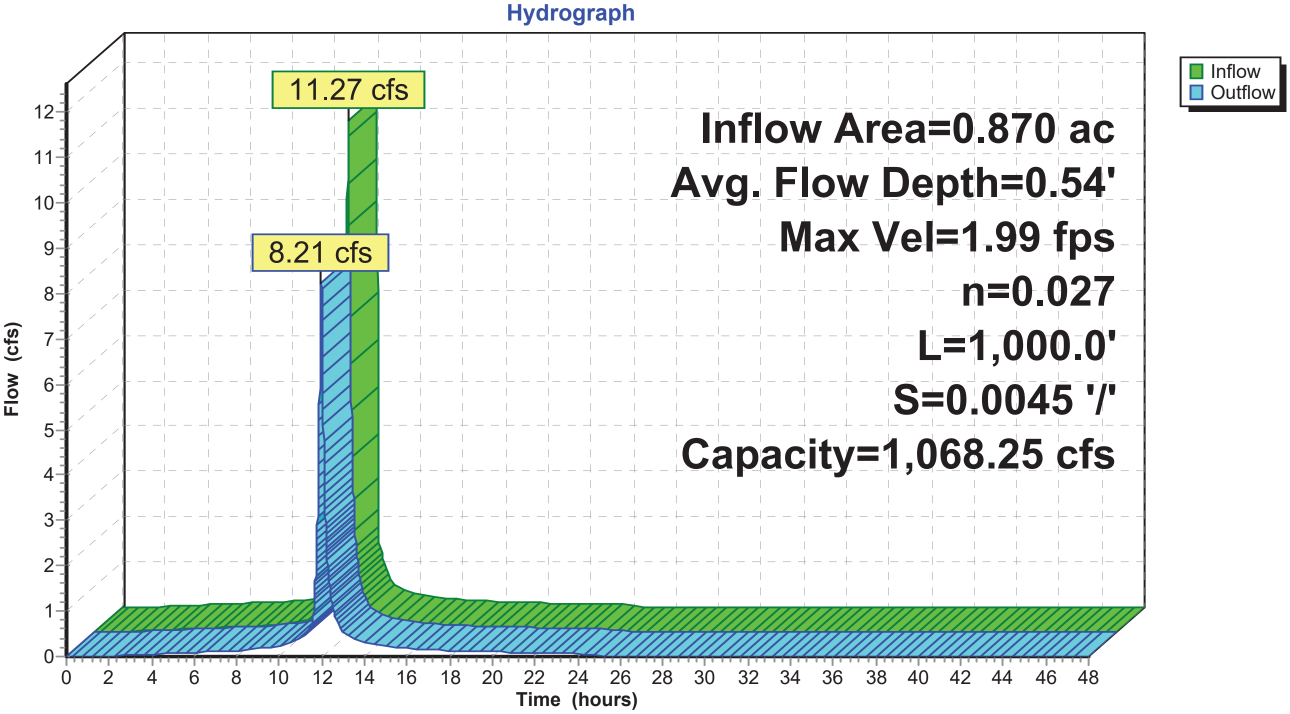
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.99 fps,  Min. Travel Time= 8.4 min
Avg. Velocity = 0.57 fps,  Avg. Travel Time= 29.2 min

Peak Storage= 4,132 cf @ 11.97 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 5.00'  Flow Area= 150.0 sf,  Capacity= 1,068.25 cfs

5.00'  x  5.00'  deep channel,  n= 0.027
Side Slope Z-value= 5.0 '/'   Top Width= 55.00'
Length= 1,000.0'   Slope= 0.0045 '/'
Inlet Invert= 503.00',  Outlet Invert= 498.50'
```



Reach KN2: Channel South of Knob Area



Summary for Reach OW1: Western Offsite Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

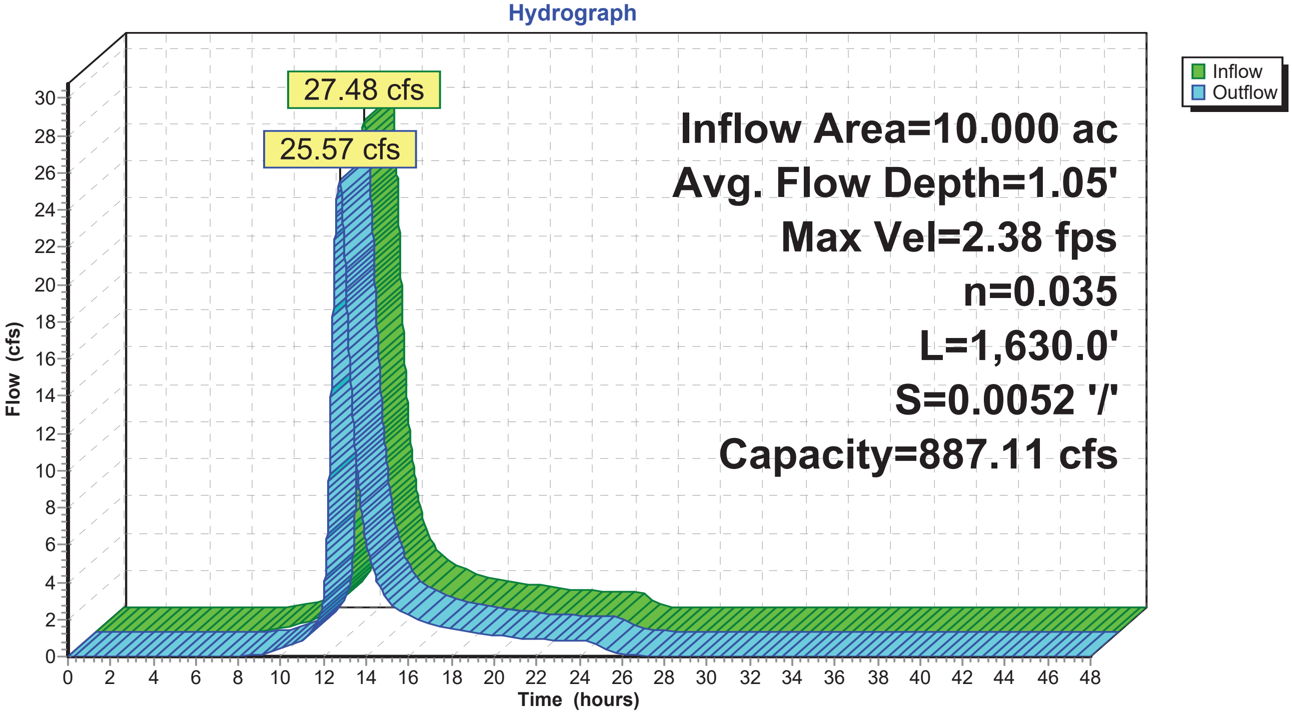
```
Inflow Area =       10.000 ac,    0.00% Impervious,  Inflow Depth =   4.93"    for  100-year 24-hour event
Inflow       =      27.48 cfs @   12.58 hrs,  Volume=            4.104 af
Outflow      =      25.57 cfs @   12.73 hrs,  Volume=            4.104 af,  Atten= 7%,  Lag= 9.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.38 fps,  Min. Travel Time= 11.4 min
Avg. Velocity = 0.81 fps,  Avg. Travel Time= 33.7 min

Peak Storage= 17,503 cf @ 12.73 hrs
Average Depth at Peak Storage= 1.05'
Bank-Full Depth= 5.00'  Flow Area= 150.0 sf,  Capacity= 887.11 cfs

5.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 55.00'
Length= 1,630.0'   Slope= 0.0052 '/'
Inlet Invert= 501.60',  Outlet Invert= 493.10'
```

Reach OW1: Western Offsite Channel



Summary for Reach OW2: Western Offsite Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

---

[62] Hint: Exceeded Reach OW1 OUTLET depth by 0.47' @ 12.42 hrs

```
Inflow Area =        21.900 ac,    0.00% Impervious,  Inflow Depth =   4.67"    for  100-year 24-hour event
Inflow       =        55.13 cfs @   12.46 hrs,  Volume=            8.528 af
Outflow      =        49.57 cfs @   12.64 hrs,  Volume=            8.528 af,  Atten= 10%,  Lag= 10.8 min
```

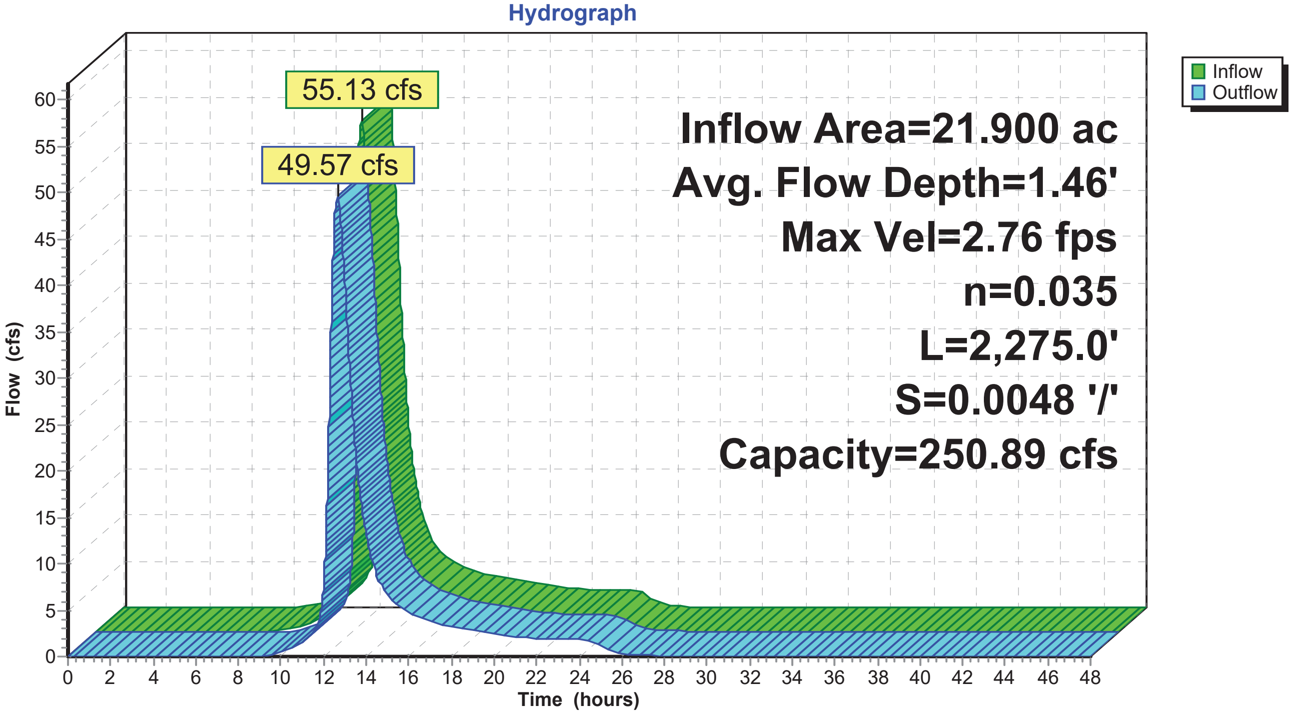
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.76 fps, Min. Travel Time= 13.7 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 51.5 min

Peak Storage= 40,882 cf @ 12.64 hrs
Average Depth at Peak Storage= 1.46'
Bank-Full Depth= 3.00' Flow Area= 60.0 sf, Capacity= 250.89 cfs

5.00' x 3.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 35.00'
Length= 2,275.0' Slope= 0.0048 '/'
Inlet Invert= 493.10', Outlet Invert= 482.10'

‡

Reach OW2: Western Offsite Channel



Summary for Reach OW3: Western Offsite Channel

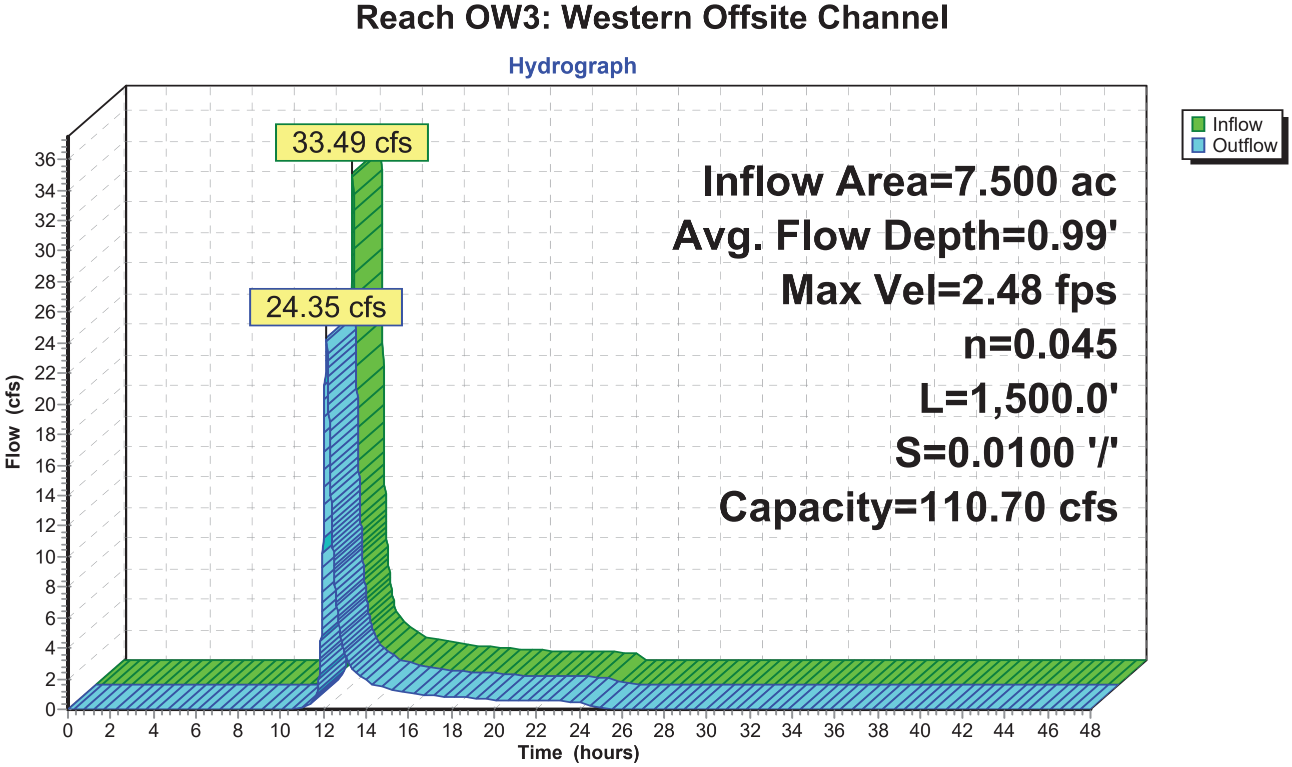
```
Inflow Area =         7.500 ac,    0.00% Impervious,  Inflow Depth =   3.21"    for  100-year 24-hour event
Inflow       =       33.49 cfs @   12.05 hrs,  Volume=              2.004 af
Outflow      =       24.35 cfs @   12.14 hrs,  Volume=              2.004 af,  Atten= 27%,  Lag= 5.2 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.48 fps, Min. Travel Time= 10.1 min
Avg. Velocity = 0.60 fps, Avg. Travel Time= 41.4 min

Peak Storage= 14,722 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.99'
Bank-Full Depth= 2.00' Flow Area= 30.0 sf, Capacity= 110.70 cfs

5.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 5.0 '/' Top Width= 25.00'
Length= 1,500.0' Slope= 0.0100 '/'
Inlet Invert= 493.00', Outlet Invert= 478.00'

‡



Summary for Reach PW1: Western Perimeter Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

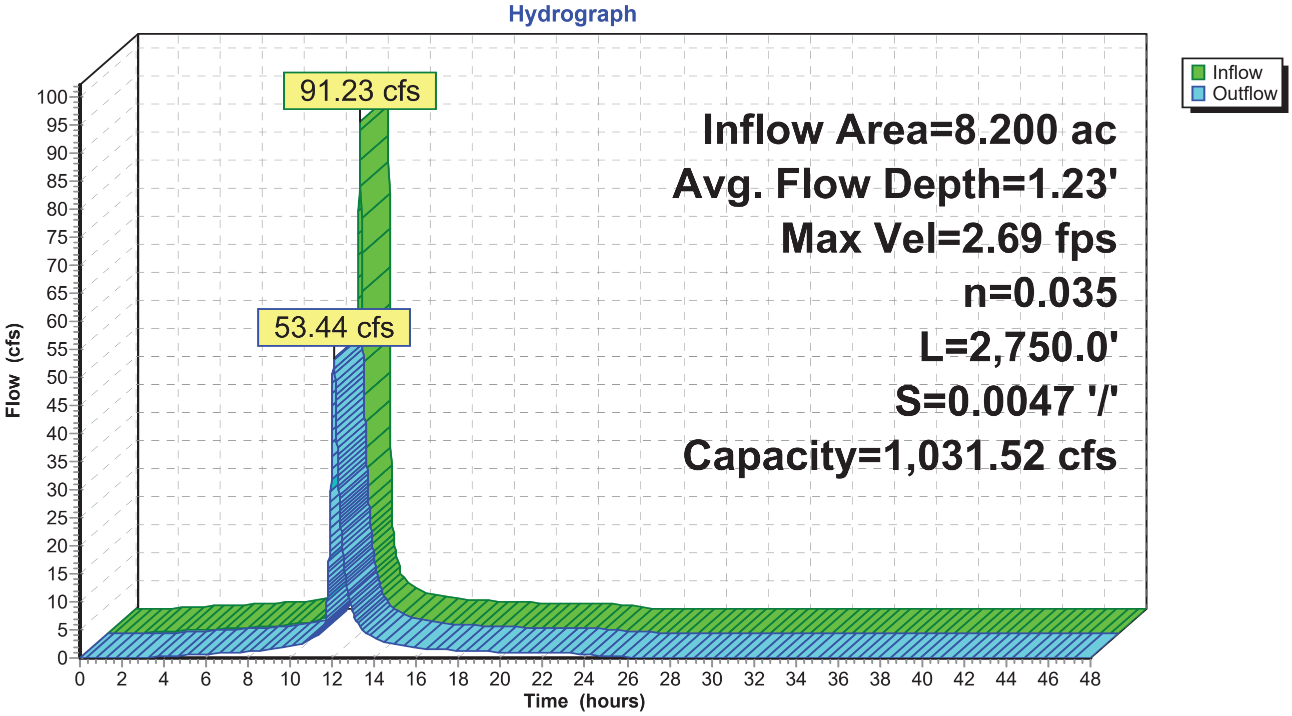
```
Inflow Area =          8.200 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =        91.23 cfs @   11.98 hrs,  Volume=             5.146 af
Outflow      =        53.44 cfs @   12.06 hrs,  Volume=             5.146 af,  Atten= 41%,  Lag= 5.0 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.69 fps, Min. Travel Time= 17.1 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 71.0 min

Peak Storage= 54,725 cf @ 12.06 hrs
Average Depth at Peak Storage= 1.23'
Bank-Full Depth= 5.00' Flow Area= 175.0 sf, Capacity= 1,031.52 cfs

10.00' x 5.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 60.00'
Length= 2,750.0' Slope= 0.0047 '/'
Inlet Invert= 500.00', Outlet Invert= 487.00'

Reach PW1: Western Perimeter Channel



Summary for Reach PW10: Southwest Outlet Channel

Elevations and characteristics approximated based on most recent survey data and aerial imagery.

---

[61] Hint: Exceeded Reach PW9 outlet invert by 4.07' @ 12.14 hrs

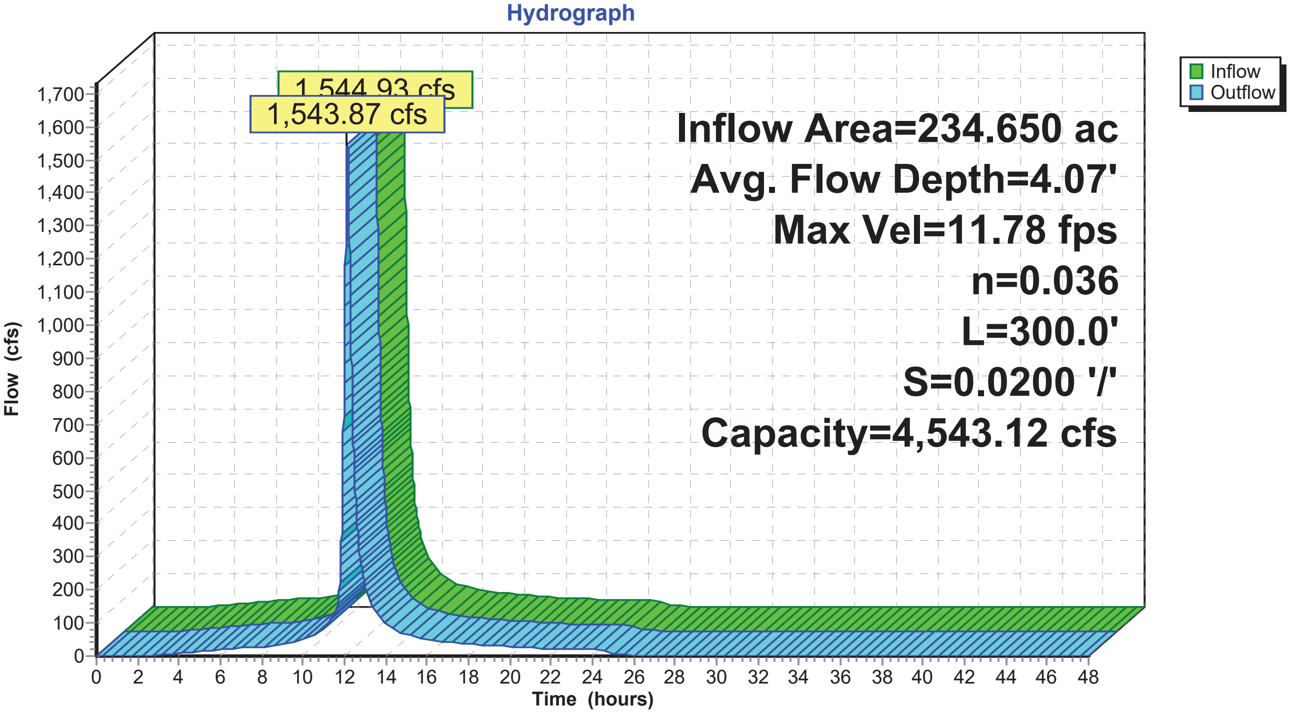
```
Inflow Area =      234.650 ac,    0.00% Impervious,  Inflow Depth =   7.04"    for  100-year 24-hour event
Inflow       =   1,544.93 cfs @   12.13 hrs,  Volume=         137.733 af
Outflow      =   1,543.87 cfs @   12.14 hrs,  Volume=         137.733 af,  Atten= 0%,  Lag= 0.3 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 11.78 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.27 fps, Avg. Travel Time= 2.2 min

Peak Storage= 39,324 cf @ 12.14 hrs
Average Depth at Peak Storage= 4.07'
Bank-Full Depth= 7.00' Flow Area= 287.0 sf, Capacity= 4,543.12 cfs

20.00' x 7.00' deep channel, n= 0.036
Side Slope Z-value= 3.0 '/' Top Width= 62.00'
Length= 300.0' Slope= 0.0200 '/'
Inlet Invert= 476.00', Outlet Invert= 470.00'

Reach PW10: Southwest Outlet Channel



Summary for Reach PW2: Western Perimeter Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[62] Hint: Exceeded Reach CW3 OUTLET depth by 1.24' @ 12.17 hrs
[62] Hint: Exceeded Reach PW1 OUTLET depth by 1.37' @ 12.16 hrs

Inflow Area =      36.100 ac,   0.00% Impervious,  Inflow Depth =   7.53"   for  100-year 24-hour event
Inflow      =     261.83 cfs @   12.09 hrs,  Volume=         22.655 af
Outflow     =     254.20 cfs @   12.13 hrs,  Volume=         22.655 af,  Atten= 3%,  Lag= 2.1 min

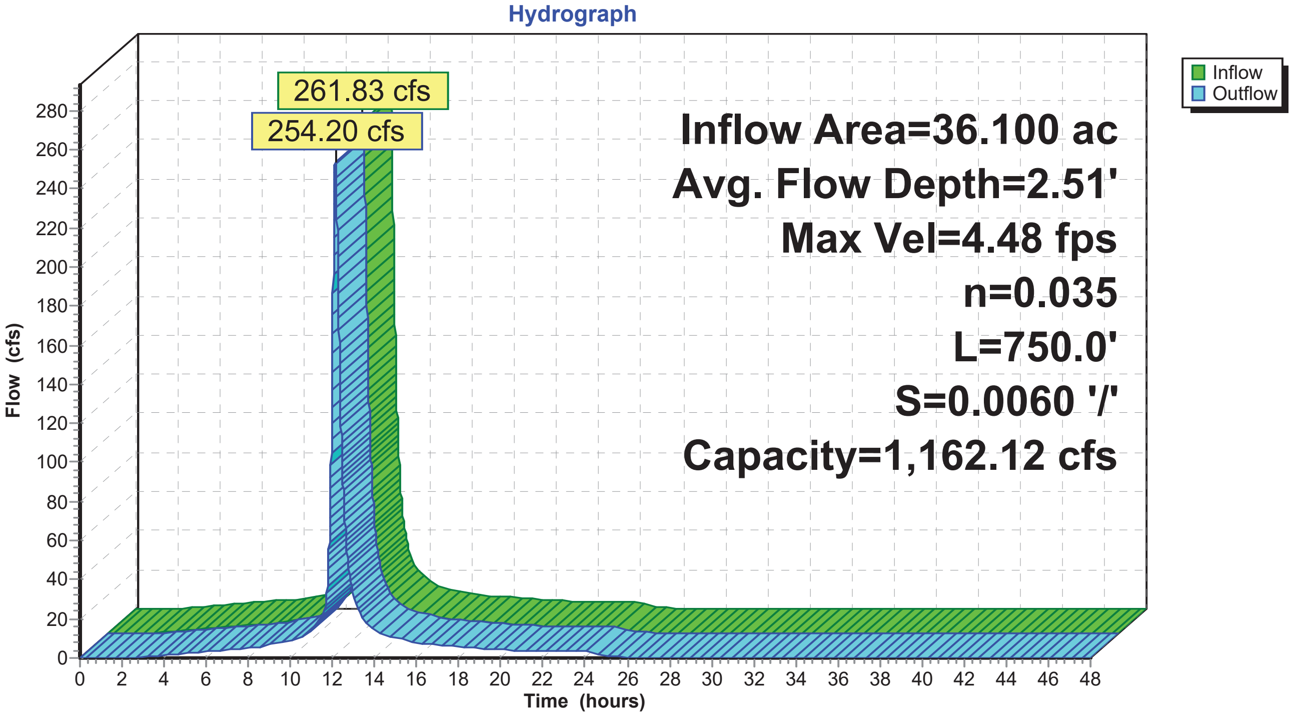
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.48 fps,  Min. Travel Time= 2.8 min
Avg. Velocity = 1.04 fps,  Avg. Travel Time= 12.0 min

Peak Storage= 42,526 cf @ 12.13 hrs
Average Depth at Peak Storage= 2.51'
Bank-Full Depth= 5.00'  Flow Area= 175.0 sf,  Capacity= 1,162.12 cfs

10.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 60.00'
Length= 750.0'   Slope= 0.0060 '/'
Inlet Invert= 487.00',  Outlet Invert= 482.50'
```

‡

Reach PW2: Western Perimeter Channel



Summary for Reach PW3: Western Perimeter Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
[61] Hint: Exceeded Reach CW6 outlet invert by 1.05' @ 12.13 hrs
[62] Hint: Exceeded Reach PW2 OUTLET depth by 1.54' @ 12.12 hrs

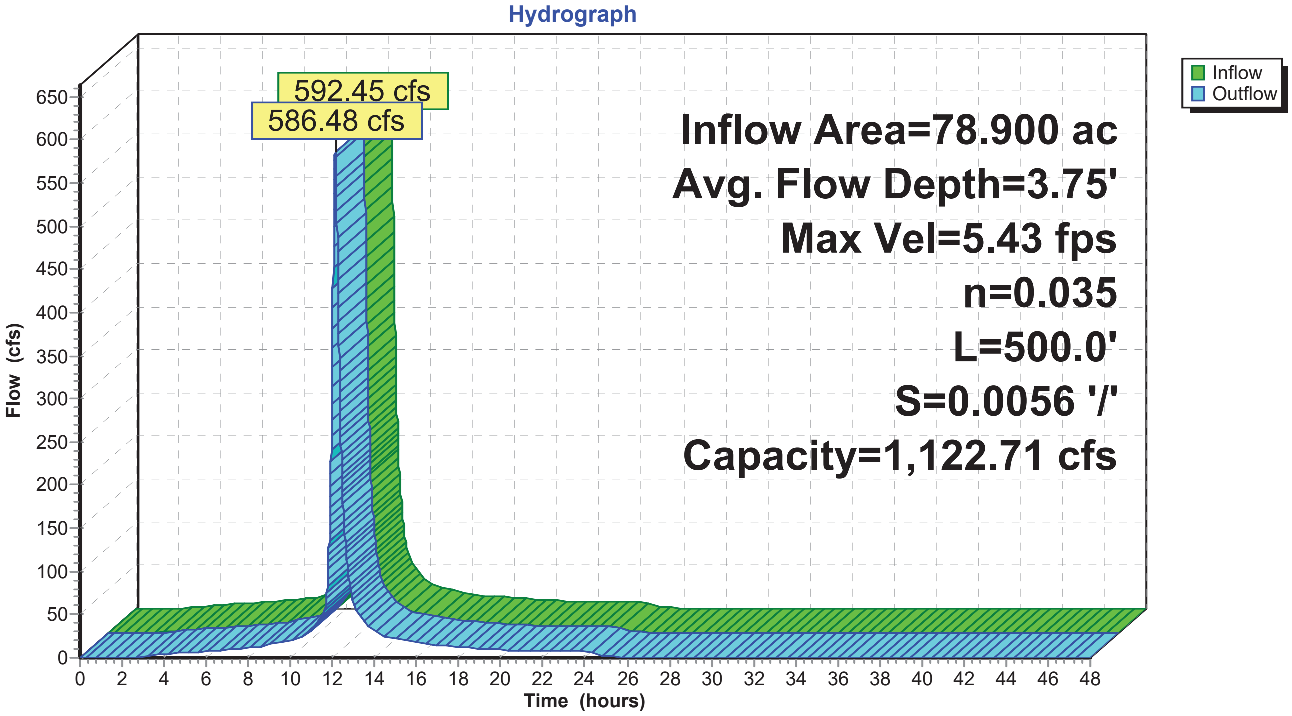
Inflow Area =      78.900 ac,   0.00% Impervious,  Inflow Depth =  7.53"   for  100-year 24-hour event
Inflow      =     592.45 cfs @  12.11 hrs,  Volume=        49.515 af
Outflow     =     586.48 cfs @  12.13 hrs,  Volume=        49.515 af,  Atten= 1%,  Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.43 fps,  Min. Travel Time= 1.5 min
Avg. Velocity = 1.24 fps,  Avg. Travel Time= 6.7 min

Peak Storage= 53,972 cf @ 12.13 hrs
Average Depth at Peak Storage= 3.75'
Bank-Full Depth= 5.00'  Flow Area= 175.0 sf,  Capacity= 1,122.71 cfs

10.00'  x  5.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 60.00'
Length= 500.0'   Slope= 0.0056 '/'
Inlet Invert= 482.80',  Outlet Invert= 480.00'
```

Reach PW3: Western Perimeter Channel



Summary for Reach PW5: Southwest Outlet Channel

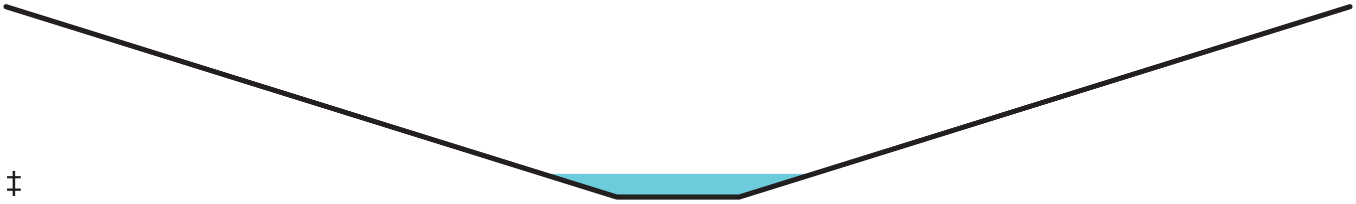
[61] Hint: Exceeded Reach CW16 outlet invert by 2.25' @ 12.10 hrs

```
Inflow Area =        46.520 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      357.88 cfs @   12.08 hrs,  Volume=           29.194 af
Outflow      =      355.21 cfs @   12.10 hrs,  Volume=           29.194 af,  Atten= 1%,  Lag= 1.0 min
```

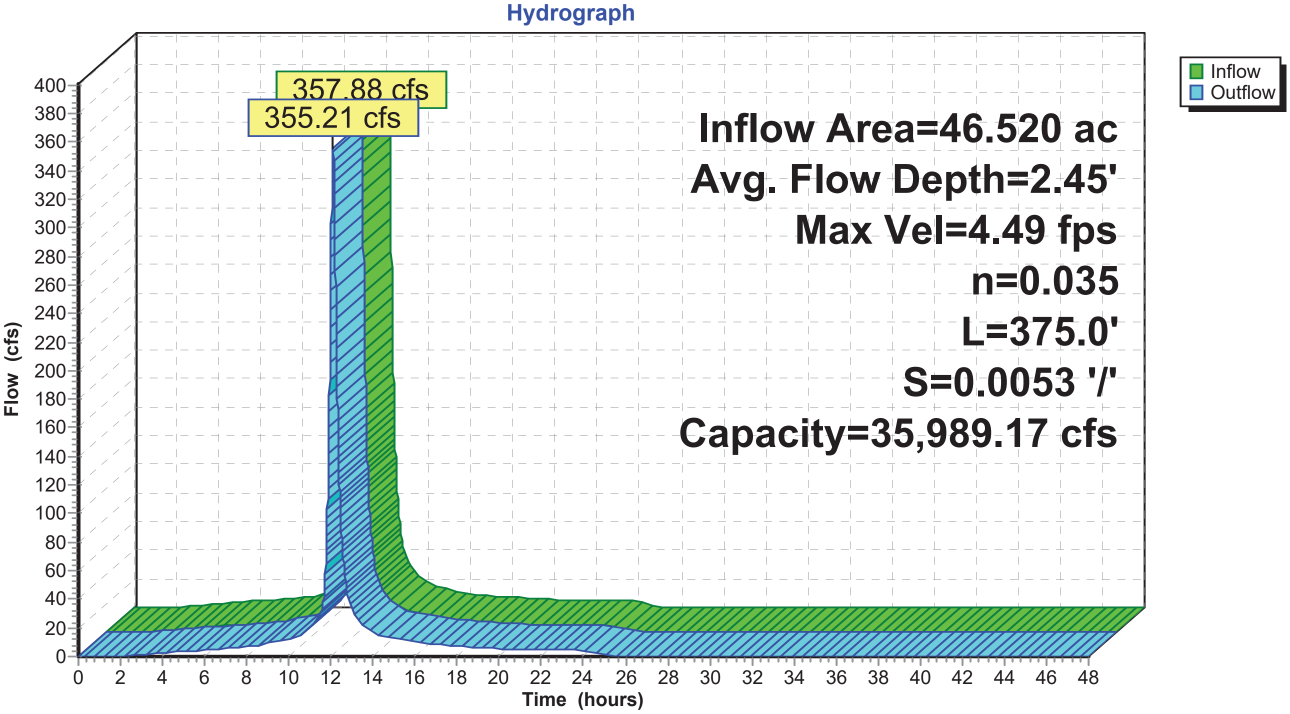
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 4.49 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 4.9 min

Peak Storage= 29,638 cf @ 12.10 hrs
Average Depth at Peak Storage= 2.45'
Bank-Full Depth= 20.00' Flow Area= 2,400.0 sf, Capacity= 35,989.17 cfs

20.00' x 20.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 220.00'
Length= 375.0' Slope= 0.0053 '/'
Inlet Invert= 484.20', Outlet Invert= 482.22'



Reach PW5: Southwest Outlet Channel



Summary for Reach PW6: Southwest Outlet Channel

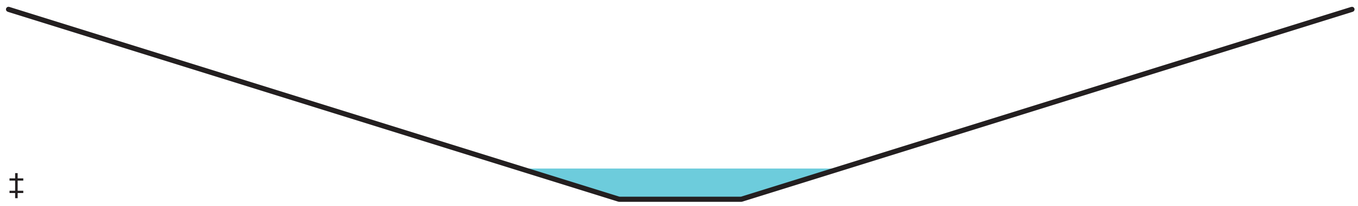
```
[62] Hint: Exceeded Reach CW12 OUTLET depth by 2.08' @ 12.13 hrs
[62] Hint: Exceeded Reach PW5 OUTLET depth by 0.82' @ 12.17 hrs

Inflow Area =        77.520 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      592.76 cfs @   12.10 hrs,  Volume=           48.649 af
Outflow      =      589.53 cfs @   12.12 hrs,  Volume=           48.649 af,  Atten= 1%,  Lag= 0.8 min

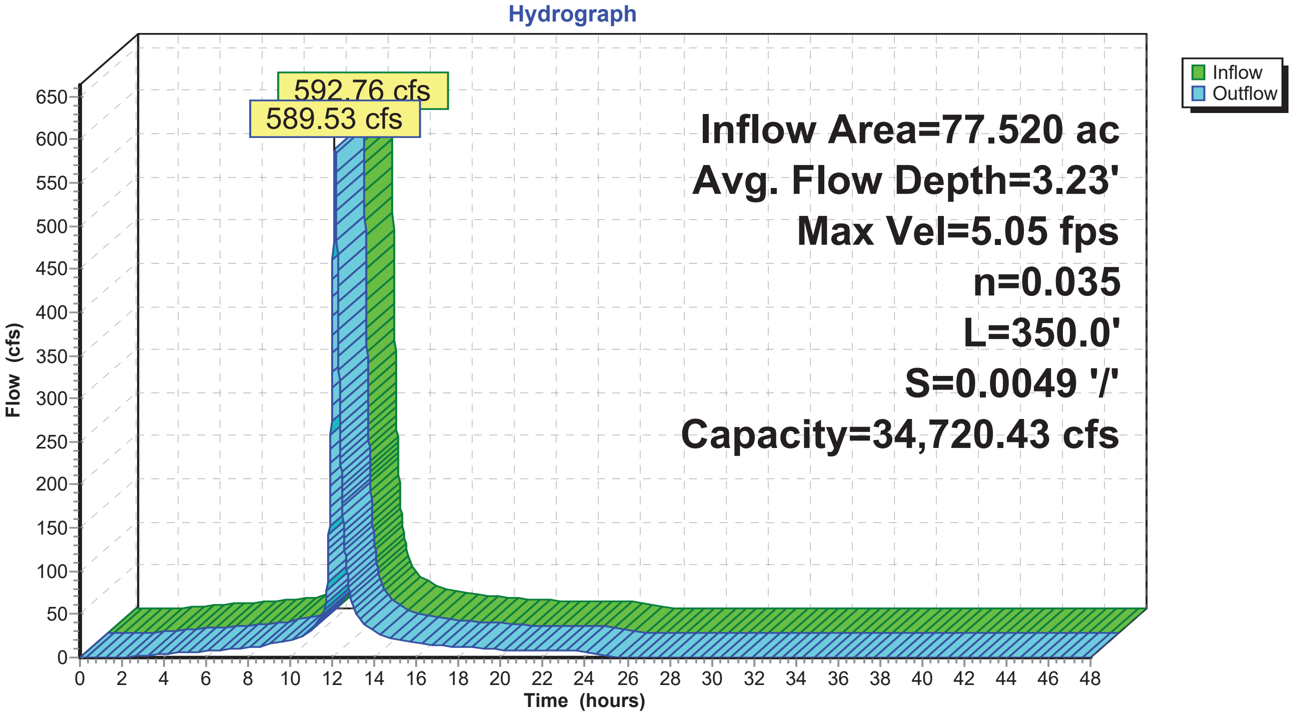
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.05 fps,  Min. Travel Time= 1.2 min
Avg. Velocity = 1.39 fps,  Avg. Travel Time= 4.2 min

Peak Storage= 40,894 cf @ 12.12 hrs
Average Depth at Peak Storage= 3.23'
Bank-Full Depth= 20.00'  Flow Area= 2,400.0 sf,  Capacity= 34,720.43 cfs

20.00'  x  20.00'  deep channel,  n= 0.035
Side Slope Z-value= 5.0 '/'   Top Width= 220.00'
Length= 350.0'   Slope= 0.0049 '/'
Inlet Invert= 482.22',  Outlet Invert= 480.50'
```



Reach PW6: Southwest Outlet Channel



Summary for Reach PW7: Southwest Outlet Channel

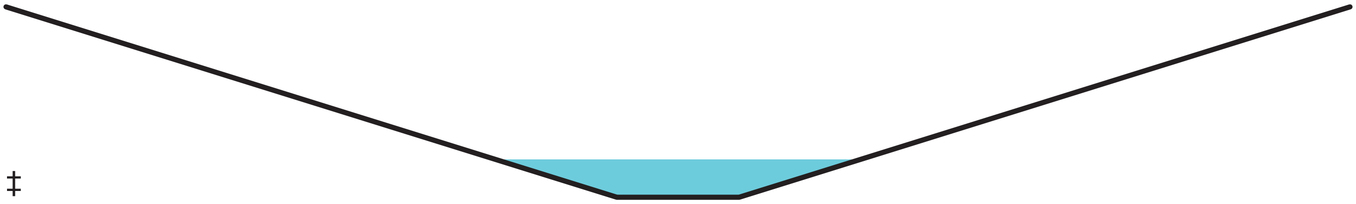
[62] Hint: Exceeded Reach CW9 OUTLET depth by 1.88' @ 12.14 hrs
[62] Hint: Exceeded Reach PW6 OUTLET depth by 0.75' @ 12.14 hrs

```
Inflow Area =      118.020 ac,    0.00% Impervious,  Inflow Depth =   7.53"    for  100-year 24-hour event
Inflow       =      907.78 cfs @   12.11 hrs,  Volume=           74.066 af
Outflow      =      904.78 cfs @   12.12 hrs,  Volume=           74.066 af,  Atten= 0%,  Lag= 0.7 min
```

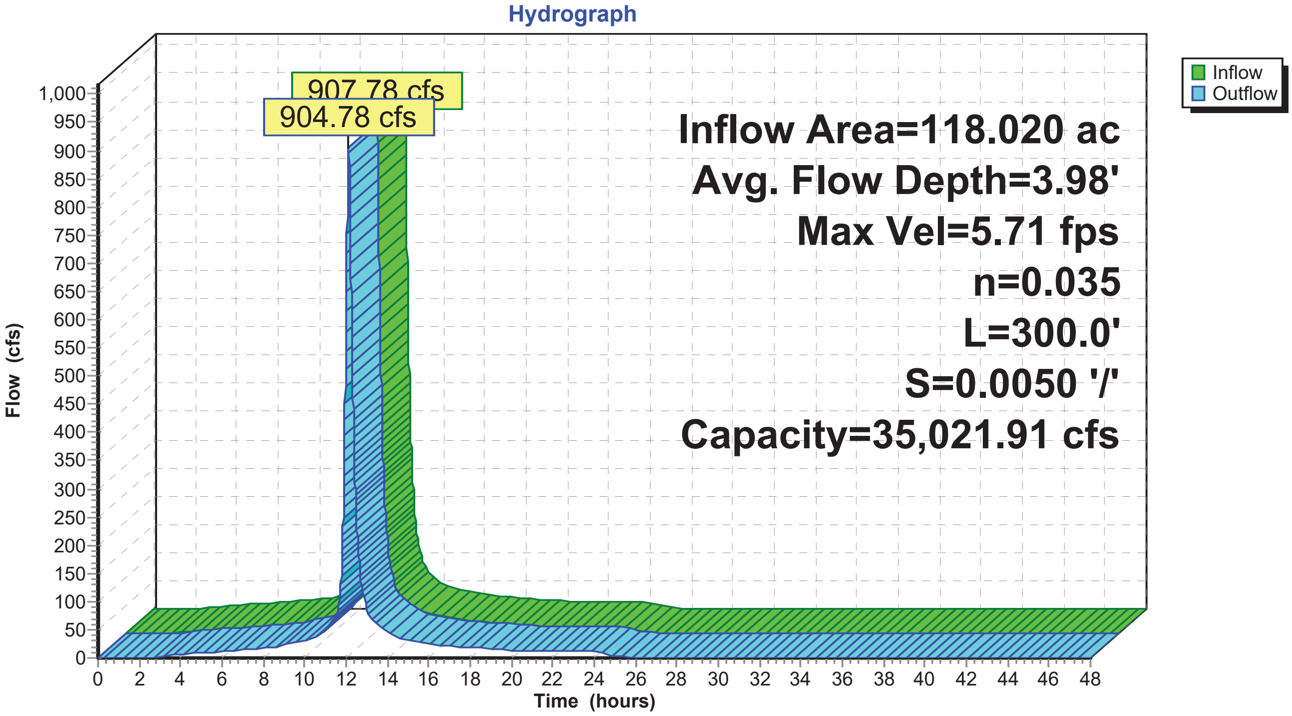
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.71 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.54 fps, Avg. Travel Time= 3.2 min

Peak Storage= 47,578 cf @ 12.12 hrs
Average Depth at Peak Storage= 3.98'
Bank-Full Depth= 20.00' Flow Area= 2,400.0 sf, Capacity= 35,021.91 cfs

20.00' x 20.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 220.00'
Length= 300.0' Slope= 0.0050 '/'
Inlet Invert= 480.50', Outlet Invert= 479.00'



Reach PW7: Southwest Outlet Channel



Summary for Reach PW8: Southwest Outlet Channel

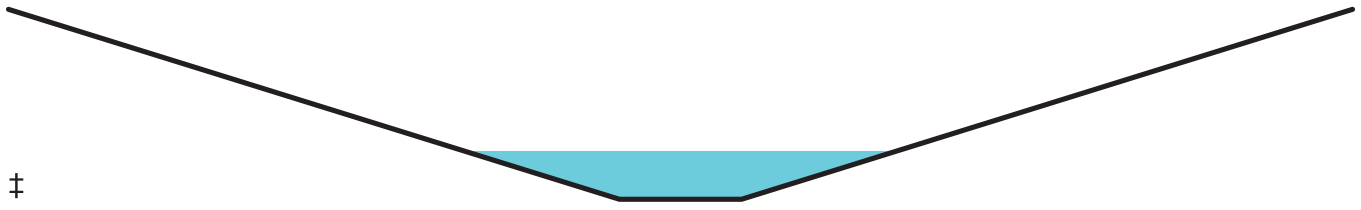
[62] Hint: Exceeded Reach PW3 OUTLET depth by 0.33' @ 12.14 hrs
[62] Hint: Exceeded Reach PW7 OUTLET depth by 1.13' @ 12.17 hrs

```
Inflow Area =      223.520 ac,    0.00% Impervious,  Inflow Depth =   7.20"    for  100-year 24-hour event
Inflow       =   1,512.40 cfs @   12.12 hrs,  Volume=         134.197 af
Outflow      =   1,510.78 cfs @   12.13 hrs,  Volume=         134.197 af,  Atten= 0%,  Lag= 0.4 min
```

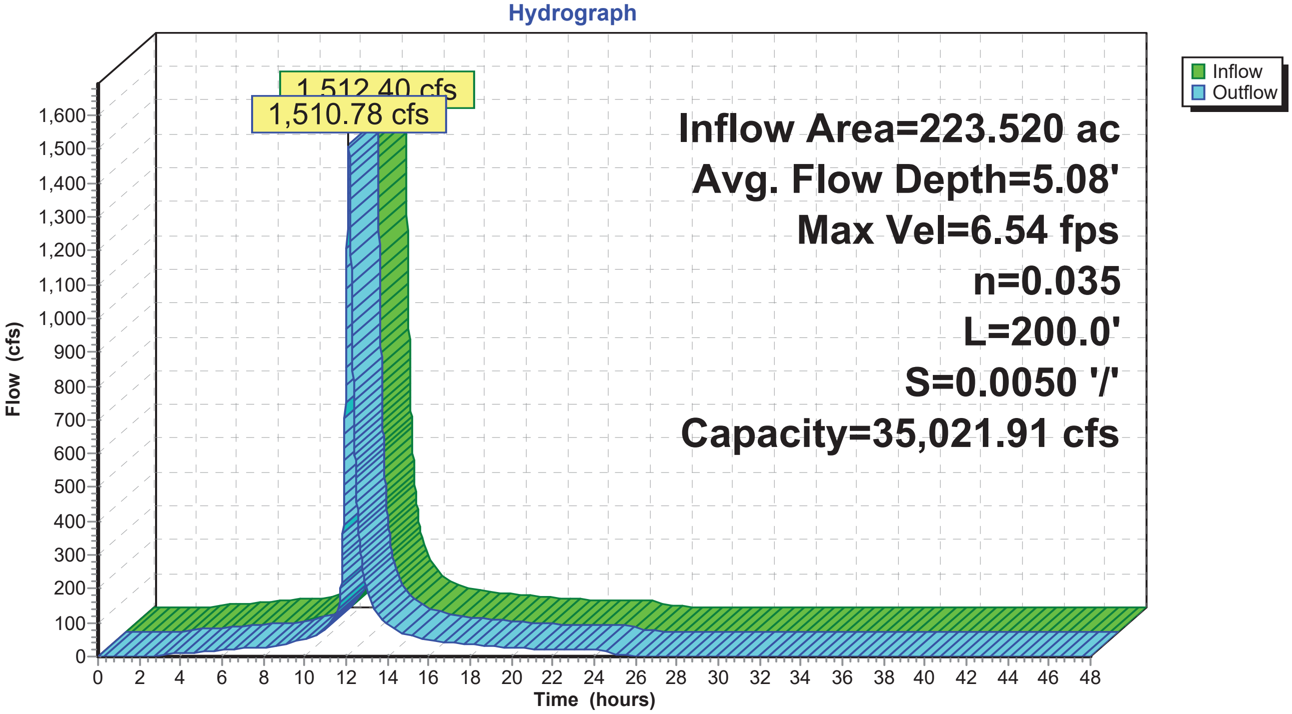
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 6.54 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.60 fps, Avg. Travel Time= 2.1 min

Peak Storage= 46,198 cf @ 12.13 hrs
Average Depth at Peak Storage= 5.08'
Bank-Full Depth= 20.00' Flow Area= 2,400.0 sf, Capacity= 35,021.91 cfs

20.00' x 20.00' deep channel, n= 0.035
Side Slope Z-value= 5.0 '/' Top Width= 220.00'
Length= 200.0' Slope= 0.0050 '/'
Inlet Invert= 479.00', Outlet Invert= 478.00'



Reach PW8: Southwest Outlet Channel



Summary for Reach PW9: Southwest Outlet Channel

Elevations and characteristics approximated based on most recent survey data and aerial imagery.

```
[62] Hint: Exceeded Reach DRC OUTLET depth by 5.68' @ 12.14 hrs

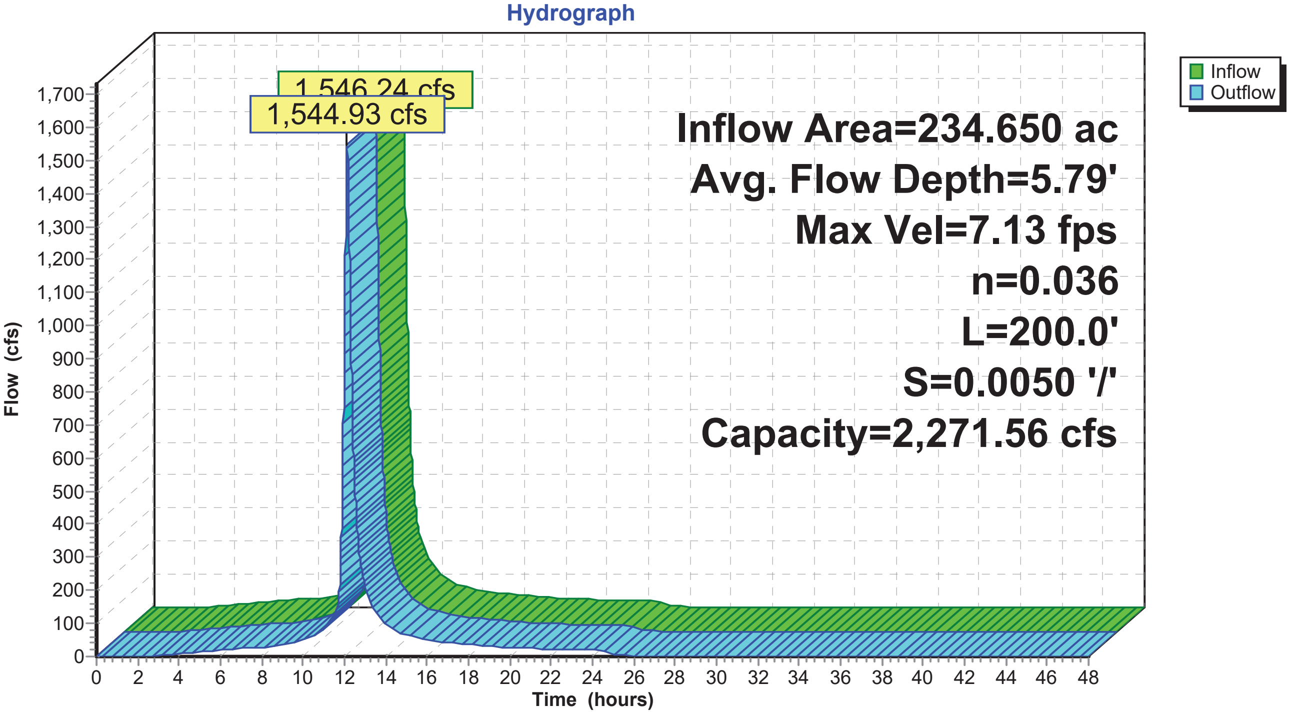
Inflow Area =      234.650 ac,   0.00% Impervious,  Inflow Depth =   7.04"    for  100-year 24-hour event
Inflow      =   1,546.24 cfs @   12.13 hrs,  Volume=         137.733 af
Outflow     =   1,544.93 cfs @   12.13 hrs,  Volume=         137.733 af,  Atten= 0%,  Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 7.13 fps,  Min. Travel Time= 0.5 min
Avg. Velocity = 1.38 fps,  Avg. Travel Time= 2.4 min

Peak Storage= 43,299 cf @ 12.13 hrs
Average Depth at Peak Storage= 5.79'
Bank-Full Depth= 7.00'  Flow Area= 287.0 sf,  Capacity= 2,271.56 cfs

20.00'  x  7.00'  deep channel,  n= 0.036
Side Slope Z-value= 3.0 '/'   Top Width= 62.00'
Length= 200.0'   Slope= 0.0050 '/'
Inlet Invert= 477.00',  Outlet Invert= 476.00'
```

Reach PW9: Southwest Outlet Channel



Summary for Reach WTC: Western Offsite Channel

CN and mannings numbers for the closure cap are based on information in Agru America's design manual for Closure Turf.

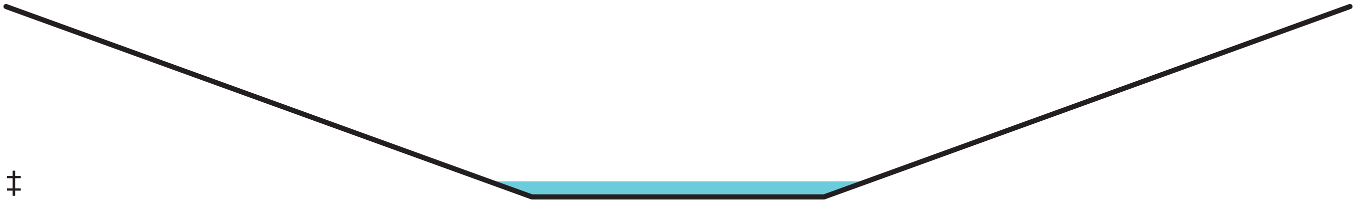
Slopes and other channel characteristics are based on the grading included in the most recent revision of the Design Drawings.

```
Inflow Area =          4.700 ac,    0.00% Impervious,  Inflow Depth >   5.33"    for  100-year 24-hour event
Inflow       =          7.85 cfs @   12.08 hrs,  Volume=            2.089 af
Outflow      =          7.85 cfs @   12.09 hrs,  Volume=            2.089 af,  Atten= 0%,  Lag= 0.4 min

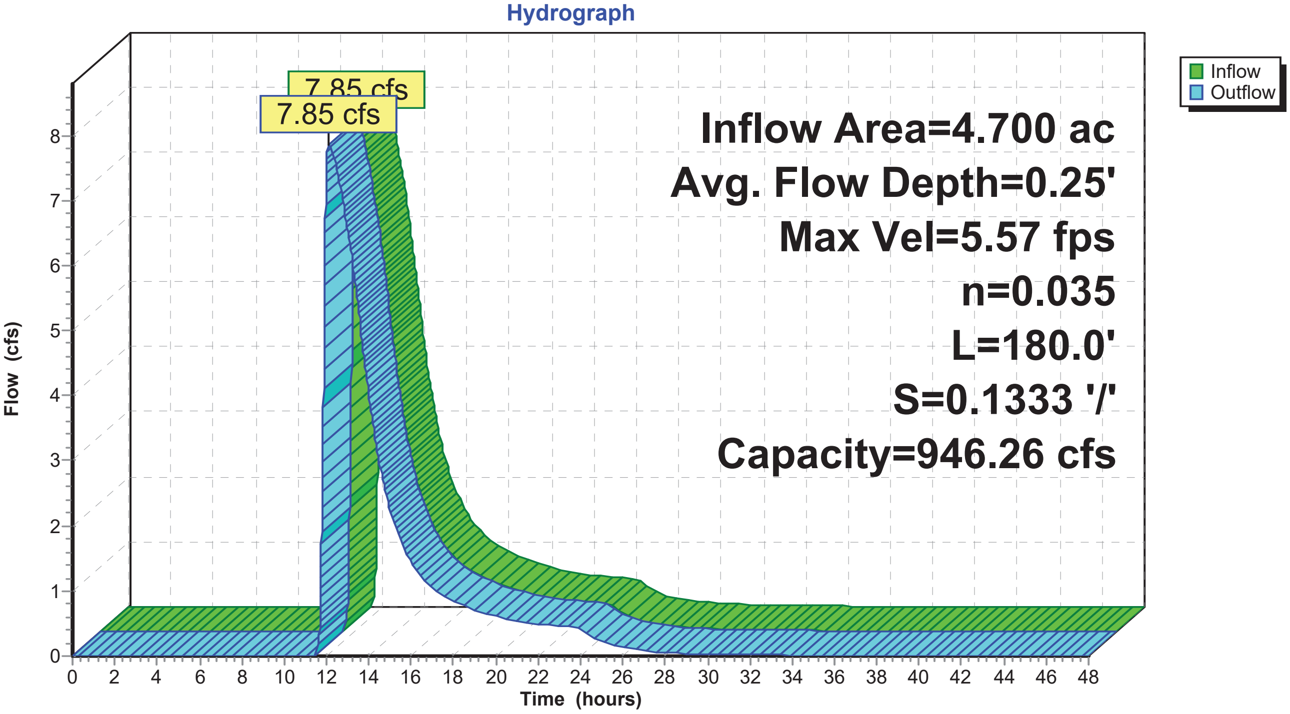
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 5.57 fps,  Min. Travel Time= 0.5 min
Avg. Velocity = 2.01 fps,  Avg. Travel Time= 1.5 min

Peak Storage= 254 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 3.00'  Flow Area= 42.0 sf,  Capacity= 946.26 cfs

5.00'  x  3.00'  deep channel,  n= 0.035
Side Slope Z-value= 3.0 '/'   Top Width= 23.00'
Length= 180.0'   Slope= 0.1333 '/'
Inlet Invert= 507.00',  Outlet Invert= 483.00'
```



Reach WTC: Western Offsite Channel



Summary for Pond AC1: Arch culvert

Dimensions of flow area under arch culvert based on 65 foot span, 20 foot rise. Exact dimensions drawn in AutoCAD and input here.

---

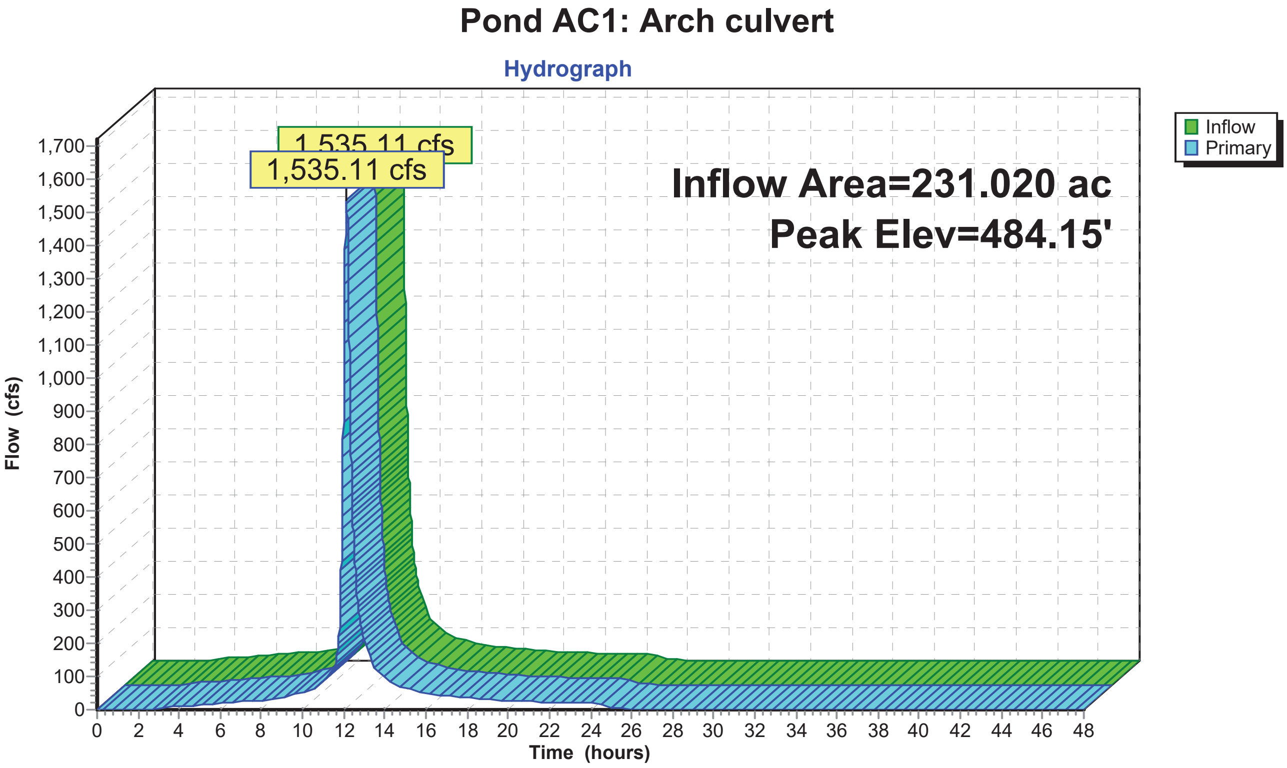
[57] Hint: Peaked at 484.15' (Flood elevation advised)
[62] Hint: Exceeded Reach OW3 OUTLET depth by 5.17' @ 12.13 hrs
[63] Warning: Exceeded Reach PW8 INLET depth by 0.07' @ 12.14 hrs

```
Inflow Area =      231.020 ac,   0.00% Impervious,  Inflow Depth =   7.07"    for  100-year 24-hour event
Inflow       =   1,535.11 cfs @   12.13 hrs,  Volume=         136.201 af
Outflow      =   1,535.11 cfs @   12.13 hrs,  Volume=         136.201 af,  Atten= 0%,  Lag= 0.0 min
Primary      =   1,535.11 cfs @   12.13 hrs,  Volume=         136.201 af
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 484.15' @ 12.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	477.00'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 6.18 8.18 10.18 12.18 14.18 16.18 18.18 20.00 Width (feet) 20.00 57.10 53.70 49.70 45.10 39.50 32.50 22.70 0.00

Primary OutFlow Max=1,535.08 cfs @ 12.13 hrs HW=484.15' TW=482.79' (Dynamic Tailwater)
└─**1=Custom Weir/Orifice** (Weir Controls 1,535.08 cfs @ 5.24 fps)



Summary for Pond DR-1: Culvert(s) under access road

[57] Hint: Peaked at 507.90' (Flood elevation advised)

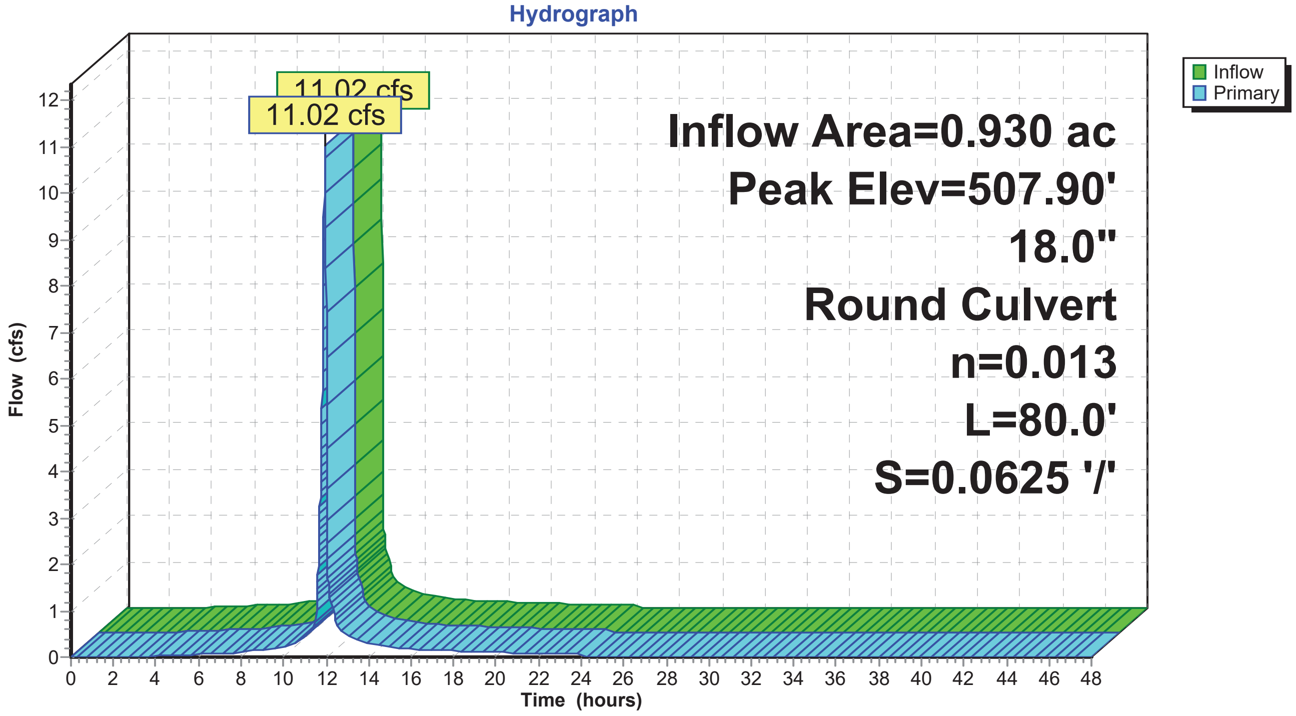
```
Inflow Area =        0.930 ac,   0.00% Impervious,  Inflow Depth =   6.81"    for  100-year 24-hour event
Inflow      =       11.02 cfs @   11.94 hrs,  Volume=            0.528 af
Outflow     =       11.02 cfs @   11.94 hrs,  Volume=            0.528 af,  Atten= 0%,  Lag= 0.0 min
Primary     =       11.02 cfs @   11.94 hrs,  Volume=            0.528 af
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 507.90' @ 11.94 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	505.00'	**18.0" Round Culvert** L= 80.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 505.00' / 500.00' S= 0.0625 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=11.00 cfs @ 11.94 hrs HW=507.90' TW=500.36' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 11.00 cfs @ 6.22 fps)

Pond DR-1: Culvert(s) under access road



Summary for Pond OC1: Culvert(s) under access road

[57] Hint: Peaked at 485.32' (Flood elevation advised)
[62] Hint: Exceeded Reach OW2 OUTLET depth by 1.76' @ 12.63 hrs
[62] Hint: Exceeded Reach WTC OUTLET depth by 2.09' @ 12.64 hrs

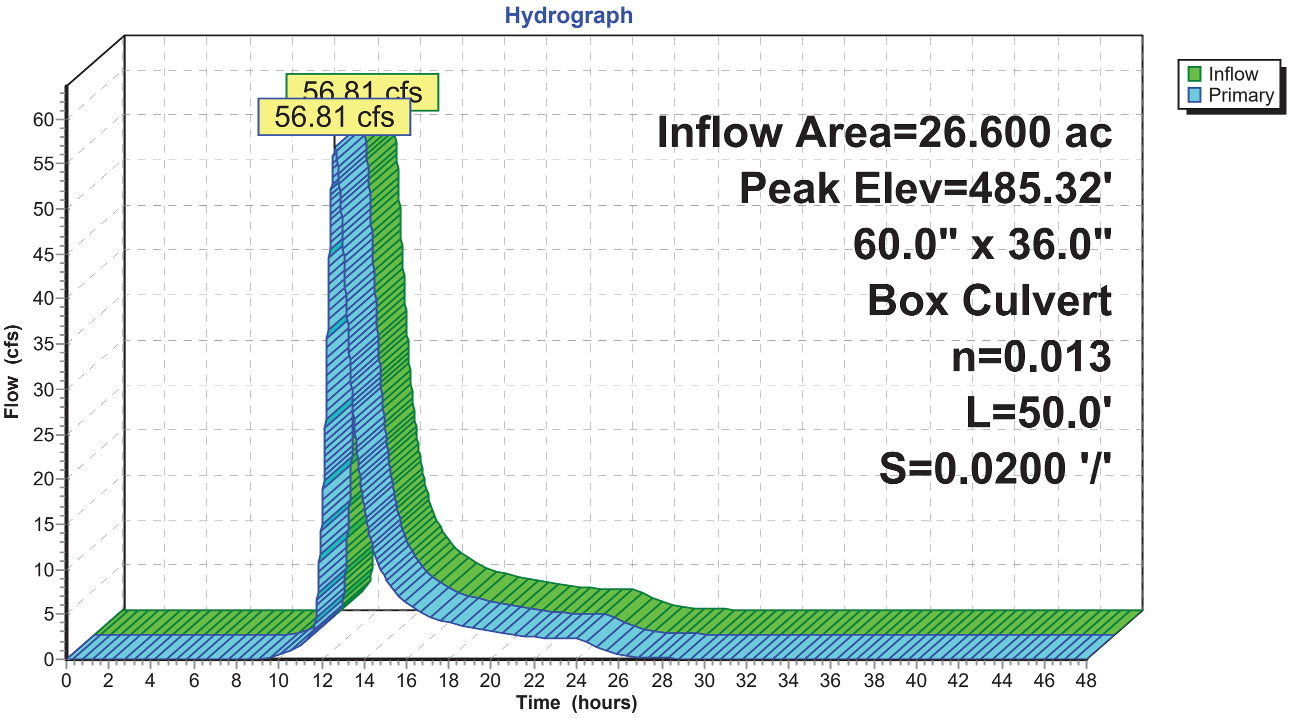
```
Inflow Area =      26.600 ac,    0.00% Impervious,  Inflow Depth =   4.79"    for  100-year 24-hour event
Inflow       =     56.81 cfs @   12.64 hrs,  Volume=          10.616 af
Outflow      =     56.81 cfs @   12.64 hrs,  Volume=          10.616 af,  Atten= 0%,  Lag= 0.0 min
Primary      =     56.81 cfs @   12.64 hrs,  Volume=          10.616 af
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 485.32' @ 12.64 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	483.00'	**60.0" W x 36.0" H Box Culvert** L= 50.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 483.00' / 482.00' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 15.00 sf

Primary OutFlow Max=56.81 cfs @ 12.64 hrs HW=485.32' TW=481.47' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 56.81 cfs @ 4.89 fps)

Pond OC1: Culvert(s) under access road



Summary for Pond RP1: Recycle Pond

[62] Hint: Exceeded Reach PW10 OUTLET depth by 0.91' @ 47.99 hrs

```
Inflow Area =      874.650 ac,  24.58% Impervious,  Inflow Depth =   5.75"    for  100-year 24-hour event
Inflow      =    4,956.18 cfs @   12.15 hrs,  Volume=         419.137 af
Outflow     =         0.00 cfs @    0.00 hrs,  Volume=            0.000 af,  Atten= 100%,  Lag= 0.0 min
Primary     =         0.00 cfs @    0.00 hrs,  Volume=            0.000 af
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 470.91' @ 48.00 hrs Surf.Area= 225.220 ac Storage= 419.137 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

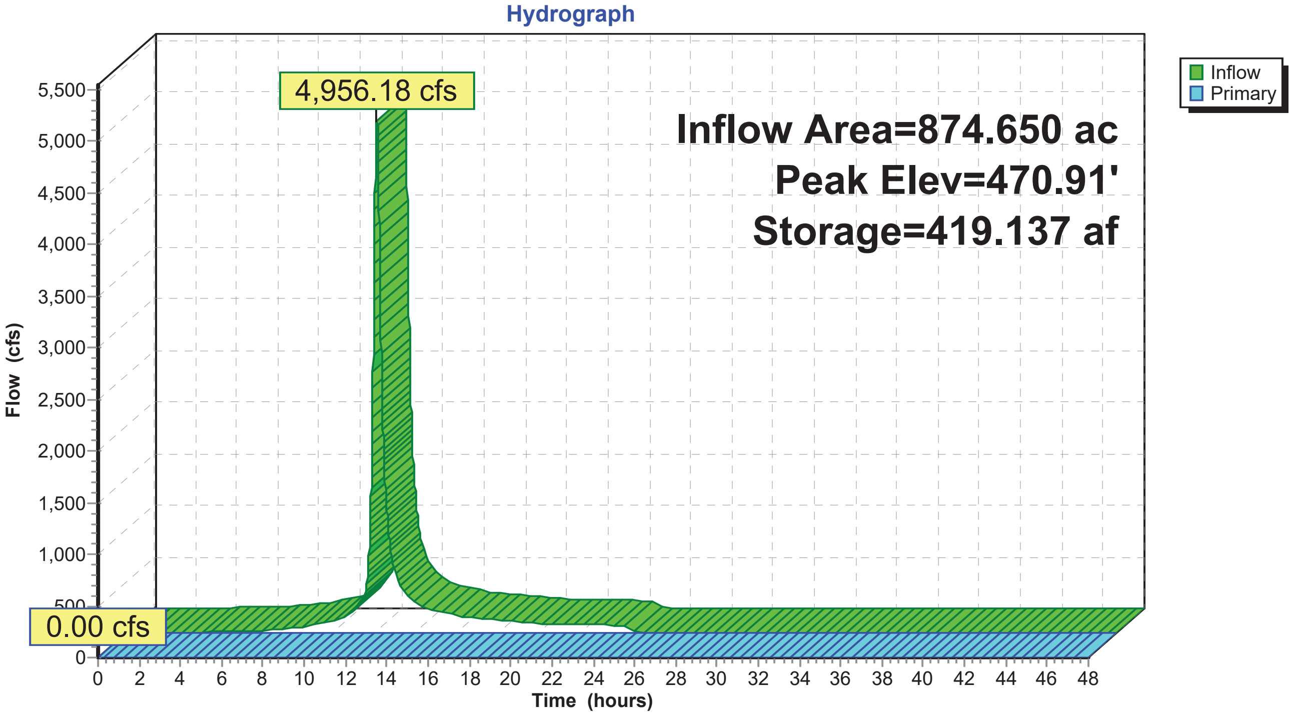
Volume	Invert	Avail.Storage	Storage Description
#1	469.00'	5,966.000 af	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
469.00	215.000	0.000	0.000
470.00	219.500	217.250	217.250
475.00	251.000	1,176.250	1,393.500
480.00	286.000	1,342.500	2,736.000
485.00	323.000	1,522.500	4,258.500
490.00	360.000	1,707.500	5,966.000

Device	Routing	Invert	Outlet Devices
#1	Primary	473.00'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 17.00 Width (feet) 85.00 170.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=469.00' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond RP1: Recycle Pond



Summary for Pond WTP: Low side of pad

```
Inflow Area =       4.700 ac,   0.00% Impervious,  Inflow Depth =  6.34"   for  100-year 24-hour event
Inflow      =      54.58 cfs @  11.93 hrs,  Volume=          2.483 af
Outflow     =       7.85 cfs @  12.08 hrs,  Volume=          2.089 af,  Atten= 86%,  Lag= 8.7 min
Primary     =       7.85 cfs @  12.08 hrs,  Volume=          2.089 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 509.64' @ 12.08 hrs   Surf.Area= 35,693 sf   Storage= 57,488 cf

Plug-Flow detention time= 193.8 min calculated for 2.089 af (84% of inflow)
Center-of-Mass det. time= 123.5 min ( 907.4 - 783.9 )

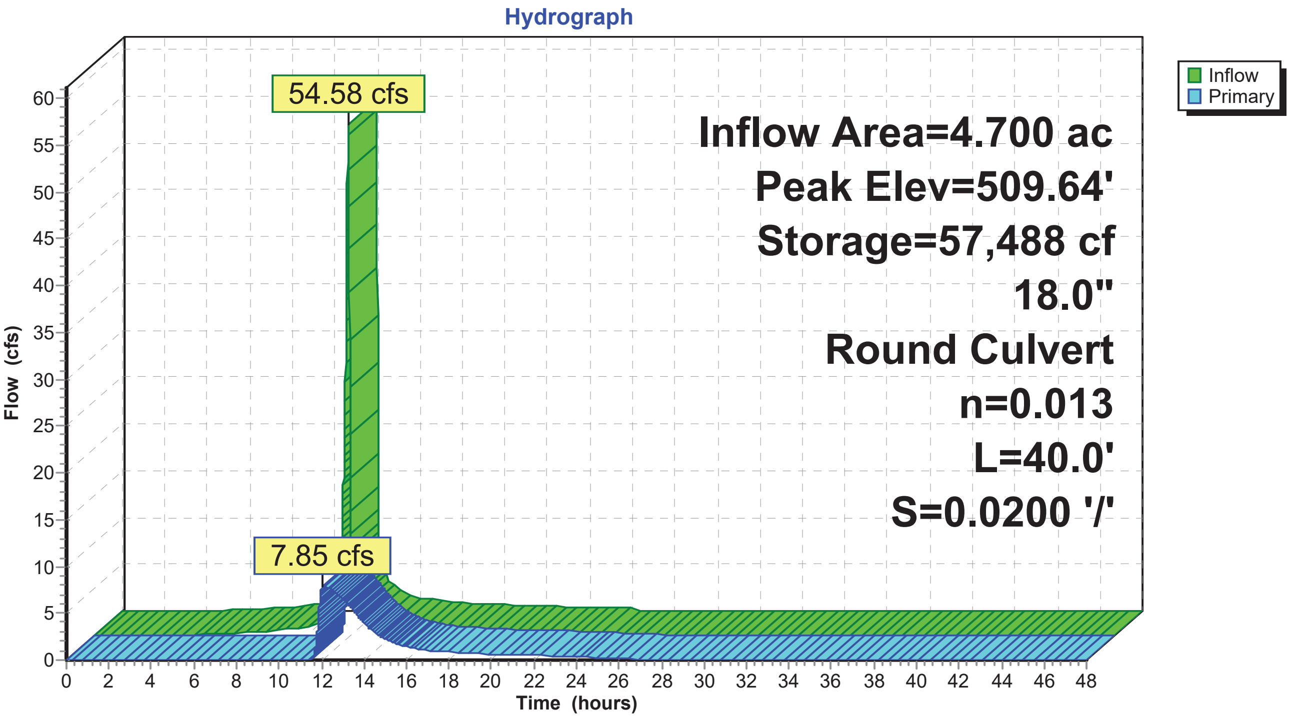
Volume       Invert    Avail.Storage   Storage Description
  #1        500.00'       205,872 cf   Custom Stage Data (Prismatic)Listed below (Recalc)

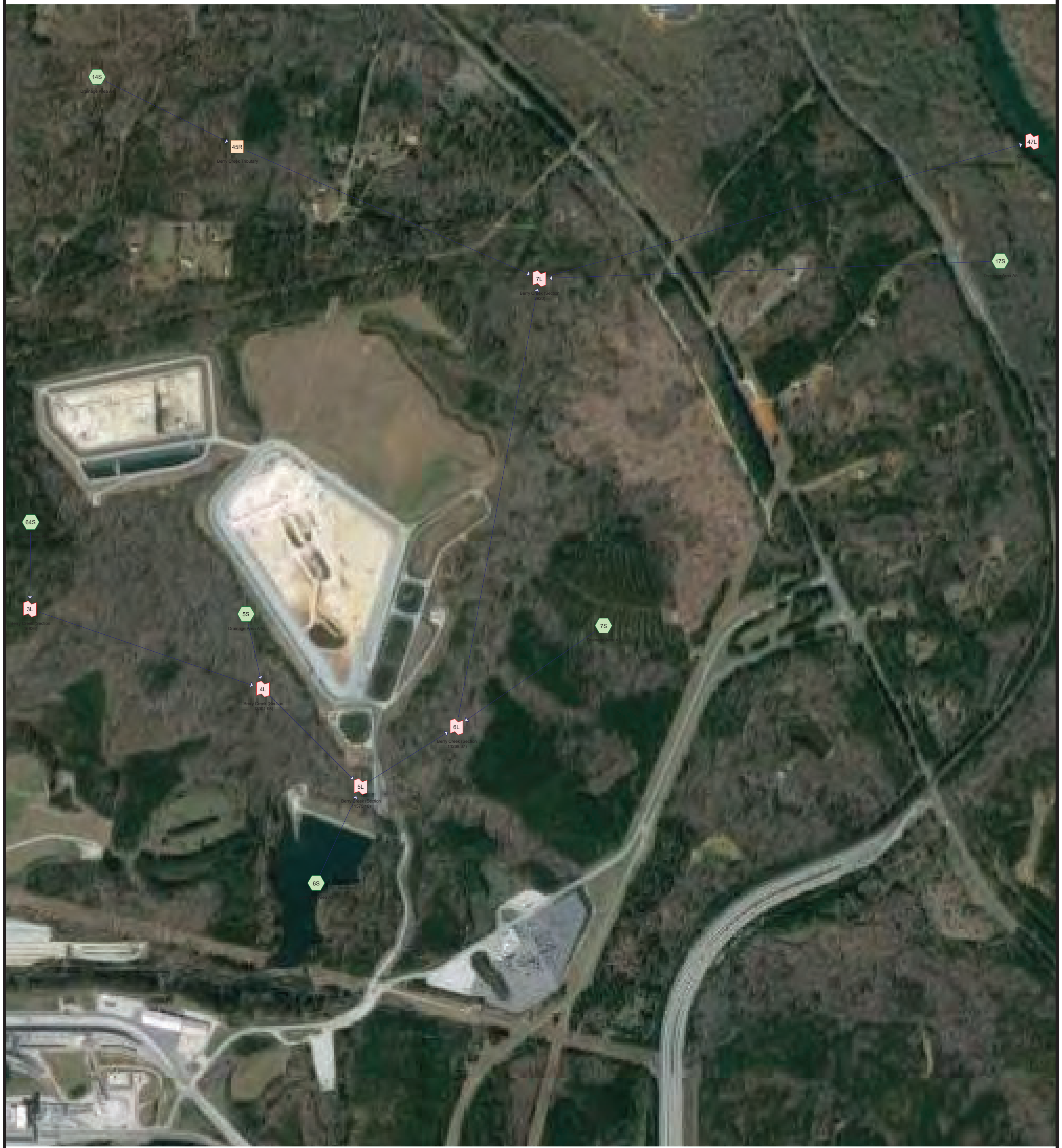
 Elevation        Surf.Area        Inc.Store        Cum.Store
    (feet)          (sq-ft)     (cubic-feet)     (cubic-feet)
    500.00               96                0                0
    502.00              481              577              577
    504.00            1,218            1,699            2,276
    506.00            2,245            3,463            5,739
    508.00           11,065           13,310           19,049
    510.00           41,023           52,088           71,137
    512.00           93,712          134,735          205,872

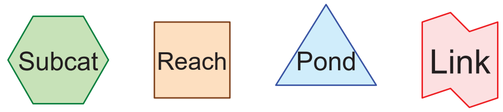
Device   Routing          Invert   Outlet Devices
  #1     Primary         507.80'   18.0"  Round Culvert
                                   L= 40.0'   CPP, mitered to conform to fill,  Ke= 0.700
                                   Inlet / Outlet Invert= 507.80' / 507.00'   S= 0.0200 '/'   Cc= 0.900
                                   n= 0.013,  Flow Area= 1.77 sf

Primary OutFlow  Max=7.85 cfs @ 12.08 hrs  HW=509.64'  TW=507.25'   (Dynamic Tailwater)
└─1=Culvert  (Inlet Controls 7.85 cfs @ 4.44 fps)
```

Pond WTP: Low side of pad







Routing Diagram for Berry Creek
Prepared by AECOM, Printed 10/22/2020
HydroCAD® 10.00-20 s/n 01723

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
252.000	98	Paved parking, HSG D (6S)
1,894.000	65	Woods/grass comb., Fair, HSG B (6S, 7S, 14S, 64S)
718.000	82	Woods/grass comb., Fair, HSG D (7S, 14S, 64S)
7.000	32	Woods/grass comb., Good, HSG A (17S)
115.000	58	Woods/grass comb., Good, HSG B (17S)
61.000	79	Woods/grass comb., Good, HSG D (17S)
26.000	73	Woods/grass comb., Poor, HSG B (5S)
14.000	86	Woods/grass comb., Poor, HSG D (5S)
3,087.000	**72**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
7.000	HSG A	17S
2,035.000	HSG B	5S, 6S, 7S, 14S, 17S, 64S
0.000	HSG C	
1,045.000	HSG D	5S, 6S, 7S, 14S, 17S, 64S
0.000	Other	
3,087.000		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	252.000	0.000	252.000	Paved parking	6S
0.000	1,894.000	0.000	718.000	0.000	2,612.000	Woods/grass comb., Fair	6S, 7S, 14S, 64S
7.000	115.000	0.000	61.000	0.000	183.000	Woods/grass comb., Good	17S
0.000	26.000	0.000	14.000	0.000	40.000	Woods/grass comb., Poor	5S
7.000	**2,035.000**	**0.000**	**1,045.000**	**0.000**	**3,087.000**	**TOTAL AREA**	

```
                     Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
                      Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
             Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: Drainage Area A1d        Runoff Area=40.000 ac   0.00% Impervious   Runoff Depth=3.90"
                                  Flow Length=2,800'   Tc=26.7 min   CN=78   Runoff=145.55 cfs  12.996 af

Subcatchment 6S: Drainage Area A3        Runoff Area=336.000 ac   75.00% Impervious   Runoff Depth=5.20"
                   Flow Length=3,700'   Slope=0.0100 '/'   Tc=29.7 min   CN=90   Runoff=1,465.87 cfs  145.515 af

Subcatchment 7S: Drainage Area A2         Runoff Area=376.000 ac   0.00% Impervious   Runoff Depth=3.00"
                                  Flow Length=8,800'   Tc=38.0 min   CN=69   Runoff=821.79 cfs  93.889 af

Subcatchment 14S: Drainage Area A4      Runoff Area=1,926.000 ac   0.00% Impervious   Runoff Depth=3.09"
                                Flow Length=1,660'   Tc=47.5 min   CN=70   Runoff=3,717.67 cfs  496.515 af

Subcatchment 17S: Drainage Area A5        Runoff Area=183.000 ac   0.00% Impervious   Runoff Depth=2.52"
                     Flow Length=2,700'   Slope=0.0300 '/'   Tc=30.3 min   CN=64   Runoff=384.54 cfs  38.483 af

Subcatchment 64S: Drainage Area A1u       Runoff Area=226.000 ac   0.00% Impervious   Runoff Depth=2.71"
                                  Flow Length=5,400'   Tc=46.0 min   CN=66   Runoff=384.78 cfs  51.041 af

Reach 45R: Berry Creek Tributary  Avg. Flow Depth=4.23'   Max Vel=4.90 fps   Inflow=3,717.67 cfs  496.515 af
                  n=0.035   L=19,200.0'   S=0.0070 '/'   Capacity=24,725.55 cfs   Outflow=1,715.76 cfs  496.397 af

Link 3L: Berry Creek (Section 16826)                                          Inflow=384.78 cfs  51.041 af
                                                                             Primary=384.78 cfs  51.041 af

Link 4L: Berry Creek (Section 13901.95)                                       Inflow=474.63 cfs  64.037 af
                                                                             Primary=474.63 cfs  64.037 af

Link 5L: Berry Creek (Section 11575.16)                                    Inflow=1,889.25 cfs  209.552 af
                                                                          Primary=1,889.25 cfs  209.552 af

Link 6L: Berry Creek (Section 11268.37)                                    Inflow=2,661.46 cfs  303.441 af
                                                                          Primary=2,661.46 cfs  303.441 af

Link 7L: Berry Creek (Section 3920)                                        Inflow=3,519.42 cfs  838.321 af
                                                                          Primary=3,519.42 cfs  838.321 af

Link 47L: Ocmulgee River                                                   Inflow=3,519.42 cfs  838.321 af
                                                                          Primary=3,519.42 cfs  838.321 af

        Total Runoff Area = 3,087.000 ac   Runoff Volume = 838.440 af   Average Runoff Depth = 3.26"
                                   91.84% Pervious = 2,835.000 ac     8.16% Impervious = 252.000 ac
```

Summary for Subcatchment 5S: Drainage Area A1d

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

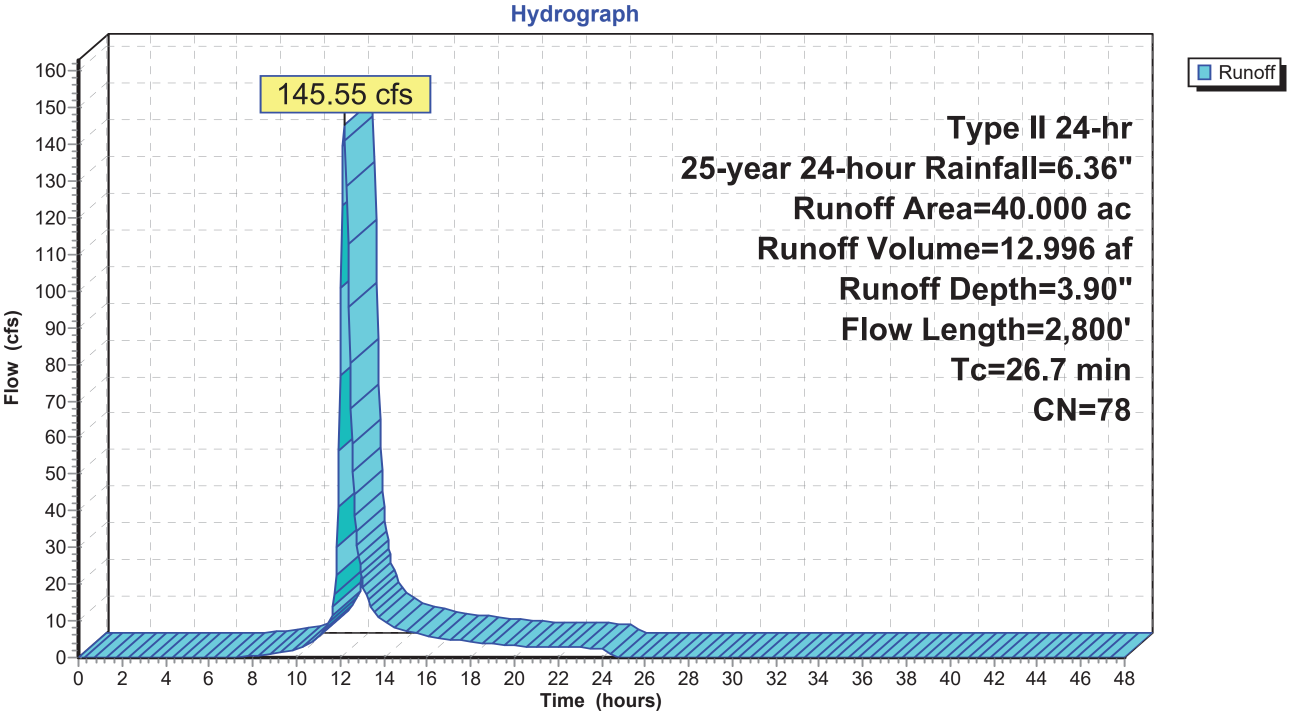
Runoff = 145.55 cfs @ 12.20 hrs, Volume= 12.996 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year 24-hour Rainfall=6.36"

Area (ac)	CN	Description
26.000	73	Woods/grass comb., Poor, HSG B
14.000	86	Woods/grass comb., Poor, HSG D
40.000	78	Weighted Average
40.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0600	0.13		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
6.8	500	0.0600	1.22		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
7.2	2,200	0.0050	5.07	760.07	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=5.00' D=5.00' Z= 5.0 '/' Top.W=55.00' n= 0.040 Winding stream, pools & shoals
26.7	2,800	Total			

Subcatchment 5S: Drainage Area A1d



Summary for Subcatchment 6S: Drainage Area A3

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

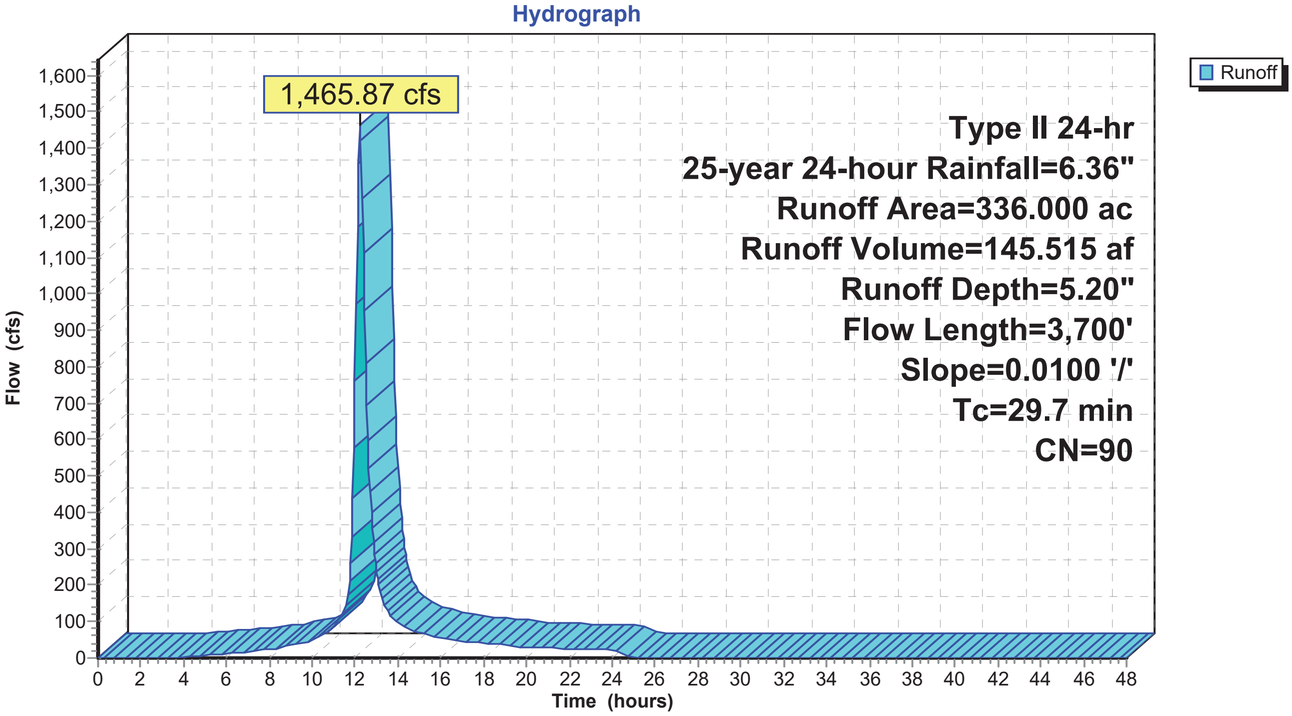
Runoff = 1,465.87 cfs @ 12.23 hrs, Volume= 145.515 af, Depth= 5.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year 24-hour Rainfall=6.36"

Area (ac)	CN	Description
84.000	65	Woods/grass comb., Fair, HSG B
252.000	98	Paved parking, HSG D
336.000	90	Weighted Average
84.000		25.00% Pervious Area
252.000		75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
26.9	2,600	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
1.3	1,000		12.69		**Lake or Reservoir, l pond** Mean Depth= 5.00'
29.7	3,700	Total			

Subcatchment 6S: Drainage Area A3



Summary for Subcatchment 7S: Drainage Area A2

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

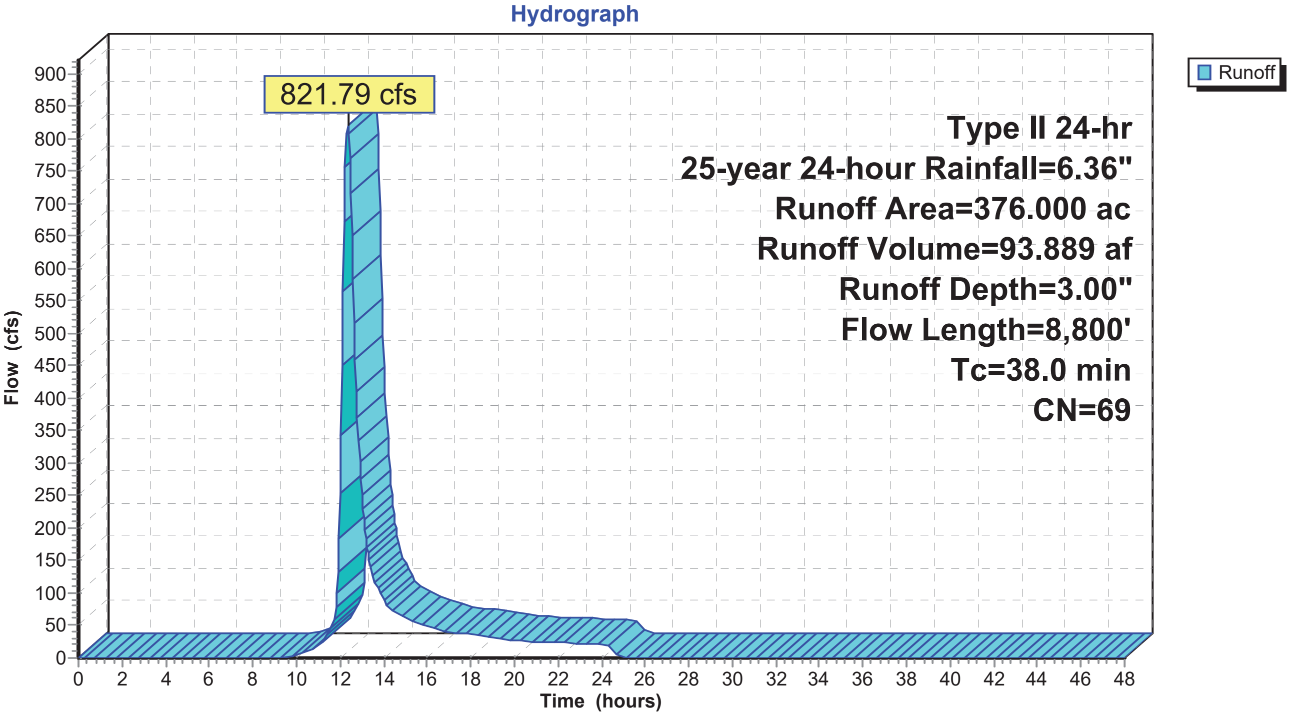
Runoff = 821.79 cfs @ 12.35 hrs, Volume= 93.889 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year 24-hour Rainfall=6.36"

Area (ac)	CN	Description
280.000	65	Woods/grass comb., Fair, HSG B
96.000	82	Woods/grass comb., Fair, HSG D
376.000	69	Weighted Average
376.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
4.1	400	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
11.0	1,500	0.0300	2.27	56.73	**Trap/Vee/Rect Channel Flow, channel to berry creek** Bot.W=20.00' D=1.00' Z= 5.0 '/' Top.W=30.00' n= 0.100 Earth, dense brush, high stage
21.4	6,800	0.0050	5.30	928.25	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=10.00' D=5.00' Z= 5.0 '/' Top.W=60.00' n= 0.040 Winding stream, pools & shoals
38.0	8,800	Total			

Subcatchment 7S: Drainage Area A2



Summary for Subcatchment 14S: Drainage Area A4

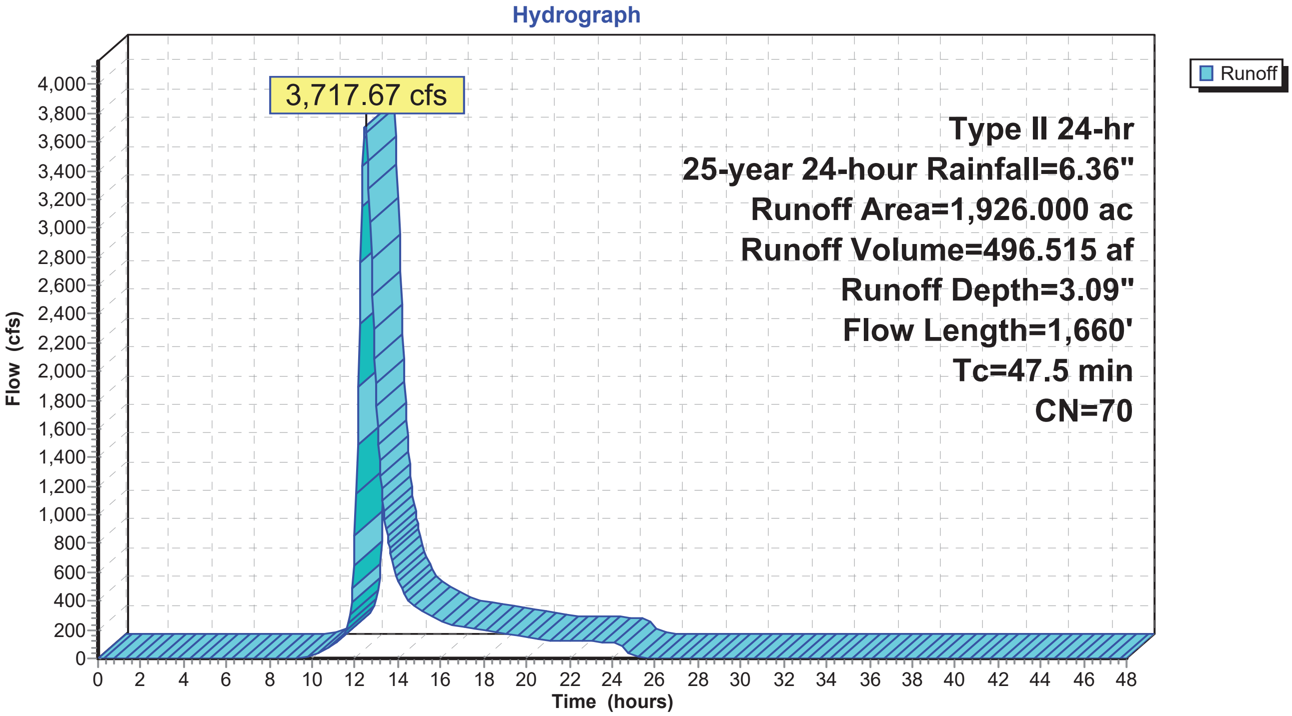
Runoff = 3,717.67 cfs @ 12.48 hrs, Volume= 496.515 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year 24-hour Rainfall=6.36"

Area (ac)	CN	Description
1,321.000	65	Woods/grass comb., Fair, HSG B
605.000	82	Woods/grass comb., Fair, HSG D
1,926.000	70	Weighted Average
1,926.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	100	0.0100	0.06		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
21.4	1,560	0.0590	1.21		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
47.5	1,660	Total			

Subcatchment 14S: Drainage Area A4



Summary for Subcatchment 17S: Drainage Area A5

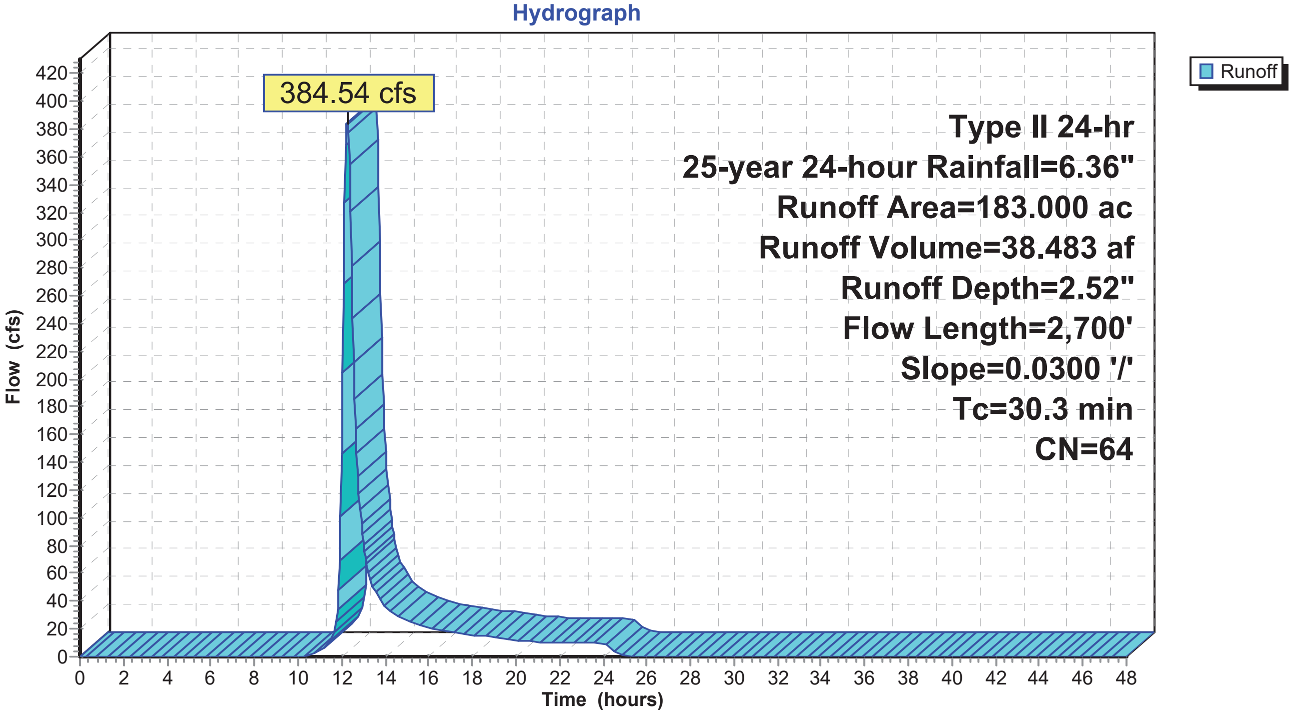
Runoff = 384.54 cfs @ 12.26 hrs, Volume= 38.483 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year 24-hour Rainfall=6.36"

Area (ac)	CN	Description
7.000	32	Woods/grass comb., Good, HSG A
115.000	58	Woods/grass comb., Good, HSG B
61.000	79	Woods/grass comb., Good, HSG D
183.000	64	Weighted Average
183.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	100	0.0300	0.10		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
7.7	400	0.0300	0.87		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
5.8	2,200	0.0300	6.28	3,765.28	**Trap/Vee/Rect Channel Flow, channel** Bot.W=20.00' D=5.00' Z= 20.0 '/' Top.W=220.00' n= 0.080 Earth, long dense weeds
30.3	2,700	Total			

Subcatchment 17S: Drainage Area A5



Summary for Subcatchment 64S: Drainage Area A1u

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

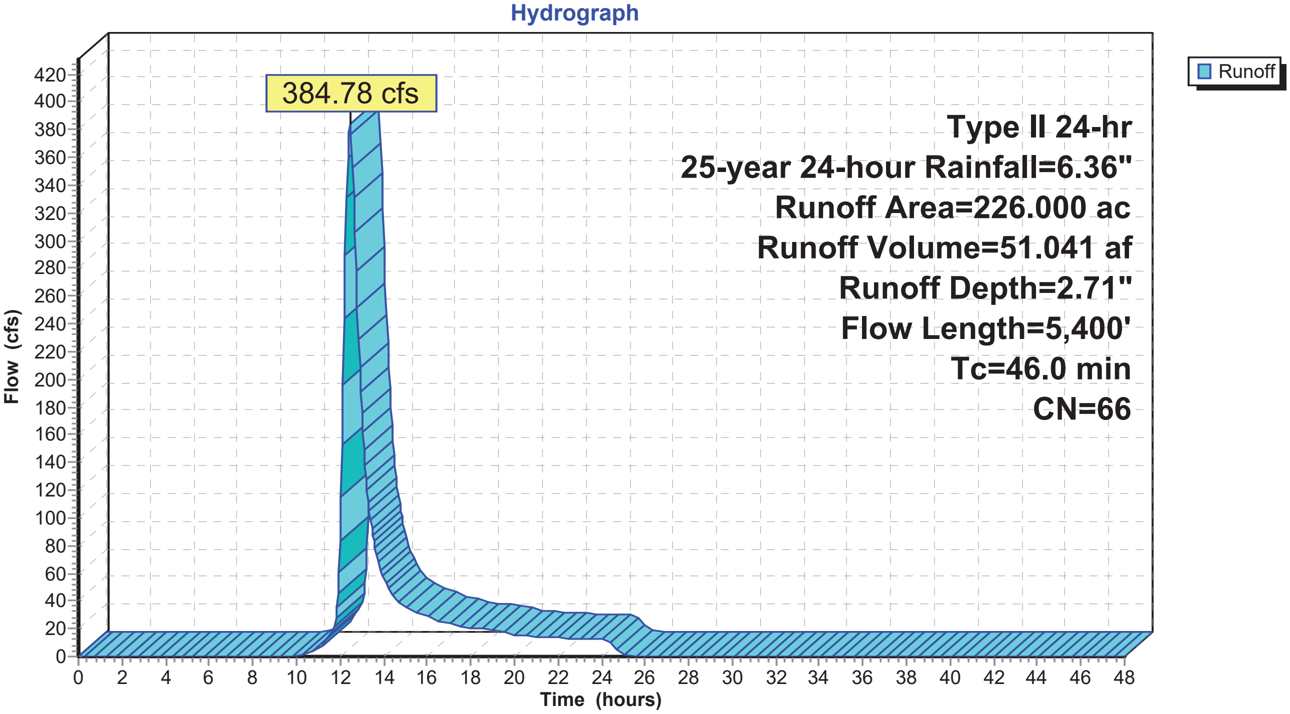
Runoff = 384.78 cfs @ 12.46 hrs, Volume= 51.041 af, Depth= 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year 24-hour Rainfall=6.36"

Area (ac)	CN	Description
209.000	65	Woods/grass comb., Fair, HSG B
17.000	82	Woods/grass comb., Fair, HSG D
226.000	66	Weighted Average
226.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
26.4	2,500	0.1000	1.58		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
9.2	2,800	0.0050	5.10	637.29	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=5.00' D=5.00' Z= 4.0 '/' Top.W=45.00' n= 0.040 Winding stream, pools & shoals
46.0	5,400	Total			

Subcatchment 64S: Drainage Area A1u



Summary for Reach 45R: Berry Creek Tributary

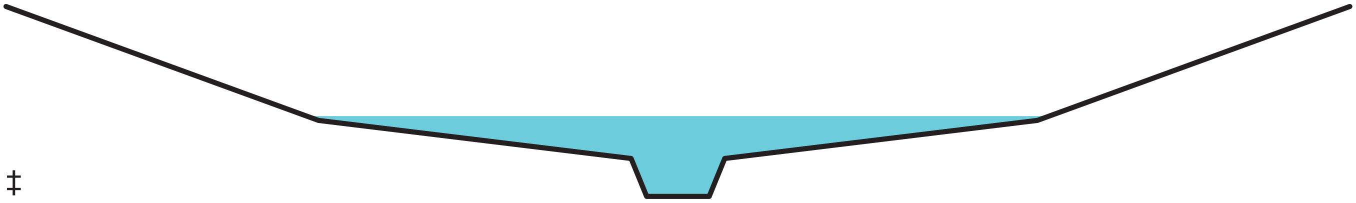
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)

```
Inflow Area =    1,926.000 ac,    0.00% Impervious,  Inflow Depth =   3.09"    for  25-year 24-hour event
Inflow       =   3,717.67 cfs @   12.48 hrs,  Volume=          496.515 af
Outflow      =   1,715.76 cfs @   13.02 hrs,  Volume=          496.397 af,  Atten= 54%,  Lag= 32.4 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.90 fps, Min. Travel Time= 65.3 min
Avg. Velocity = 2.05 fps, Avg. Travel Time= 155.8 min

Peak Storage= 6,999,083 cf @ 13.02 hrs
Average Depth at Peak Storage= 4.23'
Bank-Full Depth= 10.00' Flow Area= 2,290.0 sf, Capacity= 24,725.55 cfs

Custom cross-section, Length= 19,200.0' Slope= 0.0070 '/'
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 484.00', Outlet Invert= 350.00'

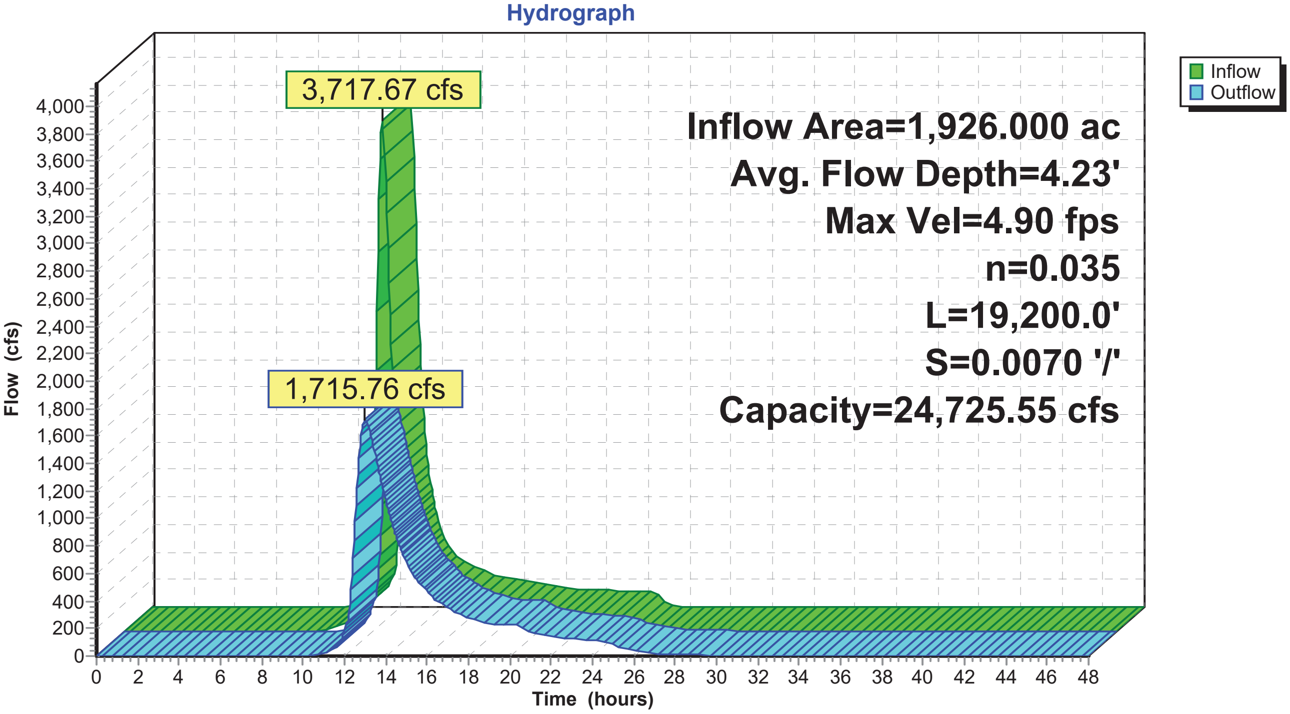


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	434.00	0.00
100.00	428.00	6.00
200.00	426.00	8.00
205.00	424.00	10.00
225.00	424.00	10.00
230.00	426.00	8.00
330.00	428.00	6.00
430.00	434.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	20.0	0	0.00
2.00	50.0	30.8	960,000	245.12
4.00	310.0	230.8	5,952,000	1,338.50
10.00	2,290.0	431.2	43,968,000	24,725.55

Reach 45R: Berry Creek Tributary



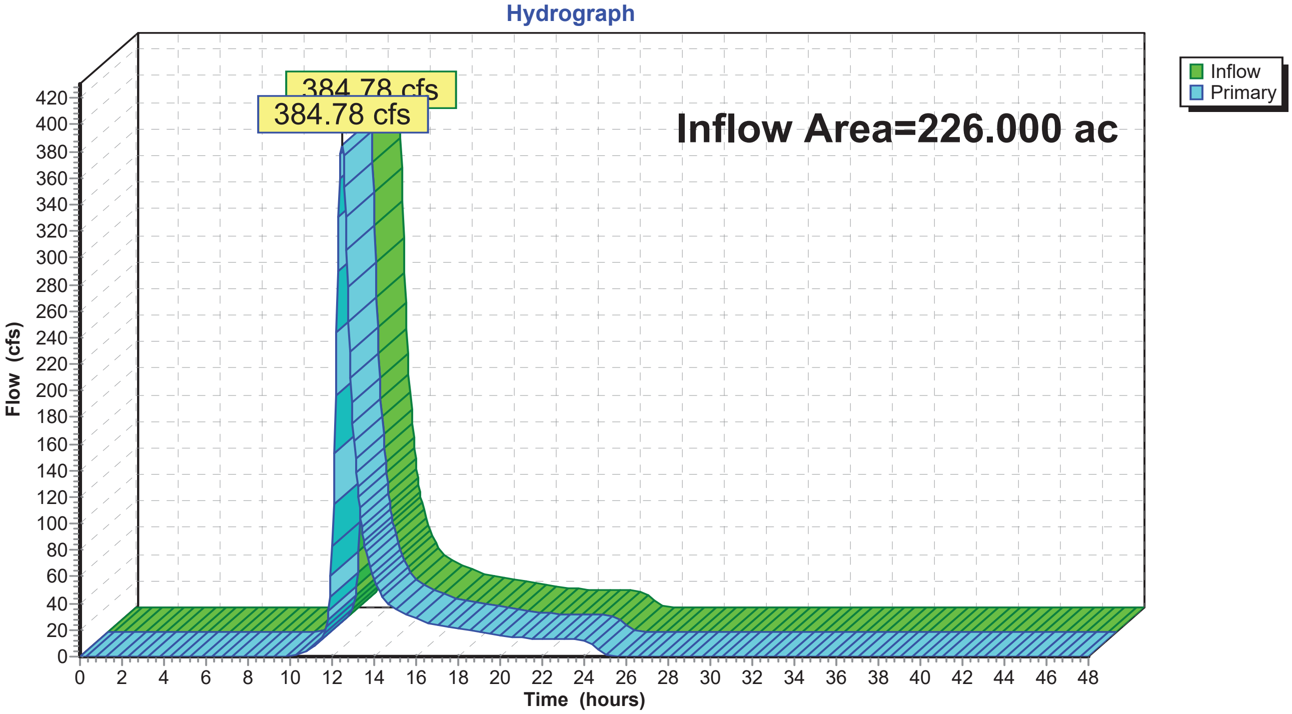
Summary for Link 3L: Berry Creek (Section 16826)

Additional details on Berry Creek can be found in the HEC-RAS model.

```
Inflow Area =      226.000 ac,    0.00% Impervious,  Inflow Depth =   2.71"    for  25-year 24-hour event
Inflow       =     384.78 cfs @   12.46 hrs,  Volume=           51.041 af
Primary      =     384.78 cfs @   12.46 hrs,  Volume=           51.041 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 3L: Berry Creek (Section 16826)

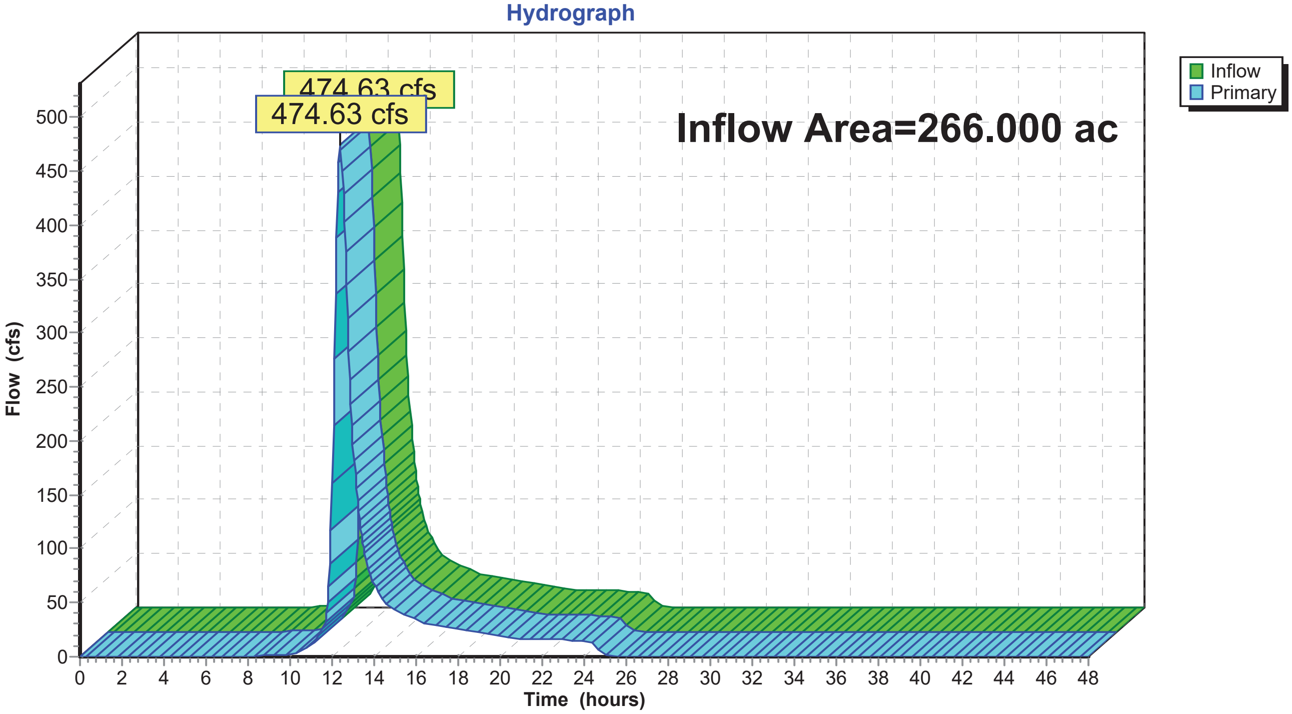


Summary for Link 4L: Berry Creek (Section 13901.95)

Inflow Area = 266.000 ac, 0.00% Impervious, Inflow Depth = 2.89" for 25-year 24-hour event
Inflow = 474.63 cfs @ 12.38 hrs, Volume= 64.037 af
Primary = 474.63 cfs @ 12.38 hrs, Volume= 64.037 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 4L: Berry Creek (Section 13901.95)

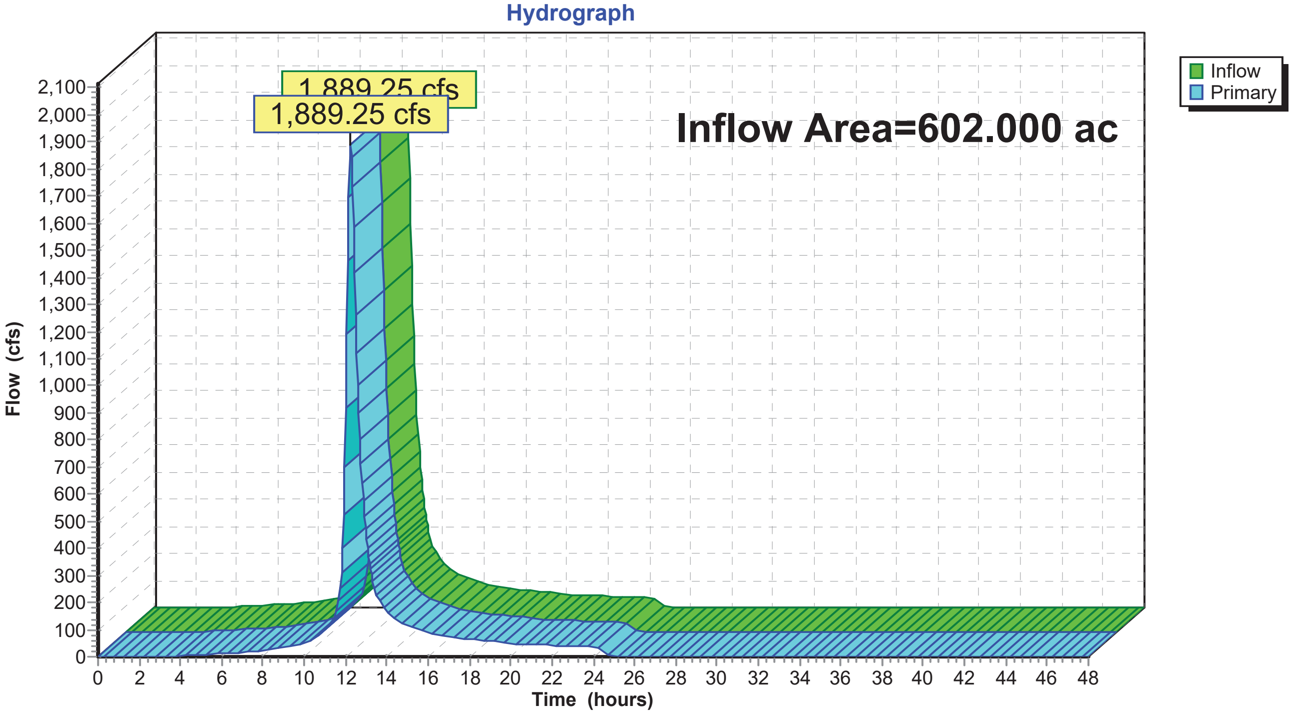


Summary for Link 5L: Berry Creek (Section 11575.16)

Inflow Area = 602.000 ac, 41.86% Impervious, Inflow Depth = 4.18" for 25-year 24-hour event
Inflow = 1,889.25 cfs @ 12.25 hrs, Volume= 209.552 af
Primary = 1,889.25 cfs @ 12.25 hrs, Volume= 209.552 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 5L: Berry Creek (Section 11575.16)

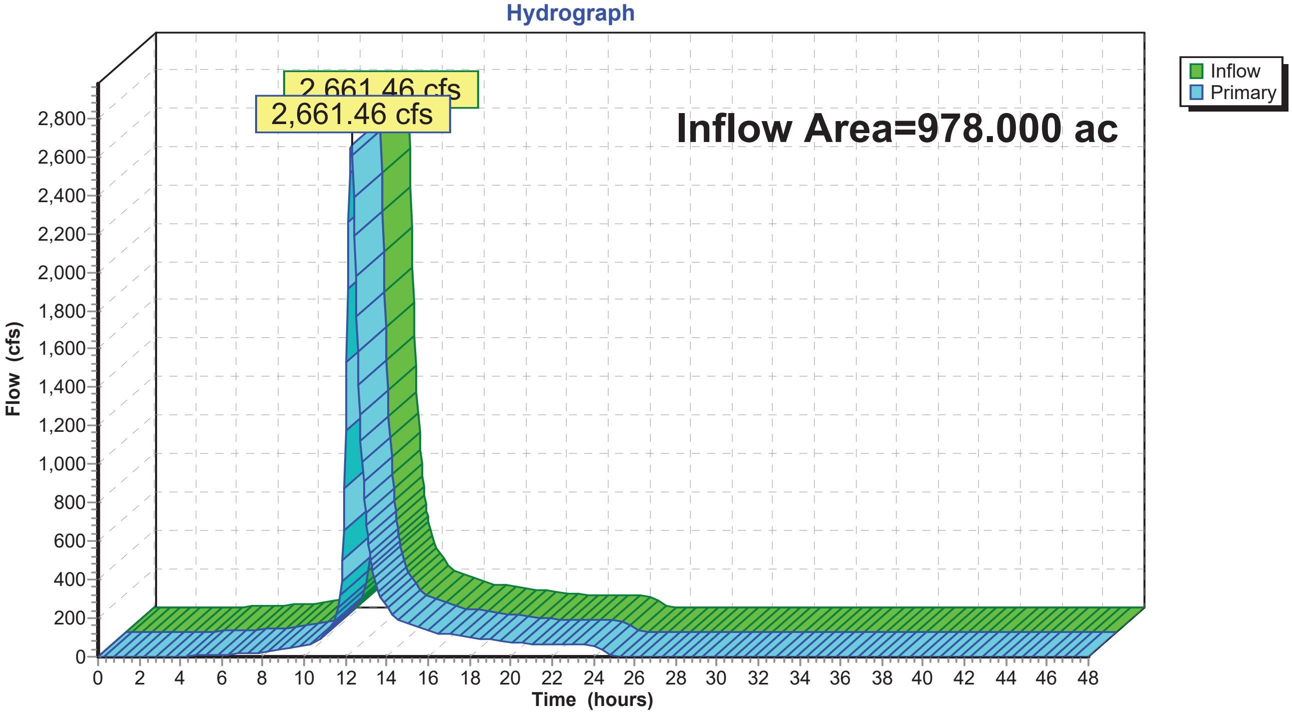


Summary for Link 6L: Berry Creek (Section 11268.37)

Inflow Area = 978.000 ac, 25.77% Impervious, Inflow Depth = 3.72" for 25-year 24-hour event
Inflow = 2,661.46 cfs @ 12.28 hrs, Volume= 303.441 af
Primary = 2,661.46 cfs @ 12.28 hrs, Volume= 303.441 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 6L: Berry Creek (Section 11268.37)

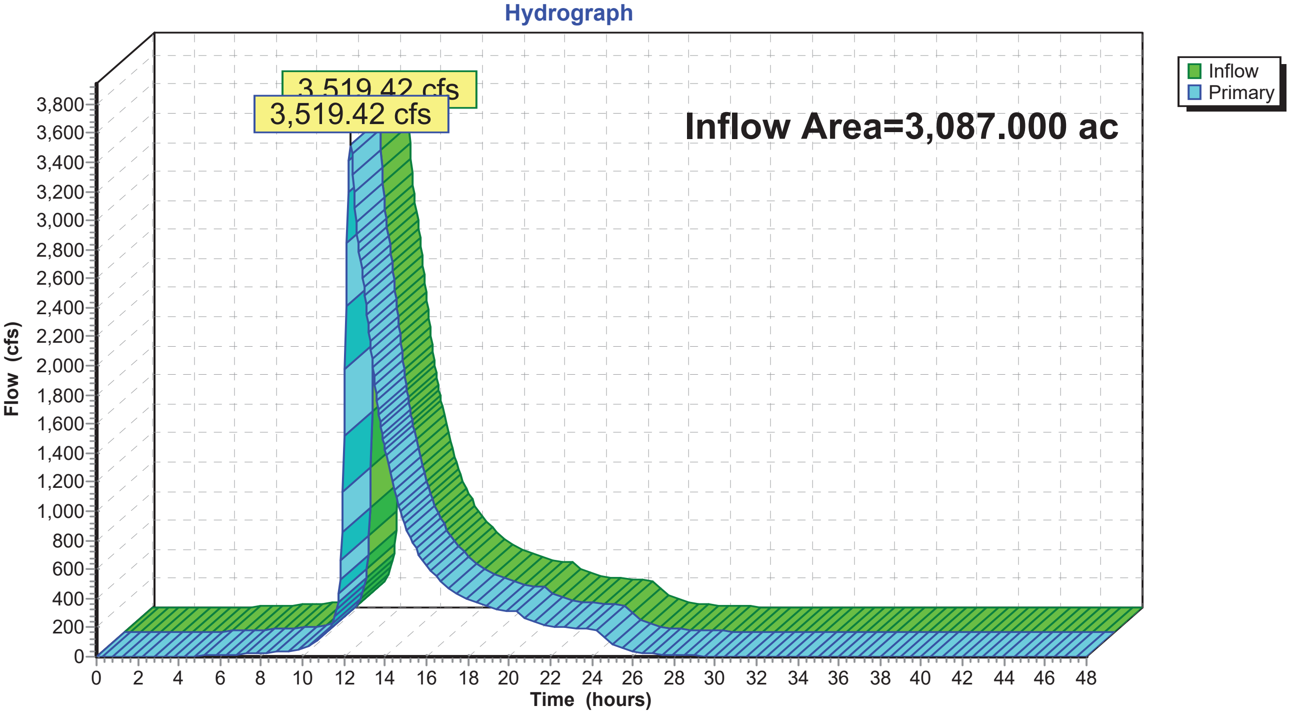


Summary for Link 7L: Berry Creek (Section 3920)

```
Inflow Area =    3,087.000 ac,    8.16% Impervious,  Inflow Depth =   3.26"    for  25-year 24-hour event
Inflow       =   3,519.42 cfs @   12.32 hrs,  Volume=         838.321 af
Primary      =   3,519.42 cfs @   12.32 hrs,  Volume=         838.321 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 7L: Berry Creek (Section 3920)

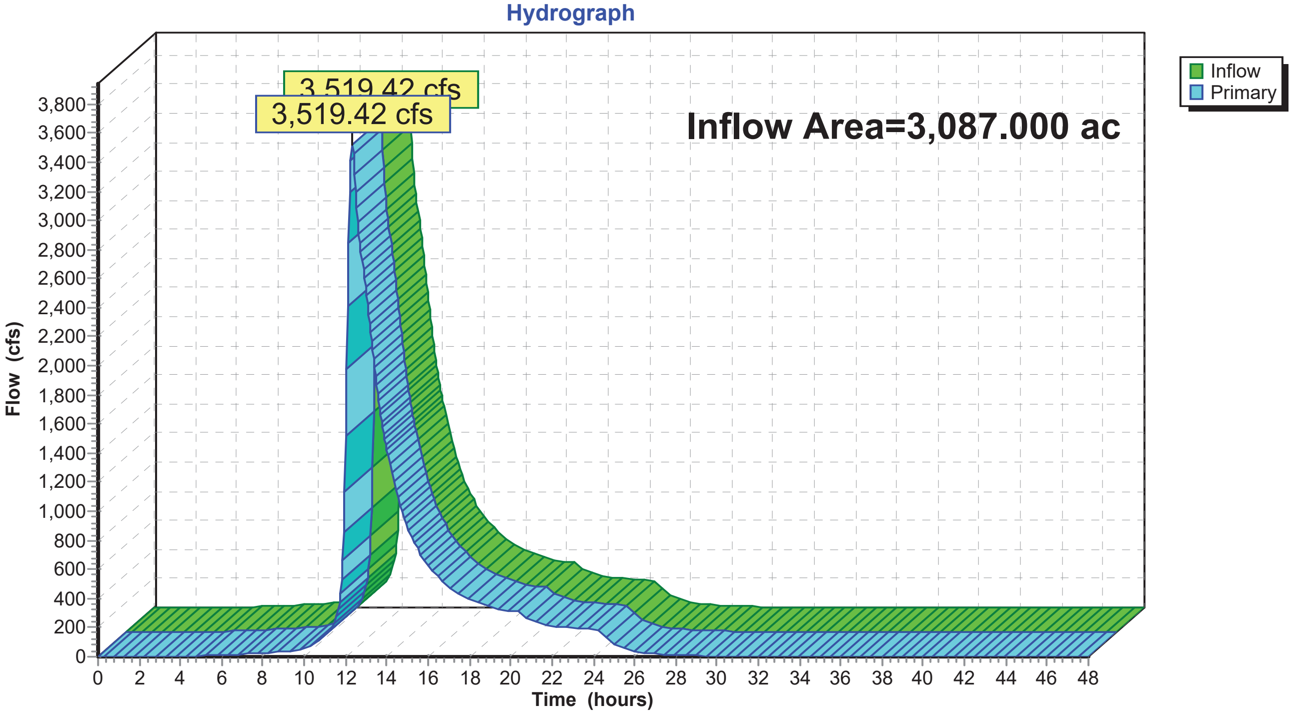


Summary for Link 47L: Ocmulgee River

```
Inflow Area =    3,087.000 ac,    8.16% Impervious,  Inflow Depth =   3.26"    for  25-year 24-hour event
Inflow       =    3,519.42 cfs @   12.32 hrs,  Volume=         838.321 af
Primary      =    3,519.42 cfs @   12.32 hrs,  Volume=         838.321 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 47L: Ocmulgee River



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: Drainage Area A1d Runoff Area=40.000 ac 0.00% Impervious Runoff Depth=4.67"
Flow Length=2,800' Tc=26.7 min CN=78 Runoff=174.15 cfs 15.583 af

Subcatchment 6S: Drainage Area A3 Runoff Area=336.000 ac 75.00% Impervious Runoff Depth=6.04"
Flow Length=3,700' Slope=0.0100 '/' Tc=29.7 min CN=90 Runoff=1,691.04 cfs 169.090 af

Subcatchment 7S: Drainage Area A2 Runoff Area=376.000 ac 0.00% Impervious Runoff Depth=3.70"
Flow Length=8,800' Tc=38.0 min CN=69 Runoff=1,021.12 cfs 115.783 af

Subcatchment 14S: Drainage Area A4 Runoff Area=1,926.000 ac 0.00% Impervious Runoff Depth=3.80"
Flow Length=1,660' Tc=47.5 min CN=70 Runoff=4,597.51 cfs 610.222 af

Subcatchment 17S: Drainage Area A5 Runoff Area=183.000 ac 0.00% Impervious Runoff Depth=3.17"
Flow Length=2,700' Slope=0.0300 '/' Tc=30.3 min CN=64 Runoff=489.70 cfs 48.338 af

Subcatchment 64S: Drainage Area A1u Runoff Area=226.000 ac 0.00% Impervious Runoff Depth=3.38"
Flow Length=5,400' Tc=46.0 min CN=66 Runoff=485.61 cfs 63.622 af

Reach 45R: Berry Creek Tributary Avg. Flow Depth=4.54' Max Vel=5.17 fps Inflow=4,597.51 cfs 610.222 af
n=0.035 L=19,200.0' S=0.0070 '/' Capacity=24,725.55 cfs Outflow=2,268.41 cfs 610.102 af

Link 3L: Berry Creek (Section 16826) Inflow=485.61 cfs 63.622 af
Primary=485.61 cfs 63.622 af

Link 4L: Berry Creek (Section 13901.95) Inflow=593.74 cfs 79.205 af
Primary=593.74 cfs 79.205 af

Link 5L: Berry Creek (Section 11575.16) Inflow=2,222.03 cfs 248.294 af
Primary=2,222.03 cfs 248.294 af

Link 6L: Berry Creek (Section 11268.37) Inflow=3,188.12 cfs 364.078 af
Primary=3,188.12 cfs 364.078 af

Link 7L: Berry Creek (Section 3920) Inflow=4,325.05 cfs 1,022.517 af
Primary=4,325.05 cfs 1,022.517 af

Link 47L: Ocmulgee River Inflow=4,325.05 cfs 1,022.517 af
Primary=4,325.05 cfs 1,022.517 af

Total Runoff Area = 3,087.000 ac Runoff Volume = 1,022.638 af Average Runoff Depth = 3.98"
91.84% Pervious = 2,835.000 ac 8.16% Impervious = 252.000 ac

Summary for Subcatchment 5S: Drainage Area A1d

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

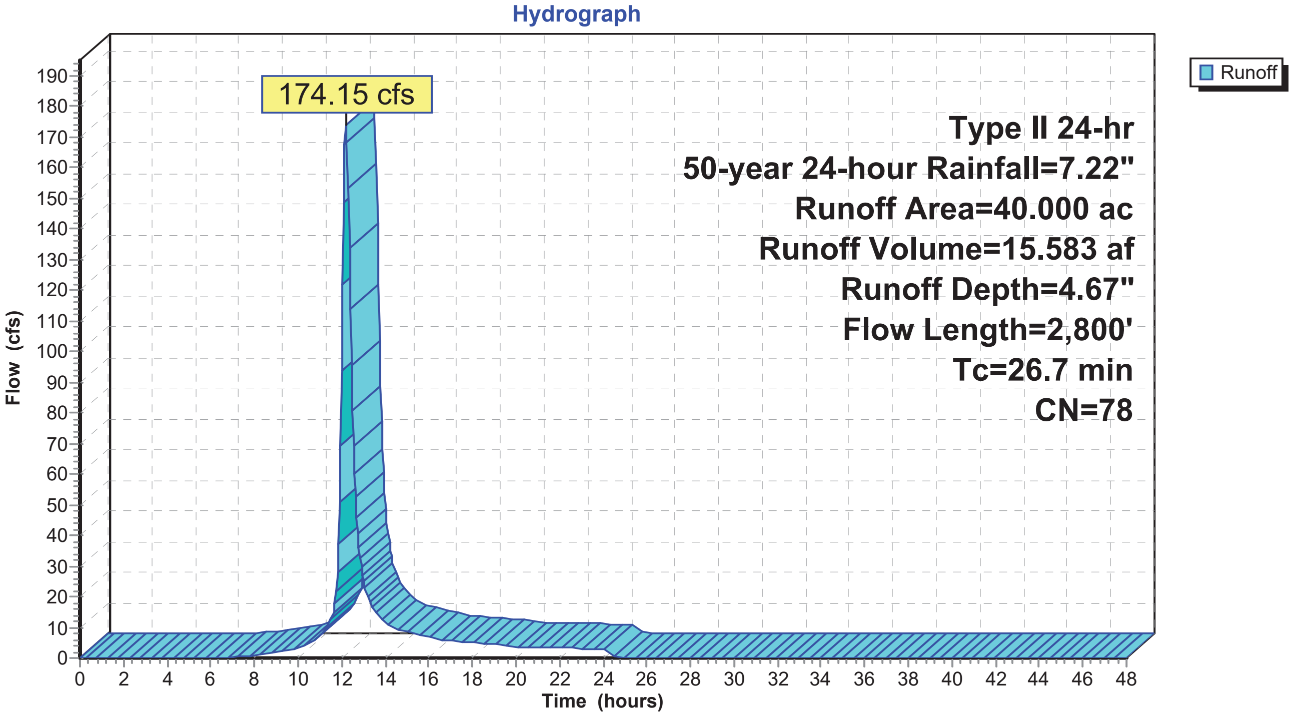
Runoff = 174.15 cfs @ 12.20 hrs, Volume= 15.583 af, Depth= 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-year 24-hour Rainfall=7.22"

Area (ac)	CN	Description
26.000	73	Woods/grass comb., Poor, HSG B
14.000	86	Woods/grass comb., Poor, HSG D
40.000	78	Weighted Average
40.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0600	0.13		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
6.8	500	0.0600	1.22		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
7.2	2,200	0.0050	5.07	760.07	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=5.00' D=5.00' Z= 5.0 '/' Top.W=55.00' n= 0.040 Winding stream, pools & shoals
26.7	2,800	Total			

Subcatchment 5S: Drainage Area A1d



Summary for Subcatchment 6S: Drainage Area A3

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

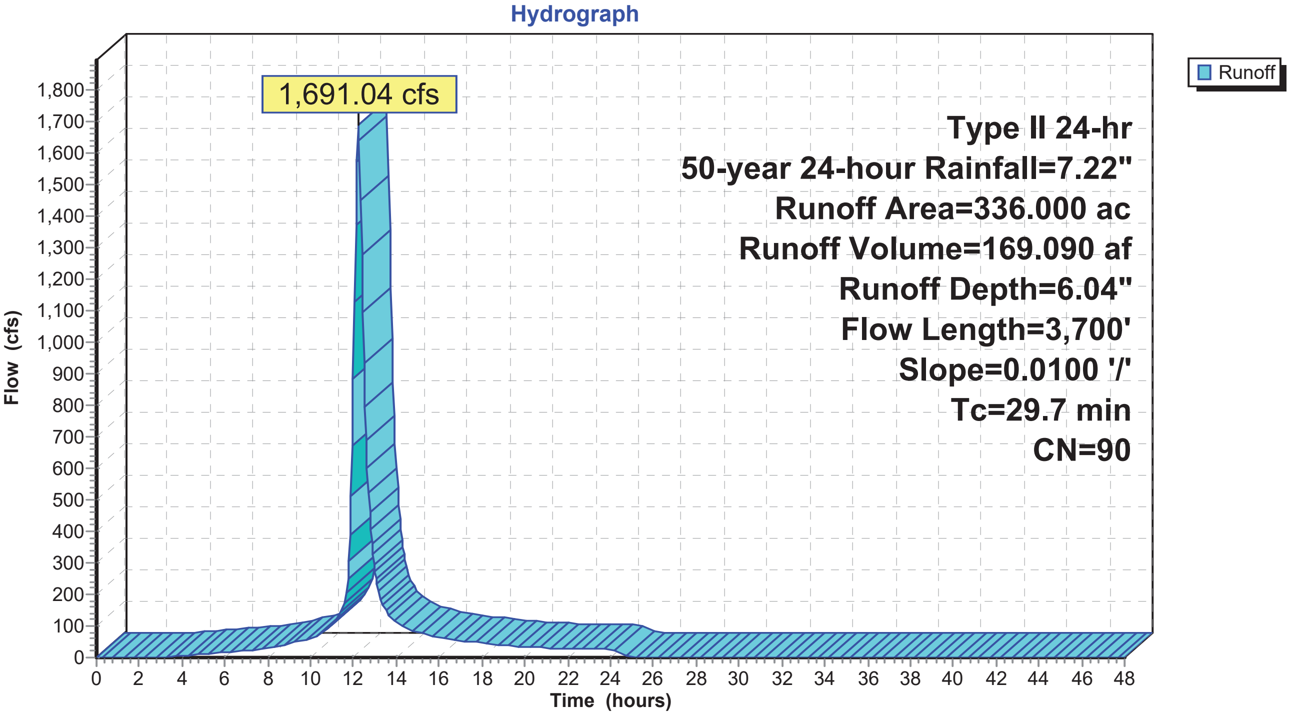
Runoff = 1,691.04 cfs @ 12.23 hrs, Volume= 169.090 af, Depth= 6.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-year 24-hour Rainfall=7.22"

Area (ac)	CN	Description
84.000	65	Woods/grass comb., Fair, HSG B
252.000	98	Paved parking, HSG D
336.000	90	Weighted Average
84.000		25.00% Pervious Area
252.000		75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
26.9	2,600	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
1.3	1,000		12.69		**Lake or Reservoir, l pond** Mean Depth= 5.00'
29.7	3,700	Total			

Subcatchment 6S: Drainage Area A3



Summary for Subcatchment 7S: Drainage Area A2

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

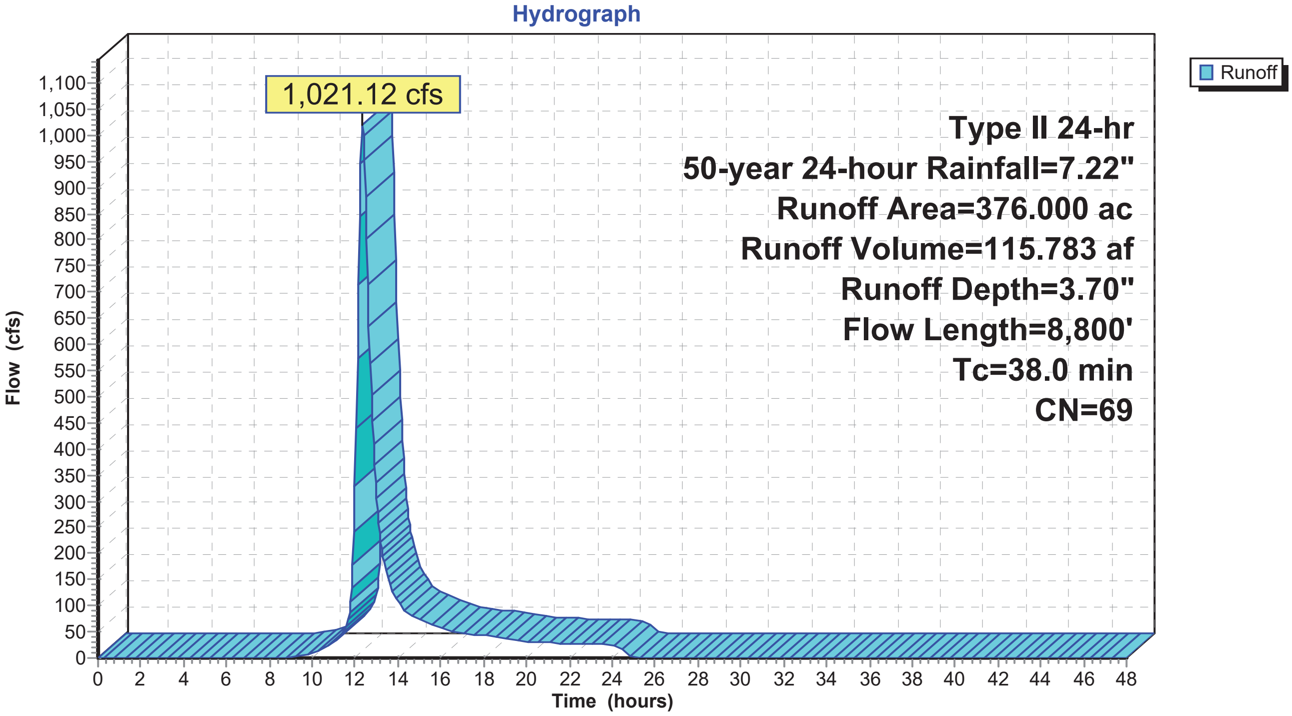
Runoff = 1,021.12 cfs @ 12.35 hrs, Volume= 115.783 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-year 24-hour Rainfall=7.22"

Area (ac)	CN	Description
280.000	65	Woods/grass comb., Fair, HSG B
96.000	82	Woods/grass comb., Fair, HSG D
376.000	69	Weighted Average
376.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
4.1	400	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
11.0	1,500	0.0300	2.27	56.73	**Trap/Vee/Rect Channel Flow, channel to berry creek** Bot.W=20.00' D=1.00' Z= 5.0 '/' Top.W=30.00' n= 0.100 Earth, dense brush, high stage
21.4	6,800	0.0050	5.30	928.25	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=10.00' D=5.00' Z= 5.0 '/' Top.W=60.00' n= 0.040 Winding stream, pools & shoals
38.0	8,800	Total			

Subcatchment 7S: Drainage Area A2



Summary for Subcatchment 14S: Drainage Area A4

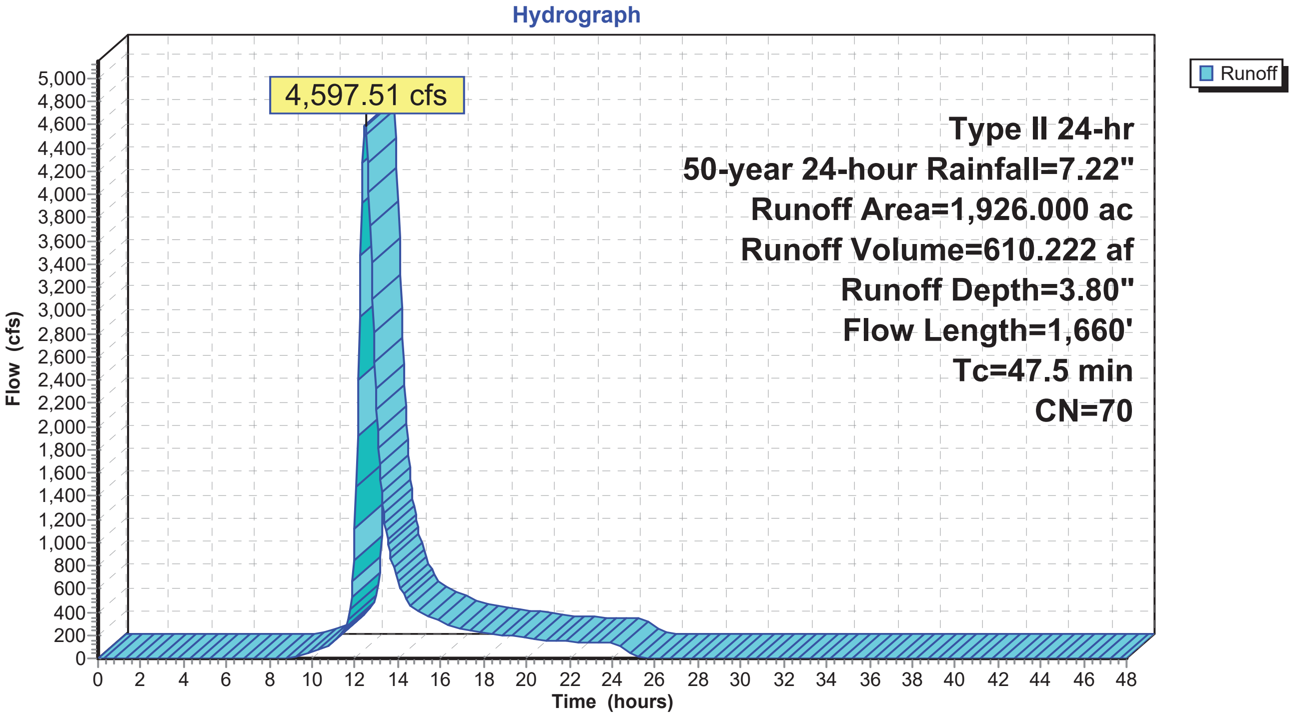
Runoff = 4,597.51 cfs @ 12.47 hrs, Volume= 610.222 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-year 24-hour Rainfall=7.22"

Area (ac)	CN	Description
1,321.000	65	Woods/grass comb., Fair, HSG B
605.000	82	Woods/grass comb., Fair, HSG D
1,926.000	70	Weighted Average
1,926.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	100	0.0100	0.06		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
21.4	1,560	0.0590	1.21		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
47.5	1,660	Total			

Subcatchment 14S: Drainage Area A4



Summary for Subcatchment 17S: Drainage Area A5

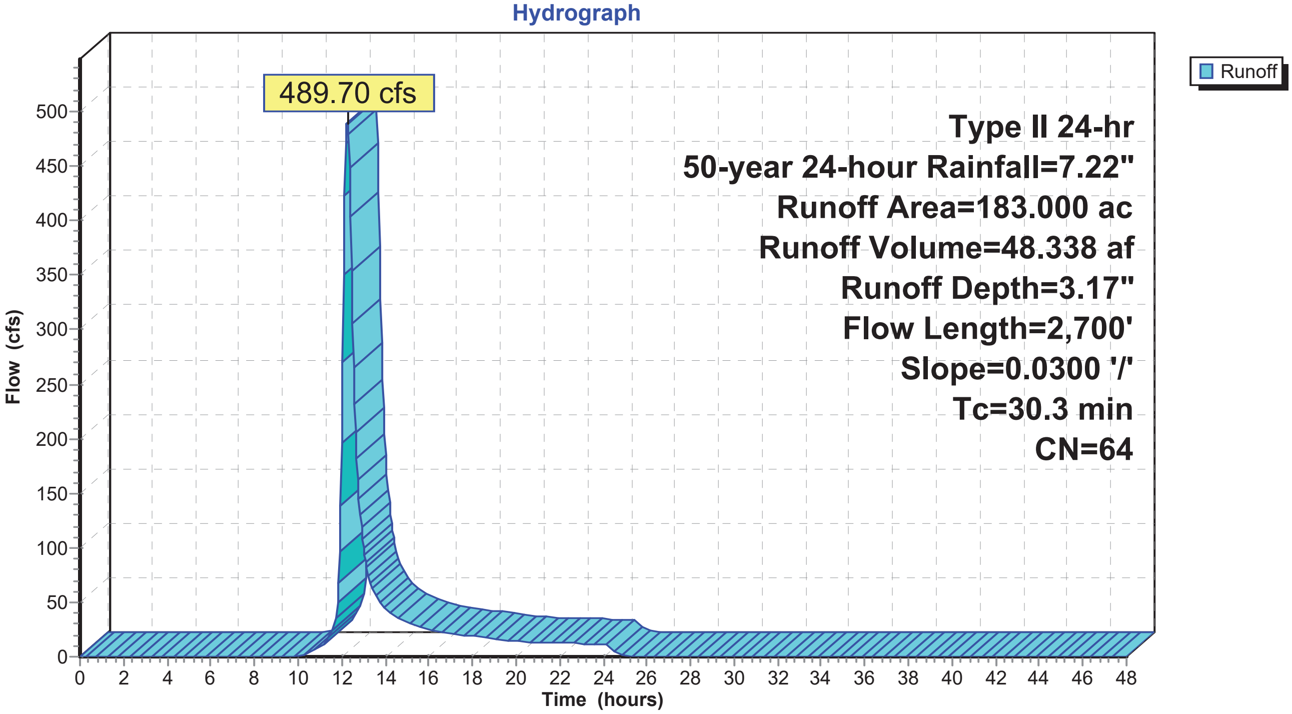
Runoff = 489.70 cfs @ 12.26 hrs, Volume= 48.338 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-year 24-hour Rainfall=7.22"

Area (ac)	CN	Description
7.000	32	Woods/grass comb., Good, HSG A
115.000	58	Woods/grass comb., Good, HSG B
61.000	79	Woods/grass comb., Good, HSG D
183.000	64	Weighted Average
183.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	100	0.0300	0.10		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
7.7	400	0.0300	0.87		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
5.8	2,200	0.0300	6.28	3,765.28	**Trap/Vee/Rect Channel Flow, channel** Bot.W=20.00' D=5.00' Z= 20.0 '/' Top.W=220.00' n= 0.080 Earth, long dense weeds
30.3	2,700	Total			

Subcatchment 17S: Drainage Area A5



Summary for Subcatchment 64S: Drainage Area A1u

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

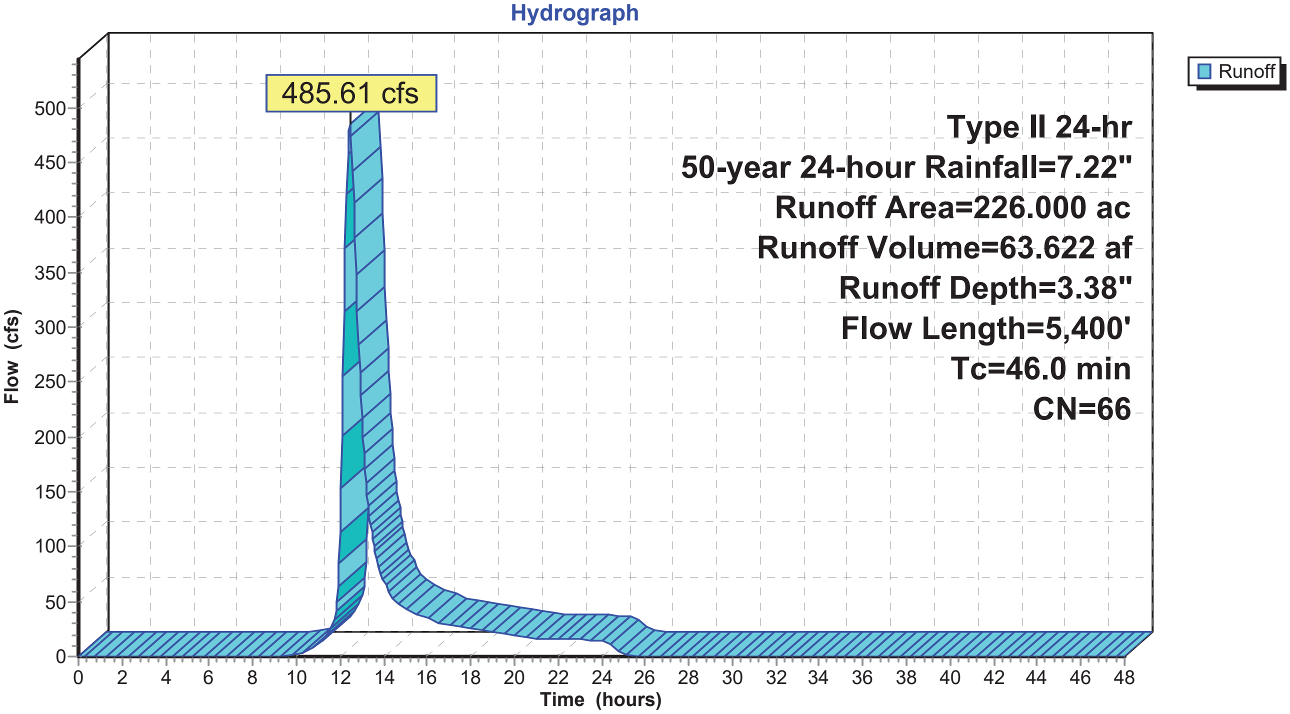
Runoff = 485.61 cfs @ 12.45 hrs, Volume= 63.622 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-year 24-hour Rainfall=7.22"

Area (ac)	CN	Description
209.000	65	Woods/grass comb., Fair, HSG B
17.000	82	Woods/grass comb., Fair, HSG D
226.000	66	Weighted Average
226.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
26.4	2,500	0.1000	1.58		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
9.2	2,800	0.0050	5.10	637.29	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=5.00' D=5.00' Z= 4.0 '/' Top.W=45.00' n= 0.040 Winding stream, pools & shoals
46.0	5,400	Total			

Subcatchment 64S: Drainage Area A1u



Summary for Reach 45R: Berry Creek Tributary

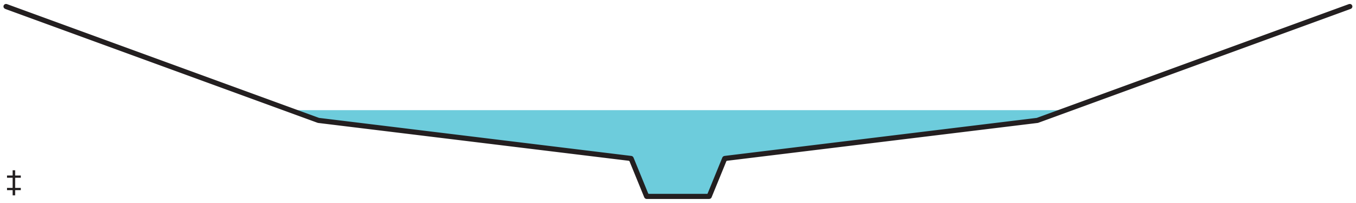
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)

```
Inflow Area =    1,926.000 ac,   0.00% Impervious,  Inflow Depth =   3.80"    for  50-year 24-hour event
Inflow       =   4,597.51 cfs @   12.47 hrs,  Volume=          610.222 af
Outflow      =   2,268.41 cfs @   12.97 hrs,  Volume=          610.102 af,  Atten= 51%,  Lag= 29.8 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.17 fps, Min. Travel Time= 61.8 min
Avg. Velocity = 2.11 fps, Avg. Travel Time= 151.7 min

Peak Storage= 8,414,979 cf @ 12.97 hrs
Average Depth at Peak Storage= 4.54'
Bank-Full Depth= 10.00' Flow Area= 2,290.0 sf, Capacity= 24,725.55 cfs

Custom cross-section, Length= 19,200.0' Slope= 0.0070 '/'
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 484.00', Outlet Invert= 350.00'

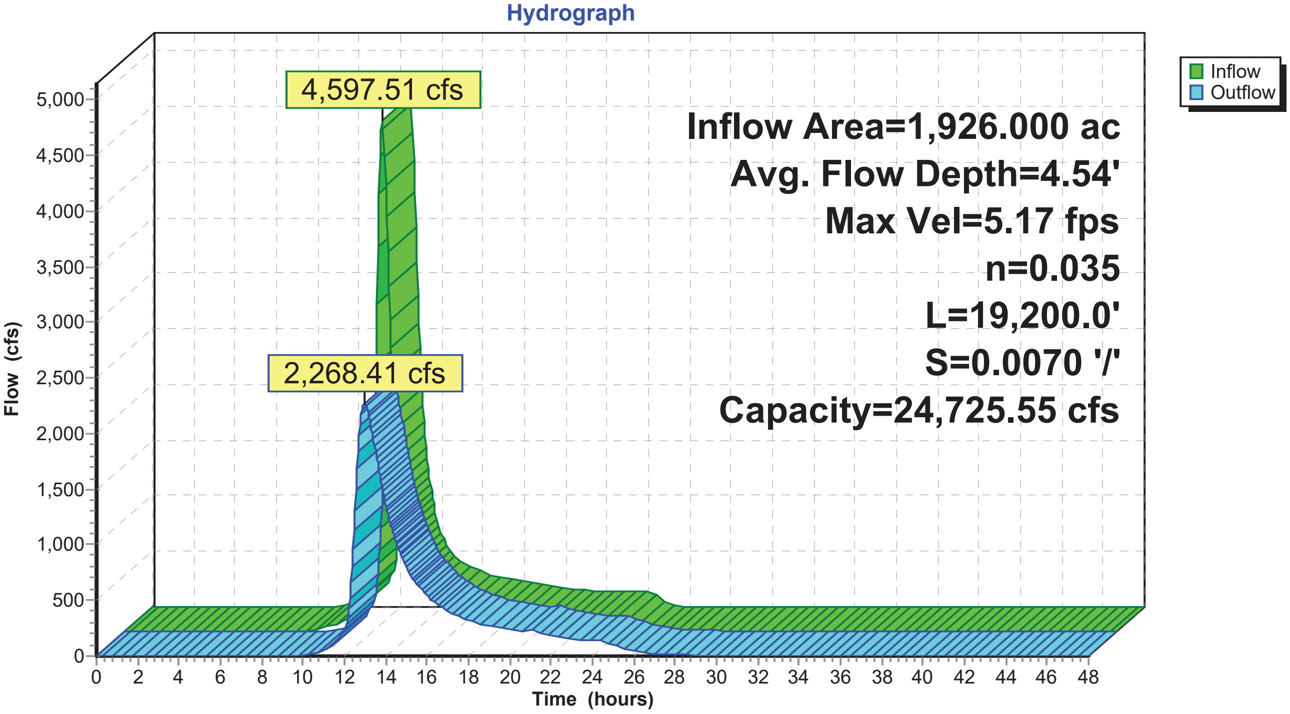


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	434.00	0.00
100.00	428.00	6.00
200.00	426.00	8.00
205.00	424.00	10.00
225.00	424.00	10.00
230.00	426.00	8.00
330.00	428.00	6.00
430.00	434.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	20.0	0	0.00
2.00	50.0	30.8	960,000	245.12
4.00	310.0	230.8	5,952,000	1,338.50
10.00	2,290.0	431.2	43,968,000	24,725.55

Reach 45R: Berry Creek Tributary



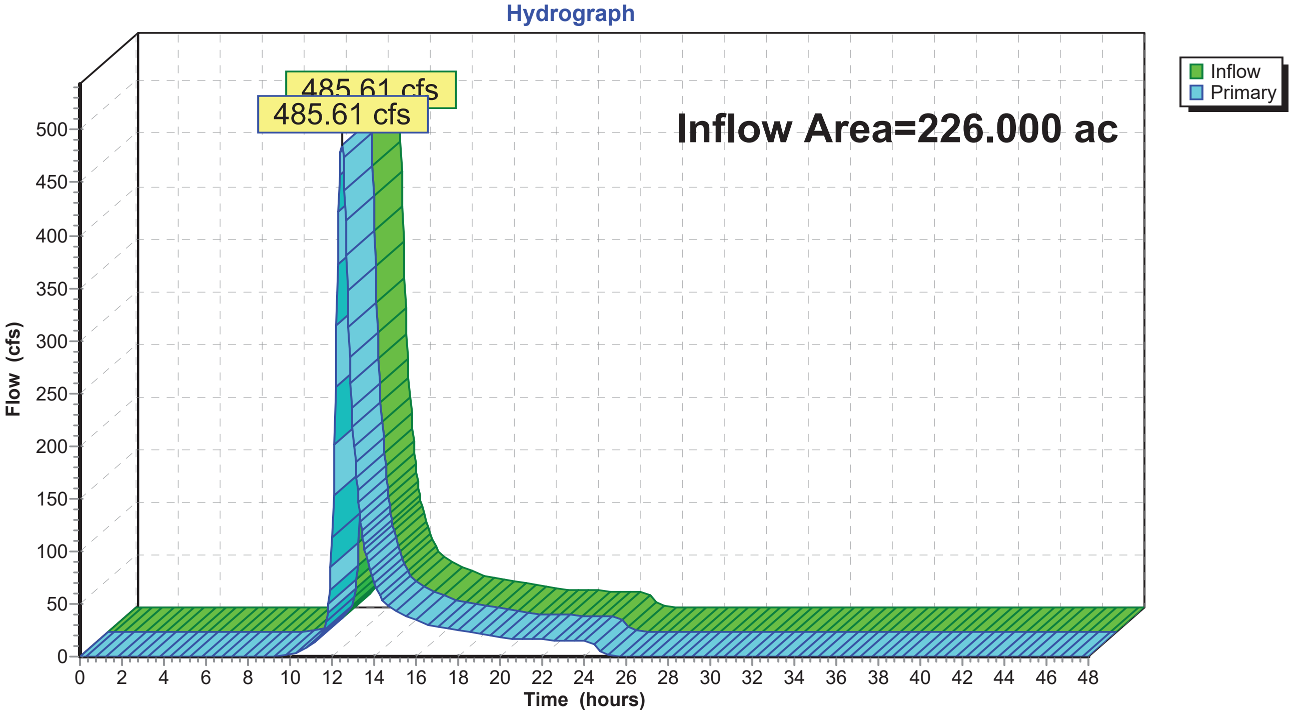
Summary for Link 3L: Berry Creek (Section 16826)

Additional details on Berry Creek can be found in the HEC-RAS model.

```
Inflow Area =      226.000 ac,    0.00% Impervious,  Inflow Depth =   3.38"    for  50-year 24-hour event
Inflow       =     485.61 cfs @   12.45 hrs,  Volume=          63.622 af
Primary      =     485.61 cfs @   12.45 hrs,  Volume=          63.622 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

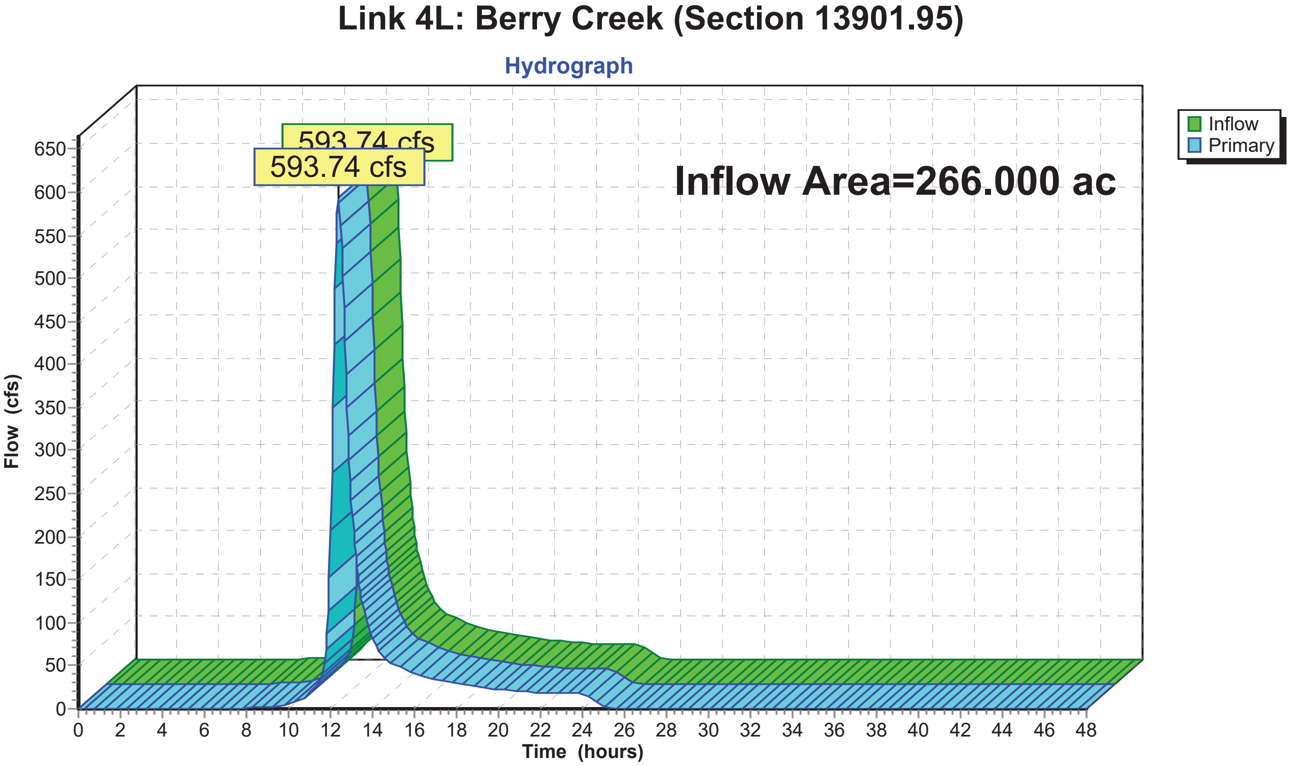
Link 3L: Berry Creek (Section 16826)



Summary for Link 4L: Berry Creek (Section 13901.95)

Inflow Area = 266.000 ac, 0.00% Impervious, Inflow Depth = 3.57" for 50-year 24-hour event
Inflow = 593.74 cfs @ 12.38 hrs, Volume= 79.205 af
Primary = 593.74 cfs @ 12.38 hrs, Volume= 79.205 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

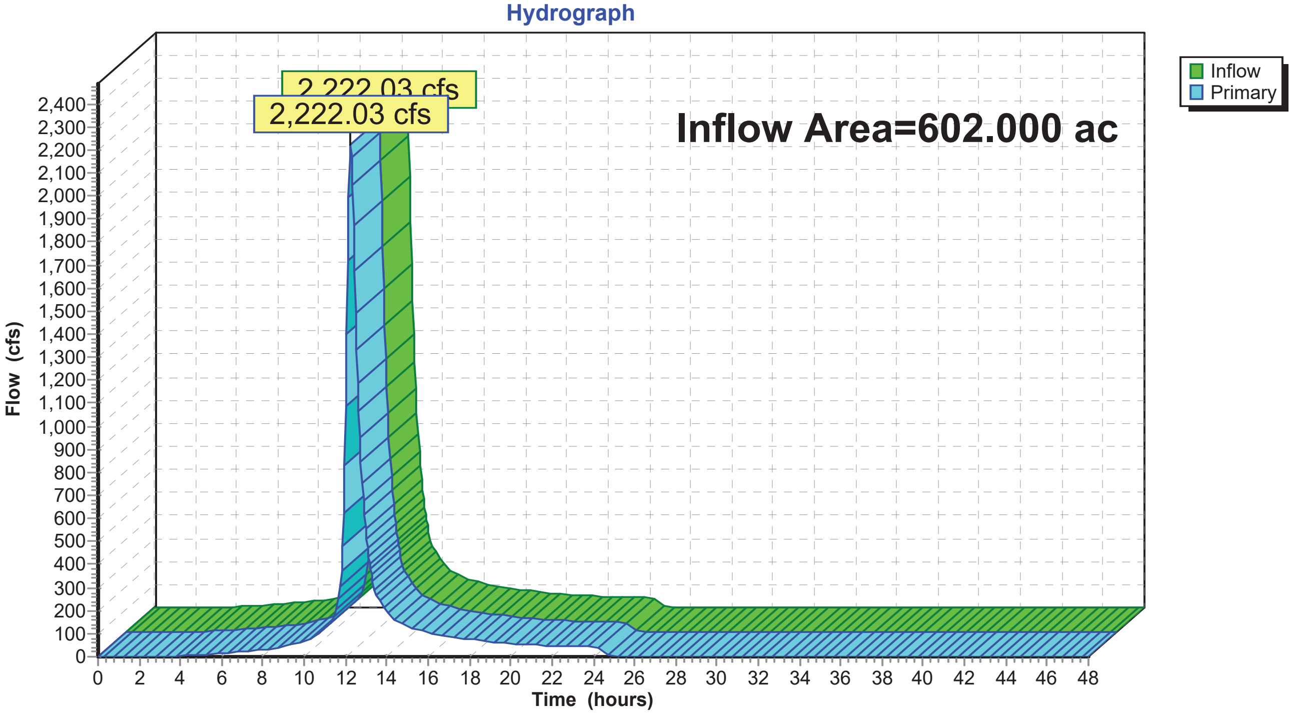


Summary for Link 5L: Berry Creek (Section 11575.16)

```
Inflow Area =      602.000 ac,  41.86% Impervious,  Inflow Depth =   4.95"    for  50-year 24-hour event
Inflow       =   2,222.03 cfs @   12.25 hrs,  Volume=         248.294 af
Primary      =   2,222.03 cfs @   12.25 hrs,  Volume=         248.294 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 5L: Berry Creek (Section 11575.16)

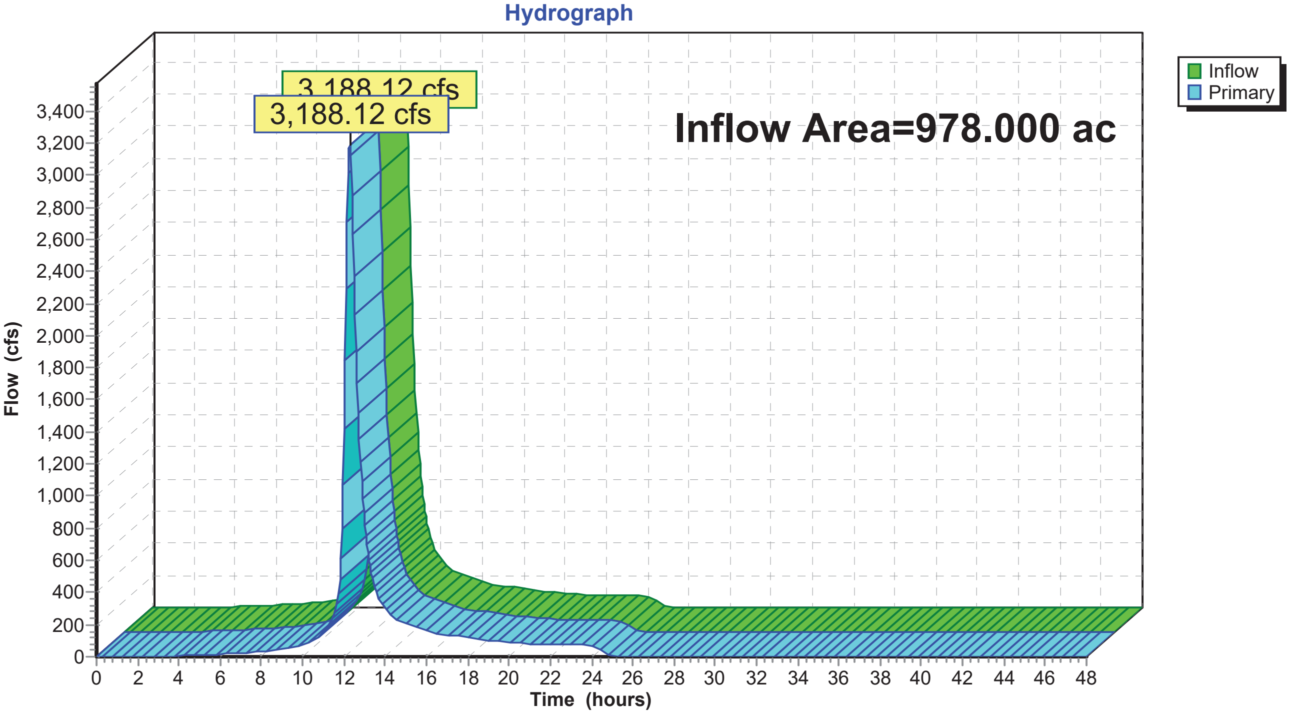


Summary for Link 6L: Berry Creek (Section 11268.37)

```
Inflow Area =      978.000 ac,  25.77% Impervious,  Inflow Depth =   4.47"    for  50-year 24-hour event
Inflow       =   3,188.12 cfs @   12.28 hrs,  Volume=          364.078 af
Primary      =   3,188.12 cfs @   12.28 hrs,  Volume=          364.078 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 6L: Berry Creek (Section 11268.37)

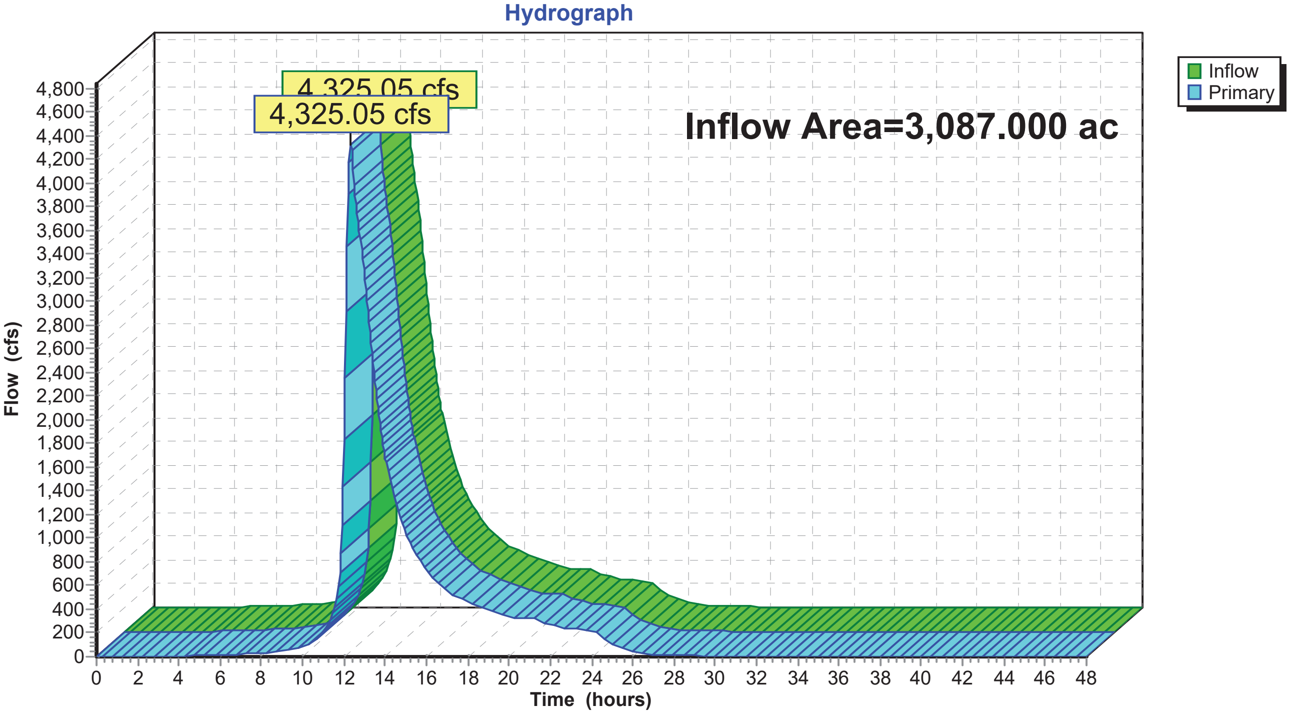


Summary for Link 7L: Berry Creek (Section 3920)

Inflow Area = 3,087.000 ac, 8.16% Impervious, Inflow Depth = 3.97" for 50-year 24-hour event
Inflow = 4,325.05 cfs @ 12.33 hrs, Volume= 1,022.517 af
Primary = 4,325.05 cfs @ 12.33 hrs, Volume= 1,022.517 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 7L: Berry Creek (Section 3920)

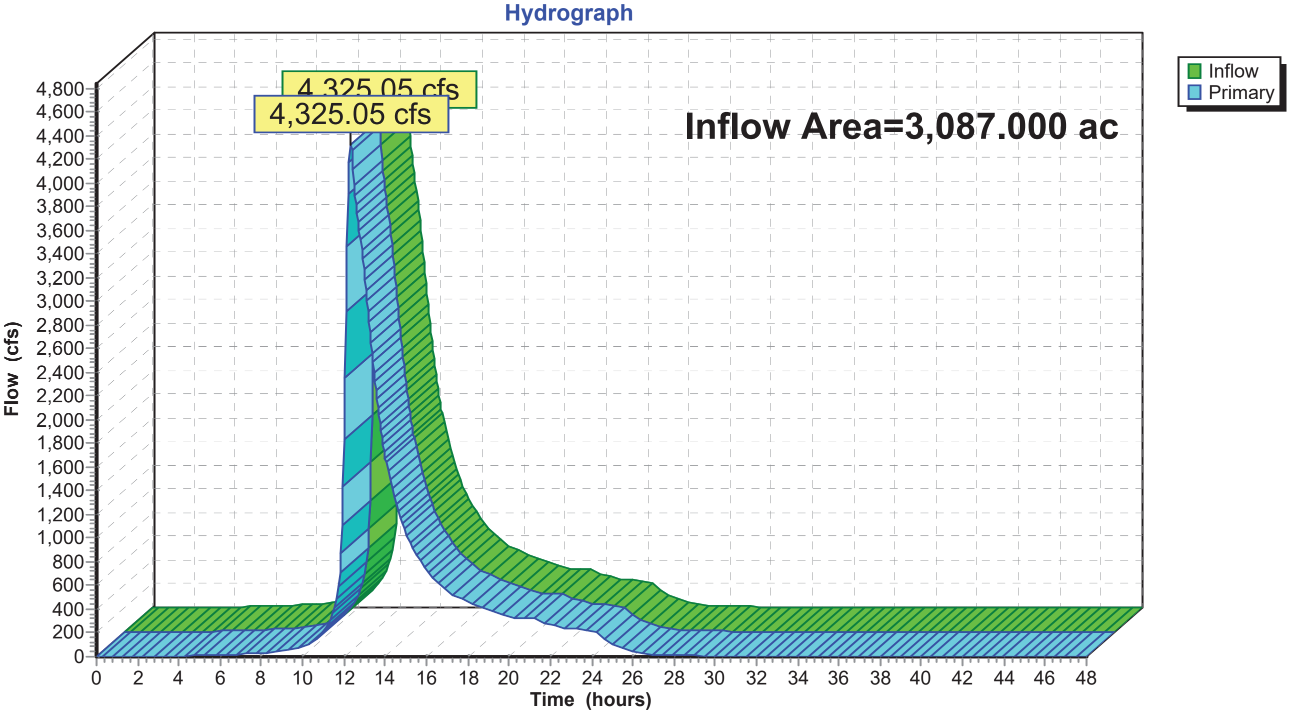


Summary for Link 47L: Ocmulgee River

Inflow Area = 3,087.000 ac, 8.16% Impervious, Inflow Depth = 3.97" for 50-year 24-hour event
Inflow = 4,325.05 cfs @ 12.33 hrs, Volume= 1,022.517 af
Primary = 4,325.05 cfs @ 12.33 hrs, Volume= 1,022.517 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 47L: Ocmulgee River



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: Drainage Area A1d Runoff Area=40.000 ac 0.00% Impervious Runoff Depth=5.51"
Flow Length=2,800' Tc=26.7 min CN=78 Runoff=204.64 cfs 18.371 af

Subcatchment 6S: Drainage Area A3 Runoff Area=336.000 ac 75.00% Impervious Runoff Depth=6.93"
Flow Length=3,700' Slope=0.0100 '/' Tc=29.7 min CN=90 Runoff=1,928.28 cfs 194.140 af

Subcatchment 7S: Drainage Area A2 Runoff Area=376.000 ac 0.00% Impervious Runoff Depth=4.46"
Flow Length=8,800' Tc=38.0 min CN=69 Runoff=1,237.95 cfs 139.757 af

Subcatchment 14S: Drainage Area A4 Runoff Area=1,926.000 ac 0.00% Impervious Runoff Depth=4.58"
Flow Length=1,660' Tc=47.5 min CN=70 Runoff=5,555.70 cfs 734.482 af

Subcatchment 17S: Drainage Area A5 Runoff Area=183.000 ac 0.00% Impervious Runoff Depth=3.89"
Flow Length=2,700' Slope=0.0300 '/' Tc=30.3 min CN=64 Runoff=605.52 cfs 59.249 af

Subcatchment 64S: Drainage Area A1u Runoff Area=226.000 ac 0.00% Impervious Runoff Depth=4.11"
Flow Length=5,400' Tc=46.0 min CN=66 Runoff=596.22 cfs 77.487 af

Reach 45R: Berry Creek Tributary Avg. Flow Depth=4.84' Max Vel=5.61 fps Inflow=5,555.70 cfs 734.482 af
n=0.035 L=19,200.0' S=0.0070 '/' Capacity=24,725.55 cfs Outflow=2,891.67 cfs 734.359 af

Link 3L: Berry Creek (Section 16826) Inflow=596.22 cfs 77.487 af
Primary=596.22 cfs 77.487 af

Link 4L: Berry Creek (Section 13901.95) Inflow=723.85 cfs 95.858 af
Primary=723.85 cfs 95.858 af

Link 5L: Berry Creek (Section 11575.16) Inflow=2,577.12 cfs 289.997 af
Primary=2,577.12 cfs 289.997 af

Link 6L: Berry Creek (Section 11268.37) Inflow=3,754.59 cfs 429.754 af
Primary=3,754.59 cfs 429.754 af

Link 7L: Berry Creek (Section 3920) Inflow=5,224.74 cfs 1,223.362 af
Primary=5,224.74 cfs 1,223.362 af

Link 47L: Ocmulgee River Inflow=5,224.74 cfs 1,223.362 af
Primary=5,224.74 cfs 1,223.362 af

Total Runoff Area = 3,087.000 ac Runoff Volume = 1,223.485 af Average Runoff Depth = 4.76"
91.84% Pervious = 2,835.000 ac 8.16% Impervious = 252.000 ac

Summary for Subcatchment 5S: Drainage Area A1d

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

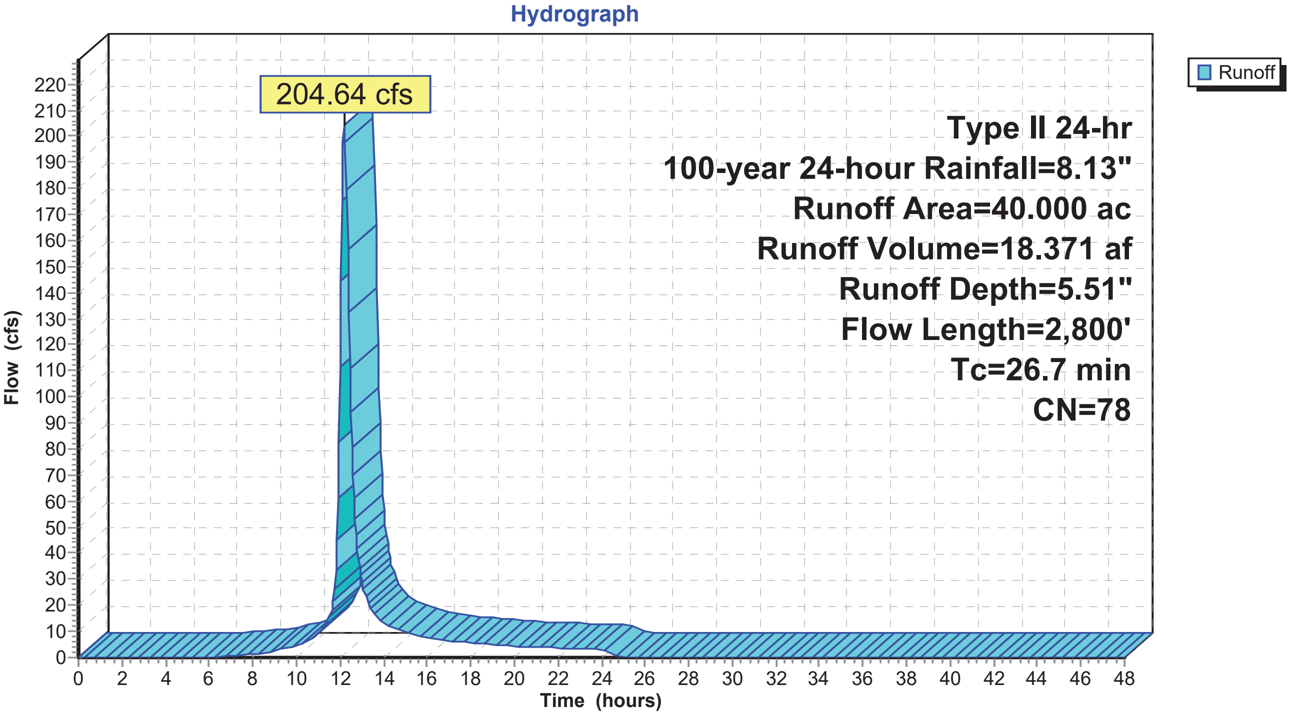
Runoff = 204.64 cfs @ 12.20 hrs, Volume= 18.371 af, Depth= 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
26.000	73	Woods/grass comb., Poor, HSG B
14.000	86	Woods/grass comb., Poor, HSG D
40.000	78	Weighted Average
40.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0600	0.13		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
6.8	500	0.0600	1.22		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
7.2	2,200	0.0050	5.07	760.07	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=5.00' D=5.00' Z= 5.0 '/' Top.W=55.00' n= 0.040 Winding stream, pools & shoals
26.7	2,800	Total			

Subcatchment 5S: Drainage Area A1d



Summary for Subcatchment 6S: Drainage Area A3

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

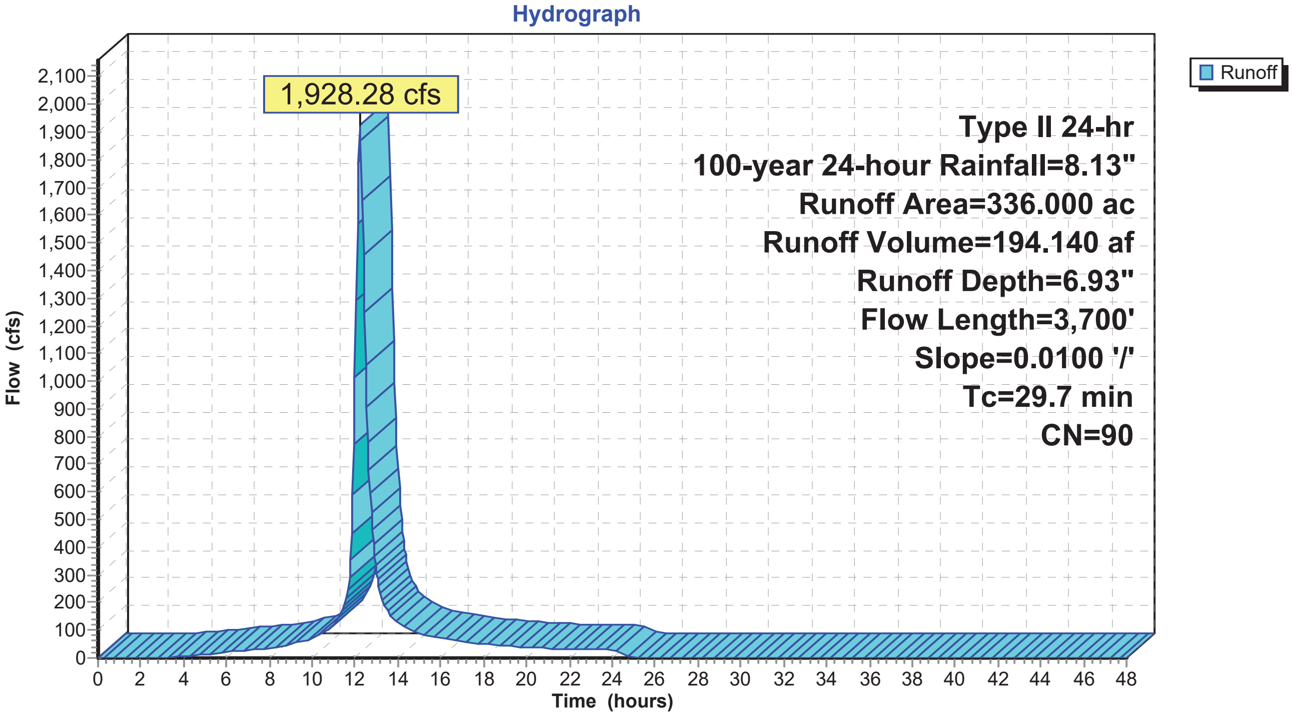
```
Runoff      =    1,928.28 cfs @   12.23 hrs,  Volume=         194.140 af,  Depth=  6.93"
```

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
84.000	65	Woods/grass comb., Fair, HSG B
252.000	98	Paved parking, HSG D
336.000	90	Weighted Average
84.000		25.00% Pervious Area
252.000		75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
26.9	2,600	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
1.3	1,000		12.69		**Lake or Reservoir, l pond** Mean Depth= 5.00'
29.7	3,700	Total			

Subcatchment 6S: Drainage Area A3



Summary for Subcatchment 7S: Drainage Area A2

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

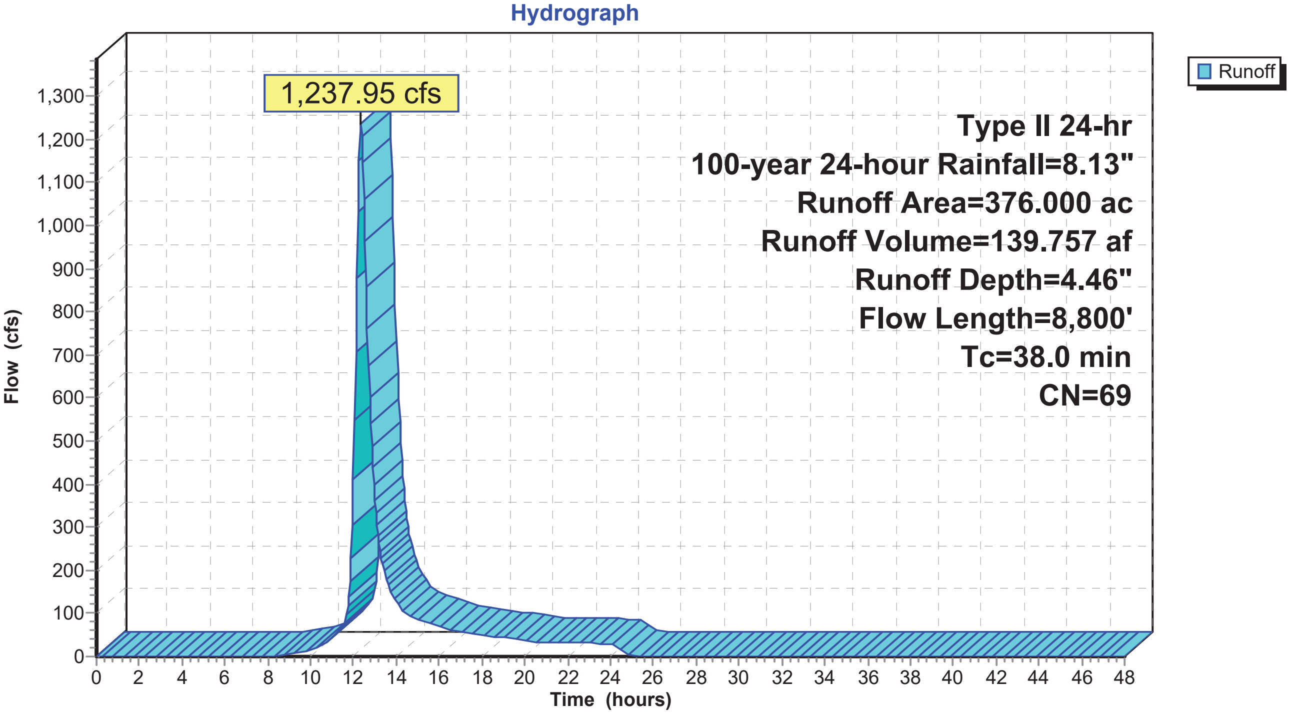
Runoff = 1,237.95 cfs @ 12.34 hrs, Volume= 139.757 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
280.000	65	Woods/grass comb., Fair, HSG B
96.000	82	Woods/grass comb., Fair, HSG D
376.000	69	Weighted Average
376.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
4.1	400	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
11.0	1,500	0.0300	2.27	56.73	**Trap/Vee/Rect Channel Flow, channel to berry creek** Bot.W=20.00' D=1.00' Z= 5.0 '/' Top.W=30.00' n= 0.100 Earth, dense brush, high stage
21.4	6,800	0.0050	5.30	928.25	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=10.00' D=5.00' Z= 5.0 '/' Top.W=60.00' n= 0.040 Winding stream, pools & shoals
38.0	8,800	Total			

Subcatchment 7S: Drainage Area A2



Summary for Subcatchment 14S: Drainage Area A4

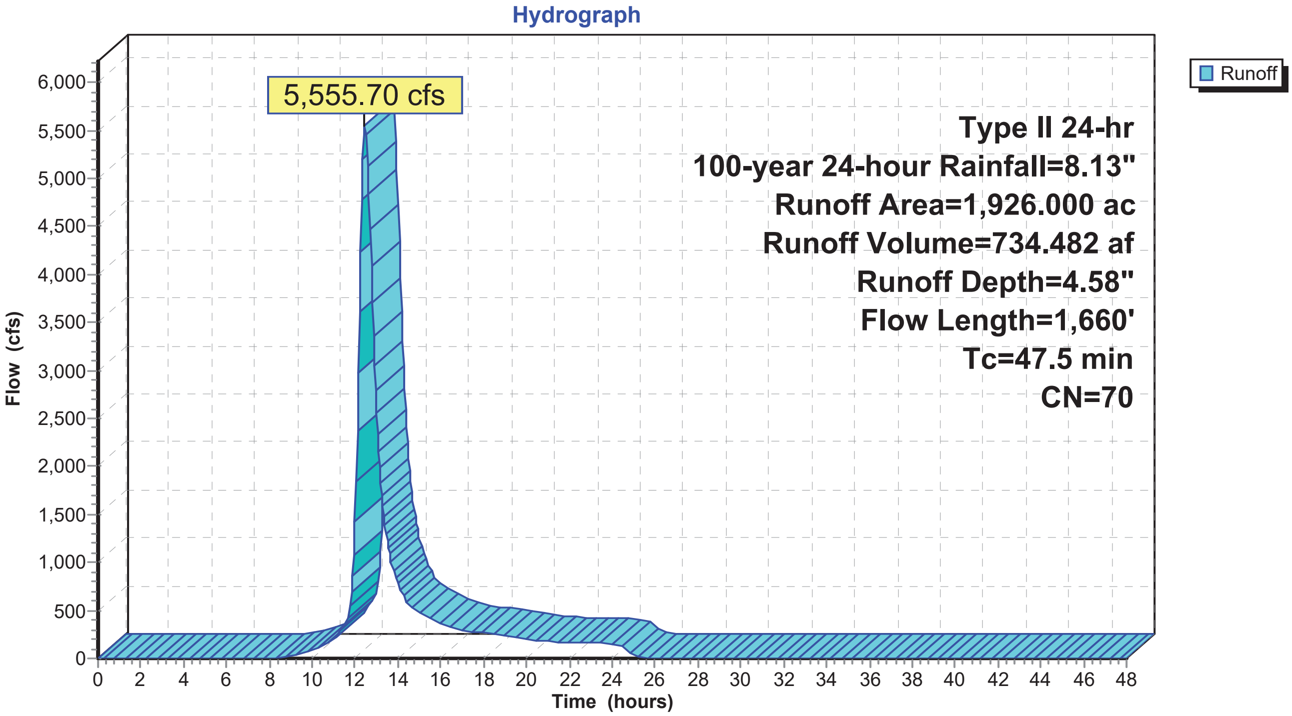
Runoff = 5,555.70 cfs @ 12.47 hrs, Volume= 734.482 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
1,321.000	65	Woods/grass comb., Fair, HSG B
605.000	82	Woods/grass comb., Fair, HSG D
1,926.000	70	Weighted Average
1,926.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	100	0.0100	0.06		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
21.4	1,560	0.0590	1.21		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
47.5	1,660	Total			

Subcatchment 14S: Drainage Area A4



Summary for Subcatchment 17S: Drainage Area A5

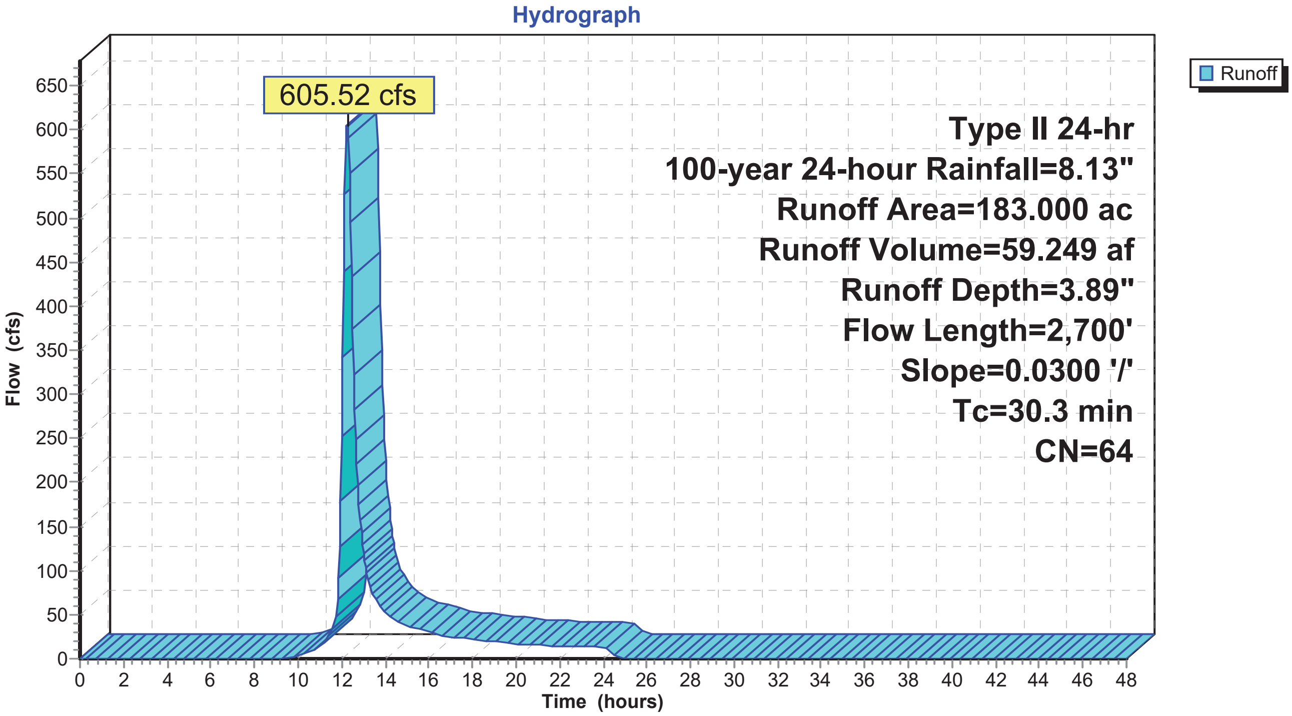
Runoff = 605.52 cfs @ 12.25 hrs, Volume= 59.249 af, Depth= 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
7.000	32	Woods/grass comb., Good, HSG A
115.000	58	Woods/grass comb., Good, HSG B
61.000	79	Woods/grass comb., Good, HSG D
183.000	64	Weighted Average
183.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	100	0.0300	0.10		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
7.7	400	0.0300	0.87		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
5.8	2,200	0.0300	6.28	3,765.28	**Trap/Vee/Rect Channel Flow, channel** Bot.W=20.00' D=5.00' Z= 20.0 '/' Top.W=220.00' n= 0.080 Earth, long dense weeds
30.3	2,700	Total			

Subcatchment 17S: Drainage Area A5



Summary for Subcatchment 64S: Drainage Area A1u

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

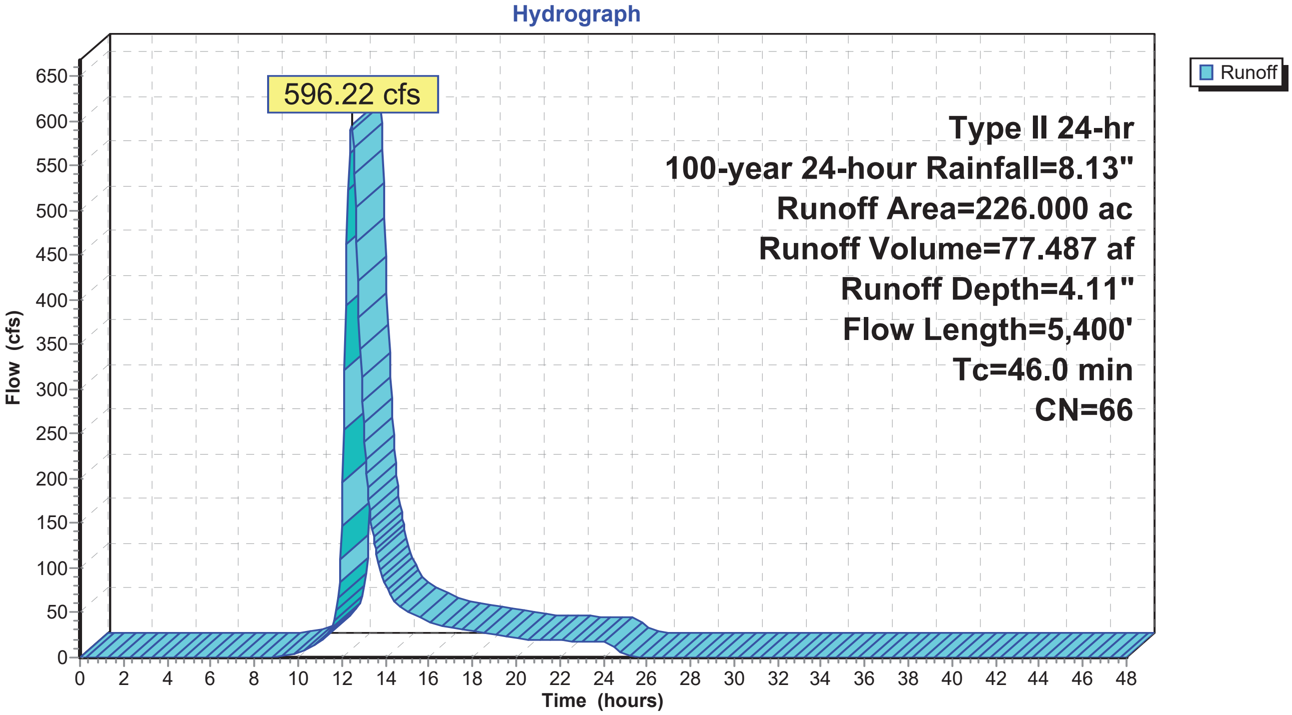
```
Runoff      =     596.22 cfs @   12.45 hrs,  Volume=          77.487 af,  Depth=  4.11"
```

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year 24-hour Rainfall=8.13"

Area (ac)	CN	Description
209.000	65	Woods/grass comb., Fair, HSG B
17.000	82	Woods/grass comb., Fair, HSG D
226.000	66	Weighted Average
226.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
26.4	2,500	0.1000	1.58		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
9.2	2,800	0.0050	5.10	637.29	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=5.00' D=5.00' Z= 4.0 '/' Top.W=45.00' n= 0.040 Winding stream, pools & shoals
46.0	5,400	Total			

Subcatchment 64S: Drainage Area A1u



Summary for Reach 45R: Berry Creek Tributary

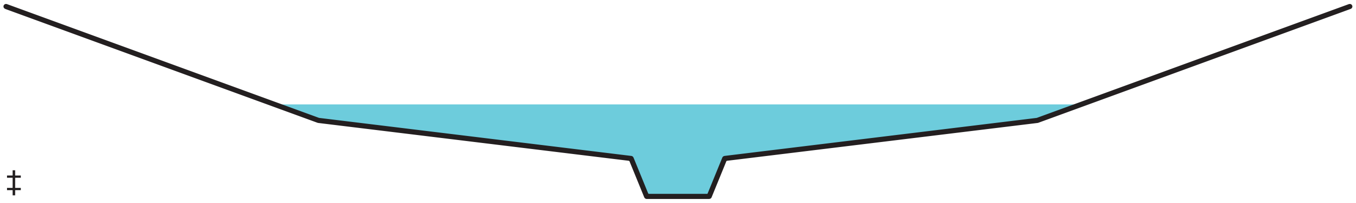
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 1,926.000 ac, 0.00% Impervious, Inflow Depth = 4.58" for 100-year 24-hour event
Inflow = 5,555.70 cfs @ 12.47 hrs, Volume= 734.482 af
Outflow = 2,891.67 cfs @ 12.93 hrs, Volume= 734.359 af, Atten= 48%, Lag= 27.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.61 fps, Min. Travel Time= 57.0 min
Avg. Velocity = 2.16 fps, Avg. Travel Time= 148.4 min

Peak Storage= 9,891,769 cf @ 12.93 hrs
Average Depth at Peak Storage= 4.84'
Bank-Full Depth= 10.00' Flow Area= 2,290.0 sf, Capacity= 24,725.55 cfs

Custom cross-section, Length= 19,200.0' Slope= 0.0070 '/'
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 484.00', Outlet Invert= 350.00'

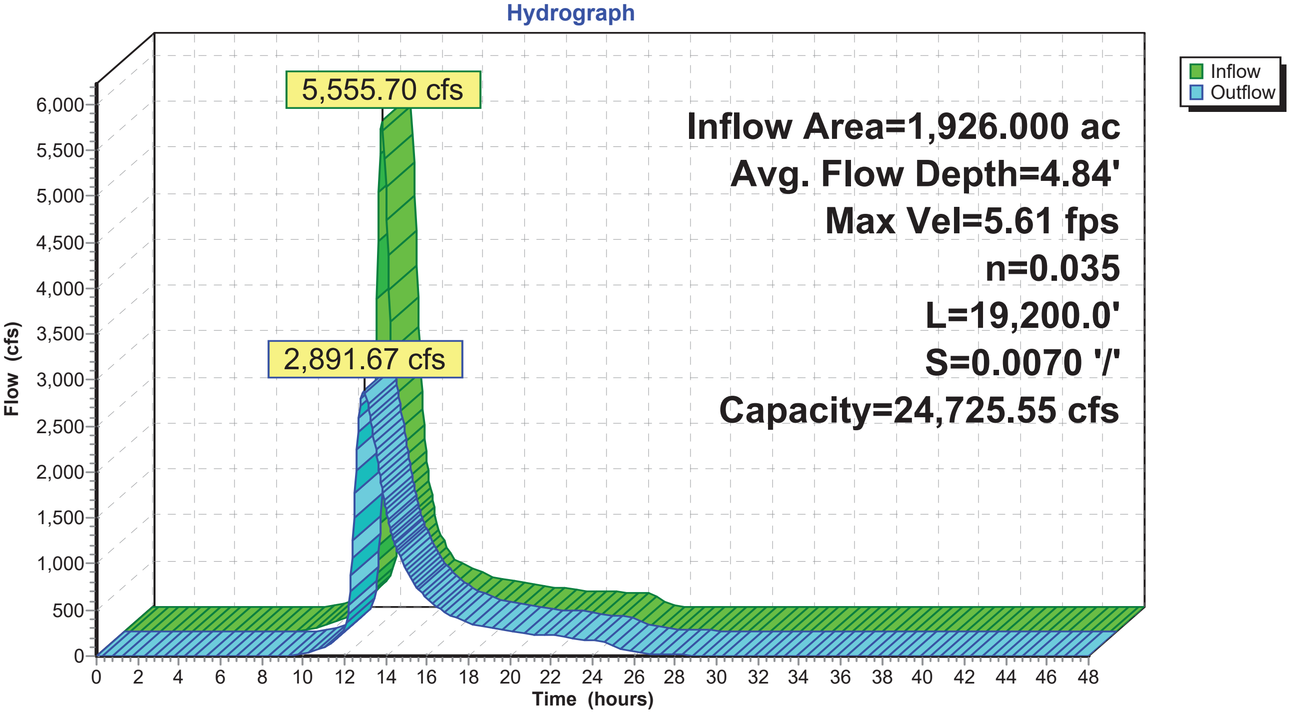


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	434.00	0.00
100.00	428.00	6.00
200.00	426.00	8.00
205.00	424.00	10.00
225.00	424.00	10.00
230.00	426.00	8.00
330.00	428.00	6.00
430.00	434.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	20.0	0	0.00
2.00	50.0	30.8	960,000	245.12
4.00	310.0	230.8	5,952,000	1,338.50
10.00	2,290.0	431.2	43,968,000	24,725.55

Reach 45R: Berry Creek Tributary



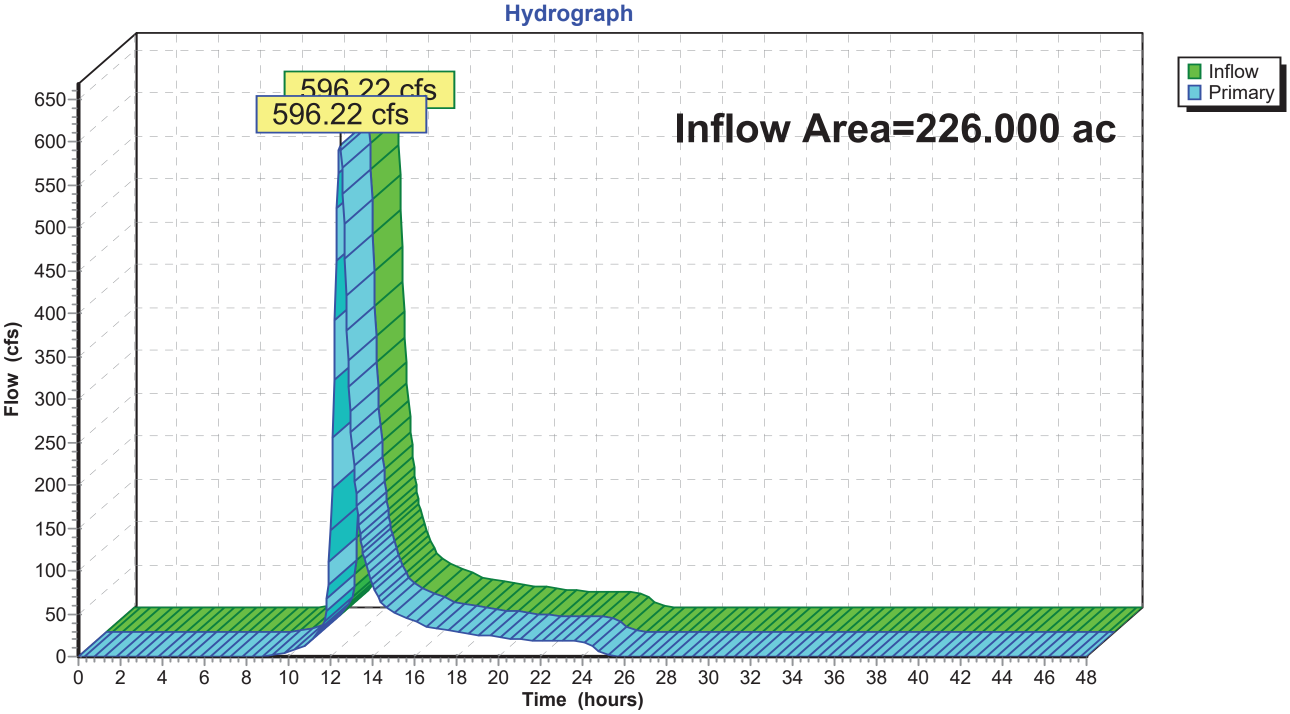
Summary for Link 3L: Berry Creek (Section 16826)

Additional details on Berry Creek can be found in the HEC-RAS model.

Inflow Area = 226.000 ac, 0.00% Impervious, Inflow Depth = 4.11" for 100-year 24-hour event
Inflow = 596.22 cfs @ 12.45 hrs, Volume= 77.487 af
Primary = 596.22 cfs @ 12.45 hrs, Volume= 77.487 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 3L: Berry Creek (Section 16826)

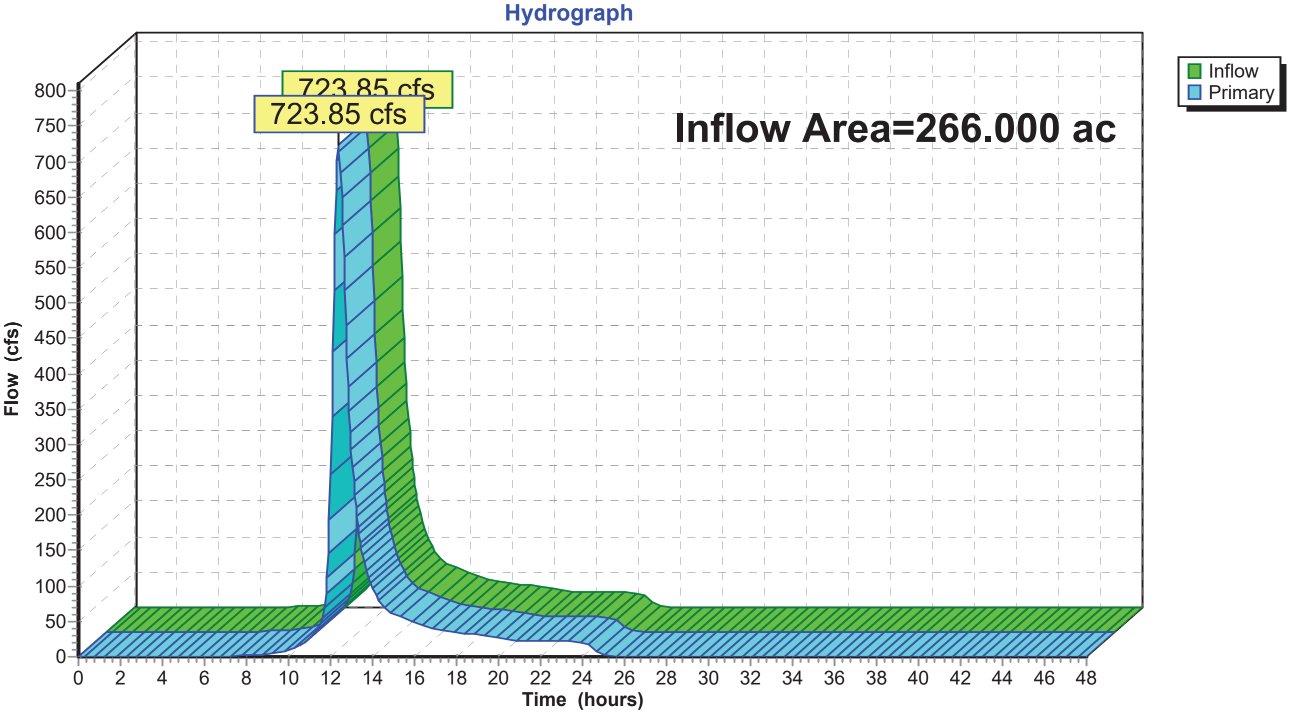


Summary for Link 4L: Berry Creek (Section 13901.95)

```
Inflow Area =      266.000 ac,   0.00% Impervious,  Inflow Depth =   4.32"    for  100-year 24-hour event
Inflow      =      723.85 cfs @   12.38 hrs,  Volume=          95.858 af
Primary     =      723.85 cfs @   12.38 hrs,  Volume=          95.858 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

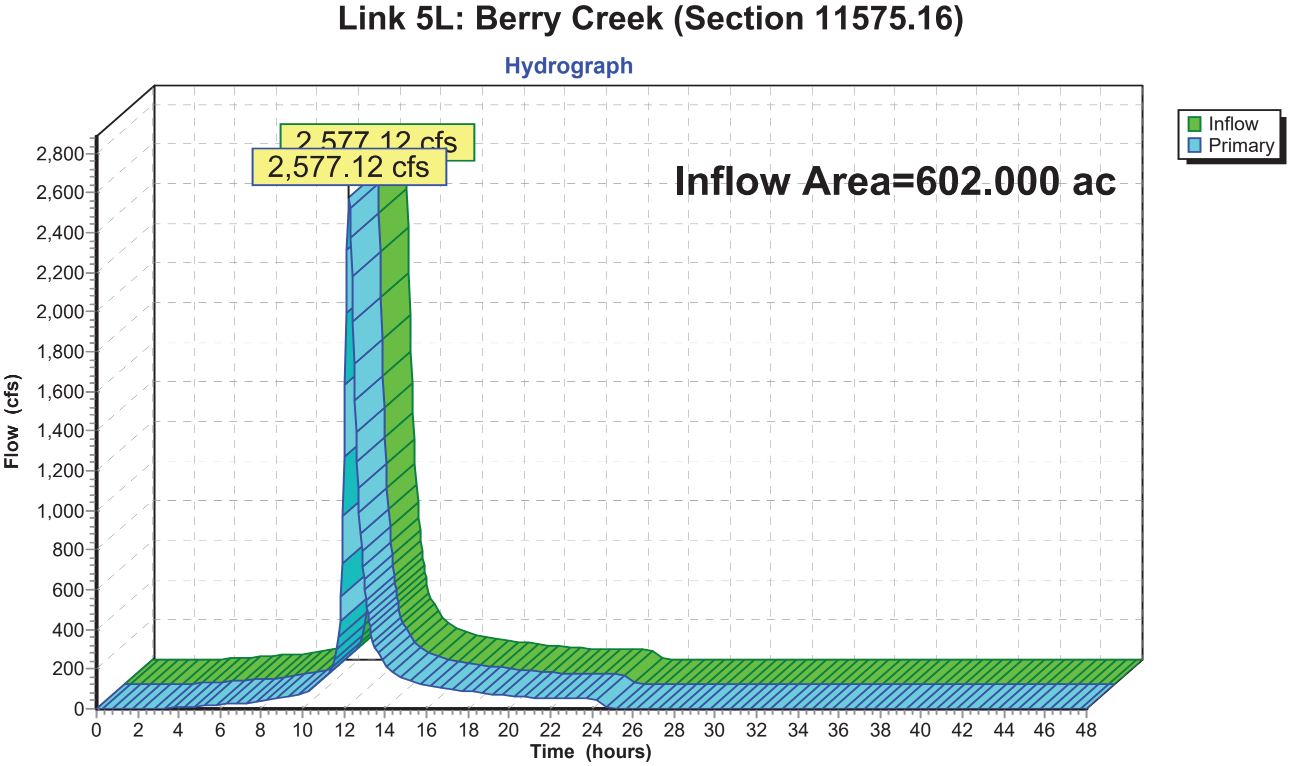
Link 4L: Berry Creek (Section 13901.95)



Summary for Link 5L: Berry Creek (Section 11575.16)

```
Inflow Area =      602.000 ac,  41.86% Impervious,  Inflow Depth =   5.78"    for  100-year 24-hour event
Inflow       =   2,577.12 cfs @   12.25 hrs,  Volume=         289.997 af
Primary      =   2,577.12 cfs @   12.25 hrs,  Volume=         289.997 af,  Atten= 0%,  Lag= 0.0 min
```

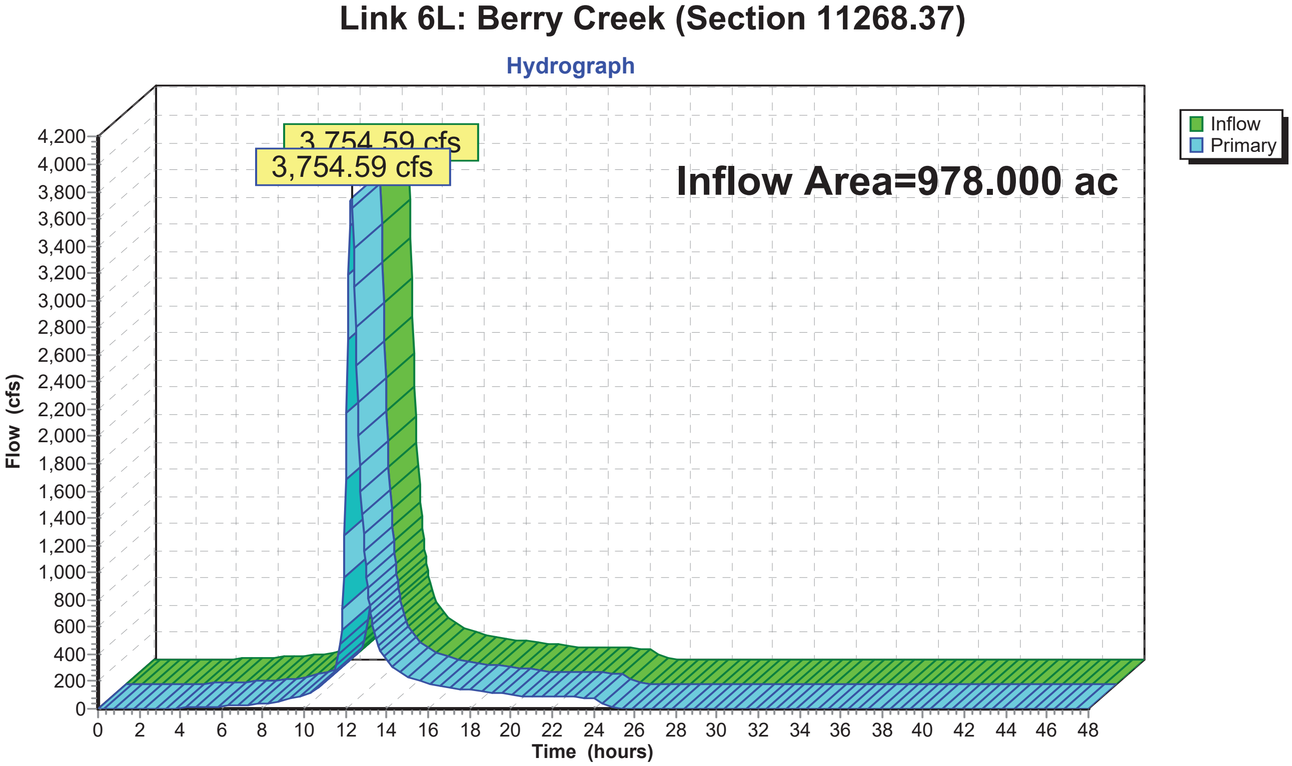
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs



Summary for Link 6L: Berry Creek (Section 11268.37)

```
Inflow Area =      978.000 ac,  25.77% Impervious,  Inflow Depth =   5.27"    for  100-year 24-hour event
Inflow       =   3,754.59 cfs @   12.28 hrs,  Volume=         429.754 af
Primary      =   3,754.59 cfs @   12.28 hrs,  Volume=         429.754 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

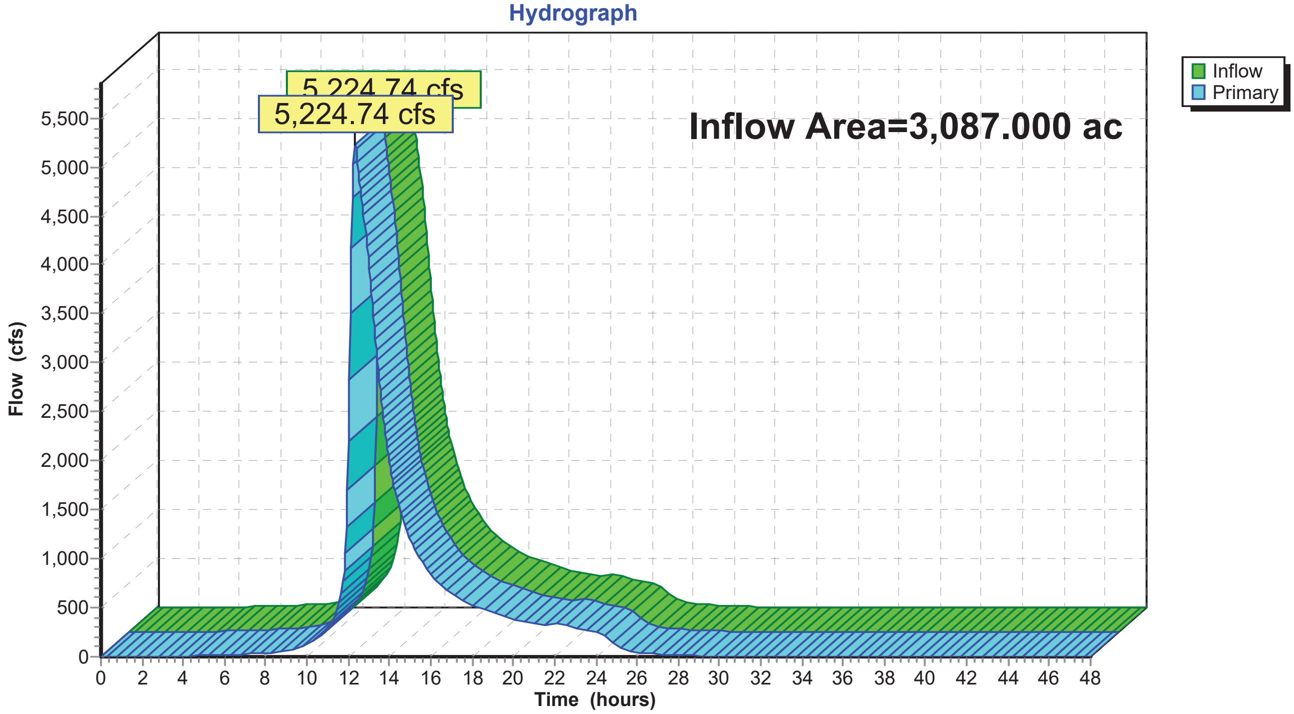


Summary for Link 7L: Berry Creek (Section 3920)

Inflow Area = 3,087.000 ac, 8.16% Impervious, Inflow Depth = 4.76" for 100-year 24-hour event
Inflow = 5,224.74 cfs @ 12.34 hrs, Volume= 1,223.362 af
Primary = 5,224.74 cfs @ 12.34 hrs, Volume= 1,223.362 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 7L: Berry Creek (Section 3920)

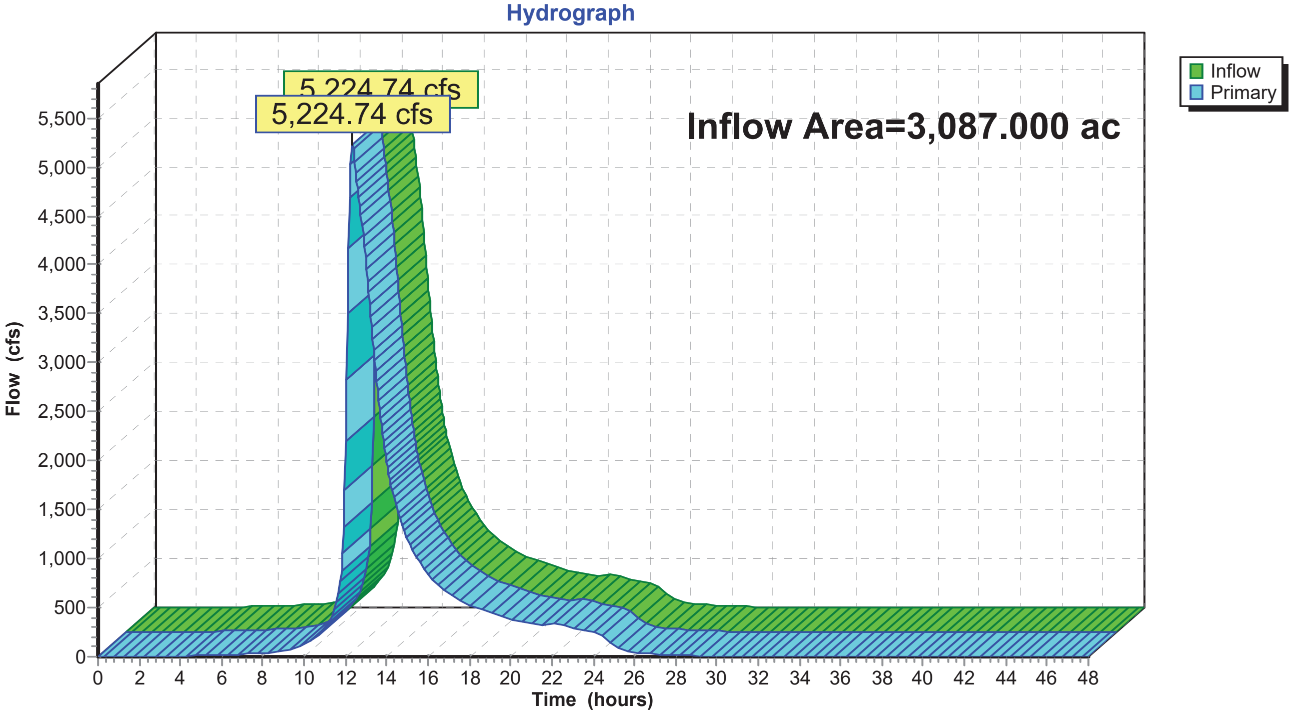


Summary for Link 47L: Ocmulgee River

```
Inflow Area =    3,087.000 ac,    8.16% Impervious,  Inflow Depth =   4.76"    for  100-year 24-hour event
Inflow       =   5,224.74 cfs @   12.34 hrs,  Volume=       1,223.362 af
Primary      =   5,224.74 cfs @   12.34 hrs,  Volume=       1,223.362 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 47L: Ocmulgee River



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: Drainage Area A1d Runoff Area=40.000 ac 0.00% Impervious Runoff Depth=6.42"
Flow Length=2,800' Tc=26.7 min CN=78 Runoff=237.27 cfs 21.386 af

Subcatchment 6S: Drainage Area A3 Runoff Area=336.000 ac 75.00% Impervious Runoff Depth=7.89"
Flow Length=3,700' Slope=0.0100 '/' Tc=29.7 min CN=90 Runoff=2,180.16 cfs 220.927 af

Subcatchment 7S: Drainage Area A2 Runoff Area=376.000 ac 0.00% Impervious Runoff Depth=5.30"
Flow Length=8,800' Tc=38.0 min CN=69 Runoff=1,473.86 cfs 166.028 af

Subcatchment 14S: Drainage Area A4 Runoff Area=1,926.000 ac 0.00% Impervious Runoff Depth=5.42"
Flow Length=1,660' Tc=47.5 min CN=70 Runoff=6,596.66 cfs 870.420 af

Subcatchment 17S: Drainage Area A5 Runoff Area=183.000 ac 0.00% Impervious Runoff Depth=4.68"
Flow Length=2,700' Slope=0.0300 '/' Tc=30.3 min CN=64 Runoff=732.86 cfs 71.317 af

Subcatchment 64S: Drainage Area A1u Runoff Area=226.000 ac 0.00% Impervious Runoff Depth=4.93"
Flow Length=5,400' Tc=46.0 min CN=66 Runoff=717.41 cfs 92.762 af

Reach 45R: Berry Creek Tributary Avg. Flow Depth=5.15' Max Vel=6.03 fps Inflow=6,596.66 cfs 870.420 af
n=0.035 L=19,200.0' S=0.0070 '/' Capacity=24,725.55 cfs Outflow=3,595.50 cfs 870.294 af

Link 3L: Berry Creek (Section 16826) Inflow=717.41 cfs 92.762 af
Primary=717.41 cfs 92.762 af

Link 4L: Berry Creek (Section 13901.95) Inflow=865.95 cfs 114.148 af
Primary=865.95 cfs 114.148 af

Link 5L: Berry Creek (Section 11575.16) Inflow=2,957.97 cfs 335.076 af
Primary=2,957.97 cfs 335.076 af

Link 6L: Berry Creek (Section 11268.37) Inflow=4,365.82 cfs 501.104 af
Primary=4,365.82 cfs 501.104 af

Link 7L: Berry Creek (Section 3920) Inflow=6,230.16 cfs 1,442.715 af
Primary=6,230.16 cfs 1,442.715 af

Link 47L: Ocmulgee River Inflow=6,230.16 cfs 1,442.715 af
Primary=6,230.16 cfs 1,442.715 af

Total Runoff Area = 3,087.000 ac Runoff Volume = 1,442.841 af Average Runoff Depth = 5.61"
91.84% Pervious = 2,835.000 ac 8.16% Impervious = 252.000 ac

Summary for Subcatchment 5S: Drainage Area A1d

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

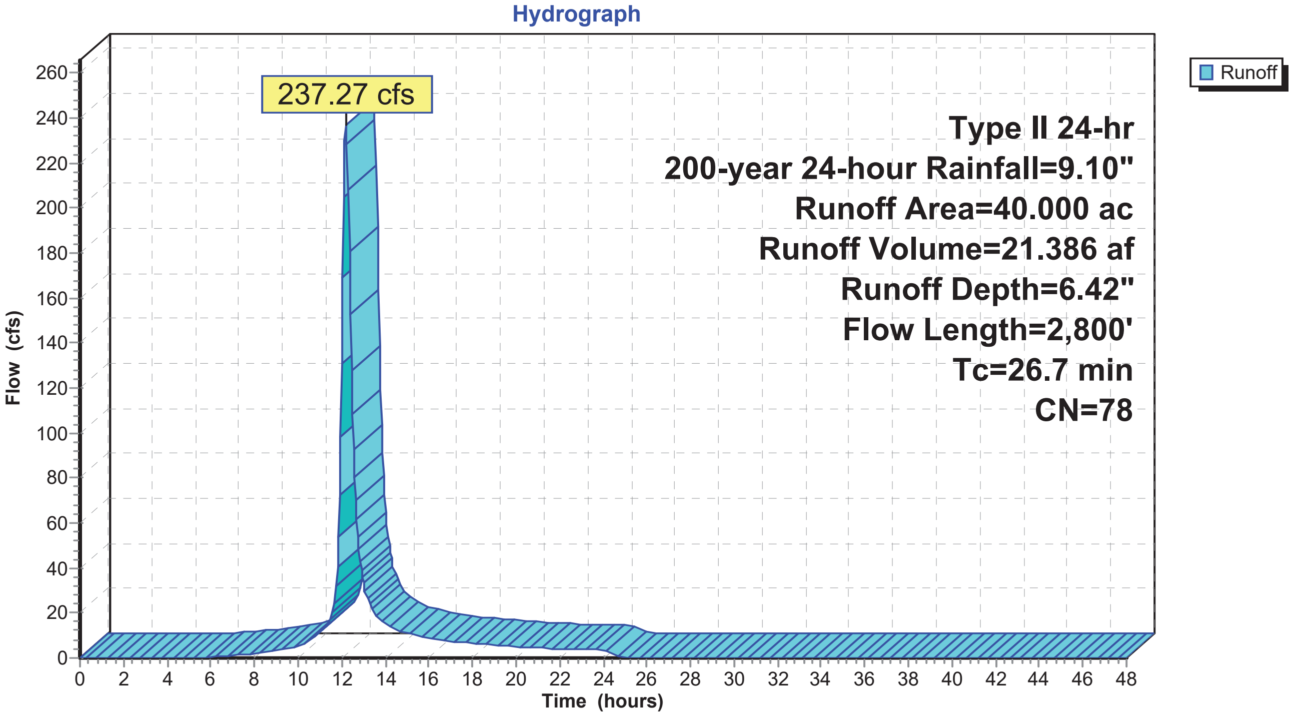
```
Runoff      =     237.27 cfs @   12.20 hrs,  Volume=         21.386 af,  Depth=  6.42"
```

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-year 24-hour Rainfall=9.10"

```
  Area (ac)   CN   Description
     26.000   73   Woods/grass comb., Poor, HSG B
     14.000   86   Woods/grass comb., Poor, HSG D
     40.000   78   Weighted Average
     40.000        100.00% Pervious Area

    Tc  Length    Slope  Velocity  Capacity  Description
 (min)  (feet)  (ft/ft)  (ft/sec)     (cfs)
  12.7     100   0.0600      0.13            Sheet Flow, sheet
                                             Woods: Light underbrush   n= 0.400   P2= 3.77"
   6.8     500   0.0600      1.22            Shallow Concentrated Flow, shallow conc
                                             Woodland   Kv= 5.0 fps
   7.2   2,200   0.0050      5.07    760.07  Trap/Vee/Rect Channel Flow, Berry Creek
                                             Bot.W=5.00'  D=5.00'  Z= 5.0 '/'  Top.W=55.00'
                                             n= 0.040  Winding stream, pools & shoals
  26.7   2,800   Total
```

Subcatchment 5S: Drainage Area A1d



Summary for Subcatchment 6S: Drainage Area A3

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

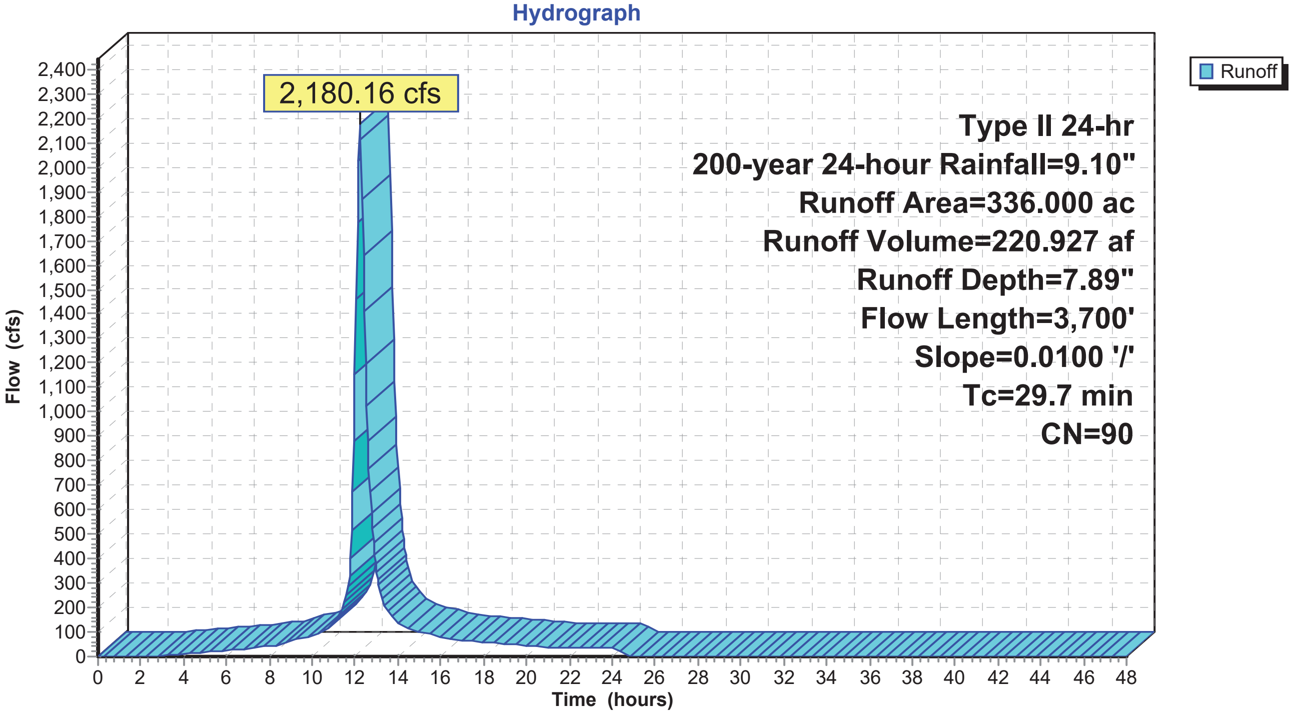
Runoff = 2,180.16 cfs @ 12.23 hrs, Volume= 220.927 af, Depth= 7.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-year 24-hour Rainfall=9.10"

Area (ac)	CN	Description
84.000	65	Woods/grass comb., Fair, HSG B
252.000	98	Paved parking, HSG D
336.000	90	Weighted Average
84.000		25.00% Pervious Area
252.000		75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
26.9	2,600	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
1.3	1,000		12.69		**Lake or Reservoir, l pond** Mean Depth= 5.00'
29.7	3,700	Total			

Subcatchment 6S: Drainage Area A3



Summary for Subcatchment 7S: Drainage Area A2

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

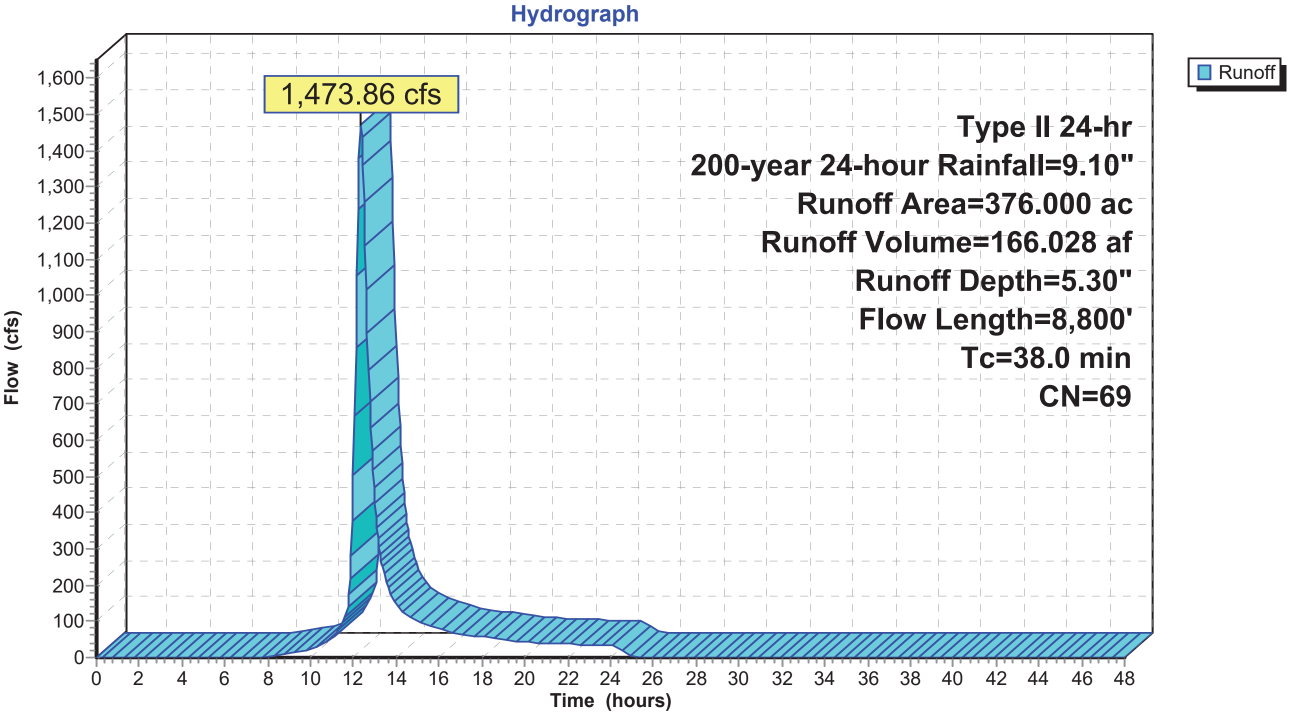
```
Runoff    =   1,473.86 cfs @   12.34 hrs,  Volume=        166.028 af,  Depth=  5.30"
```

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-year 24-hour Rainfall=9.10"

Area (ac)	CN	Description
280.000	65	Woods/grass comb., Fair, HSG B
96.000	82	Woods/grass comb., Fair, HSG D
376.000	69	Weighted Average
376.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
4.1	400	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
11.0	1,500	0.0300	2.27	56.73	**Trap/Vee/Rect Channel Flow, channel to berry creek** Bot.W=20.00' D=1.00' Z= 5.0 '/' Top.W=30.00' n= 0.100 Earth, dense brush, high stage
21.4	6,800	0.0050	5.30	928.25	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=10.00' D=5.00' Z= 5.0 '/' Top.W=60.00' n= 0.040 Winding stream, pools & shoals
38.0	8,800	Total			

Subcatchment 7S: Drainage Area A2



Summary for Subcatchment 14S: Drainage Area A4

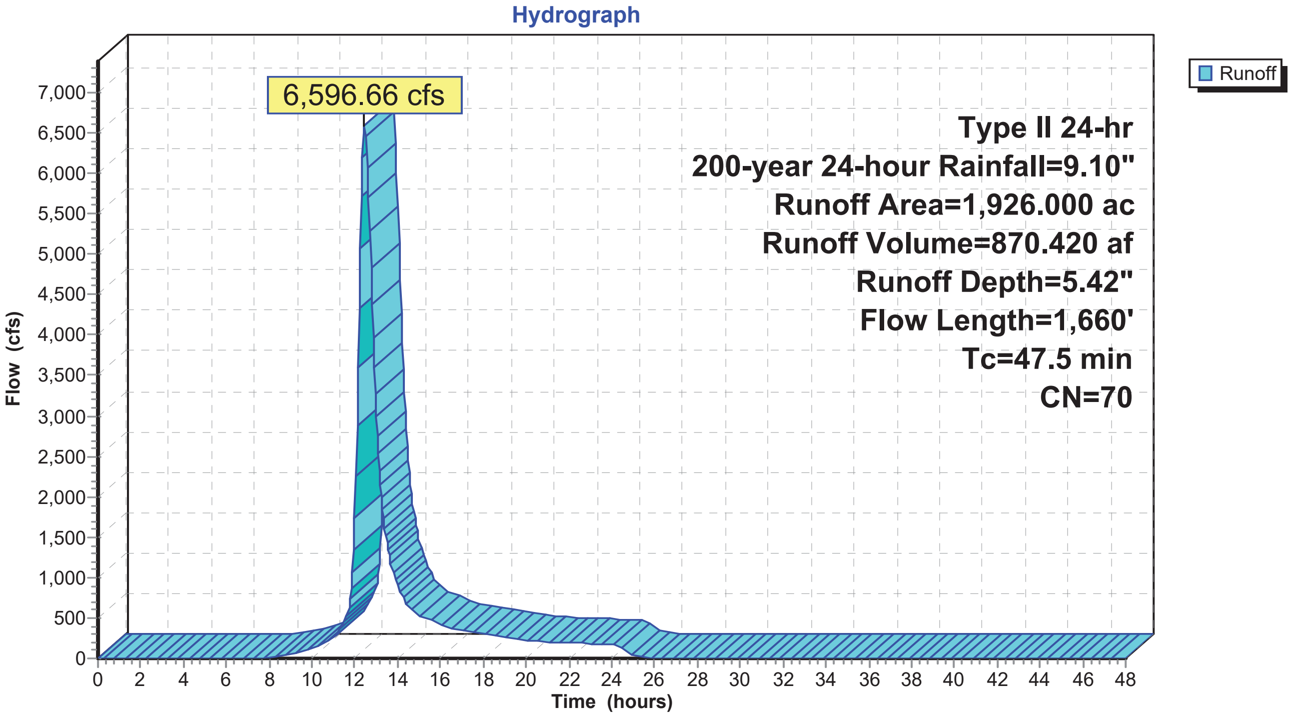
Runoff = 6,596.66 cfs @ 12.46 hrs, Volume= 870.420 af, Depth= 5.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-year 24-hour Rainfall=9.10"

Area (ac)	CN	Description
1,321.000	65	Woods/grass comb., Fair, HSG B
605.000	82	Woods/grass comb., Fair, HSG D
1,926.000	70	Weighted Average
1,926.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	100	0.0100	0.06		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
21.4	1,560	0.0590	1.21		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
47.5	1,660	Total			

Subcatchment 14S: Drainage Area A4



Summary for Subcatchment 17S: Drainage Area A5

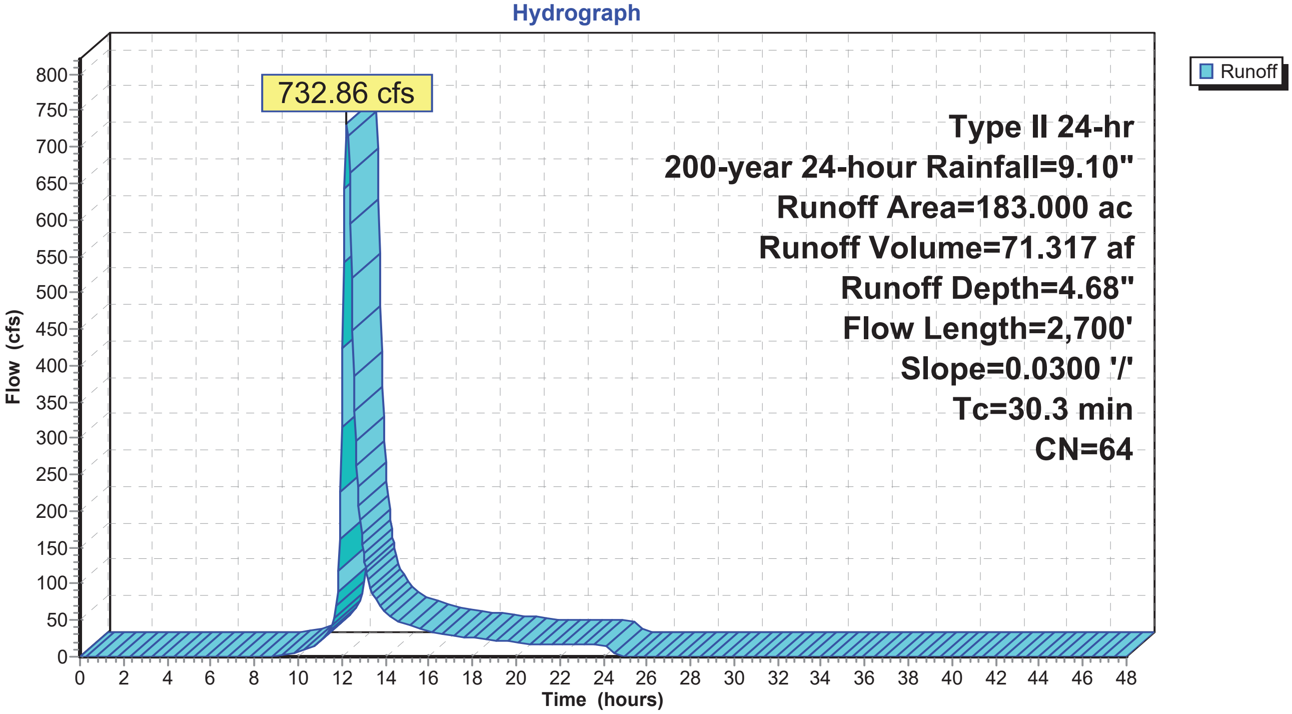
Runoff = 732.86 cfs @ 12.25 hrs, Volume= 71.317 af, Depth= 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-year 24-hour Rainfall=9.10"

Area (ac)	CN	Description
7.000	32	Woods/grass comb., Good, HSG A
115.000	58	Woods/grass comb., Good, HSG B
61.000	79	Woods/grass comb., Good, HSG D
183.000	64	Weighted Average
183.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	100	0.0300	0.10		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
7.7	400	0.0300	0.87		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
5.8	2,200	0.0300	6.28	3,765.28	**Trap/Vee/Rect Channel Flow, channel** Bot.W=20.00' D=5.00' Z= 20.0 '/' Top.W=220.00' n= 0.080 Earth, long dense weeds
30.3	2,700	Total			

Subcatchment 17S: Drainage Area A5



Summary for Subcatchment 64S: Drainage Area A1u

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

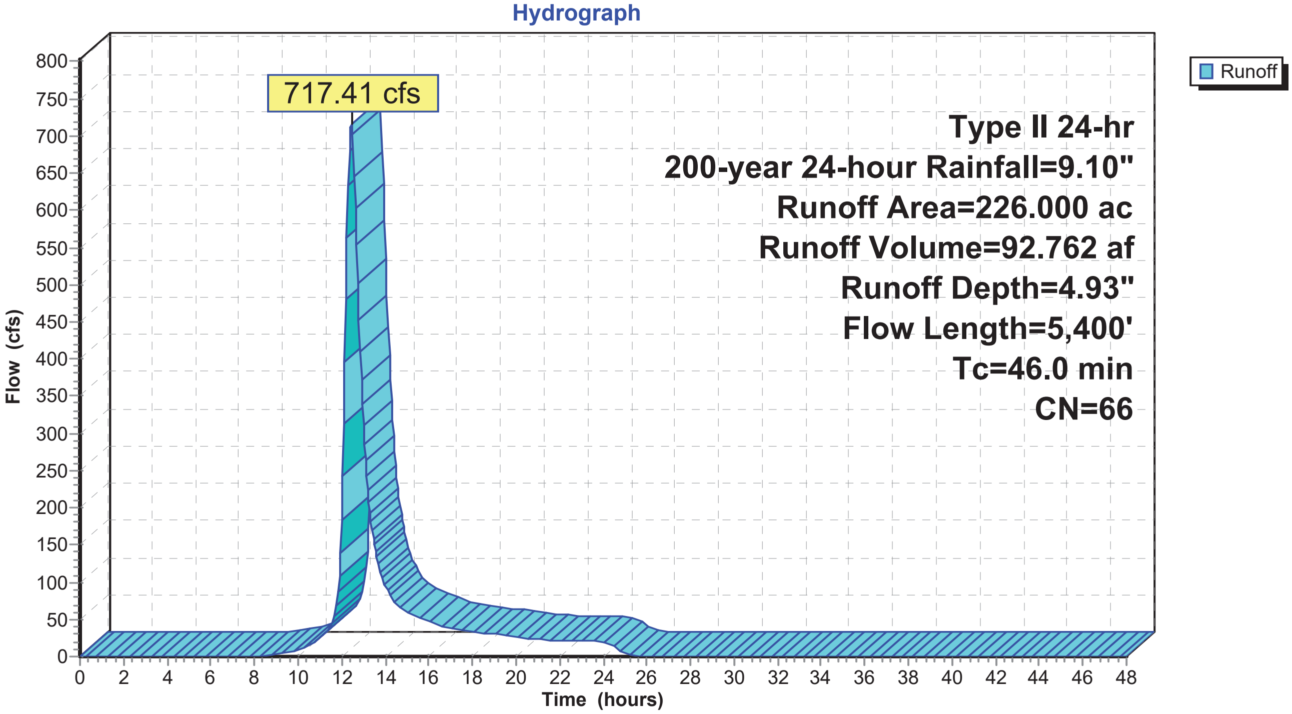
Runoff = 717.41 cfs @ 12.44 hrs, Volume= 92.762 af, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 200-year 24-hour Rainfall=9.10"

Area (ac)	CN	Description
209.000	65	Woods/grass comb., Fair, HSG B
17.000	82	Woods/grass comb., Fair, HSG D
226.000	66	Weighted Average
226.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
26.4	2,500	0.1000	1.58		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
9.2	2,800	0.0050	5.10	637.29	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=5.00' D=5.00' Z= 4.0 '/' Top.W=45.00' n= 0.040 Winding stream, pools & shoals
46.0	5,400	Total			

Subcatchment 64S: Drainage Area A1u



Summary for Reach 45R: Berry Creek Tributary

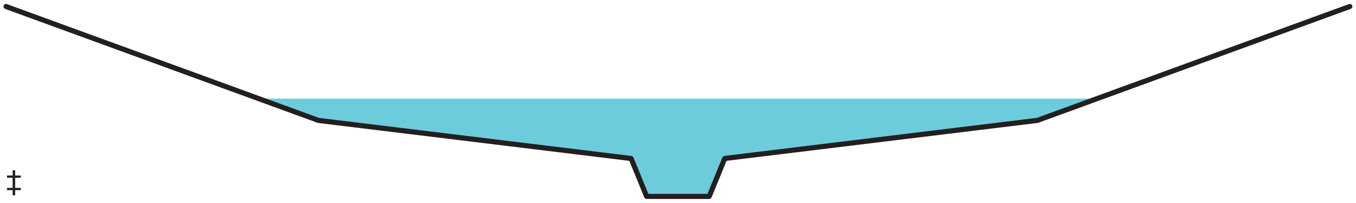
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)

Inflow Area = 1,926.000 ac, 0.00% Impervious, Inflow Depth = 5.42" for 200-year 24-hour event
Inflow = 6,596.66 cfs @ 12.46 hrs, Volume= 870.420 af
Outflow = 3,595.50 cfs @ 12.90 hrs, Volume= 870.294 af, Atten= 45%, Lag= 26.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.03 fps, Min. Travel Time= 53.1 min
Avg. Velocity = 2.19 fps, Avg. Travel Time= 146.0 min

Peak Storage= 11,450,626 cf @ 12.90 hrs
Average Depth at Peak Storage= 5.15'
Bank-Full Depth= 10.00' Flow Area= 2,290.0 sf, Capacity= 24,725.55 cfs

Custom cross-section, Length= 19,200.0' Slope= 0.0070 '/'
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 484.00', Outlet Invert= 350.00'

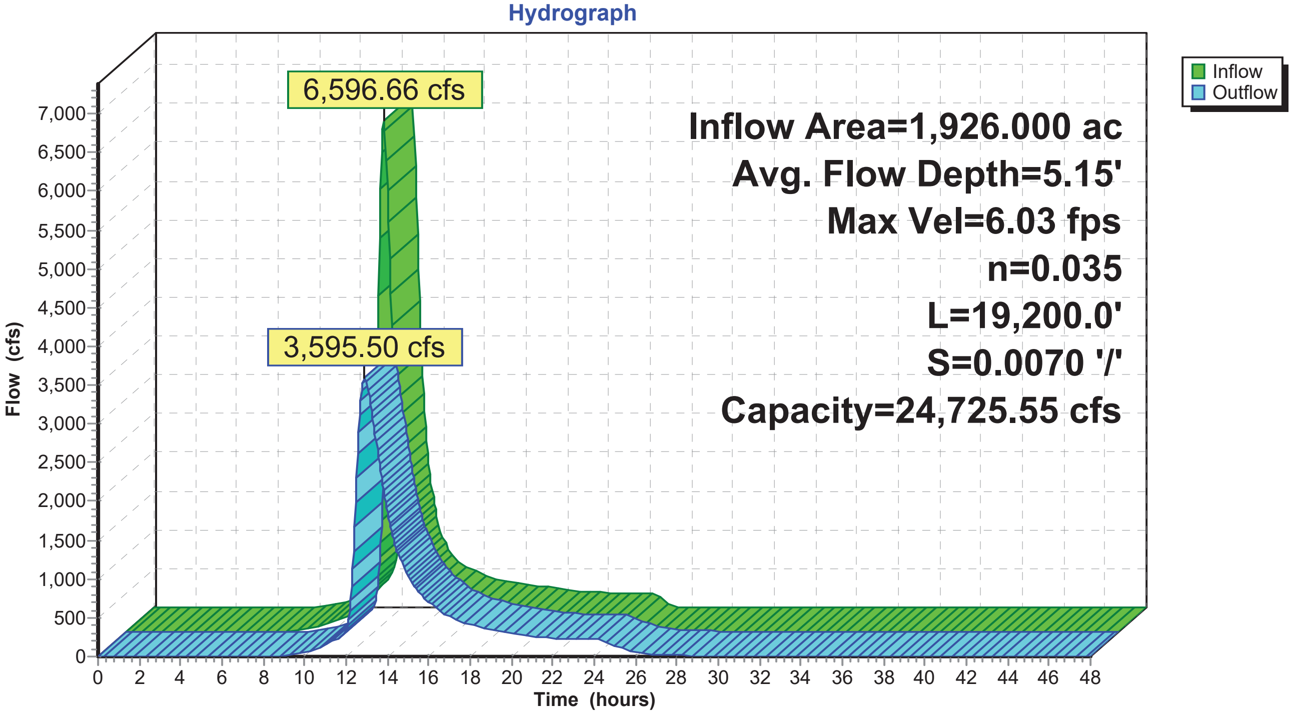


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	434.00	0.00
100.00	428.00	6.00
200.00	426.00	8.00
205.00	424.00	10.00
225.00	424.00	10.00
230.00	426.00	8.00
330.00	428.00	6.00
430.00	434.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	20.0	0	0.00
2.00	50.0	30.8	960,000	245.12
4.00	310.0	230.8	5,952,000	1,338.50
10.00	2,290.0	431.2	43,968,000	24,725.55

Reach 45R: Berry Creek Tributary



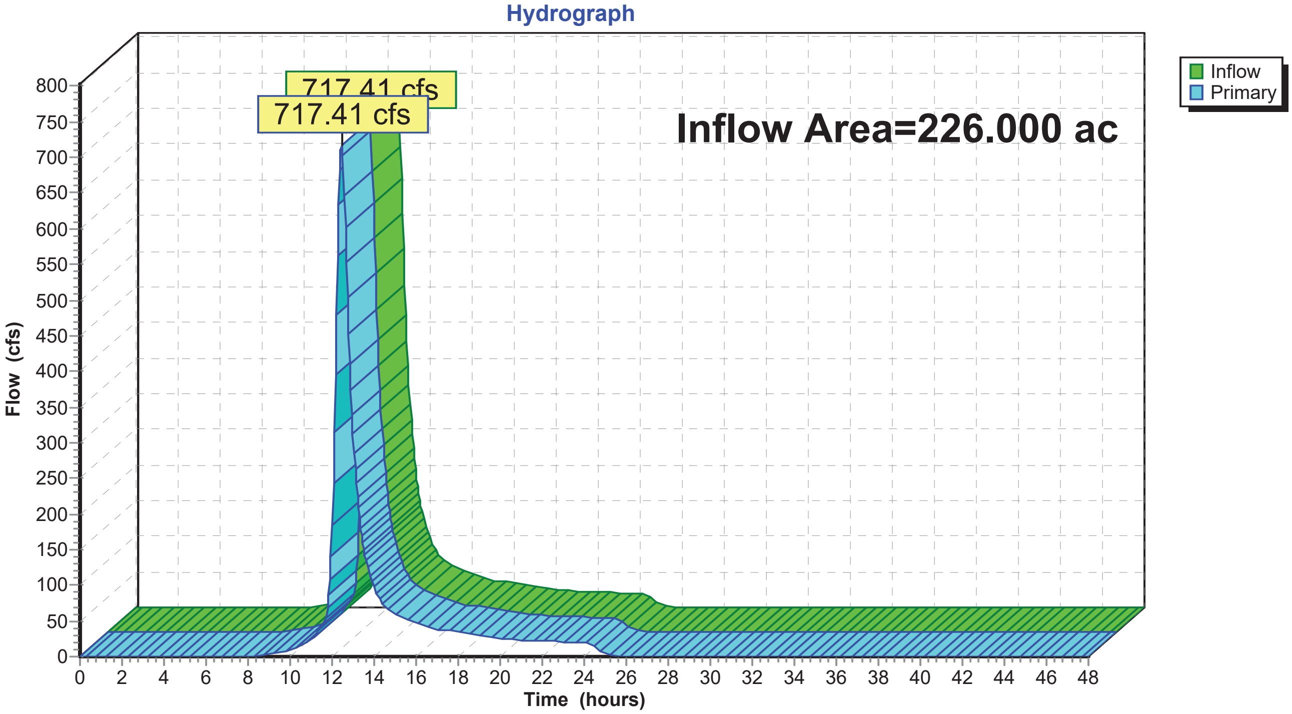
Summary for Link 3L: Berry Creek (Section 16826)

Additional details on Berry Creek can be found in the HEC-RAS model.

```
Inflow Area =      226.000 ac,    0.00% Impervious,  Inflow Depth =   4.93"    for  200-year 24-hour event
Inflow       =     717.41 cfs @   12.44 hrs,  Volume=           92.762 af
Primary      =     717.41 cfs @   12.44 hrs,  Volume=           92.762 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 3L: Berry Creek (Section 16826)

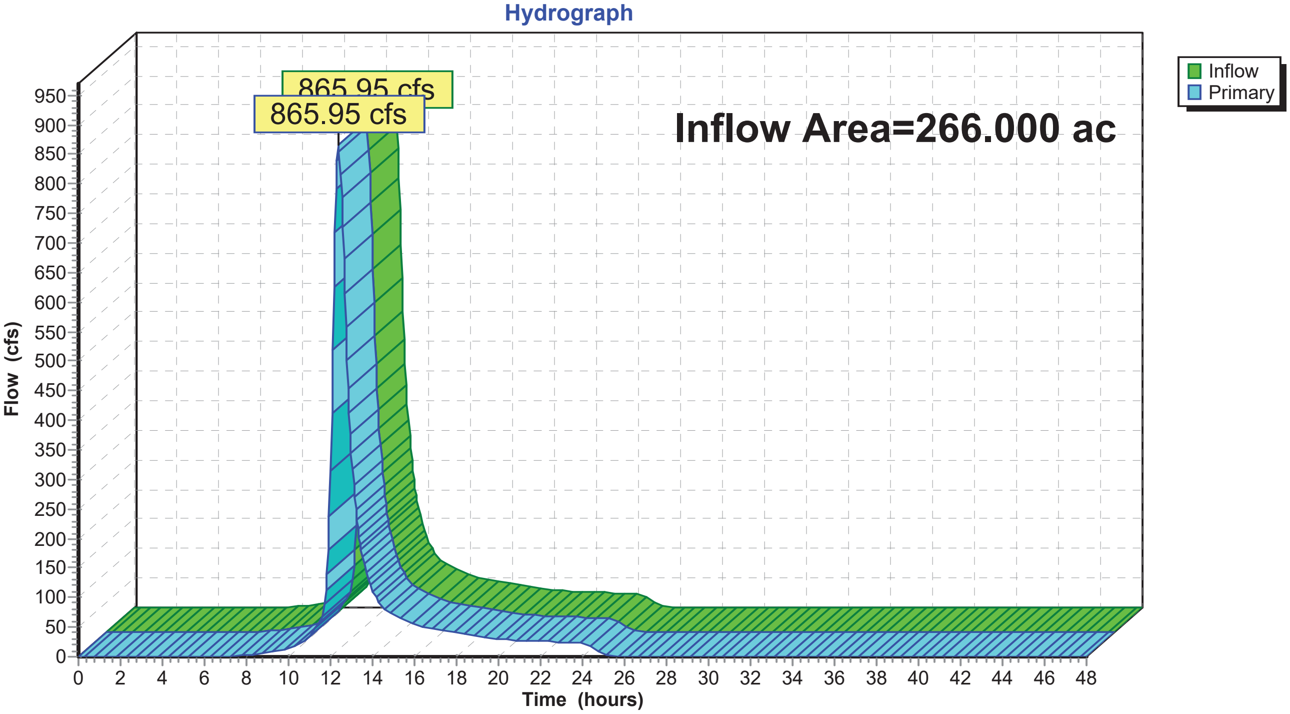


Summary for Link 4L: Berry Creek (Section 13901.95)

```
Inflow Area =      266.000 ac,    0.00% Impervious,  Inflow Depth =   5.15"    for  200-year 24-hour event
Inflow       =      865.95 cfs @   12.38 hrs,  Volume=          114.148 af
Primary      =      865.95 cfs @   12.38 hrs,  Volume=          114.148 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 4L: Berry Creek (Section 13901.95)

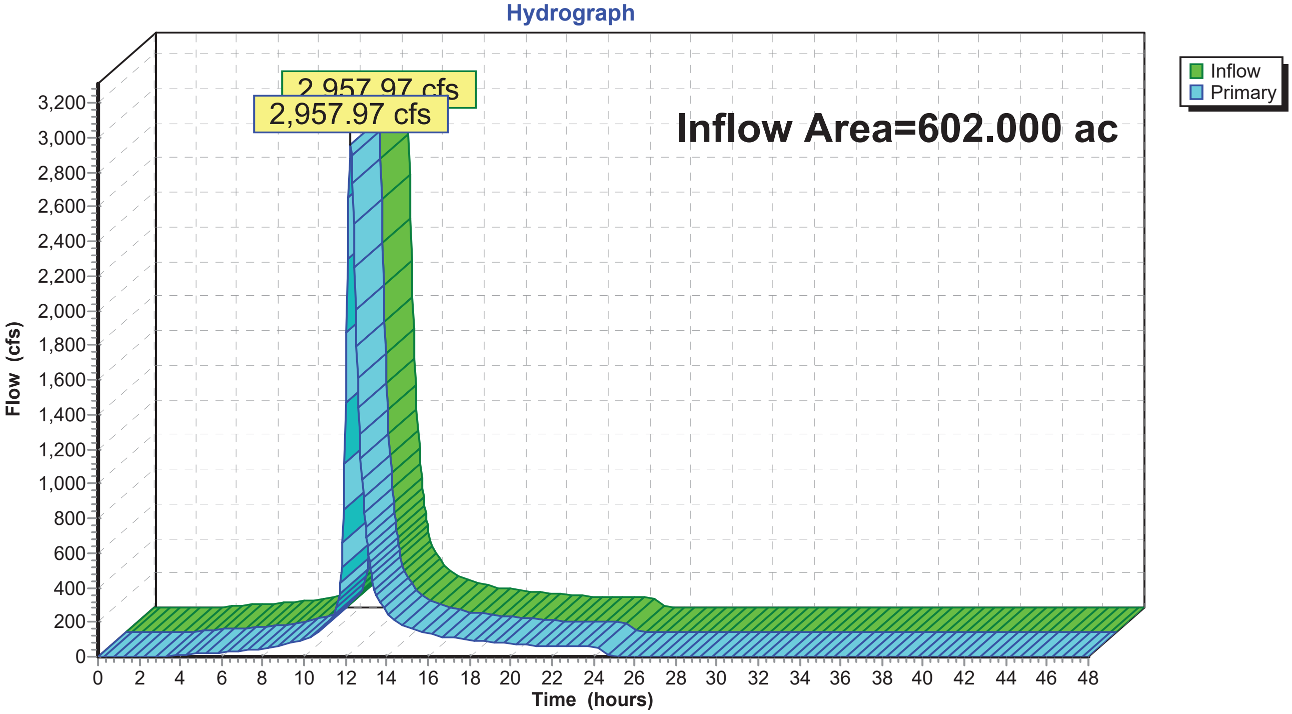


Summary for Link 5L: Berry Creek (Section 11575.16)

Inflow Area = 602.000 ac, 41.86% Impervious, Inflow Depth = 6.68" for 200-year 24-hour event
Inflow = 2,957.97 cfs @ 12.25 hrs, Volume= 335.076 af
Primary = 2,957.97 cfs @ 12.25 hrs, Volume= 335.076 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 5L: Berry Creek (Section 11575.16)

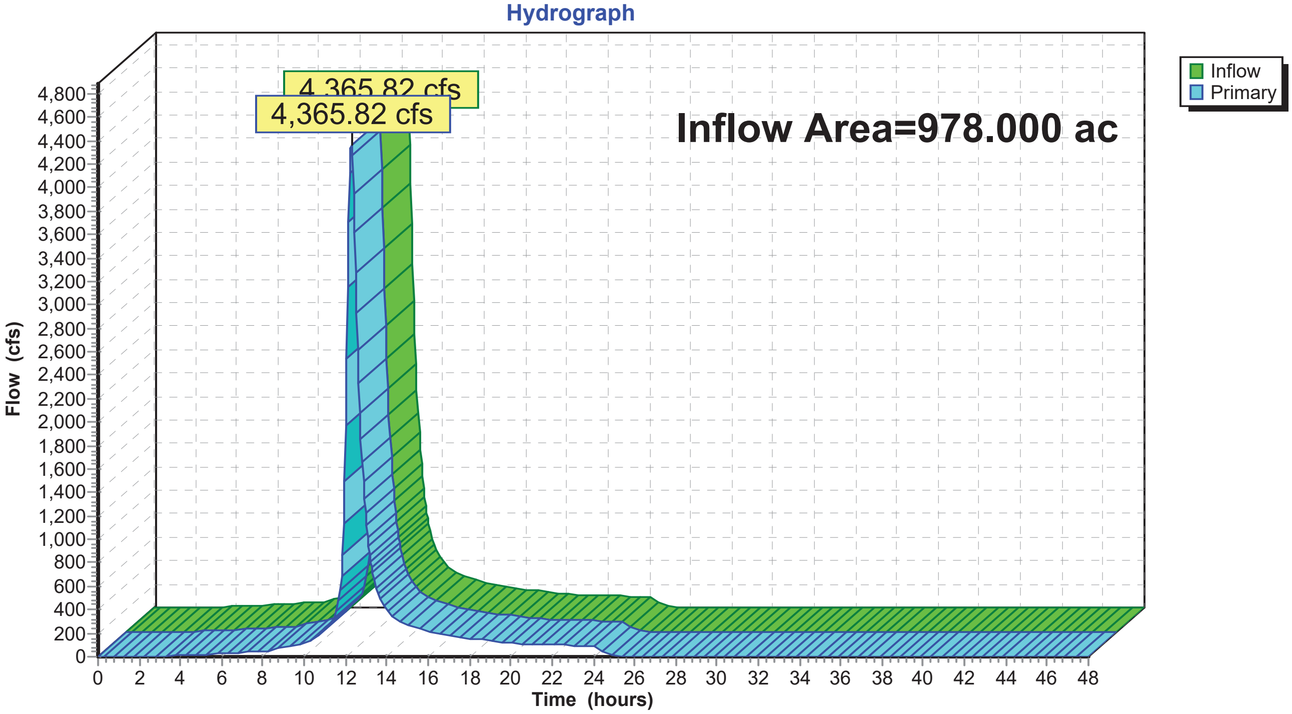


Summary for Link 6L: Berry Creek (Section 11268.37)

```
Inflow Area =      978.000 ac,  25.77% Impervious,  Inflow Depth =   6.15"    for  200-year 24-hour event
Inflow      =   4,365.82 cfs @   12.28 hrs,  Volume=         501.104 af
Primary     =   4,365.82 cfs @   12.28 hrs,  Volume=         501.104 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

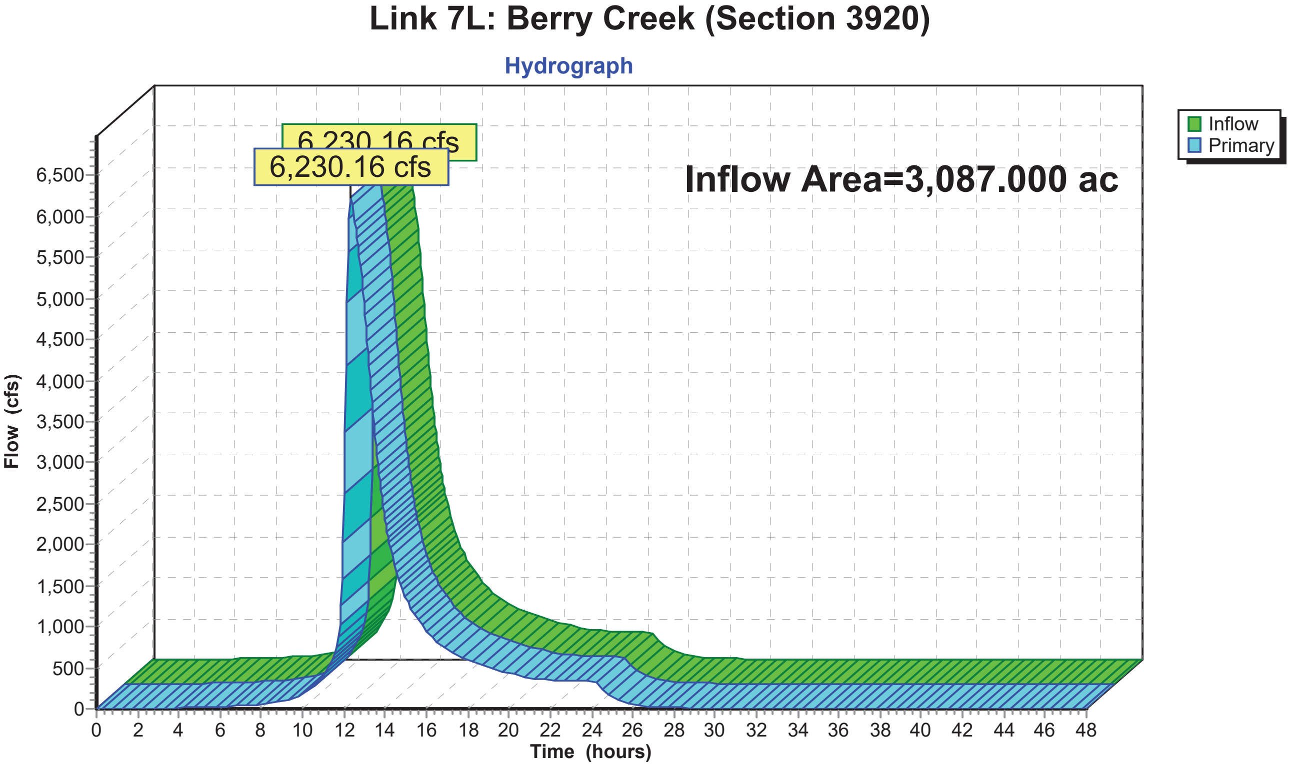
Link 6L: Berry Creek (Section 11268.37)



Summary for Link 7L: Berry Creek (Section 3920)

```
Inflow Area =    3,087.000 ac,    8.16% Impervious,  Inflow Depth =   5.61"    for  200-year 24-hour event
Inflow        =    6,230.16 cfs @   12.36 hrs,  Volume=       1,442.715 af
Primary       =    6,230.16 cfs @   12.36 hrs,  Volume=       1,442.715 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

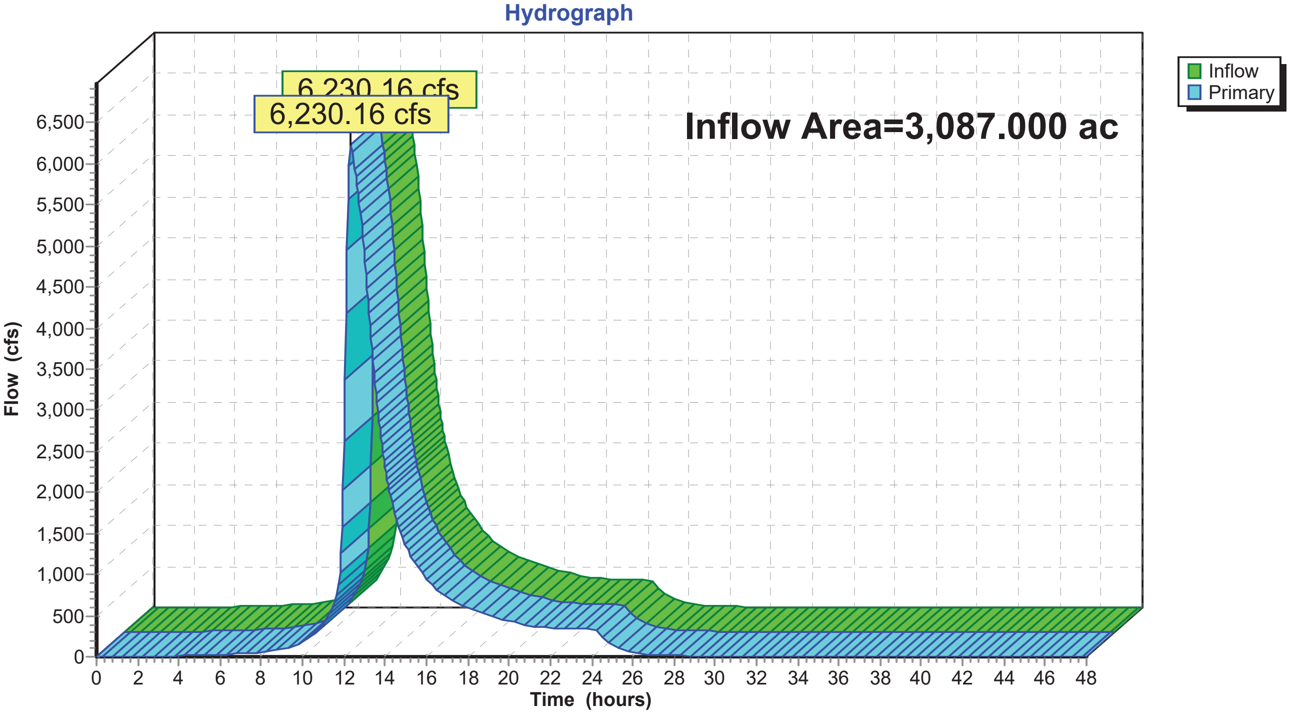


Summary for Link 47L: Ocmulgee River

Inflow Area = 3,087.000 ac, 8.16% Impervious, Inflow Depth = 5.61" for 200-year 24-hour event
Inflow = 6,230.16 cfs @ 12.36 hrs, Volume= 1,442.715 af
Primary = 6,230.16 cfs @ 12.36 hrs, Volume= 1,442.715 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 47L: Ocmulgee River



```
                      Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
                       Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
             Reach routing by Dyn-Stor-Ind method  -  Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: Drainage Area A1d        Runoff Area=40.000 ac   0.00% Impervious   Runoff Depth=7.64"
                                   Flow Length=2,800'   Tc=26.7 min   CN=78   Runoff=281.07 cfs  25.480 af

Subcatchment 6S: Drainage Area A3        Runoff Area=336.000 ac   75.00% Impervious   Runoff Depth=9.18"
                     Flow Length=3,700'   Slope=0.0100 '/'   Tc=29.7 min   CN=90   Runoff=2,516.33 cfs  256.929 af

Subcatchment 7S: Drainage Area A2         Runoff Area=376.000 ac   0.00% Impervious   Runoff Depth=6.45"
                                 Flow Length=8,800'   Tc=38.0 min   CN=69   Runoff=1,795.28 cfs  202.133 af

Subcatchment 14S: Drainage Area A4      Runoff Area=1,926.000 ac   0.00% Impervious   Runoff Depth=6.59"
                                Flow Length=1,660'   Tc=47.5 min   CN=70   Runoff=8,013.08 cfs  1,056.950 af

Subcatchment 17S: Drainage Area A5        Runoff Area=183.000 ac   0.00% Impervious   Runoff Depth=5.77"
                       Flow Length=2,700'   Slope=0.0300 '/'   Tc=30.3 min   CN=64   Runoff=908.07 cfs  88.046 af

Subcatchment 64S: Drainage Area A1u       Runoff Area=226.000 ac   0.00% Impervious   Runoff Depth=6.05"
                                   Flow Length=5,400'   Tc=46.0 min   CN=66   Runoff=883.64 cfs  113.861 af

Reach 45R: Berry Creek            Avg. Flow Depth=5.54'   Max Vel=6.52 fps   Inflow=8,013.08 cfs  1,056.950 af
                  n=0.035   L=19,200.0'   S=0.0070 '/'   Capacity=24,725.55 cfs   Outflow=4,586.30 cfs  1,056.817 af

Link 3L: Berry Creek (Section 16826)                                          Inflow=883.64 cfs  113.861 af
                                                                             Primary=883.64 cfs  113.861 af

Link 4L: Berry Creek (Section 13901.95)                                     Inflow=1,060.30 cfs  139.341 af
                                                                           Primary=1,060.30 cfs  139.341 af

Link 5L: Berry Creek (Section 11575.16)                                     Inflow=3,470.93 cfs  396.270 af
                                                                           Primary=3,470.93 cfs  396.270 af

Link 6L: Berry Creek (Section 11268.37)                                     Inflow=5,193.14 cfs  598.403 af
                                                                           Primary=5,193.14 cfs  598.403 af

Link 7L: Berry Creek (Section 3920)                                       Inflow=7,736.25 cfs  1,743.267 af
                                                                         Primary=7,736.25 cfs  1,743.267 af

Link 47L: Ocmulgee River                                                  Inflow=7,736.25 cfs  1,743.267 af
                                                                         Primary=7,736.25 cfs  1,743.267 af

     Total Runoff Area = 3,087.000 ac   Runoff Volume = 1,743.400 af   Average Runoff Depth = 6.78"
                                   91.84% Pervious = 2,835.000 ac     8.16% Impervious = 252.000 ac
```

Summary for Subcatchment 5S: Drainage Area A1d

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

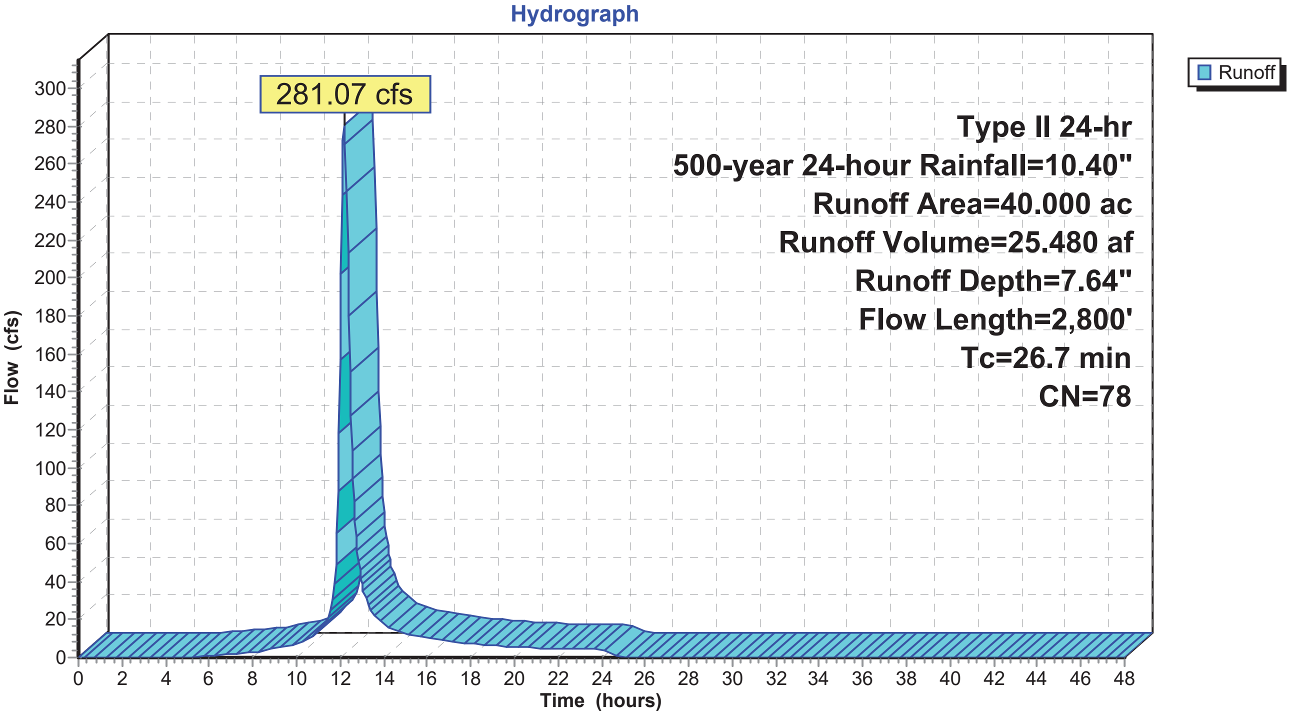
Runoff = 281.07 cfs @ 12.20 hrs, Volume= 25.480 af, Depth= 7.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-year 24-hour Rainfall=10.40"

Area (ac)	CN	Description
26.000	73	Woods/grass comb., Poor, HSG B
14.000	86	Woods/grass comb., Poor, HSG D
40.000	78	Weighted Average
40.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0600	0.13		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
6.8	500	0.0600	1.22		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
7.2	2,200	0.0050	5.07	760.07	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=5.00' D=5.00' Z= 5.0 '/' Top.W=55.00' n= 0.040 Winding stream, pools & shoals
26.7	2,800	Total			

Subcatchment 5S: Drainage Area A1d



Summary for Subcatchment 6S: Drainage Area A3

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

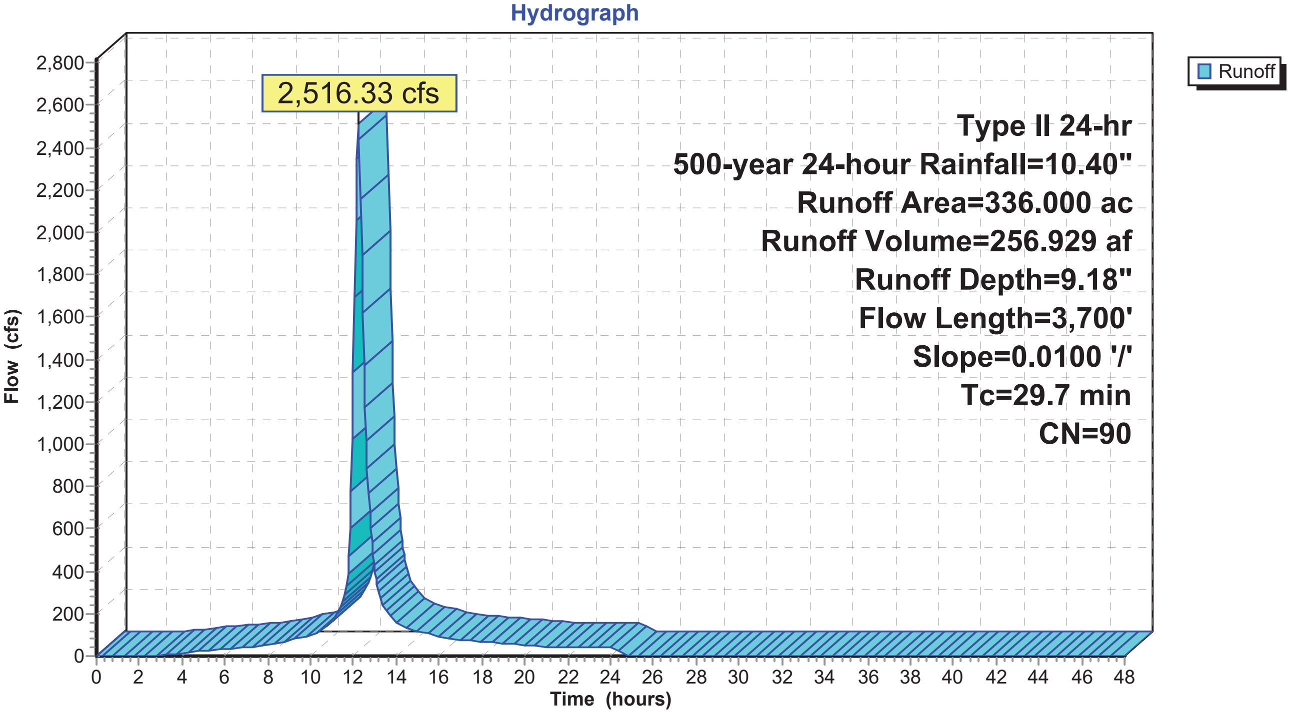
Runoff = 2,516.33 cfs @ 12.23 hrs, Volume= 256.929 af, Depth= 9.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-year 24-hour Rainfall=10.40"

Area (ac)	CN	Description
84.000	65	Woods/grass comb., Fair, HSG B
252.000	98	Paved parking, HSG D
336.000	90	Weighted Average
84.000		25.00% Pervious Area
252.000		75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
26.9	2,600	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
1.3	1,000		12.69		**Lake or Reservoir, l pond** Mean Depth= 5.00'
29.7	3,700	Total			

Subcatchment 6S: Drainage Area A3



Summary for Subcatchment 7S: Drainage Area A2

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

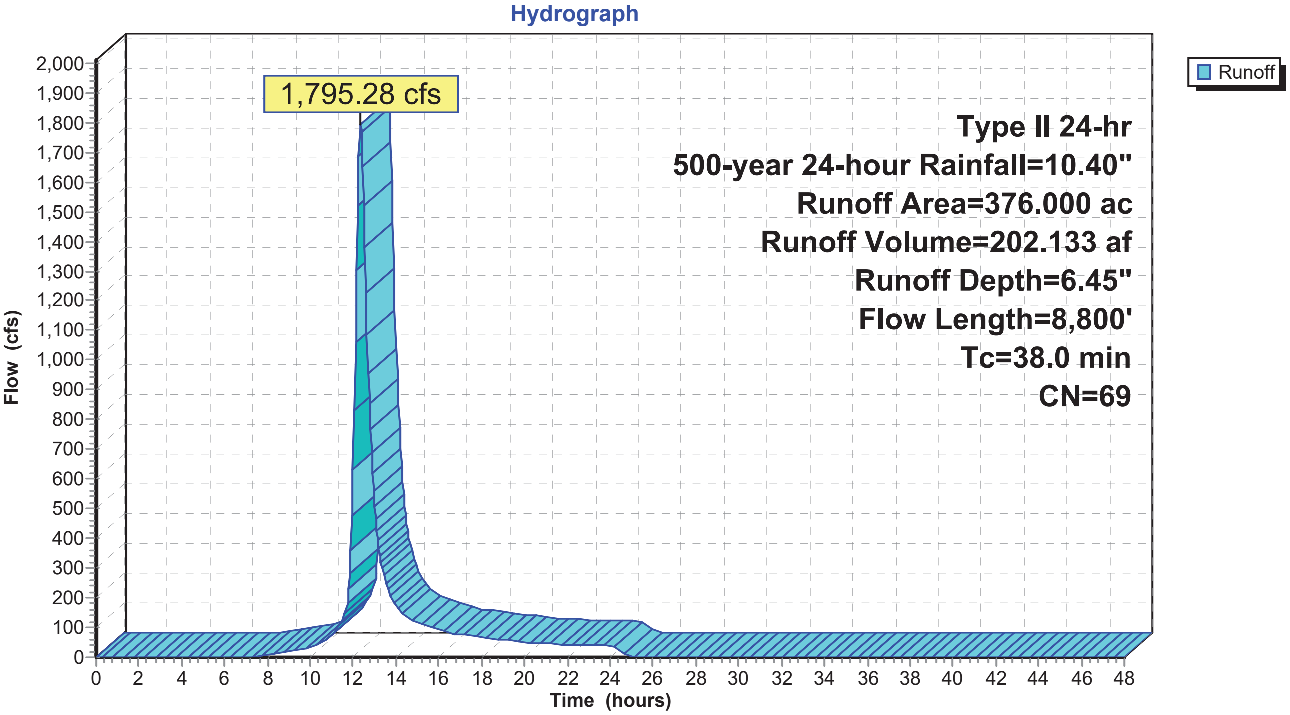
Runoff = 1,795.28 cfs @ 12.34 hrs, Volume= 202.133 af, Depth= 6.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-year 24-hour Rainfall=10.40"

Area (ac)	CN	Description
280.000	65	Woods/grass comb., Fair, HSG B
96.000	82	Woods/grass comb., Fair, HSG D
376.000	69	Weighted Average
376.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	100	0.0100	1.13		**Sheet Flow, sheet** Smooth surfaces n= 0.011 P2= 3.77"
4.1	400	0.0100	1.61		**Shallow Concentrated Flow, shallow conc** Unpaved Kv= 16.1 fps
11.0	1,500	0.0300	2.27	56.73	**Trap/Vee/Rect Channel Flow, channel to berry creek** Bot.W=20.00' D=1.00' Z= 5.0 '/' Top.W=30.00' n= 0.100 Earth, dense brush, high stage
21.4	6,800	0.0050	5.30	928.25	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=10.00' D=5.00' Z= 5.0 '/' Top.W=60.00' n= 0.040 Winding stream, pools & shoals
38.0	8,800	Total			

Subcatchment 7S: Drainage Area A2



Summary for Subcatchment 14S: Drainage Area A4

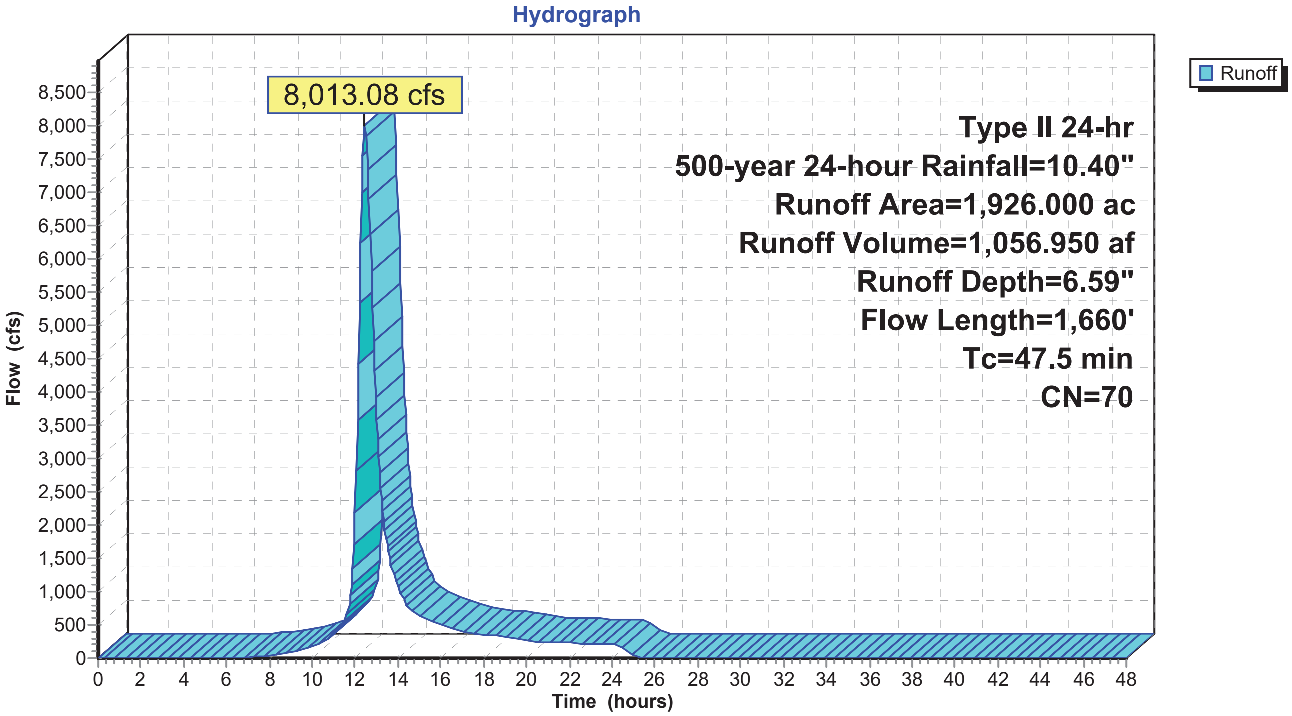
Runoff = 8,013.08 cfs @ 12.46 hrs, Volume= 1,056.950 af, Depth= 6.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-year 24-hour Rainfall=10.40"

Area (ac)	CN	Description
1,321.000	65	Woods/grass comb., Fair, HSG B
605.000	82	Woods/grass comb., Fair, HSG D
1,926.000	70	Weighted Average
1,926.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.1	100	0.0100	0.06		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
21.4	1,560	0.0590	1.21		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
47.5	1,660	Total			

Subcatchment 14S: Drainage Area A4



Summary for Subcatchment 17S: Drainage Area A5

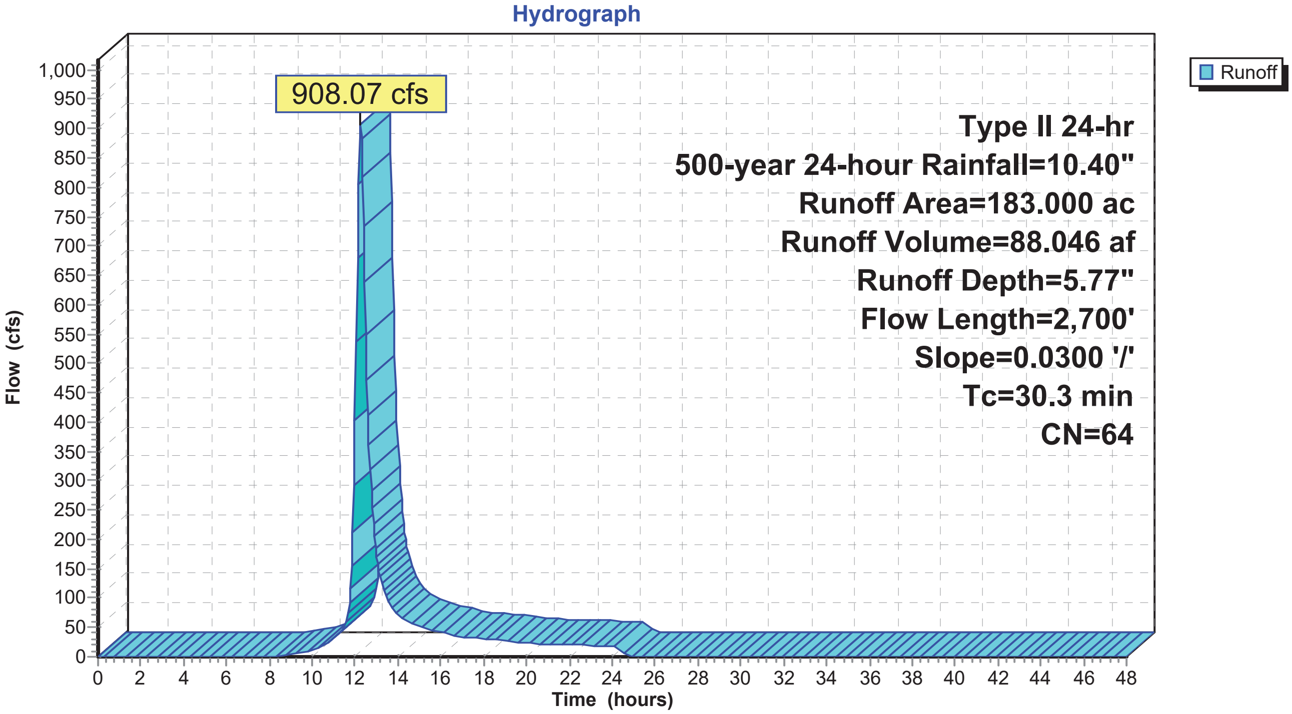
Runoff = 908.07 cfs @ 12.25 hrs, Volume= 88.046 af, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-year 24-hour Rainfall=10.40"

Area (ac)	CN	Description
7.000	32	Woods/grass comb., Good, HSG A
115.000	58	Woods/grass comb., Good, HSG B
61.000	79	Woods/grass comb., Good, HSG D
183.000	64	Weighted Average
183.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	100	0.0300	0.10		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
7.7	400	0.0300	0.87		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
5.8	2,200	0.0300	6.28	3,765.28	**Trap/Vee/Rect Channel Flow, channel** Bot.W=20.00' D=5.00' Z= 20.0 '/' Top.W=220.00' n= 0.080 Earth, long dense weeds
30.3	2,700	Total			

Subcatchment 17S: Drainage Area A5



Summary for Subcatchment 64S: Drainage Area A1u

Hydrologic Soil Type B from NRCS web soil survey.

Drainage area delineated using USGS Stream Stats web tool and verified in AutoCAD Civil 3D using most recent survey data as defined in the H&H calculation memorandum.

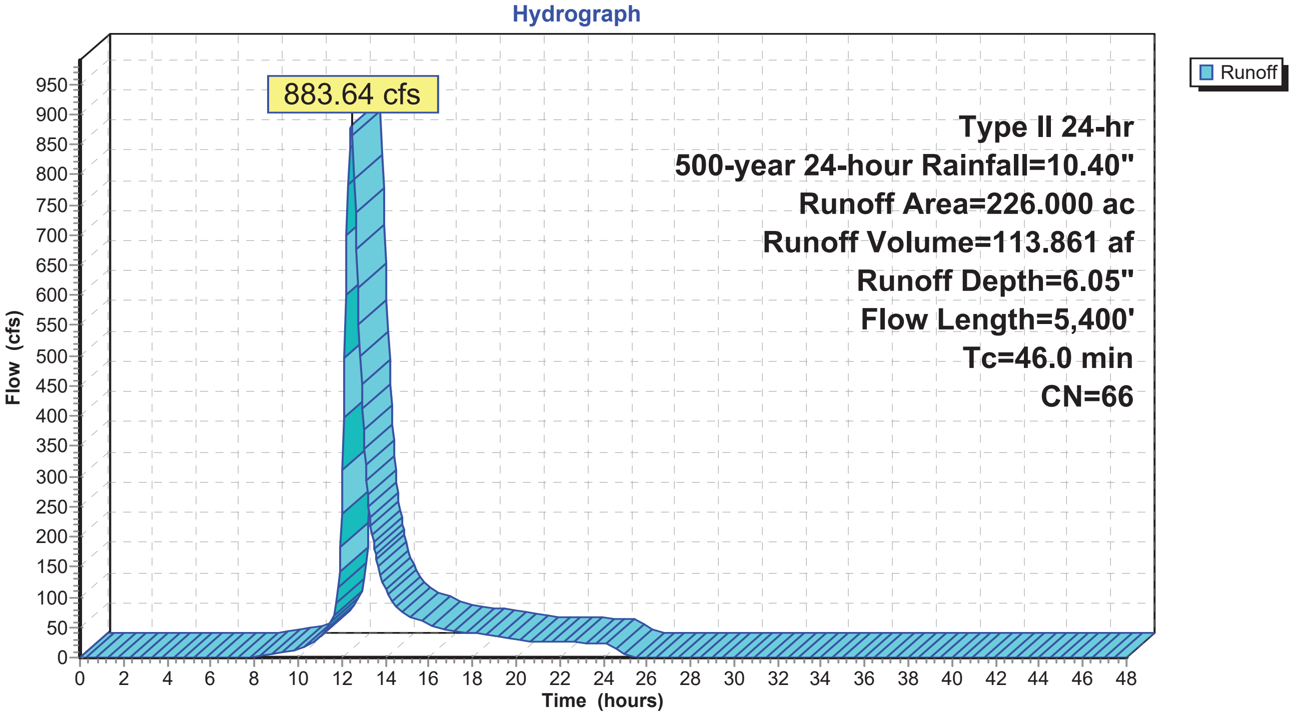
```
Runoff      =      883.64 cfs @   12.44 hrs,  Volume=        113.861 af,  Depth=  6.05"
```

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 500-year 24-hour Rainfall=10.40"

Area (ac)	CN	Description
209.000	65	Woods/grass comb., Fair, HSG B
17.000	82	Woods/grass comb., Fair, HSG D
226.000	66	Weighted Average
226.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	100	0.1000	0.16		**Sheet Flow, sheet** Woods: Light underbrush n= 0.400 P2= 3.77"
26.4	2,500	0.1000	1.58		**Shallow Concentrated Flow, shallow conc** Woodland Kv= 5.0 fps
9.2	2,800	0.0050	5.10	637.29	**Trap/Vee/Rect Channel Flow, Berry Creek** Bot.W=5.00' D=5.00' Z= 4.0 '/' Top.W=45.00' n= 0.040 Winding stream, pools & shoals
46.0	5,400	Total			

Subcatchment 64S: Drainage Area A1u



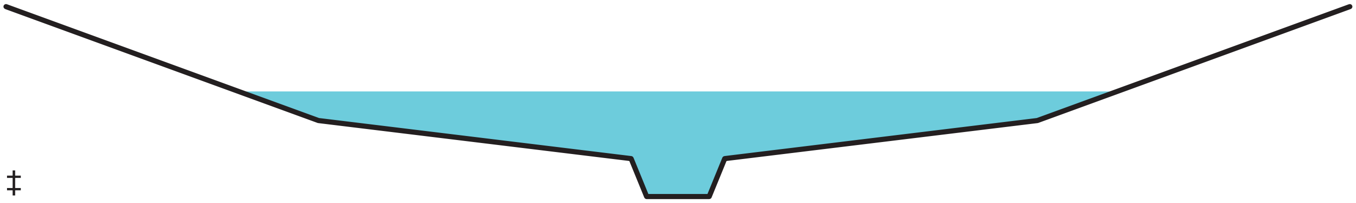
Summary for Reach 45R: Berry Creek Tributary

```
Inflow Area =    1,926.000 ac,    0.00% Impervious,  Inflow Depth =   6.59"    for  500-year 24-hour event
Inflow       =   8,013.08 cfs @   12.46 hrs,  Volume=        1,056.950 af
Outflow      =   4,586.30 cfs @   12.87 hrs,  Volume=        1,056.817 af,  Atten= 43%,  Lag= 24.7 min
```

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.52 fps, Min. Travel Time= 49.1 min
Avg. Velocity = 2.24 fps, Avg. Travel Time= 142.6 min

Peak Storage= 13,503,670 cf @ 12.87 hrs
Average Depth at Peak Storage= 5.54'
Bank-Full Depth= 10.00' Flow Area= 2,290.0 sf, Capacity= 24,725.55 cfs

Custom cross-section, Length= 19,200.0' Slope= 0.0070 '/'
Constant n= 0.035 Earth, dense weeds
Inlet Invert= 484.00', Outlet Invert= 350.00'

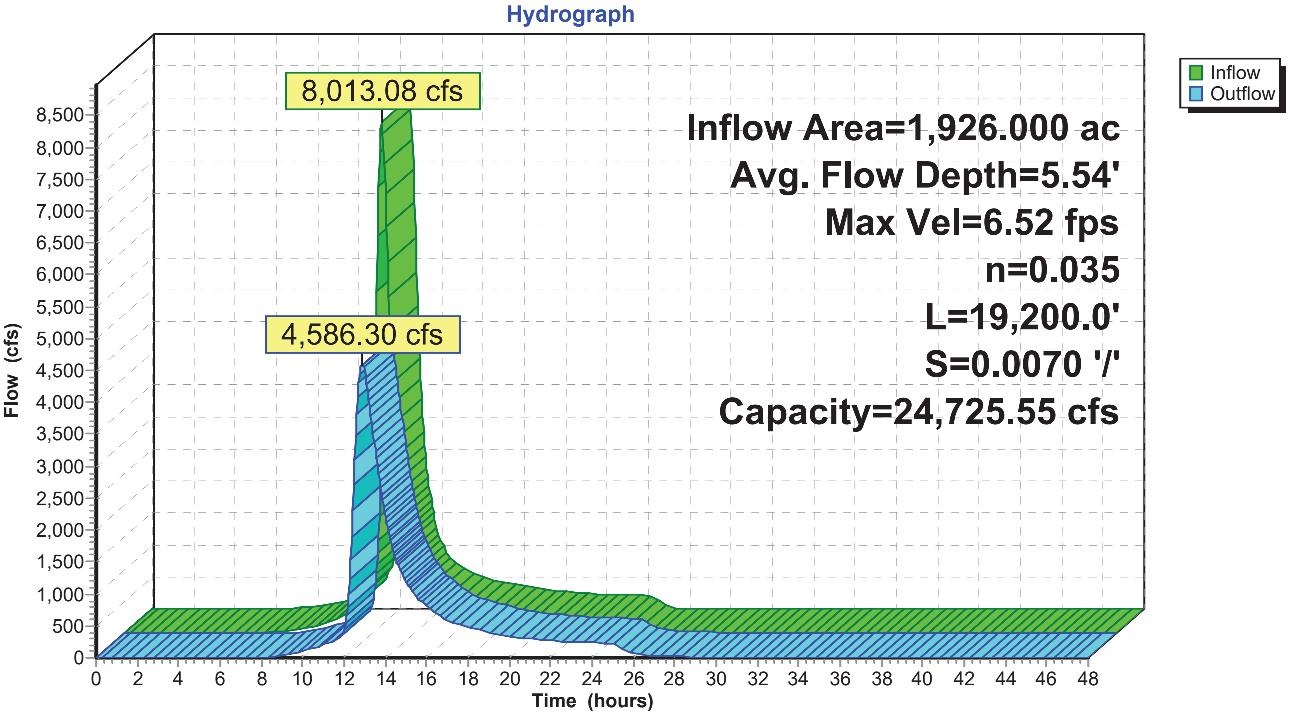


‡

Offset (feet)	Elevation (feet)	Chan.Depth (feet)
0.00	434.00	0.00
100.00	428.00	6.00
200.00	426.00	8.00
205.00	424.00	10.00
225.00	424.00	10.00
230.00	426.00	8.00
330.00	428.00	6.00
430.00	434.00	0.00

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	20.0	0	0.00
2.00	50.0	30.8	960,000	245.12
4.00	310.0	230.8	5,952,000	1,338.50
10.00	2,290.0	431.2	43,968,000	24,725.55

Reach 45R: Berry Creek Tributary



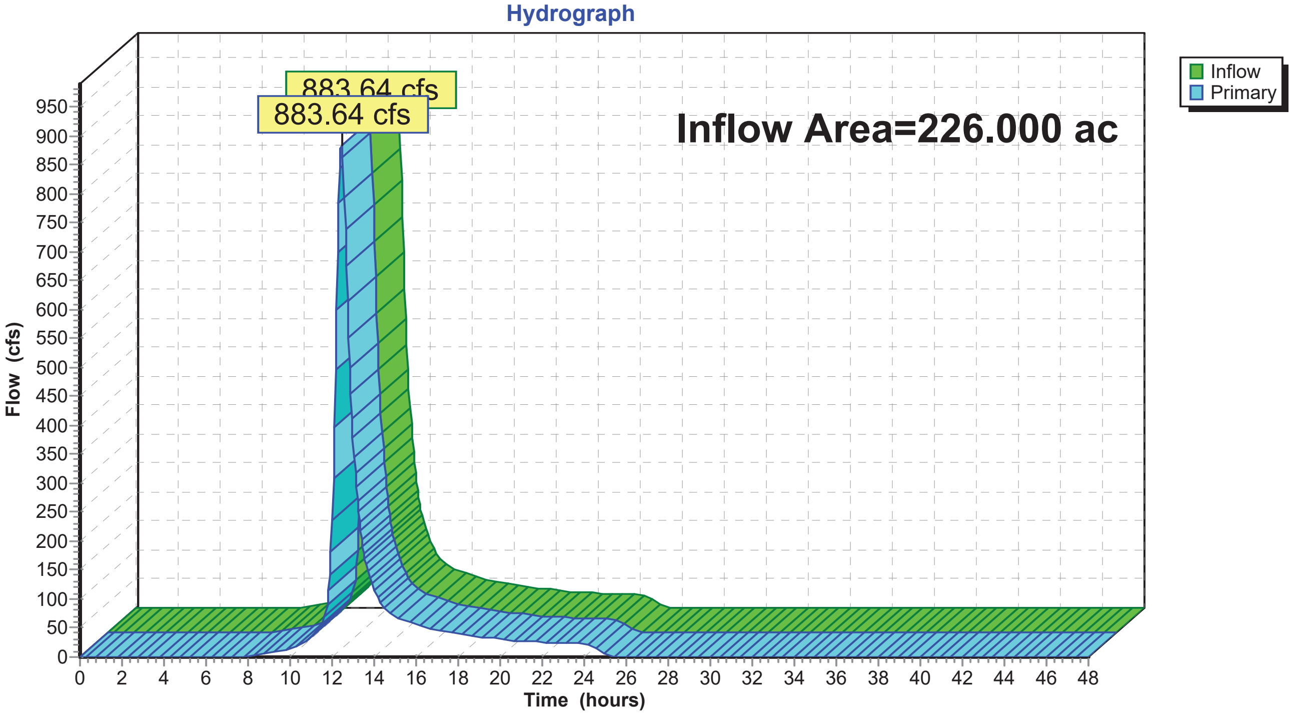
Summary for Link 3L: Berry Creek (Section 16826)

Additional details on Berry Creek can be found in the HEC-RAS model.

Inflow Area = 226.000 ac, 0.00% Impervious, Inflow Depth = 6.05" for 500-year 24-hour event
Inflow = 883.64 cfs @ 12.44 hrs, Volume= 113.861 af
Primary = 883.64 cfs @ 12.44 hrs, Volume= 113.861 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

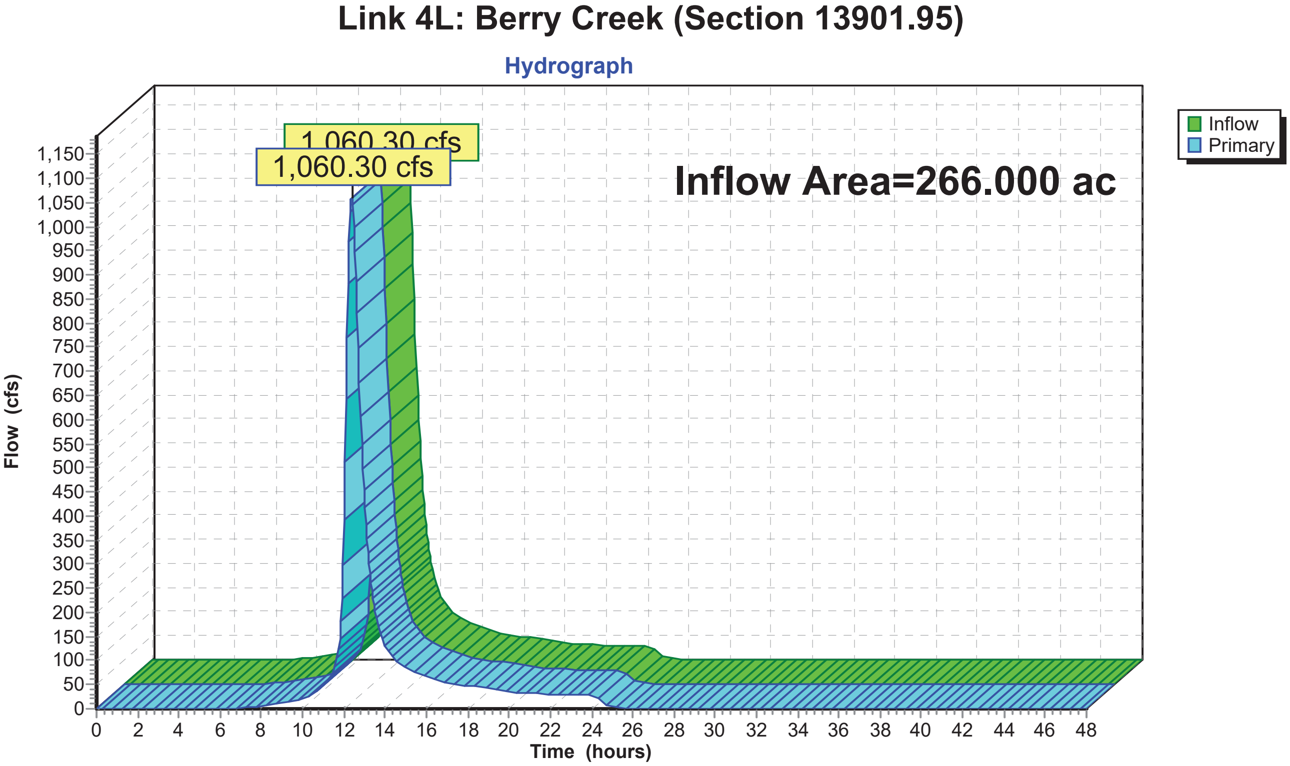
Link 3L: Berry Creek (Section 16826)



Summary for Link 4L: Berry Creek (Section 13901.95)

```
Inflow Area =      266.000 ac,    0.00% Impervious,  Inflow Depth =   6.29"    for  500-year 24-hour event
Inflow       =   1,060.30 cfs @   12.38 hrs,  Volume=          139.341 af
Primary      =   1,060.30 cfs @   12.38 hrs,  Volume=          139.341 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

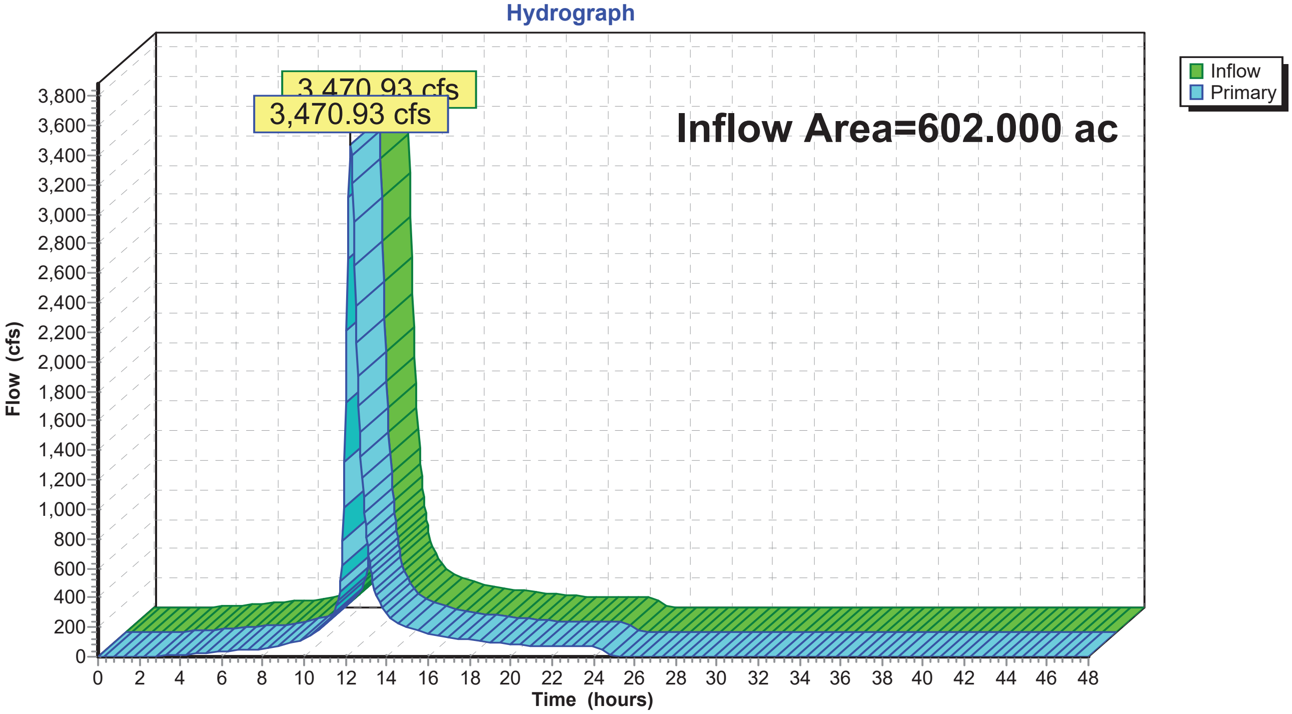


Summary for Link 5L: Berry Creek (Section 11575.16)

```
Inflow Area =      602.000 ac,  41.86% Impervious,  Inflow Depth =   7.90"    for  500-year 24-hour event
Inflow        =   3,470.93 cfs @   12.25 hrs,  Volume=         396.270 af
Primary       =   3,470.93 cfs @   12.25 hrs,  Volume=         396.270 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 5L: Berry Creek (Section 11575.16)

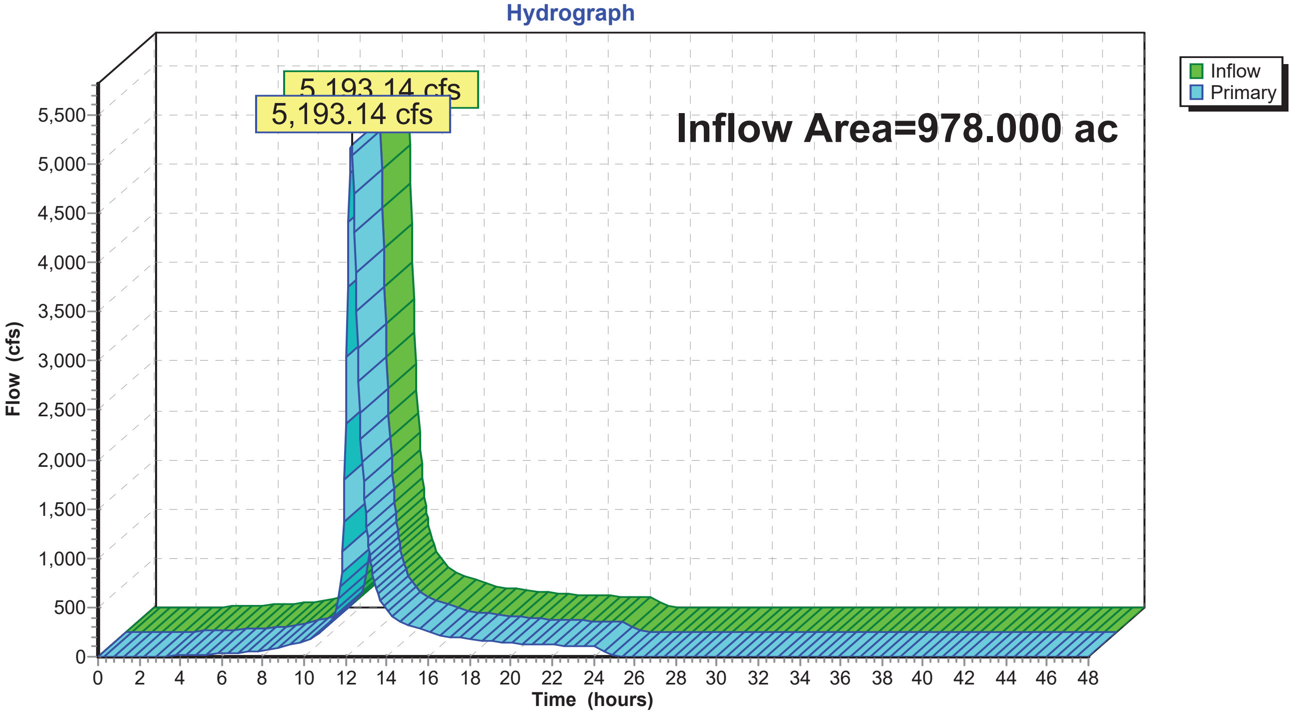


Summary for Link 6L: Berry Creek (Section 11268.37)

```
Inflow Area =      978.000 ac,  25.77% Impervious,  Inflow Depth =   7.34"    for  500-year 24-hour event
Inflow       =   5,193.14 cfs @   12.28 hrs,  Volume=         598.403 af
Primary      =   5,193.14 cfs @   12.28 hrs,  Volume=         598.403 af,  Atten= 0%,  Lag= 0.0 min
```

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 6L: Berry Creek (Section 11268.37)

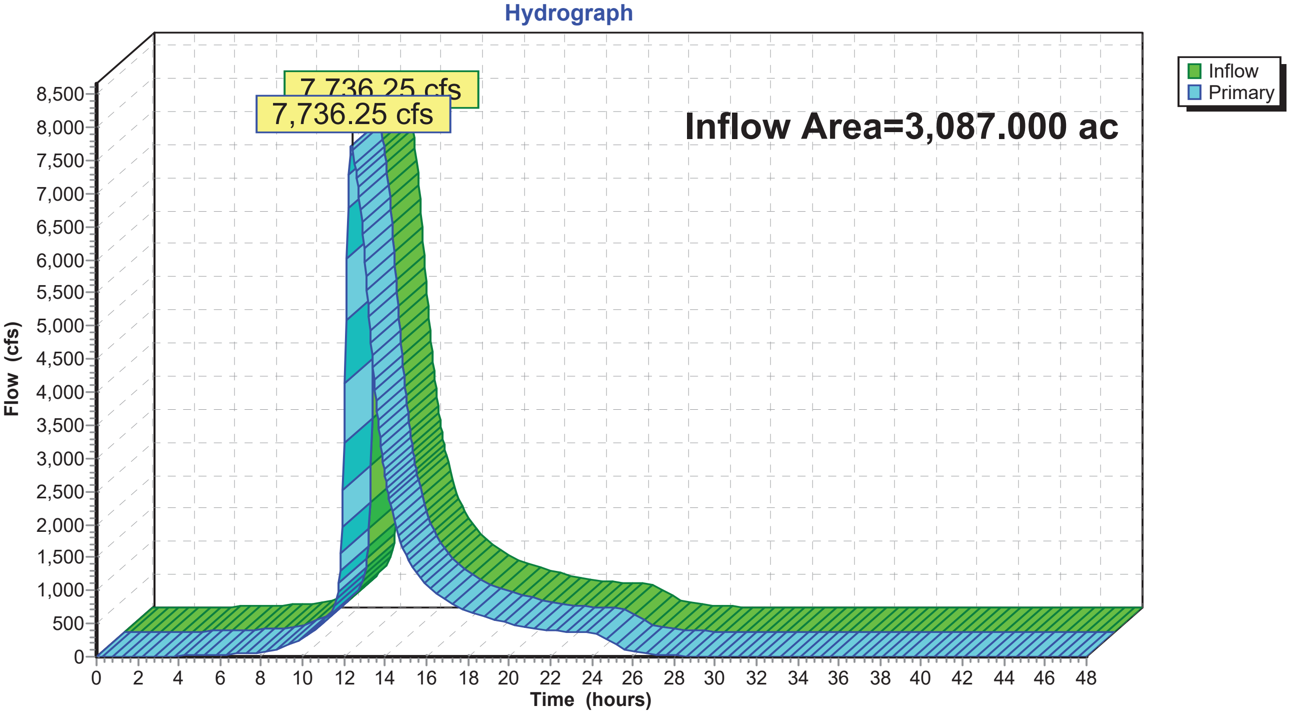


Summary for Link 7L: Berry Creek (Section 3920)

Inflow Area = 3,087.000 ac, 8.16% Impervious, Inflow Depth = 6.78" for 500-year 24-hour event
Inflow = 7,736.25 cfs @ 12.38 hrs, Volume= 1,743.267 af
Primary = 7,736.25 cfs @ 12.38 hrs, Volume= 1,743.267 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 7L: Berry Creek (Section 3920)

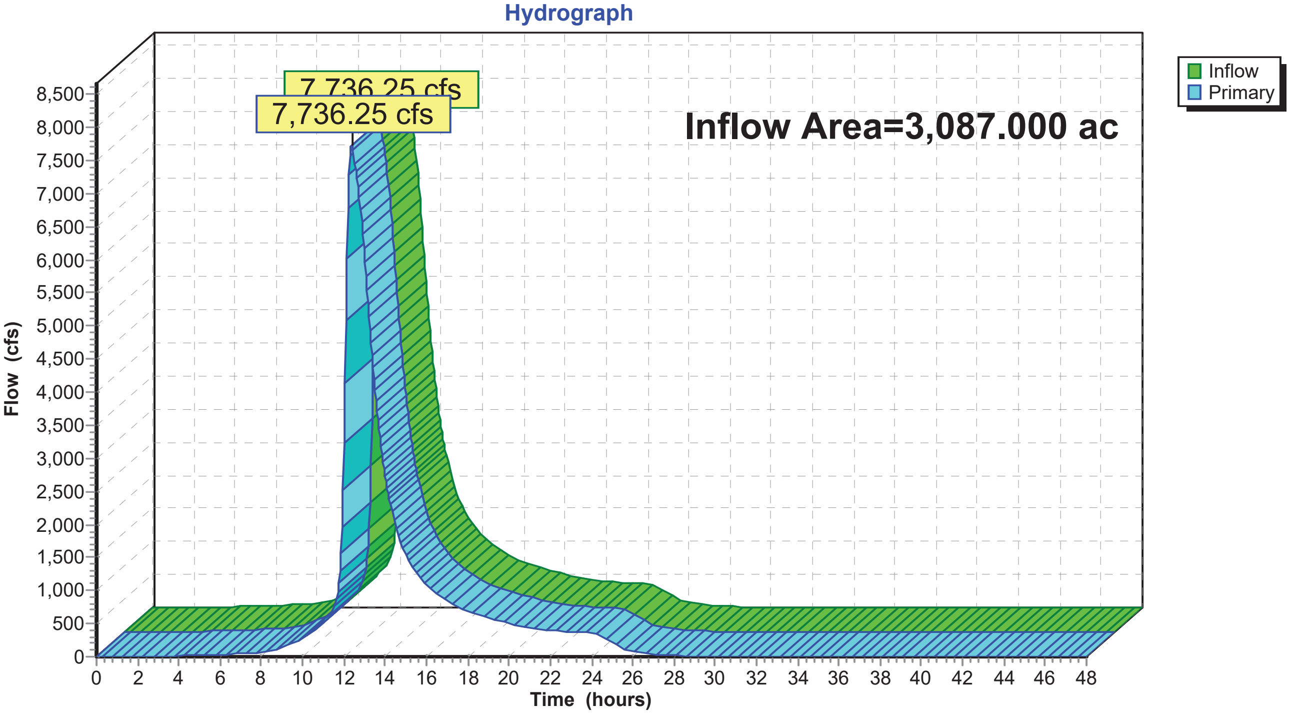


Summary for Link 47L: Ocmulgee River

Inflow Area = 3,087.000 ac, 8.16% Impervious, Inflow Depth = 6.78" for 500-year 24-hour event
Inflow = 7,736.25 cfs @ 12.38 hrs, Volume= 1,743.267 af
Primary = 7,736.25 cfs @ 12.38 hrs, Volume= 1,743.267 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 47L: Ocmulgee River



Attachment C
Hydraulic Calculations

Checked: J. Bacic

Date: 4/17/2020

Channel	Min. Channel Depth (ft)	Channel Bottom Width (ft)	Channel Side Slopes	Channel Slope (ft/ft)	Approx. Length (ft)	Min. Turn Radius into Downstream Channel (ft)	Armoring	Armoring Thickness (in)	Armoring Depth (ft)	Bedding	HydroCAD Model	Design Storm	Peak Inflow (ft3/s)	Manning's n	Max Velocity (ft/s)	Max Shear (lb/ft^2)	Allowable Shear (lb/ft^2)	Froude Number	Peak Flow Depth (ft)	Turn Radius Bend Run-up (ft)	Freeboard (ft)	Notes
CE1	3.0	8	5H:1V	0.026	750	N/A	GDOT Type 3 Riprap	24	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	89	0.084	3.1	2.8	5.0	0.51	1.7	N/A	1.3	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CET1	3.0	8	5H:1V	0.026	50	50	GDOT Type 1 Riprap	36	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	89	0.098	2.8	6.1	12.0	0.44	1.9	0.1	1.1	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CE2	3.0	8	5H:1V	0.025	850	N/A	GDOT Type 3 Riprap	24	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	112	0.080	3.3	3.0	5.0	0.53	1.9	N/A	1.1	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CET2	3.0	8	5H:1V	0.025	100	50	GDOT Type 1 Riprap	36	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	112	0.095	3.0	6.5	12.0	0.45	2.1	0.2	0.9	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CE3	3.0	8	5H:1V	0.027	850	N/A	GDOT Type 3 Riprap	24	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	90	0.084	3.1	2.9	5.0	0.52	1.7	N/A	1.3	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CET3	3.0	8	5H:1V	0.027	100	50	GDOT Type 1 Riprap	36	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	90	0.100	2.8	6.3	12.0	0.45	1.9	0.1	1.1	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CE4	3.0	8	5H:1V	0.028	850	N/A	GDOT Type 3 Riprap	24	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	108	0.082	3.4	3.2	5.0	0.55	1.8	N/A	1.2	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CET4	3.0	8	5H:1V	0.028	100	50	GDOT Type 1 Riprap	36	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	108	0.094	3.1	6.9	12.0	0.48	2.0	0.2	1.0	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CE5	3.0	8	5H:1V	0.019	1500	N/A	GDOT Type 3 Riprap	24	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	146	0.075	3.4	2.7	5.0	0.51	2.3	N/A	0.7	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CET5	3.0	8	5H:1V	0.019	100	50	GDOT Type 1 Riprap	36	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	146	0.093	2.9	5.9	12.0	0.41	2.5	0.2	0.5	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CW1	4.0	8	5H:1V	0.005	1700	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	160	0.042	3.3	0.8	1.0	0.47	2.4	N/A	1.6	
CW2	4.0	16	5H:1V	0.005	560	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	210	0.041	3.5	0.7	1.0	0.48	2.2	N/A	1.8	
CW3	3.5	16	5H:1V	0.028	100	100	GDOT Type 1 Riprap	36	3.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	210	0.088	3.7	7.0	5.0	0.53	2.1	0.2	1.4	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CW4	4.0	8	5H:1V	0.005	2200	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	245	0.041	3.7	0.9	1.0	0.5	2.9	N/A	1.1	
CW5	4.0	16	5H:1V	0.005	1050	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	344	0.040	4.0	0.9	1.0	0.51	2.8	N/A	1.2	
CW6	3.5	16	5H:1V	0.028	100	100	GDOT Type 1 Riprap	36	3.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	344	0.091	4.1	9.5	12.0	0.53	2.8	0.2	0.7	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CW7	4.0	8	5H:1V	0.005	2200	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	204	0.041	3.6	0.8	1.0	0.49	2.7	N/A	1.3	
CW8	4.0	16	5H:1V	0.005	1050	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	321	0.040	4.0	0.9	1.0	0.51	2.7	N/A	1.3	
CW9	3.5	16	5H:1V	0.030	100	100	GDOT Type 1 Riprap	36	3.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	321	0.079	4.6	8.8	12.0	0.62	2.5	0.3	1.0	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CW10	4.0	8	5H:1V	0.005	2200	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	157	0.042	3.3	0.8	1.0	0.47	2.4	N/A	1.6	
CW11	4.0	16	5H:1V	0.005	1100	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	238	0.041	3.6	0.7	1.0	0.49	2.4	N/A	1.6	
CW12	3.5	16	5H:1V	0.030	150	100	GDOT Type 1 Riprap	36	3.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	238	0.085	4.0	7.7	12.0	0.57	2.2	0.2	1.3	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CW13	4.0	8	5H:1V	0.005	2200	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	177	0.041	3.4	0.8	1.0	0.48	2.5	N/A	1.5	
CW14	4.0	16	5H:1V	0.005	700	N/A	AASHTO No. 1 Stone	12	4.0	16-oz geotextile	West	100-year	212	0.041	3.5	0.7	1.0	0.48	2.3	N/A	1.7	
CW15	3.0	8	5H:1V	0.010	730	50	GDOT Type 3 Riprap	15	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	117	0.074	2.6	2.9	5.0	0.37	2.3	0.1	0.7	
CW16	3.5	16	5H:1V	0.030	500	100	GDOT Type 1 Riprap	36	3.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	353	0.091	4.3	10.0	12.0	0.55	2.8	0.2	0.7	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CW17	3.0	8	5H:1V	0.026	960	N/A	GDOT Type 3 Riprap	24	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	148	0.077	3.8	3.4	5.0	0.57	2.1	N/A	0.9	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
CW18	3.0	8	5H:1V	0.030	200	50	GDOT Type 1 Riprap	36	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	148	0.087	3.6	8.1	12.0	0.55	2.2	0.2	0.8	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
KN1	1.5	5	5H:1V	0.030	1130	50	GDOT Type 3 Riprap	24	1.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	19	0.094	2.1	3.2	5.0	0.45	1.0	0.1	0.5	
KN2	1.5	5	5H:1V	0.005		N/A	AASHTO No. 1 Stone	12	1.5	16-oz geotextile	West	100-year	9	0.051	1.4	0.3	1.0	0.33	0.9	N/A	0.6	
PE1	2.5	5	5H:1V	0.005	2460	N/A	AASHTO No. 1 Stone	12	2.5	16-oz geotextile	East	100-year	86	0.043	2.8	0.6	1.0	0.44	2.0	N/A	0.5	
PE2	3.5	10	5H:1V	0.004	610	100	GDOT Type 3 Riprap	15	3.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	166	0.067	2.2	1.6	5.0	0.28	3.0	0.1	0.5	
PE3	4.5	10	5H:1V	0.004	390	N/A	GDOT Type 3 Riprap	15	4.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	275	0.063	2.6	1.0	5.0	0.31	3.7	N/A	0.8	
PE4	5.0	10	5H:1V	0.004	400	N/A	GDOT Type 3 Riprap	15	5.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	360	0.061	2.8	1.1	5.0	0.32	4.1	N/A	0.9	
PE5	4.5	10	5H:1V	0.008	580	N/A	GDOT Type 3 Riprap	15	4.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	460	0.062	3.9	2.1	5.0	0.44	4.0	N/A	0.5	
PE6	6.0	10	5H:1V	0.011	860	100	GDOT Type 1 Riprap	24	6.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	800	0.074	4.3	7.1	12.0	0.44	5.2	0.4	0.8	
PE7	6.0	10	5H:1V	0.004	900	N/A	GDOT Type 3 Riprap	15	6.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	770	0.057	3.7	1.5	5.0	0.37	5.5	N/A	0.5	
PW1	2.0	10	5H:1V	0.005	2750	200	AASHTO No. 1 Stone	12	2.0	16-oz geotextile	West	100-year	53	0.045	2.3	0.5	1.0	0.41	1.4	0	0.6	
PW2	4.0	10	5H:1V	0.005	750	400	GDOT Type 3 Riprap	15	4.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	254	0.064	2.7	1.2	5.0	0.32	3.5	0	0.5	
PW3	5.5	10	5H:1V	0.005	500	100	GDOT Type 3 Riprap	15	5.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	587	0.059	3.5	3.0	5.0	0.37	4.9	0.2	0.6	
PW4	5.5	10	5H:1V	0.004	2500	400	GDOT Type 3 Riprap	15	5.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	327	0.094	1.9	1.9	5.0	0.2	5.0	0	0.5	
PW5	4.0	20	5H:1V	0.005	700	N/A	GDOT Type 3 Riprap	15	4.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	355	0.006	2.9	1.0	5.0	0.34	3.3	N/A	0.7	
PW6	5.0	20	5H:1V	0.005	350	400	GDOT Type 3 Riprap	15	5.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	590	0.060	3.5	1.8	5.0	0.37	4.2	0.1	0.8	
PW7	5.5	20	5H:1V	0.005	300	400	GDOT Type 3 Riprap	15	5.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	905	0.057	4.0	2.3	5.0	0.39	5.0	0.1	0.5	
PW8	6.5	20	5H:1V	0.006	200	400	GDOT Type 3 Riprap	15	6.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	1508	0.055	5.0	3.5	5.0	0.45	6.0	0.2	0.5	

PW9	7.0	20	5H:1V	0.005	200	N/A	GDOT Type 3 Riprap	15	7.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	1545	0.055	4.7	2.0	5.0	0.42	6.3	N/A	0.7	
PW10	6.0	20	5H:1V	0.020	300	N/A	GDOT Type 1 Riprap	36	6.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	West	100-year	1543	0.072	6.5	6.5	12.0	0.63	5.2	N/A	0.8	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
OW1	2.5	5	5H:1V	0.005	1630	N/A	NA Green Vmax P550 TRM	N/A	2.5	N/A	West	100-year	26	0.140	4.4	0.7	13.0	0.13	2.0	N/A	0.5	See note 3 below.
OW2	3.0	5	5H:1V	0.005	2275	N/A	NA Green Vmax P550 TRM	N/A	3.0	N/A	West	100-year	50	0.113	5.2	0.8	13.0	0.17	2.5	N/A	0.5	See note 3 below.
OW3	2.5	5	5H:1V	0.010	1500	N/A	NA Green Vmax P550 TRM	N/A	2.5	N/A	West	100-year	24	0.140	5.5	1.0	13.0	0.19	1.7	N/A	0.8	See note 3 below.
DRC	1.5	5	3H:1V	0.120	200	N/A	NA Green Vmax P550 TRM	N/A	1.5	N/A	West	100-year	11	0.120	10.4	4.8	13.0	0.57	0.7	N/A	0.8	See note 3 below.
WTC	1.5	5	3H:1V	0.130	180	N/A	NA Green Vmax P550 TRM	N/A	1.5	N/A	West	100-year	8	0.160	9.7	4.8	13.0	0.53	0.6	N/A	0.9	See note 3 below.
SW1	2.0	5	5H:1V	0.030	40	100	GDOT Type 3 Riprap	24	2.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	wEST	100-year	60	0.074	3.3	4.2	5.0	0.6	1.5	0.1	0.5	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.

Notes:

1. All values calculated using Hydraulic Toolbox which utilized the methodology and equations found in HEC-15.

2. Riprap proposed for channels with a minimum turn radius to extend all the way through the proposed turn.

Checked: J. Bacic

Date: 4/17/2020

Channel	Min. Channel Depth (ft)	Channel Bottom Width (ft)	Channel Side Slopes	Channel Slope (ft/ft)	Approx. Length (ft)	Min. Turn Radius into Downstream	Armoring	Armoring Thickness (in)	Armoring Depth (ft)	Bedding	HydroCAD Model	Design Storm	Peak Inflow (ft3/s)	Manning's n	Max Velocity (ft/s)	Max Shear (lb/ft^2)	Allowable Shear (lb/ft^2)	Froude Number	Peak Flow Depth (ft)	Turn Radius Bend Run-up (ft)	Freeboard (ft)	Notes
R1	2.5	20	4H:1V	0.016	2000	N/A	NA Green Vmax P550 TRM	N/A	2.5	N/A	East	100-year	209	0.071	10.3	2.0	13.0	0.50	2.1	N/A	0.4	See Note 3 below.
R2	2.0	10	4H:1V	0.039	850	N/A	NA Green Vmax P550 TRM	N/A	2.0	N/A	East	100-year	68	0.087	11.1	3.3	13.0	0.59	1.3	N/A	0.7	See Note 3 below.
R3	3.0	20	4H:1V	0.017	750	N/A	NA Green Vmax P550 TRM	N/A	3.0	N/A	East	100-year	304	0.064	11.9	2.5	13.0	0.58	2.4	N/A	0.6	See Note 3 below.
R4	2.5	10	4H:1V	0.025	900	N/A	NA Green Vmax P550 TRM	N/A	2.5	N/A	East	100-year	124	0.074	11.7	3.0	13.0	0.58	1.9	N/A	0.6	See Note 3 below.
R5	4.5	20	4H:1V	0.003	875	N/A	NA Green Vmax P550 TRM	N/A	4.5	N/A	East	100-year	311	0.068	6.7	0.7	13.0	0.25	3.9	N/A	0.6	See Note 3 below.
R6	2.0	10	4H:1V	0.038	950	N/A	NA Green Vmax P550 TRM	N/A	2.0	N/A	East	100-year	83	0.082	11.9	3.5	13.0	0.62	1.5	N/A	0.5	See Note 3 below.
R7	2.0	12	4H:1V	0.046	850	N/A	NA Green Vmax P550 TRM	N/A	2.0	N/A	East	100-year	88	0.082	12.3	3.8	13.0	0.68	1.3	N/A	0.7	See Note 3 below.
R8	5.0	12	4H:1V	0.006	2000	N/A	NA Green Vmax P550 TRM	N/A	5.0	N/A	East	100-year	455	0.059	10.0	1.6	13.0	0.40	4.2	N/A	0.8	See Note 3 below.
R9	4.0	5	4H:1V	0.003	1500	N/A	NA Green Vmax P550 TRM	N/A	4.0	N/A	East	100-year	89	0.092	5.3	0.7	13.0	0.17	3.5	N/A	0.5	See Note 3 below.
R10	3.0	5	4H:1V	0.004	400	N/A	NA Green Vmax P550 TRM	N/A	3.0	N/A	East	100-year	32	0.120	4.6	0.6	13.0	0.14	2.4	N/A	0.6	See Note 3 below.
R11	3.0	20	4H:1V	0.003	1500	N/A	NA Green Vmax P550 TRM	N/A	3.0	N/A	East	100-year	372	0.025	7.0	0.5	13.0	0.82	2.5	N/A	0.5	See Note 3 below.
AR1	1.5	2	4H:1V	0.065	310	N/A	NA Green Vmax P550 TRM	N/A	1.5	N/A	East	100-year	12	0.140	9.9	4.1	13.0	0.44	1.0	N/A	0.5	See Note 3 below.
AR2	2.5	2	4H:1V	0.022	465	N/A	NA Green Vmax P550 TRM	N/A	2.5	N/A	East	100-year	27	0.110	8.4	2.3	13.0	0.34	1.7	N/A	0.8	See Note 3 below.
AR3	2.0	2	4H:1V	0.046	260	N/A	NA Green Vmax P550 TRM	N/A	2.0	N/A	East	100-year	18	0.130	9.8	3.6	13.0	0.43	1.3	N/A	0.7	See Note 3 below.
AR4	2.0	2	4H:1V	0.056	250	N/A	NA Green Vmax P550 TRM	N/A	2.0	N/A	East	100-year	18	0.120	10.5	4.1	13.0	0.48	1.2	N/A	0.8	See Note 3 below.
AR5	2.0	2	4H:1V	0.050	590	N/A	NA Green Vmax P550 TRM	N/A	2.0	N/A	East	100-year	22	0.110	11.4	4.6	13.0	0.54	1.2	N/A	0.8	See Note 3 below.
OE1	2.5	5	3H:1V	0.012	2100	N/A	NA Green Vmax P550 TRM	N/A	2.5	N/A	East	100-year	25	0.120	6.4	1.3	13.0	0.25	1.7	N/A	0.8	See Note 3 below.
OE2	1.5	5	3H:1V	0.062	550	100	GDOT Type 3 Riprap	24	1.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	25	0.067	4.0	3.4	5.0	0.89	0.8	0.1	0.7	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
B0	6.0	35	5H:1V	0.010	50	N/A	GDOT Type 1 Riprap	36	6.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	1000-year	1575	0.070	5.0	3.2	12.0	0.46	5.2	N/A	0.8	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
B1	5.0	35	5H:1V	0.022	600	400	GDOT Type 1 Riprap	36	5.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	1000-year	1575	0.073	6.4	9.0	12.0	0.64	4.3	0.3	0.7	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
B2	5.0	35	5H:1V	0.013	770	N/A	GDOT Type 3 Riprap	15	5.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	1545	0.058	6.3	3.5	5.0	0.62	4.3	N/A	0.7	
B3	2.5	15	3H:1V	0.005	800	650	AASHTO No. 1 Stone	12	2.5	16-oz geotextile	East	100-year	150	0.041	3.5	0.7	1.0	0.48	2.0	0.1	0.5	
B4	2.5	15	3H:1V	0.045	600	N/A	GDOT Type 3 Riprap	24	2.5	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	178	0.074	5.1	4.8	5.0	0.78	1.7	N/A	0.8	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
B5	3.0	15	3H:1V	0.010	250	N/A	GDOT Type 3 Riprap	15	3.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	100-year	178	0.068	3.3	1.5	5.0	0.42	2.5	N/A	0.5	
ESA	2.0	20	3H:1V	0.070	240	150	GDOT Type 1 Riprap	36	2.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	500-year	150	0.075	5.3	7.6	12.0	0.93	1.2	0.2	0.8	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
ESB	1.0	20	3H:1V	0.027	510	N/A	GDOT Type 3 Riprap	24	1.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	500-year	15	0.048	2.3	1.0	5.0	0.73	0.3	N/A	0.7	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.
ESC	1.0	20	3H:1V	0.043	350	N/A	GDOT Type 3 Riprap	24	1.0	12" AASHTO No. 57 Stone, 300-mil geocomposite	East	500-year	34	0.099	2.3	1.8	5.0	0.50	0.7	N/A	0.3	Thickness of 1.5*D100 is selected for all slopes at 2% or steeper.

__Notes:__

1. All values calculated using Hydraulic Toolbox which utilized the methodology and equations found in HEC-15.

2. Riprap proposed for channels with a minimum turn radius to extend all the way through the proposed turn.

Closure Culvert Summary Table

Calculated By:	Nick Fischer	8/28/2020
Checked By:	Andrew McAviniew	8/28/2020

Approx. Location	Pipe Material	Size	FlowDepth (ft)	Quantity	Q100 (cfs)	V100 (ft/s)	Fr100	Slope (ft/ft)	Upstream Invert (ft)	Downstream Invert (ft)	Peak Upstream WSE (ft)	Road/Berm Elevation at Sta. (ft)	Freeboard (ft)
Closure Cap Letdown	Concrete Box Culvert	10'(W) x 5'(H)	5.0	3	1090	8.4	0.66	0.003	458.0	457.9	463.6	465.0	1.4
Detention Basin A Outlet	HDPE	DR-17 IPS 42"	3.1	1	126	17.2	1.73	0.006	432.0	430.5	449.2	451.0	1.8
Detention Basin B Outlet	HDPE	DR-7 IPS 18"	1.1	1	9	10.5	1.81	0.007	451.0	450.0	461.9	463.0	1.1
Detention Basin C Outlet	HDPE	DR-7 IPS 18"	1.1	1	10	10.9	1.87	0.007	453.0	452.0	464.7	466.0	1.3
D. Basin. Access Road Approx. Sta. 8+00	RCP	24"	2.0	2	27	4.5	0.56	0.029	480.0	476.0	481.8	484.0	2.2
D. Basin. Access Road Approx. Sta. 11+00	RCP	48"	4.0	1	18	4.2	0.37	0.067	477.0	469.0	478.5	484.0	5.5
East Staging Area Pond Outlet Channel Culverts 1	RCP	36"	3.0	2	66	5.4	0.55	0.034	494.5	492.5	497.0	498.0	1.0
East Staging Area Pond Outlet Channel Culverts 2	RCP	36"	3.0	2	66	5.4	0.55	0.042	479.7	477.1	483.9	484.0	0.1
Culvert from Western Closure Cap Perimeter Channel to SW Outlet Channel	Concrete Box Culvert	5'(W) x 3'(H)	3.0	1	57	4.9	0.50	0.020	483.0	482.0	485.3	486.0	0.7
SW Outlet Channel Arch Culvert	Arch Culvert (See plans)	66' (W) x 23' (H)	6	1	1535	5	0.45	0.006	477.0	476.4	484.2	520	35.8

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Friday, March 13, 2020

Project Units: U.S. Customary Units

Notes:

Channel Analysis: R1 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0160 ft/ft

Manning's n: 0.0707

Lining Type: Vegetative - Class B

Flow: 209.0000 cfs

Result Parameters

Depth: 2.0589 ft

Area of Flow: 58.1339 ft^2

Wetted Perimeter: 36.9780 ft

Hydraulic Radius: 1.5721 ft

Average Velocity: 3.5951 ft/s

Top Width: 36.4711 ft

Froude Number: 0.5018

Critical Depth: 1.3650 ft

Critical Velocity: 6.0141 ft/s

Critical Slope: 0.0710 ft/ft

Critical Top Width: 30.92 ft

Calculated Max Shear Stress: 2.0556 lb/ft^2

Calculated Avg Shear Stress: 1.5696 lb/ft^2

Channel Analysis: R1 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0160 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 209.0000 cfs

Result Parameters

Depth: 0.8638 ft

Area of Flow: 20.2596 ft^2

Wetted Perimeter: 27.1228 ft

Hydraulic Radius: 0.7470 ft

Average Velocity: 10.3161 ft/s

Top Width: 26.9101 ft

Froude Number: 2.0952

Critical Depth: 1.3650 ft

Critical Velocity: 6.0138 ft/s

Critical Slope: 0.0032 ft/ft

Critical Top Width: 30.92 ft

Calculated Max Shear Stress: 0.8624 lb/ft^2

Calculated Avg Shear Stress: 0.7458 lb/ft^2

Channel Analysis: R2 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0390 ft/ft

Manning's n: 0.0873

Lining Type: Vegetative - Class B

Flow: 68.0000 cfs

Result Parameters

Depth: 1.3381 ft

Area of Flow: 20.5434 ft^2

Wetted Perimeter: 21.0344 ft

Hydraulic Radius: 0.9767 ft

Average Velocity: 3.3101 ft/s

Top Width: 20.7049 ft

Froude Number: 0.5856

Critical Depth: 0.9828 ft

Critical Velocity: 4.9667 ft/s

Critical Slope: 0.1235 ft/ft

Critical Top Width: 17.86 ft

Calculated Max Shear Stress: 3.2564 lb/ft^2

Calculated Avg Shear Stress: 2.3768 lb/ft^2

Channel Analysis: R2 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0390 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 68.0000 cfs

Result Parameters

Depth: 0.5071 ft

Area of Flow: 6.0997 ft^2

Wetted Perimeter: 14.1817 ft

Hydraulic Radius: 0.4301 ft

Average Velocity: 11.1481 ft/s

Top Width: 14.0568 ft

Froude Number: 2.9824

Critical Depth: 0.9830 ft

Critical Velocity: 4.9652 ft/s

Critical Slope: 0.0036 ft/ft

Critical Top Width: 17.86 ft

Calculated Max Shear Stress: 1.2341 lb/ft^2

Calculated Avg Shear Stress: 1.0467 lb/ft^2

Channel Analysis: R3 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0170 ft/ft

Manning's n: 0.0638

Lining Type: Vegetative - Class B

Flow: 304.0000 cfs

Result Parameters

Depth: 2.3454 ft

Area of Flow: 68.9120 ft^2

Wetted Perimeter: 39.3407 ft

Hydraulic Radius: 1.7517 ft

Average Velocity: 4.4114 ft/s

Top Width: 38.7633 ft

Froude Number: 0.5831

Critical Depth: 1.7101 ft

Critical Velocity: 6.6230 ft/s

Critical Slope: 0.0544 ft/ft

Critical Top Width: 33.68 ft

Calculated Max Shear Stress: 2.4880 lb/ft^2

Calculated Avg Shear Stress: 1.8582 lb/ft^2

Channel Analysis: R3 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0170 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 304.0000 cfs

Result Parameters

Depth: 1.0522 ft

Area of Flow: 25.4735 ft^2

Wetted Perimeter: 28.6769 ft

Hydraulic Radius: 0.8883 ft

Average Velocity: 11.9340 ft/s

Top Width: 28.4179 ft

Froude Number: 2.2213

Critical Depth: 1.7102 ft

Critical Velocity: 6.6227 ft/s

Critical Slope: 0.0030 ft/ft

Critical Top Width: 33.68 ft

Calculated Max Shear Stress: 1.1162 lb/ft^2

Calculated Avg Shear Stress: 0.9423 lb/ft^2

Channel Analysis: R4 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0250 ft/ft

Manning's n: 0.0750

Lining Type: Vegetative - Class B

Flow: 123.0000 cfs

Result Parameters

Depth: 1.8851 ft

Area of Flow: 33.0649 ft^2

Wetted Perimeter: 25.5448 ft

Hydraulic Radius: 1.2944 ft

Average Velocity: 3.7200 ft/s

Top Width: 25.0806 ft

Froude Number: 0.5709

Critical Depth: 1.3826 ft

Critical Velocity: 5.7285 ft/s

Critical Slope: 0.0832 ft/ft

Critical Top Width: 21.06 ft

Calculated Max Shear Stress: 2.9407 lb/ft^2

Calculated Avg Shear Stress: 2.0192 lb/ft^2

Channel Analysis: R4 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0250 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 123.0000 cfs

Result Parameters

Depth: 0.8025 ft

Area of Flow: 10.6012 ft^2

Wetted Perimeter: 16.6177 ft

Hydraulic Radius: 0.6379 ft

Average Velocity: 11.6024 ft/s

Top Width: 16.4201 ft

Froude Number: 2.5447

Critical Depth: 1.3823 ft

Critical Velocity: 5.7303 ft/s

Critical Slope: 0.0033 ft/ft

Critical Top Width: 21.06 ft

Calculated Max Shear Stress: 1.2519 lb/ft^2

Calculated Avg Shear Stress: 0.9952 lb/ft^2

Channel Analysis: R5 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0684

Lining Type: Vegetative - Class B

Flow: 311.0000 cfs

Result Parameters

Depth: 3.8591 ft

Area of Flow: 136.7548 ft^2

Wetted Perimeter: 51.8233 ft

Hydraulic Radius: 2.6389 ft

Average Velocity: 2.2741 ft/s

Top Width: 50.8731 ft

Froude Number: 0.2444

Critical Depth: 1.7342 ft

Critical Velocity: 6.6574 ft/s

Critical Slope: 0.0621 ft/ft

Critical Top Width: 33.87 ft

Calculated Max Shear Stress: 0.7224 lb/ft^2

Calculated Avg Shear Stress: 0.4940 lb/ft^2

Channel Analysis: R5 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 313.0000 cfs

Result Parameters

Depth: 1.7389 ft

Area of Flow: 46.8715 ft^2

Wetted Perimeter: 34.3390 ft

Hydraulic Radius: 1.3650 ft

Average Velocity: 6.6778 ft/s

Top Width: 33.9108 ft

Froude Number: 1.0010

Critical Depth: 1.7404 ft

Critical Velocity: 6.6705 ft/s

Critical Slope: 0.0030 ft/ft

Critical Top Width: 33.92 ft

Calculated Max Shear Stress: 0.3255 lb/ft^2

Calculated Avg Shear Stress: 0.2555 lb/ft^2

Channel Analysis: R6 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0380 ft/ft

Manning's n: 0.0822

Lining Type: Vegetative - Class B

Flow: 83.0000 cfs

Result Parameters

Depth: 1.4495 ft

Area of Flow: 22.8986 ft^2

Wetted Perimeter: 21.9526 ft

Hydraulic Radius: 1.0431 ft

Average Velocity: 3.6247 ft/s

Top Width: 21.5958 ft

Froude Number: 0.6203

Critical Depth: 1.1039 ft

Critical Velocity: 5.2154 ft/s

Critical Slope: 0.1061 ft/ft

Critical Top Width: 18.83 ft

Calculated Max Shear Stress: 3.4370 lb/ft^2

Calculated Avg Shear Stress: 2.4734 lb/ft^2

Channel Analysis: R6 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0380 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 83.0000 cfs

Result Parameters

Depth: 0.5721 ft

Area of Flow: 7.0304 ft^2

Wetted Perimeter: 14.7178 ft

Hydraulic Radius: 0.4777 ft

Average Velocity: 11.8059 ft/s

Top Width: 14.5769 ft

Froude Number: 2.9958

Critical Depth: 1.1040 ft

Critical Velocity: 5.2151 ft/s

Critical Slope: 0.0035 ft/ft

Critical Top Width: 18.83 ft

Calculated Max Shear Stress: 1.3566 lb/ft^2

Calculated Avg Shear Stress: 1.1327 lb/ft^2

Channel Analysis: R7 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 12.0000 ft

Longitudinal Slope: 0.0460 ft/ft

Manning's n: 0.0817

Lining Type: Vegetative - Class B

Flow: 88.0000 cfs

Result Parameters

Depth: 1.3141 ft

Area of Flow: 22.6757 ft^2

Wetted Perimeter: 22.8360 ft

Hydraulic Radius: 0.9930 ft

Average Velocity: 3.8808 ft/s

Top Width: 22.5125 ft

Froude Number: 0.6814

Critical Depth: 1.0492 ft

Critical Velocity: 5.1784 ft/s

Critical Slope: 0.1052 ft/ft

Critical Top Width: 20.39 ft

Calculated Max Shear Stress: 3.7719 lb/ft^2

Calculated Avg Shear Stress: 2.8503 lb/ft^2

Channel Analysis: R7 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 12.0000 ft

Longitudinal Slope: 0.0460 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 88.0000 cfs

Result Parameters

Depth: 0.5093 ft

Area of Flow: 7.1499 ft^2

Wetted Perimeter: 16.2002 ft

Hydraulic Radius: 0.4413 ft

Average Velocity: 12.3079 ft/s

Top Width: 16.0748 ft

Froude Number: 3.2522

Critical Depth: 1.0491 ft

Critical Velocity: 5.1788 ft/s

Critical Slope: 0.0035 ft/ft

Critical Top Width: 20.39 ft

Calculated Max Shear Stress: 1.4620 lb/ft^2

Calculated Avg Shear Stress: 1.2668 lb/ft^2

Channel Analysis: R8 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Channel Width: 12.0000 ft
Longitudinal Slope: 0.0060 ft/ft
Manning's n: 0.0591
Lining Type: Vegetative - Class B
Flow: 455.0000 cfs

Result Parameters

Depth: 4.2434 ft
Area of Flow: 122.9472 ft^2
Wetted Perimeter: 46.9921 ft
Hydraulic Radius: 2.6163 ft
Average Velocity: 3.7008 ft/s
Top Width: 45.9473 ft
Froude Number: 0.3987
Critical Depth: 2.6461 ft
Critical Velocity: 7.6135 ft/s
Critical Slope: 0.0429 ft/ft
Critical Top Width: 33.17 ft
Calculated Max Shear Stress: 1.5887 lb/ft^2
Calculated Avg Shear Stress: 0.9796 lb/ft^2

Channel Analysis: R8 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 12.0000 ft

Longitudinal Slope: 0.0060 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 455.0000 cfs

Result Parameters

Depth: 2.1783 ft

Area of Flow: 45.1198 ft^2

Wetted Perimeter: 29.9628 ft

Hydraulic Radius: 1.5059 ft

Average Velocity: 10.0843 ft/s

Top Width: 29.4265 ft

Froude Number: 1.4352

Critical Depth: 2.6460 ft

Critical Velocity: 7.6140 ft/s

Critical Slope: 0.0028 ft/ft

Critical Top Width: 33.17 ft

Calculated Max Shear Stress: 0.8156 lb/ft^2

Calculated Avg Shear Stress: 0.5638 lb/ft^2

Channel Analysis: R9 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0920

Lining Type: Vegetative - Class B

Flow: 89.0000 cfs

Result Parameters

Depth: 3.4459 ft

Area of Flow: 64.7251 ft^2

Wetted Perimeter: 33.4153 ft

Hydraulic Radius: 1.9370 ft

Average Velocity: 1.3750 ft/s

Top Width: 32.5669 ft

Froude Number: 0.1719

Critical Depth: 1.4730 ft

Critical Velocity: 5.5473 ft/s

Critical Slope: 0.1288 ft/ft

Critical Top Width: 16.78 ft

Calculated Max Shear Stress: 0.6451 lb/ft^2

Calculated Avg Shear Stress: 0.3626 lb/ft^2

Channel Analysis: R9 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 89.0000 cfs

Result Parameters

Depth: 1.5201 ft

Area of Flow: 16.8437 ft^2

Wetted Perimeter: 17.5352 ft

Hydraulic Radius: 0.9606 ft

Average Velocity: 5.2839 ft/s

Top Width: 17.1610 ft

Froude Number: 0.9399

Critical Depth: 1.4731 ft

Critical Velocity: 5.5468 ft/s

Critical Slope: 0.0034 ft/ft

Critical Top Width: 16.78 ft

Calculated Max Shear Stress: 0.2846 lb/ft^2

Calculated Avg Shear Stress: 0.1798 lb/ft^2

Channel Analysis: R10 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0040 ft/ft

Manning's n: 0.1262

Lining Type: Vegetative - Class B

Flow: 32.0000 cfs

Result Parameters

Depth: 2.3718 ft

Area of Flow: 34.3603 ft^2

Wetted Perimeter: 24.5582 ft

Hydraulic Radius: 1.3991 ft

Average Velocity: 0.9313 ft/s

Top Width: 23.9742 ft

Froude Number: 0.1371

Critical Depth: 0.8575 ft

Critical Velocity: 4.4268 ft/s

Critical Slope: 0.2801 ft/ft

Critical Top Width: 11.86 ft

Calculated Max Shear Stress: 0.5920 lb/ft^2

Calculated Avg Shear Stress: 0.3492 lb/ft^2

Channel Analysis: R10 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0040 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 32.0000 cfs

Result Parameters

Depth: 0.8552 ft

Area of Flow: 7.2012 ft^2

Wetted Perimeter: 12.0520 ft

Hydraulic Radius: 0.5975 ft

Average Velocity: 4.4437 ft/s

Top Width: 11.8414 ft

Froude Number: 1.0042

Critical Depth: 0.8567 ft

Critical Velocity: 4.4325 ft/s

Critical Slope: 0.0040 ft/ft

Critical Top Width: 11.85 ft

Calculated Max Shear Stress: 0.2135 lb/ft^2

Calculated Avg Shear Stress: 0.1491 lb/ft^2

Channel Analysis: R11 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0250

Lining Type: Vegetative - Class B

Flow: 372.0000 cfs

Result Parameters

Depth: 2.5163 ft

Area of Flow: 75.6516 ft^2

Wetted Perimeter: 40.7496 ft

Hydraulic Radius: 1.8565 ft

Average Velocity: 4.9173 ft/s

Top Width: 40.1301 ft

Froude Number: 0.6311

Critical Depth: 1.9274 ft

Critical Velocity: 6.9654 ft/s

Critical Slope: 0.0081 ft/ft

Critical Top Width: 35.42 ft

Calculated Max Shear Stress: 0.4710 lb/ft^2

Calculated Avg Shear Stress: 0.3475 lb/ft^2

Channel Analysis: R11 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0030 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 372.0000 cfs

Result Parameters

Depth: 1.9117 ft

Area of Flow: 52.8514 ft^2

Wetted Perimeter: 35.7641 ft

Hydraulic Radius: 1.4778 ft

Average Velocity: 7.0386 ft/s

Top Width: 35.2934 ft

Froude Number: 1.0136

Critical Depth: 1.9275 ft

Critical Velocity: 6.9646 ft/s

Critical Slope: 0.0029 ft/ft

Critical Top Width: 35.42 ft

Calculated Max Shear Stress: 0.3579 lb/ft^2

Calculated Avg Shear Stress: 0.2766 lb/ft^2

Channel Analysis: R11 - VEG, Steep End

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0300 ft/ft

Manning's n: 0.0595

Lining Type: Vegetative - Class B

Flow: 372.0000 cfs

Result Parameters

Depth: 2.1607 ft

Area of Flow: 61.8892 ft^2

Wetted Perimeter: 37.8177 ft

Hydraulic Radius: 1.6365 ft

Average Velocity: 6.0107 ft/s

Top Width: 37.2857 ft

Froude Number: 0.8222

Critical Depth: 1.9277 ft

Critical Velocity: 6.9641 ft/s

Critical Slope: 0.0457 ft/ft

Critical Top Width: 35.42 ft

Calculated Max Shear Stress: 4.0449 lb/ft^2

Calculated Avg Shear Stress: 3.0636 lb/ft^2

Channel Analysis: AR1 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0650 ft/ft

Manning's n: 0.1385

Lining Type: Vegetative - Class B

Flow: 12.0000 cfs

Result Parameters

Depth: 1.0197 ft

Area of Flow: 6.1990 ft^2

Wetted Perimeter: 10.4090 ft

Hydraulic Radius: 0.5955 ft

Average Velocity: 1.9358 ft/s

Top Width: 10.1579 ft

Froude Number: 0.4367

Critical Depth: 0.6811 ft

Critical Velocity: 3.7295 ft/s

Critical Slope: 0.3809 ft/ft

Critical Top Width: 7.45 ft

Calculated Max Shear Stress: 4.1361 lb/ft^2

Calculated Avg Shear Stress: 2.4155 lb/ft^2

Channel Analysis: AR1 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0650 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 12.0000 cfs

Result Parameters

Depth: 0.3543 ft

Area of Flow: 1.2108 ft^2

Wetted Perimeter: 4.9217 ft

Hydraulic Radius: 0.2460 ft

Average Velocity: 9.9111 ft/s

Top Width: 4.8345 ft

Froude Number: 3.4901

Critical Depth: 0.6811 ft

Critical Velocity: 3.7295 ft/s

Critical Slope: 0.0045 ft/ft

Critical Top Width: 7.45 ft

Calculated Max Shear Stress: 1.4371 lb/ft^2

Calculated Avg Shear Stress: 0.9978 lb/ft^2

Channel Analysis: AR2 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0220 ft/ft

Manning's n: 0.1136

Lining Type: Vegetative - Class B

Flow: 27.0000 cfs

Result Parameters

Depth: 1.6811 ft

Area of Flow: 14.6667 ft^2

Wetted Perimeter: 15.8628 ft

Hydraulic Radius: 0.9246 ft

Average Velocity: 1.8409 ft/s

Top Width: 15.4489 ft

Froude Number: 0.3330

Critical Depth: 1.0113 ft

Critical Velocity: 4.4163 ft/s

Critical Slope: 0.2295 ft/ft

Critical Top Width: 10.09 ft

Calculated Max Shear Stress: 2.3078 lb/ft^2

Calculated Avg Shear Stress: 1.2693 lb/ft^2

Channel Analysis: AR2 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0220 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 27.0000 cfs

Result Parameters

Depth: 0.6855 ft

Area of Flow: 3.2509 ft^2

Wetted Perimeter: 7.6530 ft

Hydraulic Radius: 0.4248 ft

Average Velocity: 8.3055 ft/s

Top Width: 7.4842 ft

Froude Number: 2.2208

Critical Depth: 1.0111 ft

Critical Velocity: 4.4177 ft/s

Critical Slope: 0.0040 ft/ft

Critical Top Width: 10.09 ft

Calculated Max Shear Stress: 0.9411 lb/ft^2

Calculated Avg Shear Stress: 0.5831 lb/ft^2

Channel Analysis: AR3 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0460 ft/ft

Manning's n: 0.1227

Lining Type: Vegetative - Class B

Flow: 18.0000 cfs

Result Parameters

Depth: 1.2471 ft

Area of Flow: 8.7147 ft^2

Wetted Perimeter: 12.2835 ft

Hydraulic Radius: 0.7095 ft

Average Velocity: 2.0655 ft/s

Top Width: 11.9764 ft

Froude Number: 0.4267

Critical Depth: 0.8318 ft

Critical Velocity: 4.0619 ft/s

Critical Slope: 0.2833 ft/ft

Critical Top Width: 8.65 ft

Calculated Max Shear Stress: 3.5795 lb/ft^2

Calculated Avg Shear Stress: 2.0364 lb/ft^2

Channel Analysis: AR3 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0460 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 18.0000 cfs

Result Parameters

Depth: 0.4728 ft

Area of Flow: 1.8395 ft^2

Wetted Perimeter: 5.8985 ft

Hydraulic Radius: 0.3119 ft

Average Velocity: 9.7850 ft/s

Top Width: 5.7821 ft

Froude Number: 3.0572

Critical Depth: 0.8317 ft

Critical Velocity: 4.0632 ft/s

Critical Slope: 0.0042 ft/ft

Critical Top Width: 8.65 ft

Calculated Max Shear Stress: 1.3570 lb/ft^2

Calculated Avg Shear Stress: 0.8952 lb/ft^2

Channel Analysis: AR4 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0560 ft/ft

Manning's n: 0.1206

Lining Type: Vegetative - Class B

Flow: 18.0000 cfs

Result Parameters

Depth: 1.1853 ft

Area of Flow: 7.9899 ft^2

Wetted Perimeter: 11.7739 ft

Hydraulic Radius: 0.6786 ft

Average Velocity: 2.2528 ft/s

Top Width: 11.4821 ft

Froude Number: 0.4759

Critical Depth: 0.8319 ft

Critical Velocity: 4.0615 ft/s

Critical Slope: 0.2735 ft/ft

Critical Top Width: 8.66 ft

Calculated Max Shear Stress: 4.1418 lb/ft^2

Calculated Avg Shear Stress: 2.3713 lb/ft^2

Channel Analysis: AR4 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0560 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 18.0000 cfs

Result Parameters

Depth: 0.4507 ft

Area of Flow: 1.7141 ft^2

Wetted Perimeter: 5.7168 ft

Hydraulic Radius: 0.2998 ft

Average Velocity: 10.5012 ft/s

Top Width: 5.6058 ft

Froude Number: 3.3467

Critical Depth: 0.8317 ft

Critical Velocity: 4.0629 ft/s

Critical Slope: 0.0042 ft/ft

Critical Top Width: 8.65 ft

Calculated Max Shear Stress: 1.5750 lb/ft^2

Calculated Avg Shear Stress: 1.0477 lb/ft^2

Channel Analysis: AR5 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0600 ft/ft

Manning's n: 0.1117

Lining Type: Vegetative - Class B

Flow: 22.0000 cfs

Result Parameters

Depth: 1.2329 ft

Area of Flow: 8.5457 ft^2

Wetted Perimeter: 12.1666 ft

Hydraulic Radius: 0.7024 ft

Average Velocity: 2.5744 ft/s

Top Width: 11.8630 ft

Froude Number: 0.5345

Critical Depth: 0.9168 ft

Critical Velocity: 4.2345 ft/s

Critical Slope: 0.2285 ft/ft

Critical Top Width: 9.33 ft

Calculated Max Shear Stress: 4.6159 lb/ft^2

Calculated Avg Shear Stress: 2.6298 lb/ft^2

Channel Analysis: AR5 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Channel Width: 2.0000 ft

Longitudinal Slope: 0.0600 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 22.0000 cfs

Result Parameters

Depth: 0.4893 ft

Area of Flow: 1.9362 ft^2

Wetted Perimeter: 6.0348 ft

Hydraulic Radius: 0.3208 ft

Average Velocity: 11.3625 ft/s

Top Width: 5.9143 ft

Froude Number: 3.4996

Critical Depth: 0.9169 ft

Critical Velocity: 4.2335 ft/s

Critical Slope: 0.0041 ft/ft

Critical Top Width: 9.34 ft

Calculated Max Shear Stress: 1.8319 lb/ft^2

Calculated Avg Shear Stress: 1.2012 lb/ft^2

Channel Analysis: OE1 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0120 ft/ft

Manning's n: 0.1162

Lining Type: Vegetative - Class B

Flow: 25.0000 cfs

Result Parameters

Depth: 1.6845 ft

Area of Flow: 16.9353 ft^2

Wetted Perimeter: 15.6538 ft

Hydraulic Radius: 1.0819 ft

Average Velocity: 1.4762 ft/s

Top Width: 15.1071 ft

Froude Number: 0.2457

Critical Depth: 0.7804 ft

Critical Velocity: 4.3634 ft/s

Critical Slope: 0.2424 ft/ft

Critical Top Width: 9.68 ft

Calculated Max Shear Stress: 1.2614 lb/ft^2

Calculated Avg Shear Stress: 0.8101 lb/ft^2

Channel Analysis: OE1 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0120 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 25.0000 cfs

Result Parameters

Depth: 0.5804 ft

Area of Flow: 3.9126 ft^2

Wetted Perimeter: 8.6708 ft

Hydraulic Radius: 0.4512 ft

Average Velocity: 6.3896 ft/s

Top Width: 8.4824 ft

Froude Number: 1.6579

Critical Depth: 0.7807 ft

Critical Velocity: 4.3615 ft/s

Critical Slope: 0.0040 ft/ft

Critical Top Width: 9.68 ft

Calculated Max Shear Stress: 0.4346 lb/ft^2

Calculated Avg Shear Stress: 0.3379 lb/ft^2

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Tuesday, March 17, 2020

Project Units: U.S. Customary Units

Notes:

Channel Analysis: E. SP. BASIN C

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0430 ft/ft

Manning's n: 0.0991

Flow: 34.0000 cfs

Result Parameters

Depth: 0.6831 ft

Area of Flow: 15.0612 ft^2

Wetted Perimeter: 24.3201 ft

Hydraulic Radius: 0.6193 ft

Average Velocity: 2.2575 ft/s

Top Width: 24.0984 ft

Froude Number: 0.5032

Critical Depth: 0.4381 ft

Critical Velocity: 3.6415 ft/s

Critical Slope: 0.1936 ft/ft

Critical Top Width: 22.63 ft

Calculated Max Shear Stress: 1.8328 lb/ft^2

Calculated Avg Shear Stress: 1.6617 lb/ft^2

Channel Lining Analysis: ESC Analysis

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.06245

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 0.833316

Manning's n method: Bathurst

Manning's n: 0.0991131

Channel Bottom Shear Results

V*: 0.972513

Reynold's Number: 59933

Shield's Parameter: 0.0598319

shear stress on channel bottom: 1.83282 lb/ft^2

Permissible shear stress for channel bottom: 4.60406 lb/ft^2

channel bottom is stable

Stable D50: 0.31721 ft

Channel Side Shear Results

K1: 0.868

K2: 0.879788

Kb: 0

shear stress on side of channel: 1.83282 lb/ft^2

Permissible shear stress for side of channel: 4.0506 lb/ft^2

Stable Side D50: 0.312959 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: E. SP. BASIN C

Channel Analysis: E. SP. BASIN B

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0270 ft/ft

Manning's n: 0.1520

Flow: 15.0000 cfs

Result Parameters

Depth: 0.6219 ft

Area of Flow: 13.5978 ft^2

Wetted Perimeter: 23.9331 ft

Hydraulic Radius: 0.5682 ft

Average Velocity: 1.1031 ft/s

Top Width: 23.7313 ft

Froude Number: 0.2568

Critical Depth: 0.2562 ft

Critical Velocity: 2.8190 ft/s

Critical Slope: 0.5391 ft/ft

Critical Top Width: 21.54 ft

Calculated Max Shear Stress: 1.0477 lb/ft^2

Calculated Avg Shear Stress: 0.9572 lb/ft^2

Channel Lining Analysis: ESB Analysis

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.01676

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 0.763989

Manning's n method: Bathurst

Manning's n: 0.151996

Channel Bottom Shear Results

V*: 0.735298

Reynold's Number: 45314.2

Shield's Parameter: 0.050421

shear stress on channel bottom: 1.04775 lb/ft^2

Permissible shear stress for channel bottom: 3.8799 lb/ft^2

channel bottom is stable

Stable D50: 0.205928 ft

Channel Side Shear Results

K1: 0.868

K2: 0.879788

Kb: 0

shear stress on side of channel: 1.04775 lb/ft^2

Permissible shear stress for side of channel: 3.41349 lb/ft^2

Stable Side D50: 0.203169 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: E. SP. BASIN B

Channel Analysis: E. SP. BASIN A

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0700 ft/ft

Manning's n: 0.0746

Flow: 150.0000 cfs

Result Parameters

Depth: 1.1913 ft

Area of Flow: 28.0827 ft^2

Wetted Perimeter: 27.5342 ft

Hydraulic Radius: 1.0199 ft

Average Velocity: 5.3414 ft/s

Top Width: 27.1476 ft

Froude Number: 0.9255

Critical Depth: 1.1353 ft

Critical Velocity: 5.6451 ft/s

Critical Slope: 0.0827 ft/ft

Critical Top Width: 26.81 ft

Calculated Max Shear Stress: 5.2034 lb/ft^2

Calculated Avg Shear Stress: 4.4550 lb/ft^2

Channel Lining Analysis: ESA Analysis

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.40111

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 0.827555

Manning's n method: Bathurst

Manning's n: 0.0745779

Channel Bottom Shear Results

V*: 1.63863

Reynold's Number: 168306

Shield's Parameter: 0.129597

shear stress on channel bottom: 5.20345 lb/ft^2

Permissible shear stress for channel bottom: 13.1577 lb/ft^2

channel bottom is stable

Stable D50: 0.692619 ft

Channel Side Shear Results

K1: 0.868

K2: 1

Kb: 1.46464

shear stress on side of channel: 5.20345 lb/ft^2

Permissible shear stress for side of channel: 13.1577 lb/ft^2

Stable Side D50: 0.601193 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 150 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 7.62119 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 8.23254 ft

Additional Freeboard required because of Superelevation: 0.160488 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 6.6152 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: E. SP. BASIN A

Channel Analysis: B2

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 35.0000 ft

Longitudinal Slope: 0.0130 ft/ft

Manning's n: 0.0708

Flow: 1545.0000 cfs

Result Parameters

Depth: 4.8332 ft

Area of Flow: 285.9622 ft^2

Wetted Perimeter: 84.2893 ft

Hydraulic Radius: 3.3926 ft

Average Velocity: 5.4028 ft/s

Top Width: 83.3321 ft

Froude Number: 0.5140

Critical Depth: 3.3270 ft

Critical Velocity: 8.9934 ft/s

Critical Slope: 0.0544 ft/ft

Critical Top Width: 68.27 ft

Calculated Max Shear Stress: 3.9207 lb/ft^2

Calculated Avg Shear Stress: 2.7521 lb/ft^2

Channel Lining Analysis: B2 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.0011

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 2.62958

Manning's n method: Blodgett

Manning's n: 0.0659917

Channel Bottom Shear Results

V*: 0.653978

Reynold's Number: 40302.7

Shield's Parameter: 0.0471948

shear stress on channel bottom: 0.82881 lb/ft^2

Permissible shear stress for channel bottom: 3.63164 lb/ft^2

channel bottom is stable

Stable D50: 0.171353 ft

Channel Side Shear Results

K1: 0.868

K2: 0.879788

Kb: 0

shear stress on side of channel: 0.82881 lb/ft^2

Permissible shear stress for side of channel: 3.19508 lb/ft^2

Stable Side D50: 0.169057 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: B3 - TURN RADIUS INCLUDED

Channel Analysis: B3 - TURN RADIUS INCLUDED

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 15.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0660

Flow: 150.0000 cfs

Result Parameters

Depth: 2.6564 ft

Area of Flow: 61.0167 ft^2

Wetted Perimeter: 31.8008 ft

Hydraulic Radius: 1.9187 ft

Average Velocity: 2.4583 ft/s

Top Width: 30.9387 ft

Froude Number: 0.3085

Critical Depth: 1.3290 ft

Critical Velocity: 5.9444 ft/s

Critical Slope: 0.0630 ft/ft

Critical Top Width: 22.97 ft

Calculated Max Shear Stress: 0.8288 lb/ft^2

Calculated Avg Shear Stress: 0.5986 lb/ft^2

Channel Lining Analysis: B3 - ANALYSIS____TR

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.2 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.15 degrees

Relative Flow Depth: 5.308

Manning's n method: Blodgett

Manning's n: 0.0438017

Channel Bottom Shear Results

V*: 1.36064

Reynold's Number: 22360.5

Shield's Parameter: 0.047

shear stress on channel bottom: 3.58768 lb/ft^2

Permissible shear stress for channel bottom: 0.96444 lb/ft^2

channel bottom is NOT stable

Stable D50: 0.744107 ft

Channel Side Shear Results

K1: 0.868

K2: 0.871478

Kb: 1.05

shear stress on side of channel: 3.58768 lb/ft^2

Permissible shear stress for side of channel: 0.840488 lb/ft^2

Stable Side D50: 0.741137 lb/ft^2

side of channel is NOT stable

Channel Bend Shear Results

Curvature Radius: 650 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 3.76706 lb/ft^2

bottom of bend of the channel is NOT stable

Length of Protection beyond PT: 14.3801 ft

Additional Freeboard required because of Superelevation: 0.0593097 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 3.26981 lb/ft^2

The side of the bend of the channel is NOT stable

Channel Lining Stability Results

the channel is NOT stable

Channel Summary

Name of Selected Channel: B4

Channel Analysis: B4

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 15.0000 ft

Longitudinal Slope: 0.0450 ft/ft

Manning's n: 0.0438

Flow: 178.0000 cfs

Result Parameters

Depth: 1.2777 ft

Area of Flow: 24.0622 ft^2

Wetted Perimeter: 23.0806 ft

Hydraulic Radius: 1.0425 ft

Average Velocity: 7.3975 ft/s

Top Width: 22.6660 ft

Froude Number: 1.2653

Critical Depth: 1.4747 ft

Critical Velocity: 6.2143 ft/s

Critical Slope: 0.0270 ft/ft

Critical Top Width: 23.85 ft

Calculated Max Shear Stress: 3.5877 lb/ft^2

Calculated Avg Shear Stress: 2.9274 lb/ft^2

Channel Lining Analysis: B4 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.04623

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 2.45876

Manning's n method: Blodgett

Manning's n: 0.0675759

Channel Bottom Shear Results

V*: 0.888311

Reynold's Number: 54743.9

Shield's Parameter: 0.0564914

shear stress on channel bottom: 1.52918 lb/ft^2

Permissible shear stress for channel bottom: 4.34701 lb/ft^2

channel bottom is stable

Stable D50: 0.27603 ft

Channel Side Shear Results

K1: 0.868

K2: 0.879788

Kb: 0

shear stress on side of channel: 1.52918 lb/ft^2

Permissible shear stress for side of channel: 3.82445 lb/ft^2

Stable Side D50: 0.272332 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: B5

Channel Analysis: B5

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 15.0000 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0676

Flow: 178.0000 cfs

Result Parameters

Depth: 2.4506 ft

Area of Flow: 54.7757 ft^2

Wetted Perimeter: 30.4990 ft

Hydraulic Radius: 1.7960 ft

Average Velocity: 3.2496 ft/s

Top Width: 29.7037 ft

Froude Number: 0.4217

Critical Depth: 1.4742 ft

Critical Velocity: 6.2165 ft/s

Critical Slope: 0.0643 ft/ft

Critical Top Width: 23.85 ft

Calculated Max Shear Stress: 1.5292 lb/ft^2

Calculated Avg Shear Stress: 1.1207 lb/ft^2

Channel Lining Analysis: B5 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.12377

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 0.834525

Manning's n method: Bathurst

Manning's n: 0.0665754

Channel Bottom Shear Results

V*: 1.29094

Reynold's Number: 79556.6

Shield's Parameter: 0.0724646

shear stress on channel bottom: 3.22953 lb/ft^2

Permissible shear stress for channel bottom: 4.93255 lb/ft^2

channel bottom is stable

Stable D50: 0.551832 ft

Channel Side Shear Results

K1: 0.868

K2: 1

Kb: 0

shear stress on side of channel: 3.22953 lb/ft^2

Permissible shear stress for side of channel: 4.93255 lb/ft^2

Stable Side D50: 0.478991 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: OE2 - TR

Channel Analysis: OE2 - TR

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0620 ft/ft

Manning's n: 0.0666

Flow: 25.0000 cfs

Result Parameters

Depth: 0.8348 ft

Area of Flow: 6.2643 ft^2

Wetted Perimeter: 10.2795 ft

Hydraulic Radius: 0.6094 ft

Average Velocity: 3.9909 ft/s

Top Width: 10.0086 ft

Froude Number: 0.8890

Critical Depth: 0.7805 ft

Critical Velocity: 4.3629 ft/s

Critical Slope: 0.0796 ft/ft

Critical Top Width: 9.68 ft

Calculated Max Shear Stress: 3.2295 lb/ft^2

Calculated Avg Shear Stress: 2.3576 lb/ft^2

Channel Lining Analysis: OE2 - ANALYIS____TR

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.11114

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 4.44172

Manning's n method: Blodgett

Manning's n: 0.056804

Channel Bottom Shear Results

V*: 1.22538

Reynold's Number: 75516.4

Shield's Parameter: 0.0698637

shear stress on channel bottom: 2.90984 lb/ft^2

Permissible shear stress for channel bottom: 5.37601 lb/ft^2

channel bottom is stable

Stable D50: 0.451067 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 2

shear stress on side of channel: 2.90984 lb/ft^2

Permissible shear stress for side of channel: 5.13708 lb/ft^2

Stable Side D50: 0.472047 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 5.81969 lb/ft^2

bottom of bend of the channel is NOT stable

Length of Protection beyond PT: 42.4411 ft

Additional Freeboard required because of Superelevation: 0.85108 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 5.81969 lb/ft^2

The side of the bend of the channel is NOT stable

Channel Lining Stability Results

the channel is NOT stable

Channel Summary

Name of Selected Channel: B0

Channel Analysis: B0

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 35.0000 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0568

Flow: 1575.0000 cfs

Result Parameters

Depth: 4.6632 ft

Area of Flow: 271.9402 ft^2

Wetted Perimeter: 82.5556 ft

Hydraulic Radius: 3.2940 ft

Average Velocity: 5.7917 ft/s

Top Width: 81.6321 ft

Froude Number: 0.5592

Critical Depth: 3.3634 ft

Critical Velocity: 9.0371 ft/s

Critical Slope: 0.0349 ft/ft

Critical Top Width: 68.63 ft

Calculated Max Shear Stress: 2.9098 lb/ft^2

Calculated Avg Shear Stress: 2.0555 lb/ft^2

Channel Lining Analysis: B0 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.43749

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 2.50755

Manning's n method: Blodgett

Manning's n: 0.073063

Channel Bottom Shear Results

V*: 1.75196

Reynold's Number: 179946

Shield's Parameter: 0.13709

shear stress on channel bottom: 5.94807 lb/ft^2

Permissible shear stress for channel bottom: 17.5819 lb/ft^2

channel bottom is stable

Stable D50: 0.607891 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 0

shear stress on side of channel: 5.94807 lb/ft^2

Permissible shear stress for side of channel: 16.8067 lb/ft^2

Stable Side D50: 0.635929 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: B1 - TURN RADIUS INCLUDED

Channel Analysis: B1 - TURN RADIUS INCLUDED

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 35.0000 ft

Longitudinal Slope: 0.0220 ft/ft

Manning's n: 0.0731

Flow: 1575.0000 cfs

Result Parameters

Depth: 4.3328 ft

Area of Flow: 245.5139 ft^2

Wetted Perimeter: 79.1861 ft

Hydraulic Radius: 3.1005 ft

Average Velocity: 6.4151 ft/s

Top Width: 78.3280 ft

Froude Number: 0.6386

Critical Depth: 3.3635 ft

Critical Velocity: 9.0369 ft/s

Critical Slope: 0.0577 ft/ft

Critical Top Width: 68.63 ft

Calculated Max Shear Stress: 5.9481 lb/ft^2

Calculated Avg Shear Stress: 4.2563 lb/ft^2

Channel Lining Analysis: B1 - ANALYSIS____TR

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.43749

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 2.50755

Manning's n method: Blodgett

Manning's n: 0.073063

Channel Bottom Shear Results

V*: 1.75196

Reynold's Number: 179946

Shield's Parameter: 0.13709

shear stress on channel bottom: 5.94807 lb/ft^2

Permissible shear stress for channel bottom: 17.5819 lb/ft^2

channel bottom is stable

Stable D50: 0.607891 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 1.51839

shear stress on side of channel: 5.94807 lb/ft^2

Permissible shear stress for side of channel: 16.8067 lb/ft^2

Stable Side D50: 0.635929 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 400 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 9.03148 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 30.7458 ft

Additional Freeboard required because of Superelevation: 0.250473 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 9.03148 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: B1 - TURN RADIUS INCLUDED

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Monday, March 30, 2020

Project Units: U.S. Customary Units

Notes:

Channel Analysis: CE1

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0260 ft/ft

Manning's n: 0.0837

Flow: 89.0000 cfs

Result Parameters

Depth: 1.7298 ft

Area of Flow: 28.7984 ft^2

Wetted Perimeter: 25.6401 ft

Hydraulic Radius: 1.1232 ft

Average Velocity: 3.0905 ft/s

Top Width: 25.2976 ft

Froude Number: 0.5104

Critical Depth: 1.2126 ft

Critical Velocity: 5.2193 ft/s

Critical Slope: 0.1096 ft/ft

Critical Top Width: 20.13 ft

Calculated Max Shear Stress: 2.8064 lb/ft^2

Calculated Avg Shear Stress: 1.8222 lb/ft^2

Channel Lining Analysis: CE1 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.10685

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.51722

Manning's n method: Blodgett

Manning's n: 0.0837388

Channel Bottom Shear Results

V*: 1.20309

Reynold's Number: 74143

Shield's Parameter: 0.0689795

shear stress on channel bottom: 2.80496 lb/ft^2

Permissible shear stress for channel bottom: 5.30798 lb/ft^2

channel bottom is stable

Stable D50: 0.438681 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 2.80496 lb/ft^2

Permissible shear stress for side of channel: 5.07207 lb/ft^2

Stable Side D50: 0.459085 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CE1

Channel Analysis: CET1

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0260 ft/ft

Manning's n: 0.0991

Flow: 89.0000 cfs

Result Parameters

Depth: 1.8750 ft

Area of Flow: 32.5790 ft^2

Wetted Perimeter: 27.1217 ft

Hydraulic Radius: 1.2012 ft

Average Velocity: 2.7318 ft/s

Top Width: 26.7503 ft

Froude Number: 0.4362

Critical Depth: 1.2121 ft

Critical Velocity: 5.2219 ft/s

Critical Slope: 0.1538 ft/ft

Critical Top Width: 20.12 ft

Calculated Max Shear Stress: 3.0421 lb/ft^2

Calculated Avg Shear Stress: 1.9489 lb/ft^2

Channel Lining Analysis: CET1 - TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.27731

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 0.974313

Manning's n method: Bathurst

Manning's n: 0.0991295

Channel Bottom Shear Results

V*: 1.25291

Reynold's Number: 128688

Shield's Parameter: 0.104093

shear stress on channel bottom: 3.04205 lb/ft^2

Permissible shear stress for channel bottom: 13.3499 lb/ft^2

channel bottom is stable

Stable D50: 0.363825 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 2

shear stress on side of channel: 3.04205 lb/ft^2

Permissible shear stress for side of channel: 12.7613 lb/ft^2

Stable Side D50: 0.380606 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 50 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 6.0841 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 7.49618 ft

Additional Freeboard required because of Superelevation: 0.124096 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 6.0841 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CET1

Channel Analysis: CE2

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0250 ft/ft

Manning's n: 0.0802

Flow: 112.0000 cfs

Result Parameters

Depth: 1.9088 ft

Area of Flow: 33.4875 ft^2

Wetted Perimeter: 27.4658 ft

Hydraulic Radius: 1.2192 ft

Average Velocity: 3.3445 ft/s

Top Width: 27.0878 ft

Froude Number: 0.5301

Critical Depth: 1.3719 ft

Critical Velocity: 5.4941 ft/s

Critical Slope: 0.0972 ft/ft

Critical Top Width: 21.72 ft

Calculated Max Shear Stress: 2.9777 lb/ft^2

Calculated Avg Shear Stress: 1.9020 lb/ft^2

Channel Lining Analysis: CE2 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.11388

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.64834

Manning's n method: Blodgett

Manning's n: 0.0801814

Channel Bottom Shear Results

V*: 1.23958

Reynold's Number: 76391.8

Shield's Parameter: 0.0704272

shear stress on channel bottom: 2.9777 lb/ft^2

Permissible shear stress for channel bottom: 5.41937 lb/ft^2

channel bottom is stable

Stable D50: 0.459019 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 2.9777 lb/ft^2

Permissible shear stress for side of channel: 5.17852 lb/ft^2

Stable Side D50: 0.480369 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CE2

Channel Analysis: CET2

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0250 ft/ft

Manning's n: 0.0949

Flow: 112.0000 cfs

Result Parameters

Depth: 2.0675 ft

Area of Flow: 37.9120 ft^2

Wetted Perimeter: 29.0842 ft

Hydraulic Radius: 1.3035 ft

Average Velocity: 2.9542 ft/s

Top Width: 28.6747 ft

Froude Number: 0.4528

Critical Depth: 1.3715 ft

Critical Velocity: 5.4965 ft/s

Critical Slope: 0.1364 ft/ft

Critical Top Width: 21.71 ft

Calculated Max Shear Stress: 3.2253 lb/ft^2

Calculated Avg Shear Stress: 2.0335 lb/ft^2

Channel Lining Analysis: CET2 - TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.28924

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 1.05771

Manning's n method: Bathurst

Manning's n: 0.0949016

Channel Bottom Shear Results

V*: 1.29008

Reynold's Number: 132506

Shield's Parameter: 0.106551

shear stress on channel bottom: 3.22526 lb/ft^2

Permissible shear stress for channel bottom: 13.6652 lb/ft^2

channel bottom is stable

Stable D50: 0.380358 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 2

shear stress on side of channel: 3.22526 lb/ft^2

Permissible shear stress for side of channel: 13.0627 lb/ft^2

Stable Side D50: 0.397901 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 50 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 6.45051 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 8.61359 ft

Additional Freeboard required because of Superelevation: 0.155563 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 6.45051 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CET2

Channel Analysis: CE3

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0270 ft/ft

Manning's n: 0.0839

Flow: 90.0000 cfs

Result Parameters

Depth: 1.7237 ft

Area of Flow: 28.6463 ft^2

Wetted Perimeter: 25.5788 ft

Hydraulic Radius: 1.1199 ft

Average Velocity: 3.1418 ft/s

Top Width: 25.2374 ft

Froude Number: 0.5197

Critical Depth: 1.2199 ft

Critical Velocity: 5.2325 ft/s

Critical Slope: 0.1097 ft/ft

Critical Top Width: 20.20 ft

Calculated Max Shear Stress: 2.9042 lb/ft^2

Calculated Avg Shear Stress: 1.8869 lb/ft^2

Channel Lining Analysis: CE3 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.11091

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.51343

Manning's n method: Blodgett

Manning's n: 0.0838527

Channel Bottom Shear Results

V*: 1.22418

Reynold's Number: 75442.6

Shield's Parameter: 0.0698162

shear stress on channel bottom: 2.90416 lb/ft^2

Permissible shear stress for channel bottom: 5.37235 lb/ft^2

channel bottom is stable

Stable D50: 0.450399 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 2.90416 lb/ft^2

Permissible shear stress for side of channel: 5.13358 lb/ft^2

Stable Side D50: 0.471347 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CE3

Channel Analysis: CET3

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0270 ft/ft

Manning's n: 0.0982

Flow: 90.0000 cfs

Result Parameters

Depth: 1.8600 ft

Area of Flow: 32.1768 ft^2

Wetted Perimeter: 26.9679 ft

Hydraulic Radius: 1.1932 ft

Average Velocity: 2.7971 ft/s

Top Width: 26.5995 ft

Froude Number: 0.4482

Critical Depth: 1.2195 ft

Critical Velocity: 5.2351 ft/s

Critical Slope: 0.1507 ft/ft

Critical Top Width: 20.19 ft

Calculated Max Shear Stress: 3.1336 lb/ft^2

Calculated Avg Shear Stress: 2.0102 lb/ft^2

Channel Lining Analysis: CET3 - TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.28332

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 0.967739

Manning's n method: Bathurst

Manning's n: 0.0981992

Channel Bottom Shear Results

V*: 1.27163

Reynold's Number: 130611

Shield's Parameter: 0.105331

shear stress on channel bottom: 3.13365 lb/ft^2

Permissible shear stress for channel bottom: 13.5087 lb/ft^2

channel bottom is stable

Stable D50: 0.372118 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 2

shear stress on side of channel: 3.13365 lb/ft^2

Permissible shear stress for side of channel: 12.9131 lb/ft^2

Stable Side D50: 0.389281 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 50 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 6.2673 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 7.50795 ft

Additional Freeboard required because of Superelevation: 0.12936 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 6.2673 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CET3

Channel Analysis: CE4

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0280 ft/ft

Manning's n: 0.0815

Flow: 108.0000 cfs

Result Parameters

Depth: 1.8398 ft

Area of Flow: 31.6421 ft^2

Wetted Perimeter: 26.7621 ft

Hydraulic Radius: 1.1823 ft

Average Velocity: 3.4132 ft/s

Top Width: 26.3978 ft

Froude Number: 0.5494

Critical Depth: 1.3455 ft

Critical Velocity: 5.4502 ft/s

Critical Slope: 0.1009 ft/ft

Critical Top Width: 21.45 ft

Calculated Max Shear Stress: 3.2145 lb/ft^2

Calculated Avg Shear Stress: 2.0658 lb/ft^2

Channel Lining Analysis: CE4 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.12319

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.59822

Manning's n method: Blodgett

Manning's n: 0.0814576

Channel Bottom Shear Results

V*: 1.28792

Reynold's Number: 79370.7

Shield's Parameter: 0.0723449

shear stress on channel bottom: 3.21446 lb/ft^2

Permissible shear stress for channel bottom: 5.56694 lb/ft^2

channel bottom is stable

Stable D50: 0.486413 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 3.21446 lb/ft^2

Permissible shear stress for side of channel: 5.31952 lb/ft^2

Stable Side D50: 0.509037 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CE4

Channel Analysis: CET4

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0280 ft/ft

Manning's n: 0.0937

Flow: 108.0000 cfs

Result Parameters

Depth: 1.9669 ft

Area of Flow: 35.0799 ft^2

Wetted Perimeter: 28.0590 ft

Hydraulic Radius: 1.2502 ft

Average Velocity: 3.0787 ft/s

Top Width: 27.6694 ft

Froude Number: 0.4818

Critical Depth: 1.3451 ft

Critical Velocity: 5.4524 ft/s

Critical Slope: 0.1337 ft/ft

Critical Top Width: 21.45 ft

Calculated Max Shear Stress: 3.4366 lb/ft^2

Calculated Avg Shear Stress: 2.1844 lb/ft^2

Channel Lining Analysis: CET4 - TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.30259

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 1.01426

Manning's n method: Bathurst

Manning's n: 0.093735

Channel Bottom Shear Results

V*: 1.33169

Reynold's Number: 136780

Shield's Parameter: 0.109302

shear stress on channel bottom: 3.43664 lb/ft^2

Permissible shear stress for channel bottom: 14.018 lb/ft^2

channel bottom is stable

Stable D50: 0.399179 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 2

shear stress on side of channel: 3.43664 lb/ft^2

Permissible shear stress for side of channel: 13.3999 lb/ft^2

Stable Side D50: 0.41759 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 50 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 6.87329 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 8.30616 ft

Additional Freeboard required because of Superelevation: 0.163026 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 6.87329 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CET4

Channel Analysis: CE5

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0190 ft/ft

Manning's n: 0.0751

Flow: 148.0000 cfs

Result Parameters

Depth: 2.2506 ft

Area of Flow: 43.3301 ft^2

Wetted Perimeter: 30.9515 ft

Hydraulic Radius: 1.3999 ft

Average Velocity: 3.4156 ft/s

Top Width: 30.5058 ft

Froude Number: 0.5051

Critical Depth: 1.5891 ft

Critical Velocity: 5.8405 ft/s

Critical Slope: 0.0819 ft/ft

Critical Top Width: 23.89 ft

Calculated Max Shear Stress: 2.6683 lb/ft^2

Calculated Avg Shear Stress: 1.6598 lb/ft^2

Channel Lining Analysis: CE5 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.10114

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.89385

Manning's n method: Blodgett

Manning's n: 0.0750654

Channel Bottom Shear Results

V*: 1.17341

Reynold's Number: 72314

Shield's Parameter: 0.0678021

shear stress on channel bottom: 2.66828 lb/ft^2

Permissible shear stress for channel bottom: 5.21737 lb/ft^2

channel bottom is stable

Stable D50: 0.42236 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 2.66828 lb/ft^2

Permissible shear stress for side of channel: 4.98549 lb/ft^2

Stable Side D50: 0.442004 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CE5

Channel Analysis: CET5

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0190 ft/ft

Manning's n: 0.0933

Flow: 148.0000 cfs

Result Parameters

Depth: 2.4890 ft

Area of Flow: 50.8866 ft^2

Wetted Perimeter: 33.3826 ft

Hydraulic Radius: 1.5243 ft

Average Velocity: 2.9084 ft/s

Top Width: 32.8897 ft

Froude Number: 0.4121

Critical Depth: 1.5887 ft

Critical Velocity: 5.8429 ft/s

Critical Slope: 0.1265 ft/ft

Critical Top Width: 23.89 ft

Calculated Max Shear Stress: 2.9509 lb/ft^2

Calculated Avg Shear Stress: 1.8073 lb/ft^2

Channel Lining Analysis: CET5 - TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.27124

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 1.23775

Manning's n method: Bathurst

Manning's n: 0.0932579

Channel Bottom Shear Results

V*: 1.234

Reynold's Number: 126746

Shield's Parameter: 0.102843

shear stress on channel bottom: 2.95092 lb/ft^2

Permissible shear stress for channel bottom: 13.1896 lb/ft^2

channel bottom is stable

Stable D50: 0.35552 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 2

shear stress on side of channel: 2.95092 lb/ft^2

Permissible shear stress for side of channel: 12.608 lb/ft^2

Stable Side D50: 0.371917 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 50 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 5.90185 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 10.5211 ft

Additional Freeboard required because of Superelevation: 0.172942 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 5.90185 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CET5

Channel Analysis: CW17

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0260 ft/ft

Manning's n: 0.0770

Flow: 147.0000 cfs

Result Parameters

Depth: 2.1098 ft

Area of Flow: 39.1358 ft^2

Wetted Perimeter: 29.5162 ft

Hydraulic Radius: 1.3259 ft

Average Velocity: 3.7562 ft/s

Top Width: 29.0984 ft

Froude Number: 0.5708

Critical Depth: 1.5834 ft

Critical Velocity: 5.8327 ft/s

Critical Slope: 0.0862 ft/ft

Critical Top Width: 23.83 ft

Calculated Max Shear Stress: 3.4230 lb/ft^2

Calculated Avg Shear Stress: 2.1512 lb/ft^2

Channel Lining Analysis: CW17 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.13111

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.79326

Manning's n method: Blodgett

Manning's n: 0.0769639

Channel Bottom Shear Results

V*: 1.32904

Reynold's Number: 81904.9

Shield's Parameter: 0.0739763

shear stress on channel bottom: 3.423 lb/ft^2

Permissible shear stress for channel bottom: 5.69247 lb/ft^2

channel bottom is stable

Stable D50: 0.510119 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 3.423 lb/ft^2

Permissible shear stress for side of channel: 5.43948 lb/ft^2

Stable Side D50: 0.533845 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW17

Channel Analysis: CW18

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0300 ft/ft

Manning's n: 0.0870

Flow: 146.0000 cfs

Result Parameters

Depth: 2.1536 ft

Area of Flow: 40.4199 ft^2

Wetted Perimeter: 29.9629 ft

Hydraulic Radius: 1.3490 ft

Average Velocity: 3.6121 ft/s

Top Width: 29.5364 ft

Froude Number: 0.5441

Critical Depth: 1.5779 ft

Critical Velocity: 5.8231 ft/s

Critical Slope: 0.1101 ft/ft

Critical Top Width: 23.78 ft

Calculated Max Shear Stress: 4.0316 lb/ft^2

Calculated Avg Shear Stress: 2.5253 lb/ft^2

Channel Lining Analysis: CW18 - TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.33812

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 1.09478

Manning's n method: Bathurst

Manning's n: 0.0869694

Channel Bottom Shear Results

V*: 1.44236

Reynold's Number: 148148

Shield's Parameter: 0.11662

shear stress on channel bottom: 4.03161 lb/ft^2

Permissible shear stress for channel bottom: 14.9565 lb/ft^2

channel bottom is stable

Stable D50: 0.450871 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 2

shear stress on side of channel: 4.03161 lb/ft^2

Permissible shear stress for side of channel: 14.2971 lb/ft^2

Stable Side D50: 0.471667 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 50 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 8.06322 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 9.78284 ft

Additional Freeboard required because of Superelevation: 0.239551 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 8.06322 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW18

Channel Analysis: KN1

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0310 ft/ft

Manning's n: 0.0938

Flow: 19.0000 cfs

Result Parameters

Depth: 0.9500 ft

Area of Flow: 9.2628 ft^2

Wetted Perimeter: 14.6883 ft

Hydraulic Radius: 0.6306 ft

Average Velocity: 2.0512 ft/s

Top Width: 14.5002 ft

Froude Number: 0.4523

Critical Depth: 0.6186 ft

Critical Velocity: 3.7953 ft/s

Critical Slope: 0.1701 ft/ft

Critical Top Width: 11.19 ft

Calculated Max Shear Stress: 1.8377 lb/ft^2

Calculated Avg Shear Stress: 1.2199 lb/ft^2

Channel Lining Analysis: KN1 - TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.0627

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 0.851737

Manning's n method: Bathurst

Manning's n: 0.0938079

Channel Bottom Shear Results

V*: 0.973811

Reynold's Number: 60013

Shield's Parameter: 0.0598834

shear stress on channel bottom: 1.83771 lb/ft^2

Permissible shear stress for channel bottom: 4.60802 lb/ft^2

channel bottom is stable

Stable D50: 0.317858 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 1.75646

shear stress on side of channel: 1.83771 lb/ft^2

Permissible shear stress for side of channel: 4.40323 lb/ft^2

Stable Side D50: 0.332642 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 50 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 3.22788 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 3.73515 ft

Additional Freeboard required because of Superelevation: 0.037925 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 3.22788 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: KN1

Channel Analysis: PW4

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0036 ft/ft

Manning's n: 0.0938

Flow: 327.0000 cfs

Result Parameters

Depth: 4.9422 ft

Area of Flow: 171.5509 ft^2

Wetted Perimeter: 60.4011 ft

Hydraulic Radius: 2.8402 ft

Average Velocity: 1.9061 ft/s

Top Width: 59.4224 ft

Froude Number: 0.1977

Critical Depth: 2.2427 ft

Critical Velocity: 6.8731 ft/s

Critical Slope: 0.1150 ft/ft

Critical Top Width: 32.43 ft

Calculated Max Shear Stress: 1.1102 lb/ft^2

Calculated Avg Shear Stress: 0.6380 lb/ft^2

Channel Lining Analysis: PW4 - TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.0627

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 0.851737

Manning's n method: Bathurst

Manning's n: 0.0938079

Channel Bottom Shear Results

V*: 0.973811

Reynold's Number: 60013

Shield's Parameter: 0.0598834

shear stress on channel bottom: 1.83771 lb/ft^2

Permissible shear stress for channel bottom: 4.60802 lb/ft^2

channel bottom is stable

Stable D50: 0.317858 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 1.05

shear stress on side of channel: 1.83771 lb/ft^2

Permissible shear stress for side of channel: 4.40323 lb/ft^2

Stable Side D50: 0.332642 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 400 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 1.9296 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 3.73515 ft

Additional Freeboard required because of Superelevation: 0.00474062 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 1.9296 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: KN1

Channel Analysis: PE1

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0426

Flow: 86.0000 cfs

Result Parameters

Depth: 2.0356 ft

Area of Flow: 30.8957 ft^2

Wetted Perimeter: 25.7589 ft

Hydraulic Radius: 1.1994 ft

Average Velocity: 2.7836 ft/s

Top Width: 25.3558 ft

Froude Number: 0.4444

Critical Depth: 1.3716 ft

Critical Velocity: 5.2874 ft/s

Critical Slope: 0.0283 ft/ft

Critical Top Width: 18.72 ft

Calculated Max Shear Stress: 0.6351 lb/ft^2

Calculated Avg Shear Stress: 0.3742 lb/ft^2

Channel Lining Analysis: PE1 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.2 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.15 degrees

Relative Flow Depth: 6.09245

Manning's n method: Blodgett

Manning's n: 0.0426114

Channel Bottom Shear Results

V*: 0.572475

Reynold's Number: 9407.97

Shield's Parameter: 0.047

shear stress on channel bottom: 0.6351 lb/ft^2

Permissible shear stress for channel bottom: 0.96444 lb/ft^2

channel bottom is stable

Stable D50: 0.131724 ft

Channel Side Shear Results

K1: 1

K2: 0.952623

Kb: 0

shear stress on side of channel: 0.6351 lb/ft^2

Permissible shear stress for side of channel: 0.918747 lb/ft^2

Stable Side D50: 0.138275 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PE1

Channel Analysis: PE2

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0043 ft/ft

Manning's n: 0.0671

Flow: 166.0000 cfs

Result Parameters

Depth: 3.0159 ft

Area of Flow: 75.6363 ft^2

Wetted Perimeter: 40.7560 ft

Hydraulic Radius: 1.8558 ft

Average Velocity: 2.1947 ft/s

Top Width: 40.1588 ft

Froude Number: 0.2818

Critical Depth: 1.5700 ft

Critical Velocity: 5.9232 ft/s

Critical Slope: 0.0647 ft/ft

Critical Top Width: 25.70 ft

Calculated Max Shear Stress: 0.8092 lb/ft^2

Calculated Avg Shear Stress: 0.4980 lb/ft^2

Channel Lining Analysis: PE2 - TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 2.51124

Manning's n method: Blodgett

Manning's n: 0.0670648

Channel Bottom Shear Results

V*: 0.646203

Reynold's Number: 39823.5

Shield's Parameter: 0.047

shear stress on channel bottom: 0.80922 lb/ft^2

Permissible shear stress for channel bottom: 3.61665 lb/ft^2

channel bottom is stable

Stable D50: 0.167837 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 1.9123

shear stress on side of channel: 0.80922 lb/ft^2

Permissible shear stress for side of channel: 3.45591 lb/ft^2

Stable Side D50: 0.175644 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 1.54747 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 18.4057 ft

Additional Freeboard required because of Superelevation: 0.0601217 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 1.54747 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PE2

Channel Analysis: PE3

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0044 ft/ft

Manning's n: 0.0633

Flow: 275.0000 cfs

Result Parameters

Depth: 3.6803 ft

Area of Flow: 104.5271 ft^2

Wetted Perimeter: 47.5321 ft

Hydraulic Radius: 2.1991 ft

Average Velocity: 2.6309 ft/s

Top Width: 46.8032 ft

Froude Number: 0.3102

Critical Depth: 2.0509 ft

Critical Velocity: 6.6200 ft/s

Critical Slope: 0.0537 ft/ft

Critical Top Width: 30.51 ft

Calculated Max Shear Stress: 1.0105 lb/ft^2

Calculated Avg Shear Stress: 0.6038 lb/ft^2

Channel Lining Analysis: PE3 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.01422

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 2.97777

Manning's n method: Blodgett

Manning's n: 0.0633492

Channel Bottom Shear Results

V*: 0.7221

Reynold's Number: 44500.8

Shield's Parameter: 0.0498974

shear stress on channel bottom: 1.01047 lb/ft^2

Permissible shear stress for channel bottom: 3.8396 lb/ft^2

channel bottom is stable

Stable D50: 0.200184 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 1.01047 lb/ft^2

Permissible shear stress for side of channel: 3.66896 lb/ft^2

Stable Side D50: 0.209495 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PE3

Channel Analysis: PE4

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0042 ft/ft

Manning's n: 0.0614

Flow: 360.0000 cfs

Result Parameters

Depth: 4.1376 ft

Area of Flow: 126.9728 ft^2

Wetted Perimeter: 52.1950 ft

Hydraulic Radius: 2.4327 ft

Average Velocity: 2.8353 ft/s

Top Width: 51.3756 ft

Froude Number: 0.3178

Critical Depth: 2.3560 ft

Critical Velocity: 7.0158 ft/s

Critical Slope: 0.0487 ft/ft

Critical Top Width: 33.56 ft

Calculated Max Shear Stress: 1.0844 lb/ft^2

Calculated Avg Shear Stress: 0.6376 lb/ft^2

Channel Lining Analysis: PE4 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.01922

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 3.29528

Manning's n method: Blodgett

Manning's n: 0.0614379

Channel Bottom Shear Results

V*: 0.74804

Reynold's Number: 46099.4

Shield's Parameter: 0.0509265

shear stress on channel bottom: 1.08437 lb/ft^2

Permissible shear stress for channel bottom: 3.91879 lb/ft^2

channel bottom is stable

Stable D50: 0.211521 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 1.08437 lb/ft^2

Permissible shear stress for side of channel: 3.74463 lb/ft^2

Stable Side D50: 0.221359 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PE4

Channel Analysis: PE5

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0084 ft/ft

Manning's n: 0.0621

Flow: 458.0000 cfs

Result Parameters

Depth: 3.9662 ft

Area of Flow: 118.3142 ft^2

Wetted Perimeter: 50.4472 ft

Hydraulic Radius: 2.3453 ft

Average Velocity: 3.8710 ft/s

Top Width: 49.6617 ft

Froude Number: 0.4420

Critical Depth: 2.6610 ft

Critical Velocity: 7.3854 ft/s

Critical Slope: 0.0481 ft/ft

Critical Top Width: 36.61 ft

Calculated Max Shear Stress: 2.0789 lb/ft^2

Calculated Avg Shear Stress: 1.2293 lb/ft^2

Channel Lining Analysis: PE5 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.07462

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 3.17654

Manning's n method: Blodgett

Manning's n: 0.0621073

Channel Bottom Shear Results

V*: 1.03575

Reynold's Number: 63829.9

Shield's Parameter: 0.0623405

shear stress on channel bottom: 2.07891 lb/ft^2

Permissible shear stress for channel bottom: 4.7971 lb/ft^2

channel bottom is stable

Stable D50: 0.34928 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 2.07891 lb/ft^2

Permissible shear stress for side of channel: 4.5839 lb/ft^2

Stable Side D50: 0.365526 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PE5

Channel Analysis: PE6

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0110 ft/ft

Manning's n: 0.0742

Flow: 800.0000 cfs

Result Parameters

Depth: 5.1659 ft

Area of Flow: 185.0928 ft^2

Wetted Perimeter: 62.6823 ft

Hydraulic Radius: 2.9529 ft

Average Velocity: 4.3222 ft/s

Top Width: 61.6592 ft

Froude Number: 0.4396

Critical Depth: 3.5021 ft

Critical Velocity: 8.3034 ft/s

Critical Slope: 0.0636 ft/ft

Critical Top Width: 45.02 ft

Calculated Max Shear Stress: 3.5459 lb/ft^2

Calculated Avg Shear Stress: 2.0269 lb/ft^2

Channel Lining Analysis: PE6 - TURN__ARMOR AROUND BEND!!!

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.30933

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 2.4015

Manning's n method: Blodgett

Manning's n: 0.074218

Channel Bottom Shear Results

V*: 1.35269

Reynold's Number: 138937

Shield's Parameter: 0.110691

shear stress on channel bottom: 3.54589 lb/ft^2

Permissible shear stress for channel bottom: 14.1961 lb/ft^2

channel bottom is stable

Stable D50: 0.408806 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 2

shear stress on side of channel: 3.54589 lb/ft^2

Permissible shear stress for side of channel: 13.5702 lb/ft^2

Stable Side D50: 0.427661 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 7.09177 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 28.5931 ft

Additional Freeboard required because of Superelevation: 0.358009 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 7.09177 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PE6

Channel Analysis: PE7

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0044 ft/ft

Manning's n: 0.0574

Flow: 770.0000 cfs

Result Parameters

Depth: 5.5415 ft

Area of Flow: 208.9576 ft^2

Wetted Perimeter: 66.5127 ft

Hydraulic Radius: 3.1416 ft

Average Velocity: 3.6850 ft/s

Top Width: 65.4152 ft

Froude Number: 0.3633

Critical Depth: 3.4379 ft

Critical Velocity: 8.2376 ft/s

Critical Slope: 0.0382 ft/ft

Critical Top Width: 44.38 ft

Calculated Max Shear Stress: 1.5215 lb/ft^2

Calculated Avg Shear Stress: 0.8626 lb/ft^2

Channel Lining Analysis: PE7 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.0458

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 4.2591

Manning's n method: Blodgett

Manning's n: 0.0573786

Channel Bottom Shear Results

V*: 0.886072

Reynold's Number: 54605.9

Shield's Parameter: 0.0564025

shear stress on channel bottom: 1.52148 lb/ft^2

Permissible shear stress for channel bottom: 4.34018 lb/ft^2

channel bottom is stable

Stable D50: 0.274959 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 1.52148 lb/ft^2

Permissible shear stress for side of channel: 4.14728 lb/ft^2

Stable Side D50: 0.287748 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PE7

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Wednesday, March 25, 2020

Project Units: U.S. Customary Units

Notes:

Channel Analysis: CW1

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0416

Flow: 160.0000 cfs

Result Parameters

Depth: 2.4179 ft

Area of Flow: 48.5739 ft^2

Wetted Perimeter: 32.6577 ft

Hydraulic Radius: 1.4874 ft

Average Velocity: 3.2940 ft/s

Top Width: 32.1788 ft

Froude Number: 0.4725

Critical Depth: 1.6547 ft

Critical Velocity: 5.9419 ft/s

Critical Slope: 0.0248 ft/ft

Critical Top Width: 24.55 ft

Calculated Max Shear Stress: 0.7544 lb/ft^2

Calculated Avg Shear Stress: 0.4641 lb/ft^2

Channel Lining Analysis: CW1 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 7.2572

Manning's n method: Blodgett

Manning's n: 0.041561

Channel Bottom Shear Results

V*: 0.623922

Reynold's Number: 10663.6

Shield's Parameter: 0.047

shear stress on channel bottom: 0.75438 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.156463 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.75438 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.164159 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW1

Channel Analysis: CW2

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 16.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0412

Flow: 210.0000 cfs

Result Parameters

Depth: 2.2415 ft

Area of Flow: 60.9874 ft^2

Wetted Perimeter: 38.8594 ft

Hydraulic Radius: 1.5694 ft

Average Velocity: 3.4433 ft/s

Top Width: 38.4155 ft

Froude Number: 0.4816

Critical Depth: 1.4869 ft

Critical Velocity: 6.0265 ft/s

Critical Slope: 0.0241 ft/ft

Critical Top Width: 30.87 ft

Calculated Max Shear Stress: 0.6994 lb/ft^2

Calculated Avg Shear Stress: 0.4897 lb/ft^2

Channel Lining Analysis: CW2 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 7.63257

Manning's n method: Blodgett

Manning's n: 0.0412126

Channel Bottom Shear Results

V*: 0.600741

Reynold's Number: 10267.4

Shield's Parameter: 0.047

shear stress on channel bottom: 0.699363 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.145052 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.699363 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.152187 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW2

Channel Analysis: CW3 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 16.0000 ft

Longitudinal Slope: 0.0280 ft/ft

Manning's n: 0.0880

Flow: 210.0000 cfs

Result Parameters

Depth: 2.1269 ft

Area of Flow: 56.6505 ft^2

Wetted Perimeter: 37.6906 ft

Hydraulic Radius: 1.5030 ft

Average Velocity: 3.7069 ft/s

Top Width: 37.2694 ft

Froude Number: 0.5299

Critical Depth: 1.4873 ft

Critical Velocity: 6.0246 ft/s

Critical Slope: 0.1096 ft/ft

Critical Top Width: 30.87 ft

Calculated Max Shear Stress: 3.7162 lb/ft^2

Calculated Avg Shear Stress: 2.6261 lb/ft^2

Channel Lining Analysis: CW3 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.31964

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 1.21602

Manning's n method: Bathurst

Manning's n: 0.0879942

Channel Bottom Shear Results

V*: 1.38479

Reynold's Number: 142234

Shield's Parameter: 0.112813

shear stress on channel bottom: 3.71619 lb/ft^2

Permissible shear stress for channel bottom: 14.4683 lb/ft^2

channel bottom is stable

Stable D50: 0.423687 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 1.87982

shear stress on side of channel: 3.71619 lb/ft^2

Permissible shear stress for side of channel: 13.8304 lb/ft^2

Stable Side D50: 0.443229 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 6.98579 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 10.9689 ft

Additional Freeboard required because of Superelevation: 0.159176 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 6.98579 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW3 - TURN

Channel Analysis: CW4

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0405

Flow: 245.0000 cfs

Result Parameters

Depth: 2.9033 ft

Area of Flow: 65.3718 ft^2

Wetted Perimeter: 37.6079 ft

Hydraulic Radius: 1.7382 ft

Average Velocity: 3.7478 ft/s

Top Width: 37.0329 ft

Froude Number: 0.4971

Critical Depth: 2.0576 ft

Critical Velocity: 6.5111 ft/s

Critical Slope: 0.0223 ft/ft

Critical Top Width: 28.58 ft

Calculated Max Shear Stress: 0.9058 lb/ft^2

Calculated Avg Shear Stress: 0.5423 lb/ft^2

Channel Lining Analysis: CW4 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 8.48671

Manning's n method: Blodgett

Manning's n: 0.0405257

Channel Bottom Shear Results

V*: 0.683688

Reynold's Number: 11685.1

Shield's Parameter: 0.047

shear stress on channel bottom: 0.905826 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.187874 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.905826 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.197115 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW4

Channel Analysis: CW5

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 16.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0400

Flow: 344.0000 cfs

Result Parameters

Depth: 2.8301 ft

Area of Flow: 85.3275 ft^2

Wetted Perimeter: 44.8611 ft

Hydraulic Radius: 1.9020 ft

Average Velocity: 4.0315 ft/s

Top Width: 44.3007 ft

Froude Number: 0.5119

Critical Depth: 1.9667 ft

Critical Velocity: 6.7706 ft/s

Critical Slope: 0.0210 ft/ft

Critical Top Width: 35.67 ft

Calculated Max Shear Stress: 0.8830 lb/ft^2

Calculated Avg Shear Stress: 0.5934 lb/ft^2

Channel Lining Analysis: CW5 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 9.26009

Manning's n method: Blodgett

Manning's n: 0.040004

Channel Bottom Shear Results

V*: 0.675012

Reynold's Number: 11536.8

Shield's Parameter: 0.047

shear stress on channel bottom: 0.882981 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.183136 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.882981 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.192144 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW5

Channel Analysis: CW6 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 16.0000 ft

Longitudinal Slope: 0.0280 ft/ft

Manning's n: 0.0912

Flow: 344.0000 cfs

Result Parameters

Depth: 2.7775 ft

Area of Flow: 83.0122 ft^2

Wetted Perimeter: 44.3250 ft

Hydraulic Radius: 1.8728 ft

Average Velocity: 4.1440 ft/s

Top Width: 43.7749 ft

Froude Number: 0.5303

Critical Depth: 1.9673 ft

Critical Velocity: 6.7678 ft/s

Critical Slope: 0.1091 ft/ft

Critical Top Width: 35.67 ft

Calculated Max Shear Stress: 4.8528 lb/ft^2

Calculated Avg Shear Stress: 3.2722 lb/ft^2

Channel Lining Analysis: CW6 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.38308

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 1.51707

Manning's n method: Blodgett

Manning's n: 0.0911851

Channel Bottom Shear Results

V*: 1.58246

Reynold's Number: 162537

Shield's Parameter: 0.125883

shear stress on channel bottom: 4.85283 lb/ft^2

Permissible shear stress for channel bottom: 16.1445 lb/ft^2

channel bottom is stable

Stable D50: 0.519671 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 1.94751

shear stress on side of channel: 4.85283 lb/ft^2

Permissible shear stress for side of channel: 15.4327 lb/ft^2

Stable Side D50: 0.54364 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 9.45092 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 13.6816 ft

Additional Freeboard required because of Superelevation: 0.233644 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 9.45092 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW6 - TURN

Channel Analysis: CW7

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0410

Flow: 204.0000 cfs

Result Parameters

Depth: 2.6843 ft

Area of Flow: 57.5011 ft^2

Wetted Perimeter: 35.3744 ft

Hydraulic Radius: 1.6255 ft

Average Velocity: 3.5478 ft/s

Top Width: 34.8428 ft

Froude Number: 0.4867

Critical Depth: 1.8751 ft

Critical Velocity: 6.2614 ft/s

Critical Slope: 0.0233 ft/ft

Critical Top Width: 26.75 ft

Calculated Max Shear Stress: 0.8375 lb/ft^2

Calculated Avg Shear Stress: 0.5072 lb/ft^2

Channel Lining Analysis: CW7 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 7.93414

Manning's n method: Blodgett

Manning's n: 0.0409546

Channel Bottom Shear Results

V*: 0.657396

Reynold's Number: 11235.7

Shield's Parameter: 0.047

shear stress on channel bottom: 0.837496 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.173702 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.837496 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.182246 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW7

Channel Analysis: CW8

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 16.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0402

Flow: 321.0000 cfs

Result Parameters

Depth: 2.7396 ft

Area of Flow: 81.3612 ft^2

Wetted Perimeter: 43.9387 ft

Hydraulic Radius: 1.8517 ft

Average Velocity: 3.9454 ft/s

Top Width: 43.3961 ft

Froude Number: 0.5078

Critical Depth: 1.8922 ft

Critical Velocity: 6.6629 ft/s

Critical Slope: 0.0214 ft/ft

Critical Top Width: 34.92 ft

Calculated Max Shear Stress: 0.8548 lb/ft^2

Calculated Avg Shear Stress: 0.5777 lb/ft^2

Channel Lining Analysis: CW8 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 9.0137

Manning's n method: Blodgett

Manning's n: 0.0401614

Channel Bottom Shear Results

V*: 0.664137

Reynold's Number: 11350.9

Shield's Parameter: 0.047

shear stress on channel bottom: 0.85476 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.177283 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.85476 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.186002 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW8

Channel Analysis: CW9 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 16.0000 ft

Longitudinal Slope: 0.0300 ft/ft

Manning's n: 0.0792

Flow: 321.0000 cfs

Result Parameters

Depth: 2.4582 ft

Area of Flow: 69.5438 ft^2

Wetted Perimeter: 41.0685 ft

Hydraulic Radius: 1.6934 ft

Average Velocity: 4.6158 ft/s

Top Width: 40.5817 ft

Froude Number: 0.6214

Critical Depth: 1.8924 ft

Critical Velocity: 6.6619 ft/s

Critical Slope: 0.0833 ft/ft

Critical Top Width: 34.92 ft

Calculated Max Shear Stress: 4.6017 lb/ft^2

Calculated Avg Shear Stress: 3.1700 lb/ft^2

Channel Lining Analysis: CW9 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.36977

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 1.37094

Manning's n method: Bathurst

Manning's n: 0.0792192

Channel Bottom Shear Results

V*: 1.54097

Reynold's Number: 158276

Shield's Parameter: 0.12314

shear stress on channel bottom: 4.6017 lb/ft^2

Permissible shear stress for channel bottom: 15.7927 lb/ft^2

channel bottom is stable

Stable D50: 0.498905 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 1.91671

shear stress on side of channel: 4.6017 lb/ft^2

Permissible shear stress for side of channel: 15.0964 lb/ft^2

Stable Side D50: 0.521917 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 8.82011 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 14.0021 ft

Additional Freeboard required because of Superelevation: 0.268732 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 8.82011 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW9 - TURN

Channel Analysis: CW10

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0416

Flow: 157.0000 cfs

Result Parameters

Depth: 2.3978 ft

Area of Flow: 47.9289 ft^2

Wetted Perimeter: 32.4526 ft

Hydraulic Radius: 1.4769 ft

Average Velocity: 3.2757 ft/s

Top Width: 31.9778 ft

Froude Number: 0.4715

Critical Depth: 1.6385 ft

Critical Velocity: 5.9176 ft/s

Critical Slope: 0.0250 ft/ft

Critical Top Width: 24.38 ft

Calculated Max Shear Stress: 0.7481 lb/ft^2

Calculated Avg Shear Stress: 0.4608 lb/ft^2

Channel Lining Analysis: CW10 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 7.20586

Manning's n method: Blodgett

Manning's n: 0.0416112

Channel Bottom Shear Results

V*: 0.621323

Reynold's Number: 10619.2

Shield's Parameter: 0.047

shear stress on channel bottom: 0.748107 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.155162 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.748107 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.162794 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW10

Channel Analysis: CW11

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 16.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0409

Flow: 238.0000 cfs

Result Parameters

Depth: 2.3793 ft

Area of Flow: 66.3757 ft^2

Wetted Perimeter: 40.2646 ft

Hydraulic Radius: 1.6485 ft

Average Velocity: 3.5857 ft/s

Top Width: 39.7934 ft

Froude Number: 0.4893

Critical Depth: 1.5977 ft

Critical Velocity: 6.2100 ft/s

Critical Slope: 0.0232 ft/ft

Critical Top Width: 31.98 ft

Calculated Max Shear Stress: 0.7424 lb/ft^2

Calculated Avg Shear Stress: 0.5143 lb/ft^2

Channel Lining Analysis: CW11 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 8.01927

Manning's n method: Blodgett

Manning's n: 0.040885

Channel Bottom Shear Results

V*: 0.618929

Reynold's Number: 10578.2

Shield's Parameter: 0.047

shear stress on channel bottom: 0.742354 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.153969 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.742354 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.161542 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW11

Channel Analysis: CW12 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 16.0000 ft

Longitudinal Slope: 0.0300 ft/ft

Manning's n: 0.0846

Flow: 238.0000 cfs

Result Parameters

Depth: 2.1826 ft

Area of Flow: 58.7399 ft^2

Wetted Perimeter: 38.2581 ft

Hydraulic Radius: 1.5354 ft

Average Velocity: 4.0518 ft/s

Top Width: 37.8259 ft

Froude Number: 0.5730

Critical Depth: 1.5979 ft

Critical Velocity: 6.2086 ft/s

Critical Slope: 0.0993 ft/ft

Critical Top Width: 31.98 ft

Calculated Max Shear Stress: 4.0858 lb/ft^2

Calculated Avg Shear Stress: 2.8742 lb/ft^2

Channel Lining Analysis: CW12 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.34122

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 1.24232

Manning's n method: Bathurst

Manning's n: 0.0845503

Channel Bottom Shear Results

V*: 1.45203

Reynold's Number: 149140

Shield's Parameter: 0.117259

shear stress on channel bottom: 4.08581 lb/ft^2

Permissible shear stress for channel bottom: 15.0384 lb/ft^2

channel bottom is stable

Stable D50: 0.455496 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 1.88642

shear stress on side of channel: 4.08581 lb/ft^2

Permissible shear stress for side of channel: 14.3754 lb/ft^2

Stable Side D50: 0.476505 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 7.70755 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 11.7025 ft

Additional Freeboard required because of Superelevation: 0.193006 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 7.70755 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW12 - TURN

Channel Analysis: CW13

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0413

Flow: 177.0000 cfs

Result Parameters

Depth: 2.5256 ft

Area of Flow: 52.0978 ft^2

Wetted Perimeter: 33.7561 ft

Hydraulic Radius: 1.5434 ft

Average Velocity: 3.3975 ft/s

Top Width: 33.2559 ft

Froude Number: 0.4784

Critical Depth: 1.7434 ft

Critical Velocity: 6.0732 ft/s

Critical Slope: 0.0242 ft/ft

Critical Top Width: 25.43 ft

Calculated Max Shear Stress: 0.7880 lb/ft^2

Calculated Avg Shear Stress: 0.4815 lb/ft^2

Channel Lining Analysis: CW13 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 7.5316

Manning's n method: Blodgett

Manning's n: 0.0413032

Channel Bottom Shear Results

V*: 0.637668

Reynold's Number: 10898.5

Shield's Parameter: 0.047

shear stress on channel bottom: 0.787985 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.163433 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.787985 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.171472 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW13

Channel Analysis: CW14

Notes:

Input Parameters

Channel Type: Trapezoidal
Side Slope 1 (Z1): 5.0000 ft/ft
Side Slope 2 (Z2): 5.0000 ft/ft
Channel Width: 16.0000 ft
Longitudinal Slope: 0.0050 ft/ft
Manning's n: 0.0412
Flow: 212.0000 cfs

Result Parameters

Depth: 2.2515 ft
Area of Flow: 61.3697 ft^2
Wetted Perimeter: 38.9607 ft
Hydraulic Radius: 1.5752 ft
Average Velocity: 3.4545 ft/s
Top Width: 38.5148 ft
Froude Number: 0.4823
Critical Depth: 1.4951 ft
Critical Velocity: 6.0403 ft/s
Critical Slope: 0.0240 ft/ft
Critical Top Width: 30.95 ft
Calculated Max Shear Stress: 0.7025 lb/ft^2
Calculated Avg Shear Stress: 0.4915 lb/ft^2

Channel Lining Analysis: CW14 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 7.66059

Manning's n method: Blodgett

Manning's n: 0.0411878

Channel Bottom Shear Results

V*: 0.602071

Reynold's Number: 10290.1

Shield's Parameter: 0.047

shear stress on channel bottom: 0.702463 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.145695 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.702463 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.152862 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW14

Channel Analysis: CW15

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 8.0000 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0741

Flow: 117.0000 cfs

Result Parameters

Depth: 2.3288 ft

Area of Flow: 45.7483 ft^2

Wetted Perimeter: 31.7496 ft

Hydraulic Radius: 1.4409 ft

Average Velocity: 2.5575 ft/s

Top Width: 31.2884 ft

Froude Number: 0.3727

Critical Depth: 1.4037 ft

Critical Velocity: 5.5497 ft/s

Critical Slope: 0.0826 ft/ft

Critical Top Width: 22.04 ft

Calculated Max Shear Stress: 1.4532 lb/ft^2

Calculated Avg Shear Stress: 0.8991 lb/ft^2

Channel Lining Analysis: CW15 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.04193

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.94953

Manning's n method: Blodgett

Manning's n: 0.0741107

Channel Bottom Shear Results

V*: 0.865961

Reynold's Number: 53366.5

Shield's Parameter: 0.0556047

shear stress on channel bottom: 1.4532 lb/ft^2

Permissible shear stress for channel bottom: 4.27878 lb/ft^2

channel bottom is stable

Stable D50: 0.265401 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 2

shear stress on side of channel: 1.4532 lb/ft^2

Permissible shear stress for side of channel: 4.08862 lb/ft^2

Stable Side D50: 0.277745 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 50 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 2.9064 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 12.3978 ft

Additional Freeboard required because of Superelevation: 0.127213 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 2.9064 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW15

Channel Analysis: CW16 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 16.0000 ft

Longitudinal Slope: 0.0300 ft/ft

Manning's n: 0.0913

Flow: 353.0000 cfs

Result Parameters

Depth: 2.7679 ft

Area of Flow: 82.5919 ft^2

Wetted Perimeter: 44.2270 ft

Hydraulic Radius: 1.8675 ft

Average Velocity: 4.2740 ft/s

Top Width: 43.6788 ft

Froude Number: 0.5477

Critical Depth: 1.9957 ft

Critical Velocity: 6.8085 ft/s

Critical Slope: 0.1091 ft/ft

Critical Top Width: 35.96 ft

Calculated Max Shear Stress: 5.1815 lb/ft^2

Calculated Avg Shear Stress: 3.4959 lb/ft^2

Channel Lining Analysis: CW16 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.4

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 1.51271

Manning's n method: Blodgett

Manning's n: 0.0913281

Channel Bottom Shear Results

V*: 1.63517

Reynold's Number: 167951

Shield's Parameter: 0.129368

shear stress on channel bottom: 5.18147 lb/ft^2

Permissible shear stress for channel bottom: 16.5915 lb/ft^2

channel bottom is stable

Stable D50: 0.546521 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 1.94664

shear stress on side of channel: 5.18147 lb/ft^2

Permissible shear stress for side of channel: 15.86 lb/ft^2

Stable Side D50: 0.571728 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 10.0865 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 13.6146 ft

Additional Freeboard required because of Superelevation: 0.247993 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 10.0865 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: CW16 - TURN

Channel Analysis: KN2

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0516

Flow: 12.0000 cfs

Result Parameters

Depth: 0.8845 ft

Area of Flow: 8.3339 ft^2

Wetted Perimeter: 14.0199 ft

Hydraulic Radius: 0.5944 ft

Average Velocity: 1.4399 ft/s

Top Width: 13.8448 ft

Froude Number: 0.3271

Critical Depth: 0.4770 ft

Critical Velocity: 3.4066 ft/s

Critical Slope: 0.0553 ft/ft

Critical Top Width: 9.77 ft

Calculated Max Shear Stress: 0.2760 lb/ft^2

Calculated Avg Shear Stress: 0.1855 lb/ft^2

Channel Lining Analysis: KN2 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 2.894

Manning's n method: Blodgett

Manning's n: 0.0516222

Channel Bottom Shear Results

V*: 0.377361

Reynold's Number: 6449.55

Shield's Parameter: 0.047

shear stress on channel bottom: 0.275957 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.0572353 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 0

shear stress on side of channel: 0.275957 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.0600505 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: KN2

Channel Analysis: PW1 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0453

Flow: 53.0000 cfs

Result Parameters

Depth: 1.3796 ft

Area of Flow: 23.3133 ft^2

Wetted Perimeter: 24.0696 ft

Hydraulic Radius: 0.9686 ft

Average Velocity: 2.2734 ft/s

Top Width: 23.7964 ft

Froude Number: 0.4048

Critical Depth: 0.8265 ft

Critical Velocity: 4.5372 ft/s

Critical Slope: 0.0351 ft/ft

Critical Top Width: 18.27 ft

Calculated Max Shear Stress: 0.4304 lb/ft^2

Calculated Avg Shear Stress: 0.3022 lb/ft^2

Channel Lining Analysis: PW1 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.208 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.00016

Lining Results

Angle of Repose: 40.4 degrees

Relative Flow Depth: 4.7101

Manning's n method: Blodgett

Manning's n: 0.0452527

Channel Bottom Shear Results

V*: 0.471297

Reynold's Number: 8055.04

Shield's Parameter: 0.047

shear stress on channel bottom: 0.430446 lb/ft^2

Permissible shear stress for channel bottom: 1.00302 lb/ft^2

channel bottom is stable

Stable D50: 0.0892773 ft

Channel Side Shear Results

K1: 1

K2: 0.95312

Kb: 1.1643

shear stress on side of channel: 0.430446 lb/ft^2

Permissible shear stress for side of channel: 0.955996 lb/ft^2

Stable Side D50: 0.0936685 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 200 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 0.501169 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 12.7741 ft

Additional Freeboard required because of Superelevation: 0.0191126 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 0.501169 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PW1 - TURN

Channel Analysis: PW2 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0644

Flow: 254.0000 cfs

Result Parameters

Depth: 3.4741 ft

Area of Flow: 95.0865 ft^2

Wetted Perimeter: 45.4287 ft

Hydraulic Radius: 2.0931 ft

Average Velocity: 2.6713 ft/s

Top Width: 44.7407 ft

Froude Number: 0.3229

Critical Depth: 1.9677 ft

Critical Velocity: 6.5067 ft/s

Critical Slope: 0.0561 ft/ft

Critical Top Width: 29.68 ft

Calculated Max Shear Stress: 1.0839 lb/ft^2

Calculated Avg Shear Stress: 0.6530 lb/ft^2

Channel Lining Analysis: PW2 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.01919

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 2.83371

Manning's n method: Blodgett

Manning's n: 0.0643609

Channel Bottom Shear Results

V*: 0.74788

Reynold's Number: 46089.6

Shield's Parameter: 0.0509202

shear stress on channel bottom: 1.08391 lb/ft^2

Permissible shear stress for channel bottom: 3.91831 lb/ft^2

channel bottom is stable

Stable D50: 0.211451 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 1.12177

shear stress on side of channel: 1.08391 lb/ft^2

Permissible shear stress for side of channel: 3.74416 lb/ft^2

Stable Side D50: 0.221285 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 400 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 1.2159 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 22.069 ft

Additional Freeboard required because of Superelevation: 0.0248066 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 1.2159 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PW2 - TURN

Channel Analysis: PW3 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 10.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0591

Flow: 587.0000 cfs

Result Parameters

Depth: 4.8545 ft

Area of Flow: 166.3763 ft^2

Wetted Perimeter: 59.5065 ft

Hydraulic Radius: 2.7959 ft

Average Velocity: 3.5281 ft/s

Top Width: 58.5451 ft

Froude Number: 0.3688

Critical Depth: 3.0107 ft

Critical Velocity: 7.7823 ft/s

Critical Slope: 0.0421 ft/ft

Critical Top Width: 40.11 ft

Calculated Max Shear Stress: 1.5146 lb/ft^2

Calculated Avg Shear Stress: 0.8723 lb/ft^2

Channel Lining Analysis: PW3 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.04541

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 3.78913

Manning's n method: Blodgett

Manning's n: 0.0591039

Channel Bottom Shear Results

V*: 0.884068

Reynold's Number: 54482.4

Shield's Parameter: 0.056323

shear stress on channel bottom: 1.51461 lb/ft^2

Permissible shear stress for channel bottom: 4.33406 lb/ft^2

channel bottom is stable

Stable D50: 0.274002 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 2

shear stress on side of channel: 1.51461 lb/ft^2

Permissible shear stress for side of channel: 4.14144 lb/ft^2

Stable Side D50: 0.286746 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 3.02921 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 33.6887 ft

Additional Freeboard required because of Superelevation: 0.226505 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 3.02921 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PW3 - TURN

Channel Analysis: PW5

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0628

Flow: 355.0000 cfs

Result Parameters

Depth: 3.3444 ft

Area of Flow: 122.8124 ft^2

Wetted Perimeter: 54.1062 ft

Hydraulic Radius: 2.2698 ft

Average Velocity: 2.8906 ft/s

Top Width: 53.4439 ft

Froude Number: 0.3360

Critical Depth: 1.8237 ft

Critical Velocity: 6.6850 ft/s

Critical Slope: 0.0521 ft/ft

Critical Top Width: 38.24 ft

Calculated Max Shear Stress: 1.0434 lb/ft^2

Calculated Avg Shear Stress: 0.7082 lb/ft^2

Channel Lining Analysis: PW5 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.01647

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 3.06396

Manning's n method: Blodgett

Manning's n: 0.0627906

Channel Bottom Shear Results

V*: 0.733789

Reynold's Number: 45221.2

Shield's Parameter: 0.0503611

shear stress on channel bottom: 1.04345 lb/ft^2

Permissible shear stress for channel bottom: 3.87529 lb/ft^2

channel bottom is stable

Stable D50: 0.205269 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 1.04345 lb/ft^2

Permissible shear stress for side of channel: 3.70306 lb/ft^2

Stable Side D50: 0.214816 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PW5

Channel Analysis: PW6 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0595

Flow: 590.0000 cfs

Result Parameters

Depth: 4.1816 ft

Area of Flow: 171.0580 ft^2

Wetted Perimeter: 62.6436 ft

Hydraulic Radius: 2.7307 ft

Average Velocity: 3.4491 ft/s

Top Width: 61.8155 ft

Froude Number: 0.3654

Critical Depth: 2.4333 ft

Critical Velocity: 7.5381 ft/s

Critical Slope: 0.0433 ft/ft

Critical Top Width: 44.33 ft

Calculated Max Shear Stress: 1.3046 lb/ft^2

Calculated Avg Shear Stress: 0.8520 lb/ft^2

Channel Lining Analysis: PW6 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.03317

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 3.68964

Manning's n method: Blodgett

Manning's n: 0.0595242

Channel Bottom Shear Results

V*: 0.820506

Reynold's Number: 50565.3

Shield's Parameter: 0.0538014

shear stress on channel bottom: 1.30464 lb/ft^2

Permissible shear stress for channel bottom: 4.14002 lb/ft^2

channel bottom is stable

Stable D50: 0.244188 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 1.35267

shear stress on side of channel: 1.30464 lb/ft^2

Permissible shear stress for side of channel: 3.95602 lb/ft^2

Stable Side D50: 0.255545 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 400 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 1.76475 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 32.5413 ft

Additional Freeboard required because of Superelevation: 0.0571412 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 1.76475 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PW6 - TURN

Channel Analysis: PW7 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0572

Flow: 905.0000 cfs

Result Parameters

Depth: 5.0347 ft

Area of Flow: 227.4368 ft^2

Wetted Perimeter: 71.3443 ft

Hydraulic Radius: 3.1879 ft

Average Velocity: 3.9791 ft/s

Top Width: 70.3473 ft

Froude Number: 0.3900

Critical Depth: 3.0776 ft

Critical Velocity: 8.3094 ft/s

Critical Slope: 0.0376 ft/ft

Critical Top Width: 50.78 ft

Calculated Max Shear Stress: 1.5708 lb/ft^2

Calculated Avg Shear Stress: 0.9946 lb/ft^2

Channel Lining Analysis: PW7 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.04856

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 4.31141

Manning's n method: Blodgett

Manning's n: 0.0572093

Channel Bottom Shear Results

V*: 0.90041

Reynold's Number: 55489.6

Shield's Parameter: 0.0569714

shear stress on channel bottom: 1.57112 lb/ft^2

Permissible shear stress for channel bottom: 4.38395 lb/ft^2

channel bottom is stable

Stable D50: 0.281838 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 1.44478

shear stress on side of channel: 1.57112 lb/ft^2

Permissible shear stress for side of channel: 4.18911 lb/ft^2

Stable Side D50: 0.294946 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 400 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 2.26992 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 40.5677 ft

Additional Freeboard required because of Superelevation: 0.0865102 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 2.26992 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PW7 - TURN

Channel Analysis: PW8 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0060 ft/ft

Manning's n: 0.0552

Flow: 1508.0000 cfs

Result Parameters

Depth: 6.0259 ft

Area of Flow: 302.0788 ft^2

Wetted Perimeter: 81.4528 ft

Hydraulic Radius: 3.7086 ft

Average Velocity: 4.9921 ft/s

Top Width: 80.2594 ft

Froude Number: 0.4535

Critical Depth: 4.0357 ft

Critical Velocity: 9.3003 ft/s

Critical Slope: 0.0326 ft/ft

Critical Top Width: 60.36 ft

Calculated Max Shear Stress: 2.2561 lb/ft^2

Calculated Avg Shear Stress: 1.3885 lb/ft^2

Channel Lining Analysis: PW8 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.08297

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 5.01902

Manning's n method: Blodgett

Manning's n: 0.0552521

Channel Bottom Shear Results

V*: 1.07907

Reynold's Number: 66499.7

Shield's Parameter: 0.0640592

shear stress on channel bottom: 2.25646 lb/ft^2

Permissible shear stress for channel bottom: 4.92936 lb/ft^2

channel bottom is stable

Stable D50: 0.371804 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 1.53473

shear stress on side of channel: 2.25646 lb/ft^2

Permissible shear stress for side of channel: 4.71028 lb/ft^2

Stable Side D50: 0.389097 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 400 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 3.46305 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 50.1131 ft

Additional Freeboard required because of Superelevation: 0.155357 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 3.46305 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PW8 - TURN

Channel Analysis: PW9

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0548

Flow: 1545.0000 cfs

Result Parameters

Depth: 6.3315 ft

Area of Flow: 327.0694 ft^2

Wetted Perimeter: 84.5689 ft

Hydraulic Radius: 3.8675 ft

Average Velocity: 4.7238 ft/s

Top Width: 83.3150 ft

Froude Number: 0.4201

Critical Depth: 4.0869 ft

Critical Velocity: 9.3492 ft/s

Critical Slope: 0.0319 ft/ft

Critical Top Width: 60.87 ft

Calculated Max Shear Stress: 1.9754 lb/ft^2

Calculated Avg Shear Stress: 1.2067 lb/ft^2

Channel Lining Analysis: PW9 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.06955

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 5.23232

Manning's n method: Blodgett

Manning's n: 0.0547615

Channel Bottom Shear Results

V*: 1.00942

Reynold's Number: 62207.4

Shield's Parameter: 0.061296

shear stress on channel bottom: 1.97457 lb/ft^2

Permissible shear stress for channel bottom: 4.71673 lb/ft^2

channel bottom is stable

Stable D50: 0.335811 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 0

shear stress on side of channel: 1.97457 lb/ft^2

Permissible shear stress for side of channel: 4.5071 lb/ft^2

Stable Side D50: 0.35143 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PW9

Channel Analysis: PW10

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 20.0000 ft

Longitudinal Slope: 0.0200 ft/ft

Manning's n: 0.0716

Flow: 1543.0000 cfs

Result Parameters

Depth: 5.1921 ft

Area of Flow: 238.6319 ft^2

Wetted Perimeter: 72.9493 ft

Hydraulic Radius: 3.2712 ft

Average Velocity: 6.4660 ft/s

Top Width: 71.9211 ft

Froude Number: 0.6256

Critical Depth: 4.0858 ft

Critical Velocity: 9.3411 ft/s

Critical Slope: 0.0545 ft/ft

Critical Top Width: 60.86 ft

Calculated Max Shear Stress: 6.4797 lb/ft^2

Calculated Avg Shear Stress: 4.0825 lb/ft^2

Channel Lining Analysis: PW10 - ANALYSIS

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1.25 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.46208

Lining Results

Angle of Repose: 41.9 degrees

Relative Flow Depth: 2.65438

Manning's n method: Blodgett

Manning's n: 0.0716252

Channel Bottom Shear Results

V*: 1.82858

Reynold's Number: 187817

Shield's Parameter: 0.142157

shear stress on channel bottom: 6.47975 lb/ft^2

Permissible shear stress for channel bottom: 18.2316 lb/ft^2

channel bottom is stable

Stable D50: 0.649553 ft

Channel Side Shear Results

K1: 1

K2: 0.95591

Kb: 0

shear stress on side of channel: 6.47975 lb/ft^2

Permissible shear stress for side of channel: 17.4278 lb/ft^2

Stable Side D50: 0.679513 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: PW10

Channel Analysis: SW1 - TURN

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0300 ft/ft

Manning's n: 0.0742

Flow: 60.0000 cfs

Result Parameters

Depth: 1.4809 ft

Area of Flow: 18.3694 ft^2

Wetted Perimeter: 20.1021 ft

Hydraulic Radius: 0.9138 ft

Average Velocity: 3.2663 ft/s

Top Width: 19.8088 ft

Froude Number: 0.5977

Critical Depth: 1.1435 ft

Critical Velocity: 4.8959 ft/s

Critical Slope: 0.0900 ft/ft

Critical Top Width: 16.43 ft

Calculated Max Shear Stress: 2.7722 lb/ft^2

Calculated Avg Shear Stress: 1.7106 lb/ft^2

Channel Lining Analysis: SW1 - ANALYSIS TURN

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.75 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.1055

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.23645

Manning's n method: Bathurst

Manning's n: 0.0742119

Channel Bottom Shear Results

V*: 1.19605

Reynold's Number: 73708.8

Shield's Parameter: 0.0687

shear stress on channel bottom: 2.77221 lb/ft^2

Permissible shear stress for channel bottom: 5.28647 lb/ft^2

channel bottom is stable

Stable D50: 0.434789 ft

Channel Side Shear Results

K1: 1

K2: 0.955556

Kb: 1.5261

shear stress on side of channel: 2.77221 lb/ft^2

Permissible shear stress for side of channel: 5.05151 lb/ft^2

Stable Side D50: 0.455011 lb/ft^2

side of channel is stable

Channel Bend Shear Results

Curvature Radius: 100 ft

No further correction will occur once R/T > 10

shear stress on bottom of channel in bend: 4.23066 lb/ft^2

bottom of bend of the channel is stable

Length of Protection beyond PT: 7.27794 ft

Additional Freeboard required because of Superelevation: 0.0656848 ft

Channel Bend Side Shear Results

shear stress on side of channel in bend: 4.23066 lb/ft^2

The side of the bend of the channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Name of Selected Channel: SW1 - TURN

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Tuesday, March 24, 2020

Project Units: U.S. Customary Units

Notes:

Channel Analysis: OW1 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.1442

Lining Type: Vegetative - Class B

Flow: 26.0000 cfs

Result Parameters

Depth: 2.0562 ft

Area of Flow: 31.4213 ft^2

Wetted Perimeter: 25.9694 ft

Hydraulic Radius: 1.2099 ft

Average Velocity: 0.8275 ft/s

Top Width: 25.5622 ft

Froude Number: 0.1315

Critical Depth: 0.7353 ft

Critical Velocity: 4.0755 ft/s

Critical Slope: 0.3836 ft/ft

Critical Top Width: 12.35 ft

Calculated Max Shear Stress: 0.6415 lb/ft^2

Calculated Avg Shear Stress: 0.3775 lb/ft^2

Channel Analysis: OW1 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 26.0000 cfs

Result Parameters

Depth: 0.7013 ft

Area of Flow: 5.9655 ft^2

Wetted Perimeter: 12.1518 ft

Hydraulic Radius: 0.4909 ft

Average Velocity: 4.3584 ft/s

Top Width: 12.0129 ft

Froude Number: 1.0899

Critical Depth: 0.7351 ft

Critical Velocity: 4.0769 ft/s

Critical Slope: 0.0042 ft/ft

Critical Top Width: 12.35 ft

Calculated Max Shear Stress: 0.2188 lb/ft^2

Calculated Avg Shear Stress: 0.1532 lb/ft^2

Channel Analysis: OW2 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.1131

Lining Type: Vegetative - Class B

Flow: 50.0000 cfs

Result Parameters

Depth: 2.4636 ft

Area of Flow: 42.6643 ft^2

Wetted Perimeter: 30.1238 ft

Hydraulic Radius: 1.4163 ft

Average Velocity: 1.1719 ft/s

Top Width: 29.6359 ft

Froude Number: 0.1721

Critical Depth: 1.0405 ft

Critical Velocity: 4.7099 ft/s

Critical Slope: 0.2147 ft/ft

Critical Top Width: 15.41 ft

Calculated Max Shear Stress: 0.7686 lb/ft^2

Calculated Avg Shear Stress: 0.4419 lb/ft^2

Channel Analysis: OW2 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 50.0000 cfs

Result Parameters

Depth: 0.9720 ft

Area of Flow: 9.5845 ft^2

Wetted Perimeter: 14.9129 ft

Hydraulic Radius: 0.6427 ft

Average Velocity: 5.2167 ft/s

Top Width: 14.7204 ft

Froude Number: 1.1393

Critical Depth: 1.0406 ft

Critical Velocity: 4.7095 ft/s

Critical Slope: 0.0038 ft/ft

Critical Top Width: 15.41 ft

Calculated Max Shear Stress: 0.3033 lb/ft^2

Calculated Avg Shear Stress: 0.2005 lb/ft^2

Channel Analysis: OW3 - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.1394

Lining Type: Vegetative - Class B

Flow: 24.0000 cfs

Result Parameters

Depth: 1.6712 ft

Area of Flow: 22.3198 ft^2

Wetted Perimeter: 22.0426 ft

Hydraulic Radius: 1.0126 ft

Average Velocity: 1.0753 ft/s

Top Width: 21.7116 ft

Froude Number: 0.1869

Critical Depth: 0.7037 ft

Critical Velocity: 4.0035 ft/s

Critical Slope: 0.3626 ft/ft

Critical Top Width: 12.04 ft

Calculated Max Shear Stress: 1.0428 lb/ft^2

Calculated Avg Shear Stress: 0.6318 lb/ft^2

Channel Analysis: OW3 - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 5.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 24.0000 cfs

Result Parameters

Depth: 0.5626 ft

Area of Flow: 4.3954 ft^2

Wetted Perimeter: 10.7373 ft

Hydraulic Radius: 0.4094 ft

Average Velocity: 5.4602 ft/s

Top Width: 10.6258 ft

Froude Number: 1.4961

Critical Depth: 0.7038 ft

Critical Velocity: 4.0025 ft/s

Critical Slope: 0.0042 ft/ft

Critical Top Width: 12.04 ft

Calculated Max Shear Stress: 0.3511 lb/ft^2

Calculated Avg Shear Stress: 0.2554 lb/ft^2

Channel Analysis: DRC - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.1150 ft/ft

Manning's n: 0.1371

Lining Type: Vegetative - Class B

Flow: 11.0000 cfs

Result Parameters

Depth: 0.6697 ft

Area of Flow: 4.6937 ft^2

Wetted Perimeter: 9.2354 ft

Hydraulic Radius: 0.5082 ft

Average Velocity: 2.3436 ft/s

Top Width: 9.0180 ft

Froude Number: 0.5725

Critical Depth: 0.4805 ft

Critical Velocity: 3.5540 ft/s

Critical Slope: 0.3840 ft/ft

Critical Top Width: 7.88 ft

Calculated Max Shear Stress: 4.8055 lb/ft^2

Calculated Avg Shear Stress: 3.6471 lb/ft^2

Channel Analysis: DRC - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.1150 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 11.0000 cfs

Result Parameters

Depth: 0.1905 ft

Area of Flow: 1.0613 ft^2

Wetted Perimeter: 6.2048 ft

Hydraulic Radius: 0.1710 ft

Average Velocity: 10.3646 ft/s

Top Width: 6.1429 ft

Froude Number: 4.3943

Critical Depth: 0.4806 ft

Critical Velocity: 3.5529 ft/s

Critical Slope: 0.0046 ft/ft

Critical Top Width: 7.88 ft

Calculated Max Shear Stress: 1.3670 lb/ft^2

Calculated Avg Shear Stress: 1.2274 lb/ft^2

Channel Analysis: WTC - VEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.1330 ft/ft

Manning's n: 0.1569

Lining Type: Vegetative - Class B

Flow: 8.0000 cfs

Result Parameters

Depth: 0.5823 ft

Area of Flow: 3.9289 ft^2

Wetted Perimeter: 8.6829 ft

Hydraulic Radius: 0.4525 ft

Average Velocity: 2.0362 ft/s

Top Width: 8.4939 ft

Froude Number: 0.5276

Critical Depth: 0.3957 ft

Critical Velocity: 3.2677 ft/s

Critical Slope: 0.5300 ft/ft

Critical Top Width: 7.37 ft

Calculated Max Shear Stress: 4.8328 lb/ft^2

Calculated Avg Shear Stress: 3.7553 lb/ft^2

Channel Analysis: WTC - UNVEG

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 3.0000 ft/ft

Channel Width: 5.0000 ft

Longitudinal Slope: 0.1330 ft/ft

Manning's n: 0.0150

Lining Type: Woven Paper

Flow: 8.0000 cfs

Result Parameters

Depth: 0.1514 ft

Area of Flow: 0.8256 ft^2

Wetted Perimeter: 5.9574 ft

Hydraulic Radius: 0.1386 ft

Average Velocity: 9.6897 ft/s

Top Width: 5.9082 ft

Froude Number: 4.5680

Critical Depth: 0.3956 ft

Critical Velocity: 3.2685 ft/s

Critical Slope: 0.0048 ft/ft

Critical Top Width: 7.37 ft

Calculated Max Shear Stress: 1.2563 lb/ft^2

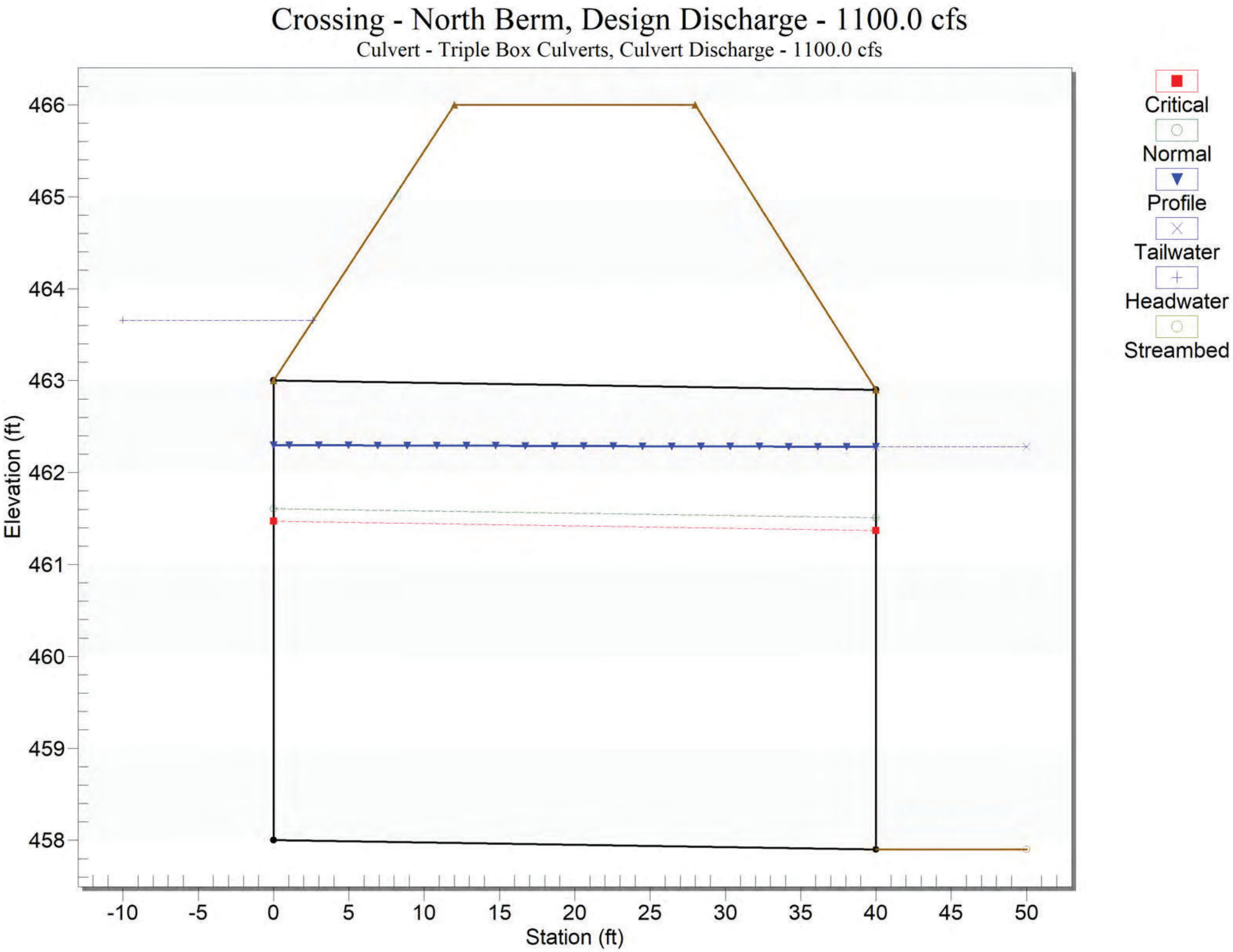
Calculated Avg Shear Stress: 1.1502 lb/ft^2

HY-8 Analysis Results

Culvert Summary Table - Triple Box Culverts

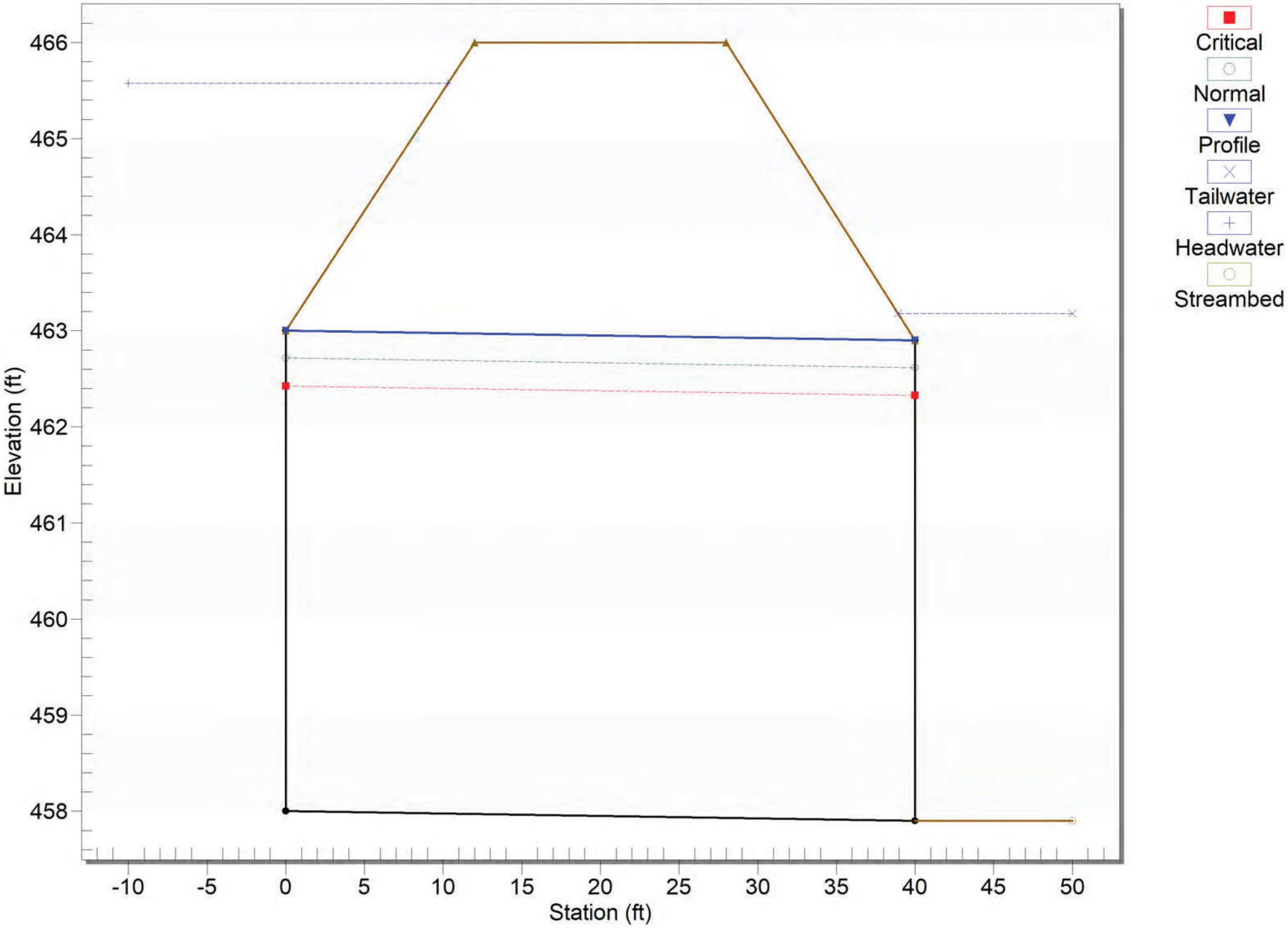
Culvert Crossing: North Berm

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
300.00	300.00	460.51	2.38	2.51	3-M1t	1.48	1.46	2.18	2.18	4.58	3.00
428.50	428.50	461.14	2.96	3.14	3-M1t	1.87	1.85	2.65	2.65	5.38	3.35
557.00	557.00	461.70	3.49	3.70	3-M1t	2.24	2.20	3.06	3.06	6.07	3.62
685.50	685.50	462.21	3.99	4.21	3-M1t	2.58	2.53	3.42	3.42	6.69	3.85
814.00	814.00	462.68	4.48	4.68	3-M1t	2.91	2.84	3.74	3.74	7.25	4.05
942.50	942.50	463.13	4.96	5.13	7-M1t	3.23	3.13	4.04	4.04	7.77	4.22
1100.00	1100.00	463.66	5.55	5.66	7-M1t	3.61	3.47	4.38	4.38	8.37	4.41
1199.50	1199.50	463.97	5.94	5.97	7-M1t	3.84	3.68	4.58	4.58	8.73	4.52
1328.00	1328.00	464.46	6.46~	6.37	7-M1t	4.14	3.93	4.82	4.82	9.18	4.66
1456.50	1456.50	465.00	7.00~	6.84	4-FFf	4.43	4.18	5.00	5.06	9.71	4.78
1585.00	1585.00	465.58	7.58~	7.41	4-FFf	4.72	4.43	5.00	5.28	10.57	4.89


Crossing - North Berm, Design Discharge - 1100.0 cfs
Culvert - Triple Box Culverts, Culvert Discharge - 1100.0 cfs
Elevation (ft)
466
465
464
463
462
461
460
459
458
Station (ft)
-10
-5
0
5
10
15
20
25
30
35
40
45
50
Critical
Normal
Profile
Tailwater
Headwater
Streambed

Crossing - North Berm, Design Discharge - 1585.0 cfs

Culvert - Triple Box Culverts, Culvert Discharge - 1585.0 cfs



Calculation: Riprap basin dimensions for SW outlet into Berry Creek
Calculated by: NSF Checked by: AJN
Date: 4/23/2020
Source: USDOT FHA Hydraulic Engineering Circular No. 14, Third Edition (July 2006)

2% slope Upstream of water level

g = 32.2 ft/s2
ye = 2.4 ft
D50 = 0.75 ft
Vo = 5 ft/s
TW = 0 ft
TW/ye = 0
Co = 2
Wo = 15
L_{S1} = 10
L_{S2} = 45
L_{A1} = 5
L_{A2} = 15
L_{B1} = 15
L_{B2} = 60

h_s = 1
L_S = 45
L_A = 15
L_B = 60

$$\frac{h_s}{y_e} = 0.86\left(\frac{D_{50}}{y_e}\right)^{-0.55}\left(\frac{V_o}{\sqrt{g y_e}}\right) - C_o \qquad (10.1)$$

where,

h_s = dissipator pool depth, m (ft)
y_e = equivalent brink (outlet) depth, m (ft)
D_{50} = median rock size by weight, m (ft)
C_o = tailwater parameter

The tailwater parameter, C_o, is defined as:

$$\begin{array}{ll} C_o = 1.4 & TW/y_e < 0.75 \\ C_o = 4.0(TW/y_e) - 1.6 & 0.75 < TW/y_e < 1.0 \\ C_o = 2.4 & 1.0 < TW/y_e \end{array} \qquad (10.2)$$

A best fit design relationship that minimizes the RMS error when applied to the experimental data was also developed. Equation 10.1 still applies, but the description of the tailwater parameter, C_o, is defined in Equation 10.3. The best fit relationship for Equations 10.1 and 10.3 exhibits a RMS error on the experimental data of 0.56.

$$\begin{array}{ll} C_o = 2.0 & TW/y_e < 0.75 \\ C_o = 4.0(TW/y_e) - 1.0 & 0.75 < TW/y_e < 1.0 \\ C_o = 3.0 & 1.0 < TW/y_e \end{array} \qquad (10.3)$$

Use of the envelope design relationship (Equations 10.1 and 10.2) is recommended when the consequences of failure at or near the design flow are severe. Use of the best fit design relationship (Equations 10.1 and 10.3) is recommended when basin failure may easily be addressed as part of routine maintenance. Intermediate risk levels can be adopted by the use of intermediate values of C_o.

- The basin is pre-shaped and lined with riprap that is at least $2D_{50}$ thick.
- The riprap floor is constructed at the approximate depth of scour, h_s, that would occur in a thick pad of riprap. The h_s/D_{50} of the material should be greater than 2.
- The length of the energy dissipating pool, L_s, is $10h_s$, but no less than $3W_o$; the length of the apron, L_A, is $5h_s$, but no less than W_o. The overall length of the basin (pool plus apron), L_B, is $15h_s$, but no less than $4W_o$.
- A riprap cutoff wall or sloping apron can be constructed if downstream channel degradation is anticipated as shown in Figure 10.1.

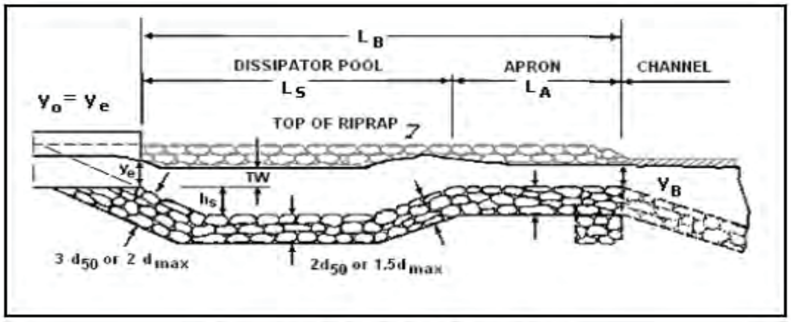


Figure 10.1. Profile of Riprap Basin

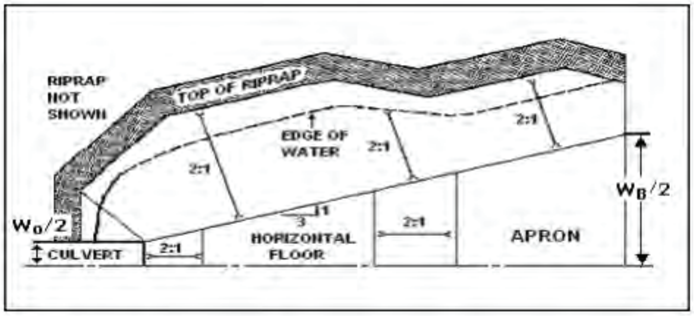


Figure 10.2. Half Plan of Riprap Basin

Calculation: Riprap basin dimensions for SW outlet into Recycle Pond
Calculated by: NSF Checked by: AJN
Date: 4/23/2020
Source: USDOT FHA Hydraulic Engineering Circular No. 14, Third Edition (July 2006)

2% slope Upstream of water level

g = 32.2 ft/s2
ye = 5.2 ft
D50 = 1.25 ft
Vo = 6.5 ft/s
TW = 1.5 ft
TW/ye = 0.288462
Co = 2
Wo = 20
L_{S1} = 30
L_{S2} = 60
L_{A1} = 15
L_{A2} = 20
L_{B1} = 45
L_{B2} = 80

h_s = 3
L_S = 60
L_A = 20
L_B = 80

$$\frac{h_s}{y_e} = 0.86\left(\frac{D_{50}}{y_e}\right)^{-0.55}\left(\frac{V_o}{\sqrt{g y_e}}\right) - C_o \qquad (10.1)$$

where,

h_s = dissipator pool depth, m (ft)
y_e = equivalent brink (outlet) depth, m (ft)
D_{50} = median rock size by weight, m (ft)
C_o = tailwater parameter

The tailwater parameter, C_o, is defined as:

$$\begin{aligned} C_o &= 1.4 && TW/y_e < 0.75 \\ C_o &= 4.0(TW/y_e) - 1.6 && 0.75 < TW/y_e < 1.0 \\ C_o &= 2.4 && 1.0 < TW/y_e \end{aligned} \qquad (10.2)$$

A best fit design relationship that minimizes the RMS error when applied to the experimental data was also developed. Equation 10.1 still applies, but the description of the tailwater parameter, C_o, is defined in Equation 10.3. The best fit relationship for Equations 10.1 and 10.3 exhibits a RMS error on the experimental data of 0.56.

$$\begin{aligned} C_o &= 2.0 && TW/y_e < 0.75 \\ C_o &= 4.0(TW/y_e) - 1.0 && 0.75 < TW/y_e < 1.0 \\ C_o &= 3.0 && 1.0 < TW/y_e \end{aligned} \qquad (10.3)$$

Use of the envelope design relationship (Equations 10.1 and 10.2) is recommended when the consequences of failure at or near the design flow are severe. Use of the best fit design relationship (Equations 10.1 and 10.3) is recommended when basin failure may easily be addressed as part of routine maintenance. Intermediate risk levels can be adopted by the use of intermediate values of C_o.

- The basin is pre-shaped and lined with riprap that is at least $2D_{50}$ thick.
- The riprap floor is constructed at the approximate depth of scour, h_s, that would occur in a thick pad of riprap. The h_s/D_{50} of the material should be greater than 2.
- The length of the energy dissipating pool, L_s, is $10h_s$, but no less than $3W_o$; the length of the apron, L_A, is $5h_s$, but no less than W_o. The overall length of the basin (pool plus apron), L_B, is $15h_s$, but no less than $4W_o$.
- A riprap cutoff wall or sloping apron can be constructed if downstream channel degradation is anticipated as shown in Figure 10.1.

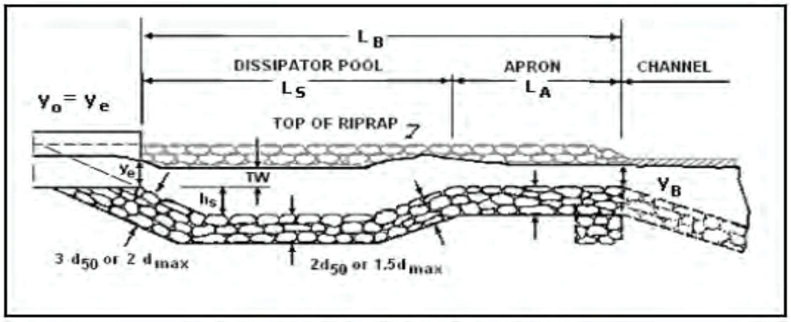


Figure 10.1. Profile of Riprap Basin

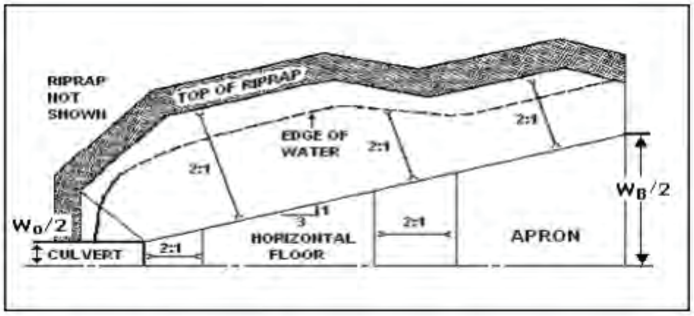


Figure 10.2. Half Plan of Riprap Basin

Job	Plant Scherer – Ash Pond Closure	**Project No.**	60563110	Sheet	**14 of 14**
Description	H&H Calculations	**Computed by**	NSF	Date	4/6/22
	Post-Closure Stormwater Calculations	**Checked by**	AJN	Date	4/15/22

Attachment D
Berry Creek HEC-RAS Analysis

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Project name:
Plant Scherer Ash Pond 1 Closure
PDP Engineering

Project ref:
60579688

From:
Douglas W. Carr, P.E. (AECOM Project Manager)

Date:
November 8, 2019

To:
Tyler Boyles, Enivornmental Affairs
Georgia Power Company

CC:
Brian J. Peterson, PMP, PE (SCS E&CS, P&C East Project Manager)
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Jim Minor, P.E. (SCS E&CS Civil)
Chet Dicke, P.E. (AECOM Deputy PM/Design Lead)
Steve Walker, P.E. (AECOM Engineering Lead)
Alex Nice, P.E. (AECOM H&H Subject Matter Expert)
Nicholas Fischer (AECOM H&H Engineer)

Memorandum

Subject: Berry Creek HEC-RAS Modeling - State Route 87 Culverts

At the request of Georgia Power Company and Southern Company Services, Inc. (GPC/SCS), AECOM has prepared this memorandum to summarize the results and recommendations from additional hydrology and hydraulics (H&H) modeling for the Berry Creek Downstream Impacts Study for the post-closure conditions of Plant Scherer Ash Pond 1 (AP-1). The additional H&H modeling memorandum results from a conference call between AECOM and GPC/SCS held on December 18, 2018. As a result of this conference call, GPC/SCS requested that AECOM provide recommendations for modifying or supplementing the culverts under State Route 87 (SR87) to meet Georgia Department of Transportation (GDOT) stormwater requirements. Modeling completed to-date for the AP-1 post-closure conditions indicate that these culverts are undersized and SR87 does not meet the current GDOT stormwater requirements.

This memorandum was originally submitted on February 6, 2019 as DRAFT. Since then, the AP-1 Closure design has been modified to direct a reduced amount of stormwater downstream towards Berry Creek. This FINAL memorandum is to present the updated analysis of the SR87 culverts based on these reduced stormwater flows expected from the modified closure design.

1. Background

Based on the 60% detailed design for the AP-1 closure (current AP-1 closure design) dated July 30, 2019, the consolidated closure-in-place footprint will be separated from the closure-by-removal area to the north by the proposed north berm. The consolidated closure-in-place footprint now encompasses approximately 380 acres with the knob area included. The closure-by-removal area now encompasses approximately 220 acres. A reduced portion of the closure-in-place footprint along with the entire portion of a larger closure-by-removal area will discharge to the east into Berry Creek. AP-1 does not currently discharge into Berry Creek, so the closure design will result in increased stormwater flows discharged into Berry Creek compared to the existing conditions. AECOM was directed by GPC/SCS to analyze the flooding impacts of these additional stormwater flows by updating the HEC-RAS model of Berry Creek that was completed by Schnabel Engineering (Schnabel) in 2017. An overview of Schnabel's HEC-RAS model and AECOM's HEC-RAS model can be found in Sections 2.1 and 2.2 below.

During the December 18, 2018 conference call, AECOM presented the HEC-RAS modeling results to GPC/SCS and compared the pre-closure and post-closure flooding impacts. AECOM's HEC-RAS modeling determined that the culverts under SR87 do not meet current GDOT stormwater requirements during the 100-year storm in both the current existing pre-closure condition and the expected future post-closure condition. Photographs of the existing culverts under SR87 taken by AECOM on February 5, 2019 are included as **Figure A** (upstream view) and **Figure B** (downstream view) below.

Figure A – Upstream view of existing concrete box culverts under State Route 87

Figure B – Downstream view of existing concrete box culverts under State Route 87

2. Development of HEC-RAS Model

AECOM received the HEC-RAS model that was used to support the Certified Letter of Map Revision (CLOMR) application completed by Schnabel Engineering and submitted in December 2017 (Schnabel’s model). Schnabel’s model was then supplemented with additional survey information collected by SCS, revised inflows, and a tailwater condition from the Ocmulgee River. This model was then used to determine the flooding extents along Berry Creek during storms ranging from the 2-year storm event to the 500-year storm event.

2.1 Schnabel’s HEC-RAS Model

A HEC-RAS model was first obtained by Schnabel from FEMA through a Flood Insurance Study (FIS) library data request. The model was then updated by Schnabel by removing cross sections upstream of the AP-1 east dike and adding in the existing Gypsum Road culvert. It appears that either FEMA or Schnabel made assumptions of Berry Creek’s channel geometry below the water surface. Schnabel’s model extends from Cross Section 16826 to Cross Section 3500. Cross section 16826 is just downstream of the existing AP-1 east dike. Cross Section 3500 is just downstream of SR87. The culverts under SR87 were not included in this HEC-RAS model. The HEC-RAS model includes an existing conditions plan (before AP-1 Closure and before the construction of Landfill Cell No. 3) and a proposed conditions plan (before AP-1 Closure, but after the construction of Landfill Cell No. 3). Both plans were used to submit a revised flood map as a part of the CLOMR application.

Schnabel used regression equations from the USGS publication titled *Magnitude and Frequency of Floods for Urban and Small Rural Stream in Georgia* (SIR 2011-5042) to determine the peak inflows into Berry Creek’s subcatchments. SIR 2011-5042 splits Georgia up into five different regions each with different regression equations for storm events ranging from the 2-year storm event to the 500-year storm event. Berry Creek is within Region 1 as described by SIR 2011-5042. These regression equations estimate the peak inflow for each storm event using the drainage area and the impervious land cover within the subcatchment. These peak inflows were routed through the HEC-RAS model at the upstream-most cross section of each subcatchment. Downstream subcatchments include the inflows from subcatchments upstream.

2.2 AECOM’s HEC-RAS Model

AECOM created a HEC-RAS model that analyzes three different plan conditions as follows:

- The existing conditions of Berry Creek from AP-1 to the Ocmulgee River;
- The proposed conditions before AP-1 Closure which includes Landfill Cell No. 3 construction; and
- The proposed conditions after AP-1 Closure which includes Landfill Cell No. 3 construction.

These three plans (AECOM’s HEC-RAS model) were constructed by adding additional downstream information, revised inflows, and tailwater conditions based on the estimated 25-year flood elevation of the Ocmulgee River to Schnabel’s model. This model was constructed to get a more accurate determination of the flooding extents along Berry Creek.

The geometry for the three plans in AECOM’s HEC-RAS model is identical for all cross sections except Cross Sections 15911.28 through 12500. The geometry for these cross sections in the existing conditions plan is based on existing topographical information available to AECOM as of the date of this memorandum. The geometry for these cross sections in the proposed conditions before AP-1 Closure plan and the proposed conditions after AP-1 Closure plan was modified based on the topography of the proposed Landfill Cell No. 3 construction.

2.2.1 Additional Downstream Information

AECOM’s HEC-RAS model of Berry Creek was extended all the way downstream to the Ocmulgee River. This extension included an addition of 6 cross sections downstream of Cross Section 3500 (Cross Sections 3000 through 500). The geometry for these cross sections was determined based on the most up to date topographical information available to AECOM as of the date of this memorandum. Additional survey work was completed by SCS as noted previously and is dated October 25, 2018. The survey work provided the following additional information:

- 7 additional cross sections (not including the 6 cross sections added downstream of Cross Section 3500) along the length of Berry Creek. Cross section 9993.515 from this survey information was used to replace Cross Section 10000 from Schnabel's Model.
- Size, length, and upstream and downstream inverts of the culverts under SR 87. These culverts were determined to be twin-box-culverts with a 14-foot span and a 12-foot depth each. The culverts are approximately 120 feet in length, and they have upstream and downstream inverts of approximately 355.2 feet NAVD88 and 354.8 feet NAVD88, respectively.
- Width, span, and top and bottom elevations of the railroad bridge downstream of SR87. The railroad bridge spans approximately 600 feet with a top and bottom elevation of approximately 377.2 feet NAVD88 and 373.7 feet NAVD88, respectively.

The additional information from this survey was added to AECOM's HEC-RAS model. The surveyed cross sections were used to check the assumptions of Berry Creek's channel geometry below the water surface from Schnabel's model. The channel inverts were lowered by 1 to 3 feet throughout the model based on the channel invert of the surveyed cross sections nearby.

2.2.2 Ocmulgee River Tailwater

AECOM obtained the FEMA HEC-RAS model that was used to develop the current, effective approximate Zone A hazard area for the Ocmulgee River. This model was used to determine the approximate 25-year flood elevation of the Ocmulgee River at the mouth of Berry Creek. AECOM determined that this elevation is approximately 365.8 feet NAVD88, and this elevation was used as the downstream boundary condition for AECOM's HEC-RAS model. Additional details on AECOM's HEC-RAS analysis of the Ocmulgee River can be found in **Appendix B.**

2.2.3 Revised Inflow Calculations

AECOM completed a hydrologic analysis of Berry Creek's subcatchments to determine the peak inflows to route through AECOM's HEC-RAS model. The peak inflows in each subcatchment were determined for storms between the 2-year and 500-year storm events using the HydroCAD model that was constructed as a part of the closure design. The peak inflow values from the HydroCAD model were calculated as summarized in Appendix C2 of the Engineering Report submitted to GPC/SCS on July 30, 2019 (the updated AP-1 closure design, 60% submittal based on the reduced stormwater flows directed towards Berry Creek).

The peak inflow values were then calculated using the regression equations in SIR 2011-5042. These inflows were calculated using the same equations that were used for the inflows in Schnabel's model, but were updated based on the topography and drainage areas determined by AECOM as a part of the updated closure design.

AECOM selected the peak inflow values from the HydroCAD model as an input for the HEC-RAS model, because these inflow values were the larger of the two peak inflow values from both methods. AECOM also believes that the HydroCAD model more accurately estimates the peak inflow for Berry Creek's various subcatchments. The selected peak inflow values were then routed through the AECOM's HEC-RAS model at the upstream-most cross section of their respective subcatchments. Downstream subcatchments include the inflows from subcatchments upstream. These hydrologic inflow calculations and the resultant inflows into the various cross sections of AECOM's HEC-RAS models can be found in **Appendix A**.

The inflows for the existing conditions plan and the proposed conditions before AP-1 Closure (with Landfill Cell. No. 3) are identical and do not include the additional downstream flows from the AP-1 Closure design. The inflows for the proposed conditions after AP-1 Closure plan (with Landfill Cell No. 3) include the additional downstream flows that are proposed as a part of the AP-1 Closure Design. These inflows are based on the additional downstream flows calculated in Appendix C2 of the Engineering Report submitted to GPC/SCS on July 30, 2019 (the updated AP-1 closure design, 60% submittal based on the reduced stormwater flows directed towards Berry Creek).

3. HEC-RAS Results

During the December 18, 2018 conference call with GPC/SCS, AECOM presented the HEC-RAS modeling results to GPC/SCS and compared the pre-closure and post-closure flooding impacts. AECOM's HEC-RAS modeling determined that culverts under SR87 do not meet current GDOT stormwater requirements during the 50-year storm or the 100-year storm in both pre-closure and post-closure conditions. AECOM revised the HEC-RAS model to reflect the reduced stormwater flow directed to Berry Creek from the current 60% AP-1 closure design. The results of the previously submitted HEC-RAS modeling results (provided in the DRAFT version of this memorandum on February 6, 2019) and the revised HEC-RAS modeling results (based on the reduced stormwater flows directed towards Berry Creek) are summarized below.

3.1 GDOT Stormwater Requirements

GDOT stormwater requirements are outlined in the *Drainage Design for Highways Manual Revision 3.4* (GDOT, 2018). This manual provides minimum design criteria for culverts and bridges for various different roadways including state routes. These requirements are summarized for the culverts under SR87 in **Table 1** below.

Table 1 GDOT Stormwater Requirements for Culverts[1]

Roadway	Primary Criteria			Secondary Criteria		
	Required Freeboard ***from Roadway Base***	Design Storm	Approximate Peak WSE[2]	Required Freeboard ***from Top of Road***	Design Storm	Approximate Peak WSE[3]
Interstates and State Routes	1.0 feet	50-year	369.75 feet	1.0 feet	100-year	371.0

Notes:

1. GDOT Stormwater Requirements as outlined in Table 8.2 of Drainage Design for Highways Manual Revision 3.4 (GDOT, 2018).

2. Assumed a maximum roadway base thickness of 1.25 feet or 16 inches based on GDOT Pavement Design Manual (GDOT, 2005). Top of road is at approximately 372.0 feet.

3. Top of road is at approximately 372.0 feet.

3.2 HEC-RAS Modeling Results Previously Submitted

AECOM submitted a summary of AECOM's HEC-RAS modeling results to GPC/SCS on February 6, 2019. These modeling results included a summary of the modeling efforts completed to-date as well as a comparison of the flooding along Berry Creek for four different conditions. All four conditions are assumed to be the proposed conditions after the completion of the construction of Landfill Cell No. 3. The four different conditions that were compared in this summary were as follows:

- The proposed conditions plan (before AP-1 Closure) of Schnabel's model;
- The proposed conditions plan (before AP-1 Closure) of AECOM's HEC-RAS model using only inflows from the regression equations in SIR 2011-5042;
- The proposed conditions plan (before AP-1 Closure) of AECOM's HEC-RAS model using the inflow calculations from the HydroCAD model; and
- The proposed conditions plan (after AP-1 Closure) of AECOM's HEC-RAS model using the inflow calculations from the HydroCAD model.

The comparison of flooding impacts along Berry Creek for these four conditions can be found in **Appendix C**.

3.3 Revised HEC-RAS Modelling Results

The stormwater flows discharged downstream to Berry Creek from the current 60% AP-1 closure design are significantly lower than the values included in the previous DRAFT version of this memorandum submitted on February 6, 2019 which were based on an earlier closure design plan. The reduced stormwater flows result in a smaller depth and area of flooding onto SR87 during the 100-year storm event. A comparison of the flooding impacts upstream and above the SR87 culverts can be seen in **Table 2** below.

Table 2 Existing SR87 Culvert Performance and Flooding Impacts

Model	Approximate Peak WSE (50-year)	Approximate Depth of SR87 flooding (50-year)	Approximate Width of SR87 flooding (50-year)	Approximate Peak WSE (100-year)	Approximate Depth of SR87 flooding (100-year)	Approximate Width of SR87 flooding (100-year)
Proposed Conditions before AP-1 Closure[1]	370.3 ft NAVD88	0 ft	0 ft	372.0 ft NAVD88	0 ft	0 ft
Proposed Conditions after AP-1 Closure (Previous DRAFT Feb 6, 2019 memo based on earlier AP-1 closure design)	371.7 ft NAVD88	0 ft	0 ft	373.7 ft NAVD88	1.7 ft	44 ft
Proposed Conditions after AP-1 Closure (current 60% Draft AP-1 closure design)	370.5 ft NAVD88	0 ft	0 ft	372.2 ft NAVD88	0.2ft	6.0 ft

Notes:

1. *The flooding during the proposed conditions before AP-1 closure has not changed from the previous DRAFT February 6, 2019 version of this memorandum.*
2. *Top of road is at approximately 372.0 feet.*
3. *The road is approximately 44 feet wide at a slope of 3.5%.*

As shown in the table above, the Proposed Conditions Plan (before AP-1 Closure) and the Proposed Conditions Plan (after AP-1 Closure) do not meet current GDOT requirements for the 50-year or 100-year storm events; however, the current AP-1 closure design significantly reduced the flooding onto SR87 compared with the earlier AP-1 closure design analyzed in the previous DRAFT version of this February 6, 2019 memorandum. Additional model output details can be found in **Appendix C** and **Appendix D**.

4. Limitations and Assumptions

AECOM has the following limitations and made the following assumptions in preparing this memorandum:

- AECOM's HEC-RAS model is a steady-state model. Steady-state models route a constant peak flow throughout the model and do not consider inflow hydrographs. AECOM expects that maximum flood elevations would decrease if Berry Creek were to be modeled in an unsteady-state model. The existing twin-box-culverts may meet current GDOT stormwater requirements if Berry Creek were modeled using an unsteady-state model.
- AECOM's HEC-RAS modeling is based on the 60% Draft AP-1 Closure design submitted to GPC/SCS on July 30, 2019. Revisions to this design may result in an increase or reduction of stormwater flows discharged into Berry Creek. AECOM's HEC-RAS modeling may need to be updated as the design process progresses.
- All elevations mentioned in this memorandum are relative to the North American Vertical Datum of 1988 (NAVD88) unless otherwise specified.
- AECOM has not included any specific recommendations for the SR87 culverts to meet current GDOT requirements.

Appendices

Appendix A: Hydrologic Inflows

Appendix B: Ocmulgee River Tailwater Study

Appendix C: HEC-RAS Model Results – Comparison

Appendix D: HEC-RAS Model Output

Appendix A – Hydrologic Inflows

Source: USGS Magnitude and Frequency of Floods for Urban and Small Rural Streams in Georgia, 2008 (SIR 2011-5042)
HydroCAD Modeling Software Version 10.00
NOAA Atlas 14, Volume 9, Version 2, Point Precipitation Frequency Estimates

Calc: NSF Date: 10/24/2018
Checked: AJN Date: 10/24/2018

Recurrence	2yr/24hr	5yr/24hr	10yr/24hr	25yr/24hr	50yr/24hr	100yr/24hr	200yr/24hr	500yr/24hr
Intensity (in)	3.77	4.59	5.31	6.36	7.22	8.13	9.1	10.4

Drainage Area A1u

(GA Region 1 - Drainage Area upstream of Inline Structure at 14002.89, **starts at Section 16826**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	250 acres			
Total Drainage Area=	0.390625 sq miles			
Impervious Drainage Area=	22 acres			
Impervious Percent=	9 %			
2-year storm flows=	120 cfs	2-year storm flows=	136 cfs	136 cfs
5-year storm flows=	181 cfs	5-year storm flows=	223 cfs	223 cfs
10-year storm flows=	225 cfs	10-year storm flows=	308 cfs	308 cfs
25-year storm flows=	285 cfs	25-year storm flows=	441 cfs	441 cfs
50-year storm flows=	332 cfs	50-year storm flows=	557 cfs	557 cfs
100-year storm flows=	380 cfs	100-year storm flows=	683 cfs	683 cfs
200-year storm flows=	429 cfs	200-year storm flows=	822 cfs	822 cfs
500-year storm flows=	494 cfs	500-year storm flows=	1013 cfs	1013 cfs

Combined Drainage Areas A1u into Section 16826

Combined inflow into Section 16826	
2-year storm flows=	**136 cfs**
5-year storm flows=	**223 cfs**
10-year storm flows=	**308 cfs**
25-year storm flows=	**441 cfs**
50-year storm flows=	**557 cfs**
100-year storm flows=	**683 cfs**
200-year storm flows=	**822 cfs**
500-year storm flows=	**1013 cfs**

Drainage Area A1d

(GA Region 1 - Drainage Area upstream of Inline Structure at 11355.86, **starts at Section 13901.95**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	40 acres			
Total Drainage Area=	0.0625 sq miles			
Impervious Drainage Area=	13 acres			
Impervious Percent=	33 %			
2-year storm flows=	58 cfs	2-year storm flows=	63 cfs	63 cfs
5-year storm flows=	73 cfs	5-year storm flows=	88 cfs	88 cfs
10-year storm flows=	82 cfs	10-year storm flows=	111 cfs	111 cfs
25-year storm flows=	93 cfs	25-year storm flows=	146 cfs	146 cfs
50-year storm flows=	101 cfs	50-year storm flows=	174 cfs	174 cfs
100-year storm flows=	109 cfs	100-year storm flows=	205 cfs	205 cfs
200-year storm flows=	116 cfs	200-year storm flows=	237 cfs	237 cfs
500-year storm flows=	125 cfs	500-year storm flows=	281 cfs	281 cfs

Combined inflow into Section 13901.95	
2-year storm flows=	**199 cfs**
5-year storm flows=	**311 cfs**
10-year storm flows=	**419 cfs**
25-year storm flows=	**587 cfs**
50-year storm flows=	**731 cfs**
100-year storm flows=	**888 cfs**
200-year storm flows=	**1059 cfs**
500-year storm flows=	**1294 cfs**

Drainage Area A3r

(GA Region 1 - Drainage Area upstream of Section 11575.16, **starts at Section 11575.16**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	340 acres			
Total Drainage Area=	0.53125 sq miles			
Impervious Drainage Area=	132 acres			
Impervious Percent=	39 %			
2-year storm flows=	335 cfs	2-year storm flows=	782 cfs	782 cfs
5-year storm flows=	416 cfs	5-year storm flows=	999 cfs	999 cfs
10-year storm flows=	465 cfs	10-year storm flows=	1190 cfs	1190 cfs
25-year storm flows=	524 cfs	25-year storm flows=	1466 cfs	1466 cfs
50-year storm flows=	566 cfs	50-year storm flows=	1691 cfs	1691 cfs
100-year storm flows=	605 cfs	100-year storm flows=	1928 cfs	1928 cfs
200-year storm flows=	643 cfs	200-year storm flows=	2180 cfs	2180 cfs
500-year storm flows=	686 cfs	500-year storm flows=	2516 cfs	2516 cfs

Combined inflow into Section 11575.16	
2-year storm flows=	**981 cfs**
5-year storm flows=	**1310 cfs**
10-year storm flows=	**1609 cfs**
25-year storm flows=	**2053 cfs**
50-year storm flows=	**2422 cfs**
100-year storm flows=	**2816 cfs**
200-year storm flows=	**3239 cfs**
500-year storm flows=	**3810 cfs**

Drainage Area A2r

(GA Region 1 - Drainage Area upstream of Section 11268.37, **starts at Section 11268.37**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	356 acres			
Total Drainage Area=	0.55625 sq miles			
Impervious Drainage Area=	16 acres			
Impervious Percent=	5 %			
2-year storm flows=	140 cfs	2-year storm flows=	281 cfs	281 cfs
5-year storm flows=	219 cfs	5-year storm flows=	439 cfs	439 cfs
10-year storm flows=	277 cfs	10-year storm flows=	589 cfs	589 cfs
25-year storm flows=	356 cfs	25-year storm flows=	822 cfs	822 cfs
50-year storm flows=	420 cfs	50-year storm flows=	1021 cfs	1021 cfs
100-year storm flows=	485 cfs	100-year storm flows=	1238 cfs	1238 cfs
200-year storm flows=	554 cfs	200-year storm flows=	1474 cfs	1474 cfs
500-year storm flows=	645 cfs	500-year storm flows=	1795 cfs	1795 cfs

Combined inflow into Section 11268.37	
2-year storm flows=	**1262 cfs**
5-year storm flows=	**1749 cfs**
10-year storm flows=	**2198 cfs**
25-year storm flows=	**2875 cfs**
50-year storm flows=	**3443 cfs**
100-year storm flows=	**4054 cfs**
200-year storm flows=	**4713 cfs**
500-year storm flows=	**5605 cfs**

Drainage Area A4

(GA Region 1 - Drainage Area upstream of Section 3500, **starts at Section 3500**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	1926 acres			
Total Drainage Area=	3.009375 sq miles			
Impervious Drainage Area=	20 acres			
Impervious Percent=	2 %			
2-year storm flows=	459 cfs	2-year storm flows=	485 cfs	485 cfs
5-year storm flows=	743 cfs	5-year storm flows=	805 cfs	805 cfs
10-year storm flows=	960 cfs	10-year storm flows=	1129 cfs	1129 cfs
25-year storm flows=	1264 cfs	25-year storm flows=	1716 cfs	1716 cfs
50-year storm flows=	1515 cfs	50-year storm flows=	2268 cfs	2268 cfs
100-year storm flows=	1772 cfs	100-year storm flows=	2892 cfs	2892 cfs
200-year storm flows=	2048 cfs	200-year storm flows=	3596 cfs	3596 cfs
500-year storm flows=	2426 cfs	500-year storm flows=	4586 cfs	4586 cfs

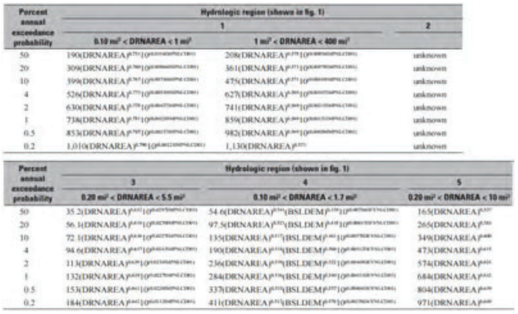
Combined inflow into Section 3500	
2-year storm flows=	**1747 cfs**
5-year storm flows=	**2554 cfs**
10-year storm flows=	**3327 cfs**
25-year storm flows=	**4591 cfs**
50-year storm flows=	**5711 cfs**
100-year storm flows=	**6946 cfs**
200-year storm flows=	**8309 cfs**
500-year storm flows=	**10191 cfs**

Drainage Area A5

(GA Region 1 - Drainage Area upstream of Section 500, **starts at Section 3000**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	183 acres			
Total Drainage Area=	0.285938 sq miles			
Impervious Drainage Area=	3 acres			
Impervious Percent=	2 %			
2-year storm flows=	79 cfs	2-year storm flows=	110 cfs	110 cfs
5-year storm flows=	125 cfs	5-year storm flows=	187 cfs	187 cfs
10-year storm flows=	158 cfs	10-year storm flows=	264 cfs	264 cfs
25-year storm flows=	205 cfs	25-year storm flows=	385 cfs	385 cfs
50-year storm flows=	243 cfs	50-year storm flows=	490 cfs	490 cfs
100-year storm flows=	282 cfs	100-year storm flows=	605 cfs	605 cfs
200-year storm flows=	323 cfs	200-year storm flows=	733 cfs	733 cfs
500-year storm flows=	378 cfs	500-year storm flows=	908 cfs	908 cfs

Combined inflow into Section 3000	
2-year storm flows=	**1857 cfs**
5-year storm flows=	**2741 cfs**
10-year storm flows=	**3591 cfs**
25-year storm flows=	**4976 cfs**
50-year storm flows=	**6201 cfs**
100-year storm flows=	**7551 cfs**
200-year storm flows=	**9042 cfs**
500-year storm flows=	**11099 cfs**



Percent annual exceedance probability	Hydrologic region (shown in fig. 1)		
	1		2
	0.10 mi² < DRNAREA < 1 mi²	1 mi² < DRNAREA < 400 mi²	
50	190(DRNAREA)[illegible]10[illegible]	208(DRNAREA)[illegible]10[illegible]	unknown
20	309(DRNAREA)[illegible]10[illegible]	361(DRNAREA)[illegible]10[illegible]	unknown
10	399(DRNAREA)[illegible]10[illegible]	475(DRNAREA)[illegible]10[illegible]	unknown
4	526(DRNAREA)[illegible]10[illegible]	627(DRNAREA)[illegible]10[illegible]	unknown
2	630(DRNAREA)[illegible]10[illegible]	741(DRNAREA)[illegible]10[illegible]	unknown
1	738(DRNAREA)[illegible]10[illegible]	859(DRNAREA)[illegible]10[illegible]	unknown
0.5	853(DRNAREA)[illegible]10[illegible]	982(DRNAREA)[illegible]10[illegible]	unknown
0.2	1,010(DRNAREA)[illegible]10[illegible]	1,130(DRNAREA)[illegible]	unknown

Percent annual exceedance probability	Hydrologic region (shown in fig. 1)		
	3	4	5
	0.20 mi² < DRNAREA < 5.5 mi²	0.10 mi² < DRNAREA < 1.7 mi²	0.20 mi² < DRNAREA < 10 mi²
50	35.2(DRNAREA)[illegible]10[illegible]	54.6(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	165(DRNAREA)[illegible]
20	56.1(DRNAREA)[illegible]10[illegible]	97.5(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	265(DRNAREA)[illegible]
10	72.1(DRNAREA)[illegible]10[illegible]	135(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	349(DRNAREA)[illegible]
4	94.6(DRNAREA)[illegible]10[illegible]	190(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	473(DRNAREA)[illegible]
2	113(DRNAREA)[illegible]10[illegible]	236(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	574(DRNAREA)[illegible]
1	132(DRNAREA)[illegible]10[illegible]	284(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	684(DRNAREA)[illegible]
0.5	153(DRNAREA)[illegible]10[illegible]	337(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	804(DRNAREA)[illegible]
0.2	184(DRNAREA)[illegible]10[illegible]	411(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	971(DRNAREA)[illegible]

Source: SIR-2011-5042

Source: USGS Magnitude and Frequency of Floods for Urban and Small Rural Streams in Georgia, 2008 (SIR 2011-5042)
HydroCAD Modeling Software Version 10.00
NOAA Atlas 14, Volume 9, Version 2, Point Precipitation Frequency Estimates

Calc: NSF Date: 7/30/2019
Checked: AJN Date: 7/30/2019

Recurrence	2yr/24hr	5yr/24hr	10yr/24hr	25yr/24hr	50yr/24hr	100yr/24hr	200yr/24hr	500yr/24hr
Intensity (in)	3.77	4.59	5.31	6.36	7.22	8.13	9.1	10.4

Drainage Area A1u

(GA Region 1 - Drainage Area upstream of Inline Structure at 14002.89, **starts at Section 16826**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	250 acres			
Total Drainage Area=	0.390625 sq miles			
Impervious Drainage Area=	22 acres			
Impervious Percent=	9 %			
2-year storm flows=	120 cfs	2-year storm flows=	136 cfs	136 cfs
5-year storm flows=	181 cfs	5-year storm flows=	223 cfs	223 cfs
10-year storm flows=	225 cfs	10-year storm flows=	308 cfs	308 cfs
25-year storm flows=	285 cfs	25-year storm flows=	441 cfs	441 cfs
50-year storm flows=	332 cfs	50-year storm flows=	557 cfs	557 cfs
100-year storm flows=	380 cfs	100-year storm flows=	683 cfs	683 cfs
200-year storm flows=	429 cfs	200-year storm flows=	822 cfs	822 cfs
500-year storm flows=	494 cfs	500-year storm flows=	1013 cfs	1013 cfs

Drainage Area C

(Peak Discharge from New Cap on Ash Pond)

HydroCAD	
2-year storm flows=	58 cfs
5-year storm flows=	64 cfs
10-year storm flows=	69 cfs
25-year storm flows=	75 cfs
50-year storm flows=	80 cfs
100-year storm flows=	84 cfs
200-year storm flows=	154 cfs
500-year storm flows=	318 cfs

Combined Drainage Areas A1u and C

Combined inflow into Section 16826	
2-year storm flows=	**194 cfs**
5-year storm flows=	**287 cfs**
10-year storm flows=	**377 cfs**
25-year storm flows=	**516 cfs**
50-year storm flows=	**637 cfs**
100-year storm flows=	**767 cfs**
200-year storm flows=	**976 cfs**
500-year storm flows=	**1331 cfs**

Drainage Area A1d

(GA Region 1 - Drainage Area upstream of Inline Structure at 11355.86, **starts at Section 13901.95**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	40 acres			
Total Drainage Area=	0.0625 sq miles			
Impervious Drainage Area=	13 acres			
Impervious Percent=	33 %			
2-year storm flows=	58 cfs	2-year storm flows=	63 cfs	63 cfs
5-year storm flows=	73 cfs	5-year storm flows=	88 cfs	88 cfs
10-year storm flows=	82 cfs	10-year storm flows=	111 cfs	111 cfs
25-year storm flows=	93 cfs	25-year storm flows=	146 cfs	146 cfs
50-year storm flows=	101 cfs	50-year storm flows=	174 cfs	174 cfs
100-year storm flows=	109 cfs	100-year storm flows=	205 cfs	205 cfs
200-year storm flows=	116 cfs	200-year storm flows=	237 cfs	237 cfs
500-year storm flows=	125 cfs	500-year storm flows=	281 cfs	281 cfs

Combined inflow into Section 13901.95	
2-year storm flows=	**257 cfs**
5-year storm flows=	**375 cfs**
10-year storm flows=	**488 cfs**
25-year storm flows=	**662 cfs**
50-year storm flows=	**811 cfs**
100-year storm flows=	**972 cfs**
200-year storm flows=	**1213 cfs**
500-year storm flows=	**1612 cfs**

Drainage Area A3r

(GA Region 1 - Drainage Area upstream of Section 11575.16, **starts at Section 11575.16**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	340 acres			
Total Drainage Area=	0.53125 sq miles			
Impervious Drainage Area=	132 acres			
Impervious Percent=	39 %			
2-year storm flows=	335 cfs	2-year storm flows=	782 cfs	782 cfs
5-year storm flows=	416 cfs	5-year storm flows=	999 cfs	999 cfs
10-year storm flows=	465 cfs	10-year storm flows=	1190 cfs	1190 cfs
25-year storm flows=	524 cfs	25-year storm flows=	1466 cfs	1466 cfs
50-year storm flows=	566 cfs	50-year storm flows=	1691 cfs	1691 cfs
100-year storm flows=	605 cfs	100-year storm flows=	1928 cfs	1928 cfs
200-year storm flows=	643 cfs	200-year storm flows=	2180 cfs	2180 cfs
500-year storm flows=	686 cfs	500-year storm flows=	2516 cfs	2516 cfs

Combined inflow into Section 11575.16	
2-year storm flows=	**1039 cfs**
5-year storm flows=	**1374 cfs**
10-year storm flows=	**1678 cfs**
25-year storm flows=	**2128 cfs**
50-year storm flows=	**2502 cfs**
100-year storm flows=	**2900 cfs**
200-year storm flows=	**3393 cfs**
500-year storm flows=	**4128 cfs**

Drainage Area A2r

(GA Region 1 - Drainage Area upstream of Section 11268.37, **starts at Section 11268.37**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	356 acres			
Total Drainage Area=	0.55625 sq miles			
Impervious Drainage Area=	16 acres			
Impervious Percent=	5 %			
2-year storm flows=	140 cfs	2-year storm flows=	281 cfs	281 cfs
5-year storm flows=	219 cfs	5-year storm flows=	439 cfs	439 cfs
10-year storm flows=	277 cfs	10-year storm flows=	589 cfs	589 cfs
25-year storm flows=	356 cfs	25-year storm flows=	822 cfs	822 cfs
50-year storm flows=	420 cfs	50-year storm flows=	1021 cfs	1021 cfs
100-year storm flows=	485 cfs	100-year storm flows=	1238 cfs	1238 cfs
200-year storm flows=	554 cfs	200-year storm flows=	1474 cfs	1474 cfs
500-year storm flows=	645 cfs	500-year storm flows=	1795 cfs	1795 cfs

Combined inflow into Section 11268.37	
2-year storm flows=	**1320 cfs**
5-year storm flows=	**1813 cfs**
10-year storm flows=	**2267 cfs**
25-year storm flows=	**2950 cfs**
50-year storm flows=	**3523 cfs**
100-year storm flows=	**4138 cfs**
200-year storm flows=	**4867 cfs**
500-year storm flows=	**5923 cfs**

Drainage Area A4

(GA Region 1 - Drainage Area upstream of Section 3500, **starts at Section 3500**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	1926 acres			
Total Drainage Area=	3.009375 sq miles			
Impervious Drainage Area=	20 acres			
Impervious Percent=	2 %			
2-year storm flows=	459 cfs	2-year storm flows=	485 cfs	485 cfs
5-year storm flows=	743 cfs	5-year storm flows=	805 cfs	805 cfs
10-year storm flows=	960 cfs	10-year storm flows=	1129 cfs	1129 cfs
25-year storm flows=	1264 cfs	25-year storm flows=	1716 cfs	1716 cfs
50-year storm flows=	1515 cfs	50-year storm flows=	2268 cfs	2268 cfs
100-year storm flows=	1772 cfs	100-year storm flows=	2892 cfs	2892 cfs
200-year storm flows=	2048 cfs	200-year storm flows=	3596 cfs	3596 cfs
500-year storm flows=	2426 cfs	500-year storm flows=	4586 cfs	4586 cfs

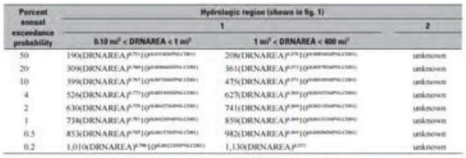
Combined inflow into Section 3500	
2-year storm flows=	**1805 cfs**
5-year storm flows=	**2618 cfs**
10-year storm flows=	**3396 cfs**
25-year storm flows=	**4666 cfs**
50-year storm flows=	**5791 cfs**
100-year storm flows=	**7030 cfs**
200-year storm flows=	**8463 cfs**
500-year storm flows=	**10509 cfs**

Drainage Area A5

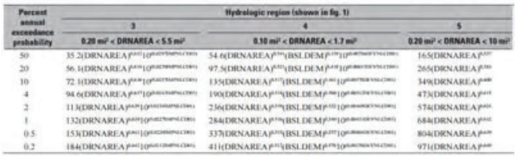
(GA Region 1 - Drainage Area upstream of Section 500, **starts at Section 3000**)

SIR 2011-5042		*HydroCAD*		*Larger Value*
Total Drainage Area=	183 acres			
Total Drainage Area=	0.285938 sq miles			
Impervious Drainage Area=	3 acres			
Impervious Percent=	2 %			
2-year storm flows=	79 cfs	2-year storm flows=	110 cfs	110 cfs
5-year storm flows=	125 cfs	5-year storm flows=	187 cfs	187 cfs
10-year storm flows=	158 cfs	10-year storm flows=	264 cfs	264 cfs
25-year storm flows=	205 cfs	25-year storm flows=	385 cfs	385 cfs
50-year storm flows=	243 cfs	50-year storm flows=	490 cfs	490 cfs
100-year storm flows=	282 cfs	100-year storm flows=	605 cfs	605 cfs
200-year storm flows=	323 cfs	200-year storm flows=	733 cfs	733 cfs
500-year storm flows=	378 cfs	500-year storm flows=	908 cfs	908 cfs

Combined inflow into Section 3000	
2-year storm flows=	**1915 cfs**
5-year storm flows=	**2805 cfs**
10-year storm flows=	**3660 cfs**
25-year storm flows=	**5051 cfs**
50-year storm flows=	**6281 cfs**
100-year storm flows=	**7635 cfs**
200-year storm flows=	**9196 cfs**
500-year storm flows=	**11417 cfs**



Percent annual exceedance probability	Hydrologic region (shown in fig. 1)		
	1		2
	0.10 mi² < DRNAREA < 1 mi²	1 mi² < DRNAREA < 400 mi²	
50	190(DRNAREA)[illegible]10[illegible]	208(DRNAREA)[illegible]10[illegible]	unknown
20	309(DRNAREA)[illegible]10[illegible]	361(DRNAREA)[illegible]10[illegible]	unknown
10	399(DRNAREA)[illegible]10[illegible]	475(DRNAREA)[illegible]10[illegible]	unknown
4	526(DRNAREA)[illegible]10[illegible]	627(DRNAREA)[illegible]10[illegible]	unknown
2	630(DRNAREA)[illegible]10[illegible]	741(DRNAREA)[illegible]10[illegible]	unknown
1	738(DRNAREA)[illegible]10[illegible]	859(DRNAREA)[illegible]10[illegible]	unknown
0.5	853(DRNAREA)[illegible]10[illegible]	982(DRNAREA)[illegible]10[illegible]	unknown
0.2	1,010(DRNAREA)[illegible]10[illegible]	1,130(DRNAREA)[illegible]	unknown



Percent annual exceedance probability	Hydrologic region (shown in fig. 1)		
	3	4	5
	0.20 mi² < DRNAREA < 5.5 mi²	0.10 mi² < DRNAREA < 1.7 mi²	0.20 mi² < DRNAREA < 10 mi²
50	35.2(DRNAREA)[illegible]10[illegible]	54.6(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	165(DRNAREA)[illegible]
20	56.1(DRNAREA)[illegible]10[illegible]	97.5(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	265(DRNAREA)[illegible]
10	72.1(DRNAREA)[illegible]10[illegible]	135(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	349(DRNAREA)[illegible]
4	94.6(DRNAREA)[illegible]10[illegible]	190(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	473(DRNAREA)[illegible]
2	113(DRNAREA)[illegible]10[illegible]	236(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	574(DRNAREA)[illegible]
1	132(DRNAREA)[illegible]10[illegible]	284(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	684(DRNAREA)[illegible]
0.5	153(DRNAREA)[illegible]10[illegible]	337(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	804(DRNAREA)[illegible]
0.2	184(DRNAREA)[illegible]10[illegible]	411(DRNAREA)[illegible](BSLDEM)[illegible]10[illegible]	971(DRNAREA)[illegible]

Source: SIR-2011-5042

Appendix B – Ocmulgee River Tailwater Study

AECOM
804 Colorado Avenue
Suite 201
Glenwood Springs
CO 81601
USA
aecom.com

Project name:
Sherer Downstream HEC-RAS Modeling

To:
Georgia Power Company

From:
Chris Romeyn, PE, CFM

Date:
September 24, 2018

Memo

Subject: Ocmulgee River HEC-RAS Analysis

As requested, I have performed a preliminary analysis of the flooding on the Ocmulgee River at the mouth of Berry Creek, near Plant Scherer. This preliminary analysis is intended to provide approximate flood elevation at the mouth of Berry Creek for the 25-year return period flood event. This memo describes the analysis performed and presents results.

Georgia Power Plant Scherer is located west of the Ocmulgee River within the Berry Creek drainage. The basin area of Berry Creek is 6.34 square miles. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel 150E (Map Number 13207CO150E) identifies this reach of the Ocmulgee River and Berry Creek as being in Special Flood Hazard Area Zone A. The Zone A classification means that there is a risk of flooding by the 100-year flood event, but typically the extent of that flooding has been estimated through approximate methods and flood elevations have not been determined analytically. Therefore a hydraulic model of the Ocmulgee River was developed to estimate the 25-year WSE.

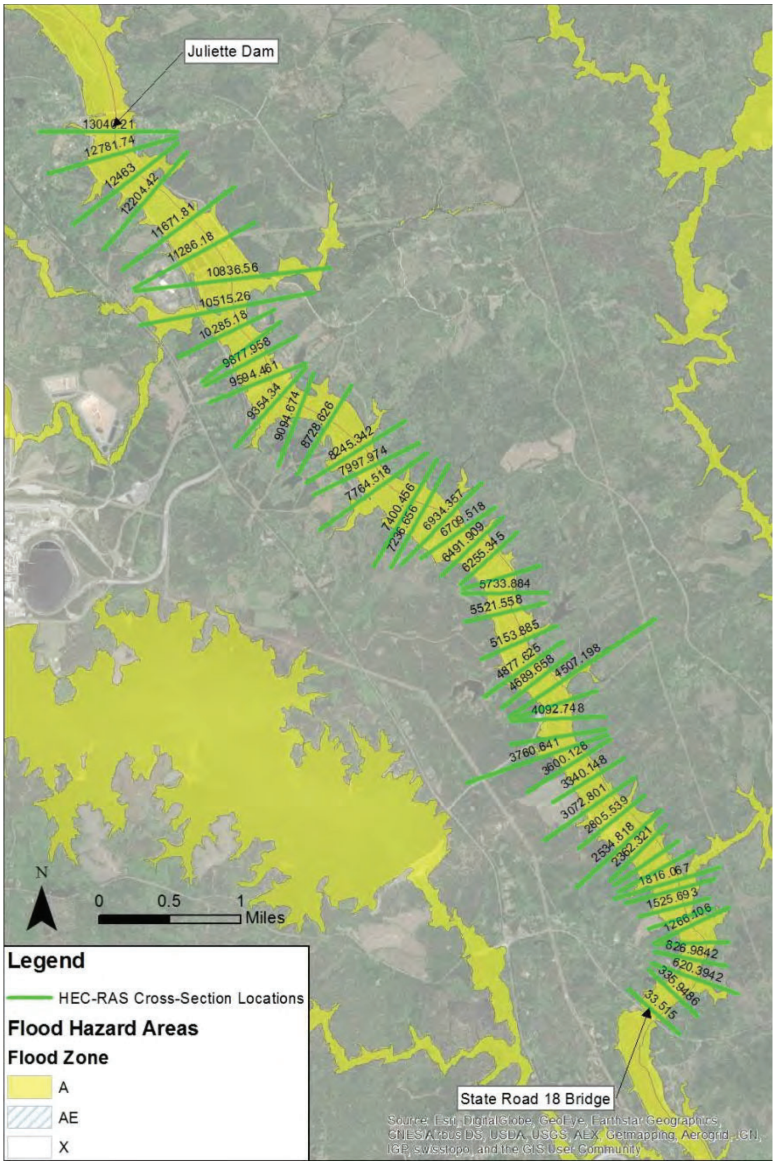
During a quality review of the HEC-RAS analysis of the AECOM team was able to locate the FEMA HEC-RAS model used to develop the current, effective Zone A on the Ocmulgee River. This model was used to estimate the 25-year water surface elevation (WSE) at the mouth of Berry Creek.

AECOM Ocmulgee River HEC-RAS Modeling

A 1-dimensional hydraulic model was developed with HEC-RAS 5.0.1 to estimate the WSE of the Ocmulgee River at the mouth of Berry Creek for the 25-year flood. Since a detailed hydrologic study of this reach of the Ocmulgee River is not available, the 25-year flood discharge from the Macon-Bibb County Flood Insurance Study (FIS 13021CV001B), located downstream, was used. The closest location where a 25-year discharge is provided for is a location 4,830 feet downstream of the Monroe County boundary. The 25-year flow at this location is 70,315 cfs. USGS 3-meter DEM topography was obtained from the USDA Geospatial Data Gateway (https://gdg.sc.egov.usda.gov/GDGOrder.aspx). HEC-GeoRAS was used in conjunction with ArcGIS to develop the HEC-RAS model.

A total of 53 cross sections were used to model an approximately 2.5 mile reach of the Ocmulgee River. The downstream boundary of the model was set just upstream of the State Road 18 Bridge and the upstream boundary was Juliette Dam. Cross section locations are presented in Figure 1. The model includes ineffective flow areas where necessary but no in-stream structures. Manning's n values of 0.035 for the channel and 0.10 for the floodplains were selected from the range for the Ocmulgee River presented in the Macon-Bibb County FIS. In accordance with typical FEMA hydraulic modeling techniques, the model was run in the subcritical flow regime only. The downstream boundary condition was set to normal depth with a slope equal to the invert slope of 0.0033 ft/ft. A sensitivity analysis was performed to ensure that the downstream boundary had minimal impact on the results. The model was run with a Normal Depth slope of 0.001, a slope of 0.0033 (channel invert slope) and a slope of 0.006 and all model runs converged to the same WSE at station 10515, the mouth of Berry Creek (Figure 2). The modeled 25-year water surface elevation of the Ocmulgee River at the mouth of Berry Creek is 379.3 ft NAVD88 (Table 1).

It's important to note that the USGS topography doesn't include any benthic data. In the channel of the Ocmulgee River the DEM elevation likely reflects the water surface elevation on the day the data was collected and not the actual river bed elevation. This lack of topographic resolution in the model results in less available conveyance area in the channel. The result is that the modeled WSE is higher than the actual WSE. The magnitude of this error is unknown, but could be on the order of ten feet.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 1 AECOM HEC-RAS Cross-sections

Table 1 Ocmulgee River 25-Year AECOM HEC-RAS Model Results

Discharge Modeled [cfs]	Cross-Section No.	Water Surface Elevation [ft]
70,315	10515	379.3

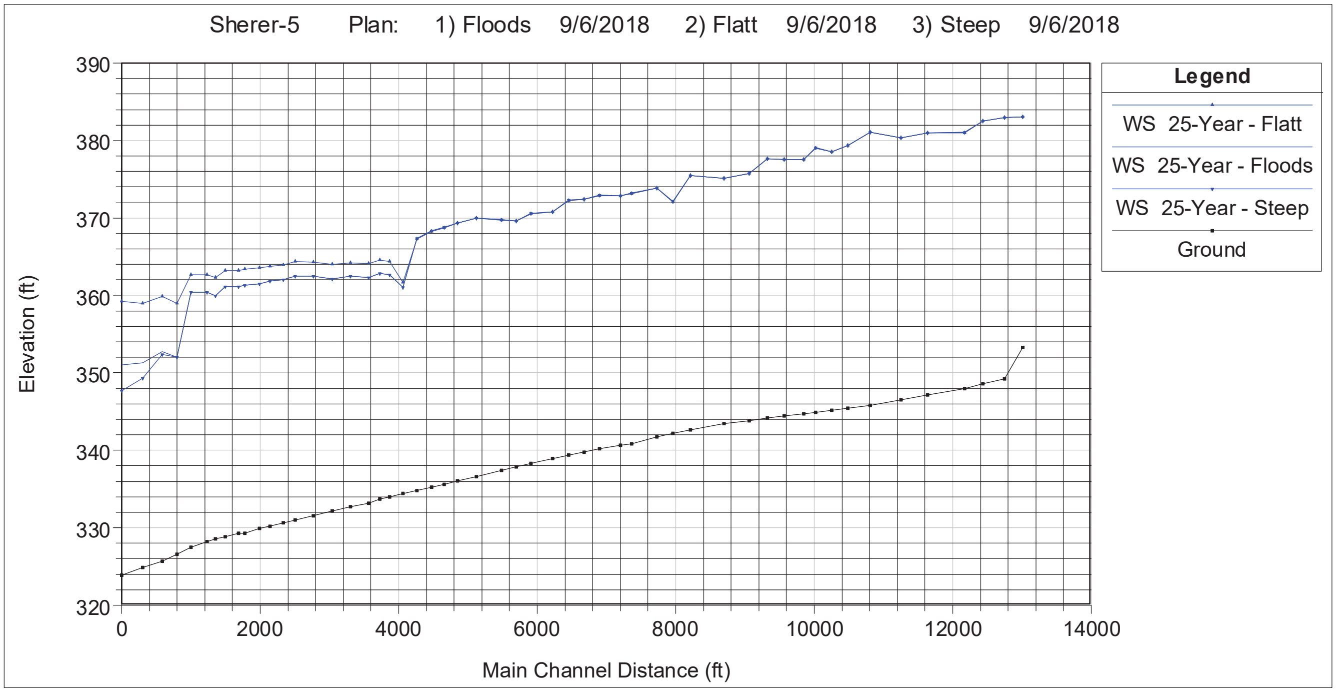


Figure 2 AECOM HEC-RAS Profile Ocmulgee River

Ocmulgee River Approximate 100-Year Floodplain Determination

The FEMA FIRM information was used to interpolate an approximate 100-year water surface elevation for comparison to the modeled 25-year results. Approximate methods outlined in FEMA 265, Managing Floodplain Development in Approximate Zone A Areas; A Guide For Obtaining and Developing Base (100-Year) Flood Elevation, were used to determine a 100-year WSE (Contour Interpolation Method). Figure 3 shows the cross-section, contours and Zone A.

The left and right bank WSE values were estimated by overlaying the Zone A floodplain shapefile on the USGS DEM and obtaining the contour elevations at the intersection of the cross-section and the Zone A limits. Table 1 below provides the calculations. **The approximate estimated 100-year WSE is 375 ft.** The fact that this result is lower than the modeled 25-year event highlights the potential errors in both the approximate method and the HEC-RAS model results.

Table 2 Ocmulgee River Approximate 100-Year Flood Elevation

Step	Description	Elevation [ft]	Note
(1)	Zone A WSE at Right Bank=	370	
(2)	Zone A WSE at Left Bank=	370	
(3)	Difference in Elevation	0	
(4)	Contour Interval [3m]	10	5 ft= 1/2 interval
(5)	Approximate BFE, Lower of (1) & (2) + 1/2*(4)=	375	

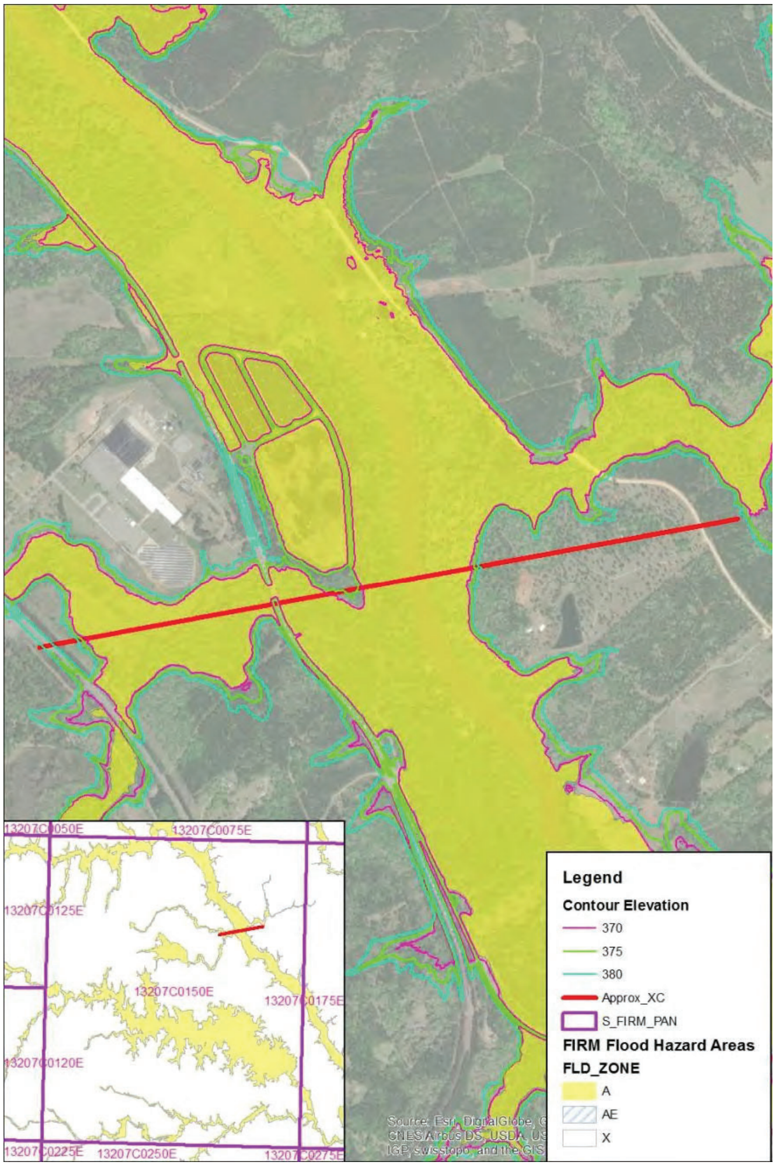


Figure 3 Ocmulgee River Approximate 100-Year Flood Elevation Determination

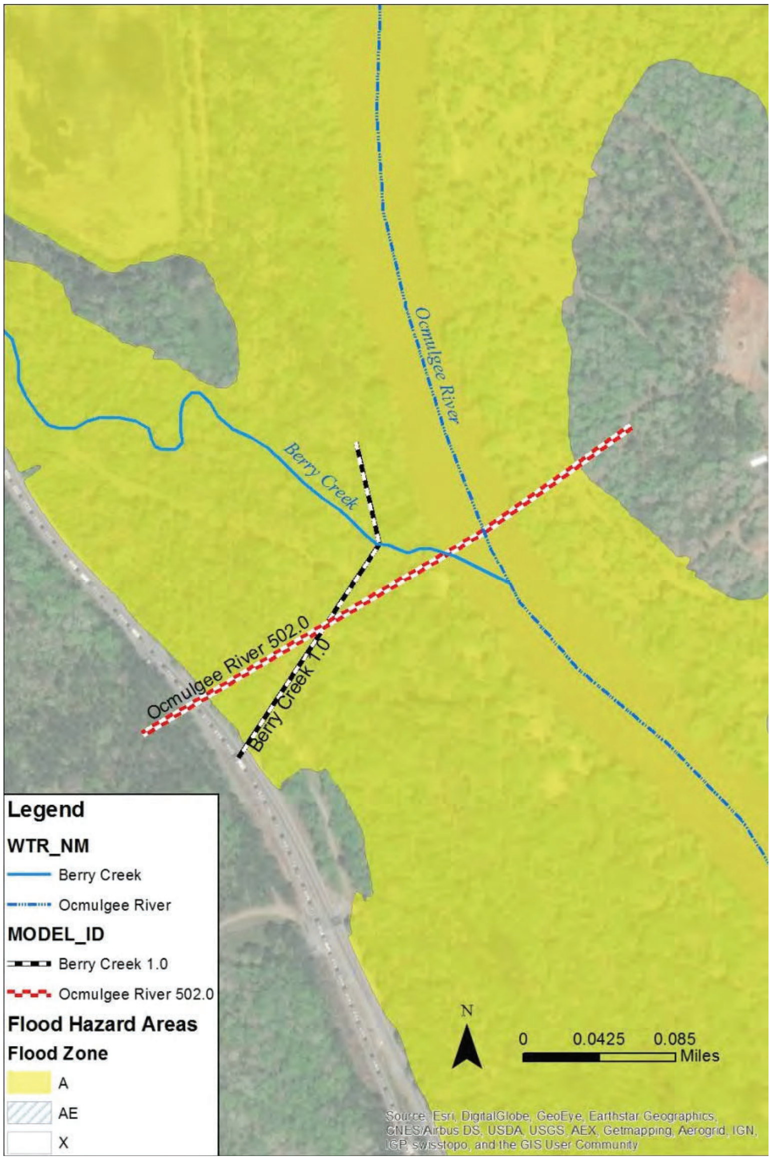
FEMA HEC-RAS Model Runs

While performing QA/QC on the AECOM Ocmulgee River HEC-RAS model AECOM located the hydraulic models used to develop the current, effective approximate Zone A hazard areas for both the Ocmulgee River and Berry Creek. AECOM obtained these models from FEMA and used them to perform an additional analysis that involved two steps as follows.

The FEMA Ocmulgee River HEC-RAS model was used to determine the downstream boundary condition for the Berry Creek model (discussed in separate memo). Cross-section 502.0 (river station 251580) in the FEMA Ocmulgee River HEC-RAS model is located at the mouth of Berry Creek. This cross-section crosses the downstream cross-section of the FEMA Berry Creek model as shown in Figure 4. The results of the FEMA Ocmulgee HEC-RAS analysis are presented in Table 3. The 25-year WSE on the Ocmulgee River at the mouth of Berry Creek is 365.78 ft.

Table 3 Ocmulgee River 25-Year FEMA HEC-RAS Model Results

Discharge Modeled [cfs]	Cross-Section No.	Water Surface Elevation [ft]
61,848	502	365.78



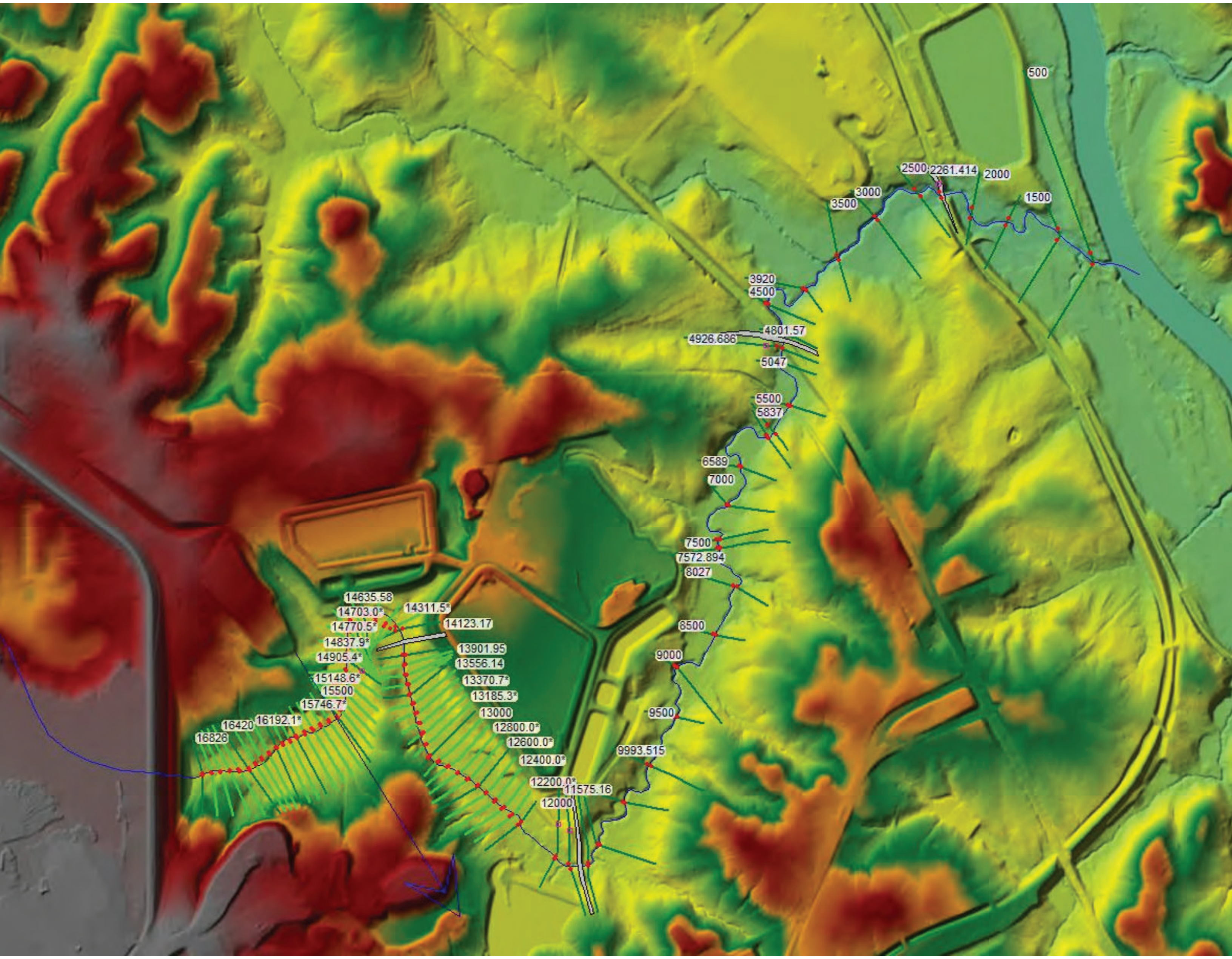
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 4 Berry Creek Model Boundary Condition

Appendix C – HEC-RAS Model Results – Comparison

	Schnabel Model (pre-closure)				AECOM Model (pre-closure, regression equations)				AECOM Model (pre-closure, HydroCAD inflows)				AECOM Model (post-closure, HydroCAD inflows)				
Cross Section	100-year WSE	100-year Velocity (channel)	100-year Velocity (left bank)	100-year Velocity (right bank)	100-year WSE	100-year Velocity (channel)	100-year Velocity (left bank)	100-year Velocity (right bank)	100-year WSE	100-year Velocity (channel)	100-year Velocity (left bank)	100-year Velocity (right bank)	100-year WSE	100-year Velocity (channel)	100-year Velocity (left bank)	100-year Velocity (right bank)	**Notes**
16826	408.9	7.59	1.05	0.86	408.28	7.11	0.88	0.65	409.21	8.55	1.24	1.03	409.42	8.87	1.3	1.05	
16420	404.63	6.62	0.91	0.45	404.87	4.19	0.56	0.34	405.68	5.02	0.75	0.51	405.86	5.11	0.8	0.55	
16116.23	402.89	3.21		0.77	402.62	5	0.64	0.75	403.21	5.76	0.76	1	403.35	5.88	0.79	1.06	
15911.28	401.18	5.8	0.64	0.77	401.3	3.85	0.43	0.5	402.01	4.16	0.63	0.68	402.17	4.26	0.67	0.7	
15500	399.57	3.72	0.64	0.56	399.16	3.69	0.52	0.45	399.94	4.17	0.74	0.66	400.12	4.28	0.78	0.71	
14972.92	397.59	5.29	0.74	0.85	397	5.63	0.43	0.6	398.07	5.13	0.77	0.84	398.28	5.17	0.82	0.89	
14635.58	-	-	-	-	395.1	2.75	0.07	0.12	396.33	3.23	0.28	0.42	396.58	3.36	0.32	0.47	New cross section added for AECOM model from survey data
14500.01	395.54	4.76	0.42	0.58	394.37	5.18	0.51	0.5	395.46	6.45	0.53	0.73	395.68	6.71	0.6	0.83	
14123.17	393.75	4.25	0.29	0.74	393.68	2.37	0.11	0.31	394.96	2.64	0.35	0.51	395.16	2.79	0.38	0.56	
14002.89 (IS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Proposed culvert crossing Cell No. 3 (Does not overtup during 500 year or less)
13901.95	393.13	5.48	0.78	0.87	393.02	5.44	0.7	0.79	394.03	6.23	1.02	1.17	394.21	6.36	1.07	1.23	
13556.14	390.57	6.51	0.53	0.47	390.57	5.85	0.45	0.4	391.59	5.59	0.75	0.64	391.72	5.68	0.79	0.69	
13000	388.13	4.13	0.46	0.26	387.73	4.72	0.47	0.21	389.3	4.01	0.65	0.37	389.52	4.02	0.68	0.39	
12500	385.36	7.32	0.6	0.66	385.34	6.63	0.51	0.56	388.88	2.73	0.54	0.42	389.1	2.81	0.56	0.45	
12000	384.47	2.48	0.38	0.36	384.48	2.39	0.35	0.33	388.78	1.35	0.29	0.28	389	1.43	0.3	0.29	
11575.16	382.77	6.99	0.95	1.08	383.52	5.25	0.78	0.89	388.48	4.52	0.85	0.93	388.7	4.47	0.84	0.93	
11425.73	382.71	3.3	0.47	0.23	383.42	3.03	0.45	0.27	388.38	3.39	0.62	0.6	388.61	3.39	0.62	0.61	
11355.86 (IS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Existing culvert crossing for existing landfills. (Overtops at El. 392.0)
11268.37	382.15	3.98	0.61	0.5	382.81	4.78	0.8	0.66	385.99	5.81	1.22	1.1	386.08	5.83	1.22	1.11	
11042.48	381.9	3.71	0.69	0.53	382.53	4.34	0.81	0.63	385.76	5.09	1.15	0.97	385.85	5.11	1.16	0.98	
10500	378.82	7.06	0.86	1	380.16	6.09	0.92	1.09	383.9	6.77	1.47	1.56	384	6.79	1.48	1.57	
10000	376.57	5.64	0.35	0.53	-	-	-	-	-	-	-	-	-	-	-	-	Replaced section 10000 with 9993.515 in AECOM model due to proximity
9993.515	-	-	-	-	377.06	5.42	0.43	0.4	380.36	8.14	1.42	1.29	380.44	8.22	1.44	1.31	Replaced section 10000 with 9993.515 in AECOM model due to proximity
9500	374.8	5.94	0.59	0.59	375.23	6.98	0.78	0.71	378.11	9.83	1.8	1.39	378.2	9.88	1.82	1.41	
9000	373.49	4.64	0.51	0.58	374.03	5.05	0.56	0.68	377.05	6.33	0.9	1.22	377.16	6.33	0.9	1.22	
8500	371.82	5.75	0.9	0.87	371.66	7.95	1.1	1.06	375.43	8.03	1.71	1.6	375.57	7.98	1.71	1.6	
8027	370.81	3.32	0.7	0.75	370.64	4.31	0.66	0.7	374.9	4.47	0.99	0.92	375.07	4.45	0.99	0.92	
7572.894	-	-	-	-	369.96	4.05	0.58	0.6	374.45	4.57	0.88	0.87	374.63	4.54	0.88	0.87	New cross section added for AECOM model from survey data
7500	369.64	4.93	0.72	0.66	369.77	4.87	0.69	0.64	374.37	4.88	1.01	0.94	374.55	4.85	1.01	0.95	
7000	368.88	4.2	0.79	0.76	369.05	4.25	0.82	0.79	373.99	4.22	1.06	0.98	374.18	4.2	1.05	0.98	
6589	368.4	3.71	0.85	0.62	368.6	3.77	0.88	0.65	373.7	4.19	1.14	0.92	373.91	4.17	1.14	0.92	
5837	367.04	5.07	1	0.75	367.45	4.69	0.78	0.63	372.72	5.89	1.16	0.86	372.95	5.86	1.16	0.85	
5764.549	-	-	-	-	367.53	2.45			372.8	3.38	0.35	0.22	373.03	3.38	0.36	0.24	New cross section added for AECOM model from survey data
5500	365.97	6.22	1.07	0.74	367.22	4.44	0.82	0.6	372.66	4.77	1.05	0.91	372.89	4.74	1.04	0.91	
5047	363.16	8.39	1.44	1.69	366.85	3.62	0.69	0.84	372.29	4.94	0.93	1.27	372.53	4.93	0.93	1.27	
4926.686	-	-	-	-	366.75	3.22	0.4	0.54	371.96	5.35	0.68	0.95	372.2	5.37	0.68	0.96	New cross section added for AECOM model from survey data
4926 (IS)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	State route 87 and culverts (Overtops at El. 372.0)
4801.57	-	-	-	-	366.16	3.2		0.33	367.22	7.26		0.83	367.25	7.39		0.85	New cross section added for AECOM model from survey data
4500	361.33	5.33	0.5	0.8	366.14	2.36	0.34	0.5	367.2	5.22	0.82	1.15	367.23	5.31	0.83	1.17	
3920	357.59	9.74	0.67	0.66	366.09	1.66	0.34	0.34	366.94	3.85	0.81	0.78	366.96	3.92	0.82	0.79	
3500	354.73	6.43	0.24	0.48	365.99	2.48	0.44	0.49	366.61	4.84	0.86	0.96	366.63	4.89	0.87	0.97	
3000	-	-	-	-	365.97	1.79	0.29	0.38	366.52	3.51	0.58	0.76	366.53	3.54	0.59	0.77	Schnabel model stops at Section 3500, AECOM model continues
2500	-	-	-	-	365.9	1.99	0.32	0.44	366.24	4.03	0.64	0.89	366.25	4.07	0.65	0.9	Schnabel model stops at Section 3500, AECOM model continues
2261.414	-	-	-	-	365.74	3.28	0.52	0.49	365.53	6.9	1.08	1.02	365.53	6.98	1.09	1.03	New cross section added for AECOM model from survey data
2260 (BR)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Existing railroad bridge (does not overtop during 500 year or less)
2000	-	-	-	-	365.83	1.39	0.29	0.31	365.91	2.87	0.59	0.65	365.92	2.9	0.6	0.66	Schnabel model stops at Section 3500, AECOM model continues
1500	-	-	-	-	365.82	1.28	0.31	0.32	365.88	2.65	0.63	0.67	365.88	2.68	0.64	0.68	Schnabel model stops at Section 3500, AECOM model continues
1000	-	-	-	-	365.81	1.04	0.25	0.21	365.82	2.16	0.52	0.44	365.83	2.19	0.52	0.45	Schnabel model stops at Section 3500, AECOM model continues
500	-	-	-	-	365.8	0.87	0.14	0.14	365.8	1.81	0.28	0.29	365.8	1.83	0.29	0.29	Schnabel model stops at Section 3500, AECOM model continues

Appendix D – HEC-RAS Model Results – Revised Model


500
2500
2261.414
2000
3000
3500
1500
3920
4500
4801.57
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5047
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7000
7500
7572.894
8027
8500
9000
9500
9993.515
14635.58
14703.0*
14311.5*
14123.17
14770.5*
14837.9*
14905.4*
13901.95
13556.14
15148.6*
13370.7*
15500
13185.3*
15746.7*
13000
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16826
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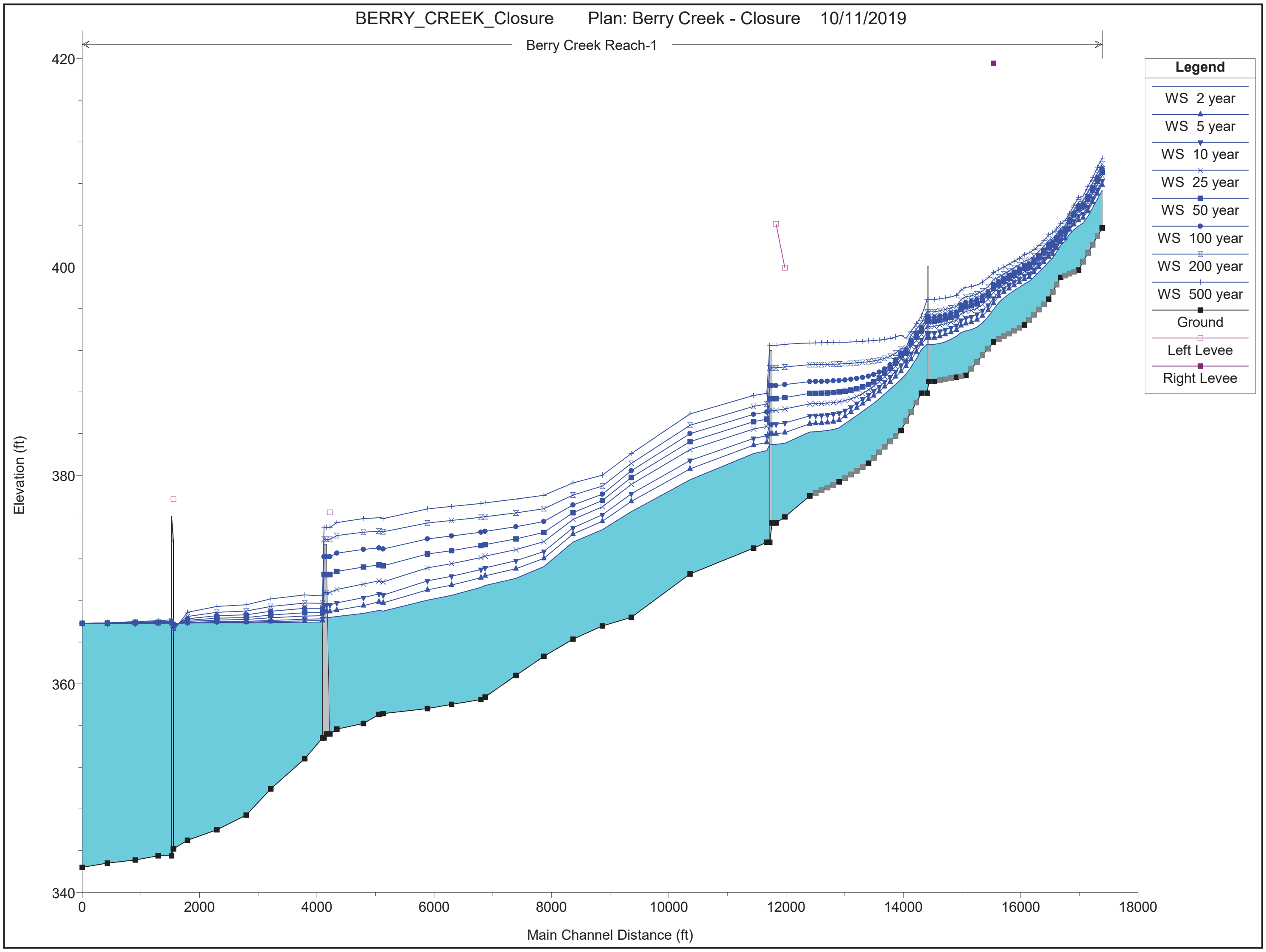
12000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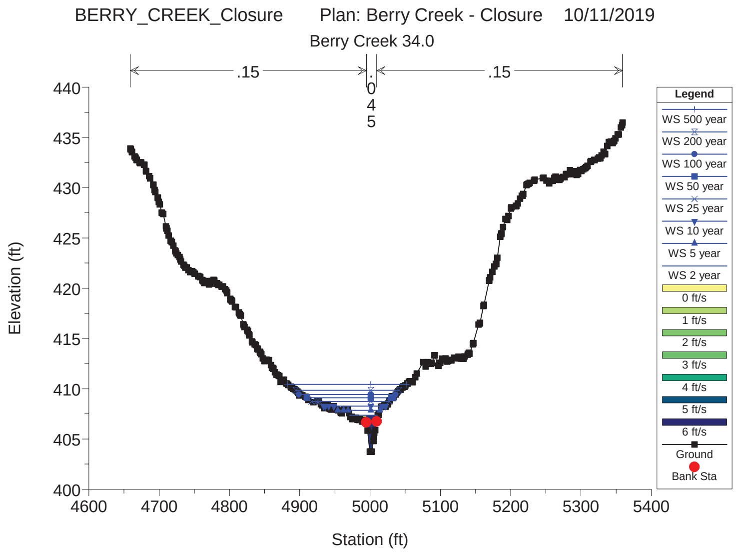
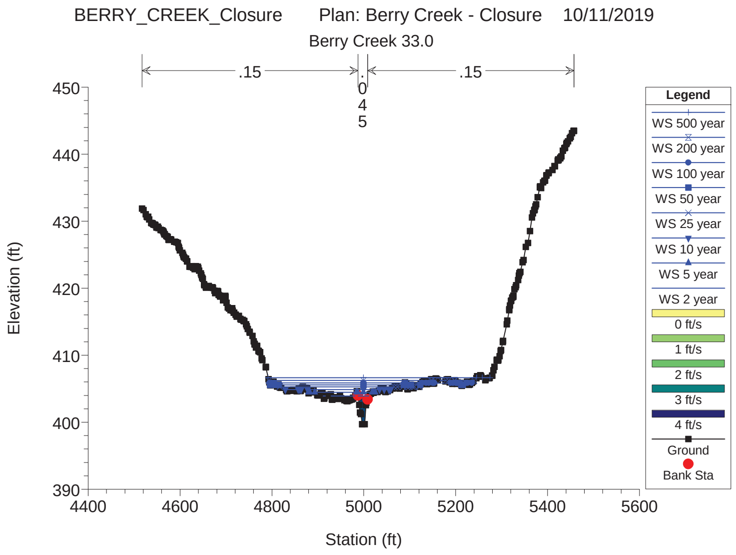
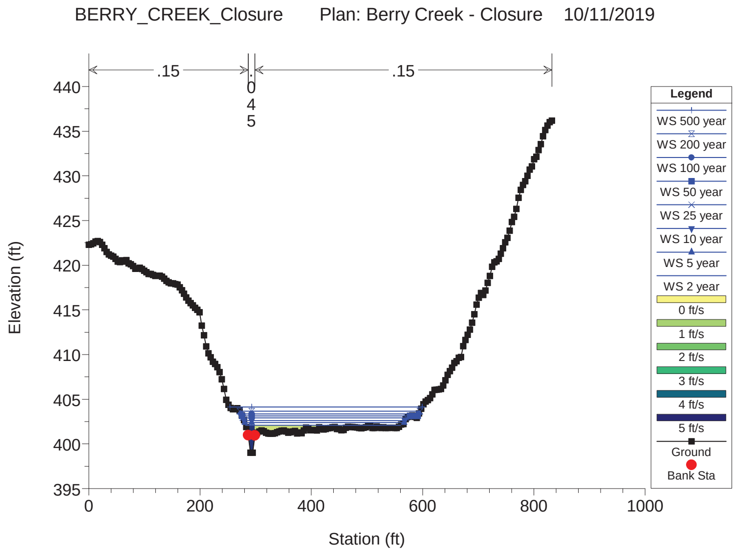
Berry Creek Reach-1
Legend
WS 2 year
WS 5 year
WS 10 year
WS 25 year
WS 50 year
WS 100 year
WS 200 year
WS 500 year
Ground
Left Levee
Right Levee
Elevation (ft)
340
360
380
400
420
Main Channel Distance (ft)
0
2000
4000
6000
8000
10000
12000
14000
16000
18000


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
Berry Creek 34.0
.15
.045
.15
Elevation (ft)
Station (ft)
440
435
430
425
420
415
410
405
400
4600
4700
4800
4900
5000
5100
5200
5300
5400
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
Ground
Bank Sta


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
Berry Creek 33.0
.15
.045
.15
Elevation (ft)
Station (ft)
450
440
430
420
410
400
390
4400
4600
4800
5000
5200
5400
5600
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta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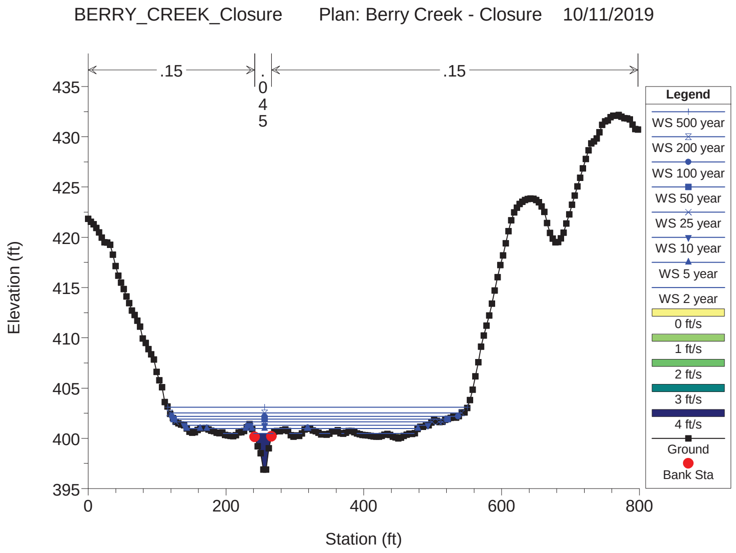
.15
.045
.15
Elevation (ft)
Station (ft)
440
435
430
425
420
415
410
405
400
395
0
200
400
600
800
1000
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta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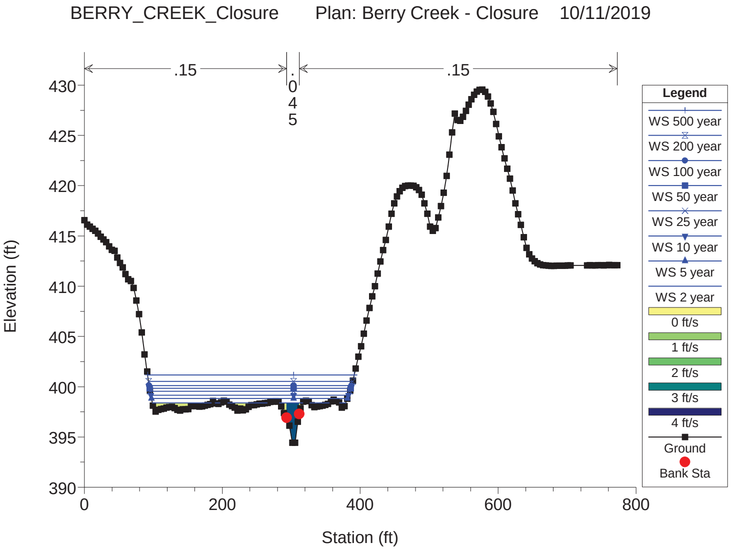
.15
.045
.15
Elevation (ft)
Station (ft)
435
430
425
420
415
410
405
400
395
0
200
400
600
800
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta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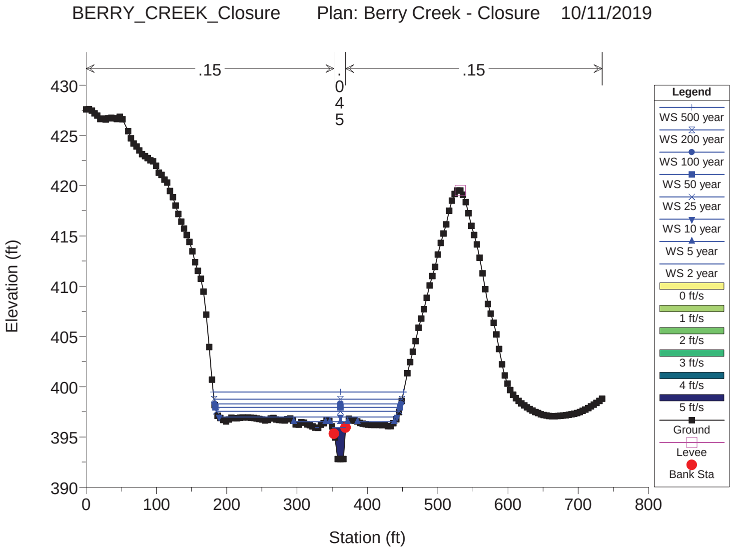
.15
.045
.15
Elevation (ft)
Station (ft)
390
395
400
405
410
415
420
425
430
0
200
400
600
800
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta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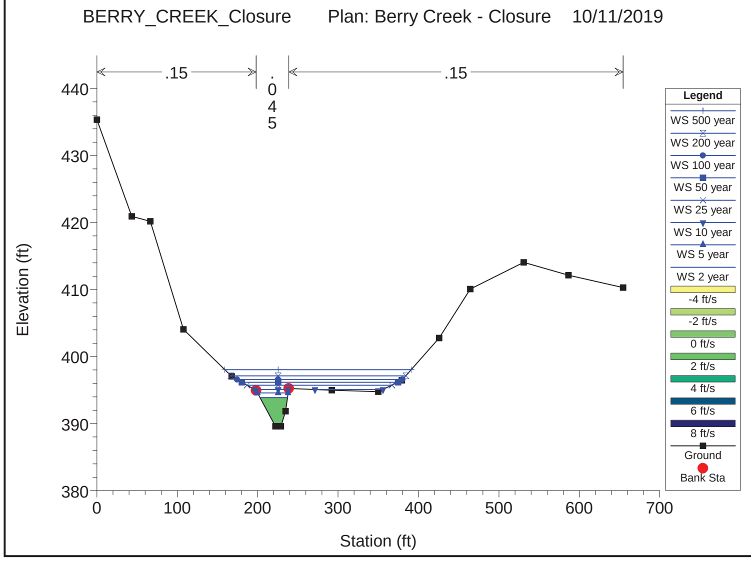
.15
.045
.15
Elevation (ft)
Station (ft)
390
395
400
405
410
415
420
425
430
0
100
200
300
400
500
600
700
800
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Levee
Bank Sta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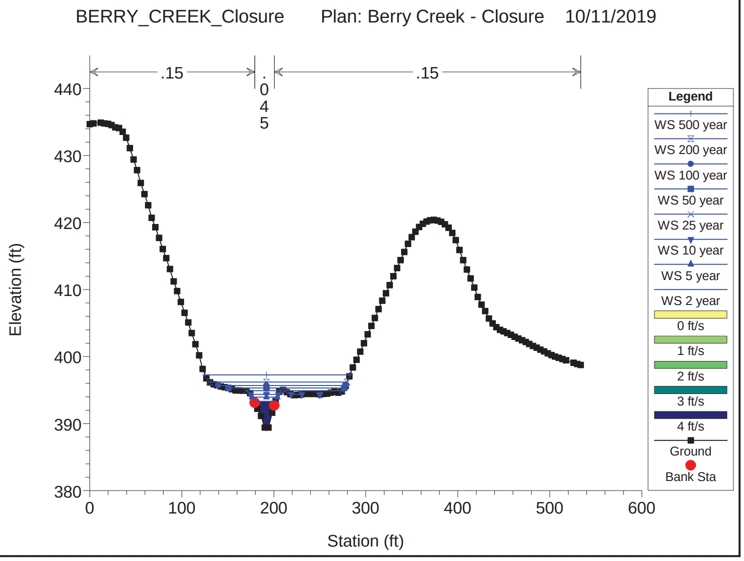
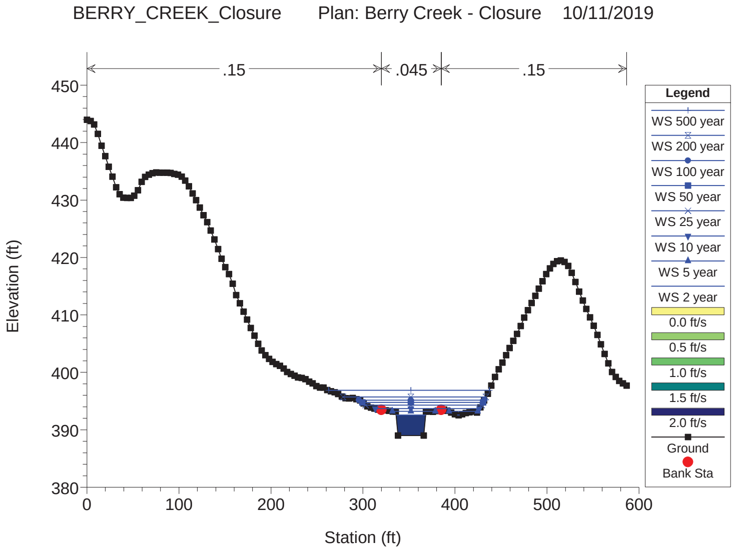
.15
.045
.15
Elevation (ft)
Station (ft)
380
390
400
410
420
430
440
0
100
200
300
400
500
600
700
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
-4 ft/s
-2 ft/s
0 ft/s
2 ft/s
4 ft/s
6 ft/s
8 ft/s
Ground
Bank Sta


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Elevation (ft)
Station (ft)
380
390
400
410
420
430
440
0
100
200
300
400
500
600
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
Ground
Bank Sta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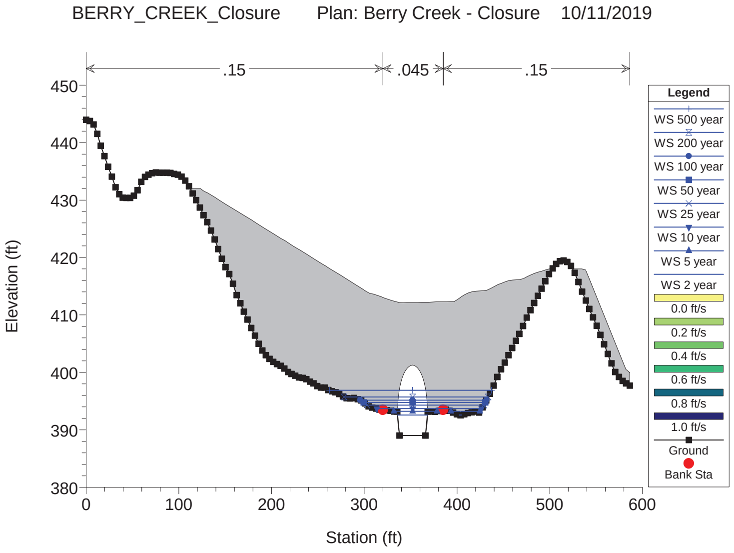
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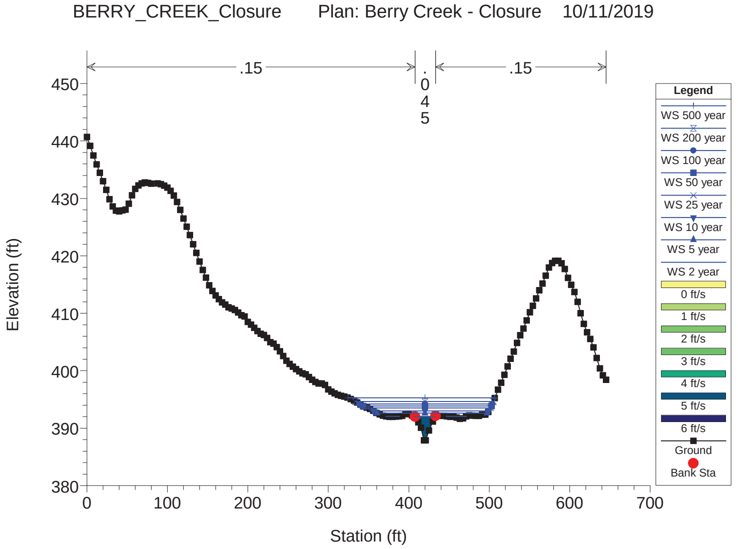
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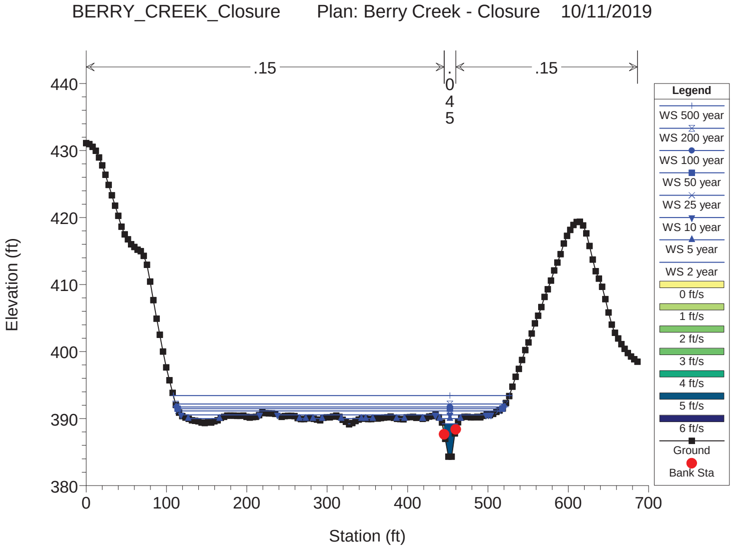
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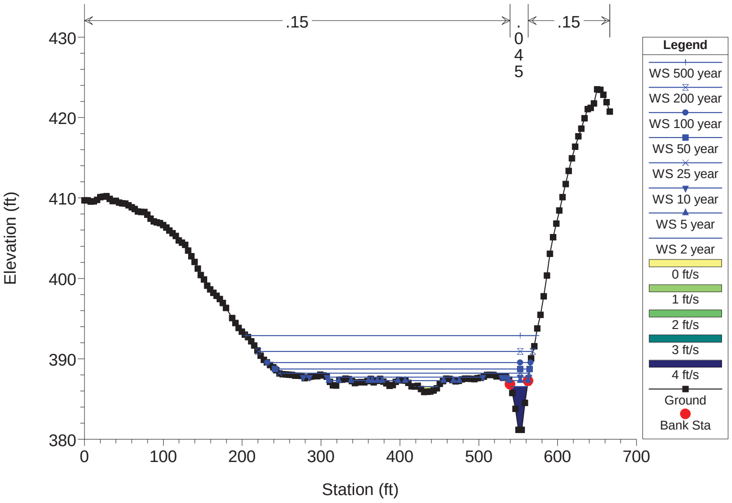
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019



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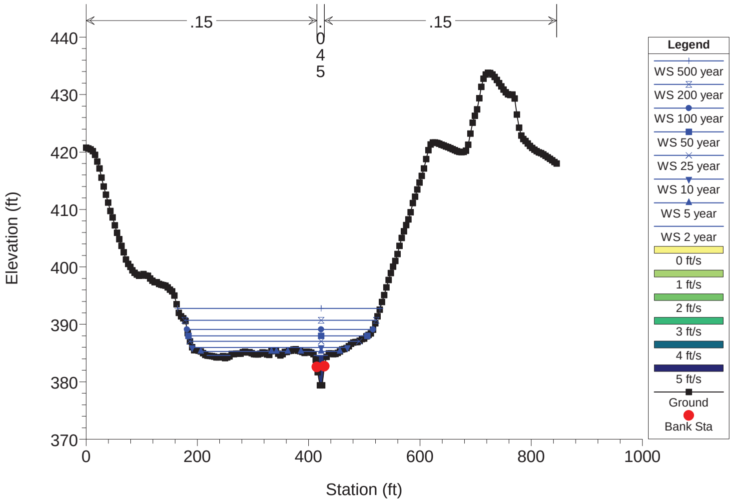

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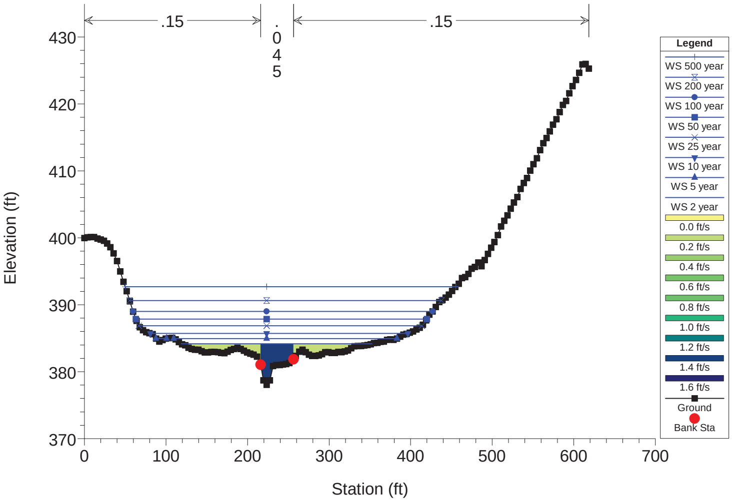
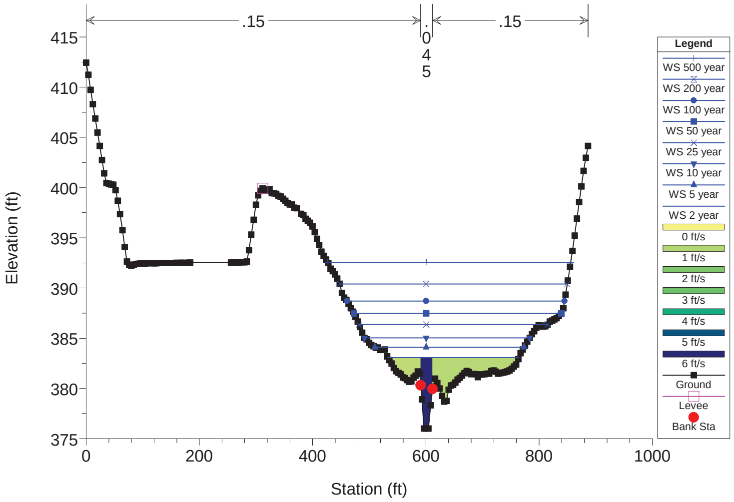


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019



HEC-RAS Plan: Close River: Berry Creek Reach: Reach-1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Flow Area	Top Width	Froude # Chl	Vel Chnl	Vel Left	Vel Right	Shear Chan	Shear LOB	Shear ROB
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(sq ft)	(ft)		(ft/s)	(ft/s)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Reach-1	16826	2 year	194.00	403.75	407.34	406.73	407.81	0.010283	43.80	39.58	0.64	5.53	0.53	0.42	1.36	0.25	0.17
Reach-1	16826	5 year	287.00	403.75	407.86	407.42	408.44	0.010511	67.14	53.55	0.66	6.38	0.87	0.59	1.70	0.44	0.29
Reach-1	16826	10 year	377.00	403.75	408.26	407.85	408.95	0.010898	93.74	80.29	0.69	7.08	0.91	0.67	2.00	0.50	0.32
Reach-1	16826	25 year	516.00	403.75	408.74	408.57	409.53	0.011066	139.76	107.47	0.71	7.83	1.09	0.79	2.34	0.67	0.46
Reach-1	16826	50 year	637.00	403.75	409.09	409.03	409.95	0.011203	180.49	120.53	0.73	8.36	1.18	0.98	2.59	0.84	0.62
Reach-1	16826	100 year	767.00	403.75	409.42	409.26	410.33	0.011419	221.52	137.43	0.74	8.87	1.30	1.05	2.84	0.97	0.70
Reach-1	16826	200 year	976.00	403.75	409.85	409.71	410.81	0.011422	282.85	146.78	0.76	9.45	1.52	1.21	3.12	1.22	0.87
Reach-1	16826	500 year	1331.00	403.75	410.44	410.34	411.51	0.012063	375.88	169.18	0.79	10.47	1.78	1.39	3.70	1.57	1.08
Reach-1	16420	2 year	194.00	399.70	403.92		404.10	0.003498	78.31	79.45	0.37	3.43	0.34	0.24	0.51	0.09	0.06
Reach-1	16420	5 year	287.00	399.70	404.47		404.68	0.003474	136.25	130.33	0.39	3.87	0.47	0.30	0.61	0.15	0.06
Reach-1	16420	10 year	377.00	399.70	404.86		405.08	0.003478	201.02	201.84	0.39	4.18	0.56	0.34	0.68	0.17	0.08
Reach-1	16420	25 year	516.00	399.70	405.29		405.55	0.003715	302.16	272.58	0.41	4.67	0.62	0.42	0.82	0.24	0.11
Reach-1	16420	50 year	637.00	399.70	405.58		405.84	0.003770	384.51	310.12	0.42	4.93	0.73	0.48	0.89	0.30	0.14
Reach-1	16420	100 year	767.00	399.70	405.86		406.12	0.003724	479.23	367.86	0.42	5.11	0.80	0.55	0.94	0.35	0.15
Reach-1	16420	200 year	976.00	399.70	406.23		406.49	0.003796	625.43	426.15	0.43	5.44	0.90	0.59	1.04	0.43	0.19
Reach-1	16420	500 year	1331.00	399.70	406.66		406.95	0.004147	820.25	470.71	0.46	6.01	1.08	0.69	1.23	0.57	0.28
Reach-1	16116.23	2 year	194.00	399.00	402.08	401.96	402.31	0.006666	152.19	278.22	0.52	4.64	0.53	0.48	0.94	0.22	0.19
Reach-1	16116.23	5 year	287.00	399.00	402.39	402.22	402.59	0.005897	241.36	286.54	0.50	4.73	0.58	0.63	0.94	0.24	0.28
Reach-1	16116.23	10 year	377.00	399.00	402.61	402.36	402.80	0.005939	303.75	289.21	0.51	4.99	0.64	0.75	1.02	0.28	0.36
Reach-1	16116.23	25 year	516.00	399.00	402.91	402.55	403.09	0.005923	389.78	294.49	0.52	5.31	0.69	0.89	1.12	0.32	0.46
Reach-1	16116.23	50 year	637.00	399.00	403.13	402.68	403.32	0.005995	457.42	310.36	0.53	5.59	0.74	0.98	1.21	0.35	0.53
Reach-1	16116.23	100 year	767.00	399.00	403.35	402.79	403.54	0.006129	526.95	319.28	0.54	5.88	0.79	1.06	1.31	0.39	0.61
Reach-1	16116.23	200 year	976.00	399.00	403.68		403.87	0.005977	631.68	324.13	0.54	6.15	0.85	1.18	1.39	0.44	0.71
Reach-1	16116.23	500 year	1331.00	399.00	404.14		404.35	0.005998	788.05	345.54	0.55	6.63	0.70	1.35	1.56	0.33	0.88
Reach-1	15911.28	2 year	194.00	396.90	400.49	399.57	400.71	0.005572	76.54	168.21	0.47	3.81	0.24	0.26	0.67	0.07	0.07
Reach-1	15911.28	5 year	287.00	396.90	400.97		401.16	0.004219	197.86	315.71	0.43	3.83	0.35	0.41	0.63	0.10	0.13
Reach-1	15911.28	10 year	377.00	396.90	401.29		401.45	0.003635	303.81	351.20	0.40	3.85	0.43	0.50	0.61	0.14	0.17
Reach-1	15911.28	25 year	516.00	396.90	401.65		401.80	0.003281	436.54	377.44	0.39	3.96	0.52	0.61	0.62	0.18	0.22
Reach-1	15911.28	50 year	637.00	396.90	401.92		402.07	0.003172	540.42	397.16	0.39	4.11	0.60	0.66	0.65	0.22	0.25
Reach-1	15911.28	100 year	767.00	396.90	402.17		402.32	0.003099	642.35	415.33	0.39	4.26	0.67	0.70	0.68	0.26	0.28
Reach-1	15911.28	200 year	976.00	396.90	402.54		402.68	0.002921	795.28	423.17	0.39	4.40	0.75	0.79	0.71	0.30	0.32
Reach-1	15911.28	500 year	1331.00	396.90	403.09		403.23	0.002696	1034.46	434.85	0.38	4.61	0.86	0.89	0.74	0.37	0.38
Reach-1	15500	2 year	194.00	394.43	398.38		398.53	0.002877	129.08	219.92	0.36	3.36	0.31	0.24	0.47	0.07	0.05
Reach-1	15500	5 year	287.00	394.43	398.84		398.98	0.002575	250.98	284.23	0.35	3.52	0.42	0.34	0.49	0.12	0.09
Reach-1	15500	10 year	377.00	394.43	399.15		399.28	0.002492	338.80	286.55	0.35	3.68	0.52	0.44	0.52	0.17	0.13
Reach-1	15500	25 year	516.00	394.43	399.54		399.67	0.002453	451.54	289.50	0.35	3.92	0.63	0.56	0.57	0.22	0.19
Reach-1	15500	50 year	637.00	394.43	399.84		399.97	0.002442	537.31	291.45	0.35	4.10	0.71	0.64	0.61	0.27	0.23
Reach-1	15500	100 year	767.00	394.43	400.12		400.26	0.002435	621.42	293.23	0.36	4.28	0.78	0.71	0.65	0.31	0.26
Reach-1	15500	200 year	976.00	394.43	400.54		400.68	0.002428	744.58	295.83	0.36	4.54	0.88	0.80	0.71	0.37	0.32
Reach-1	15500	500 year	1331.00	394.43	401.18		401.33	0.002393	934.83	299.31	0.37	4.89	1.02	0.93	0.79	0.46	0.40
Reach-1	14972.92	2 year	194.00	392.80	395.93	395.10	396.31	0.007998	40.27	23.27	0.56	4.90	0.37		1.07	0.05	
Reach-1	14972.92	5 year	287.00	392.80	396.52	395.65	396.98	0.007677	81.30	122.90	0.57	5.56	0.41	0.37	1.28	0.15	0.14
Reach-1	14972.92	10 year	377.00	392.80	396.98	396.44	397.41	0.006517	166.73	253.26	0.54	5.65	0.42	0.59	1.26	0.16	0.26
Reach-1	14972.92	25 year	516.00	392.80	397.56	397.19	397.85	0.004525	314.36	260.04	0.46	5.22	0.64	0.74	1.02	0.27	0.33
Reach-1	14972.92	50 year	637.00	392.80	397.94	397.40	398.18	0.003899	413.03	262.79	0.43	5.15	0.74	0.82	0.96	0.32	0.37
Reach-1	14972.92	100 year	767.00	392.80	398.28	397.59	398.51	0.003554	504.34	265.06	0.42	5.17	0.82	0.89	0.94	0.37	0.41
Reach-1	14972.92	200 year	976.00	392.80	398.76	397.81	398.98	0.003253	632.96	267.43	0.41	5.28	0.93	0.98	0.95	0.43	0.46
Reach-1	14972.92	500 year	1331.00	392.80	399.47	398.18	399.68	0.002983	823.95	270.58	0.40	5.51	1.08	1.11	0.99	0.52	0.54
Reach-1	14635.58	2 year	194.00	389.59	393.87		393.94	0.001194	91.30	34.28	0.23	2.12			0.19		
Reach-1	14635.58	5 year	287.00	389.59	394.56		394.65	0.001349	116.44	38.20	0.25	2.46			0.24		
Reach-1	14635.58	10 year	377.00	389.59	395.08		395.20	0.001450	151.62	127.12	0.26	2.74	0.07	0.12	0.29	0.01	0.02
Reach-1	14635.58	25 year	516.00	389.59	395.73		395.86	0.001383	258.60	180.33	0.26	2.99	0.20	0.29	0.33	0.03	0.06
Reach-1	14635.58	50 year	637.00	389.59	396.18		396.32	0.001348	342.92	194.58	0.26	3.17	0.26	0.39	0.36	0.05	0.09
Reach-1	14635.58	100 year	767.00	389.59	396.58		396.73	0.001346	423.82	205.97	0.27	3.36	0.32	0.47	0.39	0.07	0.12
Reach-1	14635.58	200 year	976.00	389.59	397.13		397.30	0.001358	541.29	217.53	0.27	3.62	0.39	0.57	0.44	0.09	0.17
Reach-1	14635.58	500 year	1331.00	389.59	398.04		398.22	0.001282	744.63	231.89	0.27	3.90	0.51	0.70	0.48	0.14	0.22
Reach-1	14500.01	2 year	194.00	389.41	393.33		393.56	0.004694	50.94	23.47	0.44	3.85	0.15	0.29	0.65	0.03	0.08
Reach-1	14500.01	5 year	287.00	389.41	393.94		394.26	0.004744	66.45	27.38	0.46	4.51	0.36	0.46	0.83	0.11	0.16
Reach-1	14500.01	10 year	377.00	389.41	394.37		394.77	0.005208	79.33	42.59	0.49	5.16	0.50	0.50	1.04	0.19	0.08
Reach-1	14500.01	25 year	516.00	389.41	394.89	393.61	395.42	0.005709	122.19	100.62	0.53	5.95	0.57	0.46	1.31	0.24	0.16
Reach-1	14500.01	50 year	637.00	389.41	395.30	394.01	395.88	0.005731	170.78	125.82	0.54	6.36	0.50	0.66	1.45	0.19	0.29
Reach-1	14500.01	100 year	767.00	389.41	395.68	394.61	396.29	0.005707	220.57	138.57	0.55	6.71	0.60	0.83	1.57	0.26	0.42
Reach-1	14500.01	200 year	976.00	389.41	396.21		396.86	0.005563	298.31	149.60	0.55	7.12	0.77	1.04	1.71	0.37	0.58
Reach-1	14500.01	500 year	1331.00	389.41	397.26		397.83	0.004310	460.14	157.34	0.50	7.08	1.03	1.24	1.59	0.53	0.71
Reach-1	14123.17	2 year	194.00	389.01	392.58	390.14	392.63	0.000700	107.68	34.67	0.17	1.80		0.02	0.13		0.00
Reach-1	14123.17	5 year	287.00	389.01	393.21	390.48	393.28	0.001330	138.46	78.00	0.24	2.22		0.17	0.21		0.03
Reach-1	14123.17	10 year	377.00	389.01	393.67	390.76	393.75	0.001748	183.86	113.24	0.27	2.36	0.11	0.31	0.24	0.01	0.07
Reach-1	14123.17	25 year	516.00	389.01	394.30	391.16	394.40	0.001417	260.63	126.08	0.25	2.49	0.25	0.43	0.25	0.05	0.11
Reach-1	14123.17	50 year	637.00	389.01	394.77	391.48	394.87	0.001289	320.73	131.17	0.25	2.61	0.33	0.49	0.26	0.07	0.13
Reach-1	14123.17	100 year	767.00	389.01	395.16	391.80	395.27	0.001279	372.52	136.11	0.25	2.79	0.38	0.56	0.29	0.09	0.16
Reach-1	14123.17	200 year	976.00	389.01	395.69	392.27	395.83	0.001309	449.76	155.28	0.26	3.07	0.37	0.64	0.34	0.09	0.20
Reach-1	14123.17	500 year	1331.00	389.01	396.86	393.66	396.99	0.001033	640.34	174.56	0.24	3.19	0.46	0.71	0.34	0.11	0.22
Reach-1	14002.89		Inl Struct														
Reach-1	13901.95	2 year	257.00	387.89	392.06	391.35	392.45	0.009882	56.91	68.71	0.62	5.00	0.16	0.32	1.16	0.04	0.12
Reach-1	13901.95	5 year	375.00	387.89	392.63	391.95	393.02	0.007765	122.74	136.92	0.58	5.22	0.51	0.59	1.17	0.22	0.27
Reach-1	13901.95	10 year	488.00	387.89	393.02		393.41	0.006961	177.53	143.73	0.56	5.43	0.70	0.78	1.20	0.34	0.40
Reach-1	13901.95	25 year	662.00	387.89	393.51		393.92	0.006405	250.19	152.73	0.55	5.78	0.87	0.98	1.29	0.46	0.55
Reach-1	13901.95	50 year	811.00	387.89	393.86		394.29	0.006232	305.19	160.04	0.55	6.08	0.97	1.11	1.39	0.54	0.66
Reach-1	13901.95	100 year	972.00	387.89	394.21		394.65	0.006067	361.34	165.23	0.55	6.36	1.07	1.23	1.47	0.62	0.76
Reach-1	13901.95	200 year	1213.00	387.89	394.65		395.13	0.006039	435.62	171.48	0.56	6.79	1.20	1.39	1.62	0.73	0.91
Reach-1	13901.95	500 year	1612.00	387.89	395.27		395.82	0.006177	544.81	182.35	0.58	7.48	1.36	1.61	1.89	0.89	1.14
Reach-1	13556.14	2 year	257.00	384.31	389.22		389.62	0.005552	53.20	21.26	0.48	5.08	0.55	0.39	1.03	0.14	0.14
Reach-1	13556.14	5 year	375.00	384.31	389.99	388.50	390.50	0.005608	98.77	129.20	0.50	5.84	0.42	0.54	1.27	0.11	0.22
Reach-1	13556.14	10 year	488.00	384.31	390.57	389.04	391.01	0.004747	248.22	359.67	0.47	5.85	0.45	0.40	1.22	0.16	0.12
Reach-1	13556.14	25 year	662.00	384.31	391.14		391.44	0.003553	470.33	398.41	0.41	5.46	0.61	0.53	1.03	0.23	0.19
Reach-1	13556.14	50 year	811.00	384.31	391.47	391.02	391.73	0.003319	599.66	404.25	0.40	5.49	0.70	0.60	1.02	0.28	0.22
Reach-1	13556.14	100 year	972.00	384.31	391.72	391.16	391.98	0.003352	704.67	406.85	0.41	5.68	0.79	0.69	1.07	0.34	0.27
Reach-1	13556.14	200 year	1213.00	384.31	392.16	391.42	392.39	0.003054	882.56	410.31	0.40	5.68	0.88	0.78	1.05	0.39	0.32
Reach-1	13556.14	500 year	1612.00	384.31	393.43		393.54	0.001551	1410.31	418.22	0.29	4.57	0.86	0.77	0.64	0.32	0.27
Reach-1	13000	2 year	257.00	381.16	386.56		386.80	0.003937	75.68	46.10	0.40	3.95	0.37		0.65	0.11	

HEC-RAS Plan: Close River: Berry Creek Reach: Reach-1 (Continued)

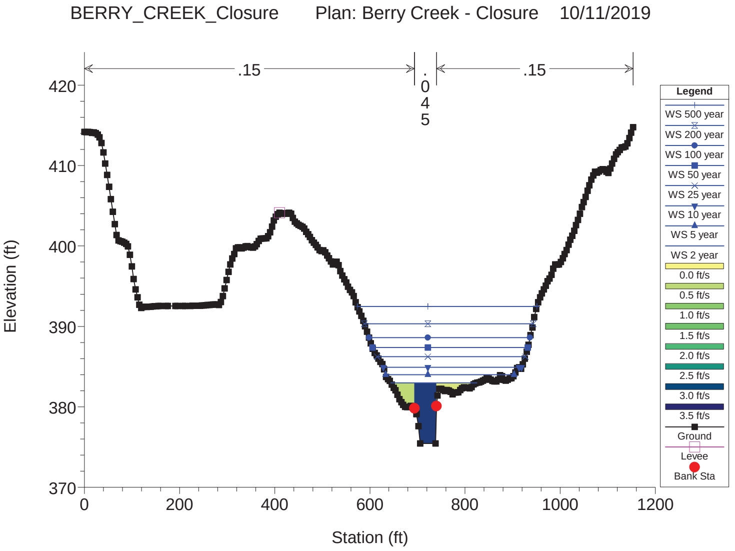
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Flow Area	Top Width	Froude # Chl	Vel Chnl	Vel Left	Vel Right	Shear Chan	Shear LOB	Shear ROB
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(sq ft)	(ft)		(ft/s)	(ft/s)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Reach-1	13000	5 year	375.00	381.16	387.30		387.57	0.003855	139.76	141.98	0.41	4.32	0.47	0.04	0.74	0.12	
Reach-1	13000	10 year	488.00	381.16	387.73		388.03	0.003929	224.40	237.18	0.42	4.71	0.47	0.21	0.84	0.15	0.05
Reach-1	13000	25 year	662.00	381.16	388.21		388.52	0.003916	361.48	317.01	0.42	5.07	0.57	0.33	0.94	0.22	0.09
Reach-1	13000	50 year	811.00	381.16	388.73		388.96	0.002955	526.33	322.87	0.38	4.74	0.67	0.38	0.79	0.25	0.11
Reach-1	13000	100 year	972.00	381.16	389.52		389.66	0.001739	787.07	333.77	0.30	4.02	0.68	0.39	0.54	0.23	0.10
Reach-1	13000	200 year	1213.00	381.16	390.91		390.98	0.000808	1262.72	348.50	0.21	3.16	0.64	0.34	0.31	0.17	0.07
Reach-1	13000	500 year	1612.00	381.16	392.90		392.94	0.000414	1972.86	367.94	0.16	2.67	0.60	0.34	0.20	0.13	0.06
Reach-1	12500	2 year	257.00	379.37	384.58		384.90	0.003657	72.38	66.30	0.40	4.61	0.30	0.50	0.80	0.06	0.17
Reach-1	12500	5 year	375.00	379.37	385.29	383.44	385.67	0.003768	169.27	218.02	0.42	5.22	0.39	0.43	0.97	0.12	0.14
Reach-1	12500	10 year	488.00	379.37	385.98		386.23	0.002593	348.10	278.78	0.36	4.73	0.52	0.49	0.76	0.17	0.16
Reach-1	12500	25 year	662.00	379.37	387.06		387.18	0.001331	660.08	304.54	0.26	3.82	0.59	0.47	0.47	0.17	0.12
Reach-1	12500	50 year	811.00	379.37	388.01		388.08	0.000815	955.98	321.68	0.21	3.28	0.59	0.46	0.33	0.15	0.10
Reach-1	12500	100 year	972.00	379.37	389.10		389.15	0.000501	1317.97	334.70	0.17	2.81	0.56	0.45	0.23	0.13	0.09
Reach-1	12500	200 year	1213.00	379.37	390.69		390.72	0.000296	1856.01	343.94	0.13	2.42	0.53	0.44	0.16	0.10	0.08
Reach-1	12500	500 year	1612.00	379.37	392.77		392.79	0.000201	2594.06	363.79	0.11	2.26	0.53	0.46	0.13	0.09	0.07
Reach-1	12000	2 year	257.00	378.03	384.17		384.19	0.000326	366.10	233.74	0.13	1.42	0.19	0.19	0.07	0.02	0.02
Reach-1	12000	5 year	375.00	378.03	384.96		384.99	0.000299	569.33	286.81	0.13	1.54	0.25	0.23	0.08	0.03	0.03
Reach-1	12000	10 year	488.00	378.03	385.71		385.74	0.000254	796.54	315.45	0.12	1.57	0.26	0.26	0.08	0.03	0.03
Reach-1	12000	25 year	662.00	378.03	386.87		386.89	0.000187	1184.63	346.89	0.11	1.54	0.29	0.28	0.07	0.04	0.03
Reach-1	12000	50 year	811.00	378.03	387.86		387.88	0.000145	1534.35	356.79	0.10	1.49	0.30	0.29	0.07	0.04	0.03
Reach-1	12000	100 year	972.00	378.03	389.00		389.02	0.000110	1945.47	367.28	0.09	1.43	0.30	0.29	0.06	0.03	0.03
Reach-1	12000	200 year	1213.00	378.03	390.62		390.63	0.000082	2550.65	382.19	0.08	1.37	0.31	0.30	0.05	0.03	0.03
Reach-1	12000	500 year	1612.00	378.03	392.71		392.72	0.000066	3376.54	405.44	0.07	1.40	0.33	0.31	0.05	0.03	0.03
Reach-1	11575.16	2 year	1039.00	376.02	383.07	381.73	383.43	0.003526	507.10	231.54	0.43	5.82	0.80	0.91	1.13	0.35	0.42
Reach-1	11575.16	5 year	1374.00	376.02	384.11	382.57	384.39	0.002588	758.19	263.68	0.38	5.58	0.79	1.01	0.98	0.32	0.46
Reach-1	11575.16	10 year	1678.00	376.02	385.04	382.91	385.27	0.001974	1017.67	291.90	0.34	5.31	0.80	1.03	0.85	0.30	0.44
Reach-1	11575.16	25 year	2128.00	376.02	386.37	383.35	386.56	0.001458	1424.42	333.71	0.30	5.08	0.87	0.98	0.74	0.32	0.38
Reach-1	11575.16	50 year	2502.00	376.02	387.47	383.64	387.62	0.001134	1809.42	366.23	0.27	4.83	0.88	0.95	0.64	0.30	0.34
Reach-1	11575.16	100 year	2900.00	376.02	388.70	383.96	388.83	0.000833	2273.74	384.13	0.23	4.47	0.84	0.93	0.53	0.26	0.31
Reach-1	11575.16	200 year	3393.00	376.02	390.41	384.32	390.50	0.000557	2948.40	402.24	0.20	4.02	0.79	0.89	0.41	0.22	0.26
Reach-1	11575.16	500 year	4128.00	376.02	392.56	384.84	392.63	0.000397	3839.36	429.04	0.17	3.76	0.75	0.88	0.34	0.18	0.23
Reach-1	11425.73	2 year	1039.00	375.43	382.99	378.53	383.13	0.000783	490.22	180.48	0.21	3.13	0.46	0.25	0.30	0.10	0.04
Reach-1	11425.73	5 year	1374.00	375.43	383.98	379.14	384.14	0.000786	720.77	270.12	0.22	3.43	0.53	0.32	0.35	0.13	0.06
Reach-1	11425.73	10 year	1678.00	375.43	384.90	379.68	385.06	0.000703	977.42	290.03	0.21	3.50	0.59	0.42	0.35	0.15	0.09
Reach-1	11425.73	25 year	2128.00	375.43	386.25	380.38	386.39	0.000586	1381.10	311.23	0.20	3.52	0.61	0.52	0.34	0.15	0.12
Reach-1	11425.73	50 year	2502.00	375.43	387.36	380.88	387.49	0.000498	1736.35	326.64	0.18	3.48	0.61	0.58	0.32	0.14	0.13
Reach-1	11425.73	100 year	2900.00	375.43	388.61	381.36	388.73	0.000409	2151.45	338.56	0.17	3.39	0.62	0.61	0.29	0.14	0.14
Reach-1	11425.73	200 year	3393.00	375.43	390.33	381.94	390.43	0.000310	2747.95	354.81	0.15	3.21	0.61	0.63	0.25	0.13	0.13
Reach-1	11425.73	500 year	4128.00	375.43	392.48	382.93	392.57	0.000245	3535.30	377.57	0.14	3.14	0.61	0.65	0.23	0.12	0.13
Reach-1	11355.86		Inl Struct														
Reach-1	11268.37	2 year	1320.00	373.58	382.38		382.58	0.001720	905.22	366.26	0.31	4.57	0.72	0.59	0.65	0.25	0.18
Reach-1	11268.37	5 year	1813.00	373.58	383.16		383.38	0.001733	1201.47	387.41	0.32	4.94	0.85	0.72	0.74	0.32	0.25
Reach-1	11268.37	10 year	2267.00	373.58	383.81		384.02	0.001705	1452.86	395.22	0.32	5.18	0.95	0.83	0.79	0.38	0.31
Reach-1	11268.37	25 year	2950.00	373.58	384.70		384.91	0.001643	1809.88	405.41	0.32	5.46	1.07	0.95	0.84	0.45	0.37
Reach-1	11268.37	50 year	3523.00	373.58	385.39		385.61	0.001596	2091.87	413.07	0.32	5.65	1.15	1.03	0.88	0.50	0.42
Reach-1	11268.37	100 year	4138.00	373.58	386.08		386.31	0.001548	2382.63	420.63	0.32	5.83	1.22	1.11	0.92	0.54	0.46
Reach-1	11268.37	200 year	4867.00	373.58	386.84		387.07	0.001510	2705.89	429.02	0.32	6.04	1.30	1.19	0.96	0.59	0.51
Reach-1	11268.37	500 year	5923.00	373.58	387.88		388.11	0.001460	3153.50	439.63	0.32	6.30	1.40	1.28	1.02	0.65	0.57
Reach-1	11042.48	2 year	1320.00	373.02	382.10		382.23	0.001326	1200.87	454.74	0.28	4.19	0.75	0.58	0.54	0.25	0.17
Reach-1	11042.48	5 year	1813.00	373.02	382.89		383.02	0.001298	1571.10	475.39	0.28	4.44	0.86	0.68	0.58	0.30	0.21
Reach-1	11042.48	10 year	2267.00	373.02	383.54		383.67	0.001265	1883.32	486.02	0.28	4.62	0.94	0.77	0.62	0.34	0.25
Reach-1	11042.48	25 year	2950.00	373.02	384.44		384.57	0.001204	2330.61	499.80	0.28	4.82	1.03	0.86	0.65	0.39	0.30
Reach-1	11042.48	50 year	3523.00	373.02	385.14		385.27	0.001162	2683.95	509.86	0.27	4.96	1.09	0.93	0.67	0.42	0.33
Reach-1	11042.48	100 year	4138.00	373.02	385.85		385.98	0.001128	3050.08	524.56	0.27	5.11	1.16	0.98	0.70	0.46	0.35
Reach-1	11042.48	200 year	4867.00	373.02	386.62		386.75	0.001095	3458.70	536.39	0.27	5.27	1.22	1.04	0.72	0.49	0.39
Reach-1	11042.48	500 year	5923.00	373.02	387.66		387.79	0.001052	4025.40	549.81	0.27	5.47	1.29	1.12	0.76	0.53	0.43
Reach-1	10500	2 year	1320.00	370.55	379.58		379.97	0.004064	583.21	250.19	0.42	6.11	0.86	1.00	1.25	0.40	0.50
Reach-1	10500	5 year	1813.00	370.55	380.63		380.97	0.003310	860.78	272.24	0.39	6.10	1.01	1.15	1.19	0.49	0.59
Reach-1	10500	10 year	2267.00	370.55	381.43		381.74	0.002971	1079.32	278.16	0.38	6.18	1.13	1.26	1.18	0.56	0.66
Reach-1	10500	25 year	2950.00	370.55	382.47		382.77	0.002724	1376.74	293.23	0.37	6.40	1.28	1.39	1.22	0.66	0.75
Reach-1	10500	50 year	3523.00	370.55	383.24		383.55	0.002594	1605.76	299.53	0.37	6.58	1.38	1.48	1.25	0.73	0.82
Reach-1	10500	100 year	4138.00	370.55	384.00		384.31	0.002506	1835.99	307.82	0.36	6.79	1.48	1.57	1.30	0.80	0.88
Reach-1	10500	200 year	4867.00	370.55	384.81		385.13	0.002422	2090.74	313.64	0.36	7.01	1.57	1.67	1.35	0.88	0.96
Reach-1	10500	500 year	5923.00	370.55	385.90		386.24	0.002357	2439.66	325.62	0.36	7.34	1.64	1.80	1.44	0.93	1.07
Reach-1	9993.515	2 year	1320.00	366.38	376.51		376.90	0.002415	293.31	103.04	0.34	4.98	0.31	0.28	0.81	0.08	0.07
Reach-1	9993.515	5 year	1813.00	366.38	377.50		378.00	0.002683	422.42	152.08	0.37	5.76	0.59	0.49	1.04	0.20	0.16
Reach-1	9993.515	10 year	2267.00	366.38	378.23		378.81	0.002866	536.72	159.32	0.39	6.34	0.81	0.71	1.22	0.34	0.28
Reach-1	9993.515	25 year	2950.00	366.38	379.14		379.84	0.003129	684.56	166.25	0.42	7.10	1.08	0.97	1.47	0.53	0.45
Reach-1	9993.515	50 year	3523.00	366.38	379.80		380.59	0.003319	796.42	171.32	0.43	7.67	1.26	1.15	1.68	0.68	0.59
Reach-1	9993.515	100 year	4138.00	366.38	380.44		381.33	0.003500	907.96	176.22	0.45	8.22	1.44	1.31	1.88	0.84	0.73
Reach-1	9993.515	200 year	4867.00	366.38	381.15		382.13	0.003670	1034.33	181.61	0.46	8.79	1.62	1.48	2.11	1.02	0.88
Reach-1	9993.515	500 year	5923.00	366.38	382.08		383.20	0.003867	1207.65	188.76	0.48	9.52	1.85	1.68	2.41	1.25	1.09
Reach-1	9500	2 year	1320.00	365.56	374.79		375.40	0.003793	330.47	170.46	0.44	6.47	0.60	0.60	1.34	0.23	0.23
Reach-1	9500	5 year	1813.00	365.56	375.59		376.33	0.004269	474.71	195.07	0.48	7.40	0.92	0.65	1.69	0.45	0.25
Reach-1	9500	10 year	2267.00	365.56	376.21		377.04	0.004541	602.46	212.02	0.50	8.04	1.16	0.75	1.95	0.65	0.34
Reach-1	9500	25 year	2950.00	365.56	376.98		377.92	0.004902	766.87	216.54	0.52	8.88	1.44	1.05	2.30	0.92	0.57
Reach-1	9500	50 year	3523.00	365.56	377.58		378.58	0.005055	898.43	220.84	0.54	9.41	1.64	1.25	2.53	1.12	0.75
Reach-1	9500	100 year	4138.00	365.56	378.20		379.25	0.005117	1036.30	225.62	0.55	9.88	1.82	1.41	2.73	1.32	0.90
Reach-1	9500	200 year	4867.00	365.56	378.98		380.05	0.004933	1217.11	233.95	0.54	10.19	1.99	1.53	2.84	1.49	1.01
Reach-1	9500	500 year	5923.00	365.56	380.02		381.10	0.004729	1461.71	240.35	0.54	10.60	2.18	1.74	2.98	1.69	1.20
Reach-1	9000	2 year	1320.00	364.28	373.61		373.91	0.002216	606.17	314.65	0.33	4.78	0.50	0.58	0.75	0.15	0.19
Reach-1	9000	5 year	1813.00	364.28	374.36		374.69	0.002337	853.76	335.43	0.35	5.28	0.62	0.76	0.88	0.21	0.29
Reach-1	9000	10 year	2267.00	364.28	374.97		375.32	0.002406	1067.08	362.58	0.36	5.66	0.71	0.87	0.98	0.26	0.36
Reach-1	9000	25 year	2950.00	364.28	375.77		376.13	0.002409	1357.86	371.87	0.36	6.04	0.80	1.04	1.08	0.32	0.47
Reach-1	9000	50 year	3523.00	364.28	376.41		376.78	0.002362	1605.02	385.43	0.36	6.27	0.87	1.14	1.14	0.36	0.54
Reach-1	9000	100 year	4138.00	364.28	377.16		377.51	0.002169	1894.46	394.23	0.35	6.33	0.90	1.22	1.13	0.37	0.58
Reach-1	9000	200 year	4867.00	364.28	378.11		378.44	0.001914	2277.08	409.28	0.34	6.32	0.92	1.28	1.09	0.37	0.60
Reach-1	9000	500 year	5923.00	364.28	379.28		379.60	0.001714	2767.23	423.89	0.32	6.40	0.96	1.36	1.08	0.38	0.64
Reach-1	8500	2 year	1320.00	362.64	371.25	370.62	372.01	0.007123	377.71	227.62	0.57	7.67	0.91	0.97	2.03	0.51	0.53
Reach-1	8500	5 year	1813.00	362.64	372.03		372.78	0.006665	560.77	237.65	0.56	8.09	1.23	1.18	2.16	0.78	0.73

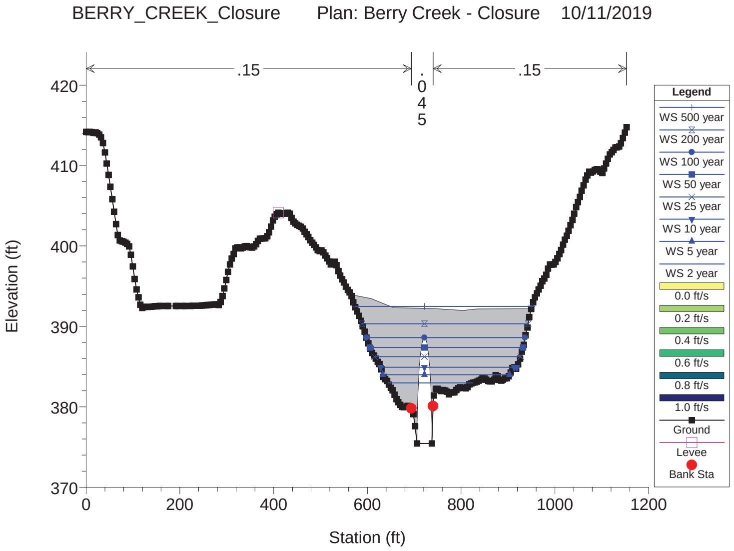
HEC-RAS Plan: Close River: Berry Creek Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Flow Area	Top Width	Froude # Chl	Vel Chnl	Vel Left	Vel Right	Shear Chan	Shear LOB	Shear ROB
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(sq ft)	(ft)		(ft/s)	(ft/s)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Reach-1	8500	10 year	2267.00	362.64	372.69		373.42	0.006201	723.68	250.90	0.55	8.34	1.40	1.36	2.22	0.93	0.89
Reach-1	8500	25 year	2950.00	362.64	373.65		374.32	0.005426	971.58	265.52	0.53	8.49	1.58	1.55	2.21	1.08	1.05
Reach-1	8500	50 year	3523.00	362.64	374.53		375.13	0.004531	1209.31	274.08	0.49	8.31	1.67	1.59	2.05	1.12	1.04
Reach-1	8500	100 year	4138.00	362.64	375.57		376.08	0.003597	1501.73	284.15	0.45	7.98	1.71	1.60	1.82	1.10	0.99
Reach-1	8500	200 year	4867.00	362.64	376.80		377.24	0.002838	1855.76	293.86	0.40	7.66	1.73	1.60	1.61	1.05	0.94
Reach-1	8500	500 year	5923.00	362.64	378.09		378.51	0.002553	2245.61	310.56	0.39	7.81	1.81	1.66	1.61	1.10	0.96
Reach-1	8027	2 year	1320.00	360.80	370.12		370.33	0.001800	779.08	366.55	0.30	4.25	0.58	0.63	0.59	0.18	0.21
Reach-1	8027	5 year	1813.00	360.80	371.05		371.25	0.001594	1124.31	377.90	0.29	4.40	0.72	0.76	0.61	0.25	0.27
Reach-1	8027	10 year	2267.00	360.80	371.81		372.00	0.001466	1414.35	387.10	0.28	4.51	0.82	0.84	0.62	0.29	0.30
Reach-1	8027	25 year	2950.00	360.80	372.88		373.07	0.001291	1834.34	394.49	0.27	4.62	0.92	0.92	0.62	0.34	0.33
Reach-1	8027	50 year	3523.00	360.80	373.90		374.06	0.001093	2239.87	405.18	0.26	4.56	0.97	0.95	0.58	0.35	0.34
Reach-1	8027	100 year	4138.00	360.80	375.07		375.22	0.000894	2723.80	419.33	0.24	4.45	0.99	0.92	0.53	0.34	0.30
Reach-1	8027	200 year	4867.00	360.80	376.40		376.53	0.000736	3286.49	430.41	0.22	4.35	1.02	0.91	0.49	0.34	0.29
Reach-1	8027	500 year	5923.00	360.80	377.72		377.85	0.000695	3864.31	444.56	0.22	4.52	1.09	0.95	0.51	0.37	0.30
Reach-1	7572.894	2 year	1320.00	358.74	369.44		369.62	0.001028	875.69	329.63	0.23	3.84	0.50	0.53	0.44	0.13	0.14
Reach-1	7572.894	5 year	1813.00	358.74	370.37		370.56	0.001086	1193.79	355.53	0.24	4.23	0.64	0.66	0.52	0.18	0.19
Reach-1	7572.894	10 year	2267.00	358.74	371.14		371.34	0.001100	1473.88	375.88	0.25	4.49	0.73	0.74	0.57	0.23	0.23
Reach-1	7572.894	25 year	2950.00	358.74	372.25		372.45	0.001058	1909.49	405.51	0.25	4.72	0.83	0.84	0.61	0.27	0.28
Reach-1	7572.894	50 year	3523.00	358.74	373.35		373.53	0.000917	2373.05	434.83	0.24	4.68	0.87	0.87	0.58	0.28	0.28
Reach-1	7572.894	100 year	4138.00	358.74	374.63		374.78	0.000757	2948.48	467.96	0.22	4.54	0.88	0.87	0.53	0.28	0.27
Reach-1	7572.894	200 year	4867.00	358.74	376.03		376.17	0.000630	3629.77	501.22	0.20	4.42	0.90	0.87	0.48	0.27	0.26
Reach-1	7572.894	500 year	5923.00	358.74	377.37		377.51	0.000609	4323.54	539.74	0.20	4.61	0.98	0.90	0.51	0.30	0.27
Reach-1	7500	2 year	1320.00	358.50	369.25		369.51	0.001706	717.02	318.34	0.30	4.68	0.62	0.55	0.68	0.20	0.16
Reach-1	7500	5 year	1813.00	358.50	370.18		370.45	0.001681	1032.41	351.79	0.30	5.03	0.74	0.72	0.75	0.26	0.25
Reach-1	7500	10 year	2267.00	358.50	370.97		371.23	0.001588	1315.88	368.40	0.30	5.18	0.85	0.81	0.77	0.31	0.29
Reach-1	7500	25 year	2950.00	358.50	372.11		372.35	0.001428	1750.14	395.35	0.29	5.31	0.95	0.91	0.78	0.36	0.34
Reach-1	7500	50 year	3523.00	358.50	373.25		373.45	0.001149	2209.10	409.09	0.26	5.10	0.99	0.95	0.70	0.36	0.34
Reach-1	7500	100 year	4138.00	358.50	374.55		374.72	0.000900	2754.95	424.04	0.24	4.85	1.01	0.95	0.61	0.35	0.32
Reach-1	7500	200 year	4867.00	358.50	375.97		376.12	0.000734	3372.09	443.93	0.22	4.69	1.03	0.94	0.55	0.34	0.30
Reach-1	7500	500 year	5923.00	358.50	377.31		377.46	0.000705	3983.03	467.24	0.22	4.88	1.09	1.01	0.58	0.37	0.33
Reach-1	7000	2 year	1320.00	358.02	368.49		368.64	0.001589	991.54	340.00	0.27	4.20	0.75	0.72	0.56	0.26	0.25
Reach-1	7000	5 year	1813.00	358.02	369.48		369.62	0.001446	1334.92	352.03	0.26	4.34	0.87	0.84	0.58	0.32	0.30
Reach-1	7000	10 year	2267.00	358.02	370.32		370.45	0.001336	1632.54	360.32	0.25	4.44	0.95	0.92	0.59	0.36	0.34
Reach-1	7000	25 year	2950.00	358.02	371.53		371.65	0.001188	2077.78	376.28	0.24	4.53	1.04	0.99	0.59	0.39	0.37
Reach-1	7000	50 year	3523.00	358.02	372.78		372.89	0.000952	2561.76	390.54	0.22	4.37	1.05	1.00	0.53	0.38	0.35
Reach-1	7000	100 year	4138.00	358.02	374.18		374.28	0.000757	3120.15	406.34	0.20	4.20	1.05	0.98	0.47	0.36	0.32
Reach-1	7000	200 year	4867.00	358.02	375.67		375.75	0.000626	3733.44	418.34	0.19	4.10	1.06	0.99	0.43	0.35	0.31
Reach-1	7000	500 year	5923.00	358.02	377.02		377.11	0.000616	4305.35	430.52	0.19	4.31	1.14	1.06	0.46	0.39	0.35
Reach-1	6589	2 year	1320.00	357.62	368.02		368.12	0.001089	1116.74	301.26	0.23	3.63	0.82	0.59	0.41	0.27	0.16
Reach-1	6589	5 year	1813.00	357.62	369.02		369.13	0.001098	1423.86	314.81	0.23	3.94	0.95	0.70	0.47	0.34	0.21
Reach-1	6589	10 year	2267.00	357.62	369.88		369.99	0.001072	1695.66	321.61	0.23	4.14	1.03	0.80	0.50	0.38	0.26
Reach-1	6589	25 year	2950.00	357.62	371.12		371.23	0.001007	2103.23	334.34	0.23	4.34	1.12	0.89	0.53	0.42	0.30
Reach-1	6589	50 year	3523.00	357.62	372.45		372.55	0.000828	2553.83	342.71	0.21	4.24	1.13	0.93	0.49	0.41	0.31
Reach-1	6589	100 year	4138.00	357.62	373.91		374.00	0.000689	3069.80	362.68	0.20	4.17	1.14	0.92	0.45	0.39	0.29
Reach-1	6589	200 year	4867.00	357.62	375.44		375.52	0.000592	3635.23	377.33	0.19	4.14	1.15	0.94	0.43	0.39	0.29
Reach-1	6589	500 year	5923.00	357.62	376.78		376.87	0.000605	4148.98	390.49	0.19	4.43	1.24	1.02	0.48	0.43	0.32
Reach-1	5837	2 year	1320.00	357.14	366.99		367.22	0.001231	572.61	143.76	0.27	4.20	0.74	0.55	0.53	0.22	0.15
Reach-1	5837	5 year	1813.00	357.14	367.77		368.10	0.001581	693.62	159.66	0.31	5.08	0.87	0.69	0.75	0.32	0.23
Reach-1	5837	10 year	2267.00	357.14	368.52		368.91	0.001751	819.58	174.97	0.33	5.67	0.98	0.75	0.91	0.40	0.27
Reach-1	5837	25 year	2950.00	357.14	369.77		370.20	0.001708	1045.26	185.90	0.34	6.10	1.14	0.80	1.01	0.50	0.29
Reach-1	5837	50 year	3523.00	357.14	371.32		371.71	0.001358	1348.32	203.82	0.31	5.98	1.16	0.83	0.92	0.48	0.29
Reach-1	5837	100 year	4138.00	357.14	372.95		373.31	0.001101	1695.05	223.78	0.28	5.86	1.16	0.85	0.85	0.46	0.29
Reach-1	5837	200 year	4867.00	357.14	374.58		374.92	0.000945	2077.04	243.23	0.27	5.86	1.18	0.88	0.82	0.45	0.29
Reach-1	5837	500 year	5923.00	357.14	375.86		376.25	0.000990	2398.14	257.92	0.28	6.34	1.31	0.90	0.93	0.53	0.31
Reach-1	5764.549	2 year	1320.00	357.06	367.05		367.12	0.000397	599.53	94.09	0.15	2.20			0.15		
Reach-1	5764.549	5 year	1813.00	357.06	367.86		367.97	0.000532	677.91	98.90	0.18	2.67			0.22		
Reach-1	5764.549	10 year	2267.00	357.06	368.63		368.77	0.000601	756.34	105.95	0.19	3.00	0.10		0.27	0.01	
Reach-1	5764.549	25 year	2950.00	357.06	369.88		370.05	0.000621	897.53	119.50	0.20	3.34	0.23		0.32	0.03	
Reach-1	5764.549	50 year	3523.00	357.06	371.42		371.59	0.000512	1094.78	138.62	0.19	3.36	0.31	0.14	0.30	0.05	0.02
Reach-1	5764.549	100 year	4138.00	357.06	373.03		373.21	0.000423	1336.47	160.96	0.17	3.38	0.36	0.24	0.29	0.06	0.03
Reach-1	5764.549	200 year	4867.00	357.06	374.65		374.83	0.000373	1617.33	188.74	0.17	3.46	0.39	0.31	0.29	0.07	0.05
Reach-1	5764.549	500 year	5923.00	357.06	375.94		376.16	0.000398	1879.05	217.62	0.18	3.80	0.44	0.38	0.34	0.08	0.07
Reach-1	5500	2 year	1320.00	356.20	366.76		366.95	0.001189	808.50	251.13	0.25	4.11	0.72	0.51	0.51	0.23	0.14
Reach-1	5500	5 year	1813.00	356.20	367.50		367.75	0.001462	1004.45	273.13	0.28	4.81	0.91	0.64	0.68	0.34	0.20
Reach-1	5500	10 year	2267.00	356.20	368.27		368.52	0.001508	1216.61	282.53	0.28	5.15	1.03	0.77	0.76	0.41	0.27
Reach-1	5500	25 year	2950.00	356.20	369.57		369.82	0.001376	1598.78	311.49	0.28	5.32	1.12	0.90	0.78	0.46	0.31
Reach-1	5500	50 year	3523.00	356.20	371.21		371.41	0.001007	2132.17	337.93	0.24	4.98	1.09	0.90	0.65	0.41	0.31
Reach-1	5500	100 year	4138.00	356.20	372.89		373.06	0.000777	2729.71	375.02	0.22	4.74	1.04	0.91	0.57	0.35	0.29
Reach-1	5500	200 year	4867.00	356.20	374.56		374.70	0.000634	3375.92	401.70	0.20	4.59	1.01	0.94	0.51	0.32	0.29
Reach-1	5500	500 year	5923.00	356.20	375.86		376.01	0.000636	3908.17	414.05	0.20	4.84	1.10	1.03	0.56	0.37	0.33
Reach-1	5047	2 year	1320.00	355.65	366.45		366.55	0.000613	1019.69	182.08	0.18	3.23	0.61	0.73	0.30	0.15	0.20
Reach-1	5047	5 year	1813.00	355.65	367.07		367.21	0.000880	1133.68	186.08	0.22	4.03	0.77	0.94	0.46	0.24	0.31
Reach-1	5047	10 year	2267.00	355.65	367.76		367.94	0.001040	1264.86	192.45	0.24	4.57	0.88	1.08	0.58	0.30	0.41
Reach-1	5047	25 year	2950.00	355.65	369.05		369.26	0.001092	1517.74	201.39	0.25	5.04	0.99	1.23	0.68	0.36	0.50
Reach-1	5047	50 year	3523.00	355.65	370.79		370.99	0.000886	1880.62	215.08	0.23	4.96	0.97	1.25	0.63	0.33	0.48
Reach-1	5047	100 year	4138.00	355.65	372.53		372.71	0.000750	2267.25	231.78	0.22	4.93	0.93	1.27	0.60	0.30	0.47
Reach-1	5047	200 year	4867.00	355.65	374.22		374.40	0.000673	2669.89	243.19	0.21	5.00	0.97	1.30	0.59	0.31	0.48
Reach-1	5047	500 year	5923.00	355.65	375.48		375.69	0.000746	2981.95	253.96	0.22	5.51	1.06	1.45	0.70	0.36	0.58
Reach-1	4926.686	2 year	1320.00	355.20	366.38	358.79	366.49	0.000338	605.41	82.47	0.15	2.80	0.35	0.46	0.21	0.06	0.09
Reach-1	4926.686	5 year	1813.00	355.20	366.94	359.60	367.13	0.000532	652.50	85.34	0.19	3.63	0.45	0.61	0.35	0.09	0.15
Reach-1	4926.686	10 year	2267.00	355.20	367.57	360.22	367.84	0.000683	707.74	88.59	0.22	4.27	0.54	0.73	0.47	0.13	0.20
Reach-1	4926.686	25 year	2950.00	355.20	368.77	361.15	369.13	0.000818	818.01	94.75	0.24	4.98	0.65	0.88	0.62	0.18	0.28
Reach-1	4926.686	50 year	3523.00	355.20	370.49	361.87	370.87	0.000749	989.02	106.21	0.24	5.18	0.68	0.92	0.64	0.18	0.29
Reach-1	4926.686	100 year	4138.00	355.20	372.20	362.55	372.60	0.000695	1184.28	122.53	0.23	5.37	0.68	0.96	0.66	0.18	0.30
Reach-1	4926.686	200 year	4867.00	355.20	373.85	363.31	374.30	0.000680	1404.26	144.94	0.23	5.65	0.70	0.97	0.71	0.19	0.31
Reach-1	4926.686	500 year	5923.00	355.20	375.01	364.33	375.57	0.000807	1583.33	167.55	0.26	6.42	0.78	1.04	0.90	0.23	0.36
Reach-1	4926		Inl Struct														
Reach-1	4801.57	2 year	1320.00	354.80	365.94		366.05	0.000465	529.53	90.58	0.16	2.75		0.27	0.22		0.04
Reach-1	4801.57	5 year	1813.00	354.80	366.07		366.28	0.000840	541.79	92.64	0.22	3.71		0.37	0.40		0.08
Reach-1	4801.57	10 year	2267.00	354.80	366.23		366.55	0.001245	557.13	95.16	0.27	4.55		0.47	0.60		0.12

HEC-RAS Plan: Close River: Berry Creek Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Flow Area	Top Width	Froude # Chl	Vel Chnl	Vel Left	Vel Right	Shear Chan	Shear LOB	Shear ROB
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(sq ft)	(ft)		(ft/s)	(ft/s)	(ft/s)	(lb/sq ft)	(lb/sq ft)	(lb/sq ft)
Reach-1	4801.57	25 year	2950.00	354.80	366.55		367.04	0.001906	587.79	100.00	0.33	5.71		0.62	0.94		0.20
Reach-1	4801.57	50 year	3523.00	354.80	366.87		367.52	0.002455	620.55	106.37	0.37	6.57		0.73	1.23		0.28
Reach-1	4801.57	100 year	4138.00	354.80	367.25		368.08	0.002981	662.70	114.00	0.41	7.39		0.85	1.54		0.36
Reach-1	4801.57	200 year	4867.00	354.80	367.72		368.74	0.003504	718.31	122.71	0.45	8.25	0.15	0.98	1.90	0.03	0.47
Reach-1	4801.57	500 year	5923.00	354.80	368.43		369.72	0.004074	809.90	134.10	0.49	9.30	0.34	1.17	2.36	0.10	0.64
Reach-1	4500	2 year	1320.00	352.82	365.92		365.95	0.000158	2071.43	336.01	0.10	2.03	0.31	0.43	0.11	0.04	0.06
Reach-1	4500	5 year	1813.00	352.82	366.04		366.10	0.000283	2113.10	339.52	0.14	2.74	0.41	0.58	0.19	0.06	0.12
Reach-1	4500	10 year	2267.00	352.82	366.20		366.28	0.000420	2165.27	342.09	0.17	3.37	0.49	0.72	0.29	0.10	0.17
Reach-1	4500	25 year	2950.00	352.82	366.51		366.63	0.000628	2271.27	344.49	0.21	4.19	0.62	0.90	0.45	0.16	0.27
Reach-1	4500	50 year	3523.00	352.82	366.83		366.99	0.000789	2383.65	346.93	0.23	4.77	0.73	1.04	0.58	0.21	0.36
Reach-1	4500	100 year	4138.00	352.82	367.23		367.43	0.000935	2524.21	350.04	0.26	5.31	0.83	1.17	0.70	0.27	0.44
Reach-1	4500	200 year	4867.00	352.82	367.74		367.97	0.001076	2704.20	354.47	0.28	5.84	0.94	1.30	0.84	0.33	0.54
Reach-1	4500	500 year	5923.00	352.82	368.54		368.81	0.001222	2987.45	361.99	0.30	6.46	1.08	1.46	1.01	0.42	0.66
Reach-1	3920	2 year	1320.00	349.91	365.88		365.89	0.000066	2808.04	377.46	0.07	1.43	0.29	0.29	0.05	0.03	0.03
Reach-1	3920	5 year	1813.00	349.91	365.97		366.00	0.000121	2841.88	377.94	0.09	1.94	0.39	0.39	0.09	0.05	0.05
Reach-1	3920	10 year	2267.00	349.91	366.08		366.13	0.000181	2885.78	378.55	0.11	2.39	0.49	0.48	0.14	0.08	0.08
Reach-1	3920	25 year	2950.00	349.91	366.33		366.40	0.000281	2979.77	380.18	0.14	3.02	0.62	0.61	0.22	0.13	0.12
Reach-1	3920	50 year	3523.00	349.91	366.61		366.70	0.000365	3084.39	381.79	0.16	3.48	0.72	0.70	0.30	0.17	0.16
Reach-1	3920	100 year	4138.00	349.91	366.96		367.08	0.000449	3220.08	383.74	0.18	3.92	0.82	0.79	0.37	0.22	0.21
Reach-1	3920	200 year	4867.00	349.91	367.42		367.56	0.000537	3397.55	387.24	0.20	4.38	0.93	0.88	0.46	0.28	0.25
Reach-1	3920	500 year	5923.00	349.91	368.16		368.33	0.000636	3684.29	391.44	0.22	4.93	1.07	0.99	0.57	0.35	0.32
Reach-1	3500	2 year	1805.00	347.41	365.85		365.87	0.000048	3996.18	519.79	0.06	1.36	0.24	0.27	0.04	0.02	0.02
Reach-1	3500	5 year	2618.00	347.41	365.92		365.95	0.000098	4028.33	522.03	0.09	1.96	0.34	0.39	0.09	0.04	0.05
Reach-1	3500	10 year	3396.00	347.41	366.00		366.05	0.000161	4070.48	523.93	0.11	2.52	0.44	0.50	0.15	0.07	0.08
Reach-1	3500	25 year	4666.00	347.41	366.17		366.27	0.000289	4162.14	527.17	0.15	3.39	0.60	0.68	0.27	0.12	0.15
Reach-1	3500	50 year	5791.00	347.41	366.37		366.51	0.000421	4266.44	533.59	0.18	4.12	0.74	0.81	0.39	0.18	0.21
Reach-1	3500	100 year	7030.00	347.41	366.63		366.83	0.000578	4405.60	537.71	0.21	4.89	0.87	0.97	0.55	0.25	0.30
Reach-1	3500	200 year	8463.00	347.41	366.98		367.25	0.000755	4597.01	541.89	0.24	5.66	1.02	1.13	0.73	0.34	0.40
Reach-1	3500	500 year	10509.00	347.41	367.58		367.94	0.000983	4923.60	549.86	0.27	6.60	1.22	1.34	0.99	0.48	0.55
Reach-1	3000	2 year	1915.00	346.00	365.85		365.85	0.000021	7227.97	786.92	0.04	0.96	0.16	0.20	0.02	0.01	0.01
Reach-1	3000	5 year	2805.00	346.00	365.90		365.91	0.000044	7270.11	787.61	0.06	1.39	0.23	0.30	0.04	0.02	0.03
Reach-1	3000	10 year	3660.00	346.00	365.97		365.99	0.000073	7325.45	788.53	0.07	1.80	0.29	0.39	0.07	0.03	0.04
Reach-1	3000	25 year	5051.00	346.00	366.12		366.16	0.000134	7446.31	790.51	0.10	2.45	0.40	0.53	0.14	0.05	0.08
Reach-1	3000	50 year	6281.00	346.00	366.30		366.35	0.000197	7584.83	792.78	0.12	2.99	0.49	0.64	0.20	0.08	0.12
Reach-1	3000	100 year	7635.00	346.00	366.53		366.60	0.000272	7771.17	795.82	0.14	3.54	0.59	0.77	0.28	0.12	0.17
Reach-1	3000	200 year	9196.00	346.00	366.86		366.95	0.000360	8029.96	800.02	0.17	4.12	0.69	0.90	0.38	0.16	0.24
Reach-1	3000	500 year	11417.00	346.00	367.42		367.54	0.000477	8479.34	807.27	0.19	4.84	0.83	1.07	0.52	0.22	0.33
Reach-1	2500	2 year	1915.00	345.00	365.83		365.84	0.000027	3912.27	385.32	0.05	1.06	0.17	0.23	0.03	0.01	0.02
Reach-1	2500	5 year	2805.00	345.00	365.86		365.88	0.000057	3924.32	385.78	0.07	1.54	0.24	0.34	0.05	0.02	0.03
Reach-1	2500	10 year	3660.00	345.00	365.90		365.94	0.000096	3940.30	386.39	0.09	2.01	0.32	0.44	0.09	0.04	0.06
Reach-1	2500	25 year	5051.00	345.00	365.99		366.07	0.000178	3975.80	387.74	0.12	2.75	0.44	0.60	0.17	0.07	0.11
Reach-1	2500	50 year	6281.00	345.00	366.10		366.23	0.000269	4017.54	389.33	0.15	3.39	0.54	0.75	0.26	0.10	0.16
Reach-1	2500	100 year	7635.00	345.00	366.25		366.43	0.000384	4075.46	391.52	0.18	4.07	0.65	0.90	0.38	0.15	0.24
Reach-1	2500	200 year	9196.00	345.00	366.46		366.72	0.000529	4159.43	394.62	0.21	4.83	0.77	1.06	0.53	0.20	0.33
Reach-1	2500	500 year	11417.00	345.00	366.85		367.22	0.000745	4314.98	400.47	0.25	5.82	0.93	1.28	0.76	0.30	0.48
Reach-1	2261.414	2 year	1915.00	344.17	365.78	349.82	365.83	0.000061	1484.86	121.05	0.07	1.72	0.27	0.26	0.07	0.02	0.02
Reach-1	2261.414	5 year	2805.00	344.17	365.77	351.02	365.86	0.000131	1482.61	120.97	0.10	2.53	0.40	0.38	0.14	0.05	0.05
Reach-1	2261.414	10 year	3660.00	344.17	365.74	352.04	365.90	0.000224	1479.62	120.86	0.13	3.30	0.52	0.49	0.24	0.09	0.08
Reach-1	2261.414	25 year	5051.00	344.17	365.68	353.44	365.99	0.000432	1472.90	120.62	0.19	4.57	0.72	0.68	0.46	0.18	0.16
Reach-1	2261.414	50 year	6281.00	344.17	365.62	354.48	366.10	0.000676	1464.94	120.34	0.23	5.71	0.90	0.85	0.72	0.27	0.25
Reach-1	2261.414	100 year	7635.00	344.17	365.53	355.54	366.24	0.001017	1453.71	119.94	0.29	6.98	1.09	1.03	1.08	0.41	0.37
Reach-1	2261.414	200 year	9196.00	344.17	365.39	356.69	366.44	0.001516	1437.14	119.35	0.35	8.48	1.32	1.25	1.60	0.60	0.55
Reach-1	2261.414	500 year	11417.00	344.17	365.12	358.20	366.80	0.002465	1405.02	118.19	0.45	10.71	1.66	1.57	2.57	0.96	0.88
Reach-1	2260		Bridge														
Reach-1	2000	2 year	1915.00	343.50	365.81		365.81	0.000011	6201.55	513.51	0.03	0.73	0.15	0.17	0.01	0.01	0.01
Reach-1	2000	5 year	2805.00	343.50	365.82		365.83	0.000023	6205.92	513.56	0.04	1.07	0.22	0.24	0.03	0.01	0.02
Reach-1	2000	10 year	3660.00	343.50	365.83		365.85	0.000038	6211.65	513.63	0.06	1.40	0.29	0.32	0.04	0.02	0.03
Reach-1	2000	25 year	5051.00	343.50	365.85		365.89	0.000072	6224.14	513.79	0.08	1.93	0.40	0.44	0.08	0.05	0.05
Reach-1	2000	50 year	6281.00	343.50	365.88		365.94	0.000111	6238.49	513.97	0.10	2.39	0.49	0.54	0.12	0.07	0.08
Reach-1	2000	100 year	7635.00	343.50	365.92		366.00	0.000163	6257.79	514.22	0.12	2.90	0.60	0.66	0.18	0.10	0.12
Reach-1	2000	200 year	9196.00	343.50	365.97		366.09	0.000234	6284.57	514.55	0.14	3.48	0.72	0.79	0.26	0.15	0.17
Reach-1	2000	500 year	11417.00	343.50	366.06		366.24	0.000354	6330.73	515.13	0.17	4.29	0.89	0.97	0.40	0.23	0.26
Reach-1	1500	2 year	1915.00	343.10	365.80		365.81	0.000010	7771.67	587.07	0.03	0.68	0.16	0.17	0.01	0.01	0.01
Reach-1	1500	5 year	2805.00	343.10	365.81		365.82	0.000021	7774.97	587.09	0.04	0.99	0.24	0.25	0.02	0.02	0.02
Reach-1	1500	10 year	3660.00	343.10	365.82		365.83	0.000036	7779.30	587.12	0.05	1.29	0.31	0.33	0.04	0.03	0.03
Reach-1	1500	25 year	5051.00	343.10	365.83		365.86	0.000068	7788.76	587.18	0.07	1.78	0.43	0.45	0.07	0.05	0.05
Reach-1	1500	50 year	6281.00	343.10	365.85		365.89	0.000105	7799.64	587.26	0.09	2.21	0.53	0.56	0.11	0.08	0.08
Reach-1	1500	100 year	7635.00	343.10	365.88		365.93	0.000154	7814.30	587.36	0.11	2.68	0.64	0.68	0.16	0.11	0.12
Reach-1	1500	200 year	9196.00	343.10	365.91		365.99	0.000222	7834.70	587.50	0.13	3.22	0.77	0.81	0.23	0.17	0.18
Reach-1	1500	500 year	11417.00	343.10	365.97		366.09	0.000337	7870.05	587.74	0.17	3.98	0.95	1.01	0.35	0.25	0.27
Reach-1	1000	2 year	1915.00	342.80	365.80		365.80	0.000007	9530.96	908.70	0.02	0.55	0.13	0.11	0.01	0.00	0.00
Reach-1	1000	5 year	2805.00	342.80	365.80		365.81	0.000015	9532.65	908.72	0.03	0.80	0.19	0.16	0.01	0.01	0.01
Reach-1	1000	10 year	3660.00	342.80	365.81		365.82	0.000025	9534.81	908.74	0.05	1.05	0.25	0.21	0.03	0.02	0.01
Reach-1	1000	25 year	5051.00	342.80	365.81		365.83	0.000048	9539.61	908.78	0.06	1.45	0.35	0.30	0.05	0.03	0.03
Reach-1	1000	50 year	6281.00	342.80	365.82		365.84	0.000074	9545.13	908.83	0.08	1.80	0.43	0.37	0.07	0.05	0.04
Reach-1	1000	100 year	7635.00	342.80	365.83		365.87	0.000109	9552.59	908.89	0.09	2.19	0.52	0.45	0.11	0.08	0.06
Reach-1	1000	200 year	9196.00	342.80	365.84		365.90	0.000157	9563.02	908.98	0.11	2.63	0.63	0.54	0.16	0.11	0.09
Reach-1	1000	500 year	11417.00	342.80	365.86		365.95	0.000241	9581.25	909.14	0.14	3.26	0.78	0.67	0.24	0.17	0.14
Reach-1	500	2 year	1915.00	342.40	365.80	348.25	365.80	0.000004	16584.91	2312.82	0.02	0.46	0.07	0.07	0.00	0.00	0.00
Reach-1	500	5 year	2805.00	342.40	365.80	349.30	365.80	0.000009	16584.91	2312.82	0.03	0.67	0.11	0.11	0.01	0.00	0.00
Reach-1	500	10 year	3660.00	342.40	365.80	350.16	365.81	0.000016	16584.91	2312.82	0.04	0.88	0.14	0.14	0.02	0.01	0.01
Reach-1	500	25 year	5051.00	342.40	365.80	351.39	365.81	0.000030	16584.91	2312.82	0.05	1.21	0.19	0.19	0.03	0.01	0.01
Reach-1	500	50 year	6281.00	342.40	365.80	352.35	365.82	0.000046	16584.91	2312.82	0.06	1.51	0.24	0.24	0.05	0.02	0.02
Reach-1	500	100 year	7635.00	342.40	365.80	353.09	365.82	0.000068	16584.91	2312.82	0.08	1.83	0.29	0.29	0.07	0.03	0.03
Reach-1	500	200 year	9196.00	342.40	365.80	353.83	365.83	0.000098	16584.91	2312.82	0.09	2.21	0.35	0.35	0.11	0.04	0.04
Reach-1	500	500 year	11417.00	342.40	365.80	354.70	365.85	0.000151	16584.91	2312.82	0.11	2.74	0.43	0.43	0.17	0.06	0.06


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
2.5 ft/s
3.0 ft/s
3.5 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
370
380
390
400
410
420
Station (ft)
0
200
400
600
800
1000
1200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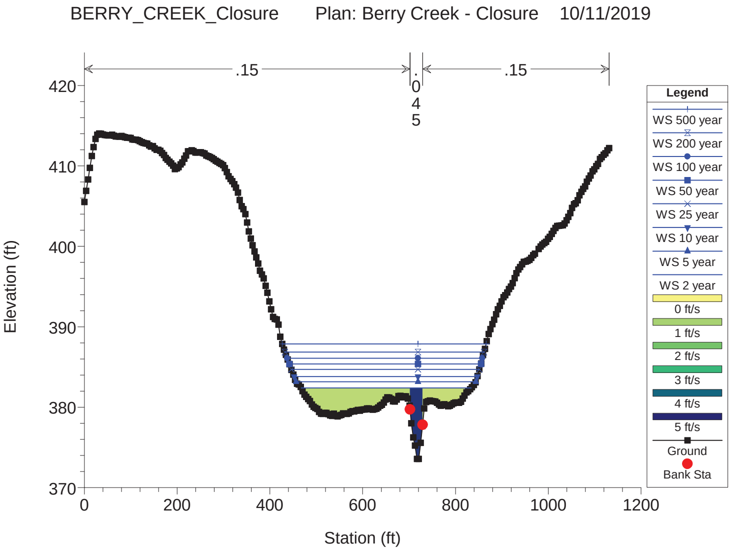
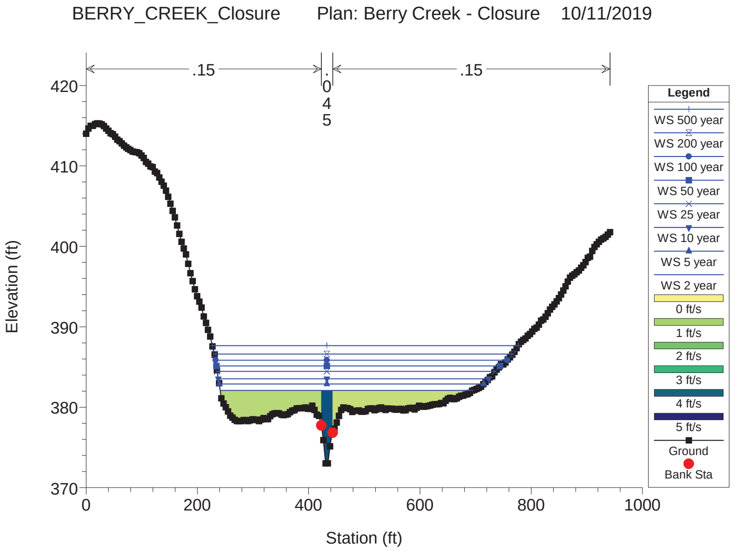
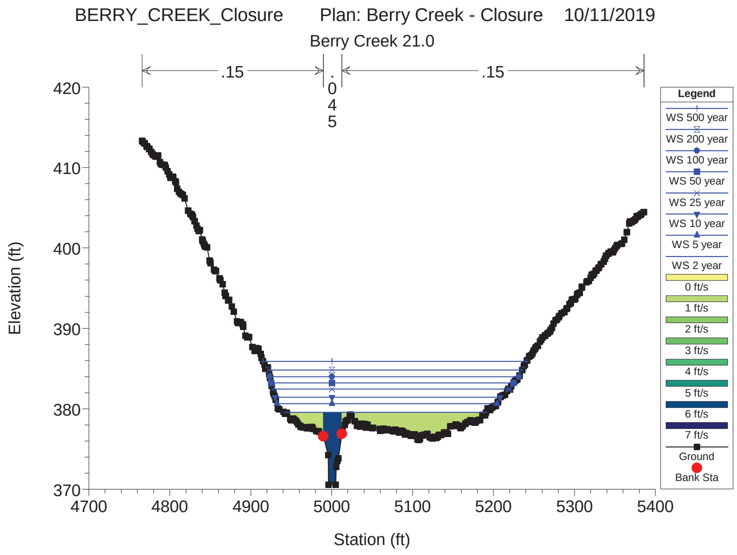
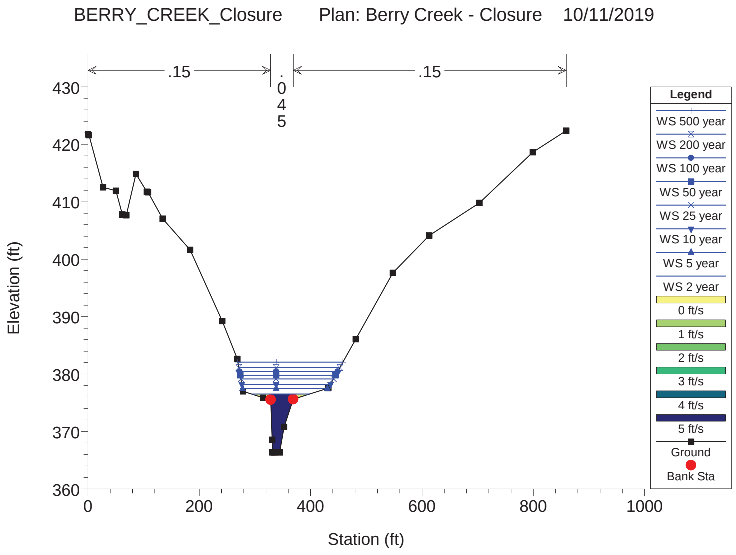
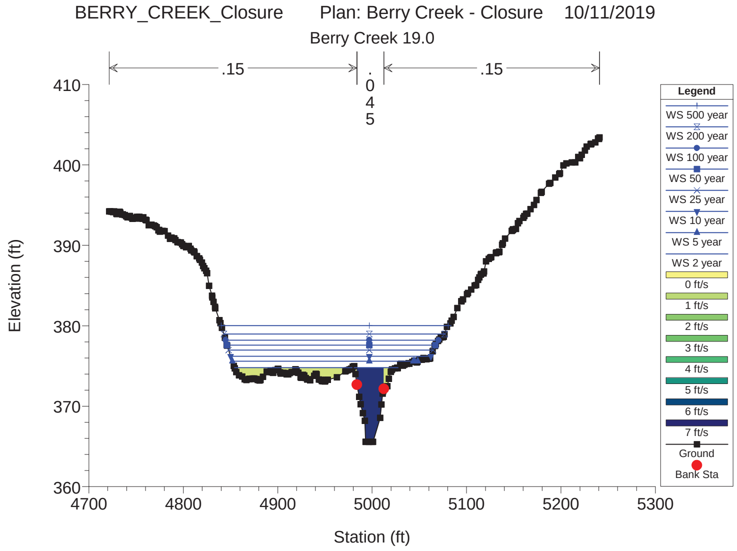
.15
.045
.15
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
370
380
390
400
410
420
Station (ft)
0
200
400
600
800
1000
1200


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
Elevation (ft)
370
380
390
400
410
420
Station (ft)
0
200
400
600
800
1000
1200


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta
Elevation (ft)
370
380
390
400
410
420
Station (ft)
0
200
400
600
800
1000


BERRY_CREEK_Closure
Plan: Berry Creek - Closure
10/11/2019
Berry Creek 21.0
.15
.045
.15
Elevation (ft)
420
410
400
390
380
370
4700
4800
4900
5000
5100
5200
5300
5400
Station (ft)
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta


BERRY_CREEK_Closure
Plan: Berry Creek - Closure
10/11/2019
.15
.045
.15
Elevation (ft)
430
420
410
400
390
380
370
360
0
200
400
600
800
1000
Station (ft)
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta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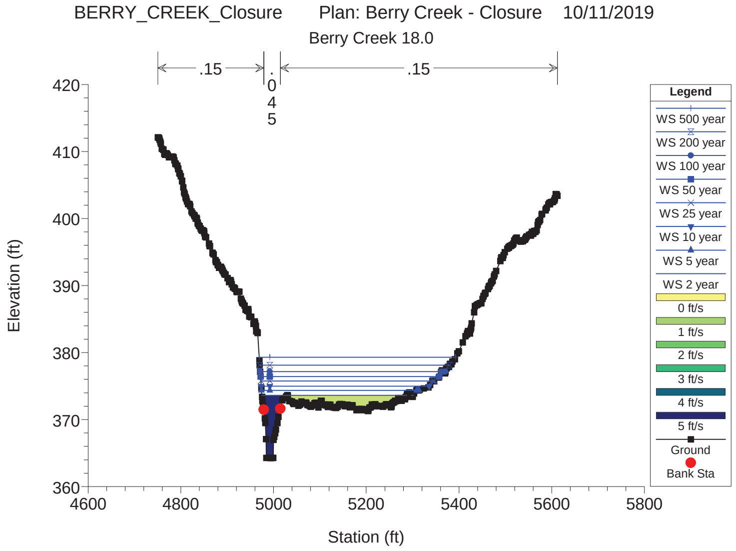
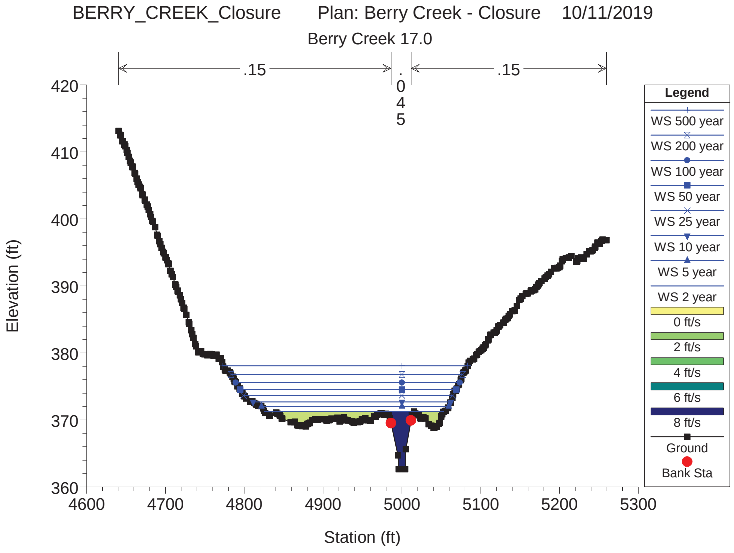
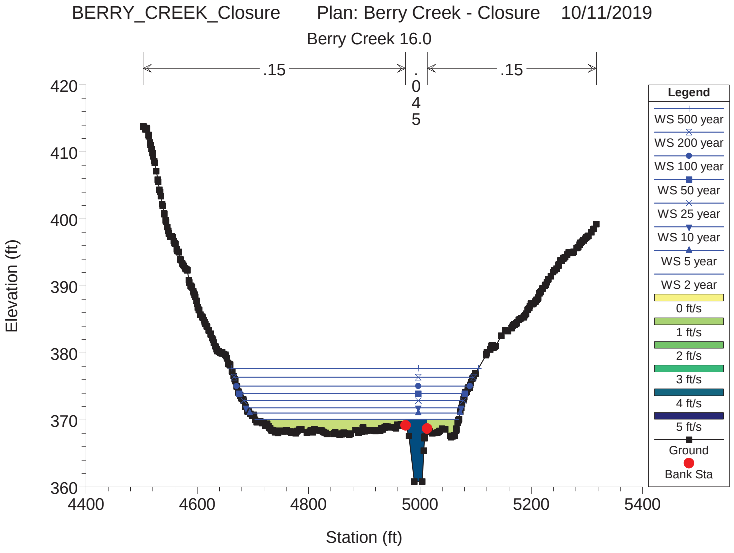
Plan: Berry Creek - Closure
10/11/2019
Berry Creek 19.0
.15
.045
.15
Elevation (ft)
410
400
390
380
370
360
4700
4800
4900
5000
5100
5200
5300
Station (ft)
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Bank Sta

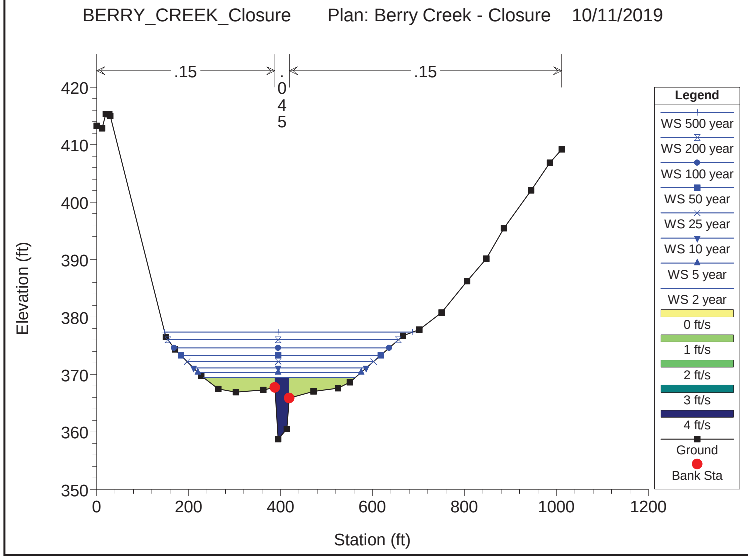

BERRY_CREEK_Closure
Plan: Berry Creek - Closure
10/11/2019
Berry Creek 18.0
.15
.045
.15
Elevation (ft)
420
410
400
390
380
370
360
4600
4800
5000
5200
5400
5600
5800
Station (ft)
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
Ground
Bank Sta

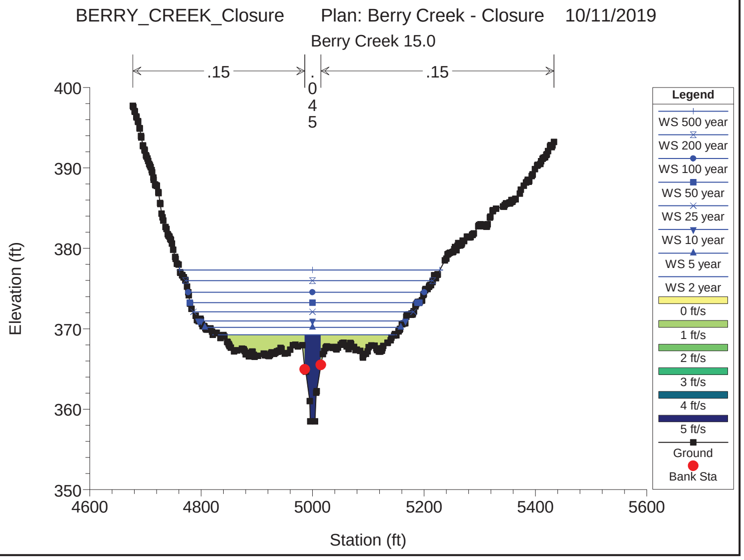

BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

Berry Creek 17.0


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

Berry Creek 16.0

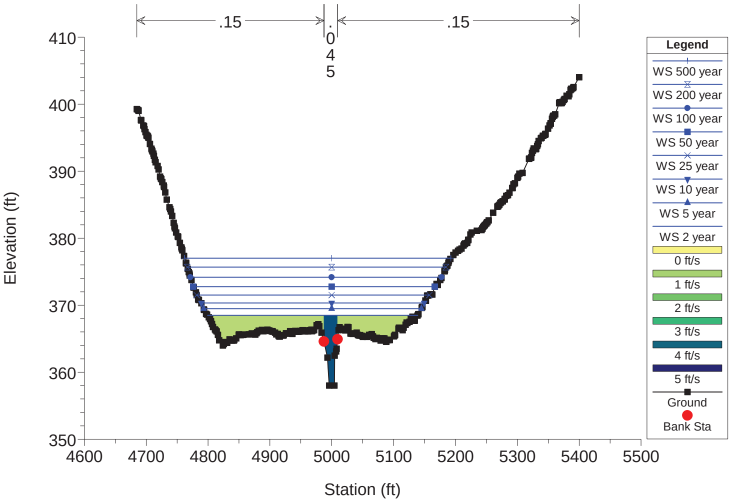

BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

Berry Creek 15.0

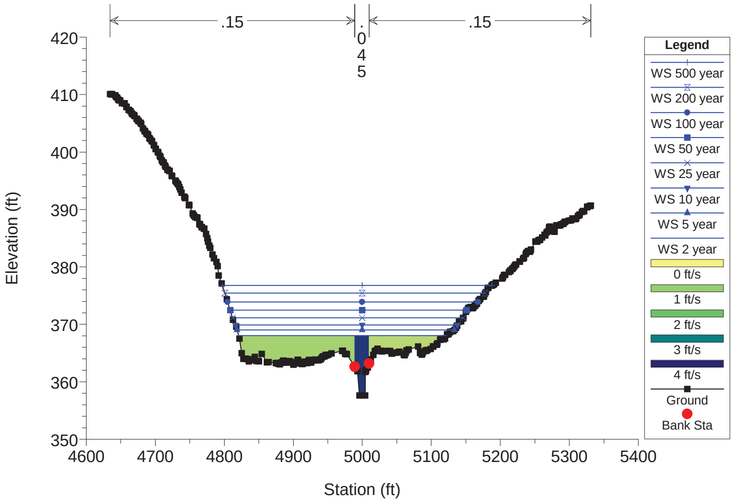
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

Berry Creek 14.0



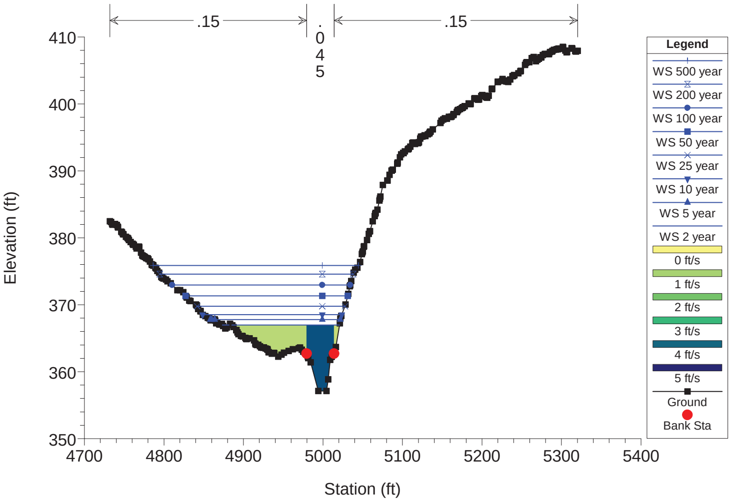
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

Berry Creek 13.0

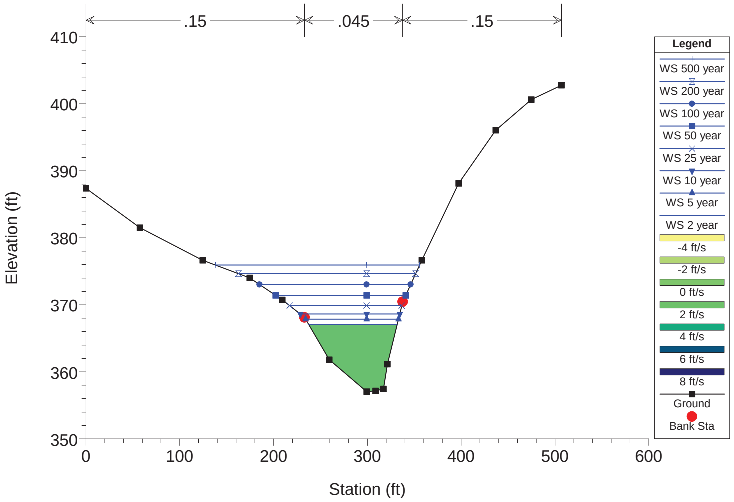


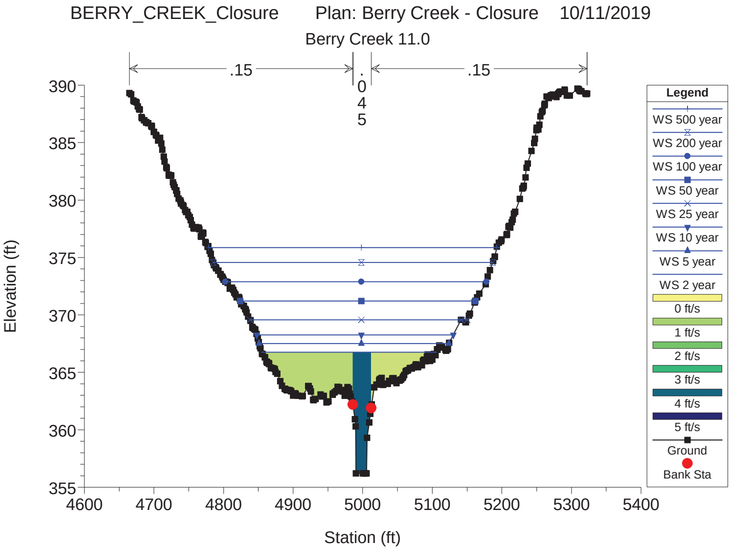
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

Berry Creek 12.0



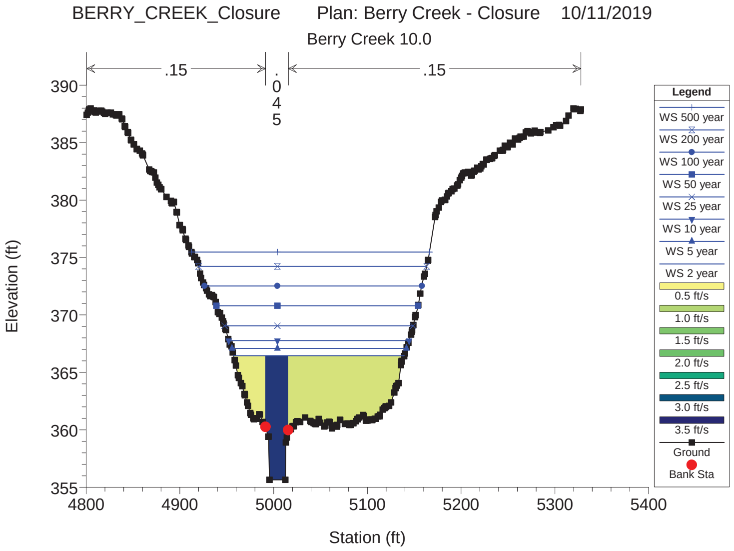
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019





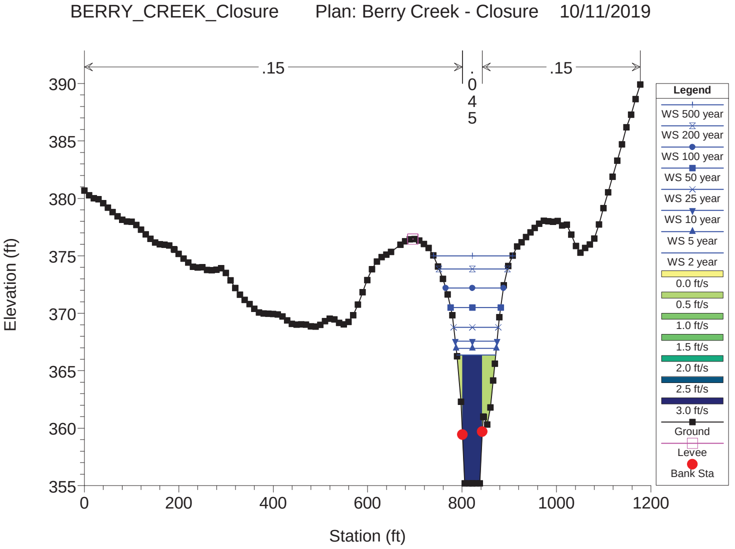
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

Berry Creek 11.0

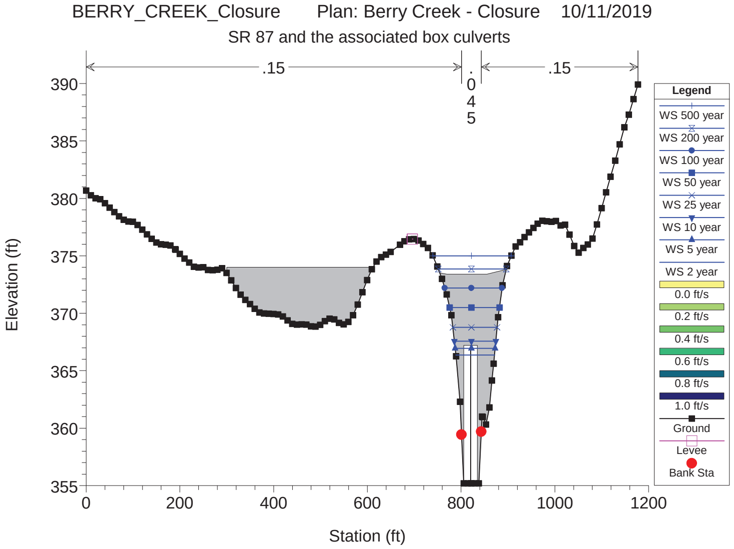


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

Berry Creek 10.0

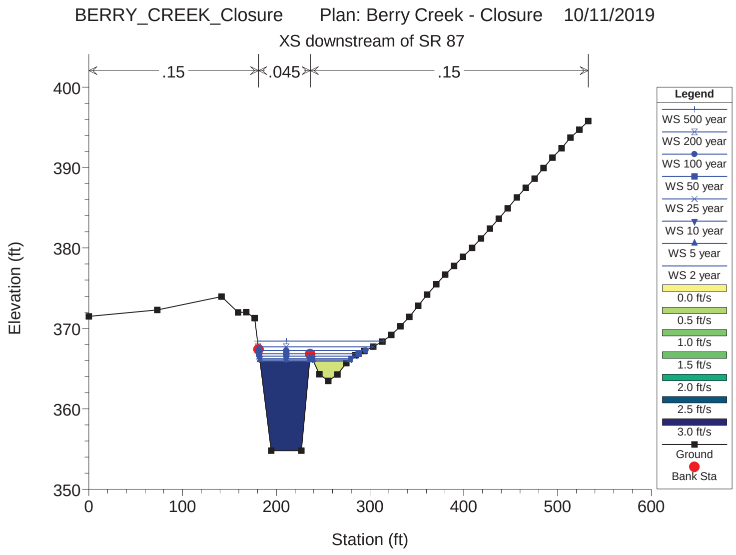


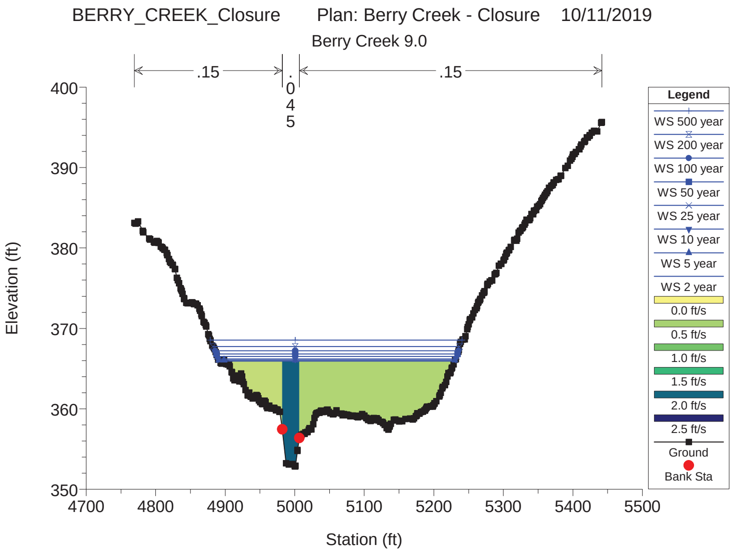
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

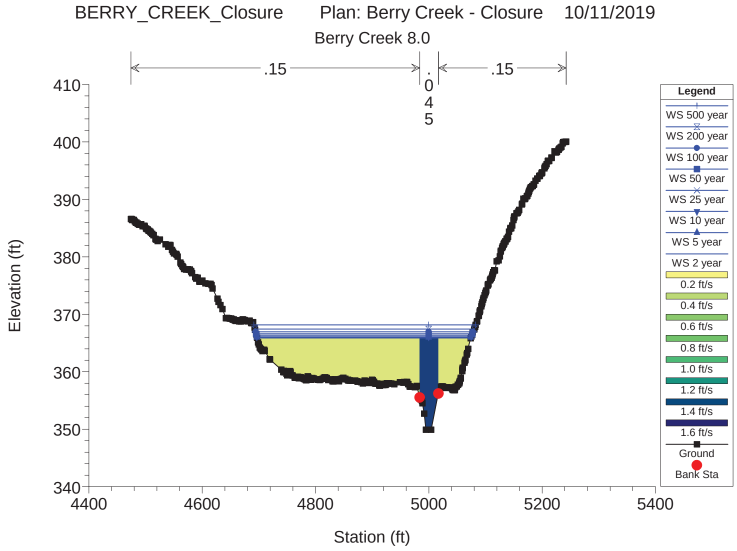


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019

SR 87 and the associated box culverts


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
XS downstream of SR 87


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
Berry Creek 9.0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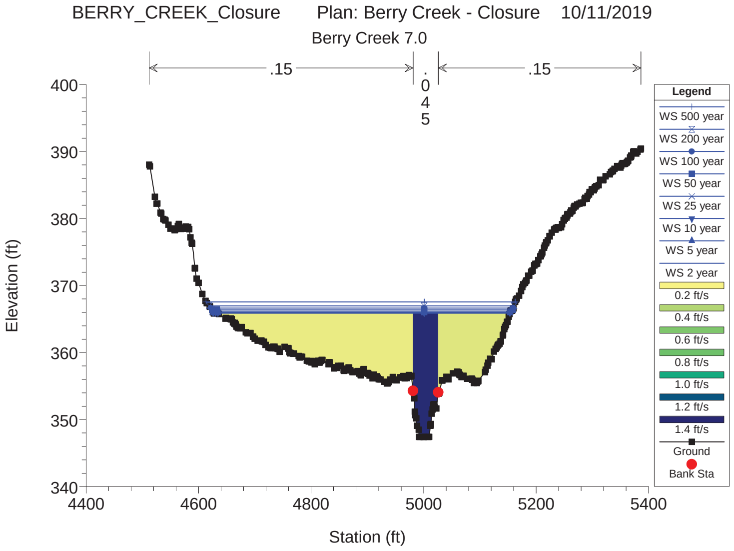
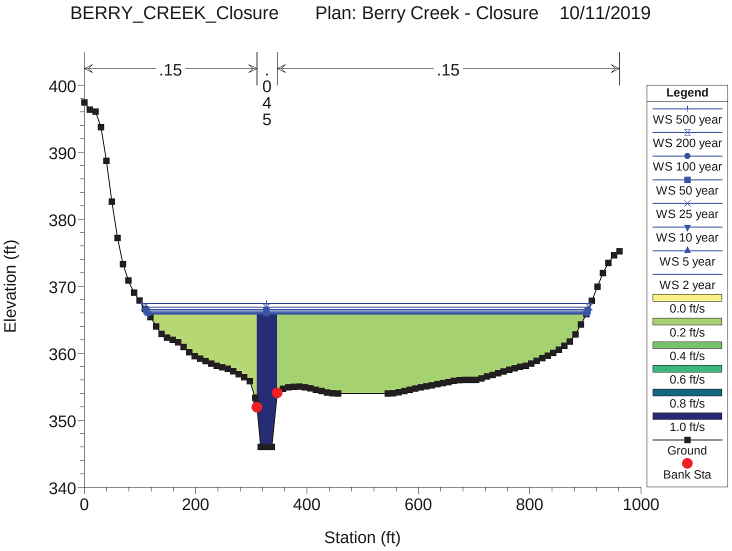
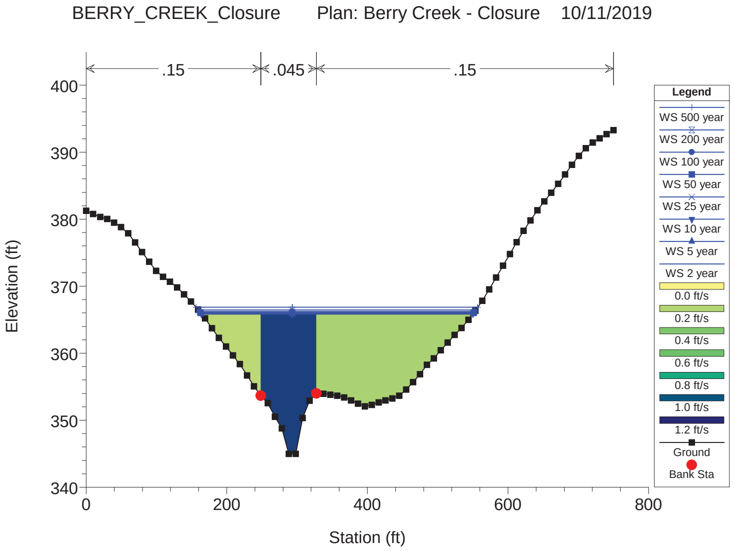
Berry Creek 8.0


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
Berry Creek 7.0


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Elevation (ft)
400
390
380
370
360
350
340
0
200
400
600
800
1000
Station (ft)
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
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Elevation (ft)
400
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370
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340
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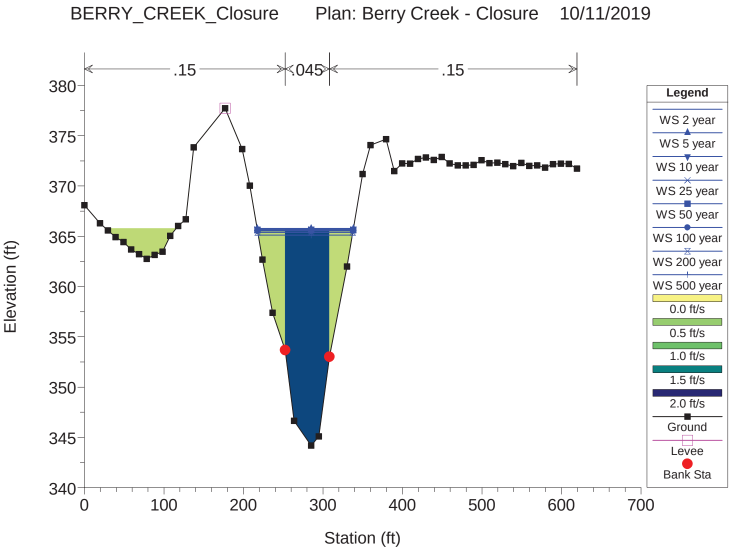
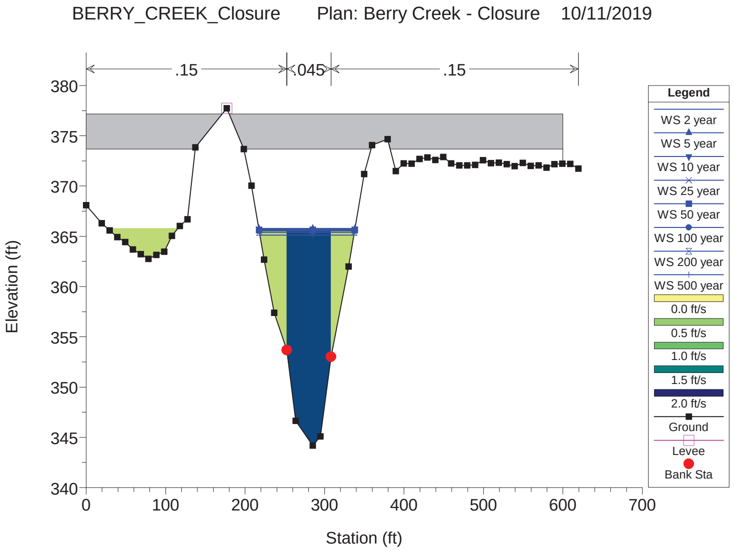
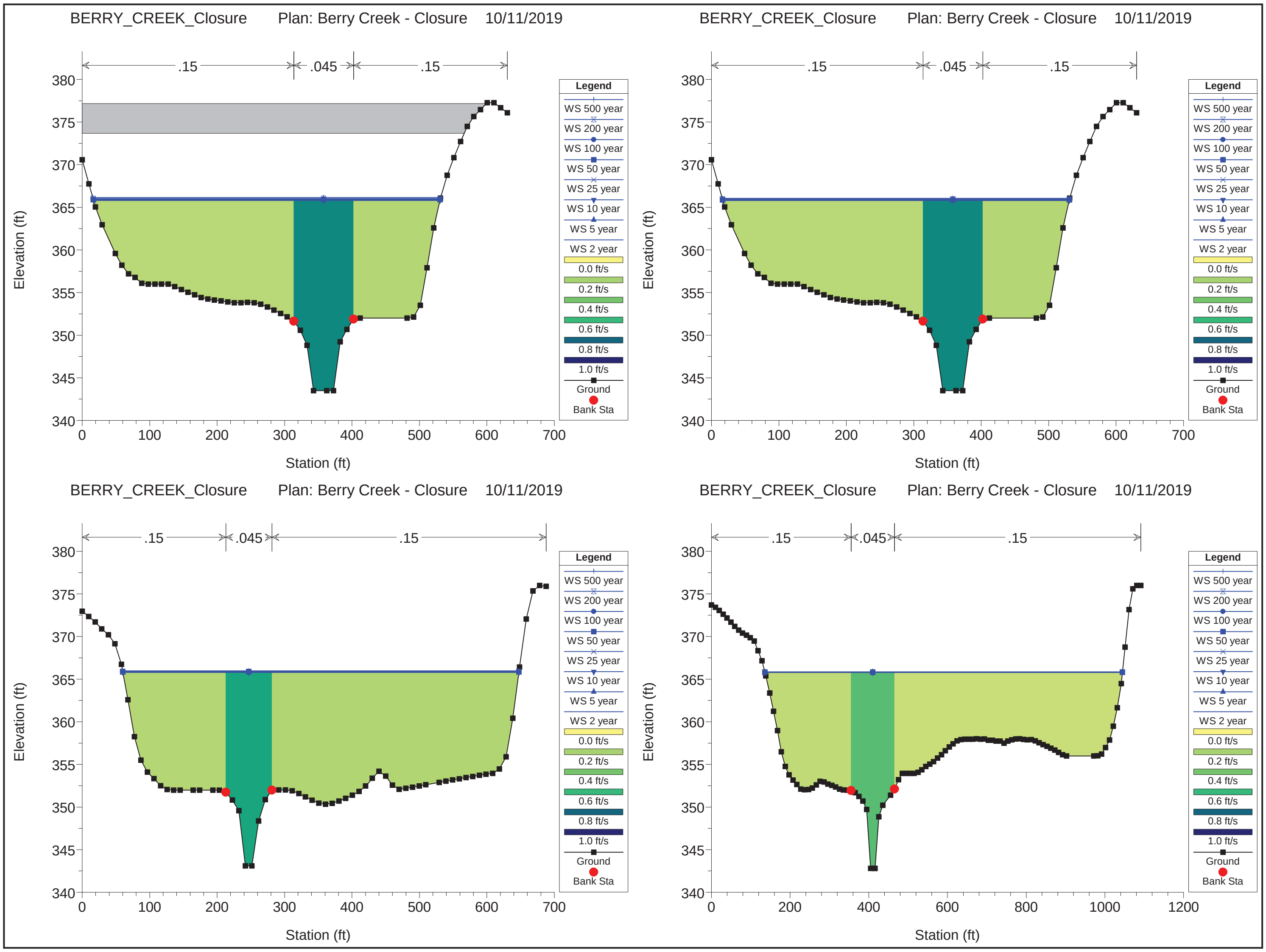
400
600
800
Station (ft)
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
1.2 ft/s
Ground
Bank Sta


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Elevation (ft)
380
375
370
365
360
355
350
345
340
0
100
200
300
400
500
600
700
Station (ft)
Legend
WS 2 year
WS 5 year
WS 10 year
WS 25 year
WS 50 year
WS 100 year
WS 200 year
WS 500 year
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Levee
Bank Sta


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Elevation (ft)
380
375
370
365
360
355
350
345
340
0
100
200
300
400
500
600
700
Station (ft)
Legend
WS 2 year
WS 5 year
WS 10 year
WS 25 year
WS 50 year
WS 100 year
WS 200 year
WS 500 year
0.0 ft/s
0.5 ft/s
1.0 ft/s
1.5 ft/s
2.0 ft/s
Ground
Levee
Bank Sta


BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Elevation (ft)
Station (ft)
380
375
370
365
360
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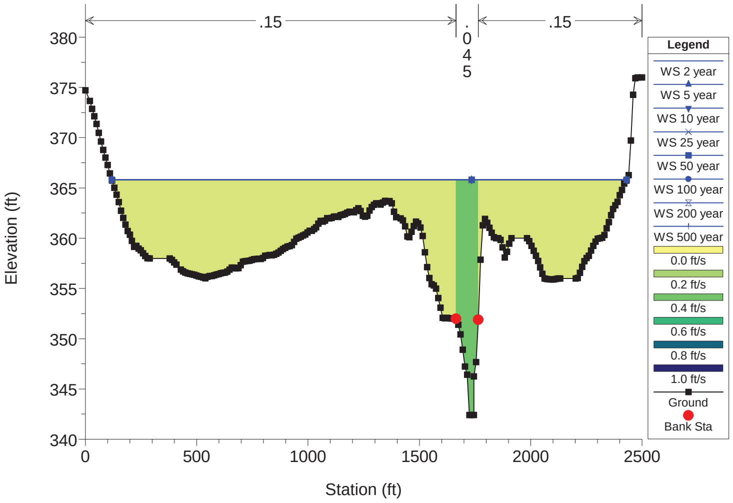
350
345
340
0
100
200
300
400
500
600
700
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Elevation (ft)
Station (ft)
380
375
370
365
360
355
350
345
340
0
100
200
300
400
500
600
700
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Elevation (ft)
Station (ft)
380
375
370
365
360
355
350
345
340
0
100
200
300
400
500
600
700
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta
BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019
.15
.045
.15
Elevation (ft)
Station (ft)
380
375
370
365
360
355
350
345
340
0
200
400
600
800
1000
1200
Legend
WS 500 year
WS 200 year
WS 100 year
WS 50 year
WS 25 year
WS 10 year
WS 5 year
WS 2 year
0.0 ft/s
0.2 ft/s
0.4 ft/s
0.6 ft/s
0.8 ft/s
1.0 ft/s
Ground
Bank Sta

BERRY_CREEK_Closure Plan: Berry Creek - Closure 10/11/2019



Attachment E
PMP Routing

Scherer PMP HEC-HMS Output

Date	Time (HR)	Precip (in)	sum of previous 24 hours (in)	24-hour unit hydrograph
1-Jan-00	0.00			
1-Jan-00	0:05	0.01		
1-Jan-00	0:10	0.01		
1-Jan-00	0:15	0.01		
1-Jan-00	0:20	0.01		
1-Jan-00	0:25	0.01		
1-Jan-00	0:30	0.01		
1-Jan-00	0:35	0.01		
1-Jan-00	0:40	0.01		
1-Jan-00	0:45	0.01		
1-Jan-00	0:50	0.01		
1-Jan-00	0:55	0.01		
1-Jan-00	1:00	0.01		
1-Jan-00	1:05	0.01		
1-Jan-00	1:10	0.01		
1-Jan-00	1:15	0.01		
1-Jan-00	1:20	0.01		
1-Jan-00	1:25	0.01		
1-Jan-00	1:30	0.01		
1-Jan-00	1:35	0.01		
1-Jan-00	1:40	0.01		
1-Jan-00	1:45	0.01		
1-Jan-00	1:50	0.01		
1-Jan-00	1:55	0.01		
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1-Jan-00	2:05	0.01		
1-Jan-00	2:10	0.01		
1-Jan-00	2:15	0.01		
1-Jan-00	2:20	0.01		
1-Jan-00	2:25	0.01		
1-Jan-00	2:30	0.01		
1-Jan-00	2:35	0.01		
1-Jan-00	2:40	0.01		
1-Jan-00	2:45	0.01		
1-Jan-00	2:50	0.01		
1-Jan-00	2:55	0.01		
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1-Jan-00	3:05	0.01		
1-Jan-00	3:10	0.01		
1-Jan-00	3:15	0.01		
1-Jan-00	3:20	0.01		
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2-Jan-00	0.00	0.02	3.6			
2-Jan-00	0:05	0.03	3.62	**0.000691404**	depth=	0.000691
2-Jan-00	0:10	0.03	3.64	**0.001382807**	depth=	0.001383
2-Jan-00	0:15	0.03	3.66	**0.002074211**	depth=	0.002074
2-Jan-00	0:20	0.03	3.68	**0.002765614**	depth=	0.002766
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2-Jan-00	0:55	0.03	3.82	**0.007605439**	depth=	0.007605
2-Jan-00	1:00	0.03	3.84	**0.008296843**	depth=	0.008297
2-Jan-00	1:05	0.03	3.86	**0.008988246**	depth=	0.008988

2-Jan-00	1:10	0.03	3.88	**0.00967965**	depth=	0.00968
2-Jan-00	1:15	0.03	3.9	**0.010371053**	depth=	0.010371
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2-Jan-00	1:25	0.03	3.94	**0.01175386**	depth=	0.011754
2-Jan-00	1:30	0.03	3.96	**0.012445264**	depth=	0.012445
2-Jan-00	1:35	0.03	3.98	**0.013136667**	depth=	0.013137
2-Jan-00	1:40	0.03	4	**0.013828071**	depth=	0.013828
2-Jan-00	1:45	0.03	4.02	**0.014519475**	depth=	0.014519
2-Jan-00	1:50	0.03	4.04	**0.015210878**	depth=	0.015211
2-Jan-00	1:55	0.03	4.06	**0.015902282**	depth=	0.015902
2-Jan-00	2:00	0.03	4.08	**0.016593685**	depth=	0.016594
2-Jan-00	2:05	0.03	4.1	**0.017285089**	depth=	0.017285
2-Jan-00	2:10	0.03	4.12	**0.017976492**	depth=	0.017976
2-Jan-00	2:15	0.03	4.14	**0.018667896**	depth=	0.018668
2-Jan-00	2:20	0.03	4.16	**0.019359299**	depth=	0.019359
2-Jan-00	2:25	0.03	4.18	**0.020050703**	depth=	0.020051
2-Jan-00	2:30	0.03	4.2	**0.020742106**	depth=	0.020742
2-Jan-00	2:35	0.03	4.22	**0.02143351**	depth=	0.021434
2-Jan-00	2:40	0.03	4.24	**0.022124914**	depth=	0.022125
2-Jan-00	2:45	0.03	4.26	**0.022816317**	depth=	0.022816
2-Jan-00	2:50	0.03	4.28	**0.023507721**	depth=	0.023508
2-Jan-00	2:55	0.03	4.3	**0.024199124**	depth=	0.024199
2-Jan-00	3:00	0.03	4.32	**0.024890528**	depth=	0.024891
2-Jan-00	3:05	0.03	4.34	**0.025581931**	depth=	0.025582
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2-Jan-00	3:20	0.03	4.4	**0.027656142**	depth=	0.027656
2-Jan-00	3:25	0.03	4.42	**0.028347546**	depth=	0.028348
2-Jan-00	3:30	0.03	4.44	**0.029038949**	depth=	0.029039
2-Jan-00	3:35	0.03	4.46	**0.029730353**	depth=	0.02973
2-Jan-00	3:40	0.03	4.48	**0.030421756**	depth=	0.030422
2-Jan-00	3:45	0.03	4.5	**0.03111316**	depth=	0.031113
2-Jan-00	3:50	0.03	4.52	**0.031804563**	depth=	0.031805
2-Jan-00	3:55	0.03	4.54	**0.032495967**	depth=	0.032496
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2-Jan-00	4:05	0.03	4.58	**0.033878774**	depth=	0.033879
2-Jan-00	4:10	0.03	4.6	**0.034570177**	depth=	0.03457
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2-Jan-00	4:20	0.03	4.64	**0.035952985**	depth=	0.035953
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2-Jan-00	5:00	0.04	4.85	**0.042636552**	depth=	0.042637
2-Jan-00	5:05	0.04	4.88	**0.043558424**	depth=	0.043558
2-Jan-00	5:10	0.04	4.91	**0.044480295**	depth=	0.04448
2-Jan-00	5:15	0.04	4.94	**0.045402166**	depth=	0.045402
2-Jan-00	5:20	0.04	4.97	**0.046324038**	depth=	0.046324
2-Jan-00	5:25	0.04	5	**0.047245909**	depth=	0.047246
2-Jan-00	5:30	0.04	5.03	**0.048167781**	depth=	0.048168
2-Jan-00	5:35	0.04	5.06	**0.049089652**	depth=	0.04909
2-Jan-00	5:40	0.04	5.09	**0.050011523**	depth=	0.050012
2-Jan-00	5:45	0.04	5.12	**0.050933395**	depth=	0.050933
2-Jan-00	5:50	0.04	5.15	**0.051855266**	depth=	0.051855
2-Jan-00	5:55	0.04	5.18	**0.052777138**	depth=	0.052777
2-Jan-00	6:00	0.04	5.21	**0.053699009**	depth=	0.053699
2-Jan-00	6:05	0.06	5.26	**0.055081816**	depth=	0.055082
2-Jan-00	6:10	0.06	5.31	**0.056464623**	depth=	0.056465

2-Jan-00	6:15	0.06	5.36	**0.05784743**	depth=	0.057847
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2-Jan-00	6:25	0.07	5.48	**0.06107398**	depth=	0.061074
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2-Jan-00	6:35	0.07	5.6	**0.06430053**	depth=	0.064301
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2-Jan-00	6:45	0.07	5.72	**0.06752708**	depth=	0.067527
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2-Jan-00	6:55	0.07	5.84	**0.07075363**	depth=	0.070754
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2-Jan-00	7:15	0.07	6.08	**0.07720673**	depth=	0.077207
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2-Jan-00	7:35	0.08	6.36	**0.084581701**	depth=	0.084582
2-Jan-00	7:40	0.08	6.43	**0.086425444**	depth=	0.086425
2-Jan-00	7:45	0.08	6.5	**0.088269186**	depth=	0.088269
2-Jan-00	7:50	0.08	6.57	**0.090112929**	depth=	0.090113
2-Jan-00	7:55	0.08	6.64	**0.091956672**	depth=	0.091957
2-Jan-00	8:00	0.08	6.71	**0.093800415**	depth=	0.0938
2-Jan-00	8:05	0.08	6.78	**0.095644158**	depth=	0.095644
2-Jan-00	8:10	0.08	6.85	**0.0974879**	depth=	0.097488
2-Jan-00	8:15	0.08	6.92	**0.099331643**	depth=	0.099332
2-Jan-00	8:20	0.08	6.99	**0.101175386**	depth=	0.101175
2-Jan-00	8:25	0.09	7.07	**0.103249597**	depth=	0.10325
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2-Jan-00	8:40	0.09	7.31	**0.109472229**	depth=	0.109472
2-Jan-00	8:45	0.09	7.39	**0.111546439**	depth=	0.111546
2-Jan-00	8:50	0.09	7.47	**0.11362065**	depth=	0.113621
2-Jan-00	8:55	0.09	7.55	**0.115694861**	depth=	0.115695
2-Jan-00	9:00	0.09	7.63	**0.117769071**	depth=	0.117769
2-Jan-00	9:05	0.09	7.71	**0.119843282**	depth=	0.119843
2-Jan-00	9:10	0.09	7.79	**0.121917493**	depth=	0.121917
2-Jan-00	9:15	0.09	7.87	**0.123991703**	depth=	0.123992
2-Jan-00	9:20	0.09	7.95	**0.126065914**	depth=	0.126066
2-Jan-00	9:25	0.1	8.04	**0.128370592**	depth=	0.128371
2-Jan-00	9:30	0.1	8.13	**0.130675271**	depth=	0.130675
2-Jan-00	9:35	0.1	8.22	**0.132979949**	depth=	0.13298
2-Jan-00	9:40	0.1	8.31	**0.135284628**	depth=	0.135285
2-Jan-00	9:45	0.1	8.4	**0.137589306**	depth=	0.137589
2-Jan-00	9:50	0.1	8.49	**0.139893985**	depth=	0.139894
2-Jan-00	9:55	0.1	8.58	**0.142198663**	depth=	0.142199
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2-Jan-00	10:15	0.1	8.94	**0.151417377**	depth=	0.151417
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2-Jan-00	10:55	0.11	9.73	**0.17146808**	depth=	0.171468
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2-Jan-00	11:15	0.11	10.13	**0.181608666**	depth=	0.181609

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2-Jan-00	11:55	0.12	11.01	**0.203733579**	depth=	0.203734
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2-Jan-00	13:05	0.21	13.21	**0.257663056**	depth=	0.257663
2-Jan-00	13:10	0.21	13.41	**0.262502881**	depth=	0.262503
2-Jan-00	13:15	0.21	13.61	**0.267342706**	depth=	0.267343
2-Jan-00	13:20	0.22	13.82	**0.272412998**	depth=	0.272413
2-Jan-00	13:25	0.22	14.03	**0.277483291**	depth=	0.277483
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2-Jan-00	13:40	0.26	14.71	**0.293846508**	depth=	0.293847
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2-Jan-00	13:50	0.3	15.28	**0.307444112**	depth=	0.307444
2-Jan-00	13:55	0.32	15.59	**0.314819083**	depth=	0.314819
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2-Jan-00	14:05	0.32	16.21	**0.329569025**	depth=	0.329569
2-Jan-00	14:10	0.31	16.51	**0.336713528**	depth=	0.336714
2-Jan-00	14:15	0.32	16.82	**0.3440885**	depth=	0.344088
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2-Jan-00	14:25	0.4	17.55	**0.361373588**	depth=	0.361374
2-Jan-00	14:30	0.47	18.01	**0.372205577**	depth=	0.372206
2-Jan-00	14:35	0.66	18.66	**0.387416455**	depth=	0.387416
2-Jan-00	14:40	1.03	19.68	**0.411154644**	depth=	0.411155
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2-Jan-00	15:35	0.52	34.84	**0.76307905**	depth=	0.763079
2-Jan-00	15:40	0.43	35.26	**0.772989168**	depth=	0.772989
2-Jan-00	15:45	0.37	35.62	**0.781516478**	depth=	0.781516
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2-Jan-00	17:25	0.18	40.41	**0.896519935**	depth=	0.89652
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3-Jan-00	3:50	0.02	42.93
3-Jan-00	3:55	0.02	42.92
3-Jan-00	4:00	0.02	42.91
3-Jan-00	4:05	0.02	42.9
3-Jan-00	4:10	0.02	42.89
3-Jan-00	4:15	0.02	42.88
3-Jan-00	4:20	0.02	42.87
3-Jan-00	4:25	0.02	42.86
3-Jan-00	4:30	0.02	42.85
3-Jan-00	4:35	0.02	42.84
3-Jan-00	4:40	0.02	42.82
3-Jan-00	4:45	0.02	42.8
3-Jan-00	4:50	0.02	42.78
3-Jan-00	4:55	0.02	42.76
3-Jan-00	5:00	0.02	42.74
3-Jan-00	5:05	0.02	42.72
3-Jan-00	5:10	0.02	42.7
3-Jan-00	5:15	0.02	42.68
3-Jan-00	5:20	0.02	42.66
3-Jan-00	5:25	0.02	42.64
3-Jan-00	5:30	0.02	42.62
3-Jan-00	5:35	0.02	42.6
3-Jan-00	5:40	0.02	42.58
3-Jan-00	5:45	0.02	42.56
3-Jan-00	5:50	0.02	42.54
3-Jan-00	5:55	0.02	42.52
3-Jan-00	6:00	0.02	42.5
3-Jan-00	6:05	0.02	42.46
3-Jan-00	6:10	0.02	42.42
3-Jan-00	6:15	0.02	42.38
3-Jan-00	6:20	0.02	42.33
3-Jan-00	6:25	0.02	42.28
3-Jan-00	6:30	0.02	42.23
3-Jan-00	6:35	0.02	42.18
3-Jan-00	6:40	0.02	42.13
3-Jan-00	6:45	0.02	42.08
3-Jan-00	6:50	0.02	42.03
3-Jan-00	6:55	0.02	41.98
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3-Jan-00	7:05	0.02	41.88
3-Jan-00	7:10	0.02	41.83
3-Jan-00	7:15	0.02	41.78
3-Jan-00	7:20	0.02	41.72
3-Jan-00	7:25	0.02	41.66
3-Jan-00	7:30	0.02	41.6
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3-Jan-00	7:45	0.02	41.42
3-Jan-00	7:50	0.02	41.36
3-Jan-00	7:55	0.02	41.3
3-Jan-00	8:00	0.02	41.24
3-Jan-00	8:05	0.02	41.18
3-Jan-00	8:10	0.02	41.12
3-Jan-00	8:15	0.02	41.06
3-Jan-00	8:20	0.02	41
3-Jan-00	8:25	0.02	40.93
3-Jan-00	8:30	0.02	40.86
3-Jan-00	8:35	0.02	40.79
3-Jan-00	8:40	0.02	40.72
3-Jan-00	8:45	0.02	40.65
3-Jan-00	8:50	0.02	40.58
3-Jan-00	8:55	0.02	40.51
3-Jan-00	9:00	0.02	40.44
3-Jan-00	9:05	0.02	40.37
3-Jan-00	9:10	0.02	40.3
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3-Jan-00	9:20	0.02	40.16
3-Jan-00	9:25	0.02	40.08
3-Jan-00	9:30	0.02	40
3-Jan-00	9:35	0.02	39.92
3-Jan-00	9:40	0.02	39.84
3-Jan-00	9:45	0.02	39.76
3-Jan-00	9:50	0.02	39.68
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3-Jan-00	10:25	0.02	39.11
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3-Jan-00	10:50	0.02	38.66
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3-Jan-00	11:20	0.02	38.11
3-Jan-00	11:25	0.02	38.01
3-Jan-00	11:30	0.02	37.91
3-Jan-00	11:35	0.02	37.81
3-Jan-00	11:40	0.02	37.71
3-Jan-00	11:45	0.02	37.61
3-Jan-00	11:50	0.02	37.51
3-Jan-00	11:55	0.02	37.41
3-Jan-00	12:00	0.02	37.31
3-Jan-00	12:05	0.01	37.19
3-Jan-00	12:10	0.01	37.07
3-Jan-00	12:15	0.01	36.94
3-Jan-00	12:20	0.01	36.8
3-Jan-00	12:25	0.01	36.65
3-Jan-00	12:30	0.01	36.49
3-Jan-00	12:35	0.01	36.33
3-Jan-00	12:40	0.01	36.16

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3-Jan-00	12:50	0.01	35.8
3-Jan-00	12:55	0.01	35.61
3-Jan-00	13:00	0.01	35.42
3-Jan-00	13:05	0.01	35.22
3-Jan-00	13:10	0.01	35.02
3-Jan-00	13:15	0.01	34.82
3-Jan-00	13:20	0.01	34.61
3-Jan-00	13:25	0.01	34.4
3-Jan-00	13:30	0.01	34.19
3-Jan-00	13:35	0.01	33.97
3-Jan-00	13:40	0.01	33.72
3-Jan-00	13:45	0.01	33.44
3-Jan-00	13:50	0.01	33.15
3-Jan-00	13:55	0.01	32.84
3-Jan-00	14:00	0.01	32.53
3-Jan-00	14:05	0.01	32.22
3-Jan-00	14:10	0.01	31.92
3-Jan-00	14:15	0.01	31.61
3-Jan-00	14:20	0.01	31.27
3-Jan-00	14:25	0.01	30.88
3-Jan-00	14:30	0.01	30.42
3-Jan-00	14:35	0.01	29.77
3-Jan-00	14:40	0.01	28.75
3-Jan-00	14:45	0.01	27.53
3-Jan-00	14:50	0.01	26.08
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3-Jan-00	15:00	0.01	22.57
3-Jan-00	15:05	0.01	20.8
3-Jan-00	15:10	0.01	19.05
3-Jan-00	15:15	0.01	17.34
3-Jan-00	15:20	0.01	16.09
3-Jan-00	15:25	0.01	14.95
3-Jan-00	15:30	0.01	14.1
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3-Jan-00	15:40	0.01	13.17
3-Jan-00	15:45	0.01	12.81
3-Jan-00	15:50	0.01	12.49
3-Jan-00	15:55	0.01	12.19
3-Jan-00	16:00	0.01	11.89
3-Jan-00	16:05	0.01	11.57
3-Jan-00	16:10	0.01	11.26
3-Jan-00	16:15	0.01	10.96
3-Jan-00	16:20	0.01	10.68
3-Jan-00	16:25	0.01	10.42
3-Jan-00	16:30	0.01	10.18
3-Jan-00	16:35	0.01	9.96
3-Jan-00	16:40	0.01	9.75
3-Jan-00	16:45	0.01	9.54
3-Jan-00	16:50	0.01	9.33
3-Jan-00	16:55	0.01	9.13
3-Jan-00	17:00	0.01	8.93
3-Jan-00	17:05	0.01	8.74
3-Jan-00	17:10	0.01	8.55
3-Jan-00	17:15	0.01	8.37
3-Jan-00	17:20	0.01	8.19
3-Jan-00	17:25	0.01	8.02
3-Jan-00	17:30	0.01	7.85
3-Jan-00	17:35	0.01	7.69
3-Jan-00	17:40	0.01	7.54
3-Jan-00	17:45	0.01	7.4

3-Jan-00	17:50	0.01	7.26
3-Jan-00	17:55	0.01	7.13
3-Jan-00	18:00	0.01	7.01
3-Jan-00	18:05	0.01	6.96
3-Jan-00	18:10	0.01	6.91
3-Jan-00	18:15	0.01	6.86
3-Jan-00	18:20	0.01	6.81
3-Jan-00	18:25	0.01	6.76
3-Jan-00	18:30	0.01	6.71
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3-Jan-00	18:40	0.01	6.61
3-Jan-00	18:45	0.01	6.56
3-Jan-00	18:50	0.01	6.51
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3-Jan-00	19:00	0.01	6.41
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3-Jan-00	19:20	0.01	6.23
3-Jan-00	19:25	0.01	6.19
3-Jan-00	19:30	0.01	6.15
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3-Jan-00	19:55	0.01	5.95
3-Jan-00	20:00	0.01	5.91
3-Jan-00	20:05	0.01	5.87
3-Jan-00	20:10	0.01	5.83
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3-Jan-00	21:25	0.01	5.25
3-Jan-00	21:30	0.01	5.22
3-Jan-00	21:35	0.01	5.19
3-Jan-00	21:40	0.01	5.16
3-Jan-00	21:45	0.01	5.13
3-Jan-00	21:50	0.01	5.1
3-Jan-00	21:55	0.01	5.07
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3-Jan-00	22:50	0.01	4.74

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3-Jan-00	23:00	0.01	4.68
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