

PREPARED FOR:

SKINQUARTER LAND, LLC
20701 HULL STREET ROAD
MOSELEY, VIRGINIA 23120

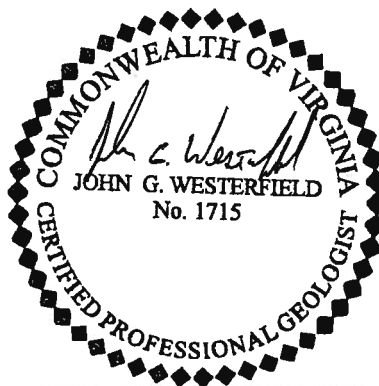
**SKINQUARTER LAND CONSTRUCTION AND DEMOLITION
DEBRIS LANDFILL, PERMIT NO. 604**

PART A PERMIT APPLICATION

**DECEMBER 2007
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EXECUTIVE SUMMARY

Skinquarter Land, LLC is proposing to construct and operate a Construction and Demolition Debris (CDD) Landfill, Permit No. 604, at 20701 Hull Street Road located in Chesterfield County, Virginia. The location of the facility, the approximate limits of the waste management unit boundary (subject to verification and modification in the Part B Permit Application), and the approximate limits of the proposed facility boundary, are presented on Drawing 1, the Site Location Plan, and on Drawing 2, the Key Map. This application, prepared in accordance with Submission Instructions Number 1, dated August 23, 2005, Procedural Requirements, Revision 2.1, is being submitted pursuant to the requirements of the Virginia Solid Waste Management Regulations (VSWMR) [9VAC20-80-10 *et seq.*].

Based on the results of a subsurface investigation performed in March and April 2007, the study area has been determined to be geologically suitable for the proposed landfill based on Virginia Department of Environmental Quality (DEQ) and VSWMR siting criteria. Evaluation of the hydrogeologic and geochemical nature of the uppermost aquifer indicates that a groundwater monitoring system can be designed for the facility, which will successfully monitor the uppermost aquifer in accordance with VSWMR. Based on the investigative results, a preliminary footprint for the limits of waste has been devised that meets all set-back and buffer requirements specified in the VSWMR and the Chesterfield County Administrative Code.

The proposed landfill is situated on an 112-acre parcel of land owned by Mr. William Stinson. Currently, Grind-All, LLC (a wood recycling facility) occupies the property. Should the construction and operation of the proposed landfill be approved by DEQ, Grind-All, LLC and Skinquarter Land, LLC operations will co-exist. Mr. William Stinson is the owner of both companies. A total of 55 acres have been approved for waste disposal under the facility's Conditional Use Permit (CUP) with Chesterfield County. The proposed facility will provide approximately 9.2 million cubic yards (4,600,000 tons) of disposal capacity. As a result of this Part A Permit Application and in accordance with the facility's CUP, a 100-foot buffer will be designated around the perimeter of the property boundary. The waste management unit

boundary will comprise of approximately 69 acres. The additional acreage (14 acres) between the disposal area and the waste management unit boundary will be used for on-site activities, including access roads, buildings, storm water control systems, and leachate management. The remaining 43 acres accounts for the 100 foot buffer around the perimeter of the property boundary and additional undisturbed buffer areas located along the perennial streams on the east side of the property.

The anticipated sequence of site development will include multiple phases of development with waste disposal starting on the south end of the proposed landfill and moving north towards the front of the facility. However, the sequence plan will be finalized in the Part B. The proposed landfill construction is consistent with the Central Virginia Solid Waste Management Plan, of which Chesterfield County is a member.

Based on the information presented herein, the proposed landfill meets state and local government landfill siting criteria. The primary purpose of proposed operations at the facility will be to expand recycling operations, and divert a significant portion of the CDD waste from being disposed in landfills. In addition, the operation of this landfill will allow Chesterfield County, the Central Virginia Waste Management Region, and ultimately the Commonwealth of Virginia to improve their annual recycling rates. Recyclable CDD waste includes yard waste, land clearing debris, and construction debris (i.e., wood, sheet rock, metal). To increase the efficiency of the already permitted mulching and wood recycling facility (Grind-All, LLC), Skinquarter Land, LLC is proposing to construct and operate a CDD landfill on the same property to co-exist with Grind-All, LLC. The existing Grind-All facility would be upgraded to accommodate for the recycling of recyclable CDD waste. Permitting and construction of Skinquarter Land's proposed CDD landfill would accommodate for future growth in the Greater Richmond Area, prevent the premature closure of the sanitary landfills in the region by preventing the diversion of CDD waste to those landfills, improve annual recycling rates for the Commonwealth of Virginia, and serve the public interest in the service area by providing competitive disposal costs.

**PART A PERMIT APPLICATION FOR
Proposed Skinquarter Land CDD Landfill
Permit No. 604**

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will be addressed during the Chesterfield County site plan application process. No other upgrades are required to comply with local jurisdiction or VDOT requirements. Correspondence between VDOT and JEI regarding the TIA is presented in Appendix XVI.

5.0 HYDROGEOLOGIC AND GEOTECHNICAL REPORT

5.1 Project and Site Description

Skinquarter Land, LLC is proposing to construct a CDD landfill at 20701 Hull Street Road in Chesterfield County, Virginia. Currently, a wood recycling facility exists at the subject property. If construction of the proposed landfill is approved, the wood recycling facility (Grind-All, LLC) will operate in conjunction with the CDD landfill. The location of the facility is presented on Drawing 1.

The landfill is situated on an 112-acre parcel of land owned by William Stinson. Chesterfield County has approved 55 acres for waste disposal in the facility's CUP. The proposed facility will provide approximately 9.2 million cubic yards (4,600,000 tons) of disposal capacity. As a result of this Part A Permit Application and in accordance with the facility's CUP, a 100-foot buffer (19 acres) will be designated around the perimeter of the facility/property boundary. The waste management unit boundary will comprise of approximately 69 acres. The additional acreage (14 acres) between the disposal area and the waste management unit boundary will be used for on-site activities, including access roads, buildings, storm water control systems, leachate management. The remaining 43 acres accounts for the 100-foot buffer around the perimeter of the property boundary and additional undisturbed buffer areas located on the east side of the property.

It is anticipated that development of the landfill will be sequential, i.e., each cell will be developed to the fullest extent possible prior to moving disposal activities to a subsequent cell.

No increase in daily disposal volume will be required, other than an estimated two to five percent annual growth (based on projected population growth of the surrounding area).

5.2 Report Preparation and Format

This hydrogeologic and geotechnical report has been prepared by JEI of Richmond, Virginia, and is being submitted on behalf of Skinquarter Land, LLC to satisfy the requirements of 9VAC20-80-510.E of the VSWMR. The report has been prepared in general conformance with the outline presented in Section I of *Submission Instructions No. 1 for Solid Waste Disposal Facilities*, Revision 2.1, dated August 23, 2005. In addition, this report was prepared in general conformance with DEQ's guidance document, Notice of Intent and Part A (Amendment) Application Template (dated January 2006, revised January 2007).

5.3 Purpose and Methods

5.3.1 Purpose

The purpose of the hydrogeologic and geotechnical report is to present the findings of a site investigation that was conducted to fulfill VSWMR Part A Permit Application requirements. The site investigation was completed by JEI on behalf of Skinquarter Land, LLC. The purpose of the site investigation was to investigate the surface, subsurface, and hydrogeologic conditions on the subject property to determine if the properties were suitable for the construction and operation of the proposed landfill.

Our investigation focused on:

- Identifying the geologic conditions in the vicinity of the proposed landfill;
- Identifying the hydrogeologic conditions at the site, including the direction and rate of groundwater flow in the uppermost aquifer beneath the proposed landfill;
- and

- Identifying the geotechnical characteristics of the unconsolidated sediments encountered at the site.

5.3.2 Investigative Methods

To accomplish these tasks, JEI has employed a variety of investigative procedures during the site investigation, including but not limited to:

- Reviewing existing geologic information available for the facility and surrounding region;
- Drilling and logging investigative soil borings;
- Gauging static water depths at available observation locations;
- Testing piezometers to estimate the hydraulic parameters of the uppermost aquifer;
- Reviewing geotechnical data for soil borings; and
- Mapping field conditions and exposed outcrops.

The field investigation was initiated in March 2007 and was substantially completed in April 2007. Monthly piezometer/well gauging activities began in April 2007 and will continue for a one-year period. JEI coordinated all aspects of the field investigation, including the drilling programs, the surveying and mapping programs, the well development, the well gauging, and the aquifer testing program.

Richard Simmons Drilling Co., Inc. of Statesville, North Carolina, and Ayers and Ayers Drilling, Inc. of Midlothian, Virginia, provided drilling services. Drilling was performed with an all-terrain drill rig and an Ingersoll-Rand CT-450 Canterra drill rig (air rotary drilling). Personnel from JEI logged all boreholes, observed all drilling activities, directed well construction activities, tested piezometers for hydraulic characteristics of the uppermost aquifer, and searched for exposed outcrops and investigated other field conditions. Personnel and equipment from Grind-All, LLC performed site clearing for drill rig access. Koontz-Bryant of Richmond, Virginia, provided surveying services of the 15 piezometers. Balzer and Associates,

Inc. of Richmond, Virginia, provided aerial and ground surveying services of the site topography.

5.4 Field Activities

This section of the report presents a discussion of the investigative techniques used to characterize the surface and subsurface conditions present in the study area.

5.4.1 Number of Borings

As presented on Drawing 3, the Near Vicinity Map, the proposed landfill will be situated on a 112-acre parcel of land owned by William Stinson (owner of Grind-All, LLC and Skinquarter Land, LLC). The facility boundary of the proposed facility is approximately 86 acres. According to 9VAC20-80-510.E.1.a and Table 7-1 of the VSWMR, an area of this size should have a minimum of 14 investigative borings to obtain sufficient information regarding the geotechnical and hydrogeologic conditions at the site. To meet this requirement, a total of 15 borings have been completed. Upon evaluating the geology encountered in the fifteen investigative borings advanced by JEI in the study area in March 2007, two additional borings were advanced by JEI to obtain samples for analysis of engineering properties.

The locations of the 17 borings advanced by JEI as part of this investigation, are shown on Drawing 4, the Site Investigation Plan. A summary of the borings used to characterize the study area is provided in Table 2. Soil boring logs used to prepare this report are included in Appendix II.

5.4.2 Location of Borings

The locations of the soil borings used for characterizing the subsurface conditions beneath the proposed landfill are shown on Drawing 4. The locations were selected to provide adequate subsurface information to characterize the site and develop geologic cross-sections. The borings range in depth from 27.5 feet below ground surface (bgs) to 68 feet bgs.

5.4.3 Drilling Methods

As discussed previously, the soil borings were advanced with either an all-terrain drill rig equipped with a hollow stem auger, or an Ingersoll-Rand drill rig equipped with an air hammer. Soil borings PZ-1 through PZ-14S were advanced with 4 1/4-inch inside diameter (ID) hollow stem augers. Soil boring PZ-14D was advanced with a 6 1/8-inch ID air hammer. Soil borings TB-1 and TB-2 were advanced with 4 1/4-inch ID hollow stem augers.

Following completion of drilling and well construction activities, Koontz-Bryant surveyed all relevant locations to obtain elevations and coordinates. Survey coordinates and elevations for all relevant borings used in this investigation are summarized in Table 2.

5.4.4 Soil and Bedrock Sampling

In general, soil samples were collected from PZ-1 through PZ-14D continuously to a depth of 20 feet below proposed base grade or to bedrock, whichever was shallower. When drilling with the hollow stem auger, soil samples were collected continuously using split-spoon soil samplers. The soil samples were collected by advancing the split-spoon sampler into undisturbed soils ahead of the augers in accordance with American Society for Testing and Materials (ASTM) Method D-1586. The number of blow counts required to drive the sampler 6 inches with a 140-pound hammer falling 30 inches was recorded during the collection of split-spoon samples. The recovered split-spoon samples were logged for percent recovery, lithology, mineralogy, color, moisture content, odor, and other features as applicable.

In borings advanced using the hammer method, grab samples of cuttings were obtained at continuous intervals for logging. The grab samples were logged for lithology, mineralogy, color, moisture content, odor, and other features as applicable. Boring logs are presented in Appendix II.

Following the advancement of these 15 borings, JEI completed boring logs detailing lithology descriptions with blow counts and percent recoveries. JEI reviewed the lithology and N-values (derived from the blow counts) from the borings logs for the entire site to determine where geotechnical sampling should be conducted. Based on the boring logs, it was evident that collecting soil samples from the overburden soils (upper 12 feet) near P-2 and P-7 would provide site-wide representative geotechnical information for the clays found in Stratum 1 and sands/silts found in Stratum 2. On April 13, 2007, Ayers and Ayers, Inc. advanced a total of two borings at the site. Borings TB-1 and TB-2 were advanced next to P-2 and P-7, respectively. The locations of the soil borings (TB-1 and TB-2) are shown on Drawing 4 of this report. Undisturbed Shelby Tube samples were collected at TB-1 from 10 to 12 feet below grade and from 8 to 10 feet below grade in TB-2. The two undisturbed samples were analyzed for Atterberg limits, grain size distribution, natural moisture content, and permeability. Bulk samples were collected from 2 to 10 feet below grade in TB-1 and from 2 to 8 feet below grade in TB-2. The two bulk samples were analyzed for Atterberg limits, grain size distribution, natural moisture content, moisture-density relationship (Standard Proctor), and permeability. The undisturbed samples collected from TB-1 and TB-2 represented Stratum 1 underlying the site. The bulk sample collected from TB-1 represented Stratum 1, and the bulk sample from TB-2 represented Stratum 2. These soils samples were submitted to Geotechnics, Inc., located in Raleigh, North Carolina for analysis. The laboratory results are presented in Appendix I.

5.4.5 Piezometers

Piezometers were constructed at each location in the study area that was investigated with soil borings (PZ-1 through PZ-14D). The piezometers were constructed with 2-inch ID schedule 40 polyvinyl chloride (PVC), with a 10-foot long, 0.010-inch, factory-slotted screen placed in the

saturated zone. All casing sections were flush-threaded together. The bottom of each well was equipped with a flush-threaded schedule 40 PVC end cap. The well heads were completed with a locking expandable well cap. Piezometers P-1, P-2, P-13, P-14S, and P-14D were converted into monitoring wells and therefore, were also completed with a locking 4-inch square steel standpipe and a cement pad measuring approximately 2 feet by 2 feet that was sloped away from the well casing.

A filter pack, consisting of a washed and graded No. 3 silica filter sand (sieve size 6-20) was placed in the annular space surrounding the screened interval in each piezometer to a depth of approximately 2 feet above the screened interval. A 2-foot thick (minimum) filter pack seal, consisting of a hydrated granular bentonite, was placed in the annular space of each borehole on top of the filter pack. The remaining annular space in each borehole was pressure grouted with a 10% BenSeal bentonite powder and 90% Portland cement grout after allowing the filter pack seal to hydrate. The grout was pumped into the borehole at a slow rate of flow with a pneumatic pump and associated tremie pipe. The Portland grout was mixed on site to job specifications before pressure grouting each well. Well construction logs are presented in Appendix II.

5.4.6 Sealing of Borings

At several locations, auger-refusal was encountered prior to intercepting the water table. In such areas and at TB-1 and TB-2, the empty borehole was backfilled with drill cuttings from the borehole, to a depth of 5 feet below grade. The top 5 feet of the boring was then sealed with hydrated granular bentonite.

5.4.7 Well Development

Personnel from JEI developed piezometers P-1, P-2, P-7, P-13, P-14S, and P-14D on April 23 and 24, 2007. Piezometers P-1, P-2, P-13, P-14S, and P-14D were developed since they were converted into monitoring wells for the site and were used for hydraulic testing. In addition, P-7 underwent hydraulic testing and was therefore developed as well. Development was performed by purging each well using a submersible pump and/or disposable bailer. During

the purge, periodic field measurements of water quality parameters (pH, temperature, turbidity, and specific conductance) were recorded. Purging was continued for approximately 10 well volumes or until the well purged dry. Well development logs are presented in Appendix II.

Purge water generated during the development efforts was discharged to a vegetated area away from the well head. Prior to use, all equipment used during development was decontaminated with analconox/distilled water solution followed by a de-ionized water rinse.

5.4.8 Hydraulic Testing and Water Level Gauging

To obtain estimates of the saturated zone hydraulic conductivity, rising and falling head slug tests were performed at P-2, P-7, P-14S, and P-14D. Due to suspect testing data, the results of a falling head test were not used for P-2 when calculating hydraulic conductivity. Slug testing was conducted at multiple locations so that a representative hydraulic conductivity reading could be obtained across the site. The hydraulic conductivity readings were averaged for the three piezometers (P-2, P-7, and P-14S) located in unconsolidated soils. The slug tests were performed with an inert, sand-filled PVC slug. The induced change in potentiometric head was measured with an In-Situ pressure transducer (model PXD-260) connected to a 2-channel data logger (Hermit 1000C), manufactured by In-Situ, Inc. of Laramie, Wyoming.

Data were downloaded from the data logger and evaluated using Bouwer and Rice's procedure for unconfined aquifers. The results of the analyses are summarized in Table 3. Raw data, graphical analyses, and results are presented in Appendix XVII.

To evaluate the potentiometric surface beneath the facility, six water level gauging events were conducted between April 2007 and September 2007. Water level measurements were obtained to the nearest 0.01 foot using an electronic water level indicator. During each gauging event, personnel from JEI obtained depth to water measurements at all piezometer and well locations. These data were compiled and are presented in Table 1.

5.4.9 Field Mapping

Koontz-Bryant delineated on-site jurisdictional wetlands and/or waters of the United States. The results of the wetland delineation and subsequent surveying are presented on Drawing 4. Additionally, the site was inspected for bedrock outcrops. No bedrock outcrops were observed. Results of the site characterization supported information regarding site geology, as presented in the following sections.

5.5 Description of Regional Geologic Setting

The proposed Skinquarter Land CDD Landfill is located in the southwestern portion of Chesterfield County, Virginia. Geologically, Chesterfield County is located on the Fall Line, a geologic boundary separating Virginia's Coastal Plain Physiographic Province to the east from the Piedmont Physiographic Province to the west (VDMR, 1993). The eastern portion of Chesterfield County lies in the Coastal Plain Physiographic Province. Strata in the Coastal Plain Province generally consist of interbedded transgressive and regressive sediments of the Mesozoic and Cenozoic Epochs overlying basement bedrock. In general, the sediments vary in thickness from a "feather's edge" where they lap onto the Piedmont bedrock to several thousand feet along the coastline (Mixon et al., 1989; VDMR, 1993). Localized fluvial deposits are found in the rivers and associated tributary channels of the Coastal Plain. Soils in this region are developed in the uppermost sediments and range from poorly to well drained with local exceptions (USDA, 1978).

The central and western portions of the County are in the Piedmont Physiographic Province. Bedrock in this province generally consists of Paleozoic meta-sedimentary and meta-igneous rocks in various stages of deformation, intruded by large intrusive suites (VDMR, 1993; Radar and Evans, 1993). Regionally, there are several southwest-northeast trending down-faulted basins of Mesozoic age, which are filled with eroded sediments. Associated with the Mesozoic basins are sills and northeastward trending dikes of diorite composition (Bloomer, 1939; Radar and Evans, 1993). Soils in the Piedmont region are generally developed in

saprolite, a poorly drained, reddish-brown unit derived from the in-place weathering of crystalline bedrock (USDA, 1978).

The sediments at the Skinquarter site are likely to be representative of the Newark Group, more specifically, the Vinta Formation. In the *Guidebook to the Geology of the Richmond and Taylorsville Basins, East-Central Virginia*, Bruce K. Goodwin of the College of William and Mary describes the Vinta Formation as “dominantly fine- to coarse-grained, gray sandstone (in part crossbedded), gray siltstone, and dark gray to black shale. Some conglomerates, containing well-rounded pebbles of quartz, granite, and gneiss are present within the Vinta Beds, at the base of channels cut into underlying beds.”

The proposed Skinquarter Land CDD Landfill is located approximately 4.25 miles east of the western boundary of the Richmond Triassic Basin. Near Bevils Bridge over the Appomattox River, Goodwin observed cataclastic rocks, the deformation of which he interpreted as a result of the seismic activity along the western boundary of the Richmond Triassic Basin. The Triassic sediments are first visible approximately 3.5 miles northeast of the proposed Skinquarter Land CDD Landfill.

In the Virginia Division of Mineral Resources Report of Investigations 23, *Geology of the Hylas and Midlothian Quadrangles, Virginia*, Goodwin gives the following information about the diabase dikes of the Richmond Triassic Basin:

Diabase dikes cut the Triassic sedimentary rocks and at a few localities they occur in the metavolcanic rocks. Because of intense weathering the dikes generally are not exposed, but their presence is indicated by boulders of dense, dark diabase. Many of these boulders are 2 or more feet across, and their outer surfaces have been weathered to a deep red-brown crust; however, some of the interiors consist of relatively fresh diabase. In some places the boulders occur as clusters in a stream bed or have a crude alignment on a slope. The dikes have been metamorphosed and the exposed dikes, which are discordant to the country rock,

are composed of fine- to medium-grained, dense, dark-gray diabase (R-3101²). The unmetamorphosed nature and cross-cutting relations of the diabase dikes indicate that they were intruded after the deposition of the Triassic sediments and that this intrusion extended beyond the borders of the Richmond Triassic Basin into the adjacent metavolcanic rocks.

5.6 Description of Site Soil Units

The soils, sediments, and bedrock beneath the study area were evaluated using a variety of investigative techniques, including but not limited to soil borings, field mapping, and literature review. Drawing 4 shows the locations of the investigative soil borings, facility access roads, site drainage features, topography, and the limits of proposed waste management activities.

As described in the soil boring logs (see Appendix II), the soils found at the site represent the following Unified Soil Classification System (USCS; ASTM-D-2487-85) units. The units are described in the general order of increasing depth (i.e., descending elevation):

Stratum 1

- Naturally occurring topsoil where present. The soil consists of medium-stiff to stiff, yellow-brown to light gray to red-brown silty and sandy clay (CL).

Stratum 2

- Dense to very dense, yellow-brown to light gray to red-brown sand and silt mixtures (SM). Some gravel present. These soils are generally located below the naturally occurring topsoil.

Stratum 3

- Competent Bedrock (siltstone and sandstone).

Field observations indicate that the near surface soils beneath the proposed landfill are generally fine to medium-grained and exhibit a low permeability. Ayers and Ayers, Inc. collected two composite soil samples and two shelly tube samples for laboratory analysis. The analytical data for the shelly tube samples demonstrated an average permeability of surficial soils (8 to 12 feet below ground surface) that was less than 1×10^{-5} cm/sec. The data were derived from analysis of discrete samples obtained from borings located in the proposed landfill. The laboratory analyses are included in Appendix I. Skinquarter Land, LLC will most likely use a flexible membrane synthetic liner and leachate collection system, with on-site soils used for daily cover material and structural fill.

5.7 Description of Site Geology

Information obtained from the borings completed at the site and summarized in Table 2 was used to develop a conceptual geologic model for the study area. Drawings 6 through 9 present five geologic cross-sections. Based on the available information, the geology of the study area can be categorized into two geologic strata: unconsolidated overburden and the Newark Super Group. The unconsolidated overburden, which includes the surficial soils, ranges in thickness from less than 28 feet to 50+ feet and is continuous across most of the study area. The uppermost sediments, Stratum 1 in the unconsolidated overburden, are described as medium-stiff to stiff, silty and sandy clays. These sediments are generally found overlying Stratum 2, a dense to very dense, mix of sand and silt with some gravel. Stratum 2 of the unconsolidated overburden was most dominant with depth along the western and southern areas of the site. Not all borings contained both strata and bedrock. Underlying the unconsolidated sediments are the siltstones, sandstones, and conglomerates of the Newark Super Group.

The upper portion of unconsolidated overburden is interpreted to be post-Triassic alluvial sediments. The lower portion of the overburden is interpreted to represent the weathered remnants of Triassic sedimentary rocks. As expected, the degree of weathering decreases with depth until competent bedrock is encountered. As shown on the geologic cross-sections, the subsurface geology across the site is relatively homogenous.

The purpose of collecting samples for analysis of engineering properties was to investigate the potential for the soils within 2 to 12 feet bgs for use as compacted soil liner or closure cap soils. The laboratory test results for the undisturbed and bulk samples indicate that the near surface soils classify as fat CLAY (CH), elastic silt, some sand (MH), and silty SAND (SM). The natural moisture contents for the undisturbed samples collected from TB-1 and TB-2 were 64.5% and 21.5%, respectively. The liquid limit ranged from non-plastic in TB-2 and 97 in TB-1. The plastic limit was non-plastic in TB-2 and 61 in TB-1. The plasticity index was non-plastic in TB-2 and 63 in TB-1. Maximum dry density determined by Standard Proctor test was 94.0 pounds per cubic foot (pcf) in TB-1 and 102.1 pcf in TB-2. The optimum moisture content for TB-1 and TB-2 was 24.3% and 19.3%, respectively. Overall, the stratum classifies as non-swelling clay composed of illite or kaolinite minerals. Permeability tests were performed on remolded bulk samples BS-1 from both borings. Each sample was compacted to about 97% of maximum dry density at moisture content 4% above optimum moisture content as determined by Standard Proctor method. These are typical compaction and moisture criteria for compacted soil liner or compacted soil cap material. The test samples had permeability ranging from 4.0E-07 to 4.6E-07 cm/sec. Neither sample met the criteria for use as a soil liner where permeability equal to or less than 1.0E-07 cm/sec is required. However, both permeability test results met the criteria for use as a compacted soil cap where permeability equal to or less than 1.0E-05 cm/sec is required. See the soil classification and laboratory results in Appendix I for additional details.

The laboratory soil tests indicate that selected on-site soils may be suitable for landfill cap, but not landfill liner. The compaction and remolded hydraulic conductivity tests summarized above indicated that the CH, MH, and SM soils could achieve the required permeability of 1.0E-05 cm/sec or lower required for a soil cap.

The standard penetration results in test borings across the site indicate medium stiff to stiff and dense consistency in the top few feet of soil, and very stiff to very dense at greater depths. These soils would be stable under the weight of the landfill and will not settle excessively. Soft, organic soils, as may be present locally in surface drainage channels, will be over excavated. Drainage will be diverted prior to excavation. Excavated areas will be proof-

rolled and prepped for fill. Structural fill will be placed to obtain the desired grade, compacted in uniform lifts, and shall not exceed 6 inches in compacted thickness. Structural fill will be compacted to within 95 percent of maximum density (standard proctor), and at a moisture of 2.0 percent of optimum moisture, as determined by ASTM D698 (AASHTO T-99).

A synthetic liner is expected to be used for the landfill cells. Options for the liner will be presented in the Part B permit application.

5.8 Geologic Cross-Sections

To illustrate the relationship between the unconsolidated sediments and the underlying bedrock in the study area, five geologic cross-sections were developed and are presented on Drawings 6 through 9. Each cross-section shows the elevation of the top of bedrock (when encountered), the elevation of the water table in the uppermost aquifer as measured on April 2, 2007, and a profile of the existing ground surface. In addition, proposed base grade elevations are shown on the cross-sections. The locations of the cross-sections are shown on the inset of each cross-section.

As shown on Drawings 6, 7, and 9, soil samples submitted for laboratory analysis of engineering properties were collected at or near locations included on cross-sections B-B', C-C' and E-E'. The geologic cross-sections demonstrate that the soil samples collected in April 2007 for analysis of engineering properties and the soils encountered during the Part A investigation conducted in March 2007 are generally correlated with each other.

5.9 Description of Site Hydrogeology

The water table beneath the study area is encountered in the unconsolidated overburden, and locally where overburden thins out, in the underlying fractured bedrock. The uppermost aquifer beneath the study area is vertically continuous and is composed of the different facies in

the overburden and the underlying fractured bedrock. As a result of the facies changes, the hydrogeologic characteristics of the uppermost aquifer vary with depth.

Depth-to-water measurements have been obtained periodically from all monitoring locations (piezometers and wells) constructed in the study area. These measurements are presented in Table 1 and shown graphically on Chart 1. Chart 1 shows that the water table beneath the proposed expansion area is relatively stable. The hydrograph indicates that fluctuations in the water table beneath the study area, presumably a result of precipitation events or lack thereof, are generally consistent across the study area, although the magnitude of the fluctuations varies. The change in magnitude of the fluctuations is likely a result of the spatial location of the monitoring points (i.e., on a topographic high or next to a stream channel), as well as the hydrogeologic characteristics of the facies being monitored.

Hydraulic characteristics of the aquifer are expected to vary horizontally at different locations, based on varying quantities of sand or clay lenses intermixed in individual strata. Lenses of clay will act as micro-aquitards, and lenses of gravel and sand will act as preferential flow paths. The effect that these micro-aquitards have on the rate and direction of groundwater flow in the individual strata depends on the thickness, lateral continuity, and interconnectivity of the lenses. The average horizontal conductivity in the area of the proposed landfill is expected to be greater than the vertical component of flow. Preferential flow in the horizontal direction is a function of the horizontal orientation of the sediments, especially the clay lenses, as clay minerals tend to be deposited in a horizontal fashion, increasing the tortuosity of the vertical flow path (Todd, 1980).

The uppermost aquifer is not expected to provide significant amounts of potable water due to the limited distribution of the recharge area and the low storage volume of the unit as a whole. The quality of the water is expected to vary significantly based on the relative proximity of the unit to areas prone to seasonal flooding, and the variable quality of the recharge due to variations in seasonal precipitation and the chemical characteristics of surface water. The study

area is located in the Triassic Basin Ground Water Area, as described in the *Ground Water Map*

of Virginia (Smith and Ellison, 1985). The area is composed of sedimentary and igneous rocks occurring in downfaulted basins within the Piedmont province. The groundwater in this area is typically not used for light industrial or public use; however, pump rates of 20 gallons per minute are common, with up to 200 gallons per minute possible in some areas. The yield range is lower in areas of igneous intrusion.

The hydraulic properties of the bedrock are expected to vary due to the presence or lack of fractures. Additional factors affecting the hydraulic properties of the bedrock facies include degree of bedrock weathering and fracture orientation, interconnectivity, aperture width, and density. Based on field observations, available literature, static water level measurements, and discussions with local citizens, the occurrence of useable amounts of groundwater in the bedrock facies is generally limited to fractures.

5.9.1 Groundwater Level Measurements

Each of the piezometers/wells at the facility were surveyed by a licensed surveyor. The surveyor provided northings and eastings of each well to within ± 0.5 foot based on the 1983 North American Datum (NAD 83). The survey data were used to locate the borings on the drawings included in this report. The surveyor also provided the elevation of the top of casing measuring points for each well to within ± 0.01 foot. These data were used to calculate the static water level elevation in each well.

JEI has collected depth-to-water measurements at the piezometers and monitoring wells throughout the site on six occasions, between April 2007 and September 2007. Skinquarter Land, LLC will continue gauging the piezometers and wells on a monthly basis until one year of water level data is obtained. To ensure that static water levels were representative of actual field conditions, no purging or sampling activities were conducted in the 24 hours preceding the gauging activities. The depth-to-water measurements were made with an electronic water level indicator accurate to within 0.01 foot. These measurements are summarized in Table 1.

The static water level data from April 2, 2007, have been used to prepare a groundwater surface contour map for the uppermost aquifer beneath the facility, which is presented on Drawing 4. As presented, the morphology of the potentiometric surface, which bears a strong resemblance to surface topography, indicates that the groundwater flow direction in the aquifer beneath the site is multi-directional locally. Based on topography and groundwater elevation data, a ridge exists through the center of the property. The contours indicate that groundwater flows to the east, west, and south in the uppermost aquifer beneath the proposed portion of the landfill toward wetland and stream channels. Groundwater flow to the east appears to converge towards a perennial stream. Groundwater flow to the west and south appears to converge towards intermittent streams. In general, the groundwater flow directions appear to converge on drainage features which transects the proposed landfill area. The intermittent and perennial streams on the property flow or ultimately flow towards the south.

Using the groundwater surface contours shown on Drawing 4, the average hydraulic gradient beneath the study area was calculated at 0.0550 foot per foot. The hydraulic gradient averages 0.0566 foot per foot beneath the eastern portion of the proposed landfill area, 0.0342 foot per foot beneath the western portion of the proposed landfill area, and 0.0741 foot per foot beneath the southern portion of the proposed landfill area. Based on the available data from MW-14S and MW-14D, which are nested wells, the vertical gradient in this area appears to be downward with a gradient of 0.1450 foot per foot as measured on April 2, 2007. Calculations used to determine horizontal and vertical hydraulic gradient are as follows:

Hydraulic Gradient between two points = Difference in Hydraulic Head / Linear Distance

Hydraulic Gradient, Eastern Portion of the Proposed Landfill Area:

$$i_e = (H_{310} - H_{270}) / 707 \text{ feet} = (310 \text{ feet} - 270 \text{ feet}) / 707 \text{ feet} = 0.0566$$

Hydraulic Gradient, Western Portion of the Proposed Landfill Area:

$$i_w = (H_{310} - H_{290}) / 585 \text{ feet} = (310 \text{ feet} - 290 \text{ feet}) / 585 \text{ feet} = 0.0342$$

Hydraulic Gradient, Southern Portion of the Proposed Landfill Area:

$$i_s = (H_{310} - H_{280}) / 405 \text{ feet} = (310 \text{ feet} - 280 \text{ feet}) / 405 \text{ feet} = 0.0741$$

The average hydraulic gradient is therefore:

$$(i_e + i_w + i_s) / 3 = (0.0566 + 0.0342 + 0.0741) / 3 = 0.0550$$

Vertical hydraulic gradient (calculated from nested wells MW-14S and MW-14D):

$$I_v = (X_{14S} - X_{14D}) / (L_{14D} - L_{14S});$$

Where: X = elevation of water in respective well; and

L = elevation of midpoint of screened interval of water column

$$I_v = (266.68 \text{ feet} - 261.61 \text{ feet}) / (243.06 \text{ feet} - 208.09 \text{ feet}) = 0.1450$$

5.9.2 Hydraulic Conductivity

Field activities associated with this study included conducting *in situ* tests to estimate the hydraulic properties of the sediments and bedrock surrounding the newly installed piezometers/wells. Specifically, falling and rising head slug tests were conducted using an inert PVC slug. The recovery of the head level in the well was recorded during the test using an In-Situ, Inc. Hermit[®] data logger (1000C model) and a pressure transducer that was placed in the well prior to testing.

The recovery data were downloaded to spreadsheet format and then evaluated using the Bouwer and Rice Method for slug tests (Bouwer and Rice, 1976; Bouwer, 1989). A summary of the aquifer testing results is presented in Table 3 and copies of the field data, test-specific parameters, and graphs showing the results of the tests are included in Appendix XVII.

As presented in Table 3, the calculated hydraulic conductivity at individual monitoring points ranged from 8.9E-06 cm/sec as measured in PZ-7 during a rising head test to 2.6E-04 cm/sec as measured in MW-14S during a falling head test. The average hydraulic conductivity across the site was determined to be 6.43E-05 cm/sec, which represents the geometric mean of

hydraulic conductivities calculated for all monitoring points tested. The average estimated hydraulic conductivity for unconsolidated material above bedrock is 5.12E-05 cm/sec. The average estimated hydraulic conductivity in the bedrock is 1.28E-04 cm/sec.

5.9.3 Groundwater Movement

The estimated average effective porosity (n_e) for unconsolidated sediments is 0.20 and for the fractured bedrock is 0.025 (Freeze and Cherry, 1979). Using these estimates of effective porosity, the average gradient, and the average hydraulic conductivity values for the unconsolidated and bedrock facies, the average estimated rate of groundwater flow beneath the proposed landfill was estimated using the algorithm below.

where:

$$V_{gw} = Ki/n_e$$

V_{gw} = groundwater velocity (cm/sec)

K = estimated hydraulic conductivity (cm/sec)

i = hydraulic gradient (foot per foot)

n_e = effective porosity (unitless)

Unconsolidated Overburden Facies

$$V_{gw} = [(5.12E-05) \times (0.0550)]/0.20$$
$$V_{gw} = 1.41E-05 \text{ cm/sec}$$
$$V_{gw} = 14.6 \text{ feet per year}$$

Bedrock Facies

$$V_{gw} = [(1.28E-04) \times (0.0550)]/0.025$$
$$V_{gw} = 2.82E-04 \text{ cm/sec}$$
$$V_{gw} = 291.8 \text{ feet per year}$$

Rate of vertical groundwater flow (unconsolidated overburden facies)

$$V_{gw} = [(5.12E-05) \times (0.1450)]/0.2$$

$$V_{gw} = 3.71E-05 \text{ cm/sec}$$

$$V_{gw} = 38.4 \text{ feet per year}$$

As presented above, the estimated horizontal rate of groundwater flow in the aquifer beneath the study area is expected to vary from 14.6 feet per year in the unconsolidated overburden to 291.8 feet per year in the fractured bedrock. Based on the range of hydraulic conductivity values estimated for the two facies, the actual groundwater flow rate within each facies is expected to vary significantly depending on spatial location, perhaps by as much as an order of magnitude. The variation in the averages estimated for the two facies is attributed to the differences in average effective porosity values used for the calculations.

Also presented above, estimated vertical groundwater flow is in a downward direction at a rate of 38.4 feet per year. The vertical flow estimate is derived from water levels in nested wells MW-14S and MW-14D, and represents flow from the unconsolidated overburden to the underlying bedrock. Vertical groundwater flow assumes isotropic conditions (i.e., that hydraulic conductivity in the horizontal and vertical direction is identical).

6.0 REFERENCES

The references listed herein were used to prepare this document and may or may not be cited in the text of this report.

American Society for Testing and Materials. 1999. D1586-99 Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils.

American Society for Testing and Materials. 2000. D2487-00 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Bloomer, R.O. 1939. *Notes on the Petersburg Granite, Virginia Geological Survey, Contributions to Virginia Geology - II Bulletin 51*, pp. 137-146.

Bouwer, H., and R.C. Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. *Water Resources Research*. Vol. 12: 423-428.

Bouwer, H. 1989. The Bouwer and Rice Slug Test – An Update. *Ground Water*. Vol. 27: 301-309.

Freeze, R.A. and J.A. Cherry. 1979. *Groundwater*. Prentice Hall, Inc.: Englewood Cliffs, New Jersey.

Goodwin, B.K. No date available. *Guidebook to the Geology of the Richmond and Taylorsville Basins, East-Central Virginia*. College of William and Mary, Virginia.

Mixon, R.B., et al. 1989. *Geologic Map and Generalized Cross Sections of the Coastal Plain and Adjacent Parts of the Piedmont, Virginia*, Miscellaneous Investigation Series, Map I-2033, United States Geological Survey, Department of Interior, Scale 1:250,000.

Radar, E.K. and N.H. Evans, eds. 1993. *Geologic Map of Virginia - expanded explanation: Virginia Division of Mineral Resources*.

Smith and Ellison. 1985. *Ground Water Map of Virginia*.

Todd, D.K. 1980. *Groundwater Hydrology*. John Wiley and Sons: New York.

United States Department of Agriculture (USDA). 1978. *Soil Survey of Chesterfield County, Virginia*.

Virginia Code § 10.1-1408.1.D.1 and §10.1-1408.1.D.2. August 8, 2000. *Waste Procedure No.3*.

Virginia Division of Mineral Resources (VDMR). 1993. *Geologic Map of Virginia*, 1:550,000 scale.

VDMR Report of Investigations No. 23. No date available. *Geology of the Hylas and Midlothian Quadrangles*.

Virginia Department of Environmental Quality (DEQ). 2005. Virginia Solid Waste Management Regulations – Amendment 4 (9VAC20-80 *et seq.*). December 19.

Virginia Department of Environmental Quality. August 23, 2005. *Submission Instructions Number 1, Revision No. 1*.

Virginia Department of Environmental Quality. January 2006. *Notice of Intent and Part A (Amendment) Application Template*.

TABLES

TABLE 2

Summary of Well Construction Information
Skinquarter Land, LLC
Proposed CDD Landfill
Permit No. 604

Boring Identification	Construction Date	Hydraulic Location	Boring Depth (feet)	Depth to Bedrock (feet)	Top of Casing Elevation (ft AMSL)	Ground Surface Elevation (ft AMSL)	Survey Coordinates		Well Depth From Top of Casing (feet)	Screened Interval (ft bgs)
							Northing	Easting		
P-1 / MW-1	03/19/07	Upgradient	27.5	27.5	311.33	308.88	3,666,676.09	11,689,055.53	30.10	17.5-27.5
P-2 / MW-2	03/20/07	Upgradient	50.0	NE	327.36	324.97	3,666,930.27	11,690,383.15	38.05	25-35
P-3	03/27/07	Downgradient	39.0	39.0	312.62	309.94	3,666,046.24	11,689,248.29	27.75	15-25
P-4	03/30/07	Downgradient	50.0	NE	332.31	328.25	3,666,461.95	11,689,717.84	34.25	20-30
P-5	03/20/07	Downgradient	27.5	27.5	314.76	312.45	3,666,503.39	11,690,214.30	30.10	17.5-27.5
P-6	03/23/07	Downgradient	41.0	41.0	309.27	306.82	3,665,862.66	11,689,322.51	27.60	15-25
P-7	03/29/07	Downgradient	35.5	NE	319.38	315.34	3,665,825.26	11,689,712.95	30.10	15-25
P-8	03/29/07	Downgradient	45.0	NE	314.21	311.68	3,665,856.93	11,690,065.62	27.85	15-25
P-9	03/22/07	Downgradient	55.0	NE	306.31	303.15	3,665,548.88	11,689,537.33	28.20	15-25
P-10	03/21/07	Downgradient	50.0	NE	308.13	304.30	3,665,434.46	11,689,944.46	34.20	20-30
P-11	03/21/07	Downgradient	35.0	35.0	302.01	298.64	3,665,584.89	11,690,416.30	34.61	20-30
P-12	03/28/07	Downgradient	35.0	NE	296.86	294.35	3,665,108.79	11,689,583.03	32.50	20-30
P-13 / MW-13	03/27/07	Downgradient	35.0	NE	289.24	287.06	3,664,908.27	11,690,287.96	32.10	20-30
P-14S / MW-14S	03/26/07	Downgradient	35.0	NE	275.13	273.06	3,665,429.42	11,690,739.77	37.65	25-35
P-14D / MW-14D	03/26/07	Downgradient	68.0	49.5	274.20	272.09	3,665,430.39	11,690,746.16	69.80	59-69
TB-1 *	04/13/07	Upgradient	12.0	NE	---	324.97	---	---	---	---
TB-2 *	04/13/07	Downgradient	10.0	NE	---	315.34	---	---	---	---

Notes: ft AMSL = feet above mean sea level.

ft bgs = feet below ground surface.

P = piezometer, MW = monitoring well, TB = test boring

Information obtained from well construction logs and site survey.

NE = not encountered

* TB-1 was advanced next to P-2 and TB-2 was advanced next to P-7. The ground surface elevations for TB-1 and TB-2 should be considered approximate.

TABLE 3

Summary of Hydraulic Conductivity Testing Results
Skinquarter Land, LLC
Proposed CDD Landfill
Permit No. 604

Well or Boring Identification	Falling Head K (cm/sec)	Rising Head K (cm/sec)	Geometric Average K (cm/sec)	Screen Fully Submerged?	Screened Formation
P-2 / MW-2	---	4.441E-05	4.441E-05	YES	Unconsolidated Material
P-7	8.929E-06	4.036E-05	1.898E-05	YES	Unconsolidated Material
P-14S / MW-14S	9.811E-05	2.571E-04	1.588E-04	YES	Unconsolidated Material
P-14D / MW-14D	1.293E-04	1.260E-04	1.276E-04	YES	Bedrock
Bedrock Material Average K (geometric mean): 1.276E-04 cm/sec					
Unconsolidated Material Average K (geometric mean): 5.116E-05 cm/sec					
Site Average K (geometric mean): 6.430E-05 cm/sec					

Notes : Bouwer and Rice Slug Test Method used for calculating K.
 K = Hydraulic Conductivity.
 cm/sec = centimeters per second.
 '---' = Not tested

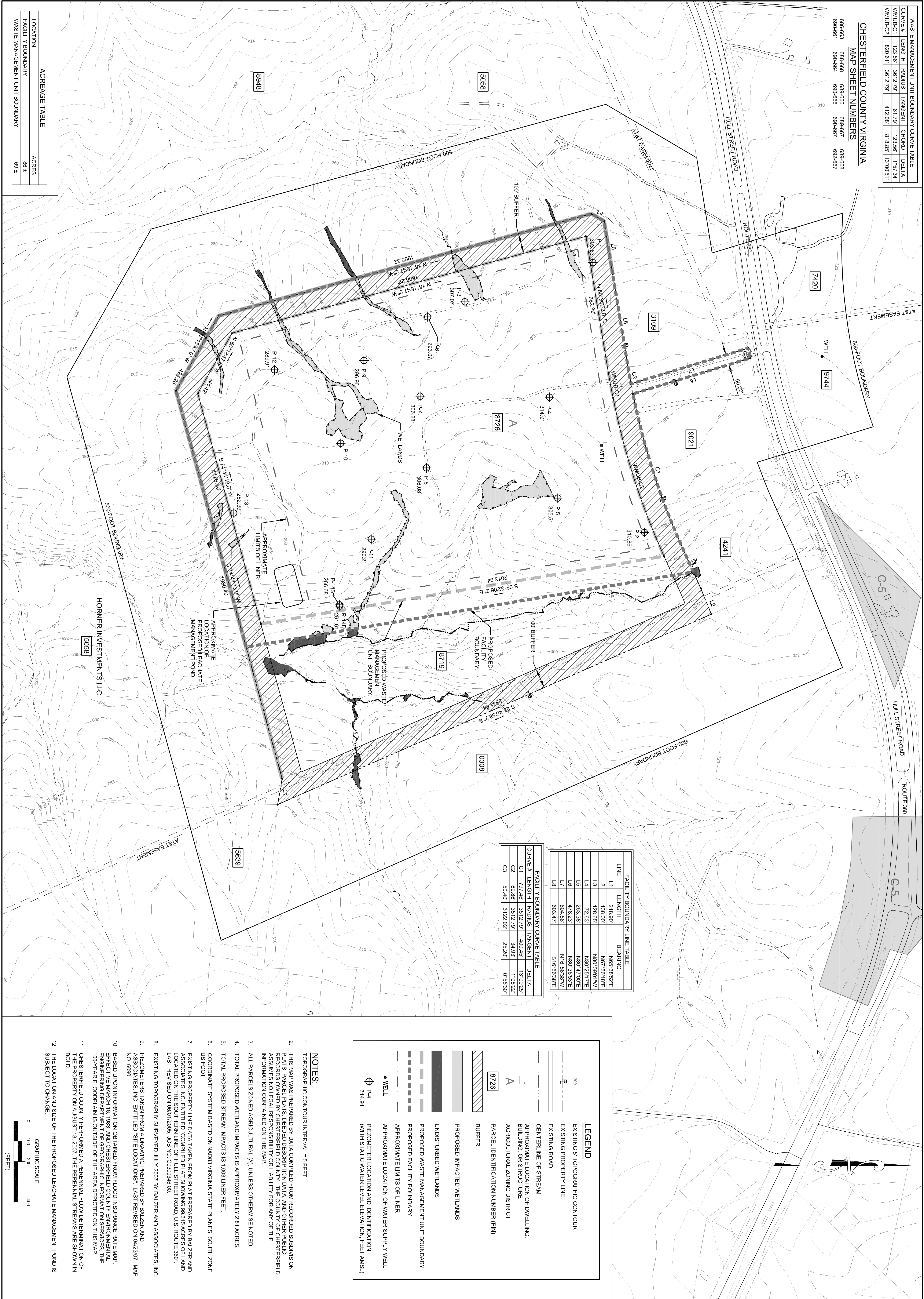
DRAWINGS

CURVE #	LENGTH	RADIUS	TANGENT	CHORD	DELTA
WMUB-C1	123.66'	3612.79'	61.79'	123.66'	1°57'34"
WMUB-C2	820.61'	3612.79'	412.08'	818.85'	13°00'51"

CHESTERFIELD COUNTY VIRGINIA

MAP SHEET NUMBERS

86-663	688-668	689-666	688-667	689-668
90-661	690-664	690-666	690-667	692-667



FACILITY BOUNDARY LINE TABLE		
LINE	LENGTH	BEARING
L-1	218.90'	N65.38S92.9E
L-2	138.00'	N67.56S71.8E
L-3	128.65'	N80.09S01.7W
L-4	72.63'	N30.25S17.6E
L-5	263.38'	N80.47S07.8E
L-6	478.23'	N80.36S53.3E
L-7	604.86'	N16.56S38.3W
L-8	603.47'	S16.56S38.3E

FACILITY BOUNDARY CURVE TABLE				
CURVE #	LENGTH	RADIUS	TANGENT	DELTA
C1	797.46'	3512.79'	400.45'	13°00'25"
C2	69.86'	3512.79'	34.93'	1°08'22"
C3	50.40'	3122.02'	25.20'	0°56'30"

	300' ---+---+---+ EXISTING PROPERTY LINE _____ EXISTING ROAD ---+---+---+ CENTERLINE OF STREAM [D] APPROXIMATE LOCATION OF DWELLING, BUILDING, OR STRUCTURE [A] AGRICULTURAL ZONING DISTRICT [8726] PARCEL IDENTIFICATION NUMBER (PIN) [Hatched] BUFFER [Solid Grey] PROPOSED IMPACTED WETLANDS [Wavy] UNDISTURBED WETLANDS [Dashed] PROPOSED WASTE MANAGEMENT UNIT BOUNDARY [Dotted] PROPOSED FACILITY BOUNDARY [Cross-Ticks] APPROXIMATE LIMITS OF LINER [Cross-Ticks] APPROXIMATE LOCATION OF WATER SUPPLY WELL [Circle with Cross] PIEZOMETER LOCATION AND IDENTIFICATION (WITH ± STATO WATER LEVEL ELEVATION, FEET AMSL)
--	--

- NOTES:

2. THIS MAP WAS PREPARED BY A DATA COMPILED FROM RECORDED SUBDIVISION PLATS, PARCEL PLATS, DEEDED DESCRIPTION DATA, AND OTHER PUBLIC RECORDS OWNED BY CHESTERFIELD COUNTY. THE COUNTY OF CHESTERFIELD ASSUMES NO LEGAL RESPONSIBILITY OR LIABILITY FOR ANY OF THE INFORMATION CONTAINED ON THIS MAP.
3. ALL PARCELS ZONED AGRICULTURAL (A), UNLESS OTHERWISE NOTED.
4. TOTAL PROPOSED WETLAND IMPACTS IS APPROXIMATELY 2.81 ACRES.
5. TOTAL PROPOSED STREAM IMPACTS IS 1,003 LINER FEET.
6. COORDINATE SYSTEM BASED ON NAD83 VIRGINIA STATE PLANES, SOUTH ZONE, US FOOT.
7. EXISTING PROPERTY LINE DATA TAKEN FROM PLAT PREPARED BY BALZER AND ASSOCIATES INC. ENTITLED "COMPILED PLAT SHOWING 89.315 ACRES OF LAND LOCATED ON THE SOUTHERN LINE OF HILL STREET ROAD, U.S. ROUTE 360", LAST REVISED ON 06/07/2005, JOB NO. C03903046/00.
8. EXISTING TOPOGRAPHY SURVEYED JULY 2007 BY BALZER AND ASSOCIATES, INC.
9. MEASUREMENTS TAKEN FROM A DRAWING PREPARED BY BALZER AND ASSOCIATES, INC. ENTITLED "SITE LOCATIONS". LAST REVISED ON 04/23/07, MAP NO. 6090.
10. BASED UPON INFORMATION OBTAINED FROM FLOOD INSURANCE RATE MAP, EFFECTIVE MARCH 16, 1983, AND CHESTERFIELD COUNTY ENVIRONMENTAL ENGINEERING DEPARTMENT OF GEOGRAPHIC INFORMATION SERVICES, THE 100-YEAR FLOODPLAIN IS OUTSIDE OF THE AREA DEPICTED ON THIS MAP.
11. CHESTERFIELD COUNTY PREPARED A PERENNIAL FLOW DETERMINATION OF THE PROPERTY ON AUGUST 13, 2007. THE PERENNIAL STREAMS ARE SHOWN IN BOLD.
12. THE LOCATION AND SIZE OF THE PROPOSED LEACHATE MANAGEMENT POND IS SUBJECT TO CHANGE.

DATE	REVISIONS AND RECORD OF ISSUE			NO	BY
				CK	APP

DESIGNED _____
DRAWN _____
CHECKED _____
APPROVED _____
DATE 09/19/07

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JONE
ENGINEERING, INC.
1604 OWNBY LANE
RICHMOND, VA 23220
PHONE: (804) 355-4520

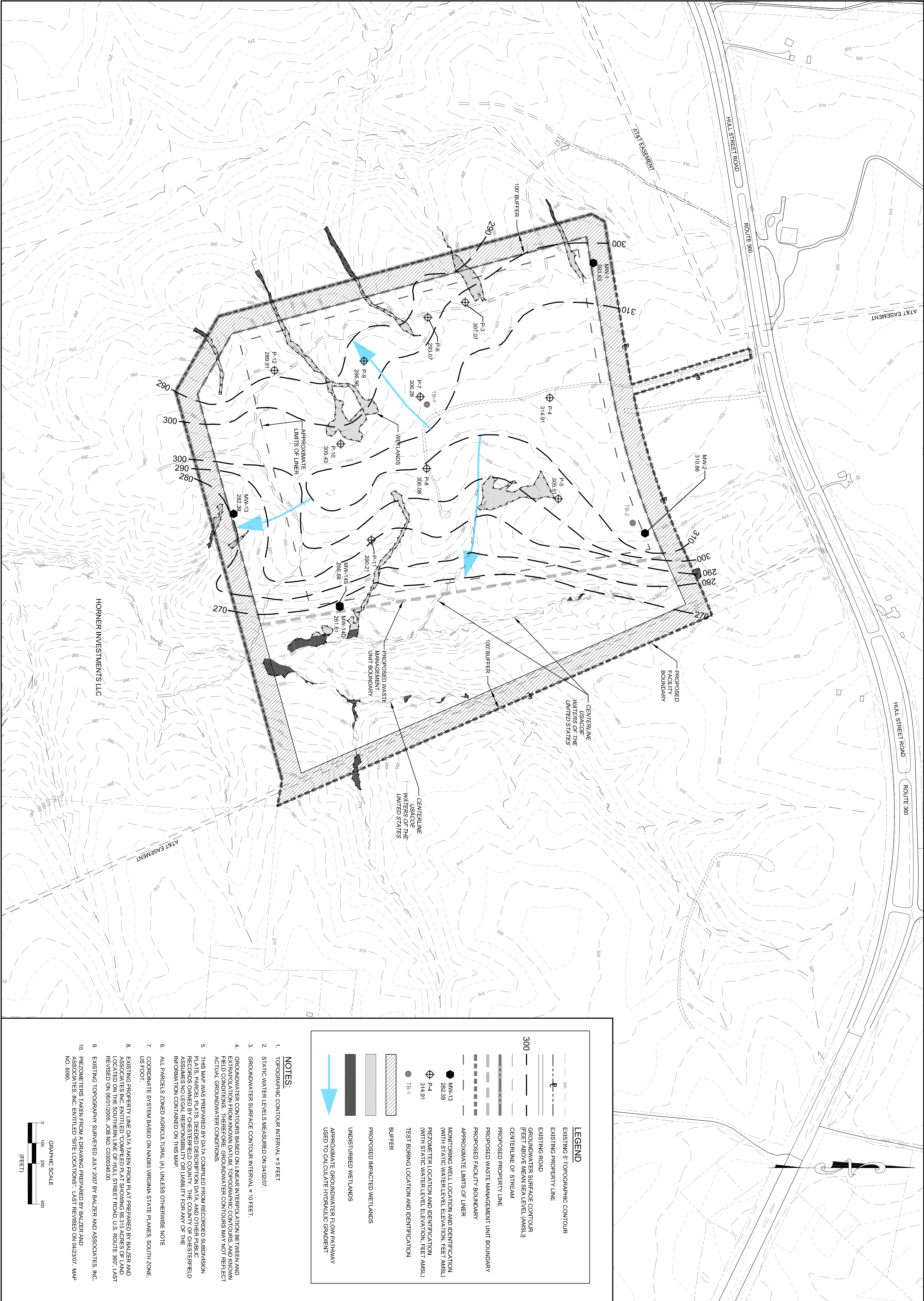
SKINQUARTER LAND, LLC—PROPOSED CDD LANDFILL
PART A PERMIT APPLICATION

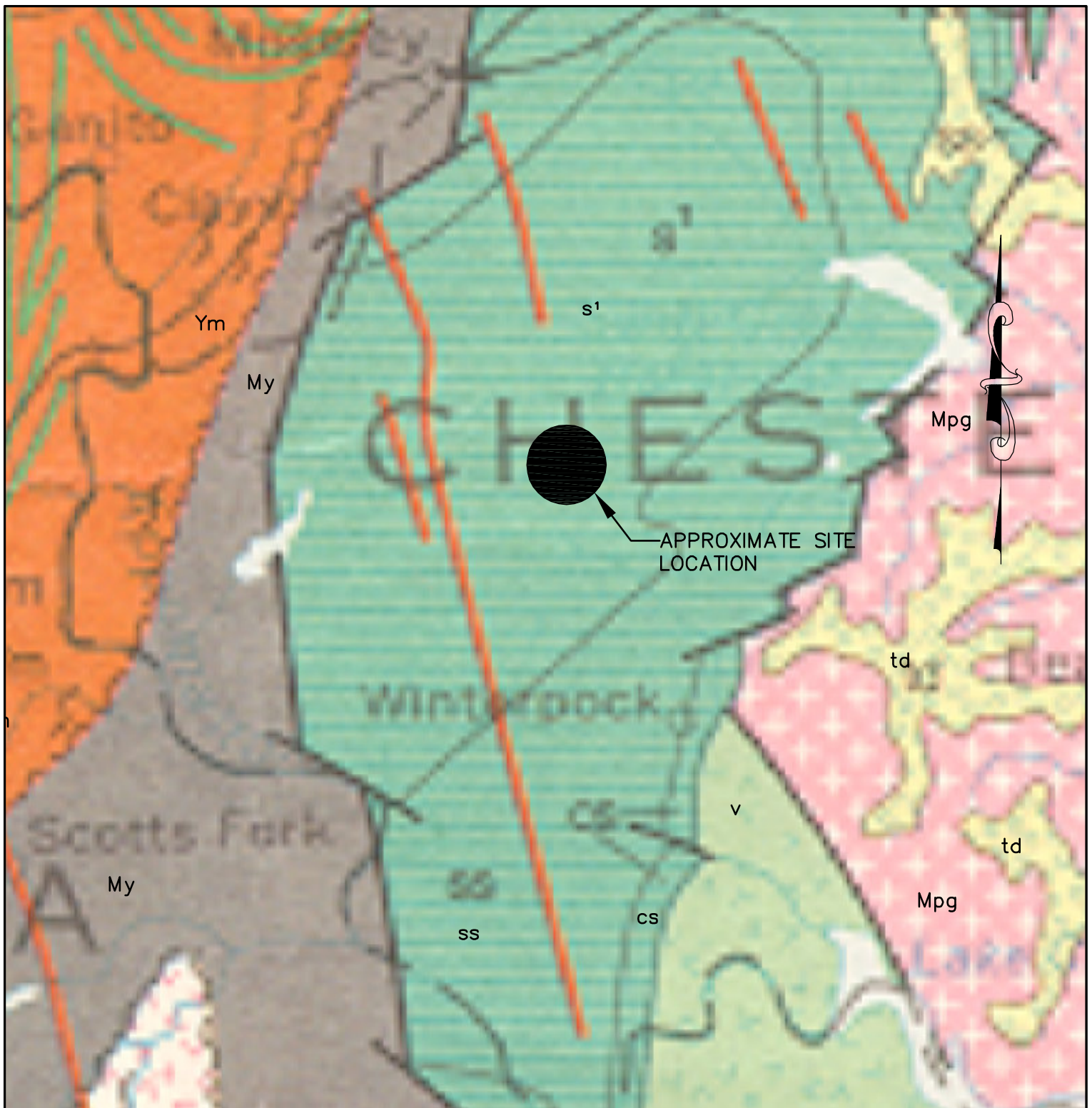
NEAR VICINITY MAP

PROJECT NO.
620.02.02

SCALE
1"=200'

DRAWING NO.





SKINQUARTER LAND SITE GEOLOGIC MAP

SOURCE:
GEOLOGIC MAP OF VIRGINIA, LAST UPDATED 1993

L:\Skinquarter Land\dwg\Part A\
05A-geologic.dwg

09/19/07



1604 OWNBY LANE
RICHMOND, VA 23220-1317
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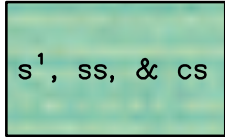
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1"=10,000'

PROJECT NO.
620.02.02

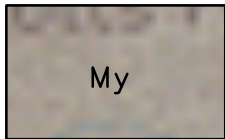
SKINQUARTER LAND
GEOLOGIC MAP
DRAWING NO. 5A



v = LATE PROTEROZOIC TO CAMBRIAN MAFIC AND
FELSIC VOLCANIC ROCKS



s', ss, cs = TRIASSIC NEWARK SUPERGROUP, s –
ARKOSIC SANDSTONE, ss – INTERBEDDED
SANDSTONE, SILTSTONE, AND SHALE, cs –
INTERBEDDED SANDSTONE, SILTSTONE, SHALE, AND
COAL



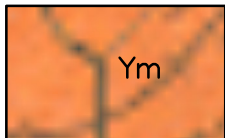
My – LATE PALEOZOIC MYLONITE, MYLONITE GNEISS,
AND CATACLASTIC ROCKS



DIKE – JURASSIC DIABASE DIKE



fg – UNDIFFERENTIATED GNEISSIC GRANITE AND
GRANODIORITE



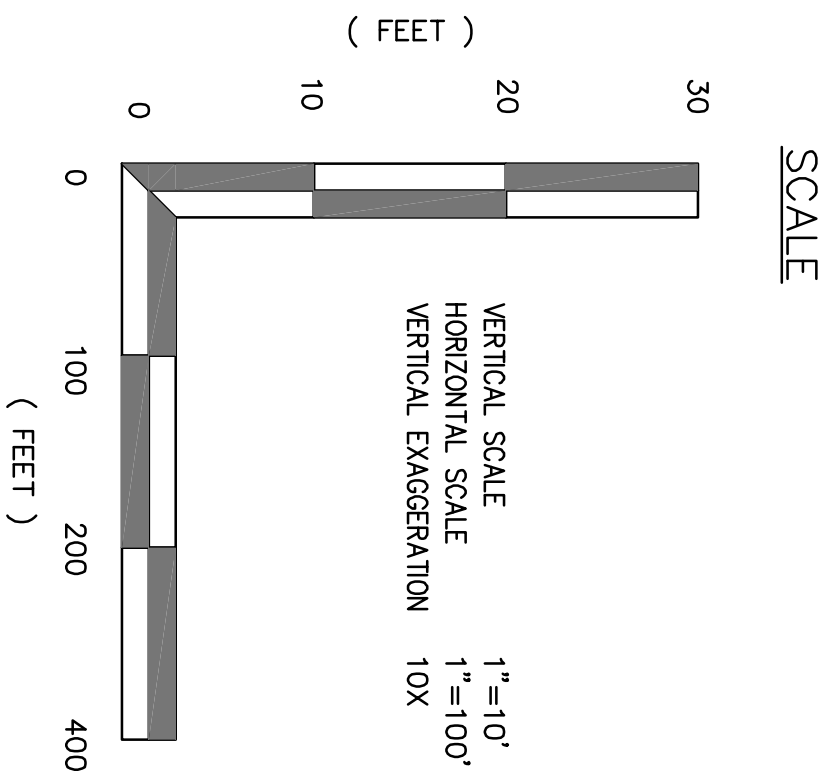
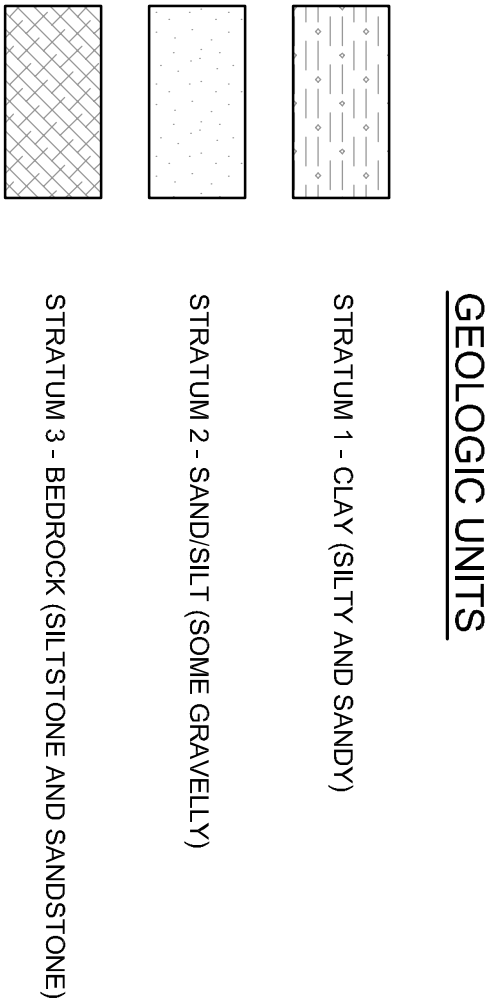
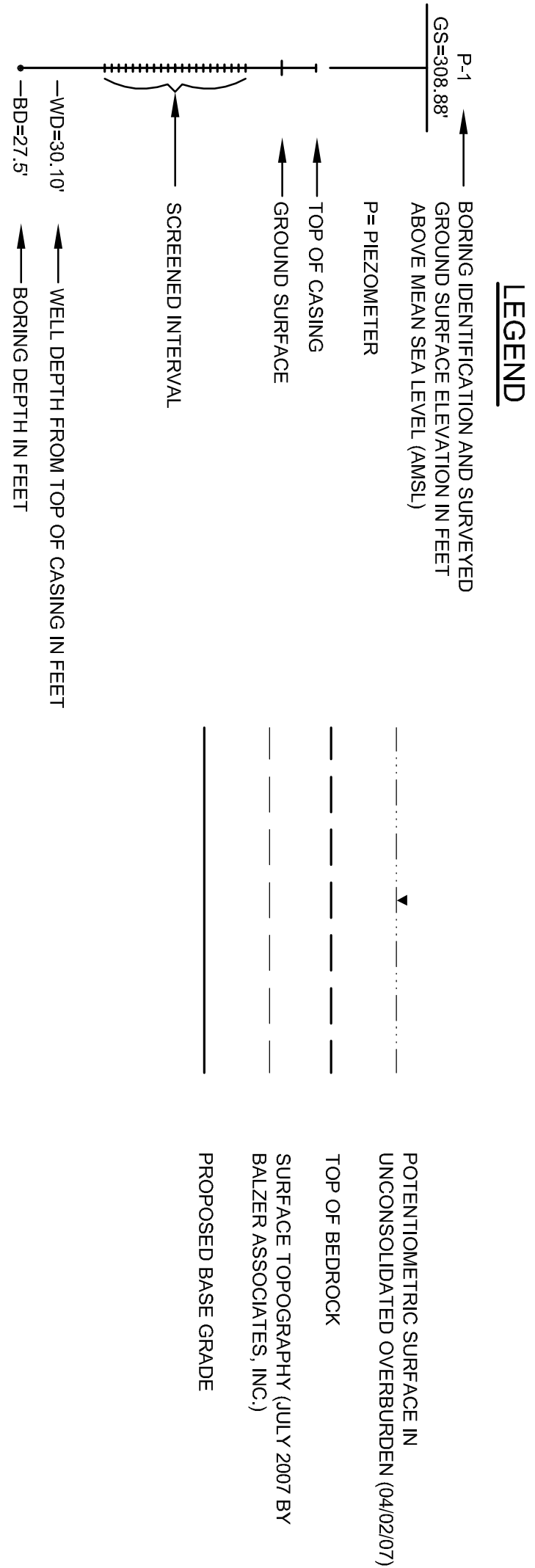
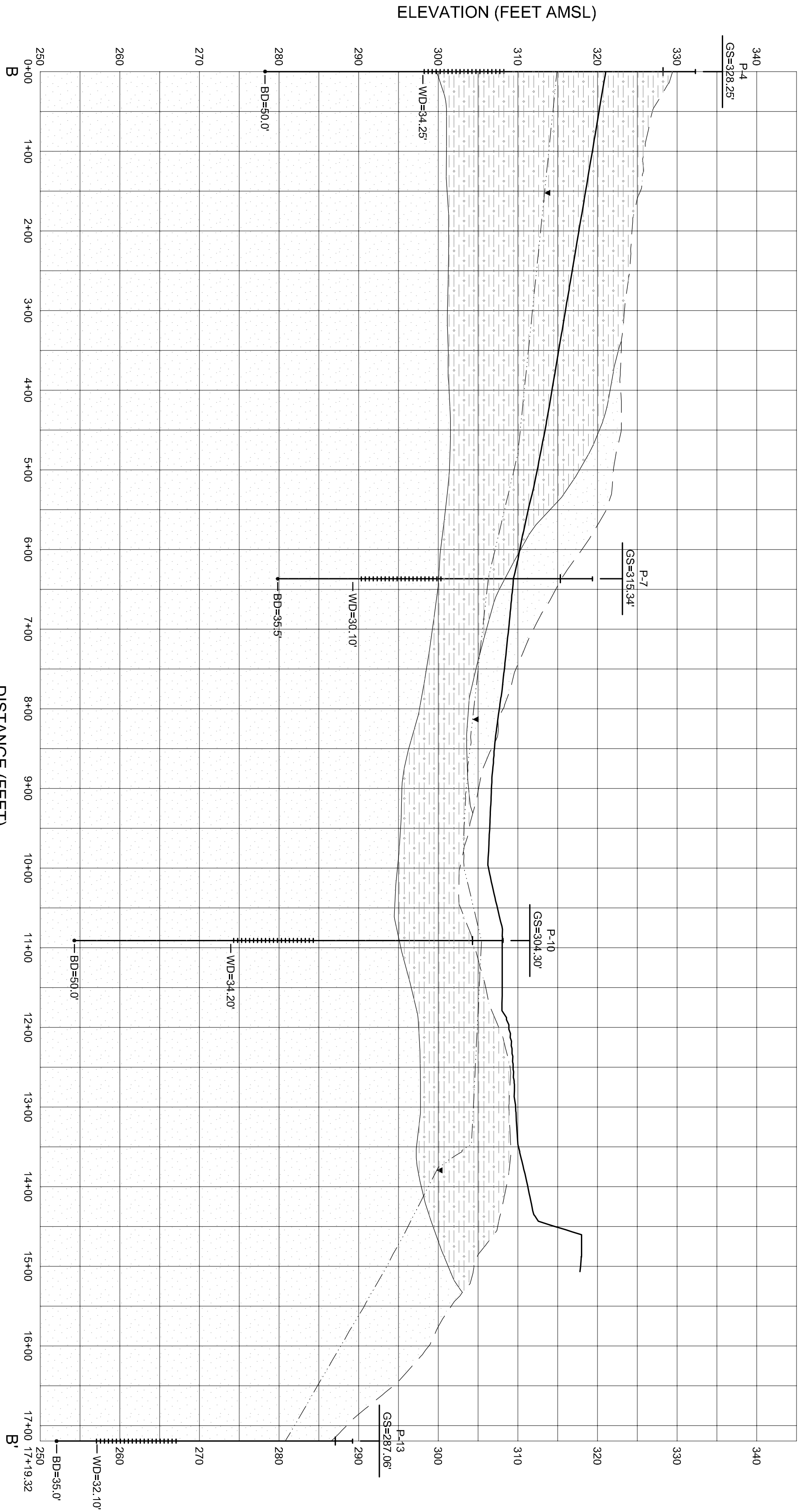
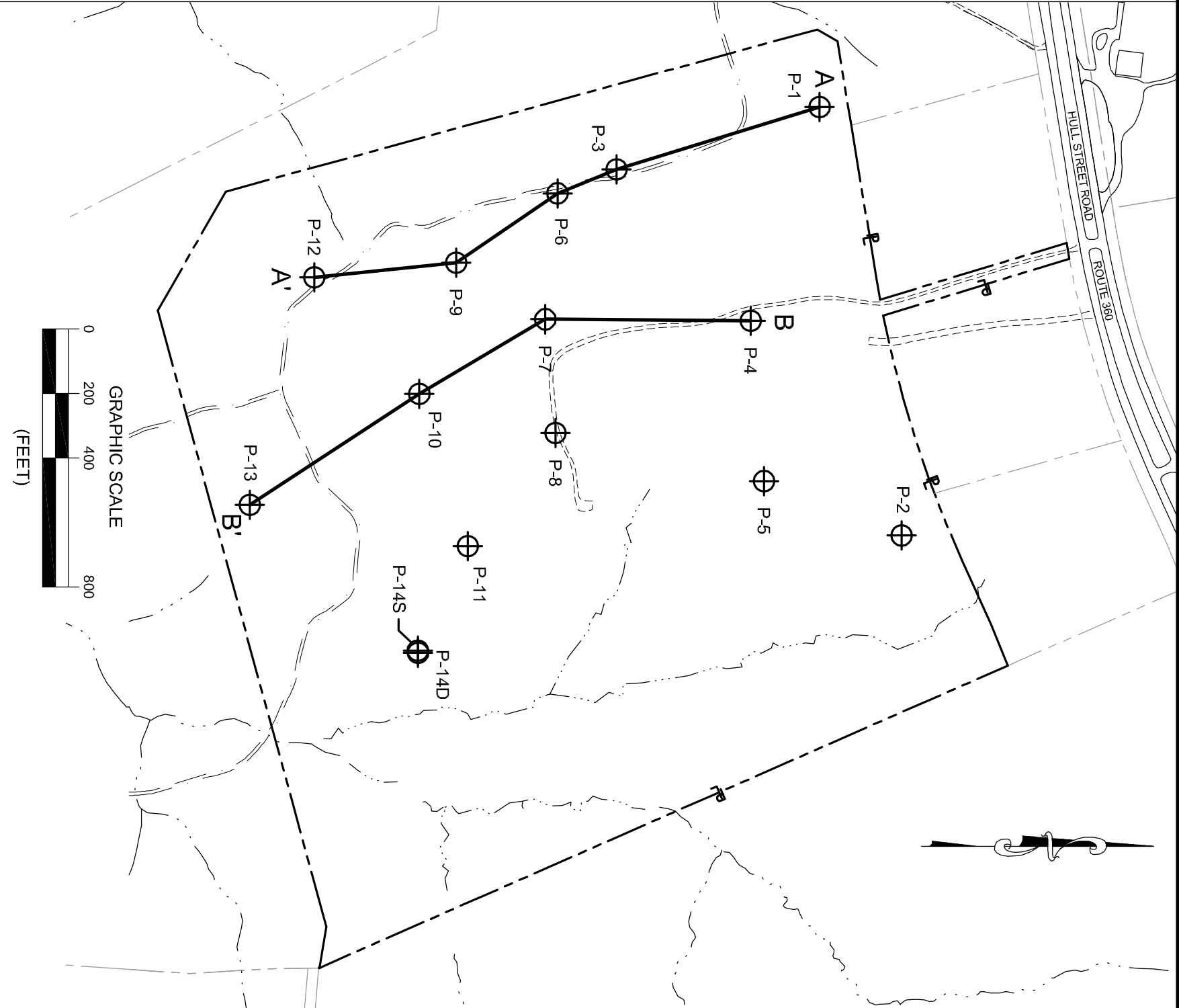
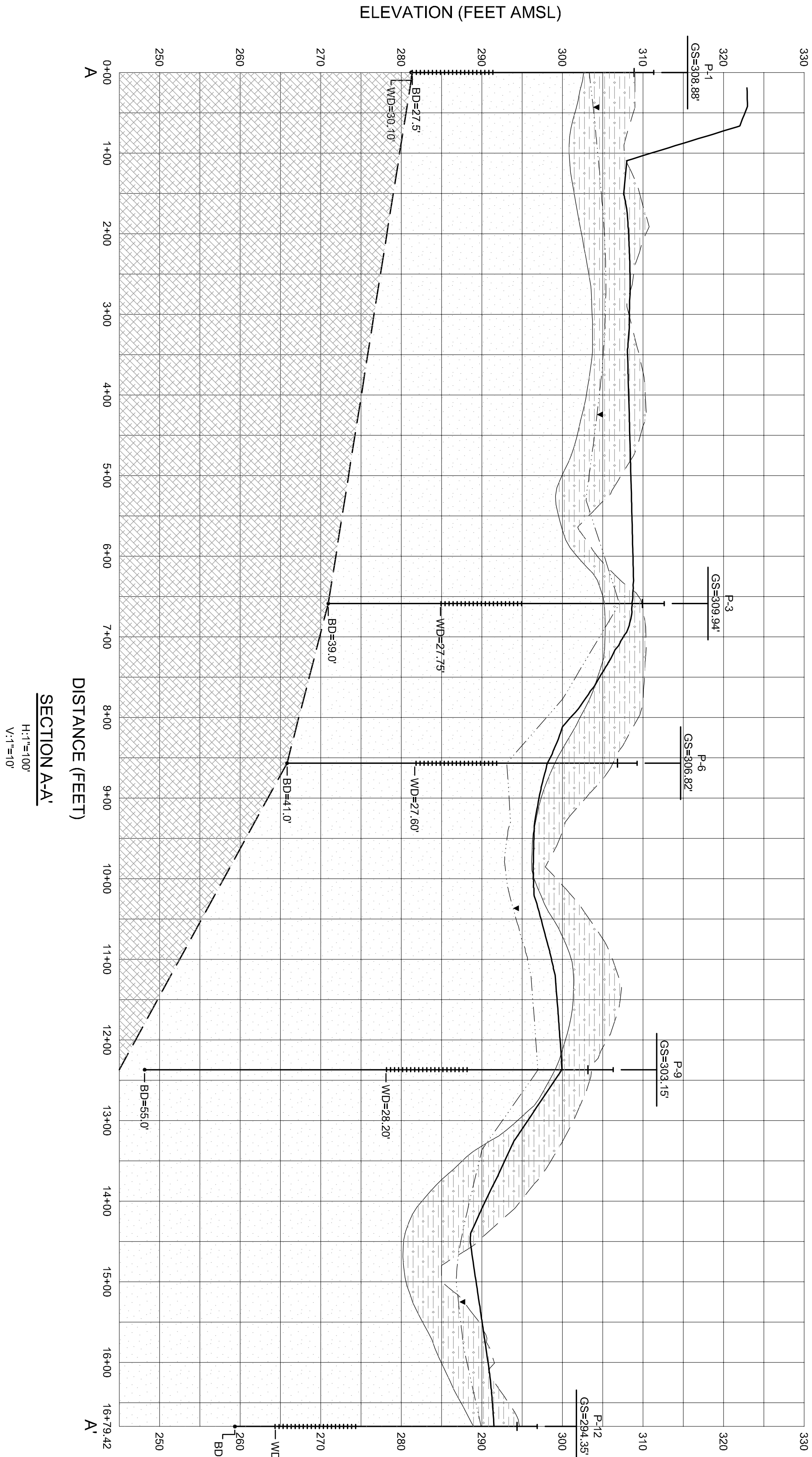
Ym – PROTEROZOIC PORPHYROBLASTIC
GARNET-BIOTITE GNEISS



Mpg – MISSISSIPPIAN PETERSBURG GRANITE



td – TERTIARY TERRACE DEPOSITS
UNDIFFERENTIATED – POORLY SORTED CLAY, SAND,
AND ROUNDED PEBBLES AND COBBLES, DEEPLY
WEATHERED



SKINQUARTER LAND, LLC--PROPOSED CDD LANDFILL
PART A PERMIT APPLICATION

CROSS SECTIONS A-A' AND B-B'

JOYCE
ENGINEERING, INC.
1604 OWNBY LANE
RICHMOND, VA 23220
PHONE: (804) 355-4520

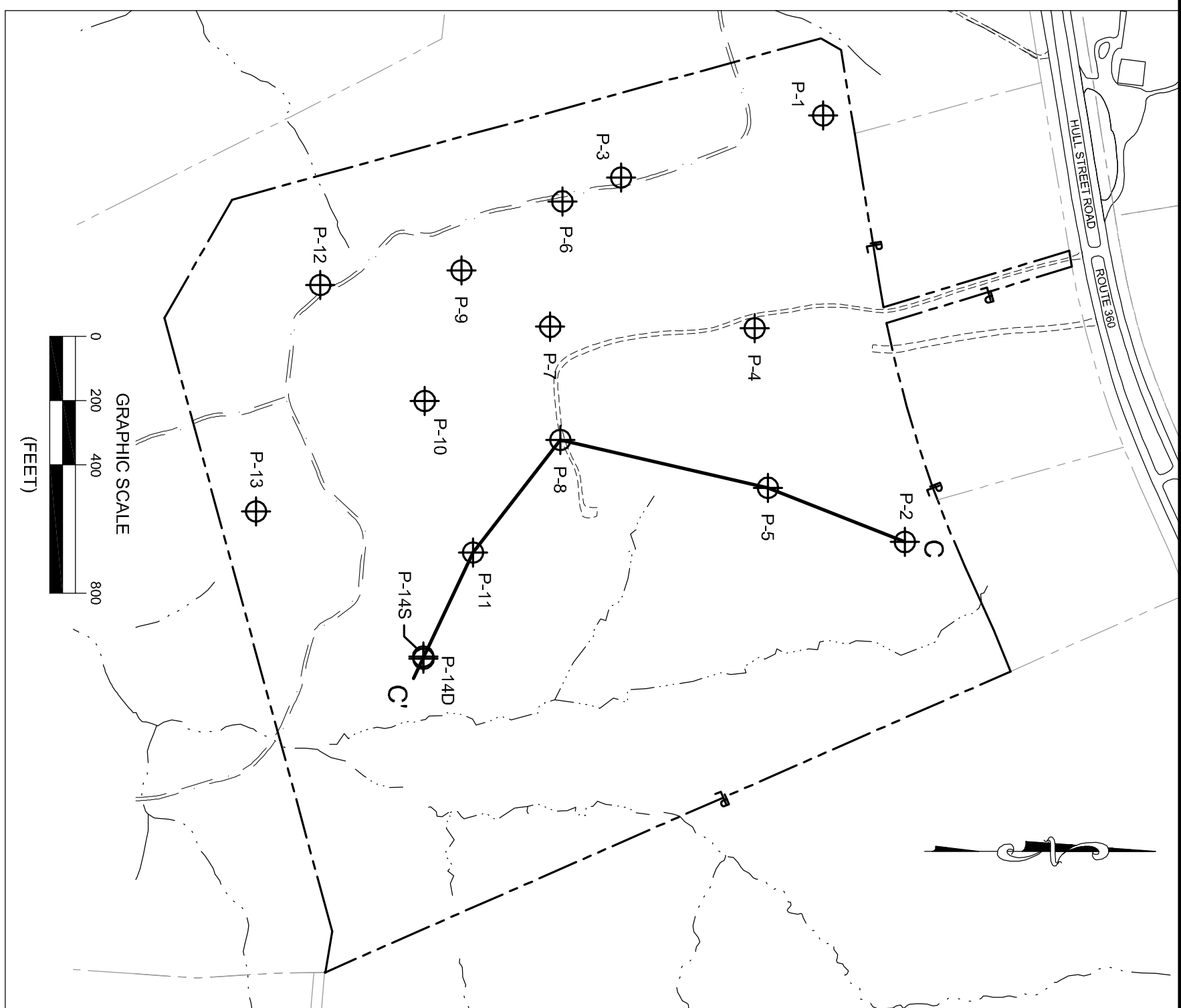
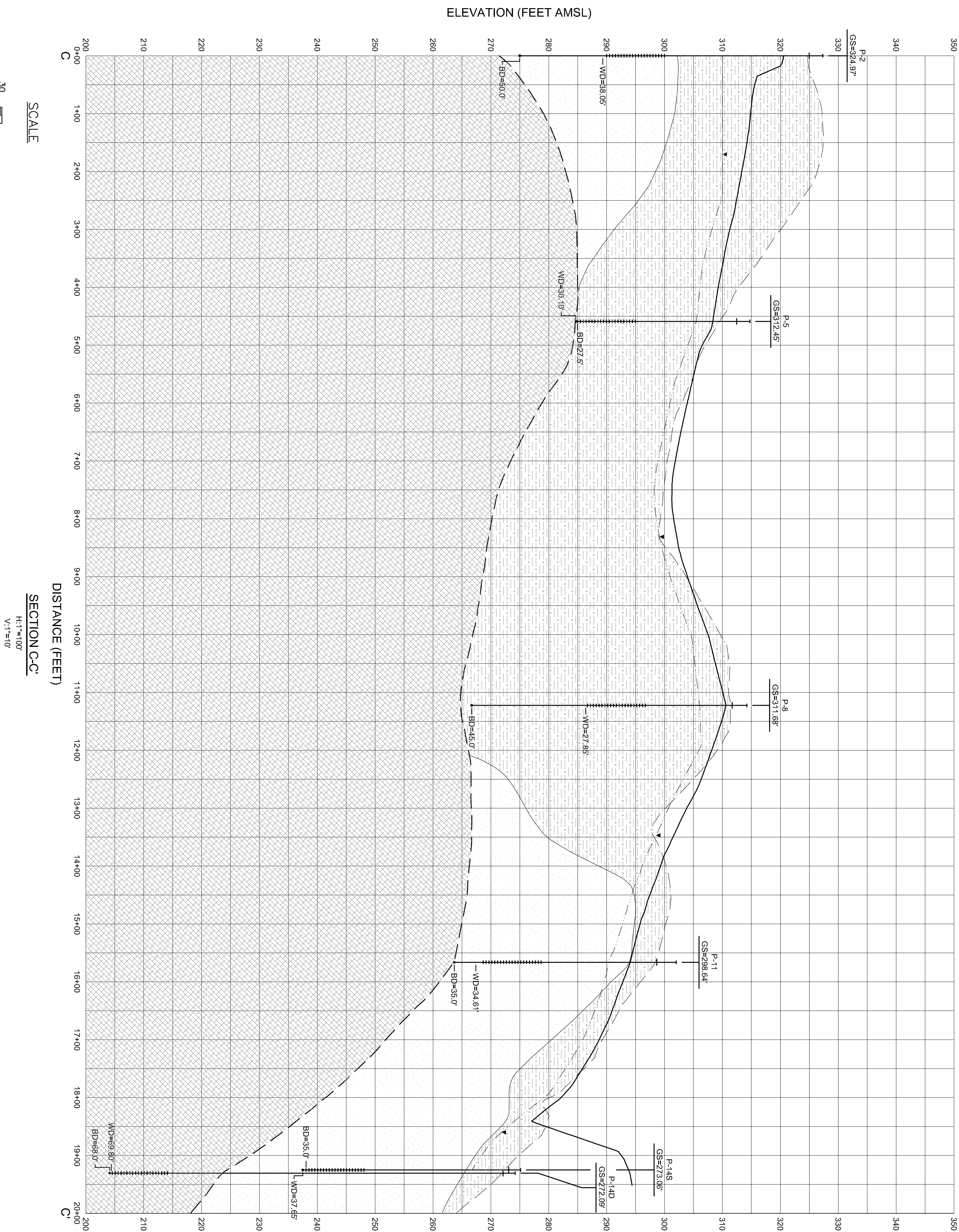
DESIGNED
DRAWN
CHECKED
APPROVED
DATE 09/19/07

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PROJECT NO.
620.02.02

SCALE
AS SHOWN

DRAWING NO.
6



DESIGNED _____
DRAWN _____
CHECKED _____
APPROVED _____
DATE 09/19/07

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ENGINEERING, INC.
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SKINQUARTER LAND, LLC—PROPOSED CDD LANDFILL
PART A PERMIT APPLICATION

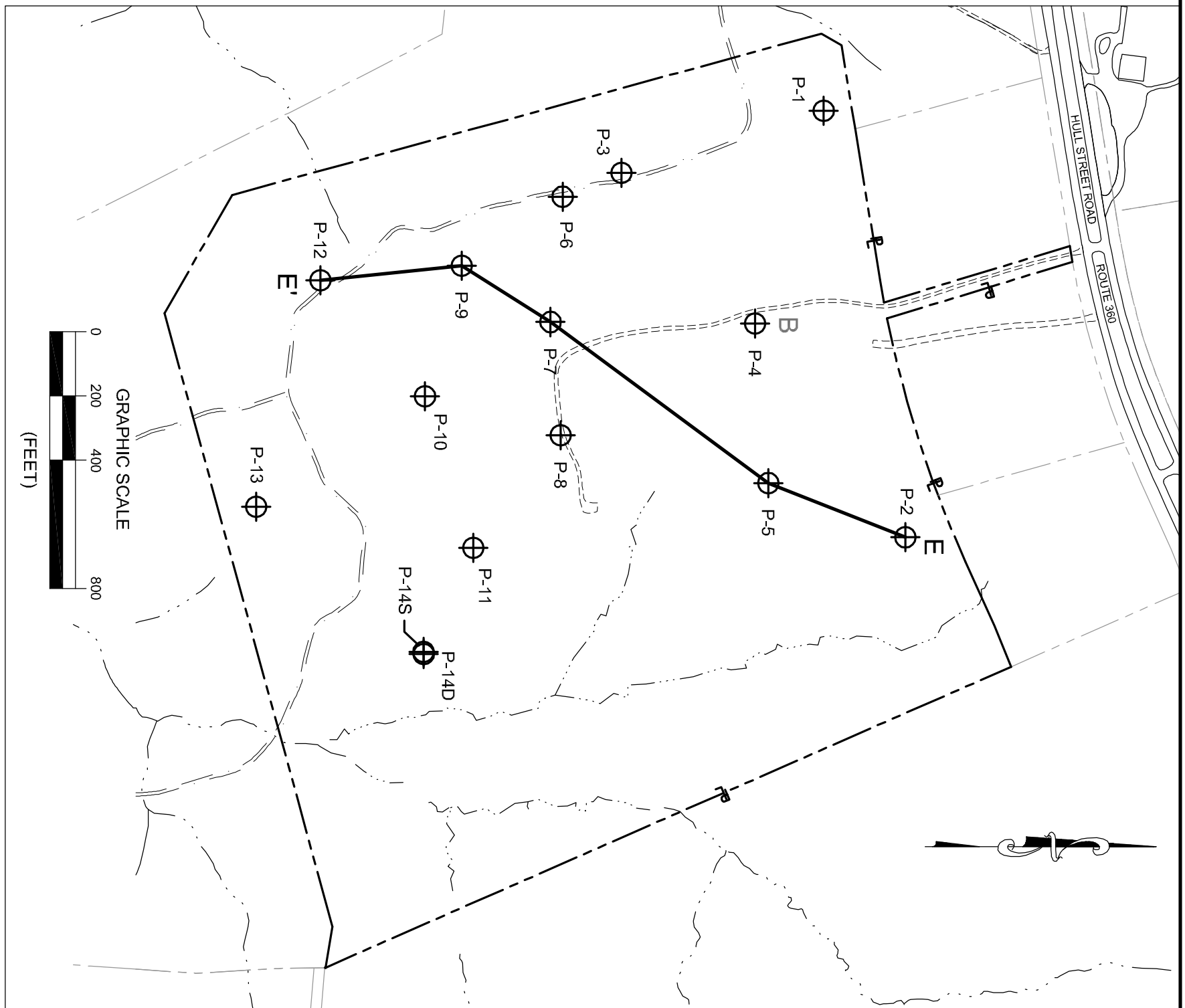
CROSS SECTIONS C-C'

PROJECT NO.
620.02.02

SCALE
AS SHOWN

DRAWING NO.

[illegible]

[illegible]

DESIGNED _____
DRAWN _____
CHECKED _____
APPROVED _____
DATE 09/19/07

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LOWE
ENGINEERING, INC.
1604 OWNBY LANE
RICHMOND, VA 23220
PHONE: (804) 355-4520

SKINQUARTER LAND, LLC—PROPOSED CDD LANDFILL
PART A PERMIT APPLICATION

CROSS SECTIONS E-E'

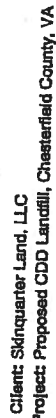
PROJECT NO.
620.02.02

SCALE
AS SHOWN

DRAWING NO.

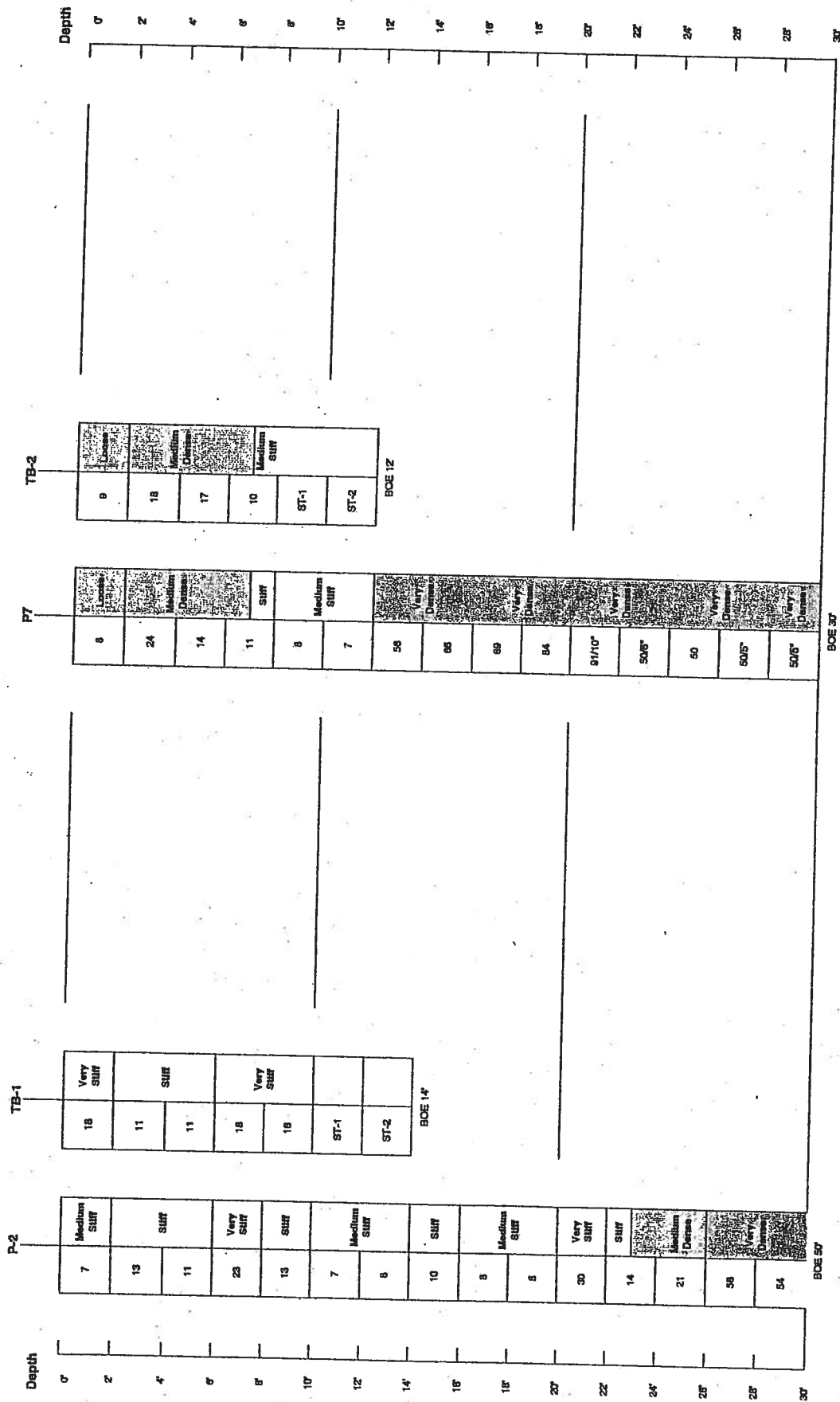
APPENDICES

APPENDIX I
GEOTECHNICAL DATA SUMMARY AND
LABORATORY CERTIFICATES-OF-ANALYSIS



Prepared By: Rich Brown, PE
Date: September 12, 2007

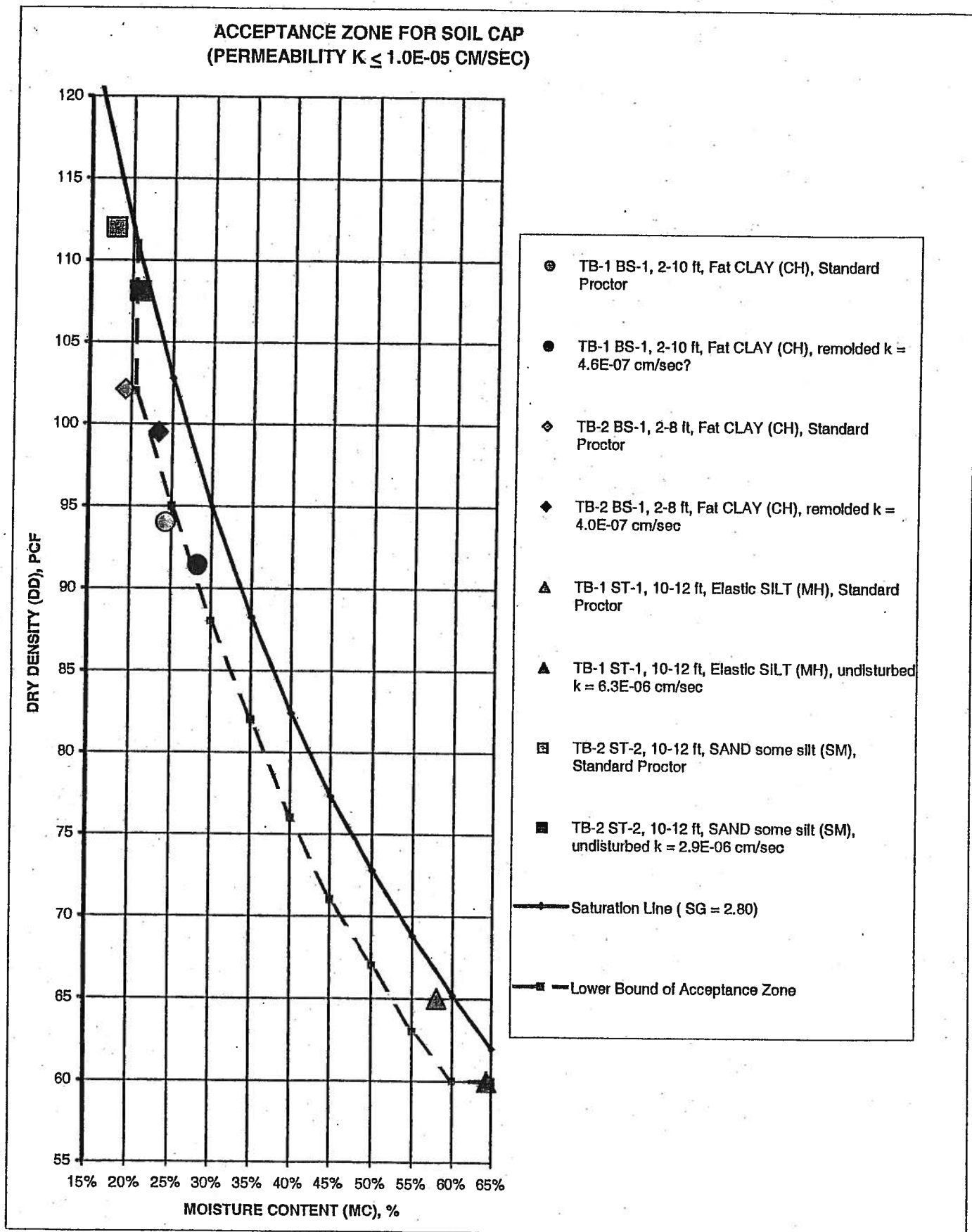
PIEZOMETER AND TEST BORING N-VALUE COMPARISON



Notes:

1. for CLAY, $N = 0$ to 2 very soft; 3 to 4 soft; 5 to 8 medium stiff; 9 to 15 stiff; 16 to 30 very stiff; >30 hard
2. for SAND, $N = 0$ to 4 very loose; 5 to 10 loose; 11 to 30 medium dense; 31 to 50 dense; >50 very dense

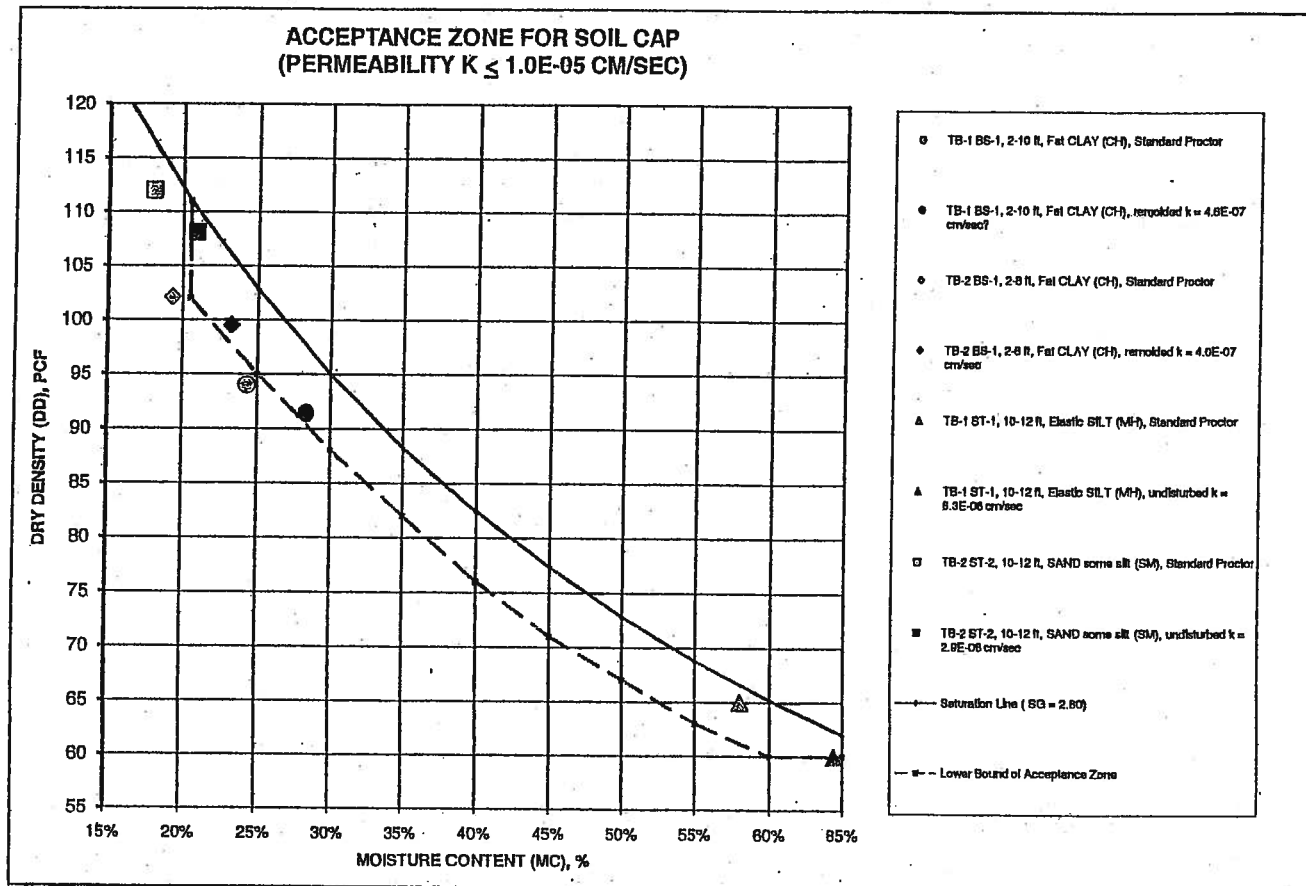
P-5: Sdkrqrqrter COD LP Gactech Evaluaunt 2007 Gactech Study for Part A\2007_09\12 P-2 and P-7 vs. TB-1 and TB-2 comparison vs\April 2007 P-2 and P-7





PERMEABILITY ACCEPTANCE ZONE FOR ON-SITE SOILS

Joyce Engineering, Inc. developed this moisture content and dry density relationship chart from laboratory tests on four on-site soil samples as a guide to the moisture content (MC) and dry density (DD) combinations required to achieve permeability suitable for landfill soil cap ($k \leq 1.0E-05$ cm/sec). The two fat CLAY (CH) samples from 2 to 10 ft depth were remolded to MC and DD combinations that achieved the required permeability for soil cap. The elastic SILT (MH) and SAND some silt (SM) soil samples from 10 to 12 ft depth in their undisturbed state also had MC and DD combinations that achieved the required permeability for soil cap.



Boring and Sample	Standard Proctor		Remolded Bulk Sample from Depth 2 to 10 ft						% Fines (Silt and Clay)	Atterberg Limits			Potential Landfill Use
	OMC, %	MDD, pcf	Unified Soil Classification	MC, %	DD, pcf	MC - OMC, %	Compaction = DD/MDD, %	Remolded Perm, cm/sec		LL	PL	PI	
TB-1, BS-1	24.3%	94.0	Sandy Fat CLAY (CH)	26.3%	91.4	4.0%	97.2%	4.6E-07	66%	81	29	52	Cap
TB-2, BS-1	19.3%	102.1	Sandy Fat CLAY (CH)	23.3%	99.5	4.0%	97.5%	4.0E-07	50%	64	24	40	Cap

Boring and Sample	Standard Proctor		Shelby Tube Sample from Depth 10 to 12 ft						% Fines (Silt and Clay)	Atterberg Limits			Potential Landfill Use
	OMC, %	MDD, pcf	Unified Soil Classification	MC, %	DD, pcf	MC - OMC, %	Compaction = DD/MDD, %	Undisturbed Perm, cm/sec	LL	PL	PI		
TB-1, ST-1	58.0%	85.0	Elastic SILT (MH)	64.4%	60.0	6.4%	92.3%	8.3E-06	84%	45	23	22	Cap
TB-2, ST-2	18.0%	112.0	SAND, some silt (SM)	20.9%	108.1	2.9%	96.5%	2.9E-06	25%	45	21	24	Cap

Acceptance Zone for $k \leq 1.0E-05$ cm/sec		
Moisture Content	Dry Density, pcf	
	Lower	Upper
15.0%	123.0	123.0
20.5%	111.0	111.0
20.5%	102.0	111.0
25.0%	95.0	102.8
30.0%	88.0	95.0
35.0%	82.0	88.2
40.0%	76.0	82.4
45.0%	71.0	77.3
50.0%	67.0	72.8
55.0%	63.0	68.8
60.0%	60.0	65.2
65.0%	60.0	62.0

Ave specific gravity = 2.80



ENGINEERING, INC.
1804 Ownby Lane, Richmond, VA 23220
Tel. (804) 355-4520 Fax: (804) 355-4282

SOIL CLASSIFICATION REPORT

Project Name: Skinquarter CDD LF, Part A, Chesterfield County, VA
Sampled by: Joyce Engineering, Inc., tested by Geotechnics, Inc.

JEI Project: 620.02, Task 02
Report Date: September 12, 2007

Test Boring:		TB-1	TB-2	TB-1	TB-2
Sample:		BS-1	BS-1	ST-1	ST-2
Location		North corner of site	North corner of site	North corner of cell	Center of cell
Northing Coordinate					
Easting Coordinate					
Ground Surface Elevation		322	320	322	320
Depth Below Surface (ft.)		2 to 10	2 to 8	10 to 12	10 to 12
Sample Elevation		320 - 312	318 to 312	312 to 310	310 to 308
Soil Description		Brown, sandy [s] CLAY (CH)	Brown, sandy [s] CLAY (CH)	Brown, silty silt, some sand (MH)	Brown SAND some silt (SM)
Initial Moisture (%) ASTM D 2216		27.6	23.9	64.5	21.5
Sieve Size	Soil Size Retained	Sieve Analysis			
		% Passing	% Passing	% Passing	% Passing
2 inch	coarse gravel	100	100	100	100
1-1/2 inch		100	100	100	100
3/4 inch		100	100	100	100
1/2 inch		99	100	100	100
3/8 inch	fine gravel	99	100	100	100
No. 4 (4.7 mm)		98	100	100	100
No. 10 (2.0 mm)	coarse sand	94	98	98	99
No. 40 (0.42 mm)	medium sand	80	73	91	53
No. 200 (0.074 mm)	fine sand	66	50	84	25
Proportion by Weight:					
Gravel		2	0	0	0
Sand		33	50	16	75
Fines (silt and clay)		66	50	84	25
Atterberg Limits:					
Liquid Limit (LL)		81	64	97	32
Plastic Limit (PL)		29	24	61	26
Plasticity Index (PI)		52	40	36	6
Specific Gravity: ASTM D 854		2.74	2.67	2.81	2.65
Standard Proctor: ASTM D 698					
Opt. Moisture Content (OMC), %		24.3%	19.3%	Assume 58%	Assume 18%
Max. Dry Density (MDD), pcf		94.0	102.1	Assume 65	Assume 112
Permeability:		Remolded	Remolded	Undisturbed	Undisturbed
ASTM D 5084, for samples at:					
Moisture Content (MC), %		28.3%	23.3%	64.4%	20.9%
MC - OMC, %		4.0%	4.0%	6.4%	2.9%
Dry Density (DD), pcf		91.4	99.5	60.0	108.1
Compaction (DD/MDD), %		97.2%	97.5%	92.3%	96.5%
Permeability, cm/sec		4.6E-07	4.0E-07	3.3E-06	2.9E-06

Note: All four permeability tests indicate soils are suitable for soil cap, but not for compacted clay liner.

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client JOYCE ENGINEERING, INC.
Client Reference PROPOSED CDD LANDFILL
Project No. 2007-576-01

Lab ID	.001	.002	.003	.006
Boring No.	TB-1	TB-2	TB-1	TB-2
Depth (ft)	2-10	2-8	10-12	10-12
Sample No.	BS-1	BS-1	ST-1	ST-2
Tare Number	211	217	201	212
Wt. of Tare & WS (gm)	731.11	1125.25	566.16	659.61
Wt. of Tare & DS (gm)	610.06	946.02	411.09	573.21
Wt. of Tare (gm)	171.19	196.69	170.73	171.54
Wt. of Water (gm)	121.05	179.23	155.07	86.4
Wt. of DS (gm)	438.87	749.33	240.36	401.67
Water Content (%)	27.6	23.9	64.5	21.5

Notes : NA

Tested By KMR Date 4/25/2007 Checked By  Date 2-14-07
page 1 of 1 DCN: CT-S1 DATE 6-30-98 REVISION: 2 \\Lab1\c\2007 PROJECTS\2007-576 JOYCE\2007-576-01 WATCONT.XLS\Sheet1

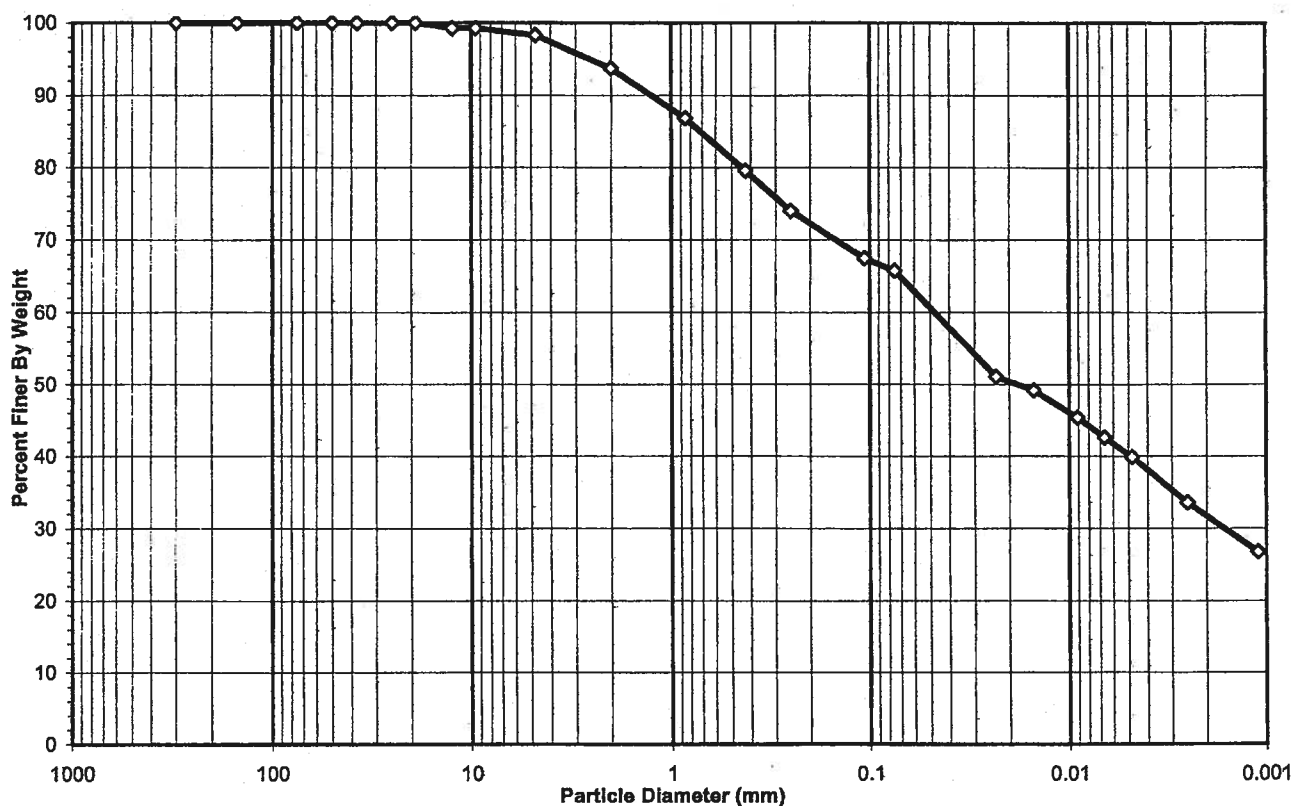
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client JOYCE ENGINEERING, INC.
Client Reference PROPOSED CDD LANDFILL
Project No. 2007-576-01
Lab ID 2007-576-01-01

Boring No. TB-1
Depth (ft) 2-10
Sample No. BS-1
Soil Color BROWN

USCS USDA	SIEVE ANALYSIS					HYDROMETER	
	cobbles	gravel	sand			silt and clay fraction	
	cobbles	gravel	sand			silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200

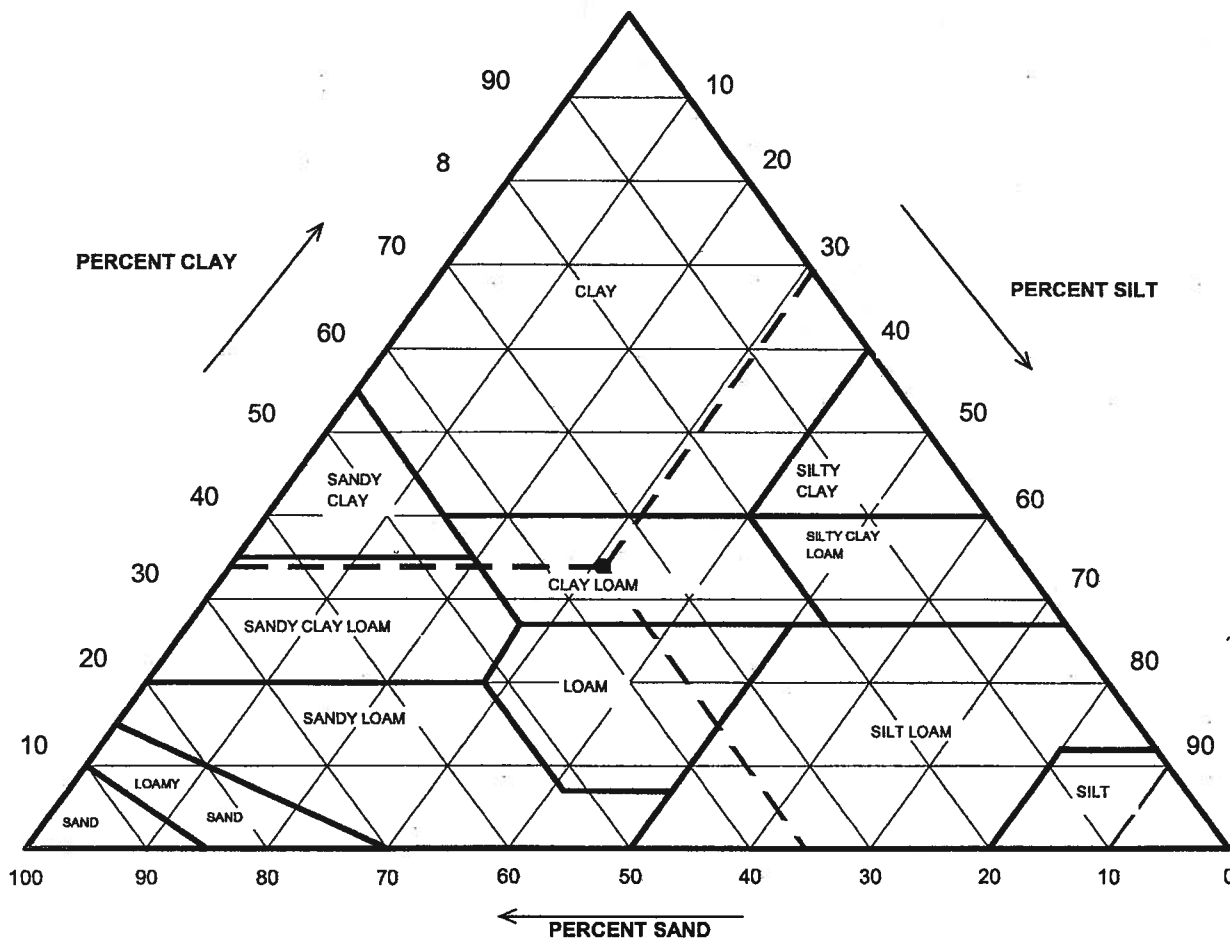


USDA CLASSIFICATION CHART

Client
Client Reference
Project No.
Lab ID

JOYCE ENGINEERING, INC.
PROPOSED CDD LANDFILL
2007-576-01
2007-576-01-01

Boring No. TB-1
Depth (ft) 2-10
Sample No. BS-1
Soil Color BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	6.29	0.00
2	93.71	Sand	33.05	35.27
0.05	60.65	Silt	28.93	30.87
0.002	31.73	Clay	31.73	33.86
USDA Classification: CLAY LOAM				

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client JOYCE ENGINEERING, INC.
Client Reference PROPOSED CDD LANDFILL
Project No. 2007-576-01
Lab ID 2007-576-01-01

Boring No. TB-1
Depth (ft) 2-10
Sample No. BS-1
Soil Color **BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	211	Tare No.	P-1
Wgt. Tare + Wet Soil (gm)	731.11	Wgt. Tare + Wet Soil (gm)	51.12
Wgt. Tare + Dry Soil (gm)	610.06	Wgt. Tare + Dry Soil (gm)	50.52
Weight of Tare (gm)	171.19	Weight of Tare (gm)	21.94
Weight of Water (gm)	121.05	Weight of Water (gm)	0.60
Weight of Dry Soil (gm)	438.87	Weight of Dry Soil (gm)	28.58
Moisture Content (%)	27.6	Moisture Content (%)	2.1

Soil Specimen Data			
Wet Weight + #10 Material (gm)	559.92	Weight of the Dry Sample (gm)	536.81
Dry Weight + #10 Material (gm)	438.9	Weight of minus #200 material (gm)	68.71
Wet Weight Hydro. Material (gm)	100.00	Weight of plus #200 material (gm)	468.10
Dry Weight Hydro. Material (gm)	97.94		
Total Dry Weight Sample (gm)	536.81	J-FACTOR (%FINER THAN #10)	0.9371

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	0.00	0.00	0.00	100.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00	100.00
1/2"	12.5	3.10	0.71	0.71	99.29	99.29
3/8"	9.50	0.00	0.00	0.71	99.29	99.29
#4	4.75	4.24	0.97	1.67	98.33	98.33
#10	2.00	20.28	4.62	6.29	93.71	93.71
#20	0.85	7.19	7.34	7.34	92.66	86.83
#40	0.425	7.59	7.75	15.09	84.91	79.57
#60	0.250	5.83	5.95	21.04	78.96	73.99
#140	0.106	6.83	6.97	28.02	71.98	67.45
#200	0.075	1.79	1.83	29.84	70.16	65.74
Pan	-	68.71	70.16	100.00	-	-

Notes :

Tested By TMS

Date 4/12/2007 Checked By

GEM

Date 2-14-07

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	2-10
Project No.	2007-576-01	Sample No.	BS-1
Lab ID	2007-576-01-01	Soil Description	BROWN FAT CLAY

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

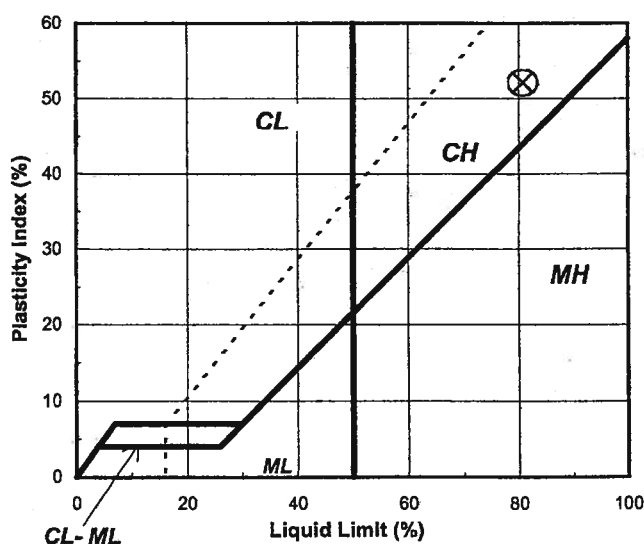
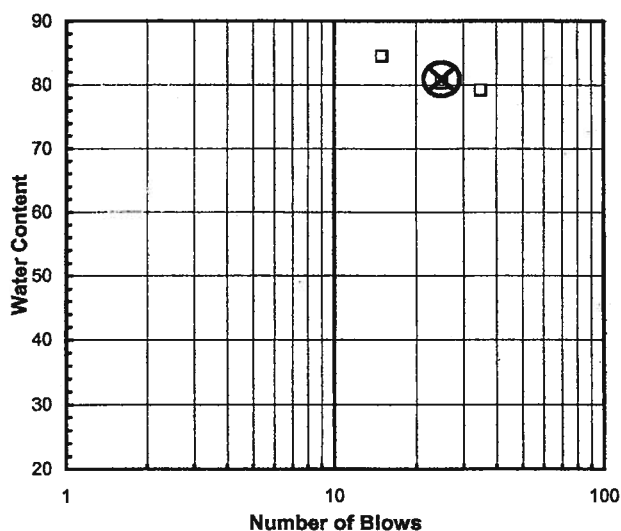
Liquid Limit Test	1	2	3	
Tare Number	E	I	P	M
Wt. of Tare & WS (gm)	33.11	31.50	31.49	U
Wt. of Tare & DS (gm)	24.95	24.26	24.29	L
Wt. of Tare (gm)	15.29	15.24	15.19	T
Wt. of Water (gm)	8.2	7.2	7.2	I
Wt. of DS (gm)	9.7	9.0	9.1	P
Moisture Content (%)	84.5	80.3	79.1	O
Number of Blows	15	25	35	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number	N	A		Liquid Limit (%) 81
Wt. of Tare & WS (gm)	21.74	21.03		Plastic Limit (%) 29
Wt. of Tare & DS (gm)	20.29	19.73		Plasticity Index (%) 52
Wt. of Tare (gm)	15.28	15.23		USCS Symbol CH
Wt. of Water (gm)	1.5	1.3		
Wt. of DS (gm)	5.0	4.5		
Moisture Content (%)	28.9	28.9	0.1	

Note: The acceptable range of the two Moisture contents is ± 2.6

Flow Curve

Plasticity Chart



Tested By JBD Date 4/23/2007 Checked By GEM Date 2-14-07

page 1 of 1 DCN: CT-S4B DATE: 10/8/2001 REVISION: 2

\\Lab1\c\2007 PROJECTS\2007-576 JOYCE\2007-576-01-01 LIMIT.xls\Sheet1

SPECIFIC GRAVITY

ASTM D 854-00 (SOP - S5)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	2-10
Project No.	2007-576-01	Sample No.	BS-1
Lab ID	2007-576-01-01	Visual Description	BROWN SANDY FAT CLAY (Minus No.4 sieve material, airdried)

Replicate Number

	1	2
Pycnometer ID	R 292	R 280
Weight of Pycnometer + Soil + Water (gm)	703.89	716.33
Temperature, T (°Celsius)	26.8	27.3
Weight of Pycnometer + Water (gm)	672.69	685.01
Tare Number	211	203
Weight of Tare + Dry Soil (gm)	220.58	220.46
Weight of Tare (gm)	171.22	171.18
Weight of Dry Soil (gm)	49.36	49.28
Specific Gravity of Soil @ T	2.718	2.745
Specific Gravity of Water @ T	0.9966	0.9965
Conversion Factor for Temperature T	0.9984	0.9982
Specific Gravity @ 20° Celsius	2.722	2.749

Average Specific Gravity @ 20° Celsius

2.74

Tested By JBD Date 4/25/2007 Checked By *GM* Date 2-14-08

HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client JOYCE ENGINEERING, INC.
Client Reference PROPOSED CDD LANDFILL
Project No. 2007-576-01
Lab ID 2007-576-01-01

Boring No. TB-1
Depth (ft) 2-10
Sample No. BS-1
Soil Color **BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	58.0	58.0	24.4	3.67	54.3	54.5	0.01262	0.0232
5		56.0	24.4	3.67	52.3	52.5	0.01262	0.0151
15		52.0	24.3	3.70	48.3	48.4	0.01263	0.0091
30		49.0	24.5	3.65	45.4	45.5	0.01260	0.0066
60		46.0	24.8	3.56	42.4	42.6	0.01256	0.0048
250		39.5	24.2	3.73	35.8	35.9	0.01265	0.0025
1440		32.0	24.9	3.53	28.5	28.5	0.01254	0.0011

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	97.94	a - Factor	0.982
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	93.71
Weight of Dry Material (gm)	97.94	Specific Gravity	2.74 Measured

Note:

Tested By **KMR** Date **4/25/2007** Checked By **GEM** Date **2-14-08**

MOISTURE DENSITY RELATIONSHIP

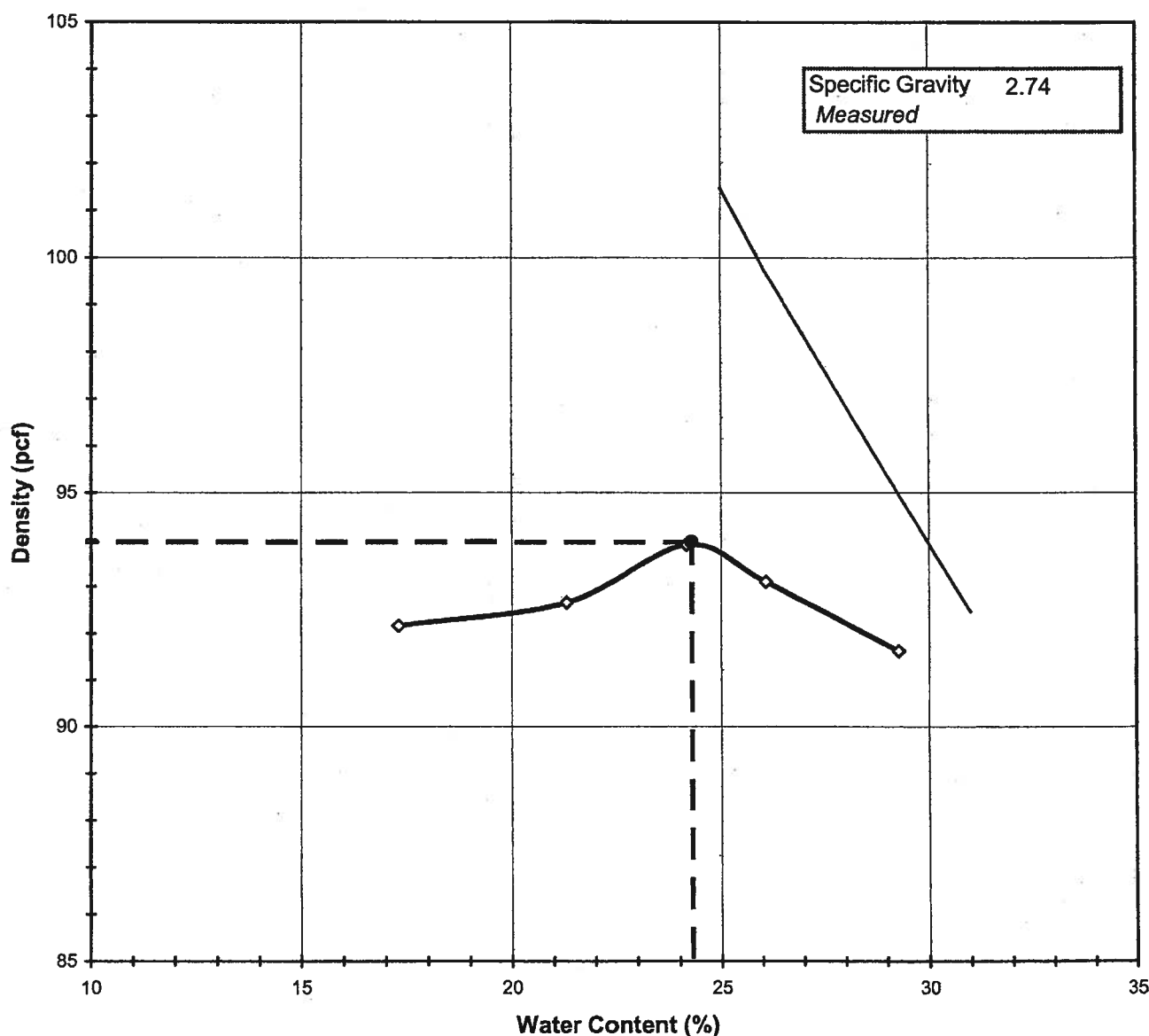
ASTM D698-91 SOP-S12

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	2-10
Project No.	2007-576-01	Sample No.	BS-1
Lab ID	2007-576-01-01	Test Method	STANDARD

Visual Description BROWN SANDY FAT CLAY

Optimum Water Content
Maximum Dry Density

24.3
94.0



Tested By **KMR** Date **4/24/2007** Checked By **GEM** Date **2-14-08**

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	2-10
Project No.	2007-576-01	Sample No.	BS-1
Lab ID	2007-576-01-01		

Visual Description BROWN SANDY FAT CLAY

Total Weight of the Sample (gm)	NA
As Received Water Content(%)	NA
Measured Specific Gravity	2.74
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

TestType	STANDARD
Rammer Weight (lbs)	5.5
Rammer Drop (in)	12
Rammer Type	MECHANICAL
Machine ID	R174
Mold ID	R172
Mold diameter	4"
Weight of the Mold	4212
Volume of the Mold(cc)	943

Mold / Specimen

Point No.	1	2	3	4	5
Wt. of Mold & WS (gm)	5846	5911	5974	5986	6003
Wt. of Mold (gm)	4212	4212	4212	4212	4212
Wt. of WS	1634	1699	1762	1774	1790
Mold Volume (cc)	943	943	943	943	943

Moisture Content / Density

Tare Number	A-1	887	F-2	SS-4	ZZ-1
Wt. of Tare & WS (gm)	466.17	471.00	480.30	564.70	530.74
Wt. of Tare & DS (gm)	411.96	405.63	406.37	468.62	433.15
Wt. of Tare (gm)	98.74	99.09	100.59	100.43	99.97
Wt. of Water (gm)	54.21	65.37	73.93	96.08	97.59
Wt. of DS (gm)	313.22	306.54	305.78	368.19	333.18

Wet Density (gm/cc)	1.73	1.80	1.87	1.88	1.90
Wet Density (pcf)	108.1	112.4	116.6	117.4	118.5
Moisture Content (%)	17.3	21.3	24.2	26.1	29.3
Dry Density (pcf)	92.2	92.7	93.9	93.1	91.6

Zero Air Voids

Moisture Content (%)	25.0	26.1	31.0
Dry Unit Weight (pcf)	101.5	99.7	92.4

Tested By KMR Date 4/24/2007 Checked By GAN Date 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-97
(SOP-S22C)

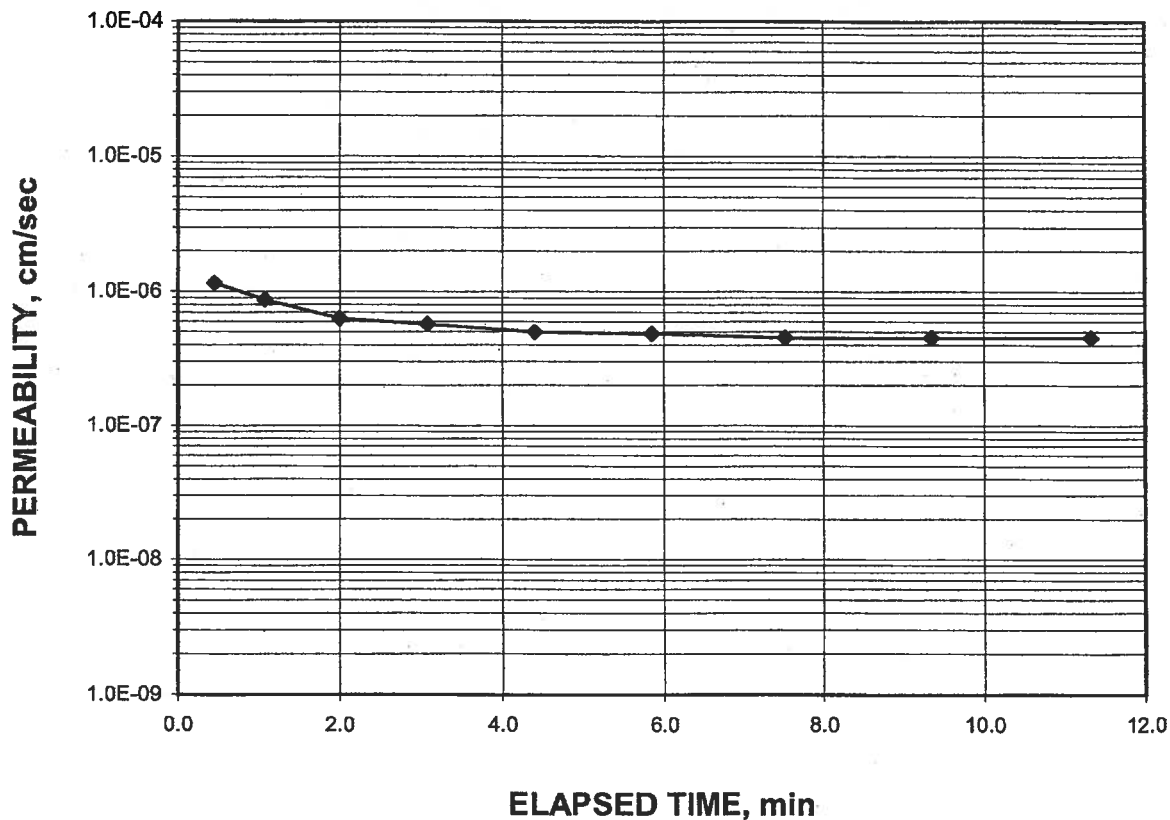


Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Project	PROPOSED CDD LANDFILL	Depth (ft.)	2-10
Project No.	2007-576-01	Sample No.	BS-1
Lab ID No.	2007-576-01-01		

Visual Description: BROWN SANDY FAT CLAY

AVERAGE PERMEABILITY = $4.6\text{E-}07$ cm/sec @ 20°C
AVERAGE PERMEABILITY = $4.6\text{E-}09$ m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS

Date: 6/13/2007

Checked By: *gem*

Date: 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-97

(SOP-S22A & B)



Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Project	PROPOSED CDD LANDFILL	Depth (ft.)	2-10
Project No.	2007-576-01	Sample No.	BS-1
Lab ID No.	2007-576-01-01		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN SANDY FAT CLAY

MOISTURE CONTENT:

BEFORE TEST

AFTER TEST

Tare Number	F-2	Z-14
Wt. of Tare & WS (gm.)	362.86	633.56
Wt. of Tare & DS (gm.)	305.02	504.17
Wt. of Tare (gm.)	100.63	100.41
Wt. of Water (gm.)	57.84	129.39
Wt. of DS (gm.)	204.39	403.76
Moisture Content (%)	28.3	32.0

SPECIMEN:

BEFORE TEST

AFTER TEST

Wt. of Tube & WS (gm.)	800.18	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	800.18	823.55
Length 1 (in.)	4.012	3.992
Length 2 (in.)	4.012	4.037
Length 3 (in.)	4.012	3.948
Top Diameter (in.)	2.872	2.788
Middle Diameter (in.)	2.872	2.864
Bottom Diameter (in.)	2.872	2.471
Average Length (in.)	4.01	3.99
Average Area (in. ²)	6.48	5.76
Sample Volume (cm ³)	425.91	376.71
Unit Wet Wt. (gm./ cm ³)	1.879	2.186
Unit Wet Wt. (pcf)	117.3	136.5
Unit Dry Wt. (pcf)	91.4	103.3
Unit Dry Wt. (gm./ cm ³)	1.464	1.656
Void Ratio, e	0.844	0.631
Porosity, n	0.458	0.387
Pore Volume (cm ³)	194.9	145.7

Tested By: TMS

Date: 6/13/2007

Checked By: *GM*

Date: *2-14-08*

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-97

(SOP-S22A & B)



Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Project	PROPOSED CDD LANDFILL	Depth (ft.)	2-10
Project No.	2007-576-01	Sample No.	BS-1
Lab ID No.	2007-576-01-01		

Test Pressures

Cell Pressure(psi)	55.0
Back Pressure(psi)	50.0
Eff. Cons. Pressure(psi)	5.0
Response (%)	97

Final Sample Dimensions

Sample Length (cm), L	10.14
Sample Area (cm ²), A	37.15
Pipette Area (cm ²), a _p	0.03142
Annulus Area (cm ²), a _a	0.76712
Equilibrium Level (cm), R _{eq}	1.75

AVERAGE PERMEABILITY = 4.6E-07 cm/sec @ 20°C

AVERAGE PERMEABILITY = 4.6E-09 m/sec @ 20°C

DATE	TIME	ELAPSED TIME	PIPETTE READING	INCREMENT GRADIENT	FLOW CONDITION	TEMP.	INCREMENTAL PERMEABILITY
		t	R _p	i	(0 flow)	(°C)	@ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(1 stop)		(cm/sec)
6/13/2007	13	11.3	0	11.5	12.6	0	24.5
6/13/2007	13	11.8	0	11.0	11.9	0	24.5
6/13/2007	13	12.4	1	10.5	11.3	0	24.5
6/13/2007	13	13.3	2	10.0	10.6	0	24.5
6/13/2007	13	14.4	3	9.5	10.0	0	24.5
6/13/2007	13	15.7	4	9.0	9.3	0	24.5
6/13/2007	13	17.2	6	8.5	8.7	0	24.5
6/13/2007	13	18.9	8	8.0	8.0	0	24.5
6/13/2007	13	20.7	9	7.5	7.4	0	24.5
6/13/2007	13	22.7	11	7.0	6.8	1	24.5

Tested By: TMS

Date: 6/13/2007

Checked By: Gam

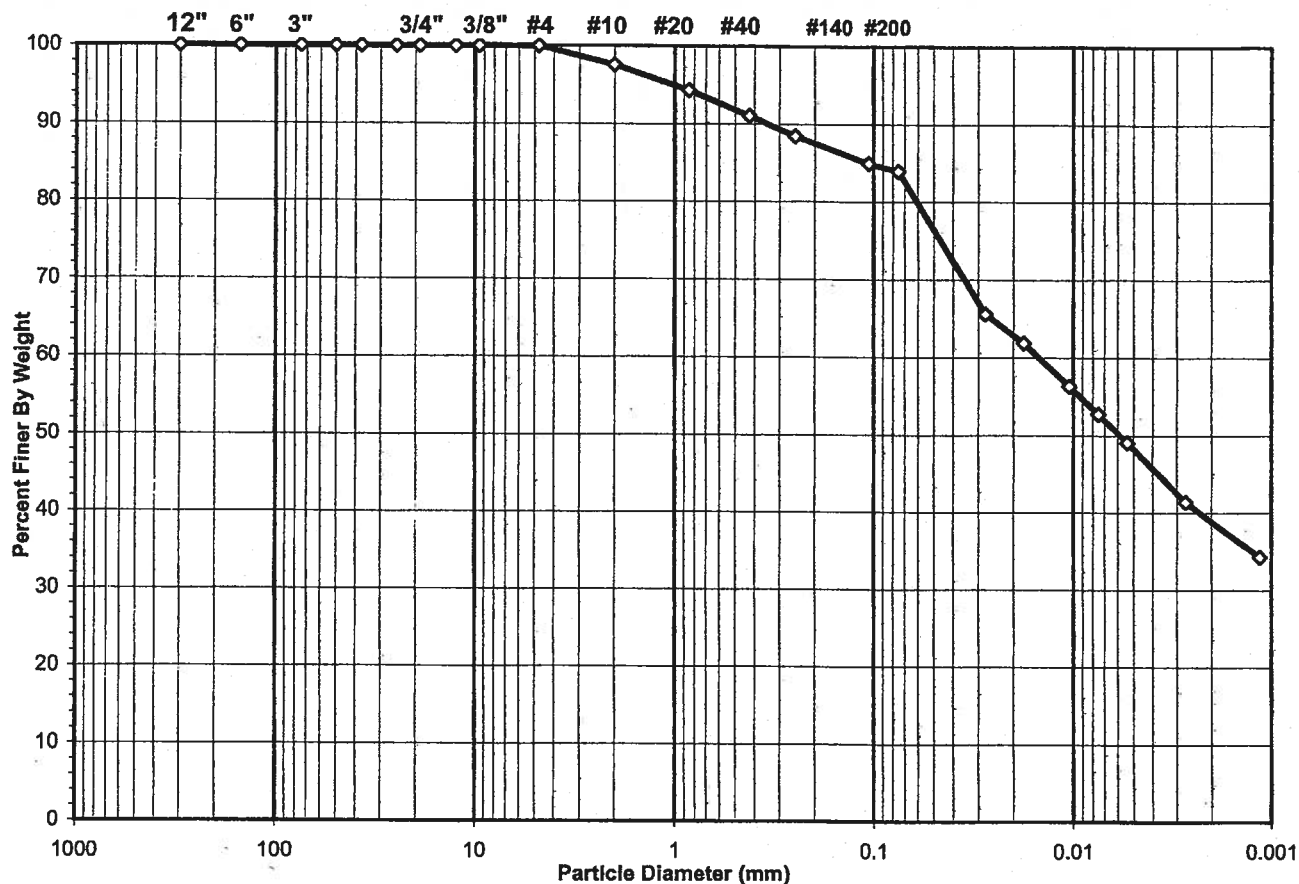
Date: 2-14-08

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)



Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	10-12
Project No.	2007-576-01	Sample No.	ST-1
Lab ID	2007-576-01-03	Soil Color	BROWN

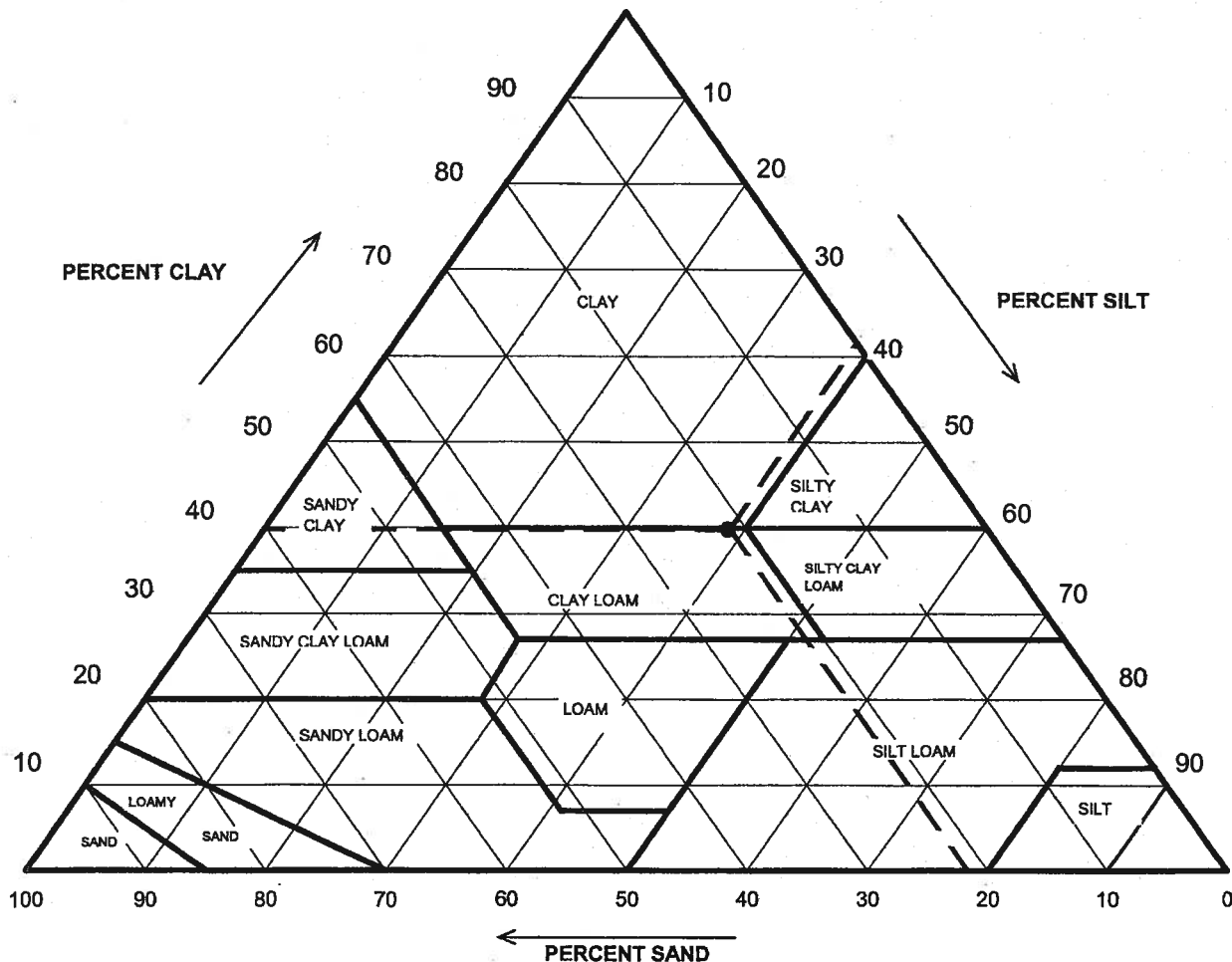
USCS USDA	SIEVE ANALYSIS				HYDROMETER	
	cobble	gravel	sand		silt and clay fraction	
	cobble	gravel	sand		silt	clay



USCS Summary		
Sieve Sizes (mm)		Percentage
Greater Than #4	Gravel	0.00
#4 To #200	Sand	16.04
Finer Than #200	Silt & Clay	83.96
USCS Symbol	MH, TESTED	
USCS Classification	ELASTIC SILT WITH SAND	

USDA CLASSIFICATION CHART

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	10-12
Project No.	2007-576-01	Sample No.	ST-1
Lab ID	2007-576-01-03	Soil Color	BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	2.42	0.00
2	97.58	Sand	21.05	21.58
0.05	76.53	Silt	37.65	38.58
0.002	38.88	Clay	38.88	39.84
USDA Classification: CLAY LOAM				

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROSPED CDD LANDFILL	Depth (ft)	10-12
Project No.	2007-576-01	Sample No.	ST-1
Lab ID	2007-576-01-03	Soil Color	BROWN

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	201	Tare No.	NA
Wgt. Tare + Wet Specimen (gm)	566.16	Wgt. Tare + Wet Specimen (gm)	NA
Wgt. Tare + Dry Specimen (gm)	411.09	Wgt. Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	170.73	Weight of Tare (gm)	NA
Weight of Water (gm)	155.07	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	240.36	Weight of Dry Soil (gm)	NA
Moisture Content (%)	64.5	Moisture Content (%)	NA

Wet Weight - 3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	240.36
Dry Weight - 3/4" Sample (gm)	38.56	Weight of minus #200 material (gm)	201.80
Wet Weight + 3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	38.56
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	0.00	0.00	0.00	100.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00	100.00
1/2"	12.5	0.00	0.00	0.00	100.00	100.00
3/8"	9.50	0.00	0.00	0.00	100.00	100.00
#4	4.75	0.00	0.00	0.00	100.00	100.00
#10	2.00	5.81	2.42	2.42	97.58	97.58
#20	0.85	7.87	3.27	5.69	94.31	94.31
#40	0.425	7.81	3.25	8.94	91.06	91.06
#60	0.250	6.18	2.57	11.51	88.49	88.49
#140	0.106	8.58	3.57	15.08	84.92	84.92
#200	0.075	2.31	0.96	16.04	83.96	83.96
Pan	-	201.80	83.96	100.00	-	-

Tested By MVL Date 4/20/2007 Checked By *GM* Date 2-14-08

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	10-12
Project No.	2007-576-01	Sample No.	ST-1
Lab ID	2007-576-01-03	Soil Description	BROWN ELASTIC SILT

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

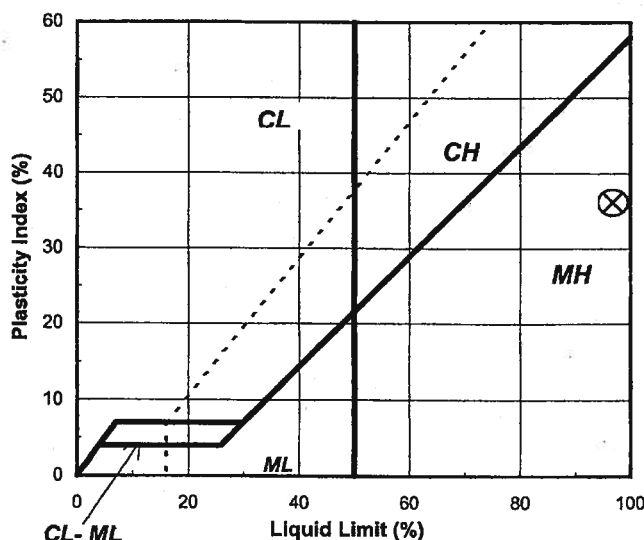
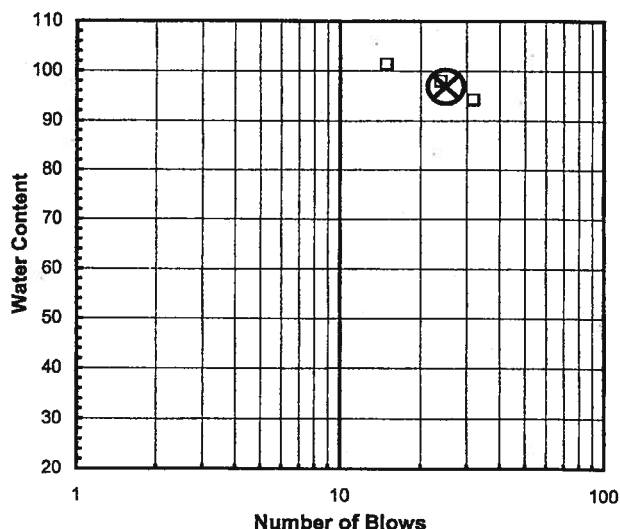
Liquid Limit Test	1	2	3	
Tare Number	A-B	G	A-P	MULTIPOINT
Wt. of Tare & WS (gm)	29.29	27.55	32.88	
Wt. of Tare & DS (gm)	22.39	21.38	24.49	
Wt. of Tare (gm)	15.58	15.08	15.58	
Wt. of Water (gm)	6.9	6.2	8.4	
Wt. of DS (gm)	6.8	6.3	8.9	
Moisture Content (%)	101.3	97.9	94.2	
Number of Blows	15	24	32	

Plastic Limit Test	1	2	Range	Test Results	
Tare Number	D	V		Liquid Limit (%)	97
Wt. of Tare & WS (gm)	25.22	25.81		Plastic Limit (%)	61
Wt. of Tare & DS (gm)	21.44	21.81		Plasticity Index (%)	36
Wt. of Tare (gm)	15.17	15.28		USCS Symbol	MH
Wt. of Water (gm)	3.8	4.0			
Wt. of DS (gm)	6.3	6.5			
Moisture Content (%)	60.3	61.3	-1.0		

Note: The acceptable range of the two Moisture contents is ± 2.6

Flow Curve

Plasticity Chart



Tested By MVL Date 4/23/2007 Checked By GEM Date 2-14-08
page 1 of 1 DCN: CT-S4B DATE: 10/8/2001 REVISION: 2

\\Lab1\c\2007 PROJECTS\2007-576 JOYCE\2007-576-01-03 LIMIT.xls\Sheet1

SPECIFIC GRAVITY

ASTM D 854-00 (SOP - S5)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	10-12
Project No.	2007-576-01	Sample No.	ST-1
Lab ID	2007-576-01-03	Visual Description	BROWN ELASTIC SILT W/SAND (Minus No.4 sieve material, alrdried)

Replicate Number	1	2
Pycnometer ID	R 280	R 292
Weight of Pycnometer + Soil + Water (gm)	716.35	703.9
Temperature, T (°Celsius)	24.5	24.5
Weight of Pycnometer + Water (gm)	685.31	672.99
Tare Number	212	210
Weight of Tare + Dry Soil (gm)	219.7	220.98
Weight of Tare (gm)	171.53	172.84
Weight of Dry Soil (gm)	48.17	48.14
Specific Gravity of Soil @ T	2.813	2.794
Specific Gravity of Water @ T	0.9972	0.9972
Conversion Factor for Temperature T	0.9990	0.9990
Specific Gravity @ 20° Celsius	2.815	2.797

Average Specific Gravity @ 20° Celsius

2.81

Tested By JBD Date 4/25/2007 Checked By *Gen* Date 2-14-08

HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)



Client	JOYCE ENGINEERING, INC.	Boring No.	TB-1
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	10-12
Project No.	2007-576-01	Sample No.	ST-1
Lab ID	2007-576-01-03	Soil Color	BROWN

Elapsed Time (min)	R Measured	Temp. (° C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	39.0	24.4	3.67	35.3	78.1	0.01237	0.0275	65.6
5	37.0	24.4	3.67	33.3	73.7	0.01237	0.0177	61.9
15	34.0	24.4	3.67	30.3	67.1	0.01237	0.0105	56.3
30	32.0	24.6	3.62	28.4	62.8	0.01234	0.0075	52.7
60	30.0	24.8	3.56	26.4	58.5	0.01231	0.0054	49.1
250	26.0	24.3	3.70	22.3	49.3	0.01238	0.0027	41.4
1460	22.0	24.9	3.53	18.5	40.8	0.01230	0.0011	34.3

Soil Specimen Data		Other Corrections	
Tare No.	213		
Tare + Dry Material (gm)	227.01	a - Factor	0.968
Weight of Tare (gm)	178.24		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	83.96
Weight of Dry Material (gm)	43.77		
		Specific Gravity	2.81 Measured

Note: Hydrometer test is performed on - # 200 sieve material.

Tested By MVL Date 4/20/2007 Checked By GEM Date 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-97
(SOP-S22C)



Client
Client Project
Project No.
Lab ID No.

JOYCE ENGINEERING, INC
PROPOSED CDD LANDFILL
2007-576-01
2007-576-01-03

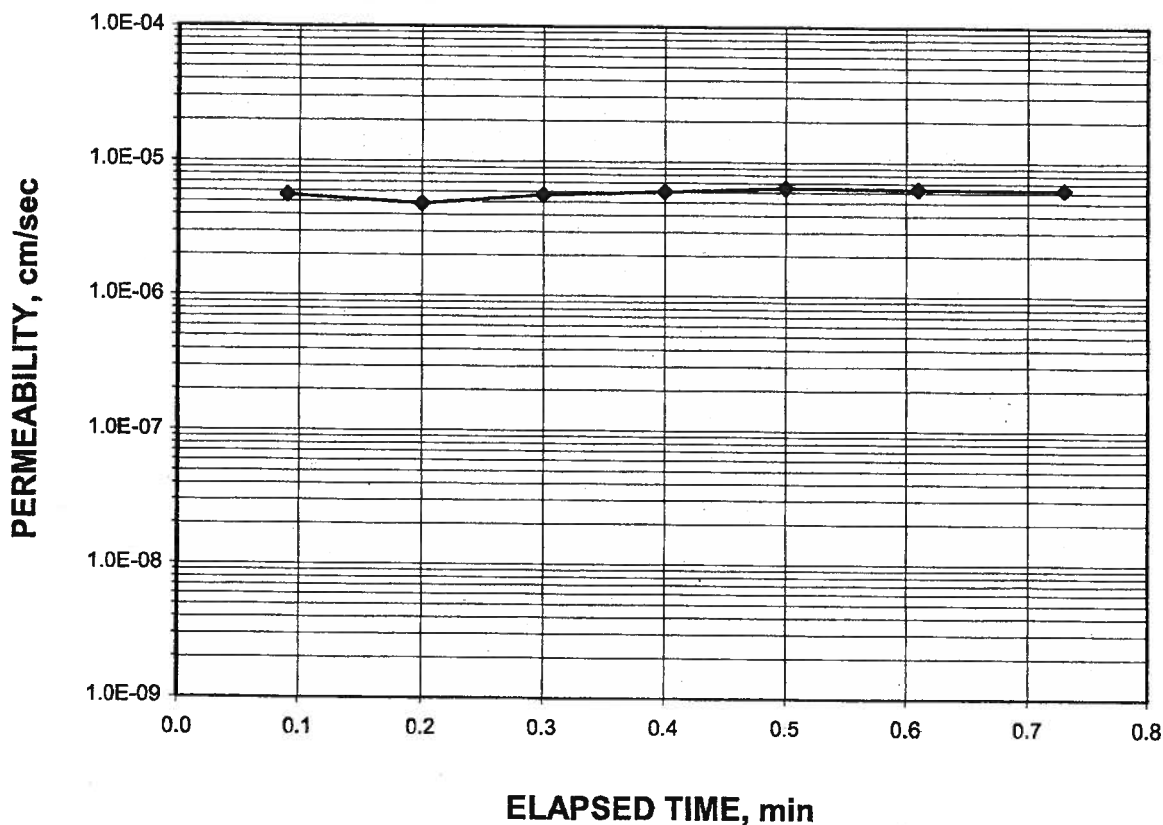
Boring No.
Depth (ft.)
Sample No.

TB-1
10 - 12
ST-1

Visual Description: BROWN ELASTIC SILTY WITH SAND

AVERAGE PERMEABILITY = $6.3\text{E-}06$ cm/sec @ 20°C
AVERAGE PERMEABILITY = $6.3\text{E-}08$ m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS

Date: 4/19/2007

Checked By: *gem*

Date: 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-97

(SOP-S22A & B)



Client JOYCE ENGINEERING, INC
Client Project PROPOSED CDD LANDFILL
Project No. 2007-576-01
Lab ID No. 2007-576-01-03

Boring No. TB-1
Depth (ft.) 10 - 12
Sample No. ST-1

Specific Gravity 2.81 Measured
Sample Condition Undisturbed

Visual Description: BROWN ELASTIC SILTY WITH SAND

MOISTURE CONTENT:

BEFORE TEST

AFTER TEST

Tare Number	F-4	F-4
Wt. of Tare & WS (gm.)	244.59	489.11
Wt. of Tare & DS (gm.)	188.14	327.35
Wt. of Tare (gm.)	100.45	100.4
Wt. of Water (gm.)	56.45	161.76
Wt. of DS (gm.)	87.69	226.95
Moisture Content (%)	64.4	71.3

SPECIMEN:

BEFORE TEST

AFTER TEST

Wt. of Tube & WS (gm.)	659.54	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	659.54	687.23
Length 1 (in.)	4.068	3.926
Length 2 (in.)	4.073	3.942
Length 3 (in.)	4.029	4.043
Top Diameter (in.)	2.811	2.857
Middle Diameter (in.)	2.878	2.882
Bottom Diameter (in.)	2.796	2.760
Average Length (in.)	4.06	3.97
Average Area (in. ²)	6.28	6.30
Sample Volume (cm ³)	417.66	410.12
Unit Wet Wt. (gm./ cm ³)	1.579	1.676
Unit Wet Wt. (pcf)	98.6	104.6
Unit Dry Wt. (pcf)	60.0	61.1
Unit Dry Wt. (gm./ cm ³)	0.961	0.978
Void Ratio, e	1.925	1.872
Porosity, n	0.658	0.652
Pore Volume (cm ³)	274.9	267.3

Tested By: TMS

Date: 4/19/2007

Checked By: GEM

Date: 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD



ASTM D 5084-97
(SOP-S22A & B)

Client	JOYCE ENGINEERING, INC	Boring No.	TB-1
Client Project	PROPOSED CDD LANDFILL	Depth (ft.)	10 - 12
Project No.	2007-576-01	Sample No.	ST-1
Lab ID No.	2007-576-01-03		

Test Pressures

Cell Pressure(psi)	60.0
Back Pressure(psi)	55.0
Eff. Cons. Pressure(psi)	5.0
Response (%)	96

Final Sample Dimensions

Sample Length (cm), L	10.08
Sample Area (cm ²), A	40.67
Pipette Area (cm ²), a _p	0.03142
Annulus Area (cm ²), a _a	0.76712
Equilibrium Level (cm), R _{eq}	1.75

AVERAGE PERMEABILITY = 6.3E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 6.3E-08 m/sec @ 20°C

DATE	TIME	ELAPSED TIME	PIPETTE READING	INCREMENT GRADIENT	FLOW CONDITION	TEMP.	INCREMENTAL PERMEABILITY
(mm/dd/yy)	(hr)	(min)	t	R _p	i	(0 flow)	@ 20°C
			(min)	(cm)	(cm/cm)	(1 stop)	(cm/sec)
4/19/2007	13	30.13	0	11.0	12.0	0	24.1 NA
4/19/2007	13	30.22	0	10.5	11.3	0	24.1 5.6E-06
4/19/2007	13	30.33	0	10.0	10.7	0	24.1 4.8E-06
4/19/2007	13	30.43	0	9.5	10.0	0	24.1 5.6E-06
4/19/2007	13	30.53	0	9.0	9.4	0	24.1 6.0E-06
4/19/2007	13	30.63	1	8.5	8.7	0	24.1 6.4E-06
4/19/2007	13	30.74	1	8.0	8.1	0	24.1 6.3E-06
4/19/2007	13	30.86	1	7.5	7.4	1	24.1 6.3E-06

Tested By: TMS Date: 4/19/2007 Checked By: GEM Date: 2-14-08

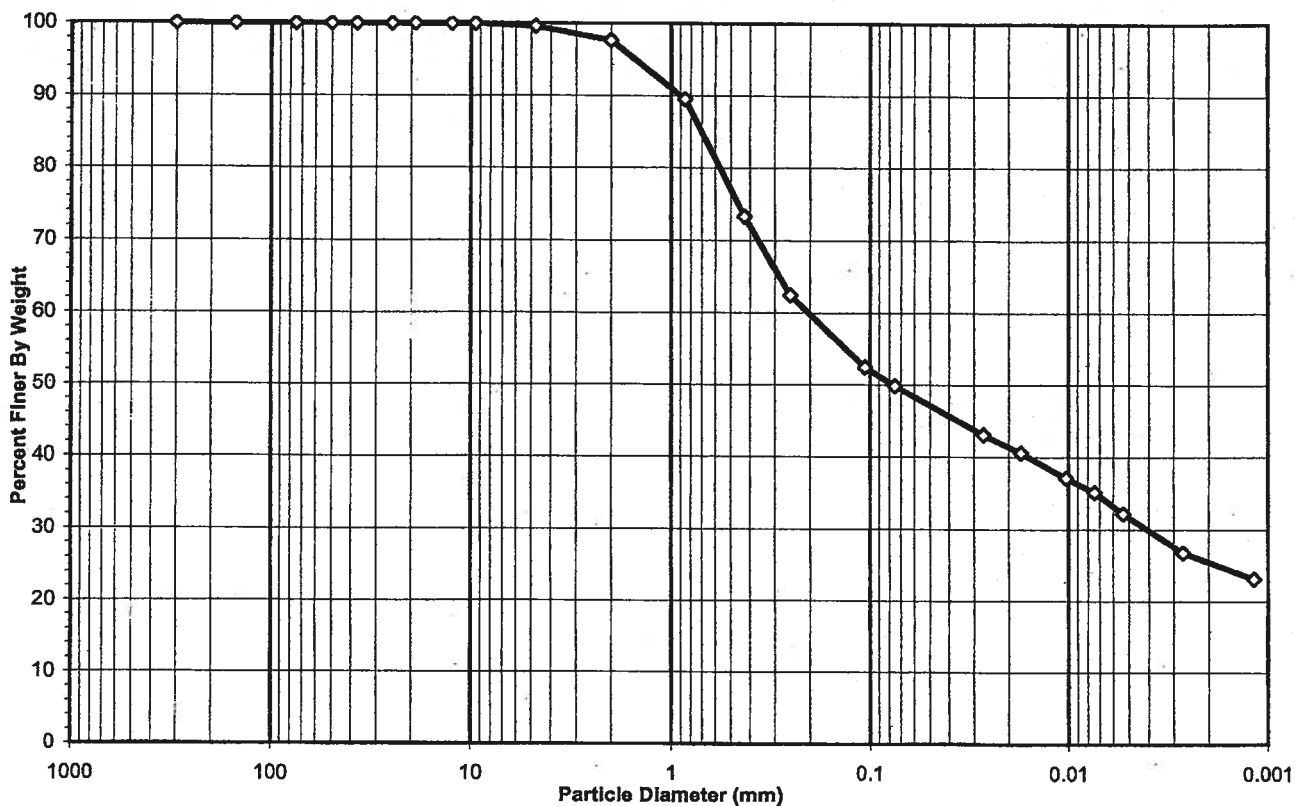
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client JOYCE ENGINEERING, INC.
Client Reference PROPOSED CDD LANDFILL
Project No. 2007-576-01
Lab ID 2007-576-01-02

Boring No. TB-2
Depth (ft) 2-8
Sample No. BS-1
Soil Color BROWN

USCS USDA	SIEVE ANALYSIS					HYDROMETER	
	cobbles	gravel	sand			silt and clay fraction	
	cobbles	gravel	sand			silt	clay

12" 6" 3" 3/4" 3/8" #4 #10 #20 #40 #140 #200



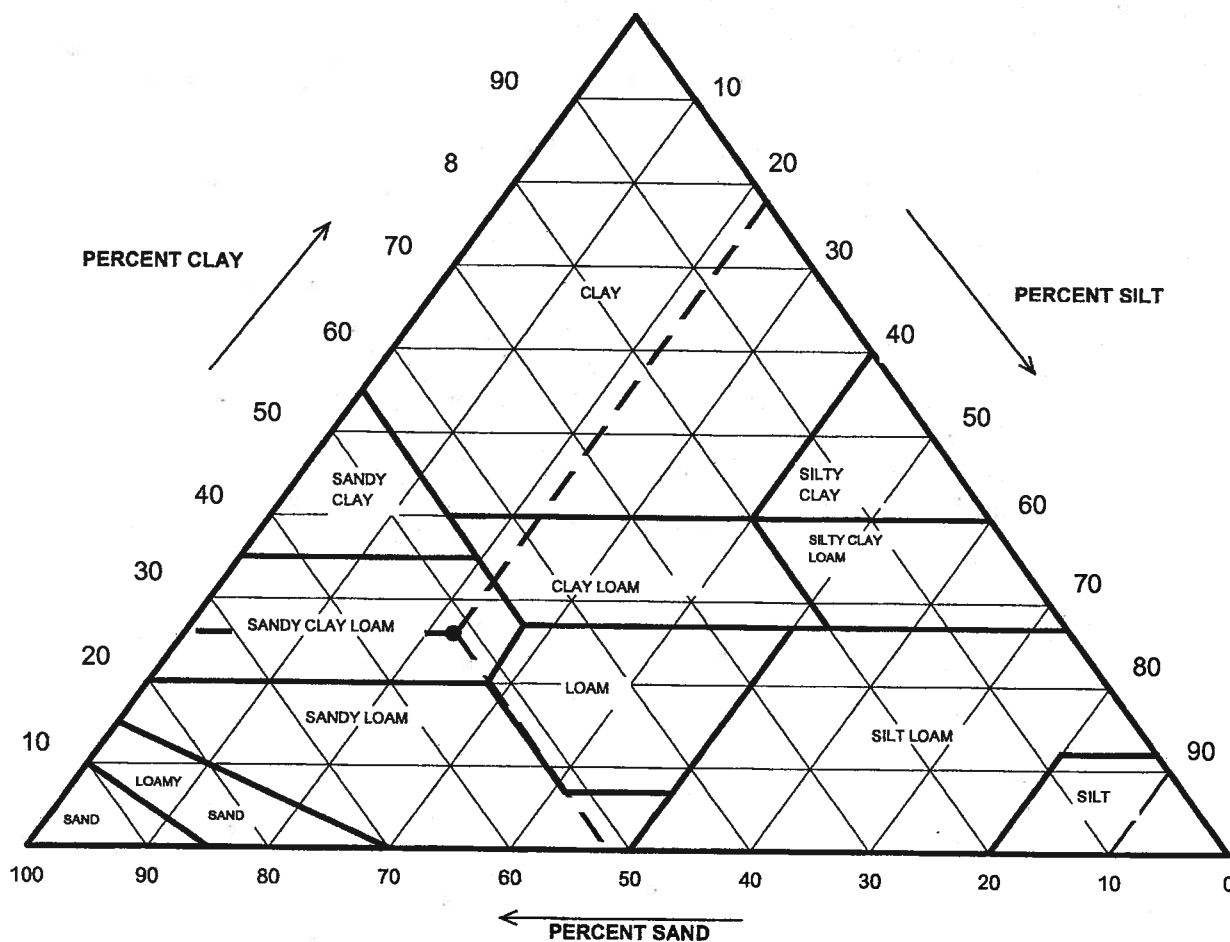
USCS Summary		
Sieve Sizes (mm)		Percentage
Greater Than #4	Gravel	0.38
#4 To #200	Sand	49.81
Finer Than #200	Silt & Clay	49.81
USCS Symbol	SC, TESTED	
USCS Classification	CLAYEY SAND	

USDA CLASSIFICATION CHART

Client
Client Reference
Project No.
Lab ID

JOYCE ENGINEERING, INC.
PROPOSED CDD LANDFILL
2007-576-01
2007-576-01-02

Boring No. TB-2
Depth (ft) 2-8
Sample No. BS-1
Soil Color BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	2.31	0.00
2	97.69	Sand	50.63	51.82
0.05	47.07	Silt	21.71	22.23
0.002	25.35	Clay	25.35	25.95
USDA Classification: SANDY CLAY LOAM				

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client JOYCE ENGINEERING, INC.
Client Reference PROPOSED CDD LANDFILL
Project No. 2007-576-01
Lab ID 2007-576-01-02

Boring No. TB-2
Depth (ft) 2-8
Sample No. BS-1
Soil Color **BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	217	Tare No.	U-1
Wgt. Tare + Wet Soil (gm)	1125.25	Wgt. Tare + Wet Soil (gm)	30.57
Wgt. Tare + Dry Soil (gm)	946.02	Wgt. Tare + Dry Soil (gm)	30.38
Weight of Tare (gm)	196.69	Weight of Tare (gm)	21.83
Weight of Water (gm)	179.23	Weight of Water (gm)	0.19
Weight of Dry Soil (gm)	749.33	Weight of Dry Soil (gm)	8.55
Moisture Content (%)	23.9	Moisture Content (%)	2.2

Soil Specimen Data			
Wet Weight + #10 Material (gm)	928.56	Weight of the Dry Sample (gm)	847.16
Dry Weight + #10 Material (gm)	749.3	Weight of minus #200 material (gm)	49.88
Wet Weight Hydro. Material (gm)	100.00	Weight of plus #200 material (gm)	797.28
Dry Weight Hydro. Material (gm)	97.83		
Total Dry Weight Sample (gm)	847.16	J-FACTOR (% FINER THAN #10)	0.9769

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	0.00	0.00	0.00	100.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00	100.00
1/2"	12.5	0.00	0.00	0.00	100.00	100.00
3/8"	9.50	0.00	0.00	0.00	100.00	100.00
#4	4.75	2.85	0.38	0.38	99.62	99.62
#10	2.00	14.45	1.93	2.31	97.69	97.69
#20	0.85	8.21	8.39	8.39	91.61	89.49
#40	0.425	16.20	16.56	24.95	75.05	73.31
#60	0.250	10.91	11.15	36.10	63.90	62.42
#140	0.106	10.05	10.27	46.38	53.62	52.38
#200	0.075	2.58	2.64	49.02	50.98	49.81
Pan	-	49.88	50.98	100.00	-	-

Notes :

Tested By TMS

Date

4/25/2007

Checked By

GEM

Date 2-14-08

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-2
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	2-8
Project No.	2007-576-01	Sample No.	BS-1
Lab ID	2007-576-01-02	Soil Description	BROWN FAT CLAY

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

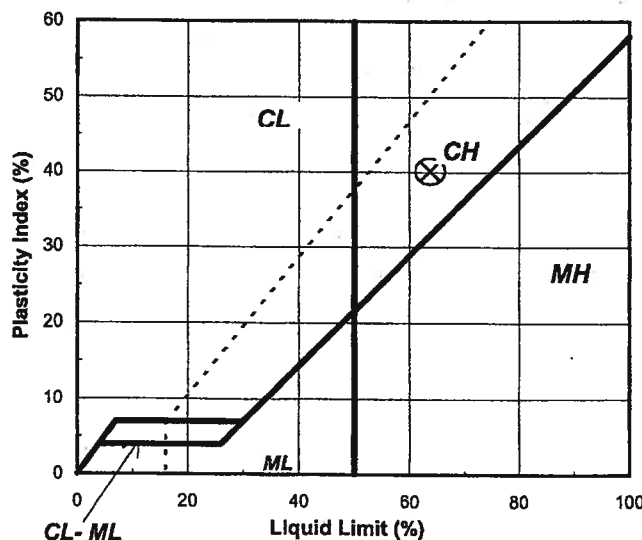
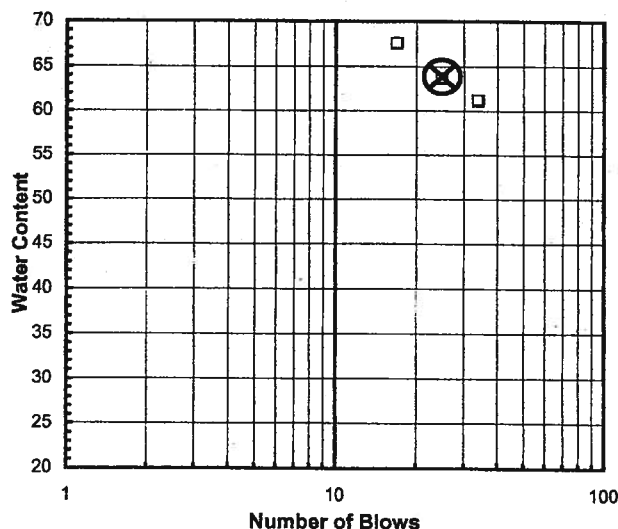
Liquid Limit Test	1	2	3	
Tare Number	H	V	A-G	M U L T I P O I N T
Wt. of Tare & WS (gm)	35.60	32.74	33.00	
Wt. of Tare & DS (gm)	27.35	25.91	26.38	
Wt. of Tare (gm)	15.13	15.18	15.55	
Wt. of Water (gm)	8.3	6.8	6.6	
Wt. of DS (gm)	12.2	10.7	10.8	
Moisture Content (%)	67.5	63.7	61.1	
Number of Blows	17	25	34	

Plastic Limit Test	1	2	Range	Test Results	
Tare Number	A-F	A-C		Liquid Limit (%)	64
Wt. of Tare & WS (gm)	27.73	33.39		Plastic Limit (%)	24
Wt. of Tare & DS (gm)	25.39	29.96		Plasticity Index (%)	40
Wt. of Tare (gm)	15.50	15.57		USCS Symbol	CH
Wt. of Water (gm)	2.3	3.4			
Wt. of DS (gm)	9.9	14.4			
Moisture Content (%)	23.7	23.8	-0.2		

Note: The acceptable range of the two Moisture contents is ± 2.6

Flow Curve

Plasticity Chart



Tested By **KMR** Date **4/23/2007** Checked By **GEM** Date **2-14-08**

SPECIFIC GRAVITY

ASTM D 854-00 (SOP - S5)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-2
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	2-8
Project No.	2007-576-01	Sample No.	BS-1
Lab ID	2007-576-01-02	Visual Description	BROWN CLAYEY SAND (Minus No.4 sieve material, alrdried)

Replicate Number	1	2
Pycnometer ID	R 280	R 292
Weight of Pycnometer + Soil + Water (gm)	716.34	703.77
Temperature, T (°Celsius)	24.4	24.6
Weight of Pycnometer + Water (gm)	685.32	672.98
Tare Number	217	211
Weight of Tare + Dry Soil (gm)	220.47	220.73
Weight of Tare (gm)	171.07	171.21
Weight of Dry Soil (gm)	49.40	49.52
Specific Gravity of Soil @ T	2.688	2.644
Specific Gravity of Water @ T	0.9972	0.9972
Conversion Factor for Temperature T	0.9990	0.9990
Specific Gravity @ 20° Celsius	2.691	2.647

Average Specific Gravity @ 20° Celsius

2.67

Tested By JBD Date 4/23/2007 Checked By *Gen* Date 2-14-08

DCN: CT-S5 Date: 03/24/05 Revision: 10R

\\Lab1\cl2007 PROJECTS\2007-576 JOYCE\2007-576-01-02 Specific Gravity Soils.xls\Sheet1

HYDROMETER ANALYSIS
ASTM D 422-63 (SOP-S3)

Client JOYCE ENGINEERING, INC.
Client Reference PROPOSED CDD LANDFILL
Project No. 2007-576-01
Lab ID 2007-576-01-02

Boring No. TB-2
Depth (ft) 2-8
Sample No. BS-1
Soil Color **BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	47.0	47.0	24.2	3.73	43.3	44.1	0.01291	0.0268
5		44.5	24.2	3.73	40.8	41.5	0.01291	0.0173
15		41.0	24.4	3.67	37.3	38.0	0.01288	0.0103
30		39.0	24.4	3.67	35.3	36.0	0.01288	0.0074
60		36.0	24.6	3.62	32.4	33.0	0.01285	0.0053
250		30.0	26.4	3.09	26.9	27.4	0.01259	0.0027
1440		27.0	24.1	3.76	23.2	23.7	0.01292	0.0012

Soil Specimen Data		Other Corrections	
Tare + Dry Material (gm)	97.83	a - Factor	0.996
Weight of Tare (gm)	0		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 10	97.69
Weight of Dry Material (gm)	97.83	Specific Gravity	2.67 Measured

Note:

Tested By **KMR** Date **4/25/2007** Checked By **GEM** Date **2-14-08**
page 4 of 4 DCN: CT-S3P DATE:02/15/05 REVISION:8 \\Lab1\cl\2007 PROJECTS\2007-576 JOYCE\2007-576-01-02 #10 Split Hydro .xls\Sheet1

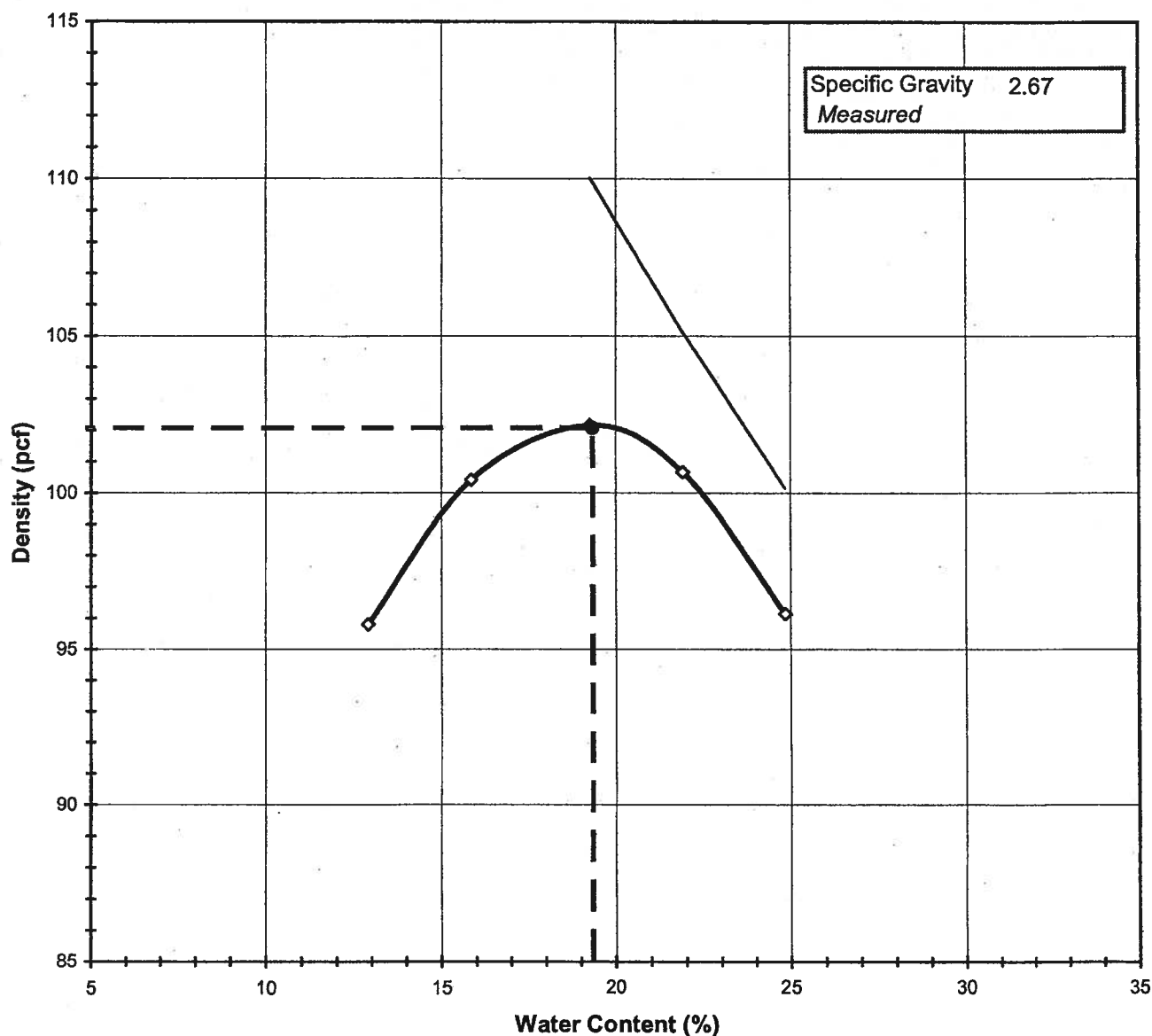
MOISTURE DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-2
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	2-8
Project No.	2007-576-01	Sample No.	BS-1
Lab ID	2007-576-01-02	Test Method	STANDARD
Visual Description	BROWN CLAYEY SAND		

Optimum Water Content
Maximum Dry Density

19.3
102.1



Tested By KMR Date 4/24/2007 Checked By *gam* Date 2-14-08

MOISTURE - DENSITY RELATIONSHIP

ASTM D698-91 SOP-S12

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-2
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	2-8
Project No.	2007-576-01	Sample No.	BS-1
Lab ID	2007-576-01-02		

Visual Description BROWN CLAYEY SAND

Total Weight of the Sample (gm)	NA
As Received Water Content(%)	NA
Measured Specific Gravity	2.67
Percent Retained on 3/4"	NA
Percent Retained on 3/8"	NA
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

TestType	STANDARD
Rammer Weight (lbs)	5.5
Rammer Drop (in)	12
Rammer Type	MECHANICAL
Machine ID	R174
Mold ID	R172
Mold diameter	4"
Weight of the Mold	4212
Volume of the Mold(cc)	943

Mold / Specimen

Point No.	1	2	3	4	5
Wt. of Mold & WS (gm)	5847	5971	6054	6067	6026
Wt. of Mold (gm)	4212	4212	4212	4212	4212
Wt. of WS	1635	1758	1841	1855	1814
Mold Volume (cc)	943	943	943	943	943

Moisture Content / Density

Tare Number	SS-5	F-4	SS-1	Y-3	Y-3
Wt. of Tare & WS (gm)	503.17	534.38	523.74	511.27	326.80
Wt. of Tare & DS (gm)	456.98	474.99	455.32	437.43	281.71
Wt. of Tare (gm)	99.08	100.42	100.15	100.30	100.29
Wt. of Water (gm)	46.19	59.39	68.42	73.84	45.09
Wt. of DS (gm)	357.90	374.57	355.17	337.13	181.42

Wet Density (gm/cc)	1.73	1.86	1.95	1.97	1.92
Wet Density (pcf)	108.2	116.3	121.8	122.7	120.0
Moisture Content (%)	12.9	15.9	19.3	21.9	24.9
Dry Density (pcf)	95.8	100.4	102.1	100.7	96.1

Zero Air Voids

Moisture Content (%)	19.3	21.9	24.9
Dry Unit Weight (pcf)	110.0	105.1	100.1

Tested By KMR Date 4/24/2007 Checked By GOM Date 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-97

(SOP-S22C)



Client
Client Project
Project No.
Lab ID No.

JOYCE ENGINEERING, INC.
PROPOSED CDD LANDFILL
2007-576-01
2007-576-01-02

Boring No.
Depth (ft.)
Sample No.

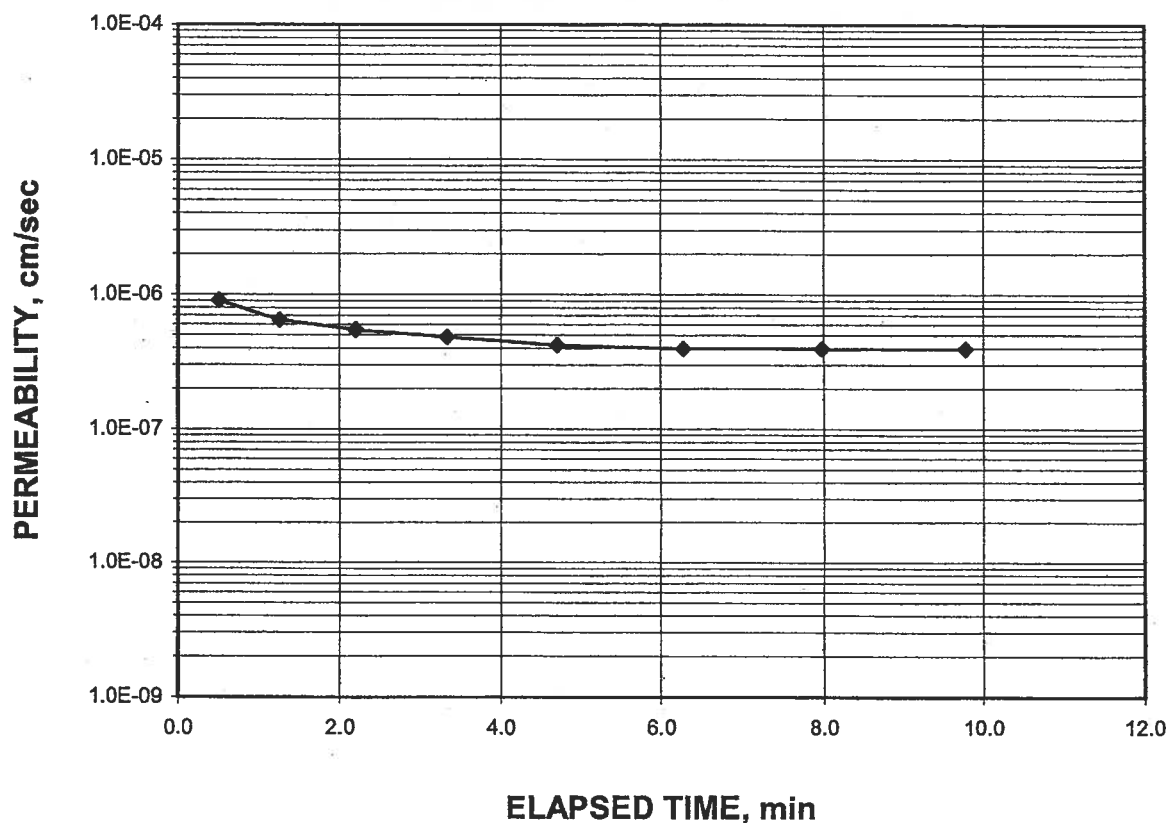
TB-2
2-8
BS-1

Visual Description: BROWN CLAYEY SAND

AVERAGE PERMEABILITY = $4.0\text{E-}07$ cm/sec @ 20°C

AVERAGE PERMEABILITY = $4.0\text{E-}09$ m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS

Date: 6/13/2007

Checked By: *gam*

Date: 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-97

(SOP-S22A & B)



Client	JOYCE ENGINEERING, INC.	Boring No.	TB-2
Client Project	PROPOSED CDD LANDFILL	Depth (ft.)	2-8
Project No.	2007-576-01	Sample No.	BS-1
Lab ID No.	2007-576-01-02		

Specific Gravity	2.70	Assumed
Sample Condition		Remolded

Visual Description: BROWN CLAYEY SAND

MOISTURE CONTENT:

BEFORE TEST

AFTER TEST

Tare Number	SS-2	Y-11
Wt. of Tare & WS (gm.)	327.33	454.36
Wt. of Tare & DS (gm.)	284.51	385.96
Wt. of Tare (gm.)	100.74	99.88
Wt. of Water (gm.)	42.82	68.40
Wt. of DS (gm.)	183.77	286.08
Moisture Content (%)	23.3	23.9

SPECIMEN:

BEFORE TEST

AFTER TEST

Wt. of Tube & WS (gm.)	837.29	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	837.29	841.42
Length 1 (in.)	4.012	3.879
Length 2 (in.)	4.012	4.046
Length 3 (in.)	4.012	3.987
Top Diameter (in.)	2.872	2.865
Middle Diameter (in.)	2.872	2.888
Bottom Diameter (in.)	2.872	2.853
Average Length (in.)	4.01	3.97
Average Area (in. ²)	6.48	6.46
Sample Volume (cm ³)	425.91	420.55
Unit Wet Wt. (gm./cm ³)	1.966	2.001
Unit Wet Wt. (pcf)	122.7	124.9
Unit Dry Wt. (pcf)	99.5	100.8
Unit Dry Wt. (gm./cm ³)	1.594	1.615
Void Ratio, e	0.693	0.672
Porosity, n	0.409	0.402
Pore Volume (cm ³)	174.4	169.0

Tested By: TMS

Date: 6/13/2007

Checked By: GEM Date: 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD



ASTM D 5084-97
(SOP-S22A & B)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-2
Client Project	PROPOSED CDD LANDFILL	Depth (ft.)	2-8
Project No.	2007-576-01	Sample No.	BS-1
Lab ID No.	2007-576-01-02		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	55.0	Sample Length (cm), L	10.09
Back Pressure(psi)	50.0	Sample Area (cm ²), A	41.70
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm ²), a _p	0.03142
Response (%)	97	Annulus Area (cm ²), a _a	0.76712
		Equilibrium Level (cm), R _{eq}	1.75

AVERAGE PERMEABILITY = 4.0E-07 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.0E-09 m/sec @ 20°C

DATE	TIME	ELAPSED TIME		PIPETTE READING	INCREMENT GRADIENT	FLOW CONDITION	TEMP.	INCREMENTAL PERMEABILITY
			t	R _p	i	(0 flow)		@ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)	(cm/sec)
6/13/2007	13	27.3	0	11.5	12.6	0	24.5	NA
6/13/2007	13	27.8	1	11.0	12.0	0	24.5	9.0E-07
6/13/2007	13	28.6	1	10.5	11.3	0	24.5	6.5E-07
6/13/2007	13	29.5	2	10.0	10.7	0	24.5	5.5E-07
6/13/2007	13	30.7	3	9.5	10.0	0	24.5	4.8E-07
6/13/2007	13	32	5	9.0	9.4	0	24.5	4.2E-07
6/13/2007	13	33.6	6	8.5	8.7	0	24.5	4.0E-07
6/13/2007	13	35.3	8	8.0	8.1	0	24.5	3.9E-07
6/13/2007	13	37.1	10	7.5	7.4	1	25.5	3.9E-07

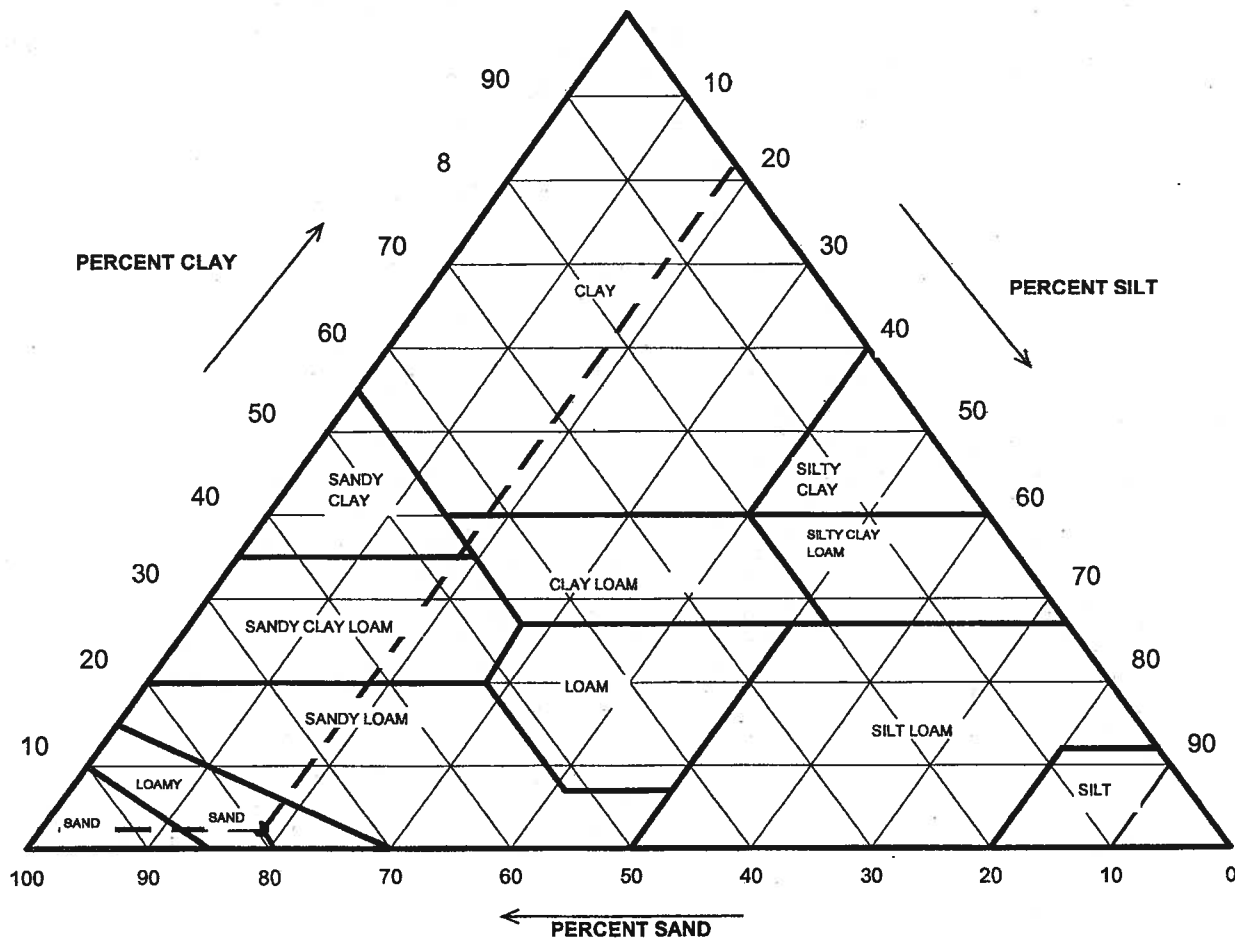
Tested By: TMS Date: 6/13/2007 Checked By: *gan* Date: 2-14-08

USDA CLASSIFICATION CHART

Client
Client Reference
Project No.
Lab ID

JOYCE ENGINEERING, INC.
PROPOSED CDD LANDFILL
2007-576-01
2007-576-01-06

Boring No. TB-2
Depth (ft) 10-12
Sample No. ST-2
Soil Color BROWN



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	0.66	0.00
2	99.34	Sand	78.97	79.50
0.05	20.36	Silt	18.08	18.20
0.002	2.28	Clay	2.28	2.30
USDA Classification: LOAMY SAND				

WASH SIEVE ANALYSIS #10 SPLIT

ASTM D 422-63 (SOP-S3)

Client **JOYCE ENGINEERING, INC.**
 Client Reference **PROPOSED CDD LANDFILL**
 Project No. **2007-576-01**
 Lab ID **2007-576-01-06**

Boring No. **TB-2**
 Depth (ft) **10-12**
 Sample No. **ST-2**
 Soil Color **BROWN**

Moisture Content/sieve +10 Material		Moisture Content for Hydrometer Portion	
Tare No.	212	Tare No.	K-1
Wgt.Tare + Wet Soil (gm)	659.61	Wgt.Tare + Wet Soil (gm)	44.50
Wgt.Tare + Dry Soil (gm)	573.21	Wgt.Tare + Dry Soil (gm)	44.24
Weight of Tare (gm)	171.54	Weight of Tare (gm)	22.03
Weight of Water (gm)	86.40	Weight of Water (gm)	0.26
Weight of Dry Soil (gm)	401.67	Weight of Dry Soil (gm)	22.21
Moisture Content (%)	21.5	Moisture Content (%)	1.2

Soil Specimen Data			
Wet Weight + #10 Material (gm)	488.07	Weight of the Dry Sample (gm)	500.51
Dry Weight + #10 Material (gm)	401.7	Weight of minus #200 material (gm)	25.25
Wet Weight Hydro. Material (gm)	100.00	Weight of plus #200 material (gm)	475.26
Dry Weight Hydro. Material (gm)	98.84		
Total Dry Weight Sample (gm)	500.51	J-FACTOR (%FINER THAN #10)	0.9934

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.00
6"	150	0.00	0.00	0.00	100.00	100.00
3"	75	0.00	0.00	0.00	100.00	100.00
2"	50	0.00	0.00	0.00	100.00	100.00
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.00
1"	25.0	0.00	0.00	0.00	100.00	100.00
3/4"	19.0	0.00	0.00	0.00	100.00	100.00
1/2"	12.5	0.00	0.00	0.00	100.00	100.00
3/8"	9.50	0.00	0.00	0.00	100.00	100.00
#4	4.75	0.00	0.00	0.00	100.00	100.00
#10	2.00	2.67	0.66	0.66	99.34	99.34
#20	0.85	24.78	25.07	25.07	74.93	74.43
#40	0.425	21.80	22.06	47.13	52.87	52.52
#60	0.250	10.44	10.56	57.69	42.31	42.03
#140	0.106	12.30	12.44	70.13	29.87	29.67
#200	0.075	4.27	4.32	74.45	25.55	25.38
Pan	-	25.25	25.55	100.00	-	-

Notes :

Tested By **TMS**

Date

4/25/2007

Checked By

GEM

Date **2-14-08**

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-2
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	10-12
Project No.	2007-576-01	Sample No.	ST-2
Lab ID	2007-576-01-06	Soil Description	BROWN SILT

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. (Minus No. 40 sieve material, Airdried)
sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

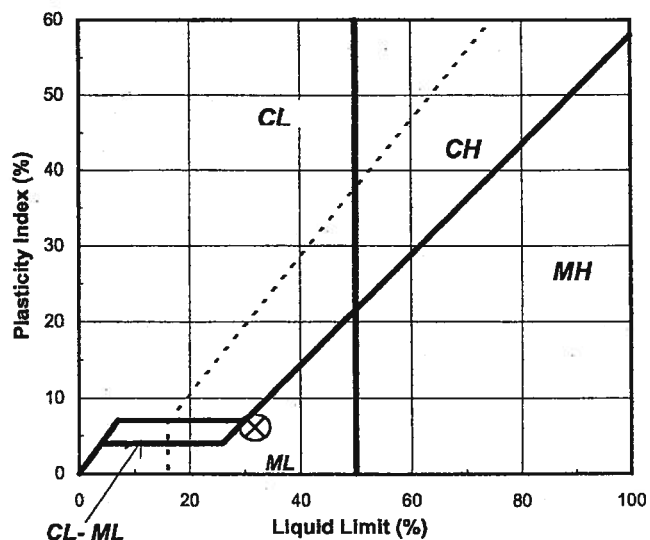
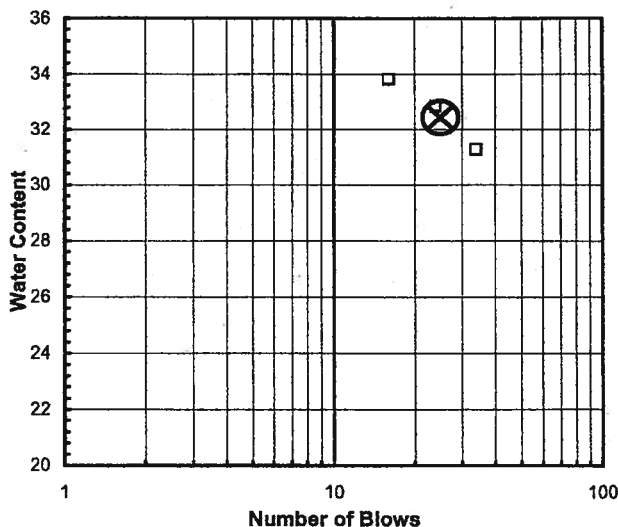
Liquid Limit Test	1	2	3	
Tare Number	G	V	D	M
Wt. of Tare & WS (gm)	34.07	34.70	42.98	U
Wt. of Tare & DS (gm)	29.27	29.90	36.36	L
Wt. of Tare (gm)	15.07	15.28	15.18	T
Wt. of Water (gm)	4.8	4.8	6.6	I
Wt. of DS (gm)	14.2	14.6	21.2	P
Moisture Content (%)	33.8	32.8	31.3	O
Number of Blows	16	24	34	I
				N
				T

Plastic Limit Test	1	2	Range	Test Results
Tare Number	A-B	A-P		Liquid Limit (%) 32
Wt. of Tare & WS (gm)	25.05	30.06		Plastic Limit (%) 26
Wt. of Tare & DS (gm)	23.06	27.05		Plasticity Index (%) 6
Wt. of Tare (gm)	15.57	15.59		USCS Symbol ML
Wt. of Water (gm)	2.0	3.0		
Wt. of DS (gm)	7.5	11.5		
Moisture Content (%)	26.6	26.3	0.3	

Note: The acceptable range of the two Moisture contents is ± 2.6

Flow Curve

Plasticity Chart



Tested By KMR Date 4/24/2007 Checked By GEM Date 2-14-08

page 1 of 1 DCN: CT-S4B DATE: 10/8/2001 REVISION: 2

\\Lab1\cd2007 PROJECTS\2007-576 JOYCE\2007-576-01-06 LIMIT.xls\Sheet1

SPECIFIC GRAVITY

ASTM D 854-00 (SOP - S5)

Client	JOYCE ENGINEERING, INC.	Boring No.	TB-2
Client Reference	PROPOSED CDD LANDFILL	Depth (ft)	10-12
Project No.	2007-576-01	Sample No.	ST-2
Lab ID	2007-576-01-06	Visual Description	BROWN SILTY SAND (Minus No.4 sieve material, airdried)

Replicate Number

	1	2
Pycnometer ID	R 292	R 280
Weight of Pycnometer + Soil + Water (gm)	703.72	716.35
Temperature, T (°Celsius)	25.1	24.6
Weight of Pycnometer + Water (gm)	672.91	685.23
Tare Number	215	214
Weight of Tare + Dry Soil (gm)	221.83	221.05
Weight of Tare (gm)	172.29	171.34
Weight of Dry Soil (gm)	49.54	49.71
Specific Gravity of Soil @ T	2.644	2.674
Specific Gravity of Water @ T	0.9970	0.9972
Conversion Factor for Temperature T	0.9988	0.9990
Specific Gravity @ 20° Celsius	2.647	2.677

Average Specific Gravity @ 20° Celsius

2.66

Tested By JBD Date

4/24/2007

Checked By

GEM

Date

2-14-08

HYDROMETER ANALYSIS ASTM D 422-63 (SOP-S3)

Client
 Client Reference
 Project No.
 Lab ID

JOYCE ENGINEERING, INC.
 PROPOSED CDD LANDFILL
 2007-576-01
 2007-576-01-06

Boring No. TB-2
 Depth (ft) 10-12
 Sample No. ST-2
 Soil Color **BROWN**

Elapsed Time (min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA
2	19.0	19.0	24.2	3.73	15.3	15.4	0.01295	0.0332
5		15.0	24.2	3.73	11.3	11.4	0.01295	0.0215
15		12.0	24.3	3.70	8.3	8.4	0.01293	0.0126
30		10.0	24.5	3.65	6.4	6.4	0.01290	0.0090
60		8.0	24.6	3.62	4.4	4.4	0.01289	0.0064
250		6.0	26.4	3.09	2.9	2.9	0.01262	0.0031
1440		5.5	24.0	3.79	1.7	1.7	0.01298	0.0013

Soil Specimen Data			Other Corrections	
Tare + Dry Material (gm)	98.84		a - Factor	0.998
Weight of Tare (gm)	0			
Weight of Deflocculant (gm)	5.0		Percent Finer than # 10	99.34
Weight of Dry Material (gm)	98.84		Specific Gravity	2.66 Measured

Note:

Tested By KMR

Date

4/25/2007

Checked By

Sam

Date

2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-97
(SOP-S22C)



Client
Client Project
Project No.
Lab ID No.

JOYCE ENGINEERING, INC
PROPOSED CDD LANDFILL
2007-576-01
2007-576-01-06

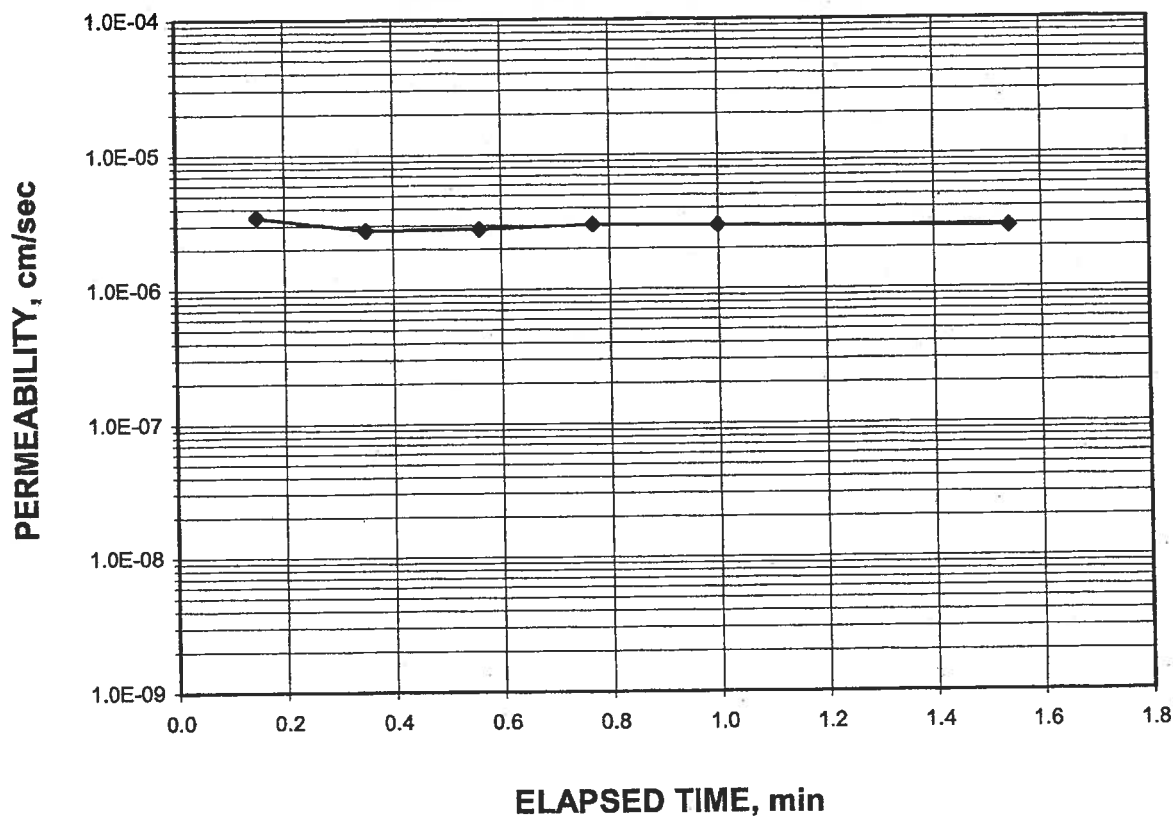
Boring No.
Depth (ft.)
Sample No.

TB-2
10 - 12
ST-2

Visual Description: BROWN SILTY SAND

AVERAGE PERMEABILITY = $2.9E-06$ cm/sec @ 20°C
AVERAGE PERMEABILITY = $2.9E-08$ m/sec @ 20°C

PERMEABILITY vs. TIME



Tested By: TMS

Date: 4/19/2007

Checked By: GEM Date: 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD

ASTM D 5084-97

(SOP-S22A & B)



Client JOYCE ENGINEERING, INC
Client Project PROPOSED CDD LANDFILL
Project No. 2007-576-01
Lab ID No. 2007-576-01-06

Boring No. TB-2
Depth (ft.) 10 - 12
Sample No. ST-2

Specific Gravity 2.66 Measured
Sample Condition Undisturbed

Visual Description: BROWN SILTY SAND

MOISTURE CONTENT:

BEFORE TEST

AFTER TEST

Tare Number	B-3	SS-1
Wt. of Tare & WS (gm.)	291.90	610.79
Wt. of Tare & DS (gm.)	258.30	533.5
Wt. of Tare (gm.)	97.77	100.12
Wt. of Water (gm.)	33.60	77.29
Wt. of DS (gm.)	160.53	433.38
Moisture Content (%)	20.9	17.8

SPECIMEN:

BEFORE TEST

AFTER TEST

Wt. of Tube & WS (gm.)	845.06	NA
Wt. of Tube (gm.)	0.00	NA
Wt. of WS (gm.)	845.06	823.42
Length 1 (in.)	3.985	3.762
Length 2 (in.)	3.862	3.812
Length 3 (in.)	3.907	3.938
Top Diameter (in.)	2.840	2.785
Middle Diameter (in.)	2.871	2.855
Bottom Diameter (in.)	2.774	2.872
Average Length (in.)	3.92	3.84
Average Area (in. ²)	6.28	6.32
Sample Volume (cm ³)	403.38	397.60
Unit Wet Wt. (gm./cm ³)	2.095	2.071
Unit Wet Wt. (pcf)	130.8	129.3
Unit Dry Wt. (pcf)	108.1	109.7
Unit Dry Wt. (gm./cm ³)	1.732	1.758
Void Ratio, e	0.535	0.513
Porosity, n	0.349	0.339
Pore Volume (cm ³)	140.7	134.9

Tested By: TMS

Date: 4/19/2007

Checked By: GEM Date: 2-14-08

FLEXIBLE WALL PERMEABILITY TEST

PERMOMETER METHOD



ASTM D 5084-97
(SOP-S22A & B)

Client	JOYCE ENGINEERING, INC	Boring No.	TB-2
Client Project	PROPOSED CDD LANDFILL	Depth (ft.)	10 - 12
Project No.	2007-576-01	Sample No.	ST-2
Lab ID No.	2007-576-01-06		

Test Pressures		Final Sample Dimensions	
Cell Pressure(psi)	55.0	Sample Length (cm), L	9.75
Back Pressure(psi)	50.0	Sample Area (cm ²), A	40.79
Eff. Cons. Pressure(psi)	5.0	Pipette Area (cm ²), a _p	0.03142
Response (%)	98	Annulus Area (cm ²), a _a	0.76712
		Equilibrium Level (cm), R _{eq}	1.75

AVERAGE PERMEABILITY = 2.9E-06 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.9E-08 m/sec @ 20°C

DATE	TIME	ELAPSED TIME	PIPETTE READING	INCREMENT GRADIENT	FLOW CONDITION	TEMP.	INCREMENTAL PERMEABILITY
		t	R _p	I	(0 flow)		@ 20°C
(mm/dd/yy)	(hr)	(min)	(min)	(cm)	(cm/cm)	(1 stop)	(°C)
4/19/2007	14	45.12	0	10.5	11.7	0	23.4
4/19/2007	14	45.27	0	10.0	11.1	0	23.4
4/19/2007	14	45.47	0	9.5	10.4	0	23.4
4/19/2007	14	45.68	1	9.0	9.7	0	23.4
4/19/2007	14	45.89	1	8.5	9.0	0	23.4
4/19/2007	14	46.12	1	8.0	8.4	0	23.4
4/19/2007	14	46.66	2	7.0	7.0	1	23.4

Tested By: TMS

Date: 4/19/2007

Checked By: *gem*

Date: 2-14-08

APPENDIX II
SOIL BORING, WELL CONSTRUCTION,
AND WELL DEVELOPMENT LOGS

02-13-2008 F:\Skinquarter CDD LF\Environmental\Part A CDD Landfill\Part A Application\Boring Logs\TB-1.bor



LOG OF BORING P-1/MW-1

(Page 1 of 1)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/19/07
Date Completed : 3/19/07
Hole Diameter : 8-Inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3666676.09
Easting Coord. : 11689055.53
Survey By : Koontz and Bryant, P.C.
Logged By : Ian Whitlock

Depth in Feet	Surf. Elev. 308.88	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-1 TOC Elevation: 311.33	Well Construction Information
0	308	1	100	4	CL	Light brown sandy clay; moist	Surface Topsoil/ Concrete Pad Bentonite (1'-15.5') Riser Pipe (-2.5'-17.5') Sand Pack (15.5'-27.5') Screen (17.5'-27.5')	WELL CONSTRUCTION Date Compl. : 3/19/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup : 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup : 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : 4-inch Locking Steel WELL PAD Type : 2'X2'X4" Concrete 1. Auger met refusal at 27.5 feet bgs.
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LOG OF BORING P-2/MW-2

(Page 1 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/20/07
Date Completed : 3/20/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3666930.27
Easting Coord. : 11690383.15
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth in Feet	Surf. Elev. 324.97	Blow Count	% Rec	N Value	Sample No. and type	USCS	DESCRIPTION	Piezometer: P-2 TOC Elevation: 327.36	Well Construction Information
0	324	2		7	Grab 1		Light orange to brown silty clay; moist		WELL CONSTRUCTION Date Compl. : 3/20/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup: 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup: 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : 4-inch Locking Steel WELL PAD Type : 2'X2'X4" Concrete Notes: SS = split spoon sample Grab = grab sample of cuttings
1		3	100						
2		4			Grab 2				
3		4							
4		4							
5		6	30	13	Grab 3	CL			
6		7							
7		8							
8		2							
9		4	30	11	Grab 4				
10		7							
11	319	11							
12		12	100	23	Grab 5				
13		18							
14		4							
15		5	50	13	Grab 5	CL	Reddish brown sandy clay; moist		
16		8							
17		10							
18		2							
19		2							
20		2							
21	314	5	50	7	SS-1		Orange silty clay; brown and gray mottling present; moist		
22		7							
23		4							
24		4	60	9	SS-2				
25		5							
26		7							
27		4							
28		4							
29	309	6	100	10					
30		7							
31		2							
32		4							
33		4	100	8		CL			
34		5							
35		2							
36		2							
37		2							
38		3	100	5					
39		7							
40		15							
41	304	15	80	30					
42		13							
43		4							
44		5							
45		9	100	14					
46		9							
47		4							
48		8	60	21		SW	Light grayish brown to light gray fine grained sand; wet		
49	25	13							
50		16							
51		19							
52		19	80	38					
53		39							
54		50/5.5				CH	Dark gray clay; fractured		

Piezometer: P-2
TOC Elevation: 327.36

Well Construction Information

WELL CONSTRUCTION

Date Compl. : 3/20/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup: 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup: 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : 4-inch Locking Steel

WELL PAD

Type : 2'X2'X4" Concrete

Notes: SS = split spoon sample
Grab = grab sample of cuttings

LOG OF BORING P-2/MW-2

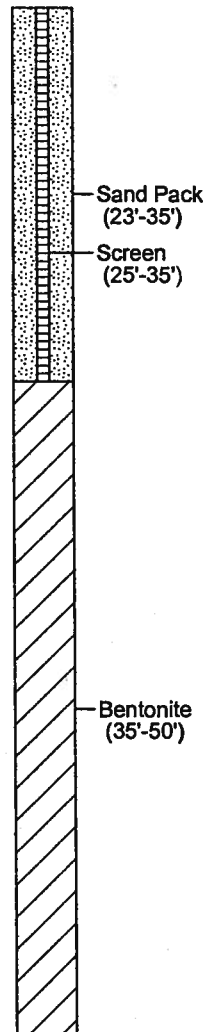
(Page 2 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/20/07
Date Completed : 3/20/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3666930.27
Easting Coord. : 11690383.15
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth In Feet	Surf. Elev. 324.97	Blow Count	% Rec	N Value	Sample No. and type	USCS	DESCRIPTION	Piezometer: P-2 TOC Elevation: 327.36	Well Construction Information
28		12					Dark gray clay; fractured		WELL CONSTRUCTION Date Compl. : 3/20/07 Hole Diameter(s) : 8-Inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-Inch Joints : Flush coupled Aprx. Csg. Stickup: 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-Inch Joints : Flush-coupled Aprx. Csg. Stickup: 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-Inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : 4-Inch Locking Steel WELL PAD Type : 2'X2'X4" Concrete Notes: SS = split spoon sample Grab = grab sample of cuttings
296		22				CH			
		32		54			Yellowish orange fine grained sand; wet		
		50							
		9							
		23	50	73/11.5		SP			
		50/5.5							
		39	50	50/5					
33		50/5							
		46	40	50/2			Yellowish orange fine to medium grained sand; gravel present; wet		
291		50/2							
		50/5	30	SSR					
38		50/4	30	SSR					
286		50/4	30	SSR		SP			
		30	SSR						
43									
281									
48									
276									
53							Boring Terminated at 50 feet		





LOG OF BORING P-3

(Page 1 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/27/07
Date Completed : 3/27/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3666046.24
Easting Coord. : 11689248.29
Survey By : Koontz and Bryant, P.C.
Logged By : Ian Whitlock

Depth In Feet	Surf. Elev. 309.94	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-3 TOC Elevation: 312.62	Well Construction Information
0	309	2		9	CL	Light brown sandy clay with fine gravel and root mass; damp	Surface Topsoil/ Concrete Pad	WELL CONSTRUCTION Date Compl. : 3/27/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup : 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup : 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Annulus Seal : 3/8" Bent., granular PROTECTIVE CSG. Type : not completed WELL PAD Type : not completed 1. Auger met refusal at 39 feet.
		2	50					
		7		17	CL	Light brown sandy clay with fine and coarse gravel; root mass present; red and orange mottling; damp		
		6	75					
		7						
		10						
		10						
5		3	60	12	CL	White sandy clay with red and purple mottling; with fine gravel		
		5						
		7						
	304	11						
		19						
		18	100	39	SM	White silty sand with some clay; fine gravel present; brown and red mottling present	Grout (0'-11')	
		21						
		23						
		9						
		14	100	36	SM	White silty sand with some clay; fine gravel present; red mottling present		
		22						
10		26						
		6						
	299	20	100	55	SM	Reddish brown silty sand with more clay; black and white mottling present	Riser Pipe (-2.5'-15')	
		35						
		50						
		19						
		31	75	71	SM	White silty sand with black and red mottling; fine gravel	Bentonite (11'-13')	
		40						
		50/5.5						
		10						
		20	75	53	SM	Reddish brown silty sand with black mottling; fine gravel present		
15		33						
	294	50/3						
		40						
		50/4	25	50/4		Reddish brown silty sand with black mottling; fine gravel present; wet		
		30						
		50/5	50	50/5			Sand Pack (13'-25')	
20		24						
	289	50/5.5	50	50/5.5	SM			
		31						
		39	50	89/11.5			Screen (15'-25')	
		50/5.5						
25		50/5.5	40	SSR			Bentonite (25'-39')	



LOG OF BORING P-3

(Page 2 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/27/07
Date Completed : 3/27/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3666046.24
Easting Coord. : 11689248.29
Survey By : Koontz and Bryant, P.C.
Logged By : Ian Whitlock

Piezometer: P-3
TOC Elevation: 312.62

Well Construction Information

Depth In Feet	Surf. Elev. 309.94	Blow Count	% Rec	N Value	USCS	DESCRIPTION
26						
283		50/5.5	40	SSR		Reddish brown silty sand with black mottling; fine gravel present; wet
		50/5.5	30	SSR	SM	
31		50/5	25	SSR		
278		50/5.5	25	SSR	SM	Reddish brown silty clay with black mottling; fine gravel present; wet
		9	25	73/11.5		
36		50/5.5			CL	Brownish red and white silty clay, wet
273		50/3	10	SSR		
		50/4	10	SSR	SM	Brownish red and white silty sand with clay, wet
Boring Terminated at 39 feet						
41						
268						
46						
263						
51						



Bentonite
(25'-39')

WELL CONSTRUCTION

Date Compl. : 3/27/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed

1. Auger met refusal at 39 feet.



LOG OF BORING P-4

(Page 1 of 2)

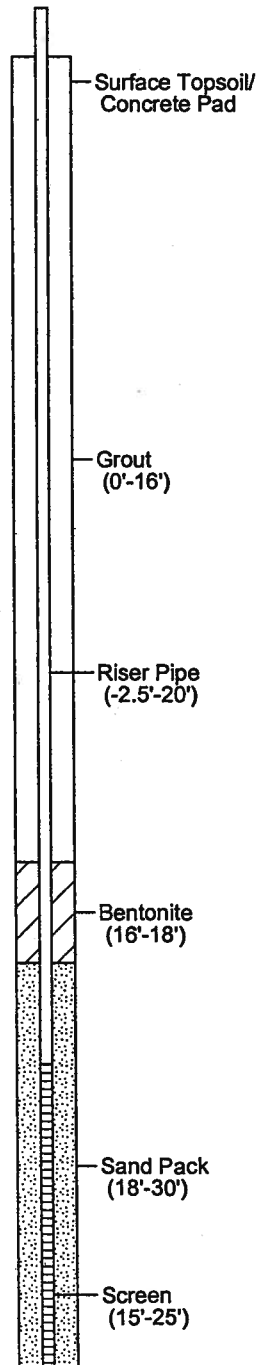
Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/30/07
Date Completed : 3/30/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3666461.95
Easting Coord. : 11689717.84
Survey By : Koontz and Bryant, P.C.
Logged By : Dave Evans

Piezometer: P-4
TOC Elevation: 332.31

Depth in Feet	Surf. Elev. 328.25	Blow Count	% Rec	N Value	USCS	DESCRIPTION
0	328	10				Yellowish orange silty clay
		9	80	21	CL	
		13				
		17				Yellowish orange silty clay; some gray clay present
		3	95	17	CL	
		8				
		9				
		13				
5	323	5				
		9	70	19	CL	
		10				
		13				Yellowish orange sandy clay; red mottling present
		4	95	18	CL	
		9				
		9				
		12				
		5				
		7	80	16	CL	Gray sandy clay; red mottling present
		9				
10	318	12				
		4				Gray sandy clay; red mottling present; moist
		8	50	16	CL	
		8				
		12				
		5				
		11	100	20	CL	Reddish brown silty clay
		15				
		4				
		9	100	20	CL	
		11				
15	313	15				Reddish brown silty clay; wet
		3				
		5	80	15	CL	
		10				
		10				
		24				
		5	65	12	CL	Reddish brown sandy clay; wet
		7				
		7				
20	308	6				
		9	86	20	CL	
		11				
		12				
		5				
		8	75	17	CL	
		9				
		15				
		9				
25		17				
		20	100	37	CL	Whitish gray sandy clay; wet
		25				



WELL CONSTRUCTION

Date Compl. : 3/30/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed



LOG OF BORING P-4

(Page 2 of 2)

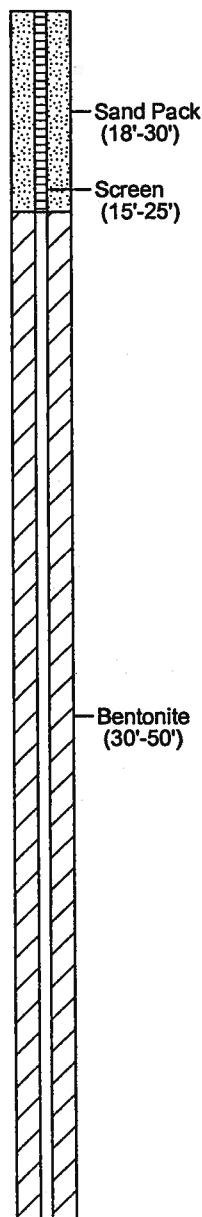
Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/30/07
Date Completed : 3/30/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3666461.95
Easting Coord. : 11689717.84
Survey By : Koontz and Bryant, P.C.
Logged By : Dave Evans

Piezometer: P-4
TOC Elevation: 332.31

Depth in Feet	Surf. Elev. 328.25	Blow Count	% Rec	N Value	USCS	DESCRIPTION
26	302	6			CL	Whitish gray sandy clay; wet
		15				Reddish brown silty clay; wet
		31	100	46		
		48				
		14				
		30	80	80/10		
		50/4			CL	
		16				
31	297	50/5	40	66/11		
		50/5.5	10	SSR		
		50/5.5	5	SSR		Reddish brown medium grained sand; wet
36	292	45				
		50/3	15	95/9	SP	
		36				
		50/4	20	86/10		
41	287	50/5.5			SSR	
		50/5			SP	Greenish gray fine grained sand; wet
		50/5			SSR	Reddish brown medium grained sand; wet
		50/5			SSR	Light gray medium grained sand; wet
46	282	50/5	10	SSR	SP	
		50/5	5	SSR		
51						Boring Terminated at 50 feet



WELL CONSTRUCTION

Date Compl. : 3/30/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup: 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup: 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed



LOG OF BORING P-5

(Page 1 of 1)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/20/07
Date Completed : 3/20/07
Hole Diameter : 8-Inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3666503.39
Easting Coord. : 11690214.30
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth in Feet	Surf. Elev. 312.45	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-5 TOC Elevation: 314.76
0	312	2 7 6 4 4 5 7 6 2 2 3	10	13		Gray sandy clay; moist	Surface Topsoil/ Concrete Pad Grout (0'-13.5') Riser Pipe (-2.5'-17.5') Bentonite (13.5'-15.5') Sand Pack (15.5'-27.5') Screen (17.5'-27.5')
		4 5 7 6 2 2 3	40	12	CL		
5	307	2 3 2 4 7 9 9	50	5			
		3 4 7 10 2 4 8 9 8 13 20 28 18	40	16	CL	Yellowish orange and light gray sandy clay	
10	302	3 4 7 10 2 4 8 9 8 13 20 28 18	50	11			
		18 36 50/5	10	12	CL	Yellowish orange and light gray sandy clay; gravel present; wet at 10 feet	
		32	50	33			
		18 27 39 50/5	70	54	CL	Reddish and light gray sandy clay; occasional gravel present; moist	
15	297	39 50/5	50	82/ 10	CL	Reddish brown silty clay	
		34 30 42 50/4	50	66			
20	292	29 50/5	40	89/ 11	SC	Light gray sandy clay	
		50/5	50	72	SC	Reddish brown silty clay; wet at 24 feet	
25	287	50/5	50	79/ 11			
		50/1	2	SSR	GW	Light gray sandy clay; dry	
Boring Terminated at 27.5 feet							
30							

WELL CONSTRUCTION	
Date Compl.	: 3/20/07
Hole Diameter(s)	: 8-Inch
Drilling Method(s)	: Hollow Stem
SURFACE CASING	
Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Flush coupled
Aprx. Csg. Stickup	: 2.5 feet
WELL CASING	
Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Flush-coupled
Aprx. Csg. Stickup	: 2.5 feet
WELL SCREEN	
Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Flush-coupled
Opening	: 10-slot
SAND PACK	
Type	: DSI #2 Sand
WELL SCREEN SEAL	
Type	: 3/8" Bent., granular
ANNULUS SEAL	
Type	: Bentonite/Grout
PROTECTIVE CSG.	
Type	: not completed
WELL PAD	
Type	: not completed

WELL CONSTRUCTION

Date Compl. : 3/20/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed



LOG OF BORING P-6

(Page 1 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/23/07
Date Completed : 3/23/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665862.66
Easting Coord. : 11689322.51
Survey By : Koontz and Bryant, P.C.
Logged By : Ian Whitlock

Depth in Feet	Surf. Elev. 306.82	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-6 TOC Elevation: 309.27
0		2				Light brown clayey sand	
306		3			SC		Surface Topsoil/ Concrete Pad
3		20		8			
5						Yellowish orange sandy clay	
5		50		11	CL		
6							
6							
5		80		19			
11							
301		11			SM	Olive gray, silty sand, moist	Grout (0'-11')
12							
13		100		24		Yellowish orange clayey sand with red mottling	
15							
3					SC		
5		90		11			
6							
9							
10							Riser Pipe (-2.5'-15')
3					SM	Light gray silty sand with light brown and red mottling; moist	
9		90		12			
11							
11						Light gray silty sand with light brown, red, and black mottling; moist; wet at 16 feet	Bentonite (11'-13')
17							
24		95		41	SM		
39							
7							
15		50/5		57/ 11			
291							
		50/5			SSR	Light gray silty sand with light brown, red, and black mottling; moist; gravel present	
		50/3		5	SSR SM		Sand Pack (13'-25')
20							
		50/3		5	SSR		
286							
		40					
		50/2		50/ 8	SM	Light gray silty sand with light brown, red, and black mottling; large gravel present; moist	Screen (15'-25')
25		50/5		20	SSR SM	Light gray silty sand with light brown, red, and black mottling; gravel present; moist	Bentonite (25'-41')

WELL CONSTRUCTION

Date Compl. : 3/23/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed

1. Auger met refusal at 41 feet.



LOG OF BORING P-6

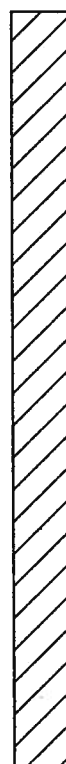
(Page 2 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/23/07
Date Completed : 3/23/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665862.66
Easting Coord. : 11689322.51
Survey By : Koontz and Bryant, P.C.
Logged By : Ian Whitlock

Depth in Feet	Surf. Elev. 306.82	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-6 TOC Elevation: 309.27	
26	280	50/5.5	50	SSR		Light gray silty sand with light brown, red, and black mottling; gravel present; moist		
		50/0	0	SSR	SM			
31	275	50/1	1	SSR				
		50/4	5	SSR				
		50/2	5	SSR	SM	Light gray silty sand with light brown, red, olive gray, and black mottling; gravel more prominent; moist		
36	270	50/5	10	SSR		Light brown silty sand with gravel present; wet		
		50/5.5	5	SSR	SM			
		50/2		SSR				
41	265	Boring Terminated at 41 feet						
46	260							
51								



Bentonite
(25'-41')

WELL CONSTRUCTION

Date Compl. : 3/23/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed

1. Auger met refusal at 41 feet.



LOG OF BORING P-7

(Page 1 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/29/07
Date Completed : 3/29/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665825.26
Easting Coord. : 11689712.95
Survey By : Koontz and Bryant, P.C.
Logged By : Dave Evans

Depth in Feet	Surf. Elev. 315.34	Blow Count	% Rec	N Value	Sample No. and Type	USCS	DESCRIPTION	Piezometer: P-7 TOC Elevation: 319.38
0	315	2			Grab 1	SC	Yellowish orange clayey sand	Surface Topsoil/ Concrete Pad
3		85	8					
5					Grab 2			
6								
7								
10		90	24				Gray clayey sand w/ red mottling	
14								
14					Grab 3	SC		
4								
5	310	90	14					Grout (0'-11')
9					Grab 4			
10								
4								
5		100	11				Red sandy clay with light brown mottling; moist at 8 feet	
6								
9								
2					SS-1			Riser Pipe (-2.5'-15')
4		90	8					
4								
8								
10	305				SS-2	CL		
2								
3		45	7					
4								
4								Bentonite (11'-13')
0								
20		40	56					
36								
50/5								
12								
28		80	65					
15	300						Gray medium grained sand with red mottling; wet	
37								
41								
15								
34		80	68			SP		Sand Pack (13'-25')
34								
4								
19								
37		80	84					Screen (15'-25')
47								
42								
20								

WELL CONSTRUCTION

Date Compl. : 3/29/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed

Notes: SS = split spoon sample
Grab = grab sample of cuttings

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LOG OF BORING P-8

(Page 1 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/29/07
Date Completed : 3/29/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665856.93
Easting Coord. : 11690065.62
Survey By : Koontz and Bryant, P.C.
Logged By : Dave Evans

Depth in Feet	Surf. Elev. 311.68	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Observation Well: P-8 TOC Elevation: 314.21	Well Construction Information
0	311	2				Light brown silty sandy clay	Surface Topsoil/ Concrete Pad	WELL CONSTRUCTION Date Compl. : 3/19/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem
		5	50	9	CL			SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup : 2.5 feet
		4				Light gray silty sandy clay		WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup : 2.5 feet
		5						WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot
		7	90	21				SAND PACK Type : DSI #2 Sand
		14						WELL SCREEN SEAL Type : 3/8" Bent., granular
		15						ANNULUS SEAL Type : Bentonite/Grout
5		5					Grout (0'-11')	PROTECTIVE CSG. Type : not completed
		7	90	17	CL			WELL PAD Type : not completed
		10						
		14						
		4						
		6	10	16				
		10						
		15						
		4						
		9	95	22		Reddish brown silty sandy clay with gray mottling	Riser Pipe (-2.5'-15')	
10		13						
		12						
		3						
		7	90	17	CL		Bentonite (11'-13')	
		10						
		10						
		3						
		5	95	13		Whitish gray silty sandy clay with red mottling; wet		
		8						
		10						
		5						
		8	100	18				
15		10						
		12						
		5						
		11	85	22	CL			
		11						
		17						
		7						
		14	100	37				
		23						
		25				Reddish brown silty sandy clay with occasional coarse sand	Sand Pack (13'-25')	
		9						
		20	90	43	CL	Light red silty sandy clay		
		23						
		27						
		12						
		23	80	59	CL	Reddish brown silty sandy clay	Screen (15'-25')	
		36						
		50/5.5						



LOG OF BORING P-8

(Page 2 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/29/07
Date Completed : 3/29/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665856.93
Easting Coord. : 11690065.62
Survey By : Koontz and Bryant, P.C.
Logged By : Dave Evans

Depth In Feet	Surf. Elev. 311.68	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Observation Well: P-8 TOC Elevation: 314.21	Well Construction Information	
24	287	17	90	76	CL	Reddish brown silty sandy clay	 Sand Pack (13'-25') Screen (15'-25') Bentonite (25'-45')	WELL CONSTRUCTION Date Compl. : 3/19/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup: 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup: 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : not completed WELL PAD Type : not completed	
		28							
		48							
		28							
		10	90	73	GC	Gray fine gravel			
		28							
		45							
		50/5							
		17	80	75	CL	Reddish brown silty sandy clay			
		32							
29	43								
	47								
	282	12	80	62	CL	Gray silty sandy clay with red mottling			
		24							
		38							
		45							
		19	80	60	CL				
		28							
		32							
		46							
34		277	15	60	55	SM	Gray silty sandy clay with red mottling; coarse gravel present		
			21						
	34								
	50								
	18		30	83	SM				
	33								
	50								
	17								
	272		27	30	63	SM			
39			36						
		50							
		17							
		30	30	67	SM				
		37							
		50/5.5							
		19							
		30	30	68	CL				
		38							
44	50/4								
Boring Terminated at 45 feet									



LOG OF BORING P-9

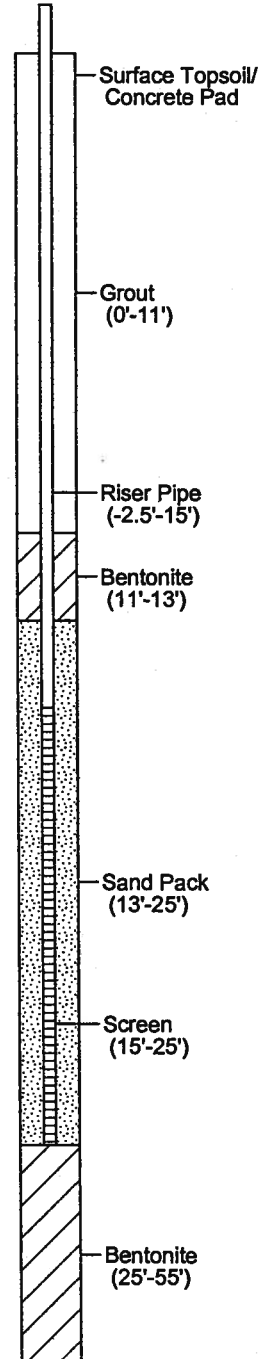
(Page 1 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/22/07
Date Completed : 3/22/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665548.55
Easting Coord. : 11689537.33
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth in Feet	Surf. Elev. 303.15	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-9 TOC Elevation: 306.31
0	303	4				Yellowish orange silty clay; moist	
		4	70	9	CL		
		5					
		6					
		5					
		6					
		8	60	14	CL	Orangish gray sandy clay	
		12					
		3					
5	298	8	80	17		Gray clayey sand; wet at 8 feet	
		9					
		10					
		9					
		9	95	20	SC		
		11					
		12					
		6					
		7					
		10	50	17			
10	293	13				Reddish brown clayey sand; wet	
		4					
		9					
		15	30	24			
		23					
		8					
		10	60	22			
		12					
		13					
		10					
15	288	17	70	41	SC		
		24					
		27					
		12					
		21	95	56			
		35					
		50/5.5					
		10					
		30	50	80/11.5			
20	283	50/5.5					
		23					
			35	73			
		50					
		29				Reddish brown silty sand	
		41	50	91/11			
		50/5					
25	278	50/5	25	SSR	SM		
		50/5.5	5	SSR			
		50/5.5	30	SSR			
30							



WELL CONSTRUCTION

Date Compl. : 3/22/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed



LOG OF BORING P-9

(Page 2 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/22/07
Date Completed : 3/22/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665548.55
Easting Coord. : 11689537.33
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth in Feet	Surf. Elev. 303.15	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-9 TOC Elevation: 306.31
30	273	50/4.5	30	SSR		Reddish brown silty sand; gravel present at 33 feet	
		50/3	10	SSR			
35	268	50/3	10	SSR	SM		
		50/5	15	SSR			
40	263	50/5.5	10	SSR	ML	Brown to dark red clayey silt; dry	
		50/3	10	SSR		Brownish gray silty sand with occasional gravel	
		50/3	10	SSR	SM		
45	258	50/3	10	SSR	SM	Brown sandy silt; dry	
		50/3	10	SSR		Brown clayey silt; dry	
50	253	50/3	10	SSR	ML		
		—	—	—			
55	248					Boring Terminated at 55 feet	
60							



Bentonite
(25'-55')

WELL CONSTRUCTION

Date Compl. : 3/22/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed



LOG OF BORING P-10

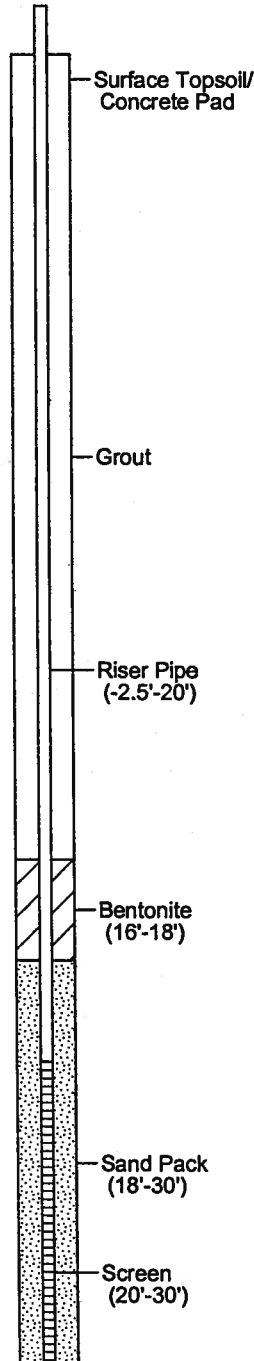
(Page 1 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/21/07
Date Completed : 3/21/07
Hole Diameter : 8-Inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665434.46
Easting Coord. : 11689944.46
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth in Feet	Surf. Elev. 304.30	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-10 TOC Elevation: 308.13	Well Construction Information
0	304	1				Orange to brown sandy clay; occasional gravel present; moist		WELL CONSTRUCTION
		2	60	4				Date Compl. : 3/21/07
		3						Hole Diameter(s) : 8-inch
		4						Drilling Method(s) : Hollow Stem
		5						
		5	60	10				SURFACE CASING
		5						Material : Schedule 40 PVC
		9						Diameter : 2-inch
		3						Joints : Flush coupled
		8	50	24	CL			Aprx. Csg. Stickup: 2.5 feet
5	299	16						WELL CASING
		17						Material : Schedule 40 PVC
		12						Diameter : 2-inch
		12	50	28				Joints : Flush-coupled
		16						Aprx. Csg. Stickup: 2.5 feet
		18						WELL SCREEN
		4						Material : Schedule 40 PVC
		5						Diameter : 2-inch
		10	100	15				Joints : Flush-coupled
		15				Light gray to reddish brown clayey sand; occasional gravel present		Opening : 10-slot
10	294	1						SAND PACK
		10	50	25				Type : DSI #2 Sand
		15						WELL SCREEN SEAL
		20						Type : 3/8" Bent., granular
		7						ANNULUS SEAL
		14	50	43	SC			Type : Bentonite/Grout
		29						PROTECTIVE CSG.
		50/5						Type : not completed
15	289	16						WELL PAD
		34	40	84/ 11				Type : not completed
		50/5						
		16						
		50/5	40	66/ 11		Reddish brown hard clayey silt; wet at 18 feet		
		50/5	30	SSR				
		50/5.5						
20	284	35						
		50/3	30	85/ 9	SC			
		14						
		50/5	30	64/ 11				
		20				Light gray to reddish brown silty sand		
25		50/3	30	70/ 9	SM			





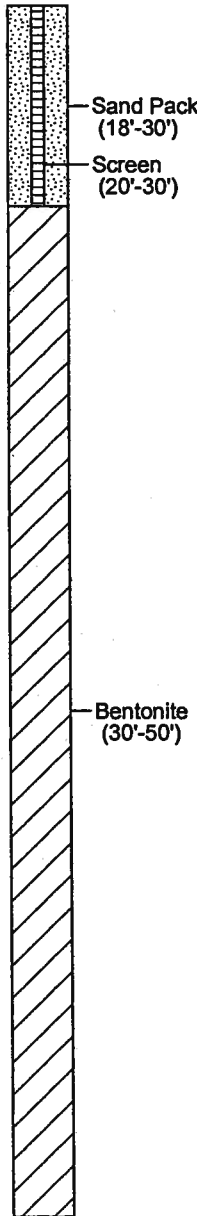
LOG OF BORING P-10

(Page 2 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/21/07
Date Completed : 3/21/07
Hole Diameter : 8-Inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665434.46
Easting Coord. : 11689944.46
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth in Feet	Surf. Elev. 304.30	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-10 TOC Elevation: 308.13	Well Construction Information
26	278	50/5.5	30	SSR		Light gray to reddish brown silty sand		WELL CONSTRUCTION Date Compl. : 3/21/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup: 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup: 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : not completed WELL PAD Type : not completed
		50/4	30	SSR	SM			
		40						
31	273	50/5	30	90/11				
		50/5.5	30	SSR	SM	Predominantly light gray coloration		
		50/5.5	10	SSR		Gravel present at 35 feet		
36	268	50/4	10	SSR	SM			
		50/5	40	SSR	ML	Reddish brown clayey silt		
41	263	50/3	15	SSR	SM	Light gray to reddish brown silty sand		
		50/3	10	SSR		Reddish brown silty sand		
46	258	50/3	—	SSR	SM		Boring Terminated at 50 feet	
51		—	—	—	—			



LOG OF BORING P-11

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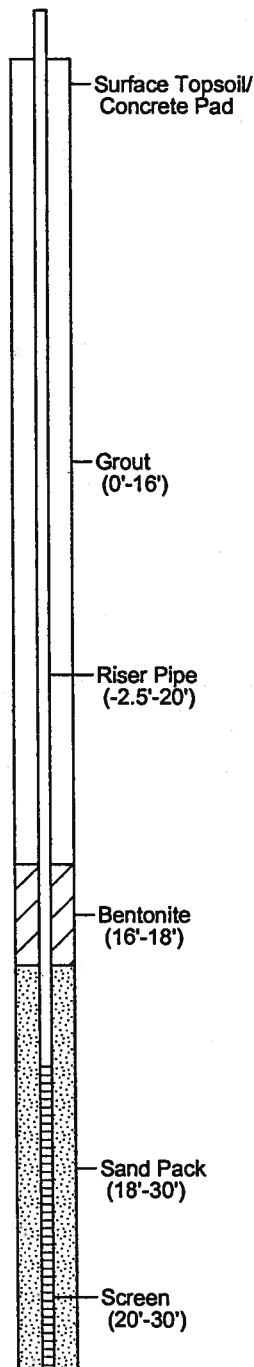
Skinquarter Land CDD
Permit No. 604
Moseley, Virginia

JEI Project No. 620.02, Task 02

Date Started : 3/21/07
Date Completed : 3/21/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665584.89
Easting Coord. : 11690416.30
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth In Feet	Surf. Elev. 298.64	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-11 TOC Elevation: 302.01
0	298	3				Orange to brown silty clay; moist	
		2					
		5	40	7			
		8					
		7			CL		
		8					
		9	60	17			
		10					
		11					
5	293	16	60	27		Light orange to reddish brown clayey sand	
		20					
		7					
		9	50	22	SC		
		13					
		15					
		12					
		15	100	36		Light orange to reddish brown sandy silt	
10		21					
		25					
		7					
		16	100	42	SM		
		26					
		33					
		16					
		20					
		31	90	51		Light gray silty sand; moist	
		35					
		8					
		18	90	33	SM		
15		15					
		31					
		14					
		19	80	43			
		24			SM	Wet at 17 feet	
		28					
		11					
		28	70	68		Occasional gravel present at 18 feet	
		40					
		46			SM		
20		11					
		28	70	65			
		37					
		38					
		23					
		42	40	92/9		Reddish brown hard clayey silt; occasional gravel present at 24 feet; moist	
		50/3			ML		
25		50/5.5	40	SSR			



WELL CONSTRUCTION

Date Compl. : 3/21/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed

1. Auger met refusal at 35 feet.



LOG OF BORING P-11

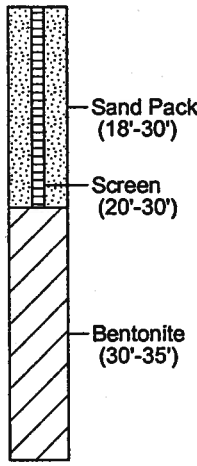
(Page 2 of 2)

Skinquarter Land CDD
Permit No. 604
Moseley, Virginia

JEI Project No. 620.02, Task 02

Date Started : 3/21/07
Date Completed : 3/21/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665584.89
Easting Coord. : 11690416.30
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth in Feet	Surf. Elev. 298.64	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-11 TOC Elevation: 302.01
26	272	50/3	30	SSR	ML	Reddish brown hard clayey silt; moist	
						Light gray clayey sand; occasional gravel present; moist	
		50/4	10	SSR			
31	267	50/4	10	SSR	SC		
		50/1	0	SSR			
		50/1	5	SSR			
36	262					Boring Terminated at 35 feet	
41	257						
46	252						
51							

WELL CONSTRUCTION

Date Compl. : 3/21/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup: 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup: 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent, granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed

1. Auger met refusal at 35 feet.



LOG OF BORING P-12

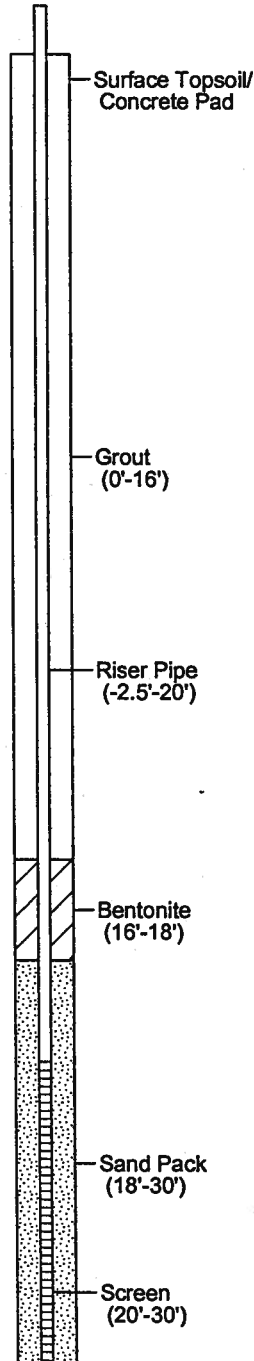
(Page 1 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/28/07
Date Completed : 3/28/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665108.79
Easting Coord. : 11689583.03
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth in Feet	Surf. Elev. 294.35	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-12 TOC Elevation: 296.86	Well Construction Information
0	294	3				Grayish yellow sandy clay; moist		WELL CONSTRUCTION
		2	100	4				Date Compl. : 3/28/07
		2						Hole Diameter(s) : 8-inch
		2						Drilling Method(s) : Hollow Stem
		2						
		3						SURFACE CASING
		6	100	9	CL			Material : Schedule 40 PVC
		7						Diameter : 2-inch
		3						Joints : Flush coupled
		4						Aprx. Csg. Stickup : 2.5 feet
5	289	6	80	10				WELL CASING
		6						Material : Schedule 40 PVC
		3						Diameter : 2-inch
		4						Joints : Flush-coupled
		7	80	11		Yellowish gray clayey sand with light brown layers; moist		Aprx. Csg. Stickup : 2.5 feet
		8						WELL SCREEN
		3						Material : Schedule 40 PVC
		3	50	8				Diameter : 2-inch
		5						Joints : Flush-coupled
		6						Opening : 10-slot
10	284	7			SC			SAND PACK
		14	100	39				Type : DSI #2 Sand
		25						WELL SCREEN SEAL
		25						Type : 3/8" Bent., granular
		20						ANNULUS SEAL
		32	100	67				Type : Bentonite/Grout
		35						PROTECTIVE CSG.
		50/5			SM	Light brown sandy silt; moist		Type : not completed
		17						WELL PAD
15	279	37	70	87/9				Type : not completed
		50/3						
		20				Grayish white silty sand, with black and red mottling; moist; wet at 16 feet		
		40	70	90/9	SM			
		50/3						
		35						
		40	70	90/8				
		50/2				Light brown silt; moist		
20	274	45						
		50/3	40	95/9	ML			
		50/5.5	10		SSR			
						Light brown sandy silt; moist		
25		50/4	10		SM			





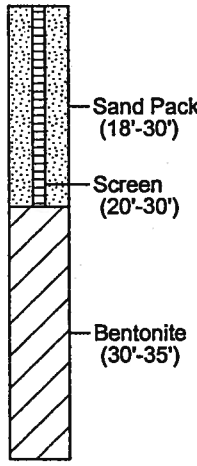
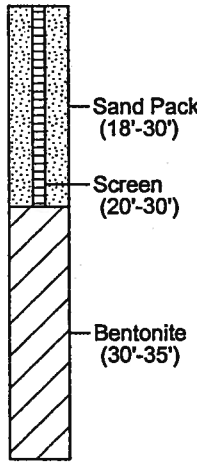
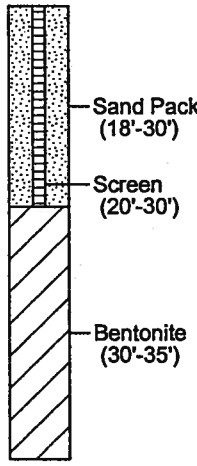
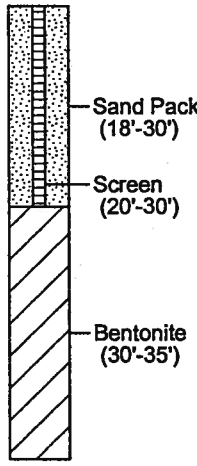
LOG OF BORING P-12

(Page 2 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/28/07
Date Completed : 3/28/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665108.79
Easting Coord. : 11689583.03
Survey By : Koontz and Bryant, P.C.
Logged By : John Westerfield

Depth in Feet	Surf. Elev. 294.35	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-12 TOC Elevation: 296.86	Well Construction Information
26	268	50/3	10	SSR	SM	Light brown sandy silt; moist		WELL CONSTRUCTION Date Compl. : 3/28/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup : 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup : 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : not completed WELL PAD Type : not completed
						Light brown silty sand; wet		
		50/3	-	SSR	SM			
31	263	32	50	82/9	SM			
		50/4						
		50/5.5	25	SSR	SM	Occasional gravel present		WELL CONSTRUCTION Date Compl. : 3/28/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup : 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup : 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : not completed WELL PAD Type : not completed
		35	100	85/8	SM			
		50/2						
36	258							
41	253							WELL CONSTRUCTION Date Compl. : 3/28/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup : 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup : 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : not completed WELL PAD Type : not completed
46	248							
51								WELL CONSTRUCTION Date Compl. : 3/28/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup : 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup : 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : not completed WELL PAD Type : not completed

Boring Terminated at 35 feet



LOG OF BORING P-13/MW-13

(Page 1 of 2)

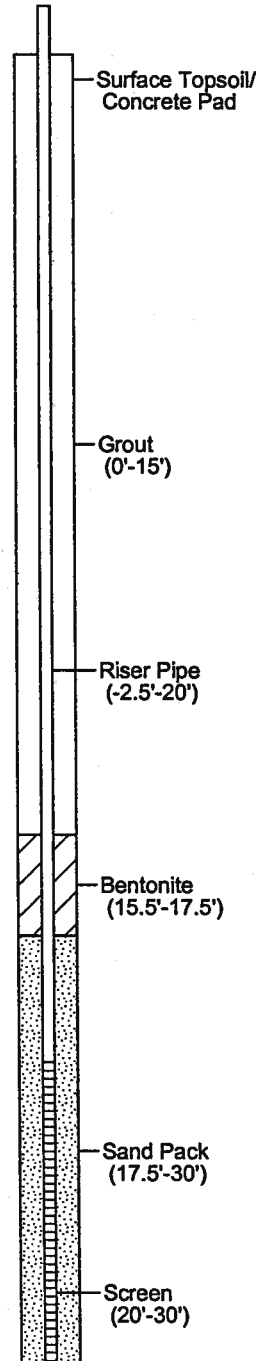
Skinquarter Land LLC
Proposed Landfill CCD
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/27/07
Date Completed : 3/28/07
Hole Diameter : 8-Inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3664908.27
Easting Coord. : 11690287.96
Survey By : Koontz and Bryant, P.C.
Logged By : Ian Whitlock

Depth In Feet	Surf. Elev. 287.06	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-13 TOC Elevation: 289.24
0	287	3				Light gray silty sand; moist	
		4	50	9	SM		
		5					
		6				Yellowish orange silty sand with root mass and fine gravel	
		6	75	15	SW		
		8					
		11				Yellowish orange silty sand with purple and brown mottling	
5	282	3	90	10	SM		
		4					
		6				Reddish brown and white silty sand with clay and fine gravel; orange mottling present	
		6					
		7	100	15	SM		
		8					
		9				Red silty sand with some clay; gray mottling present	
		16	80	42	SM		
10	277	26					
		5				Red silty sand with some clay	
		7	80	19	SM		
		12					
		12				Red and white silty sand with black mottling	
		5					
		8	75	20	SM		
		12					
		12				Yellowish orange silty sand with clay; wet	
15	272	15	90	35	SM		
		20					
		16				Red and white silty sand; wet	
		5	80	27	SM		
		12					
		15				Red and white silty sand with black mottling; fine gravel present at 20 feet; wet	
		17					
		3					
		13	60	28			
		15					
20	267	23					
		18					
		28	95	63	SM		
		35					
		50					
		18					
		40	100	90/11			
		50/5					
25		20	25	70/11			
		50/5					

Piezometer: P-13
TOC Elevation: 289.24



WELL CONSTRUCTION

Date Compl. : 3/28/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed



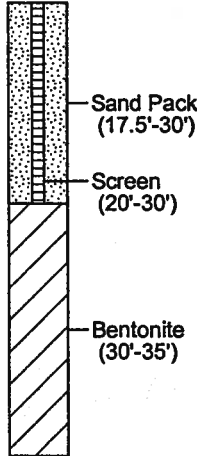
LOG OF BORING P-13/MW-13

(Page 2 of 2)

Skinquarter Land LLC
Proposed Landfill CCD
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/27/07
Date Completed : 3/28/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3664908.27
Easting Coord. : 11690287.96
Survey By : Koontz and Bryant, P.C.
Logged By : Ian Whitlock

Depth In Feet	Surf. Elev. 287.06	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-13 TOC Elevation: 289.24
26	261	50/3	0	SSR	SM	Red and white silty sand with black mottling; gravel present; wet	
		50/4	15	SSR		White silty sand with red mottling and fine gravel, wet	
31	256	50/4	15	SSR	SM		
		50/5	20	SSR			
		50/2	10	SSR			
Boring Terminated at 35 feet							
36	251						
41	246						
46	241						
51							

WELL CONSTRUCTION

Date Compl. : 3/28/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : not completed

WELL PAD

Type : not completed



LOG OF BORING P-14S/MW-14S

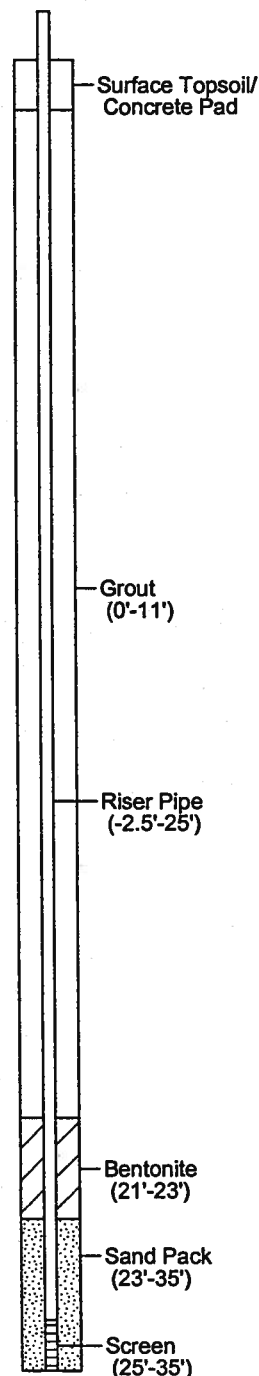
(Page 1 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/26/07
Date Completed : 3/26/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665429.42
Easting Coord. : 11690739.77
Survey By : Koontz and Bryant, P.C.
Logged By : Ian Whitlock

Depth In Feet	Surf. Elev. 273.06	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-14S TOC Elevation: 275.13
0	273	2				Yellowish orange sandy clay with black and red mottling; moist	
		3	75	5	CL		
		5				Yellowish orange sandy clay; moist	
		8	100	16	CL		
		11			CL	Yellowish orange silty clay with gray mottling and decaying plant matter	
5	268	5				Yellowish sandy clay; fine and coarse gravel present; moist	
		8	100	19	SP		
		11				Yellowish orange silty sand with black mottling; wet	
		18	60	68/11	SM		
		50/5				Light gray silty sand; wet	
		50/4	10	SSR	SM		
10	263					Light gray medium grained sand with fine gravel; wet	
		50/3	7	SSR			
					SP		
		50/2	5	SSR			
15	258					Light gray sandy clay with fine gravel; wet	
		50/2	5	SSR			
		50/1	25	SSR	SW		
		50/2	0	SSR			
20	253					White silty sand with black mottling	
		50/3	7	SSR			
					SM		
		50/3	0	SSR			
		14				Dark gray silty sand with fine and coarse gravel; wet	
25		15	20	65/11	SP		
		50/5					



WELL CONSTRUCTION

Date Compl. : 3/26/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : 4-inch Locking
Steel

WELL PAD

Type : 2'x2'x4" concrete



LOG OF BORING P-14S/MW-14S

(Page 2 of 2)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/26/07
Date Completed : 3/26/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Track Auger
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665429.42
Easting Coord. : 11690739.77
Survey By : Koontz and Bryant, P.C.
Logged By : Ian Whitlock

Depth in Feet	Surf. Elev. 273.06	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Piezometer: P-14S TOC Elevation: 275.13
26	247	50/4	5	SSR	MH	Dark gray silt; moist	Sand Pack (23'-35') Screen (25'-35')
		50/5	5	SSR	MH	Dark gray silt with white and orange mottling; wet	
31	242	50/4	5	SSR	SP	Dark gray silty sand with some coarse gravel; wet	
		50/0	0	SSR			
		50/0	0	SSR			
		Boring Terminated at 35 feet					
36	237						
41	232						
46	227						
51							

WELL CONSTRUCTION	
Date Compl.	: 3/26/07
Hole Diameter(s)	: 8-Inch
Drilling Method(s)	: Hollow Stem
SURFACE CASING	
Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Flush coupled
Aprx. Csg. Stickup	: 2.5 feet
WELL CASING	
Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Flush-coupled
Aprx. Csg. Stickup	: 2.5 feet
WELL SCREEN	
Material	: Schedule 40 PVC
Diameter	: 2-inch
Joints	: Flush-coupled
Opening	: 10-slot
SAND PACK	
Type	: DSI #2 Sand
WELL SCREEN SEAL	
Type	: 3/8" Bent., granular
ANNULUS SEAL	
Type	: Bentonite/Grout
PROTECTIVE CSG.	
Type	: 4-inch Locking Steel
WELL PAD	
Type	: 2'x2'x4" concrete

WELL CONSTRUCTION

Date Compl. : 3/26/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : 4-inch Locking Steel

WELL PAD

Type : 2'x2'x4" concrete



LOG OF BORING P-14D/MW-14D

(Page 1 of 3)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/26/07
Date Completed : 3/26/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Auger/ Air Rotary
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665430.39
Easting Coord. : 11690746.16
Survey By : Koontz and Bryant, P.C.
Logged By : Whitlock and Cecil

Depth in Feet	Surf. Elev. 272.09	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Observation Well: P-14D TOC Elevation: 274.20
0	272	2				Yellowish orange sandy clay with black and red mottling; moist	Surface Topsoil/ Concrete Pad Bentonite (1'-57') Riser Pipe (-2.5'-59')
		2	75	5	CL		
		3					
		5				Yellowish orange sandy clay; moist	
		8	100	16	CL		
		8					
		11			CL	Yellowish orange silty clay with gray mottling and decaying plant matter	
5	267	5					
		8	100	19	SP	Yellowish orange silty clay; fine and coarse gravel (quartzite) present; moist	
		11					
		18					
		5					
		18	60	68/11	SM	Yellowish orange silty sand with black mottling; wet	
		50/5					
		50/4	10	SSR	SM	Light gray silty sand; wet	
10	262						
		50/3	7	SSR		Light gray medium grained sand with fine gravel; wet	
					SP		
		50/2	5	SSR			
15	257						
		50/2	5	SSR		Light gray sandy clay with fine gravel; wet	
		50/1	25	SSR	SW		
		50/2	0	SSR			
20	252						
		50/3	7	SSR		White silty sand with black mottling	
					SM		
		50/3	0	SSR			
		14					
25		15	20	65/11	SP	Dark gray silty sand with fine and coarse gravel; wet	
		50/5					

WELL CONSTRUCTION

Date Compl. : 3/26/07
Hole Diameter(s) : 8-inch
Drilling Method(s) : Hollow Stem

SURFACE CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush coupled
Aprx. Csg. Stickup : 2.5 feet

WELL CASING

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Aprx. Csg. Stickup : 2.5 feet

WELL SCREEN

Material : Schedule 40 PVC
Diameter : 2-inch
Joints : Flush-coupled
Opening : 10-slot

SAND PACK

Type : DSI #2 Sand

WELL SCREEN SEAL

Type : 3/8" Bent., granular

ANNULUS SEAL

Type : Bentonite/Grout

PROTECTIVE CSG.

Type : 4-inch Locking Steel

WELL PAD

Type : 2'x2'x4" concrete

1. Auger met refusal at 49.5 feet.
2. Apparent fractures from 62 feet to 68 feet



LOG OF BORING P-14D/MW-14D

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Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/26/07
Date Completed : 3/26/07
Hole Diameter : 8-Inch
Drilling Method : Hollow Stem Auger/ Air Rotary
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665430.39
Easting Coord. : 11690746.16
Survey By : Koontz and Bryant, P.C.
Logged By : Whitlock and Cecil

Depth in Feet	Surf. Elev. 272.09	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Observation Well: P-14D TOC Elevation: 274.20
26	248	50/4	5	SSR	MH	Dark gray silt; moist	
		50/5	5	SSR	MH	Dark gray silt with white and orange mottling; wet	
31	241	50/4	5	SSR		Dark gray silty coarse sand with some coarse gravel, wet	
		50/0	0	SSR			
		50/0	0	SSR			
36	238	50/0	0	SSR			
		50/0	0	SSR			
41	231				SP		
46	226						
51					GP	Competent bedrock present; predominatly siltstones and sandstones	
							WELL CONSTRUCTION Date Compl. : 3/26/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup: 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup: 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : 4-inch Locking Steel WELL PAD Type : 2'x2'x4" concrete 1. Auger met refusal at 49.5 feet. 2. Apparent fractures from 62 feet to 68 feet



LOG OF BORING P-14D/MW-14D

(Page 3 of 3)

Skinquarter Land LLC
Proposed CDD Landfill
Permit No. 604
Moseley, Virginia
JEI Project No. 620.02, Task 02

Date Started : 3/26/07
Date Completed : 3/26/07
Hole Diameter : 8-inch
Drilling Method : Hollow Stem Auger/ Air Rotary
Sampling Method : Split Spoon

Drilling Company : Richard Simmons, Inc.
Northing Coord. : 3665430.39
Easting Coord. : 11690746.16
Survey By : Koontz and Bryant, P.C.
Logged By : Whitlock and Cecil

Depth in Feet	Surf. Elev. 272.09	Blow Count	% Rec	N Value	USCS	DESCRIPTION	Observation Well: P-14D TOC Elevation: 274.20
52	220					Competent bedrock present; predominantly siltstones and sandstones	
57	215				GP		
62	210					Apparent fractures	
67	205				GP		
Boring Terminated at 69 feet							WELL CONSTRUCTION Date Compl. : 3/26/07 Hole Diameter(s) : 8-inch Drilling Method(s) : Hollow Stem SURFACE CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush coupled Aprx. Csg. Stickup : 2.5 feet WELL CASING Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Aprx. Csg. Stickup : 2.5 feet WELL SCREEN Material : Schedule 40 PVC Diameter : 2-inch Joints : Flush-coupled Opening : 10-slot SAND PACK Type : DSI #2 Sand WELL SCREEN SEAL Type : 3/8" Bent., granular ANNULUS SEAL Type : Bentonite/Grout PROTECTIVE CSG. Type : 4-inch Locking Steel WELL PAD Type : 2x2'x4" concrete 1. Auger met refusal at 49.5 feet. 2. Apparent fractures from 62 feet to 68 feet
72	200						
77							

DATE: 4/24/07**WELL DEVELOPMENT LOG**Project Name: Skinquarter Land, LLCProject No./Task No.: 620.02.02Well ID: P-1/ MW-1Developer(s): J.Spillman/ D.EvansWell Diameter: 2 inchesInitial Depth to Water: 6.65 feetDepth to Bottom: 29.57 feetWater Column Thickness: 22.92 feetWell Location: On the northwestern side of the landfillEquipment: 12 Volt Pump, Non-Disposable bailer, Oakton pH/cond/temp meter, LaMotte 2020 Turbidimeter, Slope Indicator water interface meter

Gallons	Date	Time	Temp(°C)	pH	Cond. (uS)	Turb.(ntu)	Notes
0	4/24/07	1244	16.8	6.46	116.4	>1100	
3.7	4/24/07	1247	14.6	6.50	81.1	>1100	
7.4	4/24/07	1250	14.3	6.35	77.2	>1100	
11.1	4/24/07	1252	14.9	6.53	98.9	>1100	
14.8	4/24/07	1304	16.2	7.02	95.7	>1100	
18.5	4/24/07	1310	15.9	6.94	85.8	> 1100	Allowed well to recharge
22.2	4/24/07	1340	15.0	6.35	63.8	>1100	
25.9	4/24/07	1345	14.4	6.14	75.4	>1100	
29.6	4/24/07	1353	15.8	6.35	76.1	>1100	
33.3	4/24/07	1402	16.0	6.42	79.3	>1100	
Dry @ 35 Gallons							

Comments (weather conditions, color, silt, purge water management, etc.): The weather was sunny with temperatures in the 80s. The purge water was discharged to a vegetated area away from well head.

Signature: [Signature] Date: 5/3/07
QA/QC Signoff: [Signature] Date: 5/10/07

DATE: 4/23/07**WELL DEVELOPMENT LOG**

Project Name: Skinquarter Land, LLC Project No./Task No.: 620.02.02
Well ID: P-2/ MW-2 Developer(s): J.Spillman/ D.Evans
Well Diameter: 2 inches Initial Depth to Water: 16.35 feet
Depth to Bottom: 38.05 feet Water Column Thickness: 21.70 feet
Well Location: On the northeastern side of the landfill
Equipment: 12 Volt Pump, Non-Disposable bailer, Oakton pH/cond/temp meter, LaMotte
2020 Turbidimeter, Slope Indicator water interface meter

Gallons	Date	Time	Temp(°C)	pH	Cond. (uS)	Turb.(ntu)	Notes
0	4/23/07	1343	19.0	6.41	293	>1100	
3.5	4/23/07	1346	17.8	6.15	113.6	>1100	
7.0	4/23/07	1349	16.8	6.10	132.5	>1100	
10.5	4/23/07	1353	16.4	6.18	126.5	>1100	
14.0	4/23/07	1401	16.6	6.21	138.7	>1100	
17.5	4/23/07	1406	16.3	6.29	141.9	>1100	
21.0	4/23/07	1414	16.9	6.30	130.3	>1100	
24.5	4/23/07	1423	16.8	6.13	117.3	>1100	
28.0	4/23/07	1432	16.8	6.07	107.7	>1100	
31.5	4/23/07	1440	17.0	6.02	105.6	>1100	
35.0	4/23/07	1450	16.7	6.00	102.9	500	

Comments (weather conditions, color, silt, purge water management, etc.): The weather was sunny with temperatures in the 80s. The purge water was discharged to a vegetated area away from well head.

Signature: *Justin SP* Date: 5/3/07
QA/QC Signoff: *BR CY* Date: 9/10/07

DATE: 4/23/07**WELL DEVELOPMENT LOG**

Project Name: Skinquarter Land, LLC Project No./Task No.: 620.02.02
Well ID: P-7 Developer(s): J.Spillman/ D.Evans
Well Diameter: 2 inches Initial Depth to Water: 13.08 feet
Depth to Bottom: 30.10 feet Water Column Thickness: 17.02 feet
Well Location: In the center of the landfill
Equipment: 12 Volt Pump, Non-Disposable bailer, Oakton pH/cond/temp meter, LaMotte 2020 Turbidimeter, Slope Indicator water interface meter

Gallons	Date	Time	Temp(°C)	pH	Cond. (uS)	Turb.(ntu)	Notes
0	4/23/07	1132	21.6	6.60	---	>1100	
2.8	4/23/07	1134	15.9	6.57	148.6	>1100	
5.6	4/23/07	1140	16.3	6.36	132.1	>1100	
8.4	4/23/07	1146	16.6	6.16	122.1	>1100	
11.2	4/23/07	1156	16.7	6.09	110.4	>1100	
14.0	4/23/07	1213	17.0	5.79	104.6	>1100	
16.8	4/23/07	1232	17.4	5.69	100.6	>1100	
19.6	4/23/07	1246	16.9	5.71	101.7	>1100	
22.4	4/23/07	1258	17.4	5.64	100.6	>1100	
25.2	4/23/07	1308	16.5	5.65	98.6	>1100	

Comments (weather conditions, color, silt, purge water management, etc.): The weather was sunny with temperatures in the 80s. The purge water was discharged to a vegetated area away from well head.

Signature: *Jessie S* Date: 8/3/07
QA/QC Signoff: *for CI* Date: 9/10/07

DATE: 4/24/07**WELL DEVELOPMENT LOG**

Project Name: Skinquarter Land, LLC Project No./Task No.: 620.02.02
Well ID: P-13/MW-13 Developer(s): J.Spillman/ D.Evans
Well Diameter: 2 inches Initial Depth to Water: 8.53 feet
Depth to Bottom: 32.01 feet Water Column Thickness: 23.48 feet
Well Location: On the southcentral side of the landfill
Equipment: 12 Volt Pump, Non-Disposable bailer, Oakton pH/cond/temp meter, LaMotte 2020 Turbidimeter, Slope Indicator water interface meter

Gallons	Date	Time	Temp(°C)	pH	Cond. (uS)	Turb.(ntu)	Notes
0	4/24/07	1123	17.5	5.96	78.0	>1100	
3.8	4/24/07	1127	15.2	5.85	56.8	>1100	
7.6	4/24/07	1129	14.8	5.66	54.5	>1100	
11.4	4/24/07	1132	15.2	5.64	51.2	>1100	
15.2	4/24/07	1137	15.3	5.65	50.8	>1100	
Surge well with non-disposable bailer							
19.0	4/24/07	1142	15.1	5.58	57.0	>1100	
22.8	4/24/07	1146	15.0	5.64	55.1	>1100	
26.6	4/24/07	1151	15.0	5.61	54.6	>1100	
30.4	4/24/07	1155	15.6	5.60	55.0	>1100	
34.2	4/24/07	1159	14.7	5.56	53.4	>1100	
38.0	4/24/07	1203	15.0	5.57	52.0	>1100	

Comments (weather conditions, color, silt, purge water management, etc.): The weather was sunny with temperatures in the 80s. The purge water was discharged to a vegetated area away from well head.

Signature: Julie Sp Date: 5/3/07
QA/QC Signoff: Ben CH Date: 5/10/07

DATE: 4/24/07**WELL DEVELOPMENT LOG**

Project Name: Skinquarter Land, LLC Project No./Task No.: 620.02.02
Well ID: P-14S/ MW-14S Developer(s): J.Spillman/ D.Evans
Well Diameter: 2 inches Initial Depth to Water: 8.95 feet
Depth to Bottom: 37.65 feet Water Column Thickness: 28.70 feet
Well Location: On the southeastern side of the landfill
Equipment: 12 Volt Pump, Non-Disposable bailer, Oakton pH/cond/temp meter, LaMotte
2020 Turbidimeter, Slope Indicator water interface meter

Gallons	Date	Time	Temp(°C)	pH	Cond. (uS)	Turb.(ntu)	Notes
0	4/24/07	0920	17.5	7.93	388	>1100	
4.7	4/24/07	0925	15.5	7.37	151.8	>1100	
9.4	4/24/07	0928	15.1	7.12	142.8	>1100	
14.1	4/24/07	0933	14.9	6.75	139.3	>1100	
18.8	4/24/07	0938	15.0	6.65	137.3	>1100	
23.5	4/24/07	0942	15.0	6.77	137.5	>1100	
28.2	4/24/07	0947	15.3	6.62	136.2	> 1100	
32.9	4/24/07	0952	15.4	6.55	132.2	>1100	
37.6	4/24/07	0957	15.2	6.55	136.9	>1100	
42.3	4/24/07	1004	15.3	6.54	135.5	>1100	
47.0	4/24/07	1009	15.4	6.50	134.9	>1100	

Comments (weather conditions, color, silt, purge water management, etc.): The weather was sunny with temperatures in the 80s. The purge water was discharged to a vegetated area away from well head.

Signature: [Signature] Date: 5/3/07
QA/QC Signoff: [Signature] Date: 5/10/07

DATE: 4/23/07**WELL DEVELOPMENT LOG**

Project Name: Skinquarter Land, LLC Project No./Task No.: 620.02.02
Well ID: P-14D/ MW-14D Developer(s): J.Spillman/ D.Evans
Well Diameter: 2 inches Initial Depth to Water: 12.05 feet
Depth to Bottom: 69.80 feet Water Column Thickness: 57.75 feet
Well Location: On the southeastern side of the landfill
Equipment: 12 Volt Pump, Non-Disposable bailer, Oakton pH/cond/temp meter, LaMotte 2020 Turbidimeter, Slope Indicator water interface meter

Gallons	Date	Time	Temp(°C)	pH	Cond. (uS)	Turb.(ntu)	Notes
0	4/23/07	1520	18.3	6.68	182.9	>1100	
9.4	4/23/07	1553	16.3	6.86	146.3	>1100	
18.8	4/23/07	1608	16.3	6.76	--	>1100	
28.2	4/23/07	1627	16.7	7.02	141.3	>1100	
37.6	4/23/07	1637	16.3	6.74	140.0	600	
47.0	4/23/07	1651	16.3	6.98	137.3	500	
56.4	4/23/07	1700	15.8	6.74	136.7	390	
65.8	4/23/07	1716	16.1	6.72	137.7	300	
75.2	4/23/07	1732	16.3	6.91	138.2	260	

Comments (weather conditions, color, silt, purge water management, etc.): The weather was sunny with temperatures in the 80s. Development ended early because front gate was to be locked at 1745. The purge water was discharged to a vegetated area away from well head.

Signature: Date: 6/3/07
QA/QC Signoff: Date: 9/10/07

APPENDIX IX
SETTLEMENT CALCULATIONS

Job: Skinquarter CDD Landfill
 Job Number: 620.03 Task 01
 Calculated By: TMK Date: 3/6/2008
 Checked By: LBB Date:
 Subject: Differential Settlement
 Sheet: 1 of 4

Subsurface Conditions

Subsurface conditions from borings TB-1 and TB-2 within proposed footprint

Depth [ft]	GROUND SURFACE		
0			
Layer 1	Material =	CL/ML/SC	Blowcounts = 15/ft
12			
12			
Layer 2	Material =	CL	Blowcounts = 50/ft
20			

Foundation Type

Assume an approximately square foundation of 1662' x 1227'
 B=1227'
 L=1662'

Improved Janbu Approximation of Immediate Settlement

Immediate settlement of a structure on cohesive soil consists of elastic distortion associated with a change in shape without volume change and, in unsaturated clay, settlement from a decrease in volume. The theory of elasticity is generally applicable to cohesive soils.

$$S = (\mu_o) * (\mu_1) * \frac{q * B}{E_{s*}}$$

where:

S = Settlement

μ_o = Influence factor for depth D of foundation below ground surface

μ_1 = Influence factor for foundation shape

E_{s*} = Equivalent Young's Modulus of the soil, tsf

q = Loading, tsf

Loading

	Density (pcf)	Depth (ft)
Cover/Drain	125	4
Waste	75	200
Liner/Stone	125	2
Total = q		7.88 tsf

Job: Skinquarter CDD Landfill
Job Number: 620.03 Task 01
Calculated By: TMK Date: 3/6/2008
Checked By: LBB Date:
Subject: Differential Settlement
Sheet: 2 of 4

μ_0 calculated from Figure 3-8

D = 5 ft
B = 1227 ft
D/B = 0.004
 $\mu_0 = 1.0$

μ_1 calculated from Figure 3-8

L = 1662 ft
B = 1227 ft
L/B = 1.35
Assume maximum depth to bedrock of 20'
 $\mu_1 = 0.01$

E_s estimated from Table D-3 and On-site Boring Logs
 $E_s = 500 \text{ tsf}$

Table D-3

Typical Elastic Moduli

Soil	E_s , tsf
Clay	
Very soft clay	5 - 50
Soft clay	50 - 200
Medium clay	200 - 500
Stiff clay, silty clay	500 - 1000
Sandy clay	250 - 2000
Clay shale	1000 - 2000
Sand	
Loose sand	100 - 250
Dense sand	250 - 1000
Dense sand and gravel	1000 - 2000
Silty sand	250 - 2000

$$S = (1.0) * (0.01) * \frac{7.88 \text{ tsf} * 1227 \text{ ft}}{500 \text{ tsf}} = 0.19 \text{ ft}$$

0.19

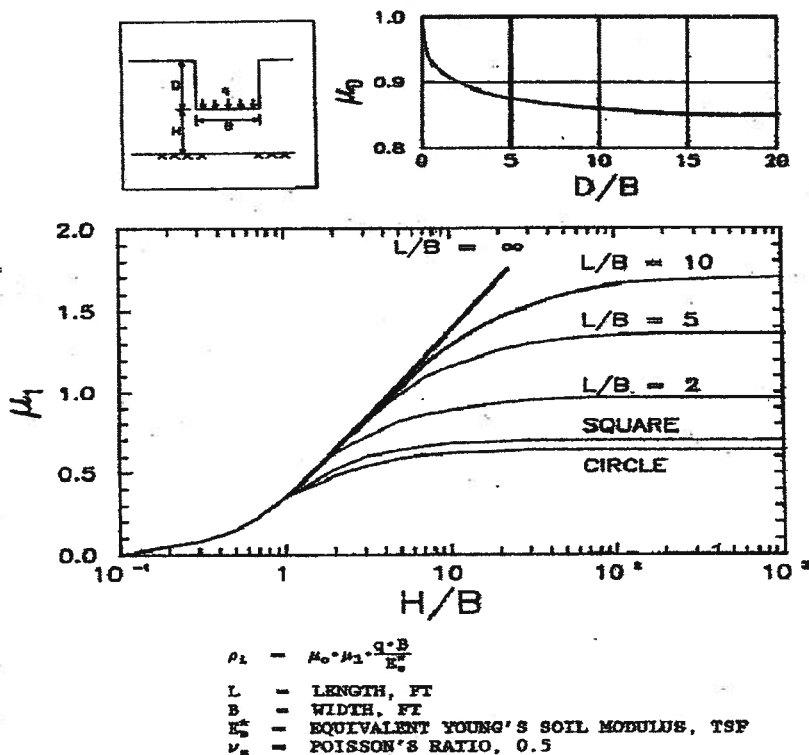


Figure 3-8. Chart for estimating immediate settlement in cohesive soil. Reprinted by permission of the National Research Council of Canada from *Canadian Geotechnical Journal*, Vol 15, 1978, "Janbu, Bjerrum, and Kjessensli's Chart Reinterpreted", by J. T. Christian and W. D. Carrier III, p 127.

Job: Skinquarter CDD Landfill
Job Number: 620.03 Task 01
Calculated By: TMK Date: 3/6/2008
Checked By: LBB Date:
Subject: Differential Settlement
Sheet: 3 of 4

Primary Consolidation Settlement

$$S = \frac{\Delta e}{1 + e_o} H$$

S = Settlement (ft)

Δe = Change in Void Ratio

H = Thickness of Layer (ft)

e_o = Initial Void Ratio

$$\Delta e = C_c * \log_{10} \frac{\sigma'_f}{\sigma'_o}$$

$$C_c = 0.012 * Wn$$

Wn = Natural Water Content (%)

σ'_f = Final Stress

σ'_o = Initial Stress

Calculation for Layer 1

Calculation of Change in Void Ratio

Natural Water Content = 25% from Lab Data

$C_c = 0.012 * Wn = 0.30$

Thickness of Soil Layer = 12 ft

Initial Stress for layer 1 = 125 pcf * 6 ft =

0.75 tsf

Final Stress for 12' thick layer = 7.88 tsf + 0.25 tsf =

8.63 tsf

from waste calculated above

Change in Stress for layer 1 = 8.63 - 0.75 =

7.875 tsf

$\Delta e = (0.30) * \log (3.92/0.47) = 0.318$

Calculation of Primary Settlement

Initial Void Ratio = 1.5 estimated

$S = (0.318) * (12') / (1 + 0.9) = 1.53 \text{ ft}$

Calculation for Layer 2

Calculation of Change in Void Ratio

Natural Water Content = 40%

$C_c = 0.012 * Wn = 0.48$

Thickness of Soil Layer = 8 ft

Initial Stress for layer 2 = 125 pcf * 8'ft =

0.5 tsf

Final Stress for layer 2 = 7.88 tsf + 1.25 tsf =

8.38 tsf

from waste calculated above

Change in Stress for layer 2 =

7.875 tsf

$\Delta e = (0.30) * \log (5.2/1.75) = 0.588$

Calculation of Primary Settlement

Initial Void Ratio = 1.5

$S = (0.414) * (20') / (1 + 1.5) = 1.88 \text{ ft}$

Job: Skinquarter CDD Landfill
Job Number: 620.03 Task 01
Calculated By: TMK Date: 3/6/2008
Checked By: LBB Date: _____
Subject: Differential Settlement
Sheet: 4 of 4

Secondary Consolidation Settlement

$$S_{sc} = C_{\alpha} \frac{H_o}{1 + e_o} (\log t_f - \log t_p)$$

C_{α} = Secondary Compression Index

H_o = Thickness of layer

t_f = Time at end of settlement period

t_p = Time at the end of consolidation compression

Calculation for Layer 1

Estimate $C_{\alpha} = 0.03 * C_c = 0.03 * 0.3 = 0.009$
 $H_o = 12$ ft
 $e_o = 1.500$
 $t_f = 60$ yrs
 $t_p = 10$ yrs

$S_{sc} = 0.034$ ft

Calculation for Layer 2

Estimate $C_{\alpha} = 0.03 * C_c = 0.03 * 0.48 = 0.0144$
 $t_f = 60$ yrs
 $t_p = 10$ yrs

$S_{sc} = 0.036$ ft

	0.190	3.667	1.53	1.88	0.034	0.036	3.667
--	-------	-------	------	------	-------	-------	-------

Total Settlement Immediate Settlement + Primary Settlement + Secondary Settlement
= 0.19 ft + 1.53 ft + 1.88 ft + 0.034 ft + 0.036 ft = 3.67 ft

References

NAVFAC EM 1110-1-1904 Settlement Analysis, 1990
McCarthy, David F. Essentials of Soil Mechanics and Foundations, 1998

Determine the factor of safety against FML strain due to differential settlement

Given:

Minimum allowable FML elongation (yield elongation) for 60-mil HDPE.

Maximum settlement at maximum fill height (calculated previously) compared to settlement at edge.

Assume zero settlement at edge.

Distance between the maximum settlement and edge of cell.

Find:

Find the factor of safety.

$$FS = Y_{allow} / [(S_{max} - S_{min}) / L]$$

Y_{allow}	=	minimum elongation at yield	=	12 %
S_{max}	=	maximum settlement	=	43.2 inches
S_{min}	=	minimum settlement	=	0.0 inches
L	=	distance between S_{max} and S_{min}	=	831.0 feet
Y_{reqd}	=	maximum potential elongation	=	0.433 %

$$Factor\ of\ Safety = Y_{allow} / Y_{reqd} = 27.7$$

Maximum settlement accounts for secondary consolidation.

APPENDIX XVII
SLUG TESTING DATA AND ANALYSIS WORKSHEETS

Skinquarter CDD Landfill

P-2 Rising Head Test

Site Name: Skinquarter CDD Landfill
 Location: Skinquarter, Virginia
 Test Date: April 25, 2007
 Import File: P:\Skinquarter CDD LF\Slug Test\P-2RH.txt

Well Label: P-2
 Aquifer Thickness: 100. feet
 Screen Length: 10. feet
 Casing Radius: 8.3e-002 feet
 Effective Radius: 0.34 feet
 Static Water Level: 0.37 feet
 Water Table to Screen Bottom: 22. feet
 Anisotropy Ratio: 1.
 Time Adjustment: 0. Seconds

Test starts with trial 0

There are 197 time and drawdown measurements

Maximum head is 0.37 feet

Minimum head is 0. feet

Trial	Time (seconds)	Adjusted Time (seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	0.	0.37	1.
2	0.66	0.66	1.e-003	0.369	0.9973
3	1.32	1.32	3.e-003	0.367	0.9919
4	1.98	1.98	4.e-003	0.366	0.9892
5	3.3	3.3	5.e-003	0.365	0.9865
6	3.96	3.96	6.e-003	0.364	0.9838
7	4.62	4.62	7.e-003	0.363	0.9811
8	5.28	5.28	8.e-003	0.362	0.9784
9	5.94	5.94	9.e-003	0.361	0.9757
10	6.6	6.6	1.e-002	0.36	0.973
11	7.26	7.26	1.1e-002	0.359	0.9703
12	7.92	7.92	1.2e-002	0.358	0.9676
13	9.24	9.24	1.3e-002	0.357	0.9649
14	9.9	9.9	1.4e-002	0.356	0.9622
15	10.56	10.56	1.5e-002	0.355	0.9595
16	11.22	11.22	1.6e-002	0.354	0.9568
17	11.88	11.88	1.7e-002	0.353	0.9541
18	12.54	12.54	1.8e-002	0.352	0.9514
19	13.86	13.86	1.9e-002	0.351	0.9486
20	14.56	14.56	2.e-002	0.35	0.9459
21	15.31	15.31	2.1e-002	0.349	0.9432
22	16.1	16.1	2.2e-002	0.348	0.9405
23	16.94	16.94	2.3e-002	0.347	0.9378
24	17.83	17.83	2.4e-002	0.346	0.9351
25	18.77	18.77	2.5e-002	0.345	0.9324
26	20.83	20.83	2.7e-002	0.343	0.927
27	21.95	21.95	2.8e-002	0.342	0.9243
28	23.14	23.14	2.9e-002	0.341	0.9216
29	24.4	24.4	3.1e-002	0.339	0.9162
30	25.73	25.73	3.2e-002	0.338	0.9135
31	27.14	27.14	3.4e-002	0.336	0.9081
32	28.63	28.63	3.6e-002	0.334	0.9027
33	33.67	33.67	3.9e-002	0.331	0.8946
34	35.55	35.55	4.e-002	0.33	0.8919
35	37.54	37.54	4.2e-002	0.328	0.8865

Skinquarter CDD Landfill

36	39.65	39.65	4.4e-002	0.326	0.8811
37	41.89	41.89	4.6e-002	0.324	0.8757
38	44.26	44.26	4.9e-002	0.321	0.8676
39	46.77	46.77	5.1e-002	0.319	0.8622
40	49.43	49.43	5.5e-002	0.315	0.8514
41	52.25	52.25	5.8e-002	0.312	0.8432
42	55.24	55.24	6.1e-002	0.309	0.8351
43	58.4	58.4	6.4e-002	0.306	0.827
44	61.75	61.75	6.8e-002	0.302	0.8162
45	65.3	65.3	7.1e-002	0.299	0.8081
46	69.06	69.06	7.5e-002	0.295	0.7973
47	73.04	73.04	7.9e-002	0.291	0.7865
48	77.26	77.26	8.3e-002	0.287	0.7757
49	81.73	81.73	8.7e-002	0.283	0.7649
50	86.47	86.47	9.1e-002	0.279	0.7541
51	91.49	91.49	9.5e-002	0.275	0.7432
52	96.8	96.8	0.1	0.27	0.7297
53	102.4	102.4	0.105	0.265	0.7162
54	108.4	108.4	0.11	0.26	0.7027
55	114.7	114.7	0.114	0.256	0.6919
56	121.4	121.4	0.118	0.252	0.6811
57	128.5	128.5	0.124	0.246	0.6649
58	136.	136.	0.128	0.242	0.6541
59	144.	144.	0.134	0.236	0.6378
60	152.4	152.4	0.139	0.231	0.6243
61	161.3	161.3	0.145	0.225	0.6081
62	170.8	170.8	0.15	0.22	0.5946
63	180.8	180.8	0.156	0.214	0.5784
64	190.8	190.8	0.161	0.209	0.5649
65	200.8	200.8	0.167	0.203	0.5486
66	210.8	210.8	0.172	0.198	0.5351
67	220.8	220.8	0.177	0.193	0.5216
68	230.8	230.8	0.181	0.189	0.5108
69	240.8	240.8	0.185	0.185	0.5
70	250.8	250.8	0.19	0.18	0.4865
71	260.8	260.8	0.194	0.176	0.4757
72	270.8	270.8	0.198	0.172	0.4649
73	280.8	280.8	0.202	0.168	0.4541
74	290.8	290.8	0.205	0.165	0.4459
75	300.8	300.8	0.209	0.161	0.4351
76	310.8	310.8	0.213	0.157	0.4243
77	320.8	320.8	0.217	0.153	0.4135
78	330.8	330.8	0.221	0.149	0.4027
79	340.8	340.8	0.225	0.145	0.3919
80	350.8	350.8	0.227	0.143	0.3865
81	360.8	360.8	0.231	0.139	0.3757
82	370.8	370.8	0.235	0.135	0.3649
83	380.8	380.8	0.237	0.133	0.3595
84	390.8	390.8	0.24	0.13	0.3514
85	400.8	400.8	0.243	0.127	0.3432
86	410.8	410.8	0.246	0.124	0.3351
87	420.8	420.8	0.249	0.121	0.327
88	430.8	430.8	0.251	0.119	0.3216
89	440.8	440.8	0.254	0.116	0.3135
90	450.8	450.8	0.256	0.114	0.3081
91	460.8	460.8	0.259	0.111	0.3
92	470.8	470.8	0.261	0.109	0.2946

Skinquarter CDD Landfill

93	480.8	480.8	0.263	0.107	0.2892
94	490.8	490.8	0.266	0.104	0.2811
95	500.8	500.8	0.267	0.103	0.2784
96	510.8	510.8	0.27	1.e-001	0.2703
97	520.8	520.8	0.272	9.8e-002	0.2649
98	530.8	530.8	0.274	9.6e-002	0.2595
99	540.8	540.8	0.276	9.4e-002	0.2541
100	550.8	550.8	0.277	9.3e-002	0.2514
101	560.8	560.8	0.279	9.1e-002	0.2459
102	570.8	570.8	0.28	9.e-002	0.2432
103	580.8	580.8	0.282	8.8e-002	0.2378
104	590.8	590.8	0.284	8.6e-002	0.2324
105	600.8	600.8	0.285	8.5e-002	0.2297
106	610.8	610.8	0.287	8.3e-002	0.2243
107	620.8	620.8	0.288	8.2e-002	0.2216
108	630.8	630.8	0.29	8.e-002	0.2162
109	640.8	640.8	0.292	7.8e-002	0.2108
110	660.8	660.8	0.295	7.5e-002	0.2027
111	680.8	680.8	0.298	7.2e-002	0.1946
112	690.8	690.8	0.299	7.1e-002	0.1919
113	700.8	700.8	0.3	7.e-002	0.1892
114	710.8	710.8	0.302	6.8e-002	0.1838
115	730.8	730.8	0.303	6.7e-002	0.1811
116	740.8	740.8	0.305	6.5e-002	0.1757
117	750.8	750.8	0.306	6.4e-002	0.173
118	770.8	770.8	0.308	6.2e-002	0.1676
119	780.8	780.8	0.309	6.1e-002	0.1649
120	790.8	790.8	0.31	6.e-002	0.1622
121	800.8	800.8	0.311	5.9e-002	0.1595
122	810.8	810.8	0.312	5.8e-002	0.1568
123	820.8	820.8	0.313	5.7e-002	0.1541
124	830.8	830.8	0.314	5.6e-002	0.1514
125	840.8	840.8	0.315	5.5e-002	0.1486
126	850.8	850.8	0.316	5.4e-002	0.1459
127	860.8	860.8	0.317	5.3e-002	0.1432
128	870.8	870.8	0.318	5.2e-002	0.1405
129	880.8	880.8	0.319	5.1e-002	0.1378
130	900.8	900.8	0.32	5.e-002	0.1351
131	910.8	910.8	0.321	4.9e-002	0.1324
132	920.8	920.8	0.322	4.8e-002	0.1297
133	930.8	930.8	0.323	4.7e-002	0.127
134	940.8	940.8	0.324	4.6e-002	0.1243
135	950.8	950.8	0.325	4.5e-002	0.1216
136	970.8	970.8	0.326	4.4e-002	0.1189
137	980.8	980.8	0.327	4.3e-002	0.1162
138	1001	1001	0.328	4.2e-002	0.1135
139	1011	1011	0.329	4.1e-002	0.1108
140	1021	1021	0.33	4.e-002	0.1081
141	1041	1041	0.331	3.9e-002	0.1054
142	1061	1061	0.332	3.8e-002	0.1027
143	1081	1081	0.333	3.7e-002	1.e-001
144	1091	1091	0.334	3.6e-002	9.73e-002
145	1111	1111	0.335	3.5e-002	9.459e-002
146	1131	1131	0.336	3.4e-002	9.189e-002
147	1151	1151	0.337	3.3e-002	8.919e-002
148	1171	1171	0.338	3.2e-002	8.649e-002
149	1201	1201	0.339	3.1e-002	8.378e-002

Skinquarter CDD Landfill

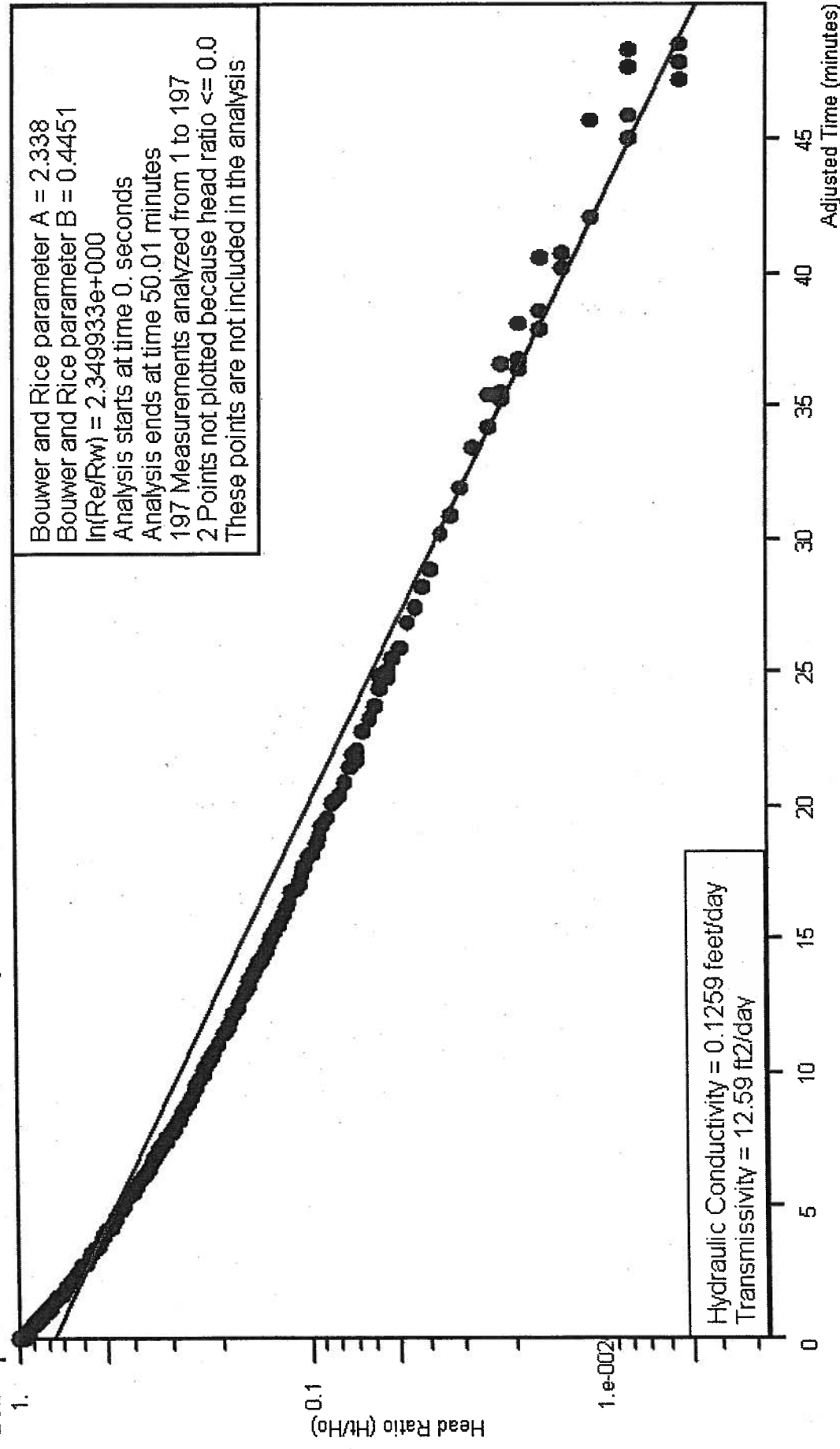
150	1211	1211	0.34	3.e-002	8.108e-002
151	1221	1221	0.341	2.9e-002	7.838e-002
152	1251	1251	0.342	2.8e-002	7.568e-002
153	1281	1281	0.343	2.7e-002	7.297e-002
154	1301	1301	0.345	2.5e-002	6.757e-002
155	1311	1311	0.344	2.6e-002	7.027e-002
156	1321	1321	0.345	2.5e-002	6.757e-002
157	1361	1361	0.346	2.4e-002	6.486e-002
158	1391	1391	0.347	2.3e-002	6.216e-002
159	1421	1421	0.348	2.2e-002	5.946e-002
160	1461	1461	0.349	2.1e-002	5.676e-002
161	1481	1481	0.35	2.e-002	5.405e-002
162	1491	1491	0.349	2.1e-002	5.676e-002
163	1501	1501	0.35	2.e-002	5.405e-002
164	1531	1531	0.351	1.9e-002	5.135e-002
165	1551	1551	0.352	1.8e-002	4.865e-002
166	1611	1611	0.353	1.7e-002	4.595e-002
167	1641	1641	0.354	1.6e-002	4.324e-002
168	1691	1691	0.355	1.5e-002	4.054e-002
169	1731	1731	0.356	1.4e-002	3.784e-002
170	1811	1811	0.357	1.3e-002	3.514e-002
171	1851	1851	0.358	1.2e-002	3.243e-002
172	1911	1911	0.359	1.1e-002	2.973e-002
173	2001	2001	0.36	1.e-002	2.703e-002
174	2051	2051	0.361	9.e-003	2.432e-002
175	2111	2111	0.362	8.e-003	2.162e-002
176	2121	2121	0.361	9.e-003	2.432e-002
177	2131	2131	0.362	8.e-003	2.162e-002
178	2181	2181	0.363	7.e-003	1.892e-002
179	2191	2191	0.362	8.e-003	2.162e-002
180	2201	2201	0.363	7.e-003	1.892e-002
181	2271	2271	0.364	6.e-003	1.622e-002
182	2281	2281	0.363	7.e-003	1.892e-002
183	2311	2311	0.364	6.e-003	1.622e-002
184	2411	2411	0.365	5.e-003	1.351e-002
185	2431	2431	0.364	6.e-003	1.622e-002
186	2441	2441	0.365	5.e-003	1.351e-002
187	2521	2521	0.366	4.e-003	1.081e-002
188	2701	2701	0.367	3.e-003	8.108e-003
189	2741	2741	0.366	4.e-003	1.081e-002
190	2751	2751	0.367	3.e-003	8.108e-003
191	2831	2831	0.368	2.e-003	5.405e-003
192	2861	2861	0.367	3.e-003	8.108e-003
193	2871	2871	0.368	2.e-003	5.405e-003
194	2901	2901	0.367	3.e-003	8.108e-003
195	2911	2911	0.368	2.e-003	5.405e-003
196	2951	2951	0.369	1.e-003	2.703e-003
197	3001	3001	0.37	0.	0.

P-2 Rising Head Test April 25, 2007

Skinquarter CDD Landfill Skinquarter, Virginia

Bouwer and Rice Graph

P-2



Analysis by Starpoint Software

P-7 Falling Head Test

Site Name: Skinquarter CDD Landfill
 Location: Skinquarter, Virginia
 Test Date: April 25, 2007
 Import File: P:\Skinquarter CDD LF\Slug Test\text files\P-7FH.txt

Well Label: P-7
 Aquifer Thickness: 100. feet
 Screen Length: 10. feet
 Casing Radius: 8.3e-002 feet
 Effective Radius: 0.34 feet
 Static Water Level: -0.613 feet
 Water Table to Screen Bottom: 17. feet
 Anisotropy Ratio: 1.
 Time Adjustment: 1.32 Seconds
 Test starts with trial 2
 There are 188 time and drawdown measurements
 Maximum head is 0.626 feet
 Minimum head is 0. feet

Trial	Time (seconds)	Adjusted Time (seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-1.32	0.	0.613	0.9792
2	0.66	-0.66	-3.e-003	0.61	0.9744
3	1.32	0.	1.3e-002	0.626	1.
4	1.98	0.66	-1.8e-002	0.595	0.9505
5	2.64	1.32	-2.4e-002	0.589	0.9409
6	3.3	1.98	-1.9e-002	0.594	0.9489
7	3.96	2.64	-2.3e-002	0.59	0.9425
8	4.62	3.3	-2.5e-002	0.588	0.9393
9	5.28	3.96	-2.7e-002	0.586	0.9361
10	5.94	4.62	-2.9e-002	0.584	0.9329
11	6.6	5.28	-3.3e-002	0.58	0.9265
12	7.26	5.94	-3.4e-002	0.579	0.9249
13	7.92	6.6	-3.5e-002	0.578	0.9233
14	8.58	7.26	-3.7e-002	0.576	0.9201
15	9.24	7.92	-3.9e-002	0.574	0.9169
16	9.9	8.58	-4.e-002	0.573	0.9153
17	10.56	9.24	-4.4e-002	0.569	0.9089
18	11.88	10.56	-4.6e-002	0.567	0.9058
19	12.54	11.22	-4.7e-002	0.566	0.9042
20	13.2	11.88	-4.9e-002	0.564	0.901
21	13.86	12.54	-5.e-002	0.563	0.8994
22	14.56	13.24	-5.2e-002	0.561	0.8962
23	15.31	13.99	-5.4e-002	0.559	0.893
24	16.94	15.62	-5.6e-002	0.557	0.8898
25	17.83	16.51	-5.8e-002	0.555	0.8866
26	18.77	17.45	-5.9e-002	0.554	0.885
27	19.77	18.45	-6.2e-002	0.551	0.8802
28	20.83	19.51	-6.4e-002	0.549	0.877
29	21.95	20.63	-6.6e-002	0.547	0.8738
30	23.14	21.82	-6.8e-002	0.545	0.8706
31	24.4	23.08	-7.e-002	0.543	0.8674
32	25.73	24.41	-7.2e-002	0.541	0.8642
33	27.14	25.82	-7.5e-002	0.538	0.8594
34	28.63	27.31	-7.7e-002	0.536	0.8562
35	30.21	28.89	-7.9e-002	0.534	0.853

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36	31.89	30.57	-8.6e-002	0.527	0.8419
37	35.55	34.23	-8.9e-002	0.524	0.8371
38	37.54	36.22	-9.2e-002	0.521	0.8323
39	39.65	38.33	-9.6e-002	0.517	0.8259
40	41.89	40.57	-0.1	0.513	0.8195
41	44.26	42.94	-0.104	0.509	0.8131
42	46.77	45.45	-0.108	0.505	0.8067
43	49.43	48.11	-0.112	0.501	0.8003
44	52.25	50.93	-0.116	0.497	0.7939
45	55.24	53.92	-0.12	0.493	0.7875
46	58.4	57.08	-0.124	0.489	0.7812
47	61.75	60.43	-0.127	0.486	0.7764
48	65.3	63.98	-0.132	0.481	0.7684
49	69.06	67.74	-0.136	0.477	0.762
50	73.04	71.72	-0.14	0.473	0.7556
51	77.26	75.94	-0.145	0.468	0.7476
52	81.73	80.41	-0.148	0.465	0.7428
53	86.47	85.15	-0.154	0.459	0.7332
54	91.49	90.17	-0.158	0.455	0.7268
55	96.8	95.48	-0.163	0.45	0.7188
56	102.4	101.1	-0.168	0.445	0.7109
57	108.4	107.1	-0.173	0.44	0.7029
58	114.7	113.4	-0.178	0.435	0.6949
59	121.4	120.1	-0.183	0.43	0.6869
60	128.5	127.2	-0.189	0.424	0.6773
61	136.	134.7	-0.194	0.419	0.6693
62	144.	142.6	-0.2	0.413	0.6597
63	152.4	151.1	-0.205	0.408	0.6518
64	161.3	160.	-0.211	0.402	0.6422
65	170.8	169.4	-0.216	0.397	0.6342
66	180.8	179.4	-0.222	0.391	0.6246
67	190.8	189.4	-0.227	0.386	0.6166
68	200.8	199.4	-0.233	0.38	0.607
69	210.8	209.4	-0.237	0.376	0.6006
70	220.8	219.4	-0.242	0.371	0.5927
71	230.8	229.4	-0.247	0.366	0.5847
72	240.8	239.4	-0.251	0.362	0.5783
73	250.8	249.4	-0.254	0.359	0.5735
74	260.8	259.4	-0.258	0.355	0.5671
75	270.8	269.4	-0.261	0.352	0.5623
76	280.8	279.4	-0.265	0.348	0.5559
77	290.8	289.4	-0.268	0.345	0.5511
78	300.8	299.4	-0.271	0.342	0.5463
79	310.8	309.4	-0.274	0.339	0.5415
80	320.8	319.4	-0.277	0.336	0.5367
81	330.8	329.4	-0.28	0.333	0.5319
82	340.8	339.4	-0.283	0.33	0.5272
83	350.8	349.4	-0.285	0.328	0.524
84	360.8	359.4	-0.287	0.326	0.5208
85	370.8	369.4	-0.29	0.323	0.516
86	380.8	379.4	-0.293	0.32	0.5112
87	390.8	389.4	-0.295	0.318	0.508
88	400.8	399.4	-0.297	0.316	0.5048
89	410.8	409.4	-0.299	0.314	0.5016
90	420.8	419.4	-0.301	0.312	0.4984
91	430.8	429.4	-0.303	0.31	0.4952
92	440.8	439.4	-0.304	0.309	0.4936

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93	450.8	449.4	-0.307	0.306	0.4888
94	460.8	459.4	-0.308	0.305	0.4872
95	470.8	469.4	-0.31	0.303	0.484
96	480.8	479.4	-0.311	0.302	0.4824
97	490.8	489.4	-0.313	0.3	0.4792
98	500.8	499.4	-0.314	0.299	0.4776
99	510.8	509.4	-0.316	0.297	0.4744
100	520.8	519.4	-0.317	0.296	0.4728
101	530.8	529.4	-0.318	0.295	0.4712
102	540.8	539.4	-0.32	0.293	0.4681
103	550.8	549.4	-0.321	0.292	0.4665
104	560.8	559.4	-0.322	0.291	0.4649
105	570.8	569.4	-0.323	0.29	0.4633
106	580.8	579.4	-0.325	0.288	0.4601
107	590.8	589.4	-0.326	0.287	0.4585
108	600.8	599.4	-0.327	0.286	0.4569
109	610.8	609.4	-0.328	0.285	0.4553
110	630.8	629.4	-0.33	0.283	0.4521
111	640.8	639.4	-0.331	0.282	0.4505
112	650.8	649.4	-0.332	0.281	0.4489
113	670.8	669.4	-0.333	0.28	0.4473
114	680.8	679.4	-0.334	0.279	0.4457
115	690.8	689.4	-0.335	0.278	0.4441
116	710.8	709.4	-0.336	0.277	0.4425
117	720.8	719.4	-0.337	0.276	0.4409
118	730.8	729.4	-0.338	0.275	0.4393
119	750.8	749.4	-0.339	0.274	0.4377
120	770.8	769.4	-0.34	0.273	0.4361
121	780.8	779.4	-0.341	0.272	0.4345
122	790.8	789.4	-0.342	0.271	0.4329
123	800.8	799.4	-0.343	0.27	0.4313
124	840.8	839.4	-0.344	0.269	0.4297
125	850.8	849.4	-0.345	0.268	0.4281
126	870.8	869.4	-0.346	0.267	0.4265
127	910.8	909.4	-0.347	0.266	0.4249
128	920.8	919.4	-0.348	0.265	0.4233
129	950.8	949.4	-0.349	0.264	0.4217
130	980.8	979.4	-0.35	0.263	0.4201
131	1031	1029	-0.351	0.262	0.4185
132	1061	1059	-0.352	0.261	0.4169
133	1081	1079	-0.353	0.26	0.4153
134	1121	1119	-0.354	0.259	0.4137
135	1131	1129	-0.353	0.26	0.4153
136	1171	1169	-0.354	0.259	0.4137
137	1181	1179	-0.355	0.258	0.4121
138	1191	1189	-0.354	0.259	0.4137
139	1201	1199	-0.355	0.258	0.4121
140	1221	1219	-0.354	0.259	0.4137
141	1231	1229	-0.356	0.257	0.4105
142	1261	1259	-0.355	0.258	0.4121
143	1271	1269	-0.356	0.257	0.4105
144	1281	1279	-0.357	0.256	0.4089
145	1291	1289	-0.356	0.257	0.4105
146	1301	1299	-0.357	0.256	0.4089
147	1321	1319	-0.356	0.257	0.4105
148	1341	1339	-0.357	0.256	0.4089
149	1421	1419	-0.358	0.255	0.4073

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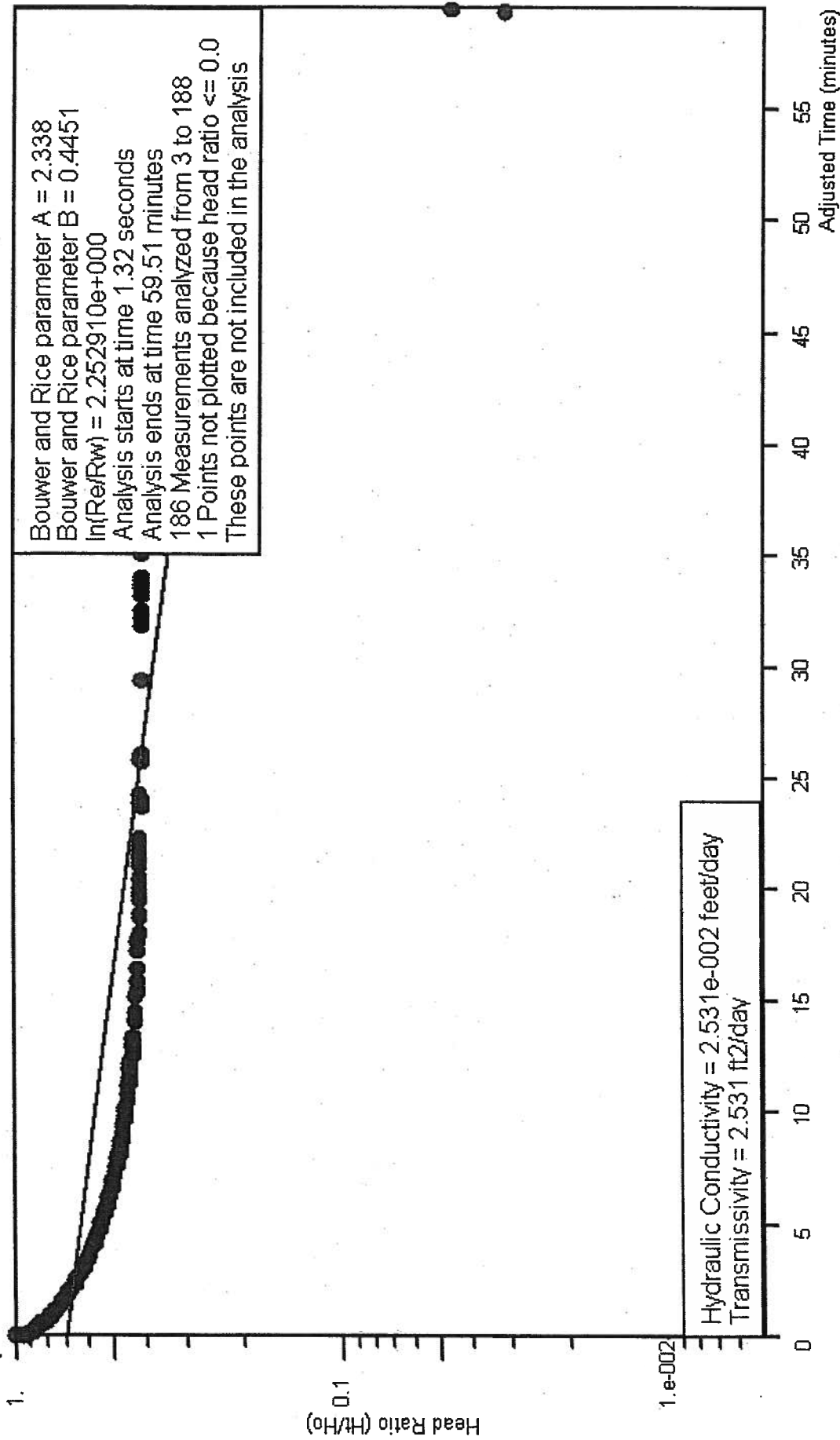
150	1431	1429	-0.357	0.256	0.4089
151	1441	1439	-0.358	0.255	0.4073
152	1451	1449	-0.357	0.256	0.4089
153	1541	1539	-0.358	0.255	0.4073
154	1551	1549	-0.357	0.256	0.4089
155	1561	1559	-0.358	0.255	0.4073
156	1761	1759	-0.359	0.254	0.4058
157	1911	1909	-0.36	0.253	0.4042
158	1931	1929	-0.359	0.254	0.4058
159	1951	1949	-0.36	0.253	0.4042
160	1991	1989	-0.359	0.254	0.4058
161	2011	2009	-0.36	0.253	0.4042
162	2021	2019	-0.359	0.254	0.4058
163	2031	2029	-0.36	0.253	0.4042
164	2041	2039	-0.359	0.254	0.4058
165	2101	2099	-0.36	0.253	0.4042
166	2161	2159	-0.359	0.254	0.4058
167	2181	2179	-0.36	0.253	0.4042
168	2191	2189	-0.359	0.254	0.4058
169	2271	2269	-0.36	0.253	0.4042
170	2281	2279	-0.359	0.254	0.4058
171	2351	2349	-0.36	0.253	0.4042
172	2361	2359	-0.359	0.254	0.4058
173	2381	2379	-0.36	0.253	0.4042
174	2391	2389	-0.359	0.254	0.4058
175	2401	2399	-0.36	0.253	0.4042
176	2411	2409	-0.359	0.254	0.4058
177	2571	2569	-0.36	0.253	0.4042
178	2591	2589	-0.359	0.254	0.4058
179	2641	2639	-0.36	0.253	0.4042
180	2651	2649	-0.359	0.254	0.4058
181	2671	2669	-0.36	0.253	0.4042
182	2681	2679	-0.359	0.254	0.4058
183	3231	3229	-0.36	0.253	0.4042
184	3251	3249	-0.359	0.254	0.4058
185	3541	3539	-0.242	0.371	0.5927
186	3551	3549	-0.613	0.	0.
187	3561	3559	-0.593	2.e-002	3.195e-002
188	3571	3569	-0.584	2.9e-002	4.633e-002

P-7 Falling Head Test April 25, 2007

Skinquarter CDD Landfill Skinquarter, Virginia

Bouwer and Rice Graph

P-7



Analysis by Starpoint Software

P-7 Rising Head Test

Site Name: Skinquarter CDD Landfill
 Location: Skinquarter, Virginia
 Test Date: April 25, 2007
 Import File: P:\Skinquarter CDD LF\Slug Test\text files\P-7RH.txt

Well Label: P-7
 Aquifer Thickness: 100. feet
 Screen Length: 10. feet
 Casing Radius: 8.3e-002 feet
 Effective Radius: 0.34 feet
 Static Water Level: 0.118 feet
 Water Table to Screen Bottom: 17. feet
 Anisotropy Ratio: 1.
 Time Adjustment: 0. Seconds
 Test starts with trial 0
 There are 132 time and drawdown measurements
 Maximum head is 0.118 feet
 Minimum head is 0. feet

Trial	Time (seconds)	Adjusted Time (seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	0.	0.118	1.
2	4.62	4.62	1.e-003	0.117	0.9915
3	7.92	7.92	2.e-003	0.116	0.9831
4	10.56	10.56	3.e-003	0.115	0.9746
5	13.2	13.2	4.e-003	0.114	0.9661
6	17.83	17.83	5.e-003	0.113	0.9576
7	20.83	20.83	6.e-003	0.112	0.9492
8	23.14	23.14	7.e-003	0.111	0.9407
9	28.63	28.63	8.e-003	0.11	0.9322
10	31.89	31.89	7.e-003	0.111	0.9407
11	33.67	33.67	1.e-002	0.108	0.9153
12	35.55	35.55	1.1e-002	0.107	0.9068
13	52.25	52.25	1.2e-002	0.106	0.8983
14	58.4	58.4	1.3e-002	0.105	0.8898
15	65.3	65.3	1.4e-002	0.104	0.8814
16	69.06	69.06	1.5e-002	0.103	0.8729
17	77.26	77.26	1.7e-002	0.101	0.8559
18	81.73	81.73	1.8e-002	0.1	0.8475
19	86.47	86.47	1.9e-002	9.9e-002	0.839
20	91.49	91.49	2.e-002	9.8e-002	0.8305
21	96.8	96.8	2.1e-002	9.7e-002	0.822
22	102.4	102.4	2.2e-002	9.6e-002	0.8136
23	108.4	108.4	2.4e-002	9.4e-002	0.7966
24	114.7	114.7	2.5e-002	9.3e-002	0.7881
25	121.4	121.4	2.6e-002	9.2e-002	0.7797
26	128.5	128.5	2.8e-002	9.e-002	0.7627
27	136.	136.	2.9e-002	8.9e-002	0.7542
28	144.	144.	3.1e-002	8.7e-002	0.7373
29	152.4	152.4	3.2e-002	8.6e-002	0.7288
30	161.3	161.3	3.4e-002	8.4e-002	0.7119
31	170.8	170.8	3.6e-002	8.2e-002	0.6949
32	180.8	180.8	3.8e-002	8.e-002	0.678
33	190.8	190.8	4.e-002	7.8e-002	0.661
34	200.8	200.8	4.2e-002	7.6e-002	0.6441
35	210.8	210.8	4.3e-002	7.5e-002	0.6356

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36	220.8	220.8	4.5e-002	7.3e-002	0.6186
37	230.8	230.8	4.7e-002	7.1e-002	0.6017
38	240.8	240.8	4.8e-002	7.e-002	0.5932
39	250.8	250.8	4.9e-002	6.9e-002	0.5847
40	260.8	260.8	5.1e-002	6.7e-002	0.5678
41	270.8	270.8	5.3e-002	6.5e-002	0.5508
42	280.8	280.8	5.4e-002	6.4e-002	0.5424
43	290.8	290.8	5.6e-002	6.2e-002	0.5254
44	300.8	300.8	5.7e-002	6.1e-002	0.5169
45	310.8	310.8	5.8e-002	6.e-002	0.5085
46	320.8	320.8	6.e-002	5.8e-002	0.4915
47	340.8	340.8	6.2e-002	5.6e-002	0.4746
48	350.8	350.8	6.3e-002	5.5e-002	0.4661
49	360.8	360.8	6.4e-002	5.4e-002	0.4576
50	370.8	370.8	6.6e-002	5.2e-002	0.4407
51	380.8	380.8	6.7e-002	5.1e-002	0.4322
52	390.8	390.8	6.8e-002	5.e-002	0.4237
53	400.8	400.8	6.9e-002	4.9e-002	0.4153
54	410.8	410.8	7.e-002	4.8e-002	0.4068
55	420.8	420.8	7.1e-002	4.7e-002	0.3983
56	430.8	430.8	7.2e-002	4.6e-002	0.3898
57	440.8	440.8	7.3e-002	4.5e-002	0.3814
58	460.8	460.8	7.4e-002	4.4e-002	0.3729
59	470.8	470.8	7.6e-002	4.2e-002	0.3559
60	480.8	480.8	7.7e-002	4.1e-002	0.3475
61	490.8	490.8	7.8e-002	4.e-002	0.339
62	510.8	510.8	7.9e-002	3.9e-002	0.3305
63	520.8	520.8	8.e-002	3.8e-002	0.322
64	530.8	530.8	8.1e-002	3.7e-002	0.3136
65	560.8	560.8	8.3e-002	3.5e-002	0.2966
66	580.8	580.8	8.4e-002	3.4e-002	0.2881
67	590.8	590.8	8.5e-002	3.3e-002	0.2797
68	610.8	610.8	8.6e-002	3.2e-002	0.2712
69	630.8	630.8	8.8e-002	3.e-002	0.2542
70	660.8	660.8	8.9e-002	2.9e-002	0.2458
71	680.8	680.8	9.e-002	2.8e-002	0.2373
72	690.8	690.8	9.1e-002	2.7e-002	0.2288
73	710.8	710.8	9.2e-002	2.6e-002	0.2203
74	730.8	730.8	9.3e-002	2.5e-002	0.2119
75	750.8	750.8	9.4e-002	2.4e-002	0.2034
76	780.8	780.8	9.5e-002	2.3e-002	0.1949
77	800.8	800.8	9.6e-002	2.2e-002	0.1864
78	830.8	830.8	9.7e-002	2.1e-002	0.178
79	860.8	860.8	9.8e-002	2.e-002	0.1695
80	880.8	880.8	9.9e-002	1.9e-002	0.161
81	920.8	920.8	0.1	1.8e-002	0.1525
82	930.8	930.8	0.101	1.7e-002	0.1441
83	970.8	970.8	0.102	1.6e-002	0.1356
84	1011	1011	0.103	1.5e-002	0.1271
85	1051	1051	0.104	1.4e-002	0.1186
86	1091	1091	0.105	1.3e-002	0.1102
87	1131	1131	0.106	1.2e-002	0.1017
88	1191	1191	0.107	1.1e-002	9.322e-002
89	1251	1251	0.108	1.e-002	8.475e-002
90	1281	1281	0.109	9.e-003	7.627e-002
91	1291	1291	0.108	1.e-002	8.475e-002
92	1301	1301	0.109	9.e-003	7.627e-002

Skinquarter CDD Landfill

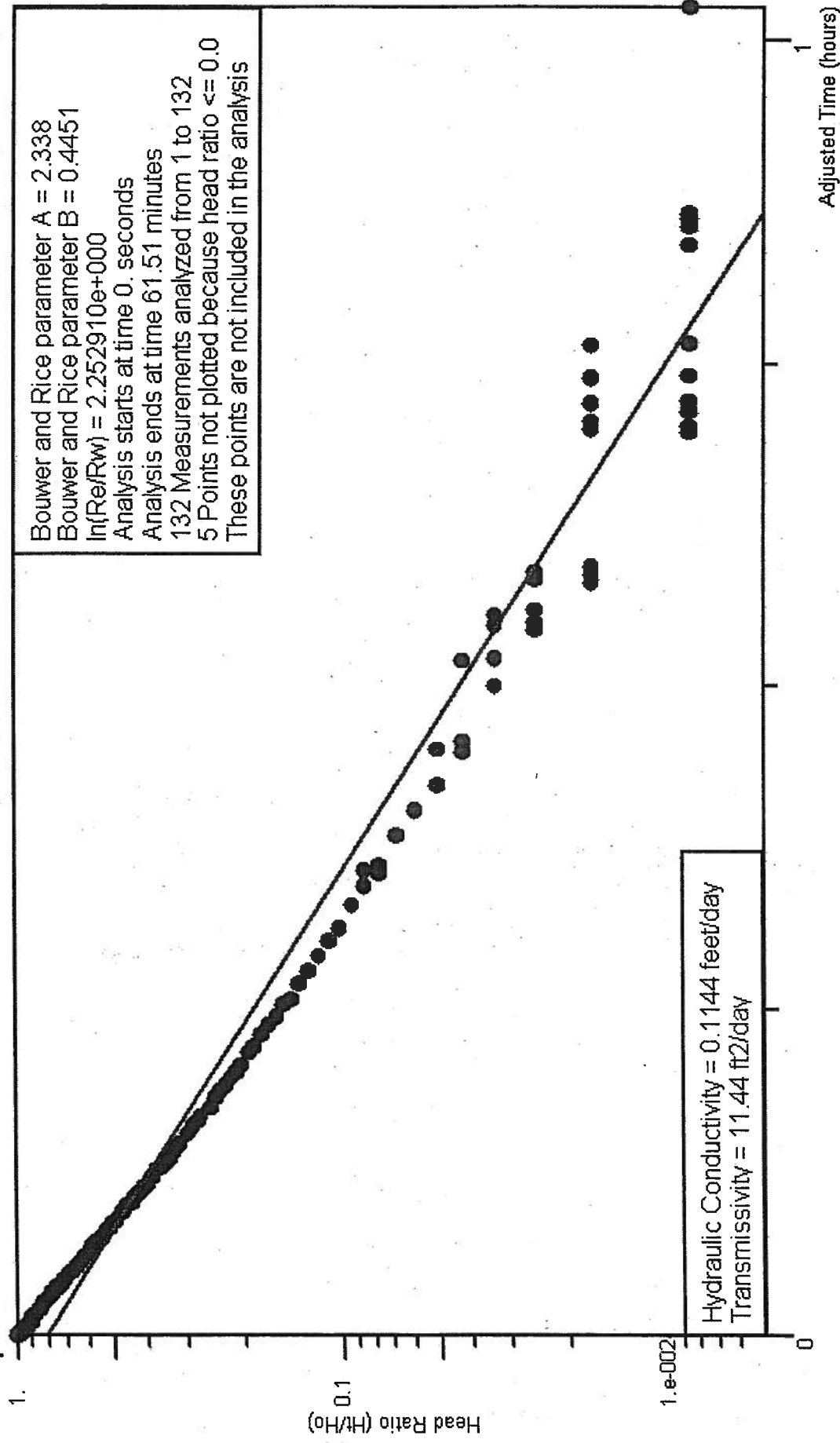
93	1391	1391	0.11	8.e-003	6.78e-002
94	1461	1461	0.111	7.e-003	5.932e-002
95	1531	1531	0.112	6.e-003	5.085e-002
96	1621	1621	0.113	5.e-003	4.237e-002
97	1631	1631	0.112	6.e-003	5.085e-002
98	1651	1651	0.113	5.e-003	4.237e-002
99	1801	1801	0.114	4.e-003	3.39e-002
100	1871	1871	0.113	5.e-003	4.237e-002
101	1881	1881	0.114	4.e-003	3.39e-002
102	1961	1961	0.115	3.e-003	2.542e-002
103	1971	1971	0.114	4.e-003	3.39e-002
104	1981	1981	0.115	3.e-003	2.542e-002
105	2001	2001	0.114	4.e-003	3.39e-002
106	2011	2011	0.115	3.e-003	2.542e-002
107	2091	2091	0.116	2.e-003	1.695e-002
108	2101	2101	0.115	3.e-003	2.542e-002
109	2111	2111	0.116	2.e-003	1.695e-002
110	2121	2121	0.115	3.e-003	2.542e-002
111	2131	2131	0.116	2.e-003	1.695e-002
112	2511	2511	0.117	1.e-003	8.475e-003
113	2521	2521	0.116	2.e-003	1.695e-002
114	2531	2531	0.117	1.e-003	8.475e-003
115	2541	2541	0.116	2.e-003	1.695e-002
116	2571	2571	0.117	1.e-003	8.475e-003
117	2591	2591	0.116	2.e-003	1.695e-002
118	2601	2601	0.117	1.e-003	8.475e-003
119	2661	2661	0.116	2.e-003	1.695e-002
120	2671	2671	0.117	1.e-003	8.475e-003
121	2751	2751	0.116	2.e-003	1.695e-002
122	2761	2761	0.117	1.e-003	8.475e-003
123	3021	3021	0.118	0.	0.
124	3031	3031	0.117	1.e-003	8.475e-003
125	3071	3071	0.118	0.	0.
126	3081	3081	0.117	1.e-003	8.475e-003
127	3091	3091	0.118	0.	0.
128	3101	3101	0.117	1.e-003	8.475e-003
129	3111	3111	0.118	0.	0.
130	3121	3121	0.117	1.e-003	8.475e-003
131	3131	3131	0.118	0.	0.
132	3691	3691	0.117	1.e-003	8.475e-003

P-7 Rising Head Test April 25, 2007

Skinquarter CDD Landfill Skinquarter, Virginia

Bouwer and Rice Graph

P-7



Analysis by Starpoint Software

P-14S Falling Head Test

Site Name: Skinquarter CDD Landfill
 Location: Skinquarter, Virginia
 Test Date: April 25, 2007
 Import File: P:\Skinquarter CDD LF\Slug Test\text files\P-14SFH.txt

Well Label: P-14S
 Aquifer Thickness: 100. feet
 Screen Length: 10. feet
 Casing Radius: 8.3e-002 feet
 Effective Radius: 0.34 feet
 Static Water Level: -0.121 feet
 Water Table to Screen Bottom: 28. feet
 Anisotropy Ratio: 1.
 Time Adjustment: 0. Seconds

Test starts with trial 0

There are 128 time and drawdown measurements

Maximum head is 0.121 feet

Minimum head is 0. feet

Trial	Time (seconds)	Adjusted Time (seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	0.	0.121	1.
2	0.672	0.672	-4.e-003	0.117	0.9669
3	1.338	1.338	-1.e-002	0.111	0.9174
4	2.01	2.01	-1.1e-002	0.11	0.9091
5	2.682	2.682	-1.2e-002	0.109	0.9008
6	3.348	3.348	-1.4e-002	0.107	0.8843
7	4.02	4.02	-1.5e-002	0.106	0.876
8	4.692	4.692	-1.7e-002	0.104	0.8595
9	5.358	5.358	-1.8e-002	0.103	0.8512
10	6.03	6.03	-2.e-002	0.101	0.8347
11	6.702	6.702	-2.1e-002	0.1	0.8264
12	7.368	7.368	-2.2e-002	9.9e-002	0.8182
13	8.04	8.04	-2.3e-002	9.8e-002	0.8099
14	8.712	8.712	-2.5e-002	9.6e-002	0.7934
15	10.05	10.05	-2.6e-002	9.5e-002	0.7851
16	10.72	10.72	-2.7e-002	9.4e-002	0.7769
17	11.39	11.39	-2.8e-002	9.3e-002	0.7686
18	12.06	12.06	-2.9e-002	9.2e-002	0.7603
19	12.73	12.73	-3.e-002	9.1e-002	0.7521
20	13.4	13.4	-3.2e-002	8.9e-002	0.7355
21	14.1	14.1	-3.3e-002	8.8e-002	0.7273
22	14.85	14.85	-3.4e-002	8.7e-002	0.719
23	15.64	15.64	-3.5e-002	8.6e-002	0.7107
24	16.48	16.48	-3.6e-002	8.5e-002	0.7025
25	18.31	18.31	-3.8e-002	8.3e-002	0.686
26	19.31	19.31	-3.9e-002	8.2e-002	0.6777
27	21.49	21.49	-4.1e-002	8.e-002	0.6612
28	22.68	22.68	-4.2e-002	7.9e-002	0.6529
29	23.94	23.94	-4.3e-002	7.8e-002	0.6446
30	25.27	25.27	-4.4e-002	7.7e-002	0.6364
31	26.68	26.68	-4.6e-002	7.5e-002	0.6198
32	28.17	28.17	-4.7e-002	7.4e-002	0.6116
33	29.75	29.75	-4.8e-002	7.3e-002	0.6033
34	31.43	31.43	-5.e-002	7.1e-002	0.5868
35	33.21	33.21	-5.4e-002	6.7e-002	0.5537

Skinquarter CDD Landfill

36	35.09	35.09	-5.6e-002	6.5e-002	0.5372
37	37.08	37.08	-5.7e-002	6.4e-002	0.5289
38	39.19	39.19	-5.8e-002	6.3e-002	0.5207
39	41.43	41.43	-5.9e-002	6.2e-002	0.5124
40	43.8	43.8	-6.1e-002	6.e-002	0.4959
41	48.97	48.97	-6.2e-002	5.9e-002	0.4876
42	51.79	51.79	-6.3e-002	5.8e-002	0.4793
43	54.78	54.78	-6.4e-002	5.7e-002	0.4711
44	57.94	57.94	-6.7e-002	5.4e-002	0.4463
45	64.84	64.84	-6.8e-002	5.3e-002	0.438
46	68.6	68.6	-7.e-002	5.1e-002	0.4215
47	72.58	72.58	-7.1e-002	5.e-002	0.4132
48	76.8	76.8	-7.2e-002	4.9e-002	0.405
49	81.27	81.27	-7.4e-002	4.7e-002	0.3884
50	86.01	86.01	-7.5e-002	4.6e-002	0.3802
51	91.03	91.03	-7.7e-002	4.4e-002	0.3636
52	96.34	96.34	-7.8e-002	4.3e-002	0.3554
53	102.	102.	-8.e-002	4.1e-002	0.3388
54	107.9	107.9	-8.1e-002	4.e-002	0.3306
55	114.3	114.3	-8.3e-002	3.8e-002	0.314
56	120.9	120.9	-8.4e-002	3.7e-002	0.3058
57	128.	128.	-8.6e-002	3.5e-002	0.2893
58	135.5	135.5	-8.7e-002	3.4e-002	0.281
59	143.5	143.5	-8.8e-002	3.3e-002	0.2727
60	151.9	151.9	-8.9e-002	3.2e-002	0.2645
61	160.8	160.8	-9.1e-002	3.e-002	0.2479
62	170.3	170.3	-9.2e-002	2.9e-002	0.2397
63	180.3	180.3	-9.3e-002	2.8e-002	0.2314
64	190.3	190.3	-9.5e-002	2.6e-002	0.2149
65	200.3	200.3	-9.4e-002	2.7e-002	0.2231
66	210.3	210.3	-9.5e-002	2.6e-002	0.2149
67	220.3	220.3	-9.6e-002	2.5e-002	0.2066
68	230.3	230.3	-9.7e-002	2.4e-002	0.1983
69	250.3	250.3	-9.8e-002	2.3e-002	0.1901
70	260.3	260.3	-9.9e-002	2.2e-002	0.1818
71	280.3	280.3	-0.1	2.1e-002	0.1736
72	300.3	300.3	-0.101	2.e-002	0.1653
73	320.3	320.3	-0.102	1.9e-002	0.157
74	330.3	330.3	-0.103	1.8e-002	0.1488
75	360.3	360.3	-0.104	1.7e-002	0.1405
76	380.3	380.3	-0.105	1.6e-002	0.1322
77	400.3	400.3	-0.106	1.5e-002	0.124
78	430.3	430.3	-0.107	1.4e-002	0.1157
79	470.3	470.3	-0.108	1.3e-002	0.1074
80	500.3	500.3	-0.109	1.2e-002	9.917e-002
81	530.3	530.3	-0.11	1.1e-002	9.091e-002
82	540.3	540.3	-0.109	1.2e-002	9.917e-002
83	550.3	550.3	-0.11	1.1e-002	9.091e-002
84	580.3	580.3	-0.111	1.e-002	8.264e-002
85	660.3	660.3	-0.112	9.e-003	7.438e-002
86	700.3	700.3	-0.113	8.e-003	6.612e-002
87	760.3	760.3	-0.114	7.e-003	5.785e-002
88	890.3	890.3	-0.115	6.e-003	4.959e-002
89	900.3	900.3	-0.114	7.e-003	5.785e-002
90	910.3	910.3	-0.115	6.e-003	4.959e-002
91	990.3	990.3	-0.116	5.e-003	4.132e-002
92	1150	1150	-0.117	4.e-003	3.306e-002

Skinquarter CDD Landfill

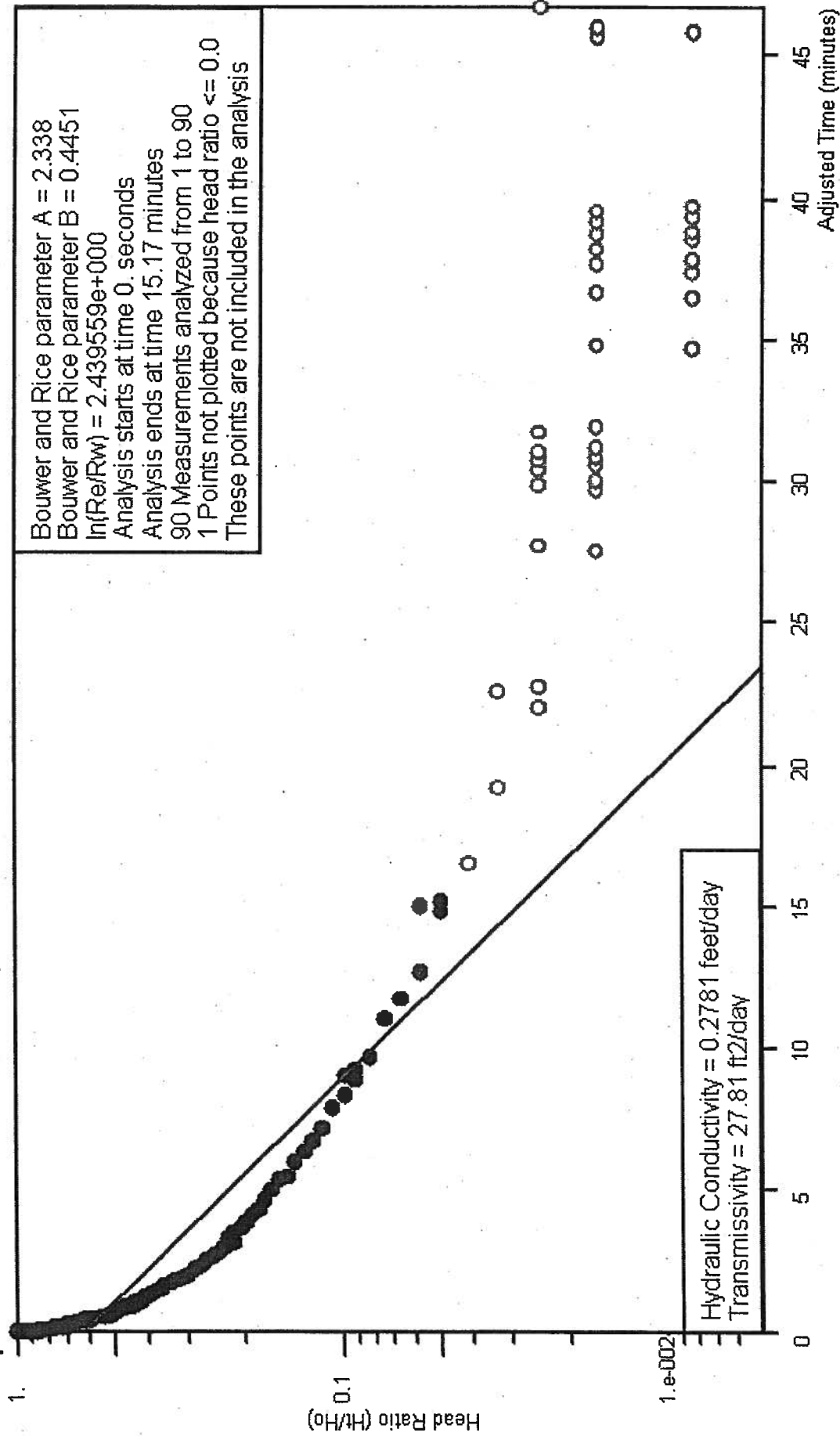
93	1320	1320	-0.118	3.e-003	2.479e-002
94	1350	1350	-0.117	4.e-003	3.306e-002
95	1360	1360	-0.118	3.e-003	2.479e-002
96	1650	1650	-0.119	2.e-003	1.653e-002
97	1660	1660	-0.118	3.e-003	2.479e-002
98	1780	1780	-0.119	2.e-003	1.653e-002
99	1790	1790	-0.118	3.e-003	2.479e-002
100	1800	1800	-0.119	2.e-003	1.653e-002
101	1820	1820	-0.118	3.e-003	2.479e-002
102	1830	1830	-0.119	2.e-003	1.653e-002
103	1840	1840	-0.118	3.e-003	2.479e-002
104	1850	1850	-0.119	2.e-003	1.653e-002
105	1860	1860	-0.118	3.e-003	2.479e-002
106	1870	1870	-0.119	2.e-003	1.653e-002
107	1900	1900	-0.118	3.e-003	2.479e-002
108	1910	1910	-0.119	2.e-003	1.653e-002
109	2080	2080	-0.12	1.e-003	8.264e-003
110	2090	2090	-0.119	2.e-003	1.653e-002
111	2190	2190	-0.12	1.e-003	8.264e-003
112	2200	2200	-0.119	2.e-003	1.653e-002
113	2240	2240	-0.12	1.e-003	8.264e-003
114	2260	2260	-0.119	2.e-003	1.653e-002
115	2270	2270	-0.12	1.e-003	8.264e-003
116	2290	2290	-0.119	2.e-003	1.653e-002
117	2310	2310	-0.12	1.e-003	8.264e-003
118	2320	2320	-0.119	2.e-003	1.653e-002
119	2330	2330	-0.12	1.e-003	8.264e-003
120	2350	2350	-0.119	2.e-003	1.653e-002
121	2360	2360	-0.12	1.e-003	8.264e-003
122	2370	2370	-0.119	2.e-003	1.653e-002
123	2380	2380	-0.12	1.e-003	8.264e-003
124	2730	2730	-0.121	0.	0.
125	2740	2740	-0.119	2.e-003	1.653e-002
126	2750	2750	-0.12	1.e-003	8.264e-003
127	2760	2760	-0.119	2.e-003	1.653e-002
128	2800	2800	-0.118	3.e-003	2.479e-002

P-14S Falling Head Test April 25, 2007

Skinquarter CDD Landfill Skinquarter, Virginia

Bouwer and Rice Graph

P-14S



Analysis by Starpoint Software

Skinquarter CDD Landfill

P-14S Rising Head Test

Site Name: Skinquarter CDD Landfill
 Location: Skinquarter, Virginia
 Test Date: April 25, 2007
 Import File: P:\Skinquarter CDD LF\Slug Test\text files\P-14SRH.txt

Well Label: P-14S
 Aquifer Thickness: 100. feet
 Screen Length: 10. feet
 Casing Radius: 8.3e-002 feet
 Effective Radius: 0.34 feet
 Static Water Level: 0.209 feet
 Water Table to Screen Bottom: 28. feet
 Anisotropy Ratio: 1.
 Time Adjustment: 0. Seconds
 Test starts with trial 0
 There are 373 time and drawdown measurements
 Maximum head is 0.209 feet
 Minimum head is 0. feet

Trial	Time (seconds)	Adjusted Time (seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	0.	0.209	1.
2	0.66	0.66	7.e-003	0.202	0.9665
3	1.32	1.32	1.1e-002	0.198	0.9474
4	1.98	1.98	1.4e-002	0.195	0.933
5	2.64	2.64	1.8e-002	0.191	0.9139
6	3.3	3.3	2.1e-002	0.188	0.8995
7	3.96	3.96	2.5e-002	0.184	0.8804
8	4.62	4.62	2.8e-002	0.181	0.866
9	5.28	5.28	3.1e-002	0.178	0.8517
10	5.94	5.94	3.3e-002	0.176	0.8421
11	6.6	6.6	3.6e-002	0.173	0.8278
12	7.26	7.26	3.9e-002	0.17	0.8134
13	7.92	7.92	4.3e-002	0.166	0.7943
14	8.58	8.58	4.5e-002	0.164	0.7847
15	9.24	9.24	4.8e-002	0.161	0.7703
16	9.9	9.9	5.1e-002	0.158	0.756
17	10.56	10.56	5.3e-002	0.156	0.7464
18	11.22	11.22	5.5e-002	0.154	0.7368
19	11.88	11.88	5.7e-002	0.152	0.7273
20	12.54	12.54	5.9e-002	0.15	0.7177
21	13.2	13.2	6.1e-002	0.148	0.7081
22	13.86	13.86	6.3e-002	0.146	0.6986
23	14.56	14.56	6.5e-002	0.144	0.689
24	15.31	15.31	6.8e-002	0.141	0.6746
25	16.1	16.1	6.9e-002	0.14	0.6699
26	16.94	16.94	7.1e-002	0.138	0.6603
27	17.83	17.83	7.4e-002	0.135	0.6459
28	18.77	18.77	7.6e-002	0.133	0.6364
29	19.77	19.77	7.8e-002	0.131	0.6268
30	20.83	20.83	8.1e-002	0.128	0.6124
31	21.95	21.95	8.3e-002	0.126	0.6029
32	23.14	23.14	8.6e-002	0.123	0.5885
33	24.4	24.4	8.8e-002	0.121	0.5789
34	25.73	25.73	9.1e-002	0.118	0.5646
35	27.14	27.14	9.3e-002	0.116	0.555

Skinquarter CDD Landfill

36	28.63	28.63	9.6e-002	0.113	0.5407
37	30.21	30.21	9.7e-002	0.112	0.5359
38	31.89	31.89	0.102	0.107	0.512
39	33.67	33.67	0.102	0.107	0.512
40	35.55	35.55	0.105	0.104	0.4976
41	37.54	37.54	0.109	1.e-001	0.4785
42	39.65	39.65	0.112	9.7e-002	0.4641
43	41.89	41.89	0.116	9.3e-002	0.445
44	44.26	44.26	0.12	8.9e-002	0.4258
45	46.77	46.77	0.123	8.6e-002	0.4115
46	49.43	49.43	0.127	8.2e-002	0.3923
47	52.25	52.25	0.131	7.8e-002	0.3732
48	55.24	55.24	0.135	7.4e-002	0.3541
49	58.4	58.4	0.139	7.e-002	0.3349
50	61.75	61.75	0.142	6.7e-002	0.3206
51	65.3	65.3	0.146	6.3e-002	0.3014
52	69.06	69.06	0.149	6.e-002	0.2871
53	73.04	73.04	0.153	5.6e-002	0.2679
54	77.26	77.26	0.156	5.3e-002	0.2536
55	81.73	81.73	0.158	5.1e-002	0.244
56	86.47	86.47	0.161	4.8e-002	0.2297
57	91.49	91.49	0.164	4.5e-002	0.2153
58	96.8	96.8	0.167	4.2e-002	0.201
59	102.4	102.4	0.169	4.e-002	0.1914
60	108.4	108.4	0.172	3.7e-002	0.177
61	114.7	114.7	0.175	3.4e-002	0.1627
62	121.4	121.4	0.176	3.3e-002	0.1579
63	128.5	128.5	0.178	3.1e-002	0.1483
64	136.	136.	0.18	2.9e-002	0.1388
65	144.	144.	0.182	2.7e-002	0.1292
66	152.4	152.4	0.183	2.6e-002	0.1244
67	161.3	161.3	0.185	2.4e-002	0.1148
68	170.8	170.8	0.187	2.2e-002	0.1053
69	180.8	180.8	0.188	2.1e-002	0.1005
70	190.8	190.8	0.189	2.e-002	9.569e-002
71	200.8	200.8	0.19	1.9e-002	9.091e-002
72	210.8	210.8	0.192	1.7e-002	8.134e-002
73	220.8	220.8	0.193	1.6e-002	7.656e-002
74	230.8	230.8	0.194	1.5e-002	7.177e-002
75	240.8	240.8	0.195	1.4e-002	6.699e-002
76	250.8	250.8	0.196	1.3e-002	6.22e-002
77	260.8	260.8	0.196	1.3e-002	6.22e-002
78	270.8	270.8	0.197	1.2e-002	5.742e-002
79	280.8	280.8	0.198	1.1e-002	5.263e-002
80	290.8	290.8	0.198	1.1e-002	5.263e-002
81	300.8	300.8	0.199	1.e-002	4.785e-002
82	310.8	310.8	0.199	1.e-002	4.785e-002
83	320.8	320.8	0.199	1.e-002	4.785e-002
84	330.8	330.8	0.199	1.e-002	4.785e-002
85	340.8	340.8	0.2	9.e-003	4.306e-002
86	350.8	350.8	0.2	9.e-003	4.306e-002
87	360.8	360.8	0.201	8.e-003	3.828e-002
88	370.8	370.8	0.201	8.e-003	3.828e-002
89	380.8	380.8	0.201	8.e-003	3.828e-002
90	390.8	390.8	0.201	8.e-003	3.828e-002
91	400.8	400.8	0.202	7.e-003	3.349e-002
92	410.8	410.8	0.202	7.e-003	3.349e-002

Skinquarter CDD Landfill

93	420.8	420.8	0.202	7.e-003	3.349e-002
94	430.8	430.8	0.203	6.e-003	2.871e-002
95	440.8	440.8	0.203	6.e-003	2.871e-002
96	450.8	450.8	0.203	6.e-003	2.871e-002
97	460.8	460.8	0.203	6.e-003	2.871e-002
98	470.8	470.8	0.203	6.e-003	2.871e-002
99	480.8	480.8	0.203	6.e-003	2.871e-002
100	490.8	490.8	0.203	6.e-003	2.871e-002
101	500.8	500.8	0.203	6.e-003	2.871e-002
102	510.8	510.8	0.203	6.e-003	2.871e-002
103	520.8	520.8	0.204	5.e-003	2.392e-002
104	530.8	530.8	0.204	5.e-003	2.392e-002
105	540.8	540.8	0.204	5.e-003	2.392e-002
106	550.8	550.8	0.204	5.e-003	2.392e-002
107	560.8	560.8	0.204	5.e-003	2.392e-002
108	570.8	570.8	0.204	5.e-003	2.392e-002
109	580.8	580.8	0.205	4.e-003	1.914e-002
110	590.8	590.8	0.205	4.e-003	1.914e-002
111	600.8	600.8	0.205	4.e-003	1.914e-002
112	610.8	610.8	0.205	4.e-003	1.914e-002
113	620.8	620.8	0.205	4.e-003	1.914e-002
114	630.8	630.8	0.205	4.e-003	1.914e-002
115	640.8	640.8	0.205	4.e-003	1.914e-002
116	650.8	650.8	0.205	4.e-003	1.914e-002
117	660.8	660.8	0.205	4.e-003	1.914e-002
118	670.8	670.8	0.205	4.e-003	1.914e-002
119	680.8	680.8	0.205	4.e-003	1.914e-002
120	690.8	690.8	0.206	3.e-003	1.435e-002
121	700.8	700.8	0.206	3.e-003	1.435e-002
122	710.8	710.8	0.206	3.e-003	1.435e-002
123	720.8	720.8	0.206	3.e-003	1.435e-002
124	730.8	730.8	0.206	3.e-003	1.435e-002
125	740.8	740.8	0.206	3.e-003	1.435e-002
126	750.8	750.8	0.206	3.e-003	1.435e-002
127	760.8	760.8	0.206	3.e-003	1.435e-002
128	770.8	770.8	0.206	3.e-003	1.435e-002
129	780.8	780.8	0.206	3.e-003	1.435e-002
130	790.8	790.8	0.206	3.e-003	1.435e-002
131	800.8	800.8	0.206	3.e-003	1.435e-002
132	810.8	810.8	0.207	2.e-003	9.569e-003
133	820.8	820.8	0.206	3.e-003	1.435e-002
134	830.8	830.8	0.206	3.e-003	1.435e-002
135	840.8	840.8	0.207	2.e-003	9.569e-003
136	850.8	850.8	0.207	2.e-003	9.569e-003
137	860.8	860.8	0.206	3.e-003	1.435e-002
138	870.8	870.8	0.207	2.e-003	9.569e-003
139	880.8	880.8	0.207	2.e-003	9.569e-003
140	890.8	890.8	0.207	2.e-003	9.569e-003
141	900.8	900.8	0.207	2.e-003	9.569e-003
142	910.8	910.8	0.207	2.e-003	9.569e-003
143	920.8	920.8	0.207	2.e-003	9.569e-003
144	930.8	930.8	0.207	2.e-003	9.569e-003
145	940.8	940.8	0.207	2.e-003	9.569e-003
146	950.8	950.8	0.207	2.e-003	9.569e-003
147	960.8	960.8	0.207	2.e-003	9.569e-003
148	970.8	970.8	0.207	2.e-003	9.569e-003
149	980.8	980.8	0.207	2.e-003	9.569e-003

Skinquarter CDD Landfill

150	990.8	990.8	0.207	2.e-003	9.569e-003
151	1001	1001	0.207	2.e-003	9.569e-003
152	1011	1011	0.207	2.e-003	9.569e-003
153	1021	1021	0.207	2.e-003	9.569e-003
154	1031	1031	0.207	2.e-003	9.569e-003
155	1041	1041	0.207	2.e-003	9.569e-003
156	1051	1051	0.207	2.e-003	9.569e-003
157	1061	1061	0.208	1.e-003	4.785e-003
158	1071	1071	0.207	2.e-003	9.569e-003
159	1081	1081	0.207	2.e-003	9.569e-003
160	1091	1091	0.207	2.e-003	9.569e-003
161	1101	1101	0.207	2.e-003	9.569e-003
162	1111	1111	0.207	2.e-003	9.569e-003
163	1121	1121	0.207	2.e-003	9.569e-003
164	1131	1131	0.207	2.e-003	9.569e-003
165	1141	1141	0.208	1.e-003	4.785e-003
166	1151	1151	0.207	2.e-003	9.569e-003
167	1161	1161	0.208	1.e-003	4.785e-003
168	1171	1171	0.207	2.e-003	9.569e-003
169	1181	1181	0.208	1.e-003	4.785e-003
170	1191	1191	0.208	1.e-003	4.785e-003
171	1201	1201	0.208	1.e-003	4.785e-003
172	1211	1211	0.208	1.e-003	4.785e-003
173	1221	1221	0.208	1.e-003	4.785e-003
174	1231	1231	0.208	1.e-003	4.785e-003
175	1241	1241	0.207	2.e-003	9.569e-003
176	1251	1251	0.208	1.e-003	4.785e-003
177	1261	1261	0.208	1.e-003	4.785e-003
178	1271	1271	0.207	2.e-003	9.569e-003
179	1281	1281	0.208	1.e-003	4.785e-003
180	1291	1291	0.208	1.e-003	4.785e-003
181	1301	1301	0.207	2.e-003	9.569e-003
182	1311	1311	0.208	1.e-003	4.785e-003
183	1321	1321	0.208	1.e-003	4.785e-003
184	1331	1331	0.208	1.e-003	4.785e-003
185	1341	1341	0.208	1.e-003	4.785e-003
186	1351	1351	0.208	1.e-003	4.785e-003
187	1361	1361	0.208	1.e-003	4.785e-003
188	1371	1371	0.208	1.e-003	4.785e-003
189	1381	1381	0.208	1.e-003	4.785e-003
190	1391	1391	0.208	1.e-003	4.785e-003
191	1401	1401	0.208	1.e-003	4.785e-003
192	1411	1411	0.207	2.e-003	9.569e-003
193	1421	1421	0.208	1.e-003	4.785e-003
194	1431	1431	0.208	1.e-003	4.785e-003
195	1441	1441	0.208	1.e-003	4.785e-003
196	1451	1451	0.208	1.e-003	4.785e-003
197	1461	1461	0.208	1.e-003	4.785e-003
198	1471	1471	0.208	1.e-003	4.785e-003
199	1481	1481	0.208	1.e-003	4.785e-003
200	1491	1491	0.208	1.e-003	4.785e-003
201	1501	1501	0.207	2.e-003	9.569e-003
202	1511	1511	0.208	1.e-003	4.785e-003
203	1521	1521	0.208	1.e-003	4.785e-003
204	1531	1531	0.208	1.e-003	4.785e-003
205	1541	1541	0.208	1.e-003	4.785e-003
206	1551	1551	0.207	2.e-003	9.569e-003

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207	1561	1561	0.207	2.e-003	9.569e-003
208	1571	1571	0.207	2.e-003	9.569e-003
209	1581	1581	0.208	1.e-003	4.785e-003
210	1591	1591	0.208	1.e-003	4.785e-003
211	1601	1601	0.208	1.e-003	4.785e-003
212	1611	1611	0.207	2.e-003	9.569e-003
213	1621	1621	0.207	2.e-003	9.569e-003
214	1631	1631	0.208	1.e-003	4.785e-003
215	1641	1641	0.208	1.e-003	4.785e-003
216	1651	1651	0.208	1.e-003	4.785e-003
217	1661	1661	0.208	1.e-003	4.785e-003
218	1671	1671	0.207	2.e-003	9.569e-003
219	1681	1681	0.208	1.e-003	4.785e-003
220	1691	1691	0.208	1.e-003	4.785e-003
221	1701	1701	0.207	2.e-003	9.569e-003
222	1711	1711	0.207	2.e-003	9.569e-003
223	1721	1721	0.208	1.e-003	4.785e-003
224	1731	1731	0.207	2.e-003	9.569e-003
225	1741	1741	0.207	2.e-003	9.569e-003
226	1751	1751	0.207	2.e-003	9.569e-003
227	1761	1761	0.207	2.e-003	9.569e-003
228	1771	1771	0.208	1.e-003	4.785e-003
229	1781	1781	0.207	2.e-003	9.569e-003
230	1791	1791	0.208	1.e-003	4.785e-003
231	1801	1801	0.208	1.e-003	4.785e-003
232	1811	1811	0.207	2.e-003	9.569e-003
233	1821	1821	0.207	2.e-003	9.569e-003
234	1831	1831	0.207	2.e-003	9.569e-003
235	1841	1841	0.208	1.e-003	4.785e-003
236	1851	1851	0.207	2.e-003	9.569e-003
237	1861	1861	0.208	1.e-003	4.785e-003
238	1871	1871	0.208	1.e-003	4.785e-003
239	1881	1881	0.208	1.e-003	4.785e-003
240	1891	1891	0.207	2.e-003	9.569e-003
241	1901	1901	0.207	2.e-003	9.569e-003
242	1911	1911	0.208	1.e-003	4.785e-003
243	1921	1921	0.208	1.e-003	4.785e-003
244	1931	1931	0.207	2.e-003	9.569e-003
245	1941	1941	0.208	1.e-003	4.785e-003
246	1951	1951	0.207	2.e-003	9.569e-003
247	1961	1961	0.207	2.e-003	9.569e-003
248	1971	1971	0.208	1.e-003	4.785e-003
249	1981	1981	0.207	2.e-003	9.569e-003
250	1991	1991	0.207	2.e-003	9.569e-003
251	2001	2001	0.208	1.e-003	4.785e-003
252	2011	2011	0.207	2.e-003	9.569e-003
253	2021	2021	0.207	2.e-003	9.569e-003
254	2031	2031	0.208	1.e-003	4.785e-003
255	2041	2041	0.207	2.e-003	9.569e-003
256	2051	2051	0.207	2.e-003	9.569e-003
257	2061	2061	0.207	2.e-003	9.569e-003
258	2071	2071	0.207	2.e-003	9.569e-003
259	2081	2081	0.208	1.e-003	4.785e-003
260	2091	2091	0.207	2.e-003	9.569e-003
261	2101	2101	0.207	2.e-003	9.569e-003
262	2111	2111	0.207	2.e-003	9.569e-003
263	2121	2121	0.207	2.e-003	9.569e-003

Skinquarter CDD Landfill

264	2131	2131	0.208	1.e-003	4.785e-003
265	2141	2141	0.207	2.e-003	9.569e-003
266	2151	2151	0.207	2.e-003	9.569e-003
267	2161	2161	0.208	1.e-003	4.785e-003
268	2171	2171	0.207	2.e-003	9.569e-003
269	2181	2181	0.208	1.e-003	4.785e-003
270	2191	2191	0.207	2.e-003	9.569e-003
271	2201	2201	0.207	2.e-003	9.569e-003
272	2211	2211	0.208	1.e-003	4.785e-003
273	2221	2221	0.207	2.e-003	9.569e-003
274	2231	2231	0.208	1.e-003	4.785e-003
275	2241	2241	0.207	2.e-003	9.569e-003
276	2251	2251	0.207	2.e-003	9.569e-003
277	2261	2261	0.207	2.e-003	9.569e-003
278	2271	2271	0.208	1.e-003	4.785e-003
279	2281	2281	0.208	1.e-003	4.785e-003
280	2291	2291	0.207	2.e-003	9.569e-003
281	2301	2301	0.208	1.e-003	4.785e-003
282	2311	2311	0.207	2.e-003	9.569e-003
283	2321	2321	0.208	1.e-003	4.785e-003
284	2331	2331	0.207	2.e-003	9.569e-003
285	2341	2341	0.207	2.e-003	9.569e-003
286	2351	2351	0.208	1.e-003	4.785e-003
287	2361	2361	0.207	2.e-003	9.569e-003
288	2371	2371	0.208	1.e-003	4.785e-003
289	2381	2381	0.207	2.e-003	9.569e-003
290	2391	2391	0.207	2.e-003	9.569e-003
291	2401	2401	0.207	2.e-003	9.569e-003
292	2411	2411	0.208	1.e-003	4.785e-003
293	2421	2421	0.207	2.e-003	9.569e-003
294	2431	2431	0.207	2.e-003	9.569e-003
295	2441	2441	0.207	2.e-003	9.569e-003
296	2451	2451	0.207	2.e-003	9.569e-003
297	2461	2461	0.208	1.e-003	4.785e-003
298	2471	2471	0.207	2.e-003	9.569e-003
299	2481	2481	0.207	2.e-003	9.569e-003
300	2491	2491	0.207	2.e-003	9.569e-003
301	2501	2501	0.207	2.e-003	9.569e-003
302	2511	2511	0.207	2.e-003	9.569e-003
303	2521	2521	0.208	1.e-003	4.785e-003
304	2531	2531	0.208	1.e-003	4.785e-003
305	2541	2541	0.208	1.e-003	4.785e-003
306	2551	2551	0.208	1.e-003	4.785e-003
307	2561	2561	0.208	1.e-003	4.785e-003
308	2571	2571	0.207	2.e-003	9.569e-003
309	2581	2581	0.207	2.e-003	9.569e-003
310	2591	2591	0.208	1.e-003	4.785e-003
311	2601	2601	0.208	1.e-003	4.785e-003
312	2611	2611	0.208	1.e-003	4.785e-003
313	2621	2621	0.208	1.e-003	4.785e-003
314	2631	2631	0.208	1.e-003	4.785e-003
315	2641	2641	0.208	1.e-003	4.785e-003
316	2651	2651	0.208	1.e-003	4.785e-003
317	2661	2661	0.208	1.e-003	4.785e-003
318	2671	2671	0.208	1.e-003	4.785e-003
319	2681	2681	0.208	1.e-003	4.785e-003
320	2691	2691	0.207	2.e-003	9.569e-003

Skinquarter CDD Landfill

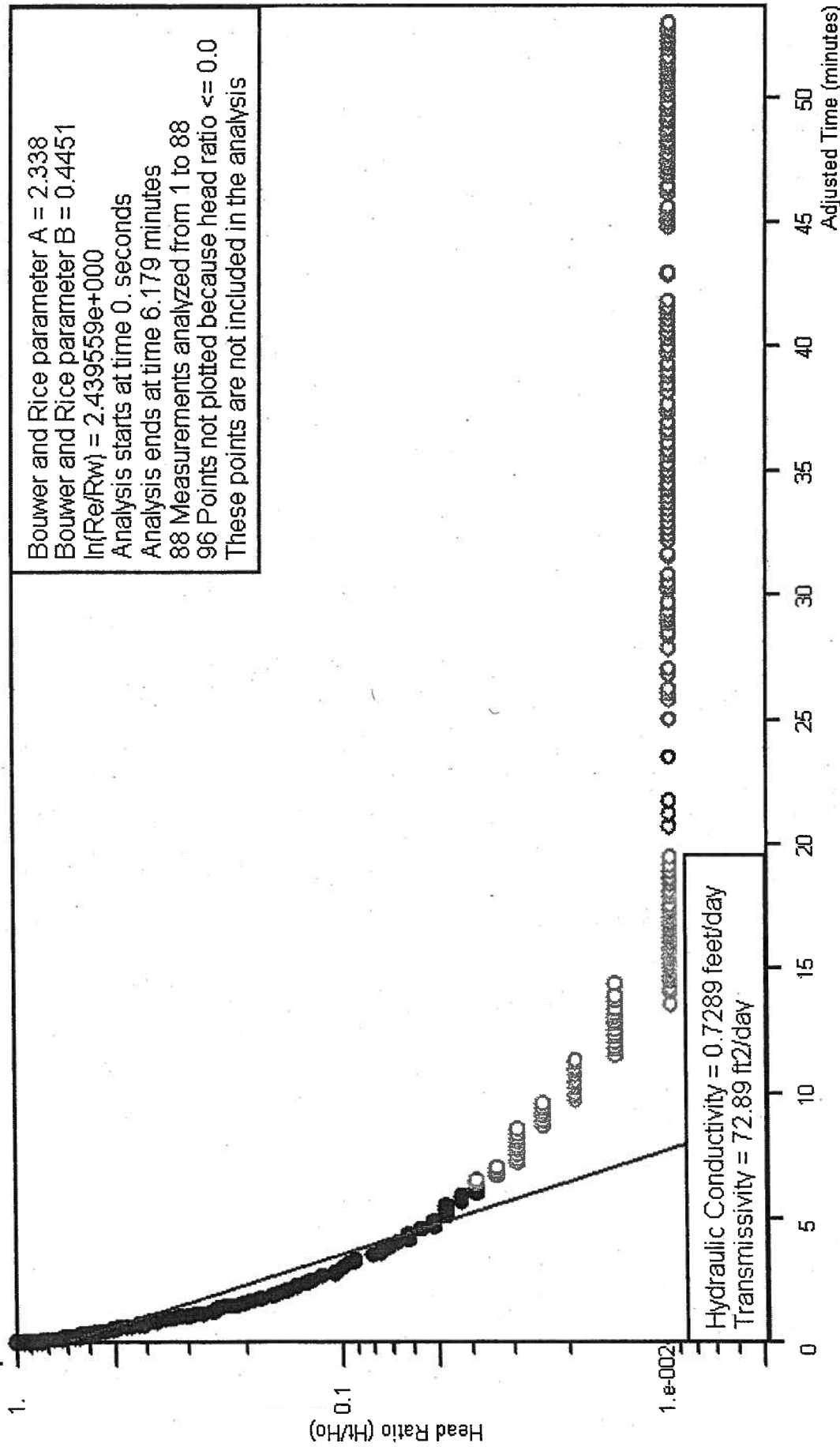
321	2701	2701	0.207	2.e-003	9.569e-003
322	2711	2711	0.207	2.e-003	9.569e-003
323	2721	2721	0.207	2.e-003	9.569e-003
324	2731	2731	0.207	2.e-003	9.569e-003
325	2741	2741	0.207	2.e-003	9.569e-003
326	2751	2751	0.208	1.e-003	4.785e-003
327	2761	2761	0.208	1.e-003	4.785e-003
328	2771	2771	0.207	2.e-003	9.569e-003
329	2781	2781	0.207	2.e-003	9.569e-003
330	2791	2791	0.207	2.e-003	9.569e-003
331	2801	2801	0.208	1.e-003	4.785e-003
332	2811	2811	0.207	2.e-003	9.569e-003
333	2821	2821	0.207	2.e-003	9.569e-003
334	2831	2831	0.207	2.e-003	9.569e-003
335	2841	2841	0.207	2.e-003	9.569e-003
336	2851	2851	0.207	2.e-003	9.569e-003
337	2861	2861	0.207	2.e-003	9.569e-003
338	2871	2871	0.207	2.e-003	9.569e-003
339	2881	2881	0.207	2.e-003	9.569e-003
340	2891	2891	0.207	2.e-003	9.569e-003
341	2901	2901	0.207	2.e-003	9.569e-003
342	2911	2911	0.207	2.e-003	9.569e-003
343	2921	2921	0.207	2.e-003	9.569e-003
344	2931	2931	0.207	2.e-003	9.569e-003
345	2941	2941	0.207	2.e-003	9.569e-003
346	2951	2951	0.207	2.e-003	9.569e-003
347	2961	2961	0.207	2.e-003	9.569e-003
348	2971	2971	0.207	2.e-003	9.569e-003
349	2981	2981	0.207	2.e-003	9.569e-003
350	2991	2991	0.207	2.e-003	9.569e-003
351	3001	3001	0.208	1.e-003	4.785e-003
352	3011	3011	0.207	2.e-003	9.569e-003
353	3021	3021	0.207	2.e-003	9.569e-003
354	3031	3031	0.207	2.e-003	9.569e-003
355	3041	3041	0.207	2.e-003	9.569e-003
356	3051	3051	0.207	2.e-003	9.569e-003
357	3061	3061	0.207	2.e-003	9.569e-003
358	3071	3071	0.207	2.e-003	9.569e-003
359	3081	3081	0.207	2.e-003	9.569e-003
360	3091	3091	0.207	2.e-003	9.569e-003
361	3101	3101	0.207	2.e-003	9.569e-003
362	3111	3111	0.208	1.e-003	4.785e-003
363	3121	3121	0.207	2.e-003	9.569e-003
364	3131	3131	0.207	2.e-003	9.569e-003
365	3141	3141	0.207	2.e-003	9.569e-003
366	3151	3151	0.207	2.e-003	9.569e-003
367	3161	3161	0.207	2.e-003	9.569e-003
368	3171	3171	0.207	2.e-003	9.569e-003
369	3181	3181	0.207	2.e-003	9.569e-003
370	3191	3191	0.208	1.e-003	4.785e-003
371	3201	3201	0.208	1.e-003	4.785e-003
372	3211	3211	0.208	1.e-003	4.785e-003
373	3221	3221	0.209	0.	0.

P-14S Rising Head Test April 25, 2007

Skinquarter CDD Landfill Skinquarter, Virginia

Bouwer and Rice Graph

P-14S



Analysis by Starpoint Software

P-14D Falling Head Test

Site Name: Skinquarter CDD Landfill
 Location: Skinquarter, Virginia
 Test Date: April 25, 2007
 Import File: P:\Skinquarter CDD LF\Slug Test\text files\P-14DFH.txt

Well Label: P-14D
 Aquifer Thickness: 100. feet
 Screen Length: 10. feet
 Casing Radius: 8.3e-002 feet
 Effective Radius: 0.34 feet
 Static Water Level: -0.236 feet
 Water Table to Screen Bottom: 57. feet
 Anisotropy Ratio: 1.
 Time Adjustment: 0. Seconds

Test starts with trial 0

There are 126 time and drawdown measurements

Maximum head is 0.236 feet

Minimum head is 0. feet

Trial	Time (seconds)	Adjusted Time (seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	0.	0.236	1.
2	0.66	0.66	-5.e-003	0.231	0.9788
3	1.32	1.32	-6.e-003	0.23	0.9746
4	1.98	1.98	-8.e-003	0.228	0.9661
5	2.64	2.64	-9.e-003	0.227	0.9619
6	3.3	3.3	-1.1e-002	0.225	0.9534
7	3.96	3.96	-1.3e-002	0.223	0.9449
8	4.62	4.62	-1.4e-002	0.222	0.9407
9	5.28	5.28	-1.5e-002	0.221	0.9364
10	5.94	5.94	-1.7e-002	0.219	0.928
11	6.6	6.6	-1.8e-002	0.218	0.9237
12	7.26	7.26	-1.9e-002	0.217	0.9195
13	7.92	7.92	-2.1e-002	0.215	0.911
14	8.58	8.58	-2.2e-002	0.214	0.9068
15	9.24	9.24	-2.4e-002	0.212	0.8983
16	9.9	9.9	-2.5e-002	0.211	0.8941
17	10.56	10.56	-2.6e-002	0.21	0.8898
18	11.22	11.22	-2.7e-002	0.209	0.8856
19	11.88	11.88	-2.8e-002	0.208	0.8814
20	12.54	12.54	-2.9e-002	0.207	0.8771
21	13.2	13.2	-3.e-002	0.206	0.8729
22	13.86	13.86	-3.2e-002	0.204	0.8644
23	15.31	15.31	-3.5e-002	0.201	0.8517
24	16.1	16.1	-3.6e-002	0.2	0.8475
25	17.83	17.83	-3.8e-002	0.198	0.839
26	18.77	18.77	-3.9e-002	0.197	0.8347
27	19.77	19.77	-4.e-002	0.196	0.8305
28	20.83	20.83	-4.2e-002	0.194	0.822
29	21.95	21.95	-4.3e-002	0.193	0.8178
30	23.14	23.14	-4.5e-002	0.191	0.8093
31	24.4	24.4	-4.7e-002	0.189	0.8008
32	25.73	25.73	-4.9e-002	0.187	0.7924
33	27.14	27.14	-5.1e-002	0.185	0.7839
34	28.63	28.63	-5.3e-002	0.183	0.7754
35	30.21	30.21	-5.4e-002	0.182	0.7712

Skinquarter CDD Landfill

36	31.89	31.89	-5.3e-002	0.183	0.7754
37	33.67	33.67	-5.4e-002	0.182	0.7712
38	35.55	35.55	-5.7e-002	0.179	0.7585
39	37.54	37.54	-6.e-002	0.176	0.7458
40	39.65	39.65	-6.2e-002	0.174	0.7373
41	41.89	41.89	-6.4e-002	0.172	0.7288
42	44.26	44.26	-6.7e-002	0.169	0.7161
43	46.77	46.77	-7.e-002	0.166	0.7034
44	49.43	49.43	-7.2e-002	0.164	0.6949
45	52.25	52.25	-7.5e-002	0.161	0.6822
46	55.24	55.24	-7.8e-002	0.158	0.6695
47	58.4	58.4	-8.1e-002	0.155	0.6568
48	61.75	61.75	-8.4e-002	0.152	0.6441
49	65.3	65.3	-8.7e-002	0.149	0.6314
50	69.06	69.06	-9.e-002	0.146	0.6186
51	73.04	73.04	-9.3e-002	0.143	0.6059
52	77.26	77.26	-9.7e-002	0.139	0.589
53	81.73	81.73	-0.1	0.136	0.5763
54	86.47	86.47	-0.104	0.132	0.5593
55	91.49	91.49	-0.107	0.129	0.5466
56	96.8	96.8	-0.111	0.125	0.5297
57	102.4	102.4	-0.115	0.121	0.5127
58	108.4	108.4	-0.118	0.118	0.5
59	114.7	114.7	-0.122	0.114	0.4831
60	121.4	121.4	-0.126	0.11	0.4661
61	128.5	128.5	-0.13	0.106	0.4492
62	136.	136.	-0.133	0.103	0.4364
63	144.	144.	-0.138	9.8e-002	0.4153
64	152.4	152.4	-0.142	9.4e-002	0.3983
65	161.3	161.3	-0.146	9.e-002	0.3814
66	170.8	170.8	-0.15	8.6e-002	0.3644
67	180.8	180.8	-0.154	8.2e-002	0.3475
68	190.8	190.8	-0.158	7.8e-002	0.3305
69	200.8	200.8	-0.162	7.4e-002	0.3136
70	210.8	210.8	-0.165	7.1e-002	0.3008
71	220.8	220.8	-0.168	6.8e-002	0.2881
72	230.8	230.8	-0.171	6.5e-002	0.2754
73	240.8	240.8	-0.174	6.2e-002	0.2627
74	250.8	250.8	-0.177	5.9e-002	0.25
75	260.8	260.8	-0.179	5.7e-002	0.2415
76	270.8	270.8	-0.182	5.4e-002	0.2288
77	280.8	280.8	-0.184	5.2e-002	0.2203
78	290.8	290.8	-0.187	4.9e-002	0.2076
79	300.8	300.8	-0.189	4.7e-002	0.1992
80	310.8	310.8	-0.19	4.6e-002	0.1949
81	320.8	320.8	-0.193	4.3e-002	0.1822
82	330.8	330.8	-0.195	4.1e-002	0.1737
83	340.8	340.8	-0.196	4.e-002	0.1695
84	350.8	350.8	-0.198	3.8e-002	0.161
85	360.8	360.8	-0.2	3.6e-002	0.1525
86	370.8	370.8	-0.201	3.5e-002	0.1483
87	380.8	380.8	-0.202	3.4e-002	0.1441
88	390.8	390.8	-0.203	3.3e-002	0.1398
89	400.8	400.8	-0.205	3.1e-002	0.1314
90	410.8	410.8	-0.206	3.e-002	0.1271
91	420.8	420.8	-0.208	2.8e-002	0.1186
92	440.8	440.8	-0.209	2.7e-002	0.1144

Skinquarter CDD Landfill

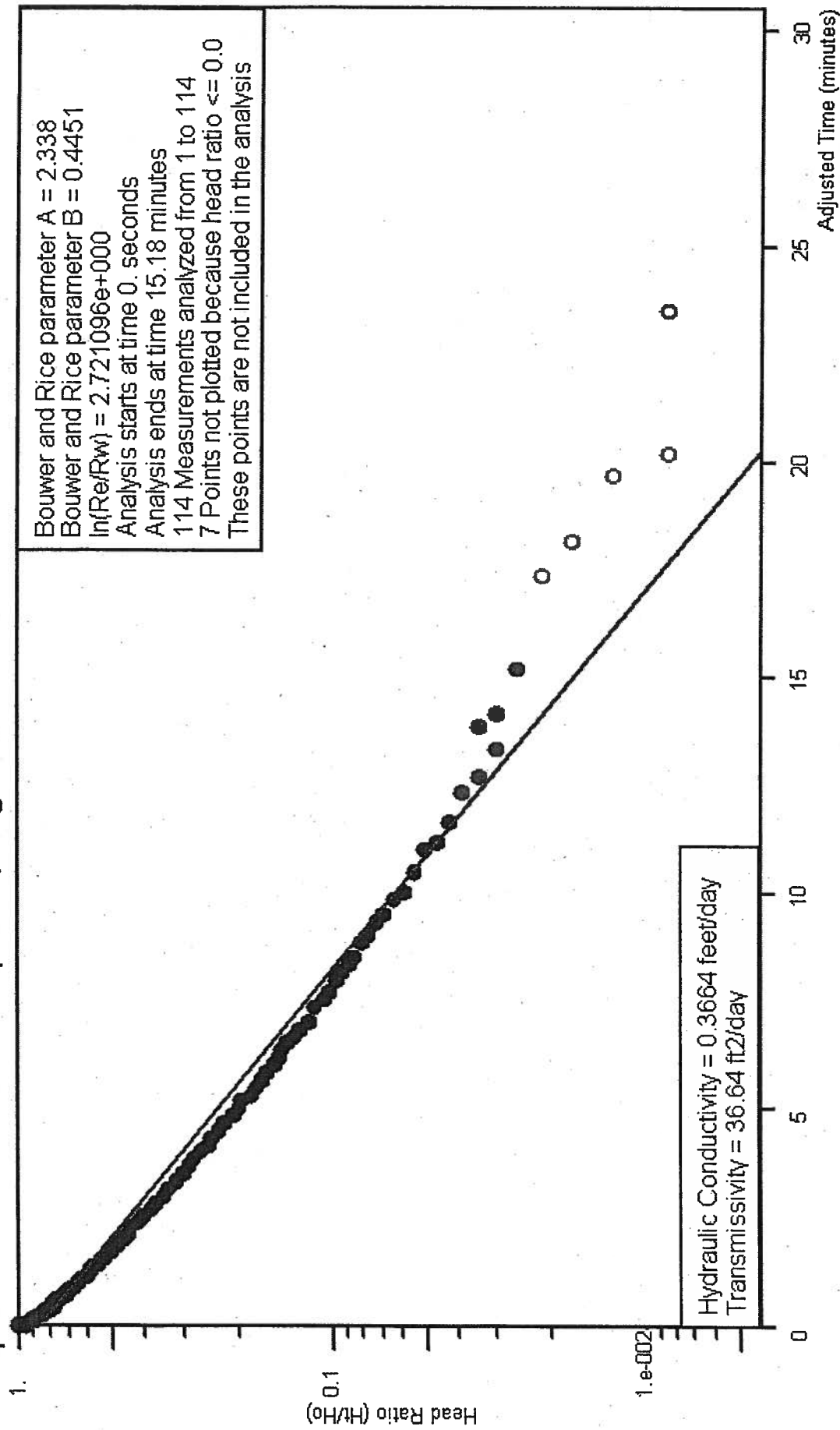
93	450.8	450.8	-0.211	2.5e-002	0.1059
94	460.8	460.8	-0.212	2.4e-002	0.1017
95	480.8	480.8	-0.213	2.3e-002	9.746e-002
96	490.8	490.8	-0.214	2.2e-002	9.322e-002
97	500.8	500.8	-0.215	2.1e-002	8.898e-002
98	510.8	510.8	-0.216	2.e-002	8.475e-002
99	530.8	530.8	-0.217	1.9e-002	8.051e-002
100	540.8	540.8	-0.218	1.8e-002	7.627e-002
101	560.8	560.8	-0.219	1.7e-002	7.203e-002
102	570.8	570.8	-0.22	1.6e-002	6.78e-002
103	590.8	590.8	-0.221	1.5e-002	6.356e-002
104	600.8	600.8	-0.222	1.4e-002	5.932e-002
105	630.8	630.8	-0.223	1.3e-002	5.508e-002
106	660.8	660.8	-0.224	1.2e-002	5.085e-002
107	670.8	670.8	-0.225	1.1e-002	4.661e-002
108	700.8	700.8	-0.226	1.e-002	4.237e-002
109	740.8	740.8	-0.227	9.e-003	3.814e-002
110	760.8	760.8	-0.228	8.e-003	3.39e-002
111	800.8	800.8	-0.229	7.e-003	2.966e-002
112	830.8	830.8	-0.228	8.e-003	3.39e-002
113	850.8	850.8	-0.229	7.e-003	2.966e-002
114	910.8	910.8	-0.23	6.e-003	2.542e-002
115	1041	1041	-0.231	5.e-003	2.119e-002
116	1091	1091	-0.232	4.e-003	1.695e-002
117	1181	1181	-0.233	3.e-003	1.271e-002
118	1211	1211	-0.234	2.e-003	8.475e-003
119	1321	1321	-0.235	1.e-003	4.237e-003
120	1411	1411	-0.234	2.e-003	8.475e-003
121	1601	1601	-0.235	1.e-003	4.237e-003
122	1611	1611	-0.236	0.	0.
123	1631	1631	-0.235	1.e-003	4.237e-003
124	1651	1651	-0.236	0.	0.
125	1821	1821	-0.235	1.e-003	4.237e-003
126	1831	1831	-0.236	0.	0.

P-14D Falling Head Test April 25, 2007

Skinquarter CDD Landfill Skinquarter, Virginia

Bouwer and Rice Graph

P-14D



Analysis by Starpoint Software

P-14D Rising Head Test

Site Name: Skinquarter CDD Landfill
 Location: Skinquarter, Virginia
 Test Date: April 25, 2007
 Import File: P:\Skinquarter CDD LF\Slug Test\text files\P-14DRH.txt

Well Label: P-14D
 Aquifer Thickness: 100. feet
 Screen Length: 10. feet
 Casing Radius: 8.3e-002 feet
 Effective Radius: 0.34 feet
 Static Water Level: 0.418 feet
 Water Table to Screen Bottom: 57. feet
 Anisotropy Ratio: 1.
 Time Adjustment: 1.98 Seconds
 Test starts with trial 3
 There are 141 time and drawdown measurements
 Maximum head is 0.42 feet
 Minimum head is 0. feet

Trial	Time (seconds)	Adjusted Time (seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-1.98	0.	0.418	0.9952
2	0.66	-1.32	-1.e-003	0.419	0.9976
3	1.32	-0.66	2.e-003	0.416	0.9905
4	1.98	0.	-2.e-003	0.42	1.
5	2.64	0.66	-1.e-003	0.419	0.9976
6	3.3	1.32	0.	0.418	0.9952
7	3.96	1.98	8.e-003	0.41	0.9762
8	4.62	2.64	1.2e-002	0.406	0.9667
9	5.28	3.3	1.5e-002	0.403	0.9595
10	5.94	3.96	1.8e-002	0.4	0.9524
11	6.6	4.62	2.4e-002	0.394	0.9381
12	7.26	5.28	2.6e-002	0.392	0.9333
13	7.92	5.94	2.8e-002	0.39	0.9286
14	8.58	6.6	2.9e-002	0.389	0.9262
15	9.24	7.26	3.2e-002	0.386	0.919
16	9.9	7.92	3.3e-002	0.385	0.9167
17	10.56	8.58	3.6e-002	0.382	0.9095
18	11.22	9.24	3.8e-002	0.38	0.9048
19	11.88	9.9	3.9e-002	0.379	0.9024
20	12.54	10.56	4.1e-002	0.377	0.8976
21	13.2	11.22	4.3e-002	0.375	0.8929
22	13.86	11.88	4.5e-002	0.373	0.8881
23	14.56	12.58	4.7e-002	0.371	0.8833
24	15.31	13.33	4.9e-002	0.369	0.8786
25	16.1	14.12	5.1e-002	0.367	0.8738
26	16.94	14.96	5.3e-002	0.365	0.869
27	17.83	15.85	5.5e-002	0.363	0.8643
28	18.77	16.79	5.7e-002	0.361	0.8595
29	19.77	17.79	6.e-002	0.358	0.8524
30	20.83	18.85	6.2e-002	0.356	0.8476
31	21.95	19.97	6.4e-002	0.354	0.8429
32	23.14	21.16	6.7e-002	0.351	0.8357
33	24.4	22.42	7.e-002	0.348	0.8286
34	25.73	23.75	7.2e-002	0.346	0.8238
35	27.14	25.16	7.5e-002	0.343	0.8167

Skinquarter CDD Landfill

36	28.63	26.65	7.8e-002	0.34	0.8095
37	30.21	28.23	7.9e-002	0.339	0.8071
38	31.89	29.91	8.9e-002	0.329	0.7833
39	33.67	31.69	9.3e-002	0.325	0.7738
40	35.55	33.57	9.6e-002	0.322	0.7667
41	37.54	35.56	0.1	0.318	0.7571
42	39.65	37.67	0.104	0.314	0.7476
43	41.89	39.91	0.107	0.311	0.7405
44	44.26	42.28	0.112	0.306	0.7286
45	46.77	44.79	0.116	0.302	0.719
46	49.43	47.45	0.12	0.298	0.7095
47	52.25	50.27	0.125	0.293	0.6976
48	55.24	53.26	0.129	0.289	0.6881
49	58.4	56.42	0.134	0.284	0.6762
50	61.75	59.77	0.139	0.279	0.6643
51	65.3	63.32	0.144	0.274	0.6524
52	69.06	67.08	0.15	0.268	0.6381
53	73.04	71.06	0.155	0.263	0.6262
54	77.26	75.28	0.161	0.257	0.6119
55	81.73	79.75	0.167	0.251	0.5976
56	86.47	84.49	0.173	0.245	0.5833
57	91.49	89.51	0.179	0.239	0.569
58	96.8	94.82	0.185	0.233	0.5548
59	102.4	100.5	0.191	0.227	0.5405
60	108.4	106.4	0.198	0.22	0.5238
61	114.7	112.7	0.204	0.214	0.5095
62	121.4	119.4	0.211	0.207	0.4929
63	128.5	126.5	0.218	0.2	0.4762
64	136.	134.	0.225	0.193	0.4595
65	144.	142.	0.232	0.186	0.4429
66	152.4	150.4	0.24	0.178	0.4238
67	161.3	159.3	0.247	0.171	0.4071
68	170.8	168.8	0.254	0.164	0.3905
69	180.8	178.8	0.261	0.157	0.3738
70	190.8	188.8	0.268	0.15	0.3571
71	200.8	198.8	0.275	0.143	0.3405
72	210.8	208.8	0.282	0.136	0.3238
73	220.8	218.8	0.288	0.13	0.3095
74	230.8	228.8	0.293	0.125	0.2976
75	240.8	238.8	0.299	0.119	0.2833
76	250.8	248.8	0.304	0.114	0.2714
77	260.8	258.8	0.309	0.109	0.2595
78	270.8	268.8	0.314	0.104	0.2476
79	280.8	278.8	0.318	1.e-001	0.2381
80	290.8	288.8	0.322	9.6e-002	0.2286
81	300.8	298.8	0.328	9.e-002	0.2143
82	310.8	308.8	0.332	8.6e-002	0.2048
83	320.8	318.8	0.335	8.3e-002	0.1976
84	330.8	328.8	0.339	7.9e-002	0.1881
85	340.8	338.8	0.342	7.6e-002	0.181
86	350.8	348.8	0.346	7.2e-002	0.1714
87	360.8	358.8	0.349	6.9e-002	0.1643
88	370.8	368.8	0.352	6.6e-002	0.1571
89	380.8	378.8	0.354	6.4e-002	0.1524
90	390.8	388.8	0.357	6.1e-002	0.1452
91	400.8	398.8	0.36	5.8e-002	0.1381
92	410.8	408.8	0.362	5.6e-002	0.1333

Skinquarter CDD Landfill

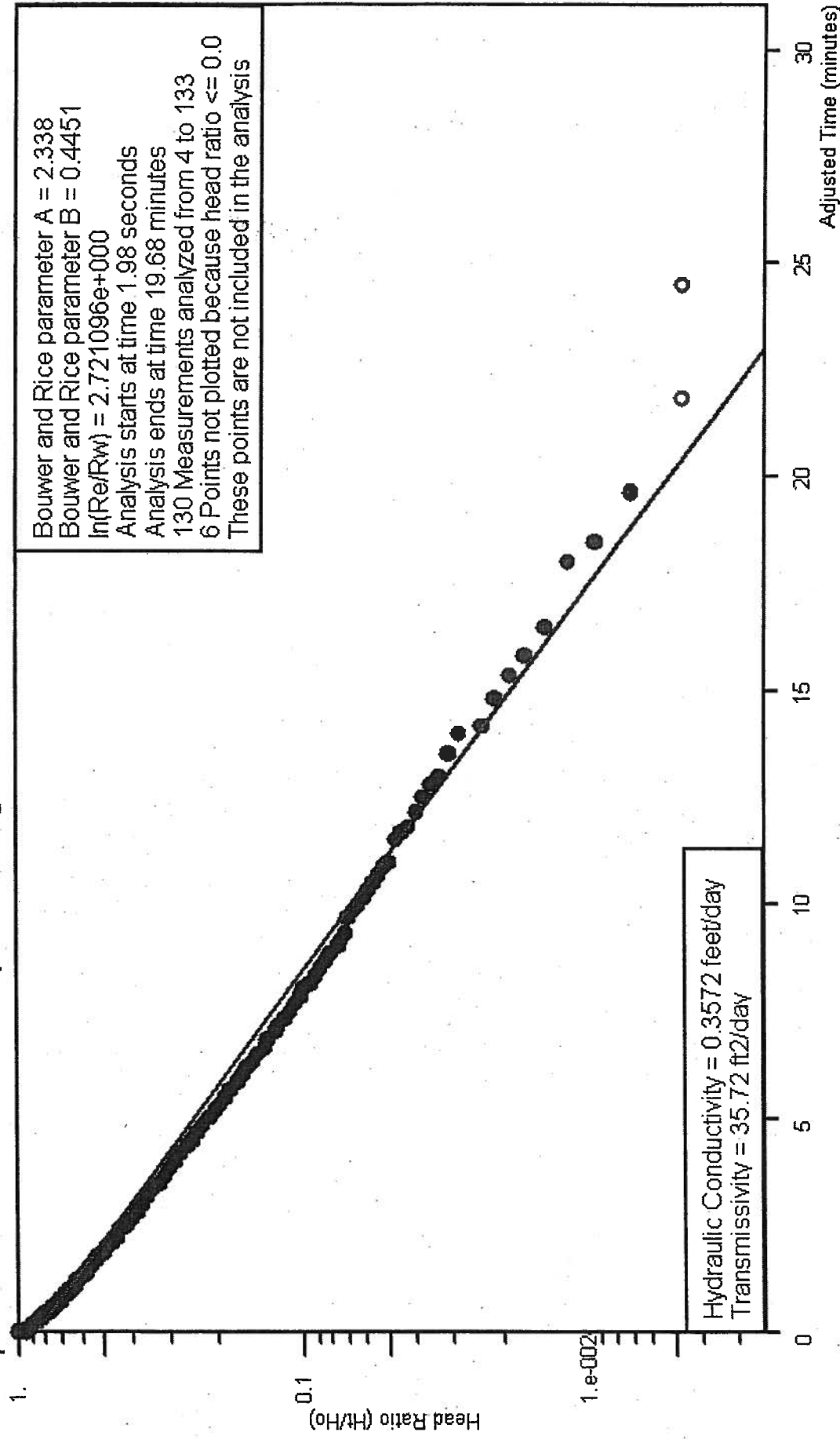
93	420.8	418.8	0.365	5.3e-002	0.1262
94	430.8	428.8	0.366	5.2e-002	0.1238
95	440.8	438.8	0.369	4.9e-002	0.1167
96	450.8	448.8	0.371	4.7e-002	0.1119
97	460.8	458.8	0.373	4.5e-002	0.1071
98	470.8	468.8	0.375	4.3e-002	0.1024
99	480.8	478.8	0.376	4.2e-002	1.e-001
100	490.8	488.8	0.378	4.e-002	9.524e-002
101	500.8	498.8	0.38	3.8e-002	9.048e-002
102	510.8	508.8	0.381	3.7e-002	8.81e-002
103	520.8	518.8	0.383	3.5e-002	8.333e-002
104	530.8	528.8	0.384	3.4e-002	8.095e-002
105	540.8	538.8	0.386	3.2e-002	7.619e-002
106	550.8	548.8	0.387	3.1e-002	7.381e-002
107	560.8	558.8	0.388	3.e-002	7.143e-002
108	580.8	578.8	0.389	2.9e-002	6.905e-002
109	590.8	588.8	0.39	2.8e-002	6.667e-002
110	600.8	598.8	0.391	2.7e-002	6.429e-002
111	610.8	608.8	0.392	2.6e-002	6.19e-002
112	620.8	618.8	0.393	2.5e-002	5.952e-002
113	630.8	628.8	0.394	2.4e-002	5.714e-002
114	640.8	638.8	0.395	2.3e-002	5.476e-002
115	650.8	648.8	0.396	2.2e-002	5.238e-002
116	660.8	658.8	0.397	2.1e-002	5.e-002
117	690.8	688.8	0.398	2.e-002	4.762e-002
118	700.8	698.8	0.399	1.9e-002	4.524e-002
119	710.8	708.8	0.4	1.8e-002	4.286e-002
120	730.8	728.8	0.401	1.7e-002	4.048e-002
121	750.8	748.8	0.402	1.6e-002	3.81e-002
122	770.8	768.8	0.403	1.5e-002	3.571e-002
123	780.8	778.8	0.404	1.4e-002	3.333e-002
124	810.8	808.8	0.405	1.3e-002	3.095e-002
125	840.8	838.8	0.406	1.2e-002	2.857e-002
126	850.8	848.8	0.408	1.e-002	2.381e-002
127	890.8	888.8	0.409	9.e-003	2.143e-002
128	920.8	918.8	0.41	8.e-003	1.905e-002
129	950.8	948.8	0.411	7.e-003	1.667e-002
130	990.8	988.8	0.412	6.e-003	1.429e-002
131	1081	1079	0.413	5.e-003	1.19e-002
132	1111	1109	0.414	4.e-003	9.524e-003
133	1181	1179	0.415	3.e-003	7.143e-003
134	1311	1309	0.416	2.e-003	4.762e-003
135	1461	1459	0.417	1.e-003	2.381e-003
136	1471	1469	0.416	2.e-003	4.762e-003
137	1481	1479	0.417	1.e-003	2.381e-003
138	1691	1689	0.418	0.	0.
139	1701	1699	0.417	1.e-003	2.381e-003
140	1731	1729	0.418	0.	0.
141	1861	1859	0.417	1.e-003	2.381e-003

P-14D Rising Head Test April 25, 2007

Skinquarter CDD Landfill Skinquarter, Virginia

Bouwer and Rice Graph

P-14D



Analysis by Starpoint Software

H_o is 0.42 feet at 1.98 seconds