CAMELOT LANDFILL
CITY OF LEWISVILLE, DENTON COUNTY
TCEQ PERMIT NO. MSW-1312B

MAJOR PERMIT AMENDMENT APPLICATION

VOLUME 5 OF 6

Prepared for

City of Farmers Branch

March 2012

JEFFREY P. YOUNG
79809

3-23-12

Prepared by

Weaver Boos Consultants, LLC–Southwest
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WBC Project No. 1339-351-11-02-6B

This document is intended for permitting purposes only.

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PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIJ
GEOTECHNICAL REPORT

Prepared for

City of Farmers Branch

March 2012

NEVZAT TURAN
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1 INTRODUCTION

This appendix addresses §330.63(e)(5)(A) and (B).

The purpose of this report is to present the geotechnical analysis and design for the horizontal and vertical expansion of the Camelot Landfill. This report is based on the geotechnical testing information that has been compiled from the subsurface investigations at the site.

The site has a currently permitted waste footprint of 198.3 acres. This application proposes to expand the currently permitted waste footprint by 38.5 acres. The bottom of excavation of the horizontal expansion area will be founded in the unweathered shale.

This report contains a compilation of geotechnical testing and design information, including:

- Slope stability analyses based on the geotechnical testing results and subsurface conditions including groundwater as well as landfill excavation, completion, and sequence of development (interim condition analysis) plans; and
- Settlement and heave analyses, which are also based on the landfill excavation and completion plans.

This geotechnical report also provides geotechnical recommendations for construction of the landfill components. The construction quality control as well as material and construction specifications for the groundwater protection components of the landfill are provided in Appendix IIID – Liner Quality Control Plan.

2 LABORATORY TESTING

2.1 Introduction

Subsurface characterization at the site was based on field exploration and geotechnical testing conducted by Rone Engineers in 1979 and 1980, Reed Engineering in 1994 and 1995, and Weaver Boos Consultants (WBC) in 2010. A total of 59 geotechnical borings were drilled at the site. Additional subsurface characterization data have been provided by the installation of monitoring wells across the site. Available laboratory testing results are provided in Appendix IIIJ-C. The laboratory testing meets the requirements of Title 30 TAC §330.63(e)(5)(A) regarding sampling each stratum (i.e., alluvial and shale stratum). A summary of the laboratory tests performed is given in Table 2-1.

Table 2-1
Geotechnical Test Methods Performed

Test	Test Method
Hydraulic Conductivity	ASTM D 5084/EM 1110-2-1906, Appendix VII
Sieve Analysis (Passing No. 200)	ASTM D 1140
Atterberg Limits (Liquid & Plastic Limit)	ASTM D 4318
Moisture Content	ASTM D 2216
Unconfined Compression	ASTM D 2166
Triaxial Shear	ASTM D 2850
Consolidation	ASTM D 2435
Standard Proctor	ASTM D 698

2.2 Classification Tests

Classification tests consisting of Atterberg limits, percent passing the number 200 sieve, dry unit weight, and moisture content tests were performed on select soil samples recovered from boreholes. These test results are presented in Appendix IIIJ-C. Classification tests were used to identify the soils according to the Unified Soil Classification System (USCS) and to evaluate physical properties of the soils.

2.3 Shear Strength Tests

An unconfined compression test was performed on an undisturbed sample of unweathered shale. The test was performed to provide general strength information and was used to evaluate the subgrade material.

Triaxial shear tests were performed on undisturbed samples of alluvial clay, alluvial sand, and the existing perimeter berm.

2.4 Hydraulic Conductivity Tests

Falling-head, flexible-wall hydraulic conductivity tests were performed on select undisturbed soil specimens of alluvial clay, the perimeter berm, and unweathered shale. These tests were performed to assist in evaluation of the hydrogeologic properties of the soils at the site.

2.5 Moisture-Density Relationships

Standard proctor laboratory compaction tests (ASTM D 698) were performed on composite bulk samples of alluvial clay. These tests were performed to evaluate the moisture-density relationship of the materials and to determine hydraulic conductivity of the remolded samples (i.e., identify soils for suitability for liner material).

2.6 Consolidation Tests

Consolidation tests were performed on select undisturbed samples of unweathered shale to provide information for use in the settlement and heave analyses.

3 TEST CORRELATIONS AND SUMMARIES

3.1 General

This section of the report addresses the generalized stratigraphy for the site, potential uses of materials that may be excavated during construction, and typical properties of those materials. Results from previous laboratory testing, field testing, and observations were used for the material correlations. The results of the testing performed on site soils are included in Appendix IIIJ-C.

3.2 Generalized Stratigraphy

Based on the boring logs that have been obtained from the site and the subsurface characterization provided in Appendix IIIG – Geology Report, the stratigraphic units are generalized in two stratum within the depths explored at the site.

- Alluvial Stratum
- Shale Stratum

The laboratory test results for material samples obtained from the site are summarized in Table 3-1. More detailed testing results are included in the tables provided in Appendix IIIJ-C. These test results were reviewed with the boring log information to develop generalized material properties in each zone. The site stratigraphy is described in detail in Appendix IIIG – Geology Report. The following subsections briefly describe the two stratum.

3.2.1 Alluvial Stratum

The alluvial stratum consists of alluvial sediments and is largely continuous below the site, except where the sediments have been removed by soil excavation to support site development. This stratum can be further divided into an upper clay and lower sand zone. The alluvial stratum ranges in total thickness from 0 to 52.5 feet with a mean thickness of 24.9 feet.

3.2.2 Shale Stratum

Beneath the alluvial stratum is a low-permeability bedrock shale. The shale stratum consist of a discontinuous veneer of weathered shale with thicknesses less than 1 foot when detected within the landfill footprint and underlying sequence of unweathered shale.

3.3 Material Requirements

Construction of the landfill will require clay or clayey soils which can be compacted to have an in-place hydraulic conductivity of $1x10^{-7}$ cm/s or less for the soil liner portion of the composite liner and an in-place hydraulic conductivity of $1x10^{-5}$ cm/s for the soil infiltration layer of the composite final cover system for Subtitle D areas.

Soil will also be required for protective cover on the liner and overliner, operational cover (daily and intermediate), the infiltration and erosion layer components of the composite final cover, berm construction, and other miscellaneous general fill. Granular material (i.e., gravel) will be used for the leachate collection sumps, leachate collection chimneys and may be used for groundwater dewatering collection trenches. Typical material requirements for various soil structures are summarized in Table 3-2.

Testing requirements and construction quality control and quality assurance for liner soils are detailed in Appendix IIID – Liner Quality Control Plan (LQCP). Testing requirements and construction quality control and quality assurance for final cover soils are detailed in Appendix IIIE – Final Cover System Quality Control Plan (FCSQCP) and Appendix IIIK – Closure Plan. Liner and final cover details are presented in Appendix IIIA-A – Liner, Overliner, and Final Cover System Details.

3.4 In-Situ Materials at Liner Subgrade

Prior to the installation of liner components, exposed in-situ materials will not include loose or soft soils. The presence of cracks, fissures, and fractures will not be allowed in the exposed surface of the base grade. In-situ base grade soils will be firm and will not exhibit significant rutting from the construction traffic.

3.5 Soil Materials for Liner

3.5.1 Properties of Soil Liner Material

The 2-foot-thick soil liner will be constructed as part of the composite liner system consisting of, from top to bottom, a 2-foot-thick protective cover, a geocomposite leachate collection layer as designed in Appendix IIIC, a 60-mil-thick HDPE geomembrane, and a 2-foot-thick compacted soil liner.

Material used to construct the soil liner is required to have a minimum liquid limit of 30 and plasticity index of 15. The hydraulic conductivity for the soil liner is required to be $1x10^{-7}$ cm/s or less (refer to Table 3-2). The soil liner material and construction requirements are discussed in detail in Appendix IIID – LQCP.

3.5.2 Properties of Liner Protective Cover Material

A two-foot thick protective soil cover will be placed over the leachate collection layer of the liner. The protective cover is required to protect the liner and leachate collection system (LCS) from erosion and construction activity and will consist of on-site soils. The LCS drainage media will be extended through the protective cover along the entire length of the leachate collection trenches and over the sumps. This extension of the drainage media through the protective cover ("chimney drain") will allow transmission of leachate to the LCS. Details of the chimney drain are provided on Drawing A.4 in Appendix IIIA-A – Liner, Overliner, and Final Cover System Details.

3.6 Soil Materials for Overliner

3.6.1 Prepared Soil Subgrade

Prior to the installation of overliner components, exposed materials will not include loose or soft soils. The presence of cracks, fissures, and fractures will not be allowed in the exposed surface of the base grade. Base grade soils will be firm and will not exhibit significant rutting from the construction traffic.

3.6.2 Soil Protective Cover

A two-foot thick protective soil cover will be placed over the leachate collection layer of the overliner. The protective cover is required to protect the overliner geosynthetics and leachate collection system (LCS) from erosion and construction activity and will consist of on-site soils. The LCS drainage media will be extended through the protective cover along the entire length of the leachate collection trenches and over the sumps. This extension of the drainage media through the protective cover ("chimney drain") will allow transmission of leachate to the LCS. Details of the chimney drain are provided on Drawing A.9 in Appendix IIIA-A – Liner, Overliner, and Final Cover System Details.

3.7 Soil Materials for Final Cover

3.7.1 Properties of Infiltration Layer Soil

Material used to construct the composite final cover soil infiltration layer component of the standard Subtitle D final cover is required to have a minimum liquid limit of 30 and a plasticity index of 15. The purpose of this layer is to reduce infiltration of surface water into the fill. As defined in Appendix IIIK – Closure Plan, the infiltration layer for Subtitle D areas will consist of 18 inches of earthen material with a coefficient of permeability no greater than 1×10^{-5} cm/s overlain by a synthetic membrane. The infiltration layer material and construction requirements are discussed in detail in Appendix IIIE – FCSQCP.

3.7.2 Properties of Erosion Layer

As shown in Appendix IIIA – Landfill Unit Design Information (Appendix IIIA-A), the final cover system for the composite liner areas will include a 24-inch-thick erosion layer. This layer may be spread and placed as two lifts over the entire final cover area. After spreading, the layer will be rolled lightly to reduce future erosion but not to the extent that compaction would inhibit plant growth. The top 6 inches of the erosion layer will be capable of sustaining vegetative growth. The completed erosion layer will be seeded with local and/or introduced grasses and maintained to establish vegetation.

3.8 Properties of Operational Cover Material

Operational cover includes daily cover and intermediate cover. The materials excavated from the site may be used for operational cover. Operational cover soil is not restricted by physical property. However, the intermediate cover layer must be capable of sustaining vegetation growth. Any of the soil materials encountered in the excavation may be used for operational cover provided that they were not previously mixed with waste materials.

3.9 Properties of Clay Fill Material

Clay fill material may be required for subgrade preparation, embankments, haul roads, and other miscellaneous fill. Material availability, compactability, and long-term maintenance requirements should be considered when evaluating the excavated soils for use as clay fill. General fill material placed below the composite liner (e.g., over-excavated areas within the liner construction area) will be placed in uniform lifts which do not exceed 8 inches in loose thickness, and general fill material for structural fill (e.g., perimeter berm construction and liner anchor trench backfill) will be placed in uniform lifts which do not exceed 12 inches in loose thickness. The fill placed below the liner will be compacted to at least 95 percent of Standard Proctor maximum dry density (ASTM D 698) at a moisture content at or above the optimum moisture content when it is used for backfill below the soil liner.

Table 3-1
Typical Properties of On-Site Materials[10]

Laboratory Test[1,2]		Constructed Fill		Alluvial Strata		Shale Strata	
Classification	Test Method	Clay Fill	Perimeter Berm	Clay	Sand and Gravel	Weathered Shale	Unweathered Shale
Liquid Limit (LL)	ASTM D 4318	57	69	57	26	54	70
Plastic Limit (PL)	ASTM D 4318	23	22	23	16	19	46
Plasticity Index (PI)	ASTM D 4318	34	47	34	10	35	25
% Passing 200 Sieve	ASTM D 1140	77.0	89.5	78.2	28.5	56	97.4
Natural Moisture Content (%)	ASTM D 2216	21.1	24.8	21.6	13.9	22.5	16.8
Dry Unit Weight (pcf)		104.7	100.3	102.9	112.8	113.7	111.4
Shear Strength	**Test Method**						
Unconfined Compressive Strength (psf)		(See Note 5)	(See Note 5)	(See Note 5)	(See Note 5)	(See Note 5)	29,200
Internal Frictional Angle (degree)[4]	ASTM D 2850	(See Note 8)	13.1	11.0	16.4	(See Note 5)	(See Note 7)
Triaxial Shear Cohesion (psf)[4]	ASTM D 2850	(See Note 8)	1,079	854	488	(See Note 5)	(See Note 7)
Pocket Penetrometer Reading (tsf)		1.8	3.6	2.3	1.0	(See Note 5)	4.5
Hydraulic Conductivity (cm/s) (Horizontal)	EM-1110-2-1906 Appendix VII/ ASTM D 5084	7.7×10^{-8}	8.9×10^{-8}	2.5×10^{-7}	1.3×10^{-4}	(See Note 6)	1.5×10^{-8}
Hydraulic Conductivity (cm/s) (Vertical)	EM-1110-2-1906 Appendix VII/ ASTM D 5084	5.5×10^{-8}	(See Note 9)	2.7×10^{-8}	1.2×10^{-4}	3.9×10^{-8}	2.5×10^{-8}
Moisture Density Relationships (Standard Proctors)	**Test Method**						
Liquid Limit (LL)	ASTM D 4318			58			
Plasticity Index (PI)	ASTM D 4318			33			
Maximum Dry Density (pcf)	ASTM D 698			98.8			
Optimum Moisture Content (%)	ASTM D 698			22.6			

[1] Laboratory test results were obtained from site subsurface investigations. Laboratory test data from site subsurface investigations are presented in Appendix IIIJ-C.

[2] Values listed are averages of the data for each soil layer or material, unless otherwise noted.

[3] Refer to Appendix IIIG – Geology Report for information regarding geologic units that exist at the site.

[4] These represent typical values and not averages. Refer to Appendix IIIJ-C for a list of all shear strength testing parameters.

[5] Unconfined compression strength was performed on the bedrock (unweathered shale) only. Strength information for sand and cohesive materials was obtained using standard penetration test and triaxial tests, respectively, as applicable.

[6] The weathered shale is discontinuous across the site with thickness ranging from 0.1 feet to 1.0 feet within the landfill footprint area. An insufficient amount of sample was recovered to complete a horizontal hydraulic conductivity test.

[7] Noncohesive material.

[8] Surfacial clay fill was observed in the borings at the north end of the site and modeled as part of the alluvial strata.

[9] The existing berm is located around the perimeter of the pre-Subtitle D waste area and corresponds to sideslopes of the deposited waste.

[10] Refer to Appendix IIIJ-C for the number of tests performed for various geotechnical parameters.

Table 3-2
Typical Soil Requirements for Landfill Construction

Landfill Component	Soil Description	Classification	Test Parameters				Material Source[2]
			LL	PI	%-200	Hydraulic Conductivity (cm/s)	
Soil Liner (Bottom Liner)	clayey sand, sandy clay, or clay	SC, CL, CH	30 min	15 min	30 min	$1x10^{-7}$ max	On site
Final Cover Infiltration Layer	clayey sand, sandy clay, or clay	SC, CL, CH	30 min	15 min	30 min	$1x10^{-5}$ max	On site
Protective Cover for Bottom Liner and Overliner	soil free of deleterious material	Not applicable					On site[1]
Erosion Layer	clay, silty clay, sandy clay, or clayey sand	CL, CH, ML, SC	Suitable to support plant growth				On site
Operational cover (daily cover, intermediate cover)	soil not previously mixed with solid waste	Not applicable	--	--	--	--	On site
Clay Fill: Perimeter Berm & Subgrade Preparation	clayey sand, sandy clay, or clay	SC, CL, CH	--	--	--	--	On site

[1] Leachate collection chimney drains will be extended through the protective cover and will be adequately exposed for transmission of leachate to the collection system.

[2] If on site materials meeting the required properties do not exist, off site material source can be used.

4 CONSTRUCTION CONSIDERATIONS

4.1 General

This section contains recommendations for excavation of the landfill, control of groundwater seepage during excavation, soil liner construction, leachate collection layer materials, operational cover soils, final cover construction, and perimeter embankment construction.

The landfill will expand its excavation footprint by approximately 38.5 acres. The floor of the proposed excavation of the landfill unit is founded in the unweathered shale. The currently developed Subtitle D liners of the landfill unit include groundwater dewatering systems for temporary groundwater hydrostatic uplift pressure relief. The liner design for the undeveloped portion of the landfill includes a temporary dewatering system.

4.2 Landfill Excavation

The excavation for the liner construction will be performed in a manner that will achieve reasonable segregation of liner quality material from the topsoil. Soil materials to be used for liner construction will be stockpiled separately, according to construction material properties outlined in Section 3.3 and visual observation during excavation.

Excavation of the soils encountered will be achieved with equipment such as excavators. Local areas of the hard shale may be encountered intermittently within the excavation and/or as the depth of excavation into the unweathered shale increases. These hard shale zones can be broken up with an excavator equipped with a hydraulic hammer tool. The hydraulic hammer may be fitted with a pointed chisel or moil for the hard shale or a blunt tool for harder cemented material. Blasting of hard rock will not be required and will not be used at this site.

Excavation side slopes will be graded no steeper than 3 horizontal to 1 vertical. Excavation cut slopes around the perimeter may require erosion protection if an extended period of time occurs between excavation and liner construction. Interim erosion protection can be accomplished by diverting runoff away from the slopes. "Track walking" with a bulldozer up and down the slopes will create the effect of "mini-dikes" with the bulldozer tracks, which will reduce erosion.

Prior to beginning construction of the liner components, the subgrade area will be stripped to a depth sufficient to remove all loose surface soils or soft zones within the exposed excavation. The liner base grades will be proof-rolled with heavy, rubber-tired construction equipment or equivalent to detect soft areas. Soft areas will be undercut to firm material and backfilled with suitable compacted clay fill, as discussed in Section 2 of Appendix IIID – LQCP. Preparation of the liner base grades will result in a surface that is stable and that does not exhibit significant rutting from the construction traffic. The prepared liner base grades will be approved by a POR, tested to verify that it meets the requirements outlined in Section 3.4, and surveyed to verify grades.

4.3 Control of Water Seepage During Excavation Applicability

The excavation within the undeveloped area of the landfill will be founded primarily in the unweathered shale around the perimeter and in the weathered shale on portions of the landfill floor. As discussed in Appendix IIIG – Geology Report, the groundwater of the uppermost aquifer flows from the northeast toward the Elm Fork of the Trinity River. The source of seepage will be the alluvial stratum/shale stratum interface. Section 5 of this report includes the design for construction below the groundwater table.

4.4 Soil Liner Construction

Both landfill floor grades and excavation side slopes will be lined with a 2-foot-thick compacted clay liner. The clay liner will have a maximum hydraulic conductivity of $1x10^{-7}$ cm/s. Details for the liner system are provided in Appendix IIIA (Appendix IIIA-A). Adequate soil liner material will be available from proposed landfill excavations, onsite, or offsite borrow sources to provide material for the liner construction. Shale may be stockpiled to facilitate pulverization, if needed. Laboratory tests will verify that this material is adequate to meet the compacted clay liner requirements listed in Title 30 TAC §330.339(c)(5) prior to using shale as liner construction material.

The soils used for liner construction will have the minimum soil property values listed in Table 4-1 that will be verified by preconstruction testing in a soils laboratory. The following soil liner properties are included in Appendix IIID – LQCP.

Table 4-1
Soil Liner Properties

Test	Specifications
Hydraulic Conductivity of Remolded Soils[1]	$1.0x10^{-7}$ cm/s or less
Plasticity Index	15 minimum
Liquid Limit	30 minimum
Percent Passing No. 200 Mesh Sieve	30 minimum
Percent Passing 1-inch Sieve	100

[1] A hydraulic conductivity test will be performed on soil samples remolded per ASTM D 698 in accordance with Appendix IIID – LQCP.

Representative preliminary sampling will be performed on the materials that will be used for soil liner construction. Prior to construction of each new liner area, conformance tests that include liquid limit, plastic limit, percent passing the No. 200 sieve, Standard Proctor (ASTM D 698) and remolded hydraulic conductivity test will be performed for the soils used for liner. Additional conformance tests will be conducted if there are visual changes in the borrow material or the liquid limit or plasticity index vary by more than 10 points. The soil liner construction and testing procedures are outlined in Appendix IIID – LQCP.

4.5 Drainage Materials

The LCS drainage material will consist of a drainage geocomposite over the entire liner bottom and side slopes. Each sector will have a bottom slope toward an LCS trench (i.e., pipe enveloped in gravel and geotextile) that will collect leachate from the bottom and sideslopes. The leachate collection system details are illustrated in Appendix IIIA (Appendix IIIA-A). The material specifications and construction procedures for the LCS components are presented in Appendix IIID – LQCP. The LCS design and demonstrations are provided in Appendix IIIC – Leachate and Contaminated Water Management Plan.

4.6 Liner and Overliner Protective Cover

The liner protective cover is required to be a minimum of 24 inches thick for both liner and overliner. The purpose of the protective cover is to protect the geosynthetics (i.e., geomembrane and drainage geocomposite) from solid waste placed over the liner system. To ensure passage of leachate into the leachate collection system, drainage passages (chimney drains) will be constructed through the protective cover. The chimney drains will be installed over the LCS collection pipes as shown in Appendix IIIA (Appendix IIIA-A). The protective cover will be placed with construction equipment in one lift such that it covers the leachate collection layer completely. The protective cover material will be free of solid waste and will not require compaction under the density-controlled construction procedures.

4.7 Operational Cover Soils

Operational cover soils include daily cover (placed over the waste each day) and intermediate cover (placed over waste in areas that will not receive additional fill for at least 6 months). All soils excavated at the site, including unweathered shale, may be used for operational cover.

4.8 Composite Final Cover Construction

4.8.1 Final Cover Infiltration Layer Construction

The infiltration layer of the final cover system will be constructed with clayey material and will be a minimum of 18 inches thick. The purpose of this layer is to reduce infiltration of surface water into the fill. As specified in Appendix IIIK – Closure Plan, for areas of the landfill with a synthetic bottom liner, the infiltration layer will consist of 18 inches of earthen material with a coefficient of permeability no greater than $1x10^{-5}$ cm/s overlain by a synthetic membrane. The final cover components material and construction requirements will be in accordance with Appendix IIIE – FCSQCP.

4.8.2 Final Cover Erosion Layer Construction

As shown in Appendix IIIA-A, the composite final cover system will include a 24-inch-thick erosion. The erosion layer will protect the infiltration layer and will support vegetative growth. The erosion layer may be spread and placed in two lifts (18 inches and 6 inches) over the entire cap area as the final cover is constructed. After spreading, each lift will be rolled lightly to reduce future erosion but not to the extent that compaction would inhibit plant growth. The top 6 inches of the erosion layer will consist of (1) topsoil stockpiled during the excavation process, (2) other on-site excavated soils amended as necessary to be capable of sustaining vegetation, and/or (3) imported soil materials. Whether placed in a single lift or two lifts, the erosion layer (top of final cover) will sustain vegetative growth.

4.9 Perimeter Embankment Construction

Perimeter embankments (berms) will be constructed to prevent surface water flow from entering the landfill excavation. The embankment will have side slopes no steeper than 3 horizontal to 1 vertical (3H:1V). A sufficient amount of soil is available from the landfill excavations to construct the perimeter embankment and other features that require clay fill material.

Prior to beginning embankment fill, the subgrade area will be stripped to a depth sufficient to remove all topsoil and vegetation. Topsoil will be stockpiled for later use. The subgrade area will be proof-rolled with heavy, rubber-tired construction equipment to detect soft areas. Soft areas will be undercut to firm material and backfilled with suitable compacted clay fill. The subgrade preparation will result in a subgrade surface that is stable and does not exhibit significant rutting from construction equipment traffic.

The embankments will be constructed of onsite soils free of organic or other objectionable materials. The general fill placed below the composite liner (e.g., over excavated areas within the liner construction area) will be spread in maximum 8-inch-thick, loose, horizontal lifts and compacted to a minimum of 95 percent of maximum Standard Proctor dry density within a range of moisture content provided at or above 95 percent compaction as determined by Standard Proctor. A minimum of one Standard

Proctor test (ASTM D 698) will be performed on each representative soil used as clay fill material. Each lift will receive a minimum of four passes with a heavy tamping roller unless adequate compaction can be demonstrated with fewer passes. Moisture-density field-testing and full-time monitoring during construction will be performed in accordance with Appendix IIID – LQCP. As necessary, the outside slope of all embankment construction will be vegetated to minimize erosion and desiccation.

4.10 Overliner System Construction

The overliner system consists of a reinforced GCL, a 40-mil-thick LLDPE geomembrane textured on both sides, a drainage geocomposite, and a 24-inch-thick protective cover soil layer. The GCL will be placed over a prepared foundation layer. The layout of the overliner system is shown in Appendix IIIA-A. Details of the overliner material and construction requirements are provided in Appendix IIID – LQCP.

5 DESIGN FOR CONSTRUCTION BELOW THE GROUNDWATER TABLE

5.1 General

The floor of the excavation within the undeveloped area of the landfill will be founded in the unweathered shale (dry lithologic zone). However, the sidewall of the existing and future excavation areas are founded above the unweathered shale (i.e., in the alluvial stratum). As discussed in detail in Section 3 – Groundwater Investigation Report of Appendix IIIG – Geology Report, groundwater may be encountered in the alluvial stratum and is expected to exert uplift pressure on the liner system over the sideslope. Therefore, similar to applicable portions of the currently developed areas, the future phases are provided with a temporary hydrostatic uplift pressure relief (or groundwater dewatering) system that is required to be operated until enough ballast in the form of soil (i.e., liner protective cover and/or final cover) and solid waste are placed over these areas. Appendix IIID – LQCP includes the design for the dewatering system (Appendix IIID-C) and ballast demonstrations (Appendix IIID-B).

The existing dewatering system design includes a trench installed at the perimeter sidewalls above the contact of the alluvial with the shale. The dewatering system consists of a gravel back-filled trench graded to drain to either an open excavation area or a sump.

Similar to the currently approved/installed groundwater dewatering system, the future liner areas will include a dewatering system consisting of a geocomposite and collection trenches on sideslopes. The dewatering system will be operated until the entire individual dewatering area receives enough ballast in the form of soil (i.e., liner protective cover and/or final cover) and waste. An individual dewatering area is defined as an excavation area that contributes groundwater to a groundwater collection and removal sump via a geocomposite and collection trenches on sideslopes.

The Woodbine Strata, or water-bearing zone as discussed in Appendix IIIG, is below the unweathered shale. A detailed discussion is provided in Appendix IIID that addresses the stability of the Shale Strata.

5.2 Dewatering System Design

The evaluation of potential water inflow into the dewatering system and the design of the dewatering system for the undeveloped portions of the landfill unit are provided in Appendix IIID – LQCP.

5.3 Design of Ballast for Liner Protection Against Potential Hydrostatic Uplift Pressure

The evaluation of ballast used to protect the liner against hydrostatic pressure for the currently installed and future dewatering system areas is provided in Appendix IIID – LQCP.

6 SLOPE STABILITY ANALYSIS

6.1 General

This slope stability analysis has been developed to analyze excavation slopes, interim slopes, and landfill completion slopes using critical sections for each condition. XSTABL Version 5.206 was used to analyze the stability of excavation slopes, interim fill slopes, overliner slopes, and the final configuration of the site. XSTABL is an industry standard computer program developed by Purdue University. XSTABL has been endorsed by the Federal Highway Administration and has been used widely in several slope stability applications for embankments, landfills, and landslides. XSTABL has been used in permit applications submitted to TCEQ for over 15 years.

The input file for the XSTABL program includes:

- Slope surface geometry.
- Subsurface information to identify different types of soil materials in horizontal and vertical directions so that each subsurface segment is identified with corresponding soil strength parameters.
- Groundwater information. The program is capable of modeling multiple groundwater surfaces that may be applicable to various subsurface soil components identified in the second bullet.
- Material strength information. Each soil section (horizontal or vertical) identified in the second bullet is assigned with strength parameters including cohesion and friction angle.
- Model control and simulation user interface of the model that allows selection of the method of analysis (e.g., Simplified Bishop) and identifying simulation control parameters.

Automatic failure surface generation functions, that use either initiation/termination ranges of the failure surface or use search boxes to define failure surface location, are used to locate the critical failure surface. The two methods employed for this slope stability analysis are described below.

1. Simplified Janbu Method – This method uses the method of slices to determine the stability of the mass above a failure surface.
2. Simplified Bishop Method – This method uses the method of slices to discretize the soil mass for determining the factor of safety.

Additionally, infinite slope stability analysis has been performed to evaluate interface stability for the liner, overliner, and the final cover system components. The slope stability analyses are provided in Appendix IIIJ-A.

The stability analysis has been developed using demonstrations showing that, for each analyzed section, the forces resisting movement of the slopes are higher than the forces that potentially create movement. Therefore, the ratio of forces resisting movement to the forces potentially creating movement is defined as the factor of safety (FS). When the FS is equal to or greater than 1.0, it means that the slope is stable. In the slope stability analysis a factor of safety greater than 1.0 is desired. The FS value is increased for the increased uncertainty for the system analyzed. Camelot Landfill is located over one of the most studied soil stratum in Texas. The soil stratum is well defined for this setting and the strength parameters for the subsurface soils have been well established. A factor of safety of 1.5 has been used for slopes that will stay in place long term, including interim and final cover configurations. A factor of safety of 1.3 is acceptable for total stress conditions that will be in place for a short period of time. A factor of safety of 1.0 has been used for the analysis developed using residual strength.

6.2 Sections Selected for Analysis

Slope stability analyses were performed on critical sections to evaluate the stability of the excavation, interim fill, overliner, and final cover configuration slopes. The geometries of the slopes analyzed were determined by reviewing the proposed excavation plan and final contour plan. The evaluation locations were selected to analyze critical slopes consisting of profiles that include the landfill configuration as well as natural materials at the toe and below the landfill excavation. The interim fill slope was analyzed using an assumed profile as discussed in Section 6.3. Figures showing the location of the cross sections are included in Appendix IIIJ-A (refer to Appendix IIIJ-A-1 for the excavation slope stability analysis, Appendix IIIJ-A-2 for the interim condition slope stability analysis, and Appendix IIIJ-A-3 for the final landfill slopes stability analysis, including overliner stability analysis).

6.3 Configurations Analyzed

The excavation, interim, overliner, and final landfill configurations were modeled to represent critical slope conditions, and the analysis was performed using circular and transitional failure surfaces. The maximum final fill slopes will be 4 horizontal to 1 vertical (4H:1V), while interim fill slopes, and excavation slopes could be as steep as 3H:1V. Therefore, the excavation and interim fill slopes were analyzed with a slope of 3H:1V, while a maximum of 4H:1V final cover slope was used for slope stability analysis. The overliner was also modeled to evaluate the impact of the overliner on the stability of the slopes. The excavation plan and the proposed final contour plan showing the location of the cross sections selected for analysis are included in Appendix IIIJ-A. The interim condition was analyzed considering a 3H:1V slope with a horizontal length expected at the site. Expected interim slopes are shown on Drawings I/IIA.4 through

I/IIA.8 (Sector Development Plans) in Parts I/II. As shown on Drawings I/IIA.4 through I/IIA.8, the horizontal length of the maximum interim slope expected at the site is less than 600 feet. Therefore, the analysis of the interim condition is conservative (refer to Appendix IIIJ-A-2). If longer interim slopes are developed during site operations, an additional analysis will be completed at that time and maintained in the Site Operating Record.

6.4 Input Parameters

The cross sections for slope stability analysis were developed from the proposed excavation and final cover plan. The soil parameters were selected based on a review of the boring logs and laboratory test results from the subsurface investigation studies at the site and upon engineering judgment and experience with similar materials. Table 6-1 summarizes the material properties and strength parameters used for the stability analyses. Groundwater levels were incorporated into the slope stability analyses using the highest measured groundwater elevations.

6.5 Results of Stability Analysis

The results of the stability analyses indicate that the proposed excavation, interim waste fill, overliner, and final configuration slopes are stable under the conditions analyzed. Tables 6-2 and 6-3 summarize the results of the stability analyses and compare the calculated factor of safety to the recommended minimum factor of safety. A factor of safety of 1.5 is used for the long term slope stability analysis performed for the excavation, interim, and final landfill configurations and a factor of safety of 1.3 is used for excavation configurations for total stress conditions. This factor of safety value has been established as the industry standard for the long-term landfill slope stability analysis in Texas. The slope stability analysis has been performed using the XSTABL 5.2 computer program. The Simplified Bishop method has been used for the rotational slope stability analysis, and the Simplified Janbu method using Rankine Block has been used for the transitional slope failure analysis to evaluate stability of interfaces for various liner and overliner components under various loading conditions. Computer-generated slope stability analysis output is included in Appendix IIIJ-A.

Additionally, an infinite slope stability analysis has been performed to evaluate interface stability for the liner, overliner, and the final cover system components. The infinite slope stability analysis was developed for the initial loading conditions for the liner and overliner systems and for the completed conditions of the final cover system. The interfaces of the overliner system components were evaluated with protective cover using peak and residual strength values. An anchor trench evaluation is also provided for the geosynthetic materials for slopes in which tensile forces may develop on the synthetic materials. The infinite slope stability analyses and the anchor trench analysis are provided in Appendix IIIJ-A-4. The actual material interface strength parameters will be verified prior to each construction event. The analysis was developed using peak strength values and a factor of safety of 1.5 and residual strength values with a factor of safety of

1.0. The results of the infinite slope stability analyses are provided in Tables 6-4 through 6-6 for liner, overliner, and final cover systems.

Table 6-1
Summary of Material Weight and Strength Parameters Used in the Slope Stability Analysis

Strength Parameters					Comments
Final Cover System					The final cover system includes the erosion layer, drainage geocomposite (single-sided on topslopes and double-sided on 4H:1V sideslopes), geomembrane liner (smooth on topslopes and textured on 4H:1V sideslopes), and compacted clay infiltration layer. An infinite slope stability analysis was performed to establish the minimum interface strength requirements for each layer of the final cover system. The minimum interface strength requirements are specified in Appendix IIIE – FCSQCP. For the rotational global stability analysis, the final cover system is modeled as a single layer and the strength parameters represent the compacted clay infiltration layer and the erosion layer. The two geosynthetic layers are not included in the rotational analysis because they provide a negligible contribution to the forces that are resisting movement. The strength values selected for the final cover system represent strength values typically used in the industry and these same strength values have been used in various permit applications approved by TCEQ. The rotational stability analysis uses the material strength parameters (i.e., cohesion of 100 lb/ft^2 and a friction angle of 16 degrees). The unit weight of the final cover system is based on experience with final cover construction. The global stability analysis in included in Appendix IIIJ-A-3. The interface slope stability analysis, which is performed using an infinite slope stability analysis procedure for the final cover system, was developed to show that certain landfill components that are placed on top of each other, such as a geomembrane and compacted clay layer (or geomembrane and geocomposite), will not experience sliding failure due to the lack of strength between these components. The strength parameter values were conservatively developed from Geosynthetic Research Institute (GRI) publications (e.g., "Direct Shear Database of Geosynthetic-to-Geosynthetic and Geosynthetic-to-Soil Interfaces" by George R. Koerner, GRI, Folsom, PA, June 14, 2005) and experience with these materials. The strength parameters (i.e., adhesion and interface friction) used for the application will be tested and verified at the time of each final cover construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design (refer to Appendix IIIE, Section 3.4.3 for the design specifications). As shown in Appendix IIIE, Table 3-3, the strength parameters listed in this table are for the weakest interface to provide for a conservative design.
Material Strength Parameters			**Interface Strength Parameters**		
Cohesion (lb/ft^2)	**Friction Angle (degrees)**	**Moist Unit Weight (lb/ft^3)**	**Adhesion (lb/ft^2)**	**Friction Angle (degrees)**	
100	16	115	Topslope 100	13	
			4H:1V Sideslope 100	18	
Solid Waste					As noted in Appendix IIIJ-A, the strength parameters for solid waste were based on information contained in the following references: Pagotto and Rimoldi (1987), Landva and Clark (1990), and Richardson and Reynolds (1991). These sources list cohesion and friction angle values that range from 210 lb/ft^2 to 605 lb/ft^2 and 18° (these are residual strength or large displacement values which require a factor of safety of 1.0) to 43°, respectively. Refer to Appendix IIIJ-A-1 (page IIIJ-A-1-14) for more information. The peak strength values (cohesion = 288 lb/ft^2 and friction angle = 23°) are conservatively selected to represent peak strength for MSW. The average unit weight of waste was determined from the midpoint of the maximum waste column thickness using the Unit Weight Profile shown in Appendix IIIN (page IIIN-12).
Material Strength Parameters			**Interface Strength Parameters**		
Cohesion (lb/ft^2)	**Friction Angle (degrees)**	**Moist Unit Weight (lb/ft^3)**	**Adhesion (lb/ft^2)**	**Friction Angle (degrees)**	
288	23	65	Interface strength parameters are not applicable to the solid waste layer because the interface between the waste and final cover and overliner systems is not a critical interface.		
Overliner System					The overliner system includes a reinforced GCL, geomembrane liner (textured on all slopes), drainage geocomposite (double-sided), and 2-foot-thick protective cover layer. Both a transitional and an infinite stability analysis were performed to establish the minimum interface strength requirements for each layer of the overliner system. The minimum interface strength requirements are specified in Appendix IIID. For the rotational stability analysis, the overliner system is modeled as a single layer and the strength parameters represent the protective cover layer (for this analysis the material strength parameters are used). The two geosynthetic layers are not included in the rotational analysis because they provide a negligible contribution to the forces that are resisting movement. The strength values selected for the overliner system represent strength values typically used in the industry for liner systems (see liner system discussion below). The unit weight of the overliner system is selected consistent with the liner system and is based on experience with liner system construction. The global stability analysis in included in Appendix IIIJ-A-2 (interim condition) and IIIJ-A-3 (final landfill conditions). The interface slope stability analysis, which is performed using an infinite slope stability analysis procedure for the overliner system, was developed to show that certain landfill components that are placed on top of each other, such as the geomembrane and geocomposite, will not experience sliding failure due to the lack of strength between these components. The infinite slope stability analysis has been developed for the initial overliner conditions with a two-foot-thick protective cover and ten-foot-thick waste. The strength parameter values were conservatively developed using materials from Geosynthetic Research Institute (GRI) publications (e.g., "Direct Shear Database of Geosynthetic-to-Geosynthetic and Geosynthetic-to-Soil Interfaces" by George R. Koerner, GRI, Folsom, PA, June 14, 2005) and experience with these materials. The strength parameters (i.e., adhesion and interface friction) used for the application will be tested and verified at the time of each overliner construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design (refer to Appendix IIID, Section 7.4 for the geotechnical testing for each construction event). As noted in Appendix IIID, Table 3-5, the strength parameters listed in this table are for the weakest interface to provide for a conservative design. The transitional slope stability analysis was performed using Simplified Janbu Method using Rankine Blocks. This analysis is similar to the interface slope stability analysis discussed above. The purpose of this analysis is to test the critical interfaces under varying loading conditions (refer to Appendices IIIJ-A-2 and IIIJ-A-3 for more information – i.e., the loading conditions reflect different landfill configurations for interim and final landfill configurations). Like the rotational slope stability analysis, XSTABL is also used for this analysis. However, for the transitional slope stability analysis, the overliner system strength parameters are modified to reflect the strength parameters (adhesion and friction angle) for the interface with the lowest strength parameters (i.e., soil/geocomposite). As noted above, these strength parameters will also be tested and verified at the time of each overliner construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design.
Material Strength Parameters			**Interface Strength Parameters**		
Cohesion (lb/ft^2)	**Friction Angle (degrees)**	**Moist Unit Weight (lb/ft^3)**	**Adhesion (lb/ft^2)**	**Friction Angle (degrees)**	
GCL 100	24	NA	100	18	
Protective Cover 100	16	115			

Table 6-1
Summary of Material Weight and Strength Parameters Used in the Slope Stability Analysis
(Continued)

Strength Parameters					Comments
Solid Waste					See comments listed under solid waste above.
Material Strength Parameters			**Interface Strength Parameters**		
Cohesion (lb/ft2)	**Friction Angle (degrees)**	**Moist Unit Weight (lb/ft^3)**	**Adhesion (lb/ft^2)**	**Friction Angle (degrees)**	
288	23	65	Interface strength parameters are not applicable to the solid waste layer because the interface between the overliner/waste system and the waste/liner system is not a critical interface.		

Strength Parameters				
Liner System				
Material Strength Parameters			**Interface Strength Parameters**	
Cohesion (lb/ft^2)	**Friction Angle (degrees)**	**Moist Unit Weight (lb/ft^3)**	**Adhesion (lb/ft^2)**	**Friction Angle (degrees)**
Protective Cover				
Effective 100	18	115		
Total 1,000	0	115		
Compacted Clay Liner				
Effective 100	18	115		
Total 1,000	0	115		
			Floor Grades 100	13
			3H:1V Sideslope 100	18

Comments

The liner system includes a 2-foot-thick compacted clay layer, 60-mil geomembrane (smooth geomembrane on the floor of the landfill and textured on the 3H:1V sideslopes), drainage geocomposite (single-sided on floor grades and double-sided on 3H:1V sideslopes), and a 2-foot-thick protective cover soil layer. Both a transitional and an infinite stability analysis were performed to establish the minimum interface strength requirements for each layer of the liner system. The minimum interface strength requirements are incorporated into Appendix IIID as requirements for each construction event.

For the rotational stability analysis, the liner system is modeled as two layers: the compacted clay liner and the soil protective cover layer. The two geosynthetic layers are not included in the rotational analysis because they provide a negligible contribution to the forces that are resisting movement. The strength values selected for the liner system represent strength values typically used in the industry. Duncan and Wright (2005) provides a comprehensive discussion regarding strength parameters for a liner system. In Chapter 5 – Shear Strengths of Soil and Municipal Solid Waste, a significant amount of data are presented and evaluated for compacted clay liners. The drained shear strength results indicate that the lowest cohesion value for compacted cohesive soils is 9 kPa (187 lb/ft^2) and the lowest reported friction angle value is 19 degrees. Therefore, selected values of 100 lb/ft^2 for cohesion and 18 degrees of friction angle conservatively represent the liner system. Soil properties used in the slope stability analysis are subject to verification at the time of each liner construction. Section 2.4.3 in Appendix IIID – LQCP includes the material strength tests required for soil used for liner construction. Protective cover and compacted clay liner soil unit weight values are based on experience with liner system construction. The rotational stability analysis is included in Appendices IIIJ-A-1 and IIIJ-A-3.

The interface slope stability analysis, which is performed using an infinite slope stability analysis procedure for the liner system, was developed to show that certain landfill components that are placed on top of each other, such as a geomembrane and compacted clay layer (or geomembrane and geocomposite), will not experience sliding failure due to the lack of strength between these components. The strength parameter values were conservatively developed using materials from Geosynthetic Research Institute (GRI) publications (e.g., "Direct Shear Database of Geosynthetic-to-Geosynthetic and Geosynthetic-to-Soil Interfaces" by George R. Koerner, GRI, Folsom, PA, June 14, 2005) and experience with these materials. The strength parameters (i.e., adhesion and interface friction) used for the application will be tested and verified at the time of each liner construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design (refer to Appendix IIID, Section 7.4 for geotechnical testing for each construction event). As shown in Appendix IIID, Table 3-5, the strength parameters listed in this table are for the weakest interface to provide for a conservative design.

The transitional slope stability analysis was performed using Simplified Janbu Method using Rankine Blocks. This analysis is similar to the interface slope stability analysis discussed above. The purpose of this analysis is to test the critical interfaces under varying loading conditions (refer to Appendices IIIJ-A-1, IIIJ-A-2, and IIIJ-A-3) for more information – i.e., the loading conditions reflect different landfill configurations for interim and final landfill configurations). Like the global slope stability analysis, XSTABL is also used for this analysis. However, for the transitional analysis the liner system strength parameters are modified to reflect the interface strength parameters. As noted above, these strength parameters will also be tested and verified at the time of each liner construction event to ensure that the as-built strength parameters meet or exceed the strength parameters used for the design.

Strength Parameters				
Perimeter Berm				
Material Strength Parameters			**Interface Strength Parameters**	
Cohesion (lb/ft^2)	**Friction Angle (degrees)**	**Moist Unit Weight (lb/ft^3)**	**Adhesion (lb/ft^2)**	**Friction Angle (degrees)**
Effective 1,074 Total 834	Effective 13.1 Total 16.0	125	Interface strength parameters are not applicable to the perimeter berm because the interface between the perimeter berm and the liner system is addressed in the interface testing of the liner system.	

The existing perimeter berm located on the southern and eastern portions of the pre-Subtitle D waste fill area was constructed in the 1980s under TCEQ Permit 1312A. The berm was constructed to separate the site's waste fill area from the 100-year floodplain of the Elm Fork of the Trinity River. Samples of the constructed berm were obtained during the 2010 WBC subsurface investigation to determine strength parameters. The triaxial shear tests resulted in the following values: cohesion values of 1,074 lb/ft^2 and 1,076 lb/ft^2 and friction angle values of 13.1 degrees and 15.0 degrees (effective stress); and cohesion values of 834 lb/ft^2 and 992 lb/ft^2 and friction angle values of 16.0 degrees and 15.8 degrees (total stress). Strength values assigned to this layer are conservatively selected to be 1,074 lb/ft^2 and 13.1 degrees (effective stress) and 834 psf and 16.0 degrees (total stress).

Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and their value is used in the stability analyses.

As noted in the table, both effective stress and total stress strength parameters are assigned to this layer. A total stress analysis is applicable to the perimeter berm because there is a potential that some of the soil may be saturated or close to a saturated condition. If this is the case, excessive pore pressure could develop within this zone, so a total stress analysis was completed.

Table 6-1
Summary of Material Weight and Strength Parameters Used in the Slope Stability Analysis
(Continued)

Strength Parameters					Comments
Alluvial Clay					Two triaxial shear tests were performed on the alluvial clay (i.e., a clay sample and a sandy clay sample) which resulted in cohesion values of 788 lb/ft^2 and 262 lb/ft^2 (total stress) and 854 lb/ft^2 and 384 lb/ft^2 (effective stress). To be conservative, cohesion values of 788 lb/ft^2 and 854 lb/ft^2 (total and effective stress, respectively) were selected. The internal friction angles were obtained from the triaxial shear tests (11.5 and 28.4 degrees for total stress and 11.0 and 32.0 degrees for effective stress). To be conservative, internal friction angle values of 11.5 degrees and 11.0 degrees (total and effective stress, respectively) were selected. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis. As noted in this table, both effective stress and total stress analyses were performed for this layer. A total stress analysis is applicable to the alluvial clay because there is a potential that some of the clay soils may be saturated (excessive pore pressure could develop) or close to a saturated condition. As noted on the geologic cross sections in Appendix IIIG-C, there are isolated areas of clay fill. Since these are relatively small areas, this subsurface stratum was modeled with the same parameters as the alluvial clay.
Material Strength Parameters			Interface Strength Parameters		
Cohesion (lb/ft^2)	Friction Angle (degrees)	Moist Unit Weight (lb/ft^3)	Adhesion (lb/ft^2)	Friction Angle (degrees)	
Effective 854 Total 788	Effective 11.0 Total 11.5	127	Interface strength parameters are not applicable to alluvial clay because the interface between the bottom of the compacted clay liner and alluvial clay is not critical.		
Alluvial Sand/Gravel					A triaxial shear test was performed on a clayey sand which resulted in cohesion values of 470 lb/ft^2 (total stress) and 488 lb/ft^2 (effective stress). Therefore, cohesion values of 470 lb/ft^2 and 488 lb/ft^2 (total and effective stress, respectively) were selected. The internal friction angles were obtained from the triaxial shear test (8.3 degrees for total stress and 16.4 for effective stress). Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis. As noted in this table, both effective stress and total stress analyses were performed for this layer. A total stress analysis is applicable to the alluvial sand/gravel soil because there is a potential that some of the soils (e.g., clayey sands or clayey gravels) may be saturated or close to a saturated condition.
Material Strength Parameters			Interface Strength Parameters		
Cohesion (lb/ft^2)	Friction Angle (degrees)	Moist Unit Weight (lb/ft^3)	Adhesion (lb/ft^2)	Friction Angle (degrees)	
Effective 488 Total 470	Effective 16.4 Total 8.3	132	Interface strength parameters are not applicable to alluvial sand/gravel because the interface between the bottom of the compacted clay liner and alluvial sand/gravel is not critical.		
Unweathered Shale					An unconfined compression test performed on the unweathered shale indicates a strength of 29,200 lb/ft^2. Therefore, a cohesion value of 5,000 lb/ft^2 and a friction angle of 0 degrees were conservatively selected for this material. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.
Material Strength Parameters			Interface Strength Parameters		
Cohesion (lb/ft^2)	Friction Angle (degrees)	Moist Unit Weight (lb/ft^3)	Adhesion (lb/ft^2)	Friction Angle (degrees)	
5,000	0	130	Interface strength parameters are not applicable to unweathered shale because the interface between the bottom of the compacted clay liner and unweathered shale is not critical.		
Slurry Wall					The strength parameters for this material were conservatively selected based on engineering judgment and experience with this material.
Material Strength Parameters			Interface Strength Parameters		
Cohesion (lb/ft^2)	Friction Angle (degrees)	Moist Unit Weight (lb/ft^3)	Adhesion (lb/ft^2)	Friction Angle (degrees)	
0	5	75	Not applicable for this stability analysis.		

Table 6-2
Factor of Safety Summary for Short-Term Slope Stability Analyses

Description		Minimum Factor of Safety Generated		Recommended Minimum of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Total Stress	Effective Stress	Total Stress	Effective Stress	Total Stress	Effective Stress
Excavation 1-1	Bishop-Circular	4.18	4.18	1.3	1.5	YES	YES
Excavation 1-2	Rankine-Block	3.62	4.01	1.3	1.5	YES	YES
Excavation 2-1	Bishop-Circular	3.42	3.42	1.3	1.5	YES	YES
Excavation 2-2	Rankine-Block	2.98	3.31	1.3	1.5	YES	YES
Excavation 3-1	Bishop-Circular	4.09	4.09	1.3	1.5	YES	YES
Excavation 3-2	Rankine-Block	4.25	4.25	1.3	1.5	YES	YES

Table 6-3
Factor of Safety Summary for Long-Term Slope Stability Analyses

Description		Minimum Factor Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Total Stress	Effective Stress	Total Stress	Effective Stress	Total Stress	Effective Stress
Final Cover 1-1 (Massive)	Bishop-Circular	2.14	2.17	1.5	1.5	YES	YES
Final Cover 1-2 (Perimeter)	Bishop-Circular	4.26	5.16	1.5	1.5	YES	YES
Final Cover 1-3 (Side Slope)	Bishop-Circular	2.13	2.13	1.5	1.5	YES	YES
Final Cover 1-4	Rankine-Block	2.06 (Peak), 1.86 (Residual)		1.5 (Peak), 1.0 (Residual)		YES	YES
Final Cover 2-1 (Massive)	Bishop-Circular	2.27	2.28	1.5	1.5	YES	YES
Final Cover 2-2 (Perimeter)	Bishop-Circular	6.49	6.86	1.5	1.5	YES	YES
Final Cover 2-3 (Side Slope)	Bishop-Circular	2.25	2.26	1.5	1.5	YES	YES
Final Cover 3-1 (Massive)	Bishop-Circular	2.31	2.32	1.5	1.5	YES	YES
Final Cover 3-2 (Perimeter)	Bishop-Circular	2.83	3.32	1.5	1.5	YES	YES
Final Cover 3-3 (Side Slope)	Bishop-Circular	2.26	2.26	1.5	1.5	YES	YES
Final Cover 4-1 (Massive)	Bishop-Circular	2.19	2.20	1.5	1.5	YES	YES
Final Cover 4-2 (Perimeter)	Bishop-Circular	4.74	5.48	1.5	1.5	YES	YES
Final Cover 4-3 (Side Slope)	Bishop-Circular	2.13	2.13	1.5	1.5	YES	YES
Final Cover 5-1 (Massive)	Bishop-Circular	2.23	2.25	1.5	1.5	YES	YES
Final Cover 5-2 (Perimeter)	Bishop-Circular	7.29	8.31	1.5	1.5	YES	YES
Final Cover 5-3 (Side Slope)	Bishop-Circular	2.14	2.14	1.5	1.5	YES	YES
Final Cover 6-1 (Massive)	Bishop-Circular	2.11	2.11	1.5	1.5	YES	YES
Final Cover 6-2 (Perimeter)	Bishop-Circular	5.20	6.17	1.5	1.5	YES	YES
Final Cover 6-3 (Side Slope)	Bishop-Circular	2.01	2.01	1.5	1.5	YES	YES
Final Cover 6-4	Rankine-Block	1.93 (Peak), 1.78 (Residual)		1.5 (Peak), 1.0 (Residual)		YES	YES
Overliner 1-1	Rankine-Block	2.17 (Peak), 1.55 (Residual)		1.5 (Peak), 1.0 (Residual)		YES	YES
Overliner 2-1	Rankine-Block	2.13 (Peak), 1.51 (Residual)		1.5 (Peak), 1.0 (Residual)		YES	YES
Overliner 3-1	Rankine-Block	2.05 (Peak), 1.42 (Residual)		1.5 (Peak), 1.0 (Residual)		YES	YES
Overliner 4-1	Rankine-Block	2.08 (Peak), 1.45 (Residual)		1.5 (Peak), 1.0 (Residual)		YES	YES
Interim Fill Section I-1	Bishop-Circular	1.61		1.5		–	YES
Interim Fill Section I-2	Rankine-Block	1.59 (Peak), 1.44 (Residual)		1.5 (Peak), 1.0 (Residual)		YES	YES
Overliner Interim Section IOL-1	Bishop-Circular	2.28		1.5		–	YES
Overliner Interim Section IOL-2	Rankine-Block	2.10 (Peak), 1.47 (Residual)		1.5 (Peak), 1.0 (Residual)		YES	YES

Table 6-4
Summary of Liner System Infinite Stability Analysis[1]

Interface	Factor of Safety Generated	Recommended Minimum Factor of Safety	Acceptable Factor of Safety
Protective Cover/Geocomposite	1.8	1.5	YES
Geocomposite/Geomembrane	1.9	1.5	YES
Geomembrane/Clay Liner	3.6	1.5	YES
Clay Liner Internal	2.3	1.5	YES
Geosynthetic Clay Liner/ Geocomposite Underdrain	3.7	1.5	YES

[1] Peak analysis results shown. Refer to Appendix IIIJ-A-4 for residual analysis.

Table 6-5
Summary of Overliner System Infinite Stability Analysis[1]

Interface	Factor of Safety Generated		Recommended Minimum Factor of Safety	Acceptable Factor of Safety
	4%	20%		
Protective Cover/Geocomposite	6.4	3.0	1.5	YES
Geocomposite/Geomembrane	7.1	3.1	1.5	YES
Geomembrane/GCL	10.7	3.8	1.5	YES
GCL Internal	13.8	4.4	1.5	YES
GCL/Subgrade	14.3	4.5	1.5	YES

[1] Peak analysis results shown. Refer to Appendix IIIJ-A-4 for residual analysis.

Table 6-6
Summary of Final Cover System Infinite Stability Analysis[1]

Interface	Factor of Safety Generated		Recommended Minimum Factor of Safety	Acceptable Factor of Safety
	4H:1V	4%		
Erosion Layer/Geocomposite	2.4	6.4	1.5	YES
Geocomposite/Geomembrane	2.5	5.3	1.5	YES
Geomembrane/Infiltration Layer	4.7	8.4	1.5	YES

[1] Peak analysis results shown. Refer to Appendix IIIJ-A-4 for residual analysis.

7 SETTLEMENT AND HEAVE ANALYSIS

7.1 General

The purpose of the settlement and heave analysis is to demonstrate that the liner and overliner system will not be adversely impacted by foundation settlement and settlement of waste below the overliner. The settlement analysis also addresses the settlement of the final cover system to demonstrate that the proposed final cover is designed to withstand the potential strain induced by waste settlement.

Settlement of the liner system will occur due to consolidation of the foundation materials from the weight of the landfill components (i.e., protective cover, solid waste and daily cover, and final cover systems). Laboratory consolidation tests indicate that the foundation soils have low compressibility. Settlement of the overliner system occurs due to consolidation of the waste below the overliner and foundation soils as a result of the weight of the landfill components above the overliner Settlement of the final cover system will occur due to consolidation of foundation soils and consolidation within the solid waste. Total consolidation of final cover consists of primary and secondary consolidation of deposited waste. Appendix IIIJ-B includes details for the foundation heave and settlement as well as overliner and final cover settlement analyses.

7.2 Foundation Heave

Potential heave (rebound) due to excavation of overburden soil above the excavation base was estimated using the standard consolidation theory for soils and the swell index obtained from the rebound portion of the consolidation tests. In order to estimate potential for heave, the load is decreased, instead of increasing the load on the soils, to correspond with the projected weight of excavated soil. Using a maximum excavation depth of approximately 76 feet (existing ground elevation minus bottom of excavation at a given location), a heave of approximately 0.78 feet was calculated. The depth of excavation for each individual sector (liner area draining to an LCS sump) is generally uniform (i.e., depth of soil to be removed from the floor grades does not change drastically within a given sector). Therefore, the change in the excavation slopes after heave, which is expected to occur within a short period of time after excavation, will not be significant. The heave analysis for the excavation areas is included in Appendix IIIJ-B-1.

In addition, a minimum of 40 feet of shale separates the bottom of excavation and the top of the Woodbine Strata. Appendix IIID-C also includes a verification procedure to determine that the Shale Strata will be stable during excavation activities.

7.3 Foundation Settlement

In general, landfill foundation settlement occurs as foundation materials consolidate due to the weight of the landfill. Foundation settlement was predicted using standard consolidation theory for soils. Consolidation data are provided in Appendix IIIJ-C. The excavation base grades are founded primarily in the unweathered shale. The settlement calculation was based on a maximum applied load of approximately 295.2 feet of solid waste with unit weight of 79 pcf and cover with an average saturated unit weight of 120 pcf. The consolidation test results indicate that the foundation soils are overconsolidated (i.e., consolidated in the geologic past from a load greater than the existing soil overburden). Two consolidation tests were performed on select samples to represent underlying soils and verify that any potential consolidation of underlying soils will not adversely impact the designed liner and overliner systems.

Based on the result of the settlement analysis using the consolidation testing performed on the shale, the subgrade consolidation will not exceed 1.47 feet. The settlement of the liner system will be generally uniform and will not adversely affect the performance of the liner or leachate collection system. Strain for the liner system is calculated by using the calculated settlement. The maximum strain calculated is 0.0011 percent. This is well below the strain values that the liner system components (e.g., geomembrane, geocomposite, compacted clay) can withstand. These calculations are included in Appendix IIIJ-B-1. The final deflected shape of the liner will generally consist of gradual transitions with the differential settlement occurring over several hundred feet or more (horizontal projection). Based on the foregoing discussion, it is concluded that settlement will not adversely affect the liner system or flow in the leachate collection system.

7.4 Overliner Settlement

Overliner settlement occurs as foundation materials and underlying in-place solid waste consolidate due to the additional weight of the landfill. In general, foundation settlement is insignificant in comparison to the settlement of underlying in-place solid waste. Waste settlement consists of primary and secondary settlement.

Settlement of solid waste below the overliner occurs as the overliner, additional waste, and final cover are placed, and continues to occur for long periods of time as waste decomposes. Initially, municipal solid waste below the overliner will undergo primary settlement due to overliner construction, waste placed over the overliner, final cover, equipment, etc.; then waste below the overliner undergoes secondary settlement as the waste decomposes. Settlement analysis for the overliner system is presented in Appendix IIIJ-B-2.

The purpose of the overliner system settlement analysis is to (1) show that positive drainage is maintained for the overliner system consistent with the demonstration included in Appendix IIIC and (2) to verify that the strain induced on the overliner system components due to differential settlement is within acceptable limits. The post-settlement slopes of the overliner system were used to demonstrate that the overliner leachate collection system will maintain the depth of leachate to within the thickness of the leachate collection layer.

One of the key parameters of the settlement analysis included in Appendix IIIJ-B-2 is the secondary compression index. This parameter is used to estimate settlement due to waste decomposition. As noted in Appendix IIIJ-B-2, the selected values for this key parameter are within the range of recommended values in the literature.

A strain analysis has been incorporated into the overliner settlement analysis presented in Appendix IIIJ-B-2. The purpose of the settlement and strain analysis is to demonstrate that the overliner system will be stable as designed and maintain positive drainage. The results indicate that maximum strain is significantly lower than the allowable strain for the overliner system components.

The areas of the overliner and overliner leachate drain pipes will be stable and maintain positive drainage after settlement. Based on the foregoing discussion, it is concluded that settlement will not adversely affect the overliner system, and the overliner system will perform as designed.

7.5 Final Cover Settlement

Landfill final cover settlement occurs due to settlement of foundation materials and the settlement of waste materials. In general, foundation settlement is insignificant in comparison to the settlement of deposited waste. Waste settlement consists of primary and secondary settlement.

Settlement of solid waste generally begins rapidly as the waste load is placed and continues to occur for long periods of time after the initial placement. Initially, municipal solid waste will undergo primary settlement due to its own weight, final cover, equipment, etc. Primary settlement occurs quickly, generally within the first month after loading. Therefore, the weight of the final cover system is the only remaining factor that contributes to primary consolidation. By the time the construction of the final cover is complete, settlement of the waste due to the weight of the final cover will be complete. Secondary settlement continues at substantial rates for periods of time well beyond primary settlement. It is a combination of mechanical secondary compression, physico-chemical reaction, and biochemical decay. Settlement analysis for the final cover system is presented in Appendix IIIJ-B-3.

A strain analysis has been incorporated into the final cover settlement analysis presented in Appendix IIIJ-B. The purpose of the settlement and strain analysis is to demonstrate that the final cover system will be stable as designed and maintain positive drainage. If it is considered that the waste settlement is uniform, then the side slopes are expected to maintain positive drainage. A strain demonstration in Appendix IIIJ-B-3 shows that the top deck and side slope areas of the final cover will be stable and maintain positive drainage after settlement.

8 CONCLUSIONS AND RECOMMENDATIONS

- The majority of soil material excavated at the site can be used for the soil liner and final cover infiltration layer. Excavated soils that meet the requirements of the final cover infiltration layer may be separately stockpiled and processed as discussed in Appendix IIID.
- Stability of the landfill excavation slopes, constructed liner slopes, interim fill slopes, overliner slopes, and the final cover slopes is acceptable as designed.
- Stability of the liner, overliner, and final cover system components is acceptable as designed.
- Foundation heave during excavation is expected to be negligible.
- Foundation settlement after filling is expected to be less than 1.5 feet (and is within the strain limits of the liner system).
- Settlement of the final cover system will not adversely affect the final cover system components, and the final cover system will function as designed.
- Settlement of the overliner system will not adversely affect the overliner system components, and the overliner system will function as designed.

APPENDIX IIIJ-A

SLOPE STABILITY ANALYSIS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

3-23-12

Includes page IIIJ-A-1 through IIIJ-A-2

CONTENTS

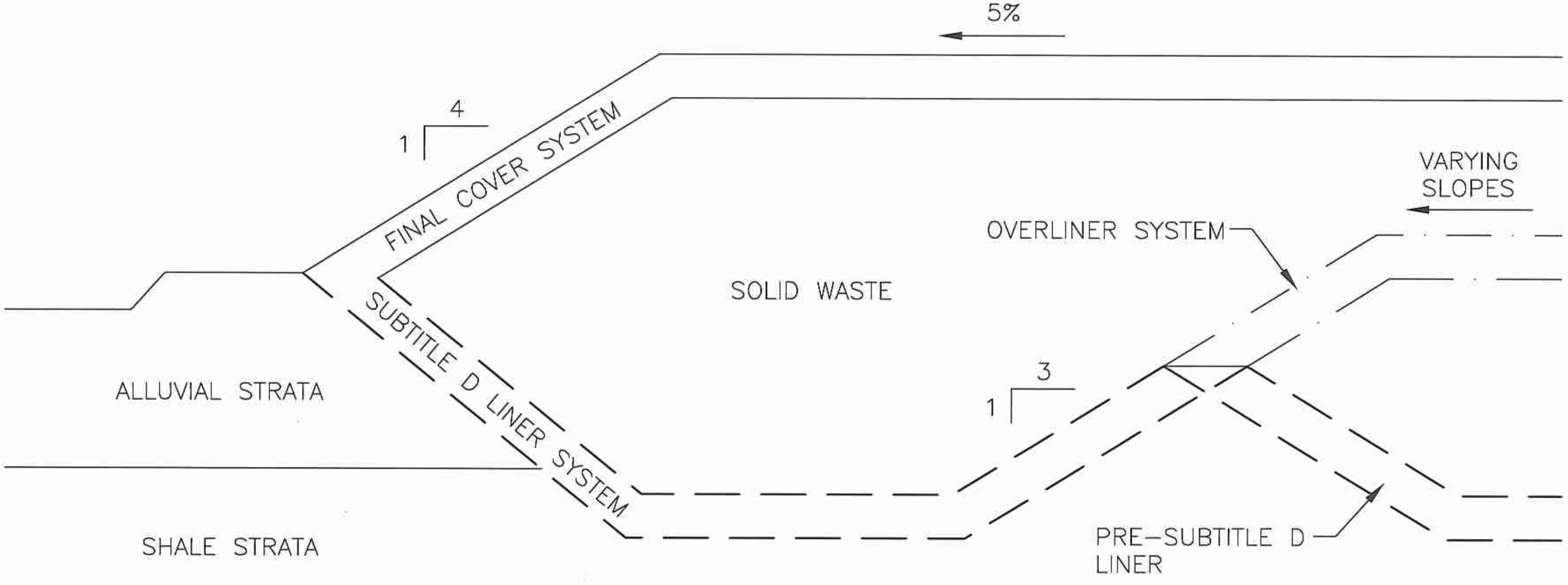
STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER

3-23-12

INTRODUCTION

This appendix includes the slope stability analysis for the landfill slopes during various phases of the site development and the final landfill configuration. General slope stability for the excavation and interim and closed conditions was evaluated by using the XSTABL 5.2 computer program. The Simplified Bishop method was used for circular failure surfaces, and the Simplified Janbu method using Rankine Block was used for the transitional slope stability analysis. Infinite slope stability has also been analyzed for the liner and final cover system. The stability analysis for the site is provided in the following four appendices. A generalized soil profile for the slope stability analysis is provided on Sheet IIIJ-A-2.

- Appendix IIIJ-A-1 includes the slope stability analysis for the excavated landfill condition.
- Appendix IIIJ-A-2 includes the slope stability analysis for the interim landfill condition (including analysis of the overliner system).
- Appendix IIIJ-A-3 includes the slope stability analysis for the closed landfill conditions (including analysis of the overliner system).
- Appendix IIIJ-A-4 includes the infinite slope stability evaluation for the liner, overliner, and final cover systems.



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NEVZAT TURAN
84059

3-23-12

MAJOR PERMIT AMENDMENT
SLOPE STABILITY ANALYSIS
GENERALIZED SOIL PROFILE

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

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DRAWN BY: VRS	DATE: 03/2012	FILE: 1339-351-11
REVIEWED BY:JPY	CAD:IIIJ-A-2-SOIL PROF.DWG	SHEET IIIJ-A-2

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APPENDIX IIIJ-A-1

SLOPE STABILITY ANALYSIS FOR LANDFILL EXCAVATION CONFIGURATION

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

3-23-12

Includes pages IIIJ-A-1-1 through IIIJ-A-1-86

Prep By: JLG
Date: 3/21/2012

Chkd By:
Date: 3-23-12

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-A
EXCAVATION CONFIGURATION SLOPE STABILITY ANALYSIS

Required: Evaluate the slope stability of the proposed landfill excavation slopes.

Given: The slope stability analyses section locations are provided on Sheet IIIJ-A-1-3.

Method: A. Evaluate the stability of the proposed excavation slopes.

1. Determine the most critical excavation slopes in the proposed design.
2. Select a soil profile for each critical section using available boring logs near the sections.
3. Select material properties using average unit weights and strength parameters. (Laboratory testing summaries for the site soils are provided in Appendix IIIJ-C).
4. Perform stability analyses.
    a. Analyze the excavation slopes using XSTABL 5.2, Simplified Bishop method for circular failure surfaces and Simplified Janbu method for transitional failure surfaces. Use both total and effective stress strength parameters to model excavation conditions to evaluate short and long term slope stability.

References:

1. XSTABL 5.2 (computer program for slope stability analyses), Interactive Software Designs, Inc.
2. Day, Robert W., *Geotechnical Engineer's Portable Handbook*, McGraw-Hill, 2000.
3. Koerner, Robert M., Designing with Geosynthetics, 5th Ed., Prentice-Hall, Inc., 2005.
4. Appendix IIIG - Geology Report

Prep By: JLG
Date: 3/21/2012

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Date: 3-23-12

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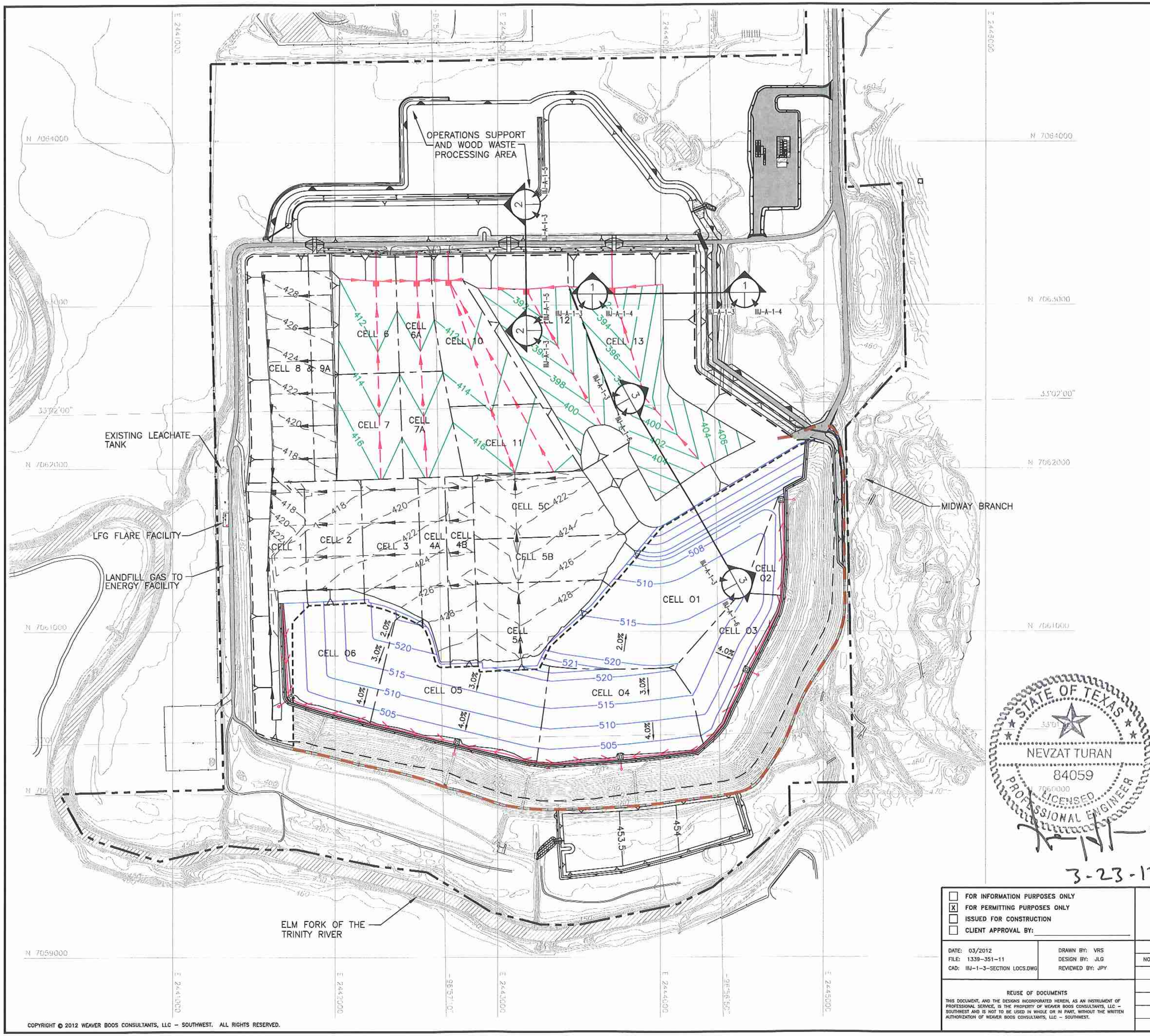
APPENDIX IIIJ-A
EXCAVATION CONFIGURATION SLOPE STABILITY ANALYSIS

Solution: A. Slope stability analyses of the proposed constructed slopes

1. The locations of the most critical sections selected for the stability analysis for the proposed slopes are shown on Sheet IIIJ-A-1-3. Sections analyzed are shown with the most critical failure surfaces on Sheets IIIJ-A-1-4, 5, and 6.
2. The soil profile used for each analysis was based on boring log data from previous site investigations (see Appendix IIIG-B) from the undeveloped area of the site and the geologic cross sections (see Appendix IIIG-C). A generalized soil profile is shown on Sheet IIIJ-A-2.
3. A summary table of the assumed material weight and strength properties is provided on Sheets IIIJ-A-1-7 through IIIJ-A-1-8. The material weight and strength parameter determination for each material type was based on previous laboratory testing results (Atterburg limits, natural moisture contents, unit weight, percent finer than #200 sieve, Standard Proctor, and strength testing) and engineering judgment from previous experience with similar materials. Laboratory testing results for the site soils are included in Appendix IIIJ-C.
4. The output from the slope stability analyses on the excavation slopes are provided on Sheets IIIJ-A-1-10 through IIIJ-A-1-86. A summary of the output can be seen on Sheet IIIJ-A-1-9.

Conclusion: Based on the above slope stability analyses, the proposed excavation slopes have adequate factors of safety to be considered stable.



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LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMITS OF PRE-SUBTITLE D WASTE
- N 7064000 STATE PLANE COORDINATE SYSTEM
- 33°02'00" GEODETIC COORDINATE SYSTEM
- 500 EXISTING CONTOUR
- CELL BOUNDARY
- 398 PROPOSED EXCAVATION CONTOUR
- PROPOSED LEACHATE LINE
- ■ PROPOSED LEACHATE COLLECTION SUMP
- PROPOSED LEACHATE RISER
- 422 AS-BUILT TOP OF SUBTITLE D CLAY LINER
- EXISTING LEACHATE LINE
- ■ EXISTING LEACHATE COLLECTION SUMP
- EXISTING LEACHATE RISER
- 515 PROPOSED TOP OF OVERLINER CONTOUR
- PROPOSED OVERLINER LEACHATE LINE
- ⊡ PROPOSED OVERLINER LEACHATE COLLECTION SUMP
- 3H:1V SLOPE (TYPICAL)
- APPROXIMATE LOCATION OF PROPOSED SLURRY WALL

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

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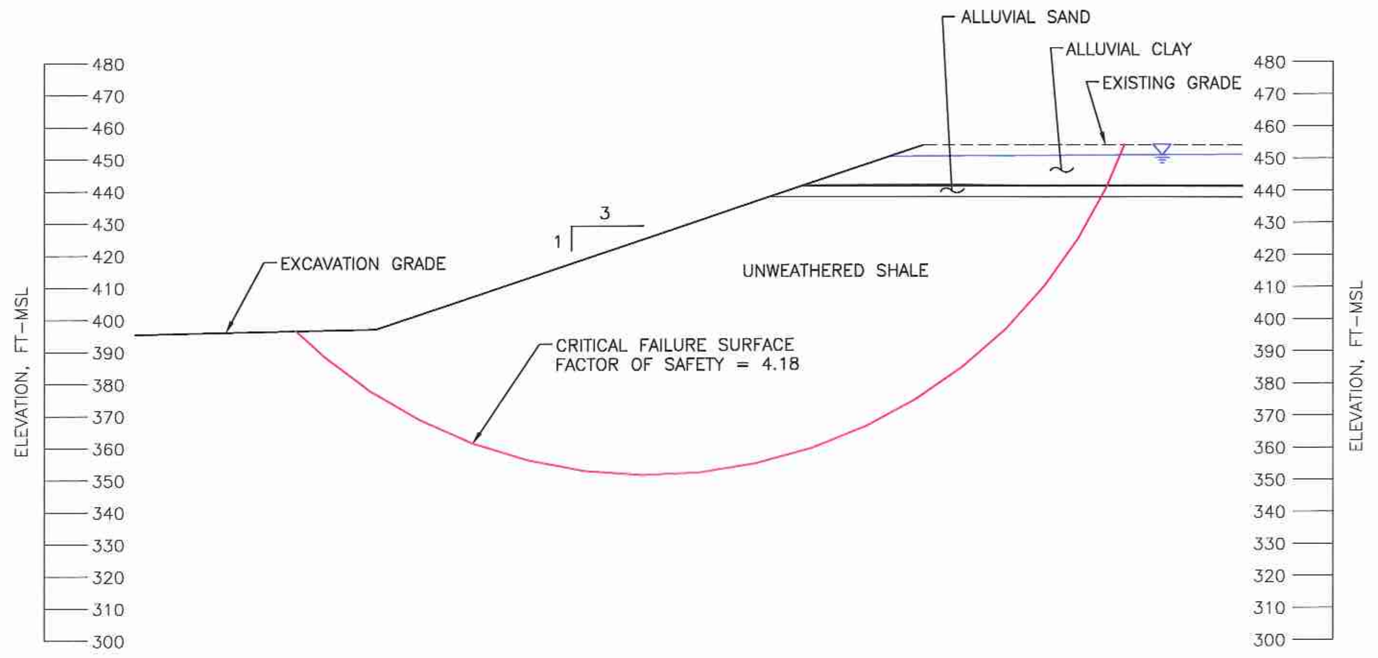

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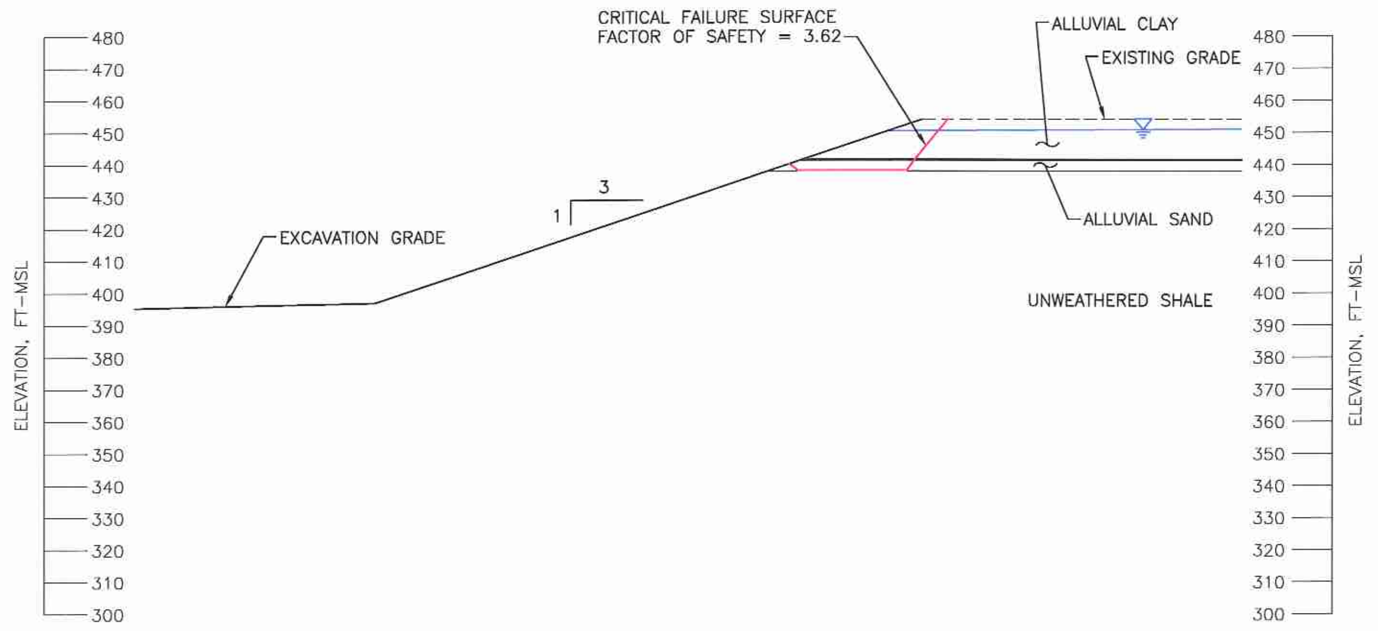

EXCAVATION SECTION 1–2 ① IIIJ-A-1-3 IIIJ-A-1-4

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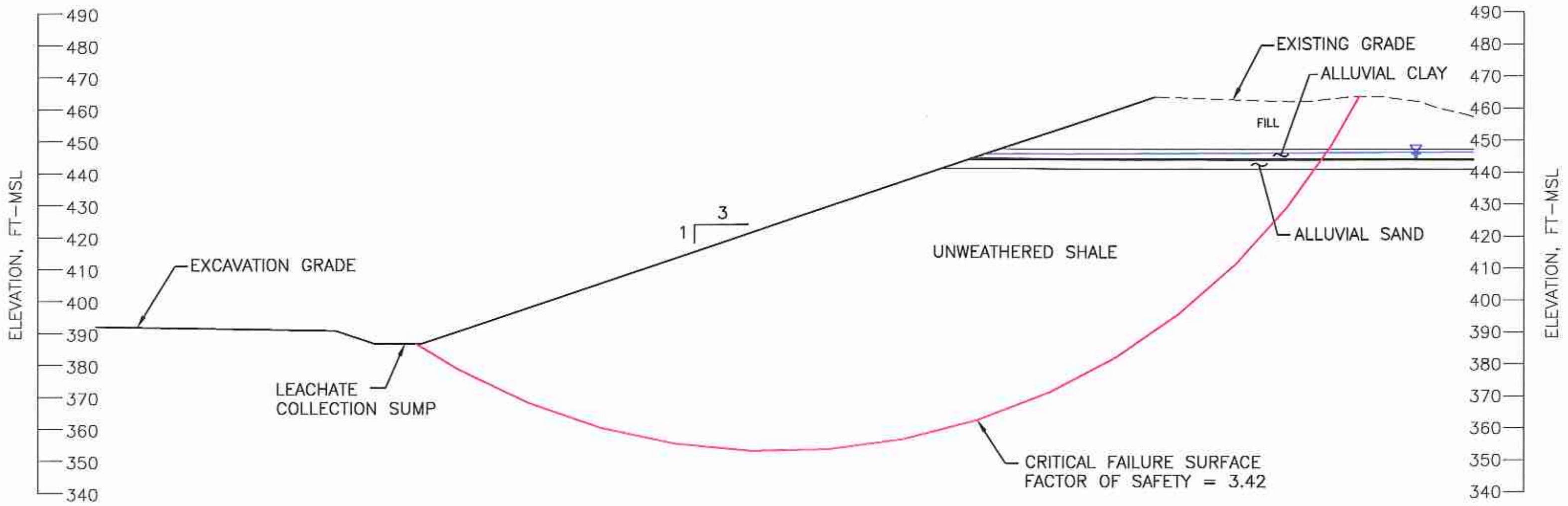
SHEET IIIJ–A–1–4



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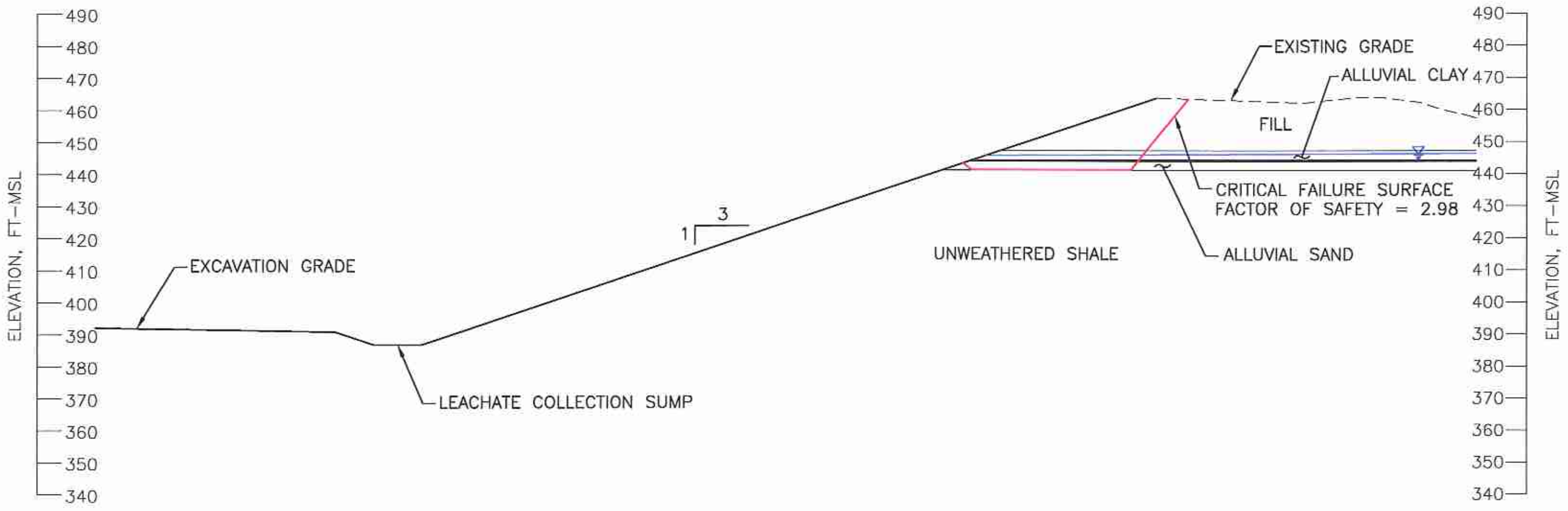

EXCAVATION SECTION 2–2

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SHEET IIIJ–A–1–5

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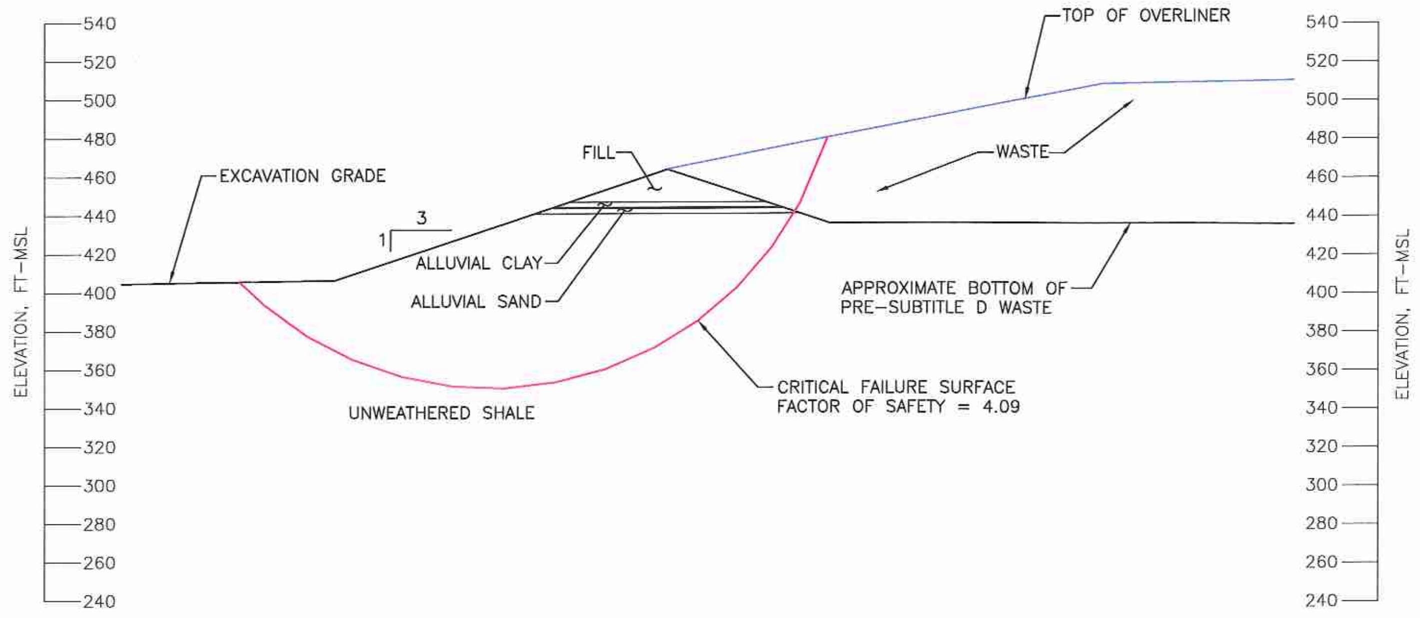

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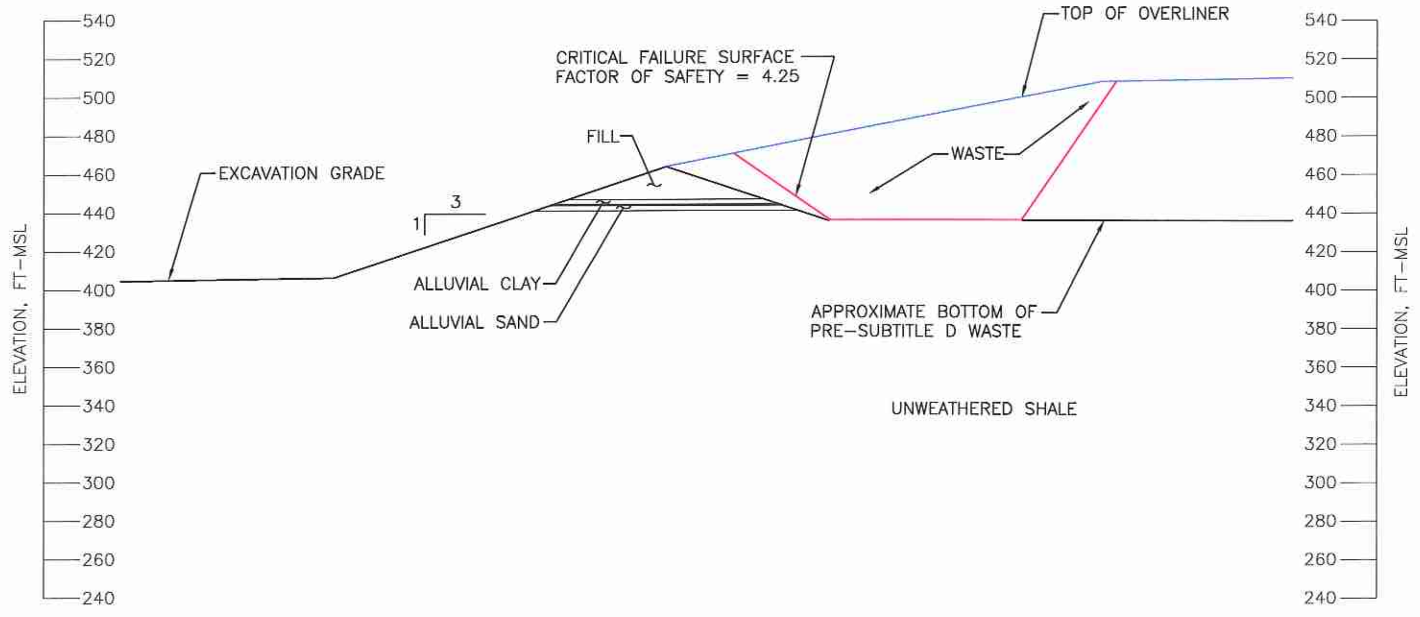
IIIJ–A–1–3 IIIJ–A–1–6



EXCAVATION SECTION 3–2 3

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IIIJ–A–1–3 IIIJ–A–1–6

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Derivation of Slope Stability Parameters:

Laboratory testing data are provided in Appendix IIIJ-C. The following includes material strength properties based on the laboratory testing results from each subsurface unit.

Material	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)
Alluvial Clay[(1)]	127.0	131.0
Alluvial Sand/Gravel	132.0	135.0
Unweathered Shale	130.0	135.0

(1) Isolated areas of fill material are modeled with the same material properties as the Alluvial Clay.

The strength parameters for the in-situ soils were selected based on the following:

Alluvial Clay

Two triaxial shear tests were performed on the alluvial clay (i.e., a clay sample and a sandy clay sample) which resulted in cohesion values of 788 lb/ft^2 and 262 lb/ft^2 (total stress) and 854 lb/ft^2 and 384 lb/ft^2 (effective stress). To be conservative, cohesion values of 788 lb/ft^2 and 854 lb/ft^2 (total and effective stress conditions, respectively) were selected. The internal friction angles were taken from the triaxial shear tests (11.5 and 28.4 degrees for total stress and 11.0 and 32.0 degrees for effective stress). To be conservative, internal friction angle values of 11.5 degrees and 11.0 degrees (total and effective stress conditions, respectively) were selected. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

Alluvial Sand/Gravel

A triaxial shear test was performed on a clayey sand which resulted in cohesion values of 470 lb/ft^2 (total stress) and 488 lb/ft^2 (effective stress). Therefore, cohesion values of 470 lb/ft^2 and 488 lb/ft^2 (total and effective stress conditions, respectively) were selected. The internal friction angles were taken from the triaxial shear test (8.3 degrees for total stress and 16.4 for effective stress). Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

Unweathered Shale

An unconfined compression test was performed on the unweathered shale which indicated a strength value of 29,200 lb/ft^2. Therefore, a cohesion value of 5,000 lb/ft^2 was conservatively selected for this material. Since pore pressure buildup is unlikely, only effective stress strength parameters are used for this material. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

Material	Total Stress		Effective Stress	
	Cohesion (psf)	Friction Angle (degrees)	Cohesion (psf)	Friction Angle (degrees)
Alluvial Clay[(1)]	788	11.5	854	11.0
Alluvial Sand	470	8.3	488	16.4
Unweathered Shale	-	-	5,000	0.0

(1) Isolated areas of fill material are modeled with the same material properties as the Alluvial Clay.

Solid waste data used in this analysis are listed below.

Soil Description	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Solid Waste	65	288	23

This information was derived from several references. Reference 3 provides a summary of several studies that have been completed to develop the shear strength parameters for MSW (refer to Chapter 6.7 in Ref. 3). MSW shear strength parameters reported in technical literature references vary widely, with friction angles as low as 10° and as high as 53° and cohesion values varying from 0 psf to 1400 psf. Many of the lower values are directly contradicted by observations of actual stable landfill slopes. A summary of a few of the studies completed is listed below.

Reference	Data Type	Results
Pagotto & Rimoldi (1987)	Back-calculation from plate bearing tests	$\phi = 22,^\circ$ c = 605 psf (29 kPa)
Landva & Clark (1990)	Laboratory direct shear tests on MSW	$\phi = 24,^\circ$ c = 460 psf (22 kPa) to $\phi = 39,^\circ$ c = 400 psf (19 kPa)
Richardson & Reynolds (1991)	Large direct shear tests performed in-situ	$\phi = 18^\circ$ to $43,^\circ$ c = 210 psf (10 kPa)

To provide for a conservative analysis, a cohesion of 288 psf and a friction angle of 23° were selected.

Prep By: JLG
Date: 3/21/2012

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Date: 3-23-12

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-A
EXCAVATION CONFIGURATION SLOPE STABILITY ANALYSIS

Factor of Safety Summary for Slope Stability

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety[2]		Acceptable Factor of Safety	
Slope Designation	Method of Analysis[1]	Total Stress	Effective Stress	Total Stress	Effective Stress	Total Stress	Effective Stress
Excavation 1-1	Bishop-Circular	4.18	4.18	1.3	1.5	YES	YES
Excavation 1-2	Rankine-Block	3.62	4.01	1.3	1.5	YES	YES
Excavation 2-1	Bishop-Circular	3.42	3.42	1.3	1.5	YES	YES
Excavation 2-2	Rankine-Block	2.98	3.31	1.3	1.5	YES	YES
Excavation 3-1	Bishop-Circular	4.09	4.09	1.3	1.5	YES	YES
Excavation 3-2	Rankine-Block	4.25	4.25	1.3	1.5	YES	YES

[1] Refer to infinite slope stability in Appendix IIIJ-A-4 for liner interface stability.

[2] For bottom liner side slopes excavated to receive liner and protective cover in a short period of time, a factor of safety of 1.3 is acceptable for total stress conditions.

SLOPE STABILITY XSTABL OUTPUT FILES

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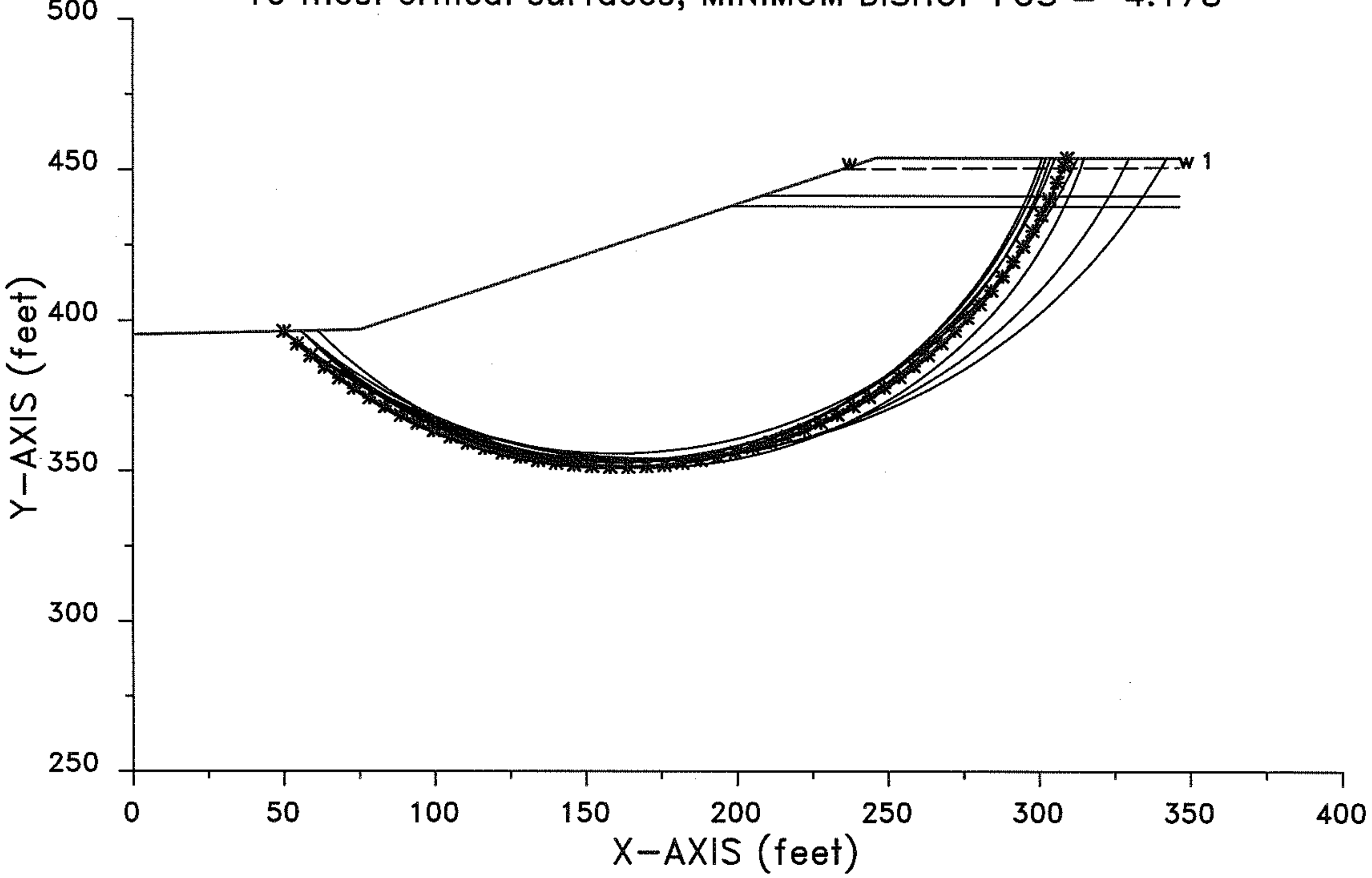
CAMELOT LF – EXCAVATION SEC 1-1E
10 most critical surfaces, MINIMUM BISHOP FOS = 4.178



```
XSTABL File: 1-1E      10-10-11   35:04

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *          Method of Slices              *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - EXCAVATION SEC 1-1E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        5 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

        1          .0      395.3       75.0      397.0          3
        2        75.0      397.0      197.8      437.9          3
        3       197.8      437.9      208.3      441.4          2
        4       208.3      441.4      246.1      454.0          1
        5       246.1      454.0      346.1      454.0          1

        2 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

        1       208.3      441.4      346.1      441.4          2
        2       197.8      437.9      346.1      437.9          3


    --------------------------
    ISOTROPIC Soil Parameters
    --------------------------

     3 Soil unit(s) specified

    Soil   Unit Weight    Cohesion  Friction     Pore Pressure      Water
    Unit  Moist     Sat.  Intercept   Angle  Parameter  Constant   Surface
```

```
 No.   (pcf)   (pcf)    (psf)     (deg)       Ru       (psf)      No.

  1    127.0   131.0     854.0    11.00      .000          .0       1
  2    132.0   135.0     488.0    16.40      .000          .0       1
  3    130.0   135.0    5000.0      .00      .000          .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.         (ft)        (ft)

    1         234.90      450.30
    2         346.10      450.90


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     50.0 ft
                             and  x =    100.0 ft


Each surface terminates between   x =    300.0 ft
                            and   x =    346.1 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =    350.0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    6.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------
```

```
      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=     5.0 degrees



************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------



    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 54 coordinate points

           Point        x-surf       y-surf
            No.          (ft)         (ft)

             1           50.00       396.43
             2           54.37       392.32
             3           58.89       388.37
             4           63.56       384.60
             5           68.36       381.01
             6           73.30       377.60
             7           78.36       374.39
             8           83.55       371.36
             9           88.84       368.54
            10           94.23       365.91
            11           99.73       363.49
            12          105.30       361.29
            13          110.96       359.29
            14          116.69       357.51
            15          122.49       355.95
            16          128.33       354.61
            17          134.23       353.49
            18          140.16       352.59
            19          146.12       351.92
            20          152.11       351.48
```

```
           21          158.10       351.26
           22          164.10       351.27
           23          170.10       351.51
           24          176.08       351.97
           25          182.04       352.66
           26          187.97       353.58
           27          193.86       354.71
           28          199.71       356.07
           29          205.49       357.65
           30          211.22       359.45
           31          216.87       361.47
           32          222.44       363.69
           33          227.93       366.13
           34          233.31       368.77
           35          238.60       371.61
           36          243.77       374.65
           37          248.82       377.89
           38          253.75       381.31
           39          258.54       384.92
           40          263.20       388.70
           41          267.71       392.66
           42          272.06       396.79
           43          276.26       401.08
           44          280.29       405.53
           45          284.15       410.12
           46          287.83       414.86
           47          291.33       419.73
           48          294.64       424.73
           49          297.77       429.86
           50          300.69       435.09
           51          303.42       440.44
           52          305.94       445.88
           53          308.25       451.42
           54          309.22       454.00

****  Simplified BISHOP FOS =    4.178  ****




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - EXCAVATION SEC 1-1E

        FOS     Circle Center     Radius   Initial Terminal  Resisting
     (BISHOP)  x-coord  y-coord            x-coord  x-coord    Moment
                 (ft)     (ft)      (ft)     (ft)     (ft)    (ft-lb)

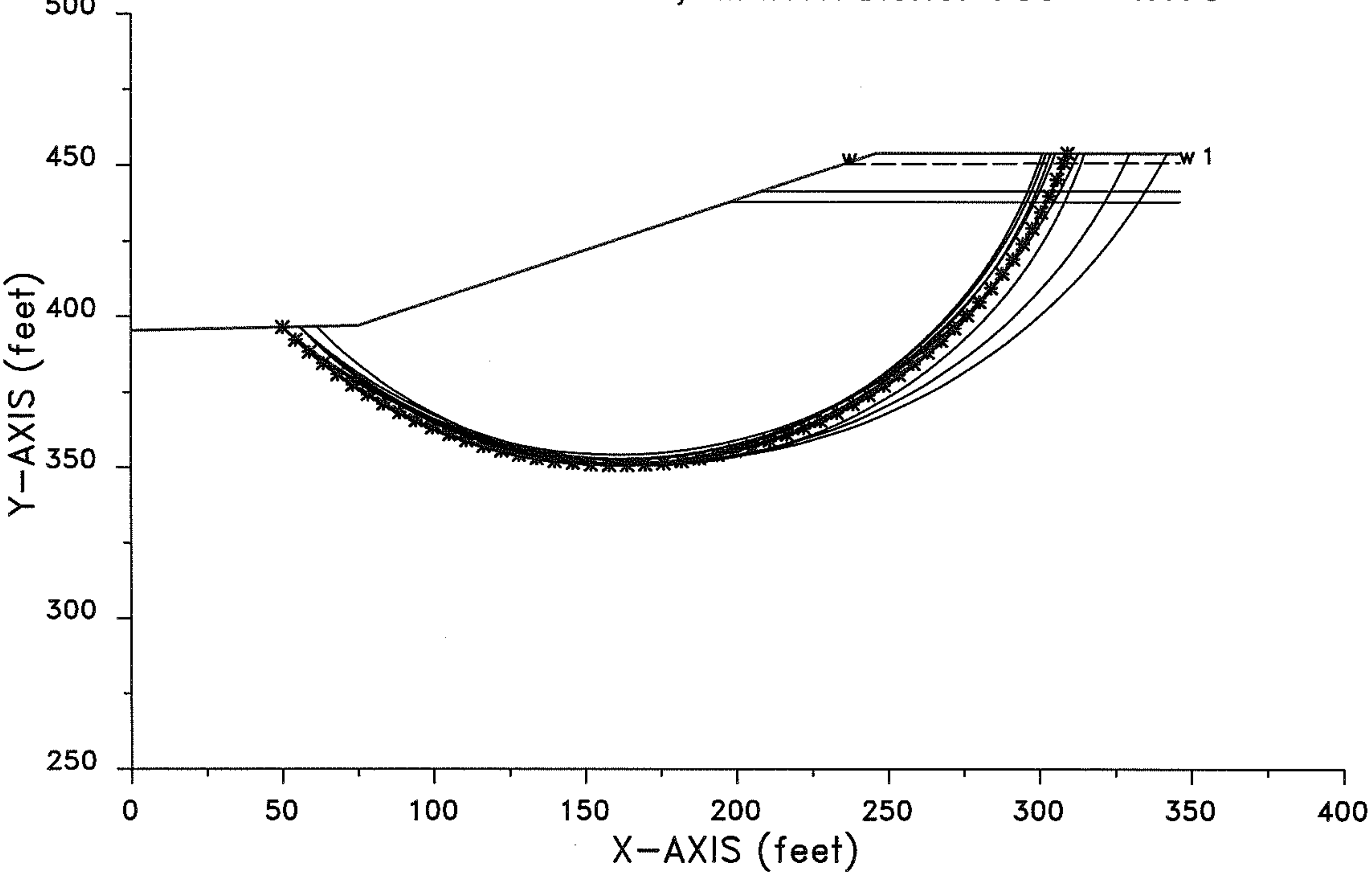
 1.    4.178    160.85   509.77    158.53    50.00   309.22  2.379E+08
 2.    4.199    157.95   501.41    150.58    50.00   300.84  2.215E+08
 3.    4.202    164.21   505.27    153.70    55.56   309.08  2.269E+08
 4.    4.214    162.46   499.25    148.23    55.56   303.61  2.163E+08
 5.    4.217    170.96   528.49    175.29    55.56   329.62  2.710E+08
 6.    4.222    159.70   523.88    168.16    50.00   312.66  2.493E+08
 7.    4.223    161.79   505.87    152.42    55.56   305.09  2.206E+08
```

```
 8.    4.226    170.21    503.88    152.95    61.11    314.78  2.267E+08
 9.    4.227    161.06    501.72    148.96    55.56    302.13  2.146E+08
10.    4.242    171.52    549.37    195.34    50.00    341.96  3.151E+08

                      * * *  END OF FILE  * * *
```

1-1T 10-10-11 35:03

CAMELOT LF - EXCAVATION SEC 1-1T
10 most critical surfaces, MINIMUM BISHOP FOS = 4.175



```
XSTABL File: 1-1T      10-10-11   35:03

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *               using the                *
             *            Method of Slices            *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             *  Ver. 5.208                 96 - 2046  *
             ******************************************


    Problem Description : CAMELOT LF - EXCAVATION SEC 1-1T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        5 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1          .0     395.3       75.0     397.0          3
        2        75.0     397.0      197.8     437.9          3
        3       197.8     437.9      208.3     441.4          2
        4       208.3     441.4      246.1     454.0          1
        5       246.1     454.0      346.1     454.0          1

        2 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1       208.3     441.4      346.1     441.4          2
        2       197.8     437.9      346.1     437.9          3


    --------------------------
    ISOTROPIC Soil Parameters
    --------------------------

     3 Soil unit(s) specified

    Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
    Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
```

```
          No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

           1   127.0   131.0    788.0    11.50      .000         .0        1
           2   132.0   135.0    470.0     8.30      .000         .0        1
           3   130.0   135.0   5000.0      .00      .000         .0        0


         ----------------------------------------------------------------------
----
          UNDRAINED STRENGTHS as a function of effective vertical stress
                              have been specified for  2 Soil Unit(s)
         ----------------------------------------------------------------------
----

                   Soil Unit #      Parameter a     Parameter Psi

                        1.               788.0           11.50
                        2.               470.0            8.30


          1 Water surface(s) have been specified

         Unit weight of water =    62.40  (pcf)


         Water Surface No.  1 specified by  2 coordinate points

         **********************************
                  PHREATIC SURFACE,
         **********************************

           Point       x-water     y-water
            No.          (ft)        (ft)

             1          234.90      450.30
             2          346.10      450.90


         A critical failure surface searching method, using a random
         technique for generating CIRCULAR surfaces has been specified.


           100 trial surfaces will be generated and analyzed.


           10 Surfaces initiate from each of  10 points equally spaced
         along the ground surface between  x =     50.0 ft
                                         and  x =    100.0 ft


         Each surface terminates between   x =    300.0 ft
                                        and   x =    346.1 ft


         Unless further limitations were imposed, the minimum elevation
```

```
    at which a surface extends is  y =    350.0 ft


    * * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

        6.0 ft line segments define each trial failure surface.


    ---------------------
    ANGULAR RESTRICTIONS
    ---------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=    -5.0 degrees



************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 54 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1          50.00       396.43
             2          54.34       392.29
             3          58.84       388.32
             4          63.49       384.52
             5          68.27       380.91
             6          73.19       377.47
             7          78.24       374.23
```

```
         8         83.41      371.18
         9         88.68      368.32
        10         94.07      365.67
        11         99.55      363.23
        12        105.12      361.00
        13        110.77      358.98
        14        116.49      357.17
        15        122.28      355.59
        16        128.12      354.22
        17        134.01      353.08
        18        139.94      352.17
        19        145.90      351.47
        20        151.88      351.01
        21        157.88      350.77
        22        163.88      350.77
        23        169.87      350.99
        24        175.85      351.43
        25        181.82      352.11
        26        187.75      353.01
        27        193.64      354.13
        28        199.49      355.48
        29        205.28      357.05
        30        211.01      358.84
        31        216.66      360.84
        32        222.24      363.06
        33        227.73      365.49
        34        233.12      368.12
        35        238.40      370.96
        36        243.58      373.99
        37        248.63      377.22
        38        253.56      380.64
        39        258.36      384.25
        40        263.02      388.03
        41        267.52      391.99
        42        271.88      396.12
        43        276.07      400.41
        44        280.10      404.86
        45        283.96      409.45
        46        287.64      414.19
        47        291.14      419.07
        48        294.45      424.07
        49        297.56      429.20
        50        300.48      434.44
        51        303.20      439.79
        52        305.72      445.24
        53        308.02      450.78
        54        309.22      454.00

****   Simplified BISHOP FOS =    4.175   ****



The following is a summary of the TEN most critical surfaces
```

```
Problem Description : CAMELOT LF - EXCAVATION SEC 1-1T

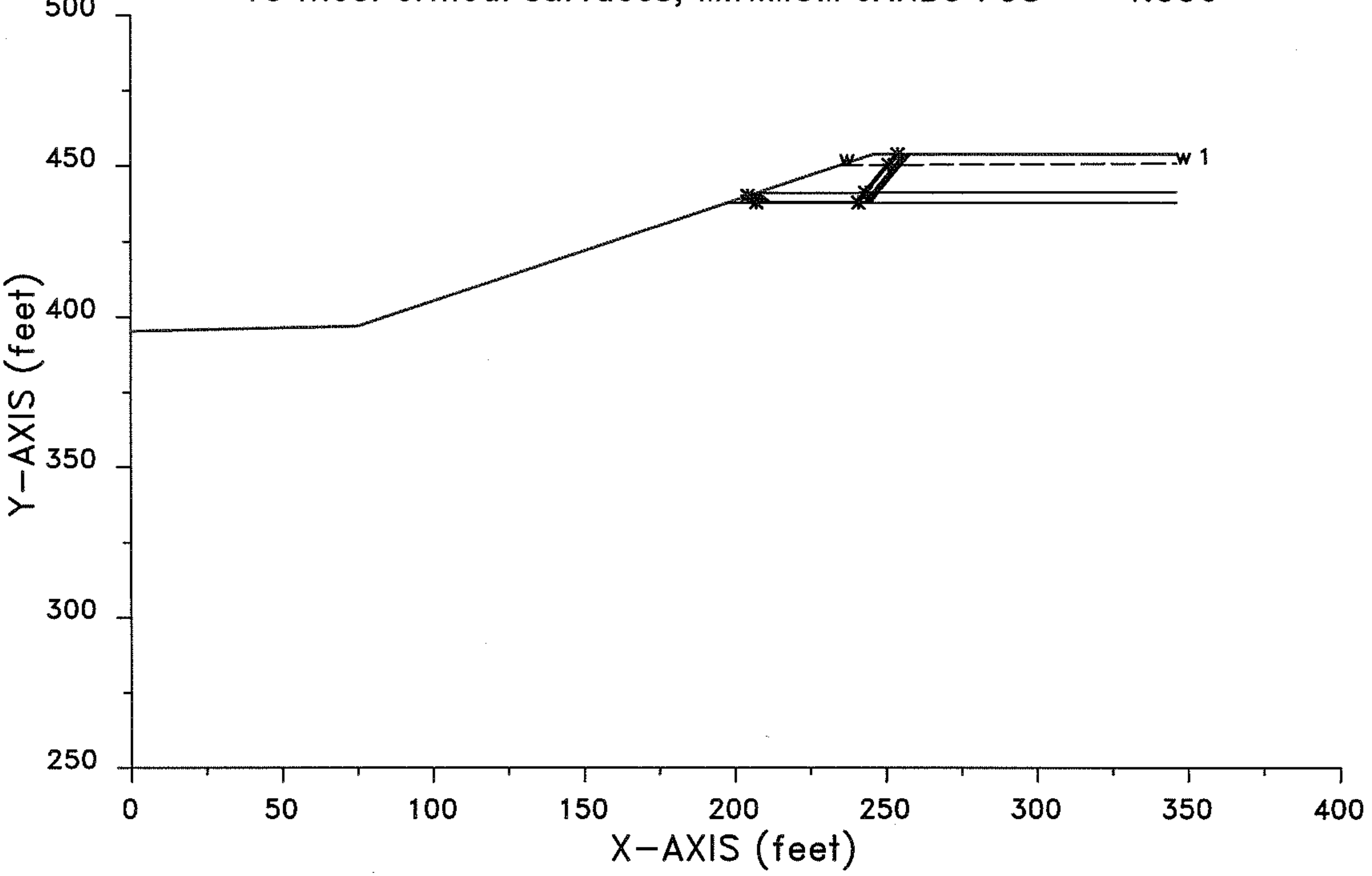
        FOS      Circle Center     Radius   Initial Terminal  Resisting
      (BISHOP)  x-coord  y-coord            x-coord  x-coord    Moment
                  (ft)     (ft)      (ft)     (ft)     (ft)     (ft-lb)

 1.    4.175    161.11   508.66    157.92    50.00   309.22  2.376E+08
 2.    4.199    158.00   501.20    150.47    50.00   300.84  2.215E+08
 3.    4.201    164.37   504.56    153.31    55.56   309.08  2.267E+08
 4.    4.202    171.72   524.89    173.10    55.56   329.61  2.693E+08
 5.    4.203    160.55   520.10    165.87    50.00   312.65  2.476E+08
 6.    4.208    172.79   542.91    191.14    50.00   341.98  3.111E+08
 7.    4.215    162.46   499.24    148.23    55.56   303.61  2.163E+08
 8.    4.220    162.06   504.65    151.75    55.56   305.10  2.202E+08
 9.    4.226    170.30   503.50    152.75    61.11   314.79  2.266E+08
10.    4.226    161.20   501.07    148.61    55.56   302.13  2.145E+08

                    * * *  END OF FILE  * * *
```

1-2E 10-10-11 35:07

CAMELOT LF – EXCAVATION SEC 1–2E
10 most critical surfaces, MINIMUM JANBU FOS = 4.006



```
XSTABL File: 1-2E      10-10-11   35:07

             ******************************************
             *               X S T A B L              *
             *                                        *
             *        Slope Stability Analysis        *
             *                using the               *
             *            Method of Slices            *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             *  Ver. 5.208                96 - 2046   *
             ******************************************


    Problem Description : CAMELOT LF - EXCAVATION SEC 1-2E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        5 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1          .0       395.3       75.0      397.0          3
       2        75.0       397.0      197.8      437.9          3
       3       197.8       437.9      208.3      441.4          2
       4       208.3       441.4      246.1      454.0          1
       5       246.1       454.0      346.1      454.0          1

        2 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1       208.3       441.1      346.1      441.4          2
       2       197.8       437.9      346.1      437.9          3


    --------------------------
    ISOTROPIC Soil Parameters
    --------------------------

     3 Soil unit(s) specified

    Soil    Unit Weight   Cohesion  Friction    Pore Pressure       Water
    Unit   Moist     Sat. Intercept   Angle   Parameter Constant   Surface
```

```
 No.  (pcf)   (pcf)    (psf)     (deg)       Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00      .000          .0       1
  2   132.0   135.0     488.0    16.40      .000          .0       1
  3   130.0   135.0    5000.0      .00      .000          .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point        x-water      y-water
   No.           (ft)         (ft)

    1          234.90       450.30
    2          346.10       450.90


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     12.0 ft


Box         x-left     y-left    x-right    y-right      Width
no.          (ft)       (ft)       (ft)       (ft)        (ft)

 1           205.0      437.9      215.0      437.9          .2
 2           240.0      437.9      250.0      437.9          .2
```

```
Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by  6 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         204.39       440.10
         2         207.22       437.98
         3         241.05       437.95
         4         243.47       441.18
         5         251.10       450.44
         6         254.04       454.00

 **  Corrected JANBU FOS =   4.006  **    (Fo factor = 1.078)


Failure surface No. 2 specified by  6 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         204.23       440.04
         2         206.97       437.99
         3         243.10       437.91
         4         245.54       441.18
         5         253.18       450.44
         6         256.11       454.00

 **  Corrected JANBU FOS =   4.017  **    (Fo factor = 1.077)


Failure surface No. 3 specified by  6 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         206.07       440.66
         2         209.71       437.94
         3         243.24       437.99
         4         245.63       441.18
         5         253.26       450.44
         6         256.20       454.00

 **  Corrected JANBU FOS =   4.041  **    (Fo factor = 1.079)


Failure surface No. 4 specified by  6 coordinate points

       Point       x-surf       y-surf
```

```
       No.        (ft)        (ft)

        1        206.67      440.86
        2        210.57      437.94
        3        240.20      437.94
        4        242.62      441.17
        5        250.25      450.43
        6        253.19      454.00

 **  Corrected JANBU FOS =   4.044  **    (Fo factor = 1.081)


Failure surface No. 5 specified by  6 coordinate points

      Point      x-surf      y-surf
       No.        (ft)        (ft)

        1        207.83      441.24
        2        212.25      437.94
        3        241.11      437.90
        4        243.56      441.18
        5        251.20      450.44
        6        254.14      454.00

 **  Corrected JANBU FOS =   4.054  **    (Fo factor = 1.081)


Failure surface No. 6 specified by  6 coordinate points

      Point      x-surf      y-surf
       No.        (ft)        (ft)

        1        207.66      441.19
        2        212.02      437.92
        3        240.51      437.98
        4        242.90      441.18
        5        250.53      450.43
        6        253.47      454.00

 **  Corrected JANBU FOS =   4.061  **    (Fo factor = 1.081)


Failure surface No. 7 specified by  6 coordinate points

      Point      x-surf      y-surf
       No.        (ft)        (ft)

        1        202.91      439.60
        2        205.11      437.96
        3        245.15      437.94
        4        247.57      441.19
        5        255.20      450.44
        6        258.14      454.00

 **  Corrected JANBU FOS =   4.074  **    (Fo factor = 1.075)
```

```
Failure surface No. 8 specified by  6 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          205.92       440.61
         2          209.42       437.99
         3          244.42       437.98
         4          246.82       441.18
         5          254.45       450.44
         6          257.38       454.00

 **  Corrected JANBU FOS =   4.077  **    (Fo factor = 1.078)

Failure surface No. 9 specified by  6 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          206.75       440.88
         2          210.68       437.95
         3          244.19       437.96
         4          246.60       441.18
         5          254.24       450.44
         6          257.17       454.00

 **  Corrected JANBU FOS =   4.078  **    (Fo factor = 1.079)

Failure surface No.10 specified by  6 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          205.31       440.40
         2          208.58       437.95
         3          244.82       437.95
         4          247.24       441.18
         5          254.88       450.44
         6          257.81       454.00

 **  Corrected JANBU FOS =   4.078  **    (Fo factor = 1.077)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - EXCAVATION SEC 1-2E

      Modified     Correction   Initial    Terminal    Available
     JANBU FOS       Factor     x-coord     x-coord     Strength
                                  (ft)        (ft)        (lb)

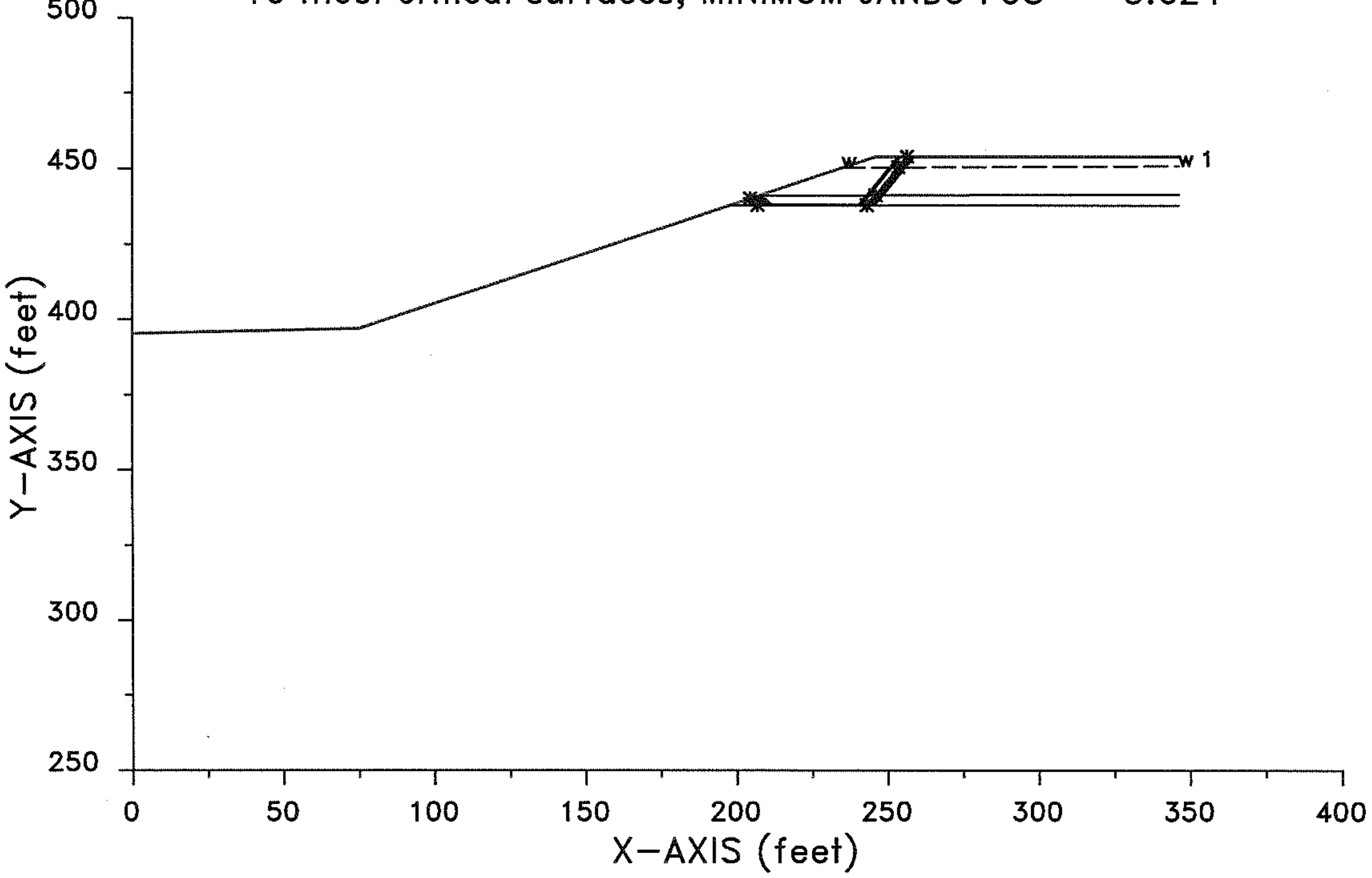
 1.     4.006         1.078     204.39      254.04     4.653E+04
```

```
  2.    4.017        1.077     204.23      256.11    4.850E+04
  3.    4.041        1.079     206.07      256.20    4.756E+04
  4.    4.044        1.081     206.67      253.19    4.459E+04
  5.    4.054        1.081     207.83      254.14    4.481E+04
  6.    4.061        1.081     207.66      253.47    4.427E+04
  7.    4.074        1.075     202.91      258.14    5.097E+04
  8.    4.077        1.078     205.92      257.38    4.868E+04
  9.    4.078        1.079     206.75      257.17    4.808E+04
 10.    4.078        1.077     205.31      257.81    4.945E+04

                       * * *  END OF FILE  * * *
```

1-2T 3-19-12 88:27

CAMELOT LF - EXCAVATION SEC 1-2T
10 most critical surfaces, MINIMUM JANBU FOS = 3.624



```
XSTABL File: 1-2T       3-19-12   88:27

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *              using the                *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - EXCAVATION SEC 1-2T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        5 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1          .0       395.3        75.0      397.0          3
       2        75.0       397.0       197.8      437.9          3
       3       197.8       437.9       208.3      441.4          2
       4       208.3       441.4       246.1      454.0          1
       5       246.1       454.0       346.1      454.0          1


        2 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1       208.3       441.1       346.1      441.4          2
       2       197.8       437.9       346.1      437.9          3


    --------------------------
    ISOTROPIC Soil Parameters
    --------------------------

     3 Soil unit(s) specified

    Soil    Unit Weight    Cohesion  Friction     Pore Pressure       Water
    Unit  Moist     Sat.   Intercept   Angle   Parameter  Constant  Surface
```

```
 No.  (pcf)   (pcf)    (psf)     (deg)       Ru       (psf)       No.

  1   127.0   131.0     788.0    11.50      .000          .0        1
  2   132.0   135.0     470.0     8.30      .000          .0        1
  3   130.0   135.0    5000.0      .00      .000          .0        0


----------------------------------------------------------------------
----
 UNDRAINED STRENGTHS as a function of effective vertical stress
                   have been specified for  2 Soil Unit(s)
----------------------------------------------------------------------
----

         Soil Unit #      Parameter a     Parameter Psi

              1.              788.0          11.50
              2.              470.0           8.30


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)

Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.         (ft)         (ft)

    1         234.90      450.30
    2         346.10      450.90


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *
```

```
Length of line segments for active and passive portions of
sliding block is      12.0 ft


Box          x-left      y-left     x-right     y-right        Width
no.           (ft)        (ft)        (ft)        (ft)          (ft)

 1           205.0       437.9       215.0       437.9            .2
 2           240.0       437.9       250.0       437.9            .2


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by  6 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         204.49       440.13
         2         206.97       437.99
         3         243.10       437.91
         4         245.93       441.18
         5         253.52       450.47
         6         256.40       454.00

 **  Corrected JANBU FOS =    3.624   **     (Fo factor = 1.106)


Failure surface No. 2 specified by  6 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         204.67       440.19
         2         207.22       437.98
         3         241.05       437.95
         4         243.85       441.18
         5         251.44       450.47
         6         254.32       454.00

 **  Corrected JANBU FOS =    3.625   **     (Fo factor = 1.108)


Failure surface No. 3 specified by  6 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)
```

```
          1         206.43        440.78
          2         209.71        437.94
          3         243.24        437.99
          4         246.00        441.18
          5         253.59        450.47
          6         256.47        454.00

  **   Corrected JANBU FOS =    3.649   **     (Fo factor = 1.108)


 Failure surface No. 4 specified by  6 coordinate points

        Point       x-surf        y-surf
         No.         (ft)          (ft)

          1         203.13        439.68
          2         205.11        437.96
          3         245.15        437.94
          4         247.95        441.19
          5         255.54        450.48
          6         258.42        454.00

  **   Corrected JANBU FOS =    3.662   **     (Fo factor = 1.103)


 Failure surface No. 5 specified by  6 coordinate points

        Point       x-surf        y-surf
         No.         (ft)          (ft)

          1         207.05        440.98
          2         210.57        437.94
          3         240.20        437.94
          4         242.99        441.18
          5         250.59        450.47
          6         253.47        454.00

  **   Corrected JANBU FOS =    3.666   **     (Fo factor = 1.111)


 Failure surface No. 6 specified by  6 coordinate points

        Point       x-surf        y-surf
         No.         (ft)          (ft)

          1         205.63        440.51
          2         208.58        437.95
          3         244.82        437.95
          4         247.62        441.19
          5         255.21        450.48
          6         258.09        454.00

  **   Corrected JANBU FOS =    3.671   **     (Fo factor = 1.107)


 Failure surface No. 7 specified by  6 coordinate points
```

```
         Point        x-surf       y-surf
          No.          (ft)         (ft)

           1          206.26       440.72
           2          209.42       437.99
           3          244.42       437.98
           4          247.19       441.18
           5          254.78       450.48
           6          257.66       454.00

  **   Corrected JANBU FOS =    3.674   **     (Fo factor = 1.108)


Failure surface No. 8 specified by  6 coordinate points

         Point        x-surf       y-surf
          No.          (ft)         (ft)

           1          207.14       441.01
           2          210.68       437.95
           3          244.19       437.96
           4          246.98       441.18
           5          254.57       450.48
           6          257.45       454.00

  **   Corrected JANBU FOS =    3.678   **     (Fo factor = 1.109)


Failure surface No. 9 specified by  6 coordinate points

         Point        x-surf       y-surf
          No.          (ft)         (ft)

           1          204.03       439.98
           2          206.39       437.94
           3          245.63       437.99
           4          248.39       441.19
           5          255.98       450.48
           6          258.86       454.00

  **   Corrected JANBU FOS =    3.684   **     (Fo factor = 1.104)


Failure surface No.10 specified by  7 coordinate points

         Point        x-surf       y-surf
          No.          (ft)         (ft)

           1          208.07       441.32
           2          208.34       441.10
           3          212.02       437.92
           4          240.51       437.98
           5          243.27       441.18
           6          250.87       450.47
           7          253.75       454.00

  **   Corrected JANBU FOS =    3.685   **     (Fo factor = 1.112)
```

```
The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - EXCAVATION SEC 1-2T

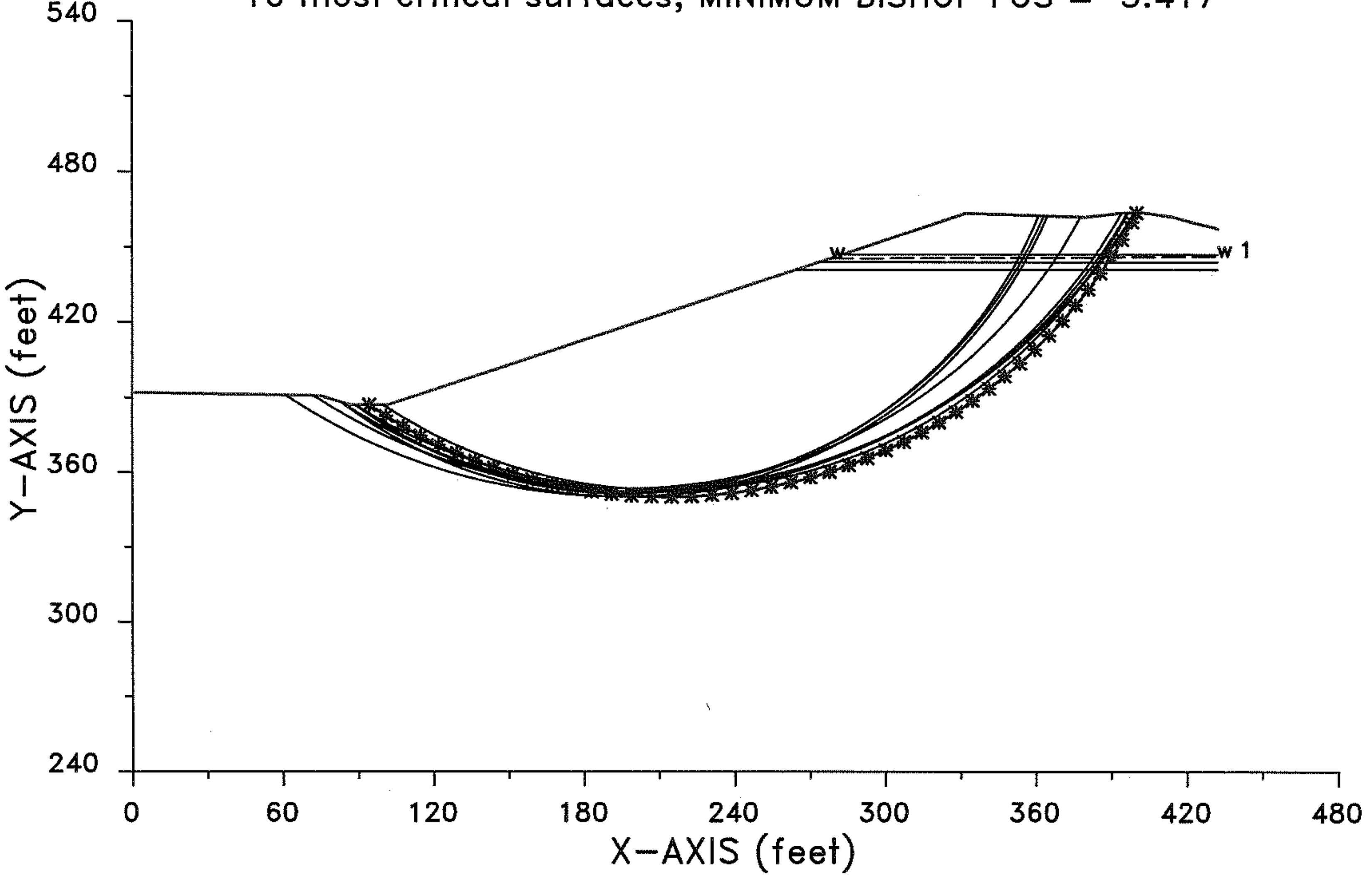
       Modified      Correction   Initial    Terminal    Available
       JANBU FOS       Factor     x-coord     x-coord     Strength
                                   (ft)        (ft)        (lb)

 1.      3.624          1.106      204.49      256.40    4.176E+04
 2.      3.625          1.108      204.67      254.32    4.025E+04
 3.      3.649          1.108      206.43      256.47    4.088E+04
 4.      3.662          1.103      203.13      258.42    4.373E+04
 5.      3.666          1.111      207.05      253.47    3.856E+04
 6.      3.671          1.107      205.63      258.09    4.236E+04
 7.      3.674          1.108      206.26      257.66    4.174E+04
 8.      3.678          1.109      207.14      257.45    4.121E+04
 9.      3.684          1.104      204.03      258.86    4.359E+04
10.      3.685          1.112      208.07      253.75    3.826E+04

                   * * *  END OF FILE  * * *
```

2-1E 3-09-12 16:52

CAMELOT LF - EXCAVATION SEC 2-1E
10 most critical surfaces, MINIMUM BISHOP FOS = 3.417



```
XSTABL File: 2-1E       3-09-12   16:52

       *****************************************
       *              X S T A B L              *
       *                                       *
       *        Slope Stability Analysis       *
       *                using the              *
       *            Method of Slices           *
       *                                       *
       *        Copyright (C) 1992 - 2008      *
       *   Interactive Software Designs, Inc.  *
       *        Moscow, ID 83843, U.S.A.       *
       *                                       *
       *          All Rights Reserved          *
       *                                       *
       *  Ver. 5.208                96 - 2046  *
       *****************************************


Problem Description : CAMELOT LF - EXCAVATION SEC 2-1E




-----------------------------
SEGMENT BOUNDARY COORDINATES
-----------------------------

   14 SURFACE boundary segments

Segment     x-left     y-left     x-right    y-right     Soil Unit
  No.        (ft)       (ft)        (ft)       (ft)     Below Segment

   1           .0      392.0        75.0      390.7          3
   2         75.0      390.7        86.9      387.0          3
   3         86.9      387.0       101.9      387.0          3
   4        101.9      387.0       264.8      441.0          3
   5        264.8      441.0       273.8      444.0          2
   6        273.8      444.0       283.1      447.1          1
   7        283.1      447.1       332.1      463.4          1
   8        332.1      463.4       379.6      462.0          1
   9        379.6      462.0       395.1      463.6          1
  10        395.1      463.6       402.8      463.6          1
  11        402.8      463.6       415.0      462.0          1
  12        415.0      462.0       422.4      459.7          1
  13        422.4      459.7       429.9      458.0          1
  14        429.9      458.0       432.1      457.3          1

    3 SUBSURFACE boundary segments

Segment     x-left     y-left     x-right    y-right     Soil Unit
  No.        (ft)       (ft)        (ft)       (ft)     Below Segment

   1        283.1      447.1       432.1      447.1          1
   2        273.8      444.0       432.1      444.0          2
   3        264.8      441.0       432.1      441.0          3
```

```
--------------------------
ISOTROPIC Soil Parameters
--------------------------

 3 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00      .000         .0       1
  2   132.0   135.0     488.0    16.40      .000         .0       1
  3   130.0   135.0    5000.0      .00      .000         .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1          278.20      445.40
    2          432.10      446.20


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     50.0 ft
                             and  x =    100.0 ft


Each surface terminates between   x =    350.0 ft
                            and   x =    400.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =    350.0 ft
```

```
        8.0 ft line segments define each trial failure surface.


    ---------------------
    ANGULAR RESTRICTIONS
    ---------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=    -5.0 degrees

************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 46 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1          94.44       387.00
             2         101.13       382.60
             3         107.97       378.46
             4         114.97       374.58
             5         122.10       370.97
             6         129.38       367.63
             7         136.77       364.57
             8         144.27       361.80
             9         151.88       359.31
            10         159.57       357.12
            11         167.34       355.22
            12         175.18       353.61
            13         183.07       352.31
            14         191.01       351.31
            15         198.98       350.61
            16         206.97       350.21
            17         214.97       350.12
```

```
          18          222.96       350.33
          19          230.95       350.85
          20          238.91       351.67
          21          246.83       352.79
          22          254.70       354.21
          23          262.51       355.93
          24          270.25       357.95
          25          277.91       360.26
          26          285.48       362.86
          27          292.94       365.74
          28          300.29       368.91
          29          307.51       372.35
          30          314.59       376.07
          31          321.53       380.05
          32          328.31       384.30
          33          334.92       388.80
          34          341.36       393.55
          35          347.62       398.54
          36          353.68       403.76
          37          359.53       409.21
          38          365.18       414.88
          39          370.60       420.76
          40          375.80       426.84
          41          380.76       433.12
          42          385.48       439.58
          43          389.95       446.21
          44          394.16       453.01
          45          398.12       459.97
          46          400.00       463.60

****  Simplified BISHOP FOS =    3.417   ****


The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - EXCAVATION SEC 2-1E

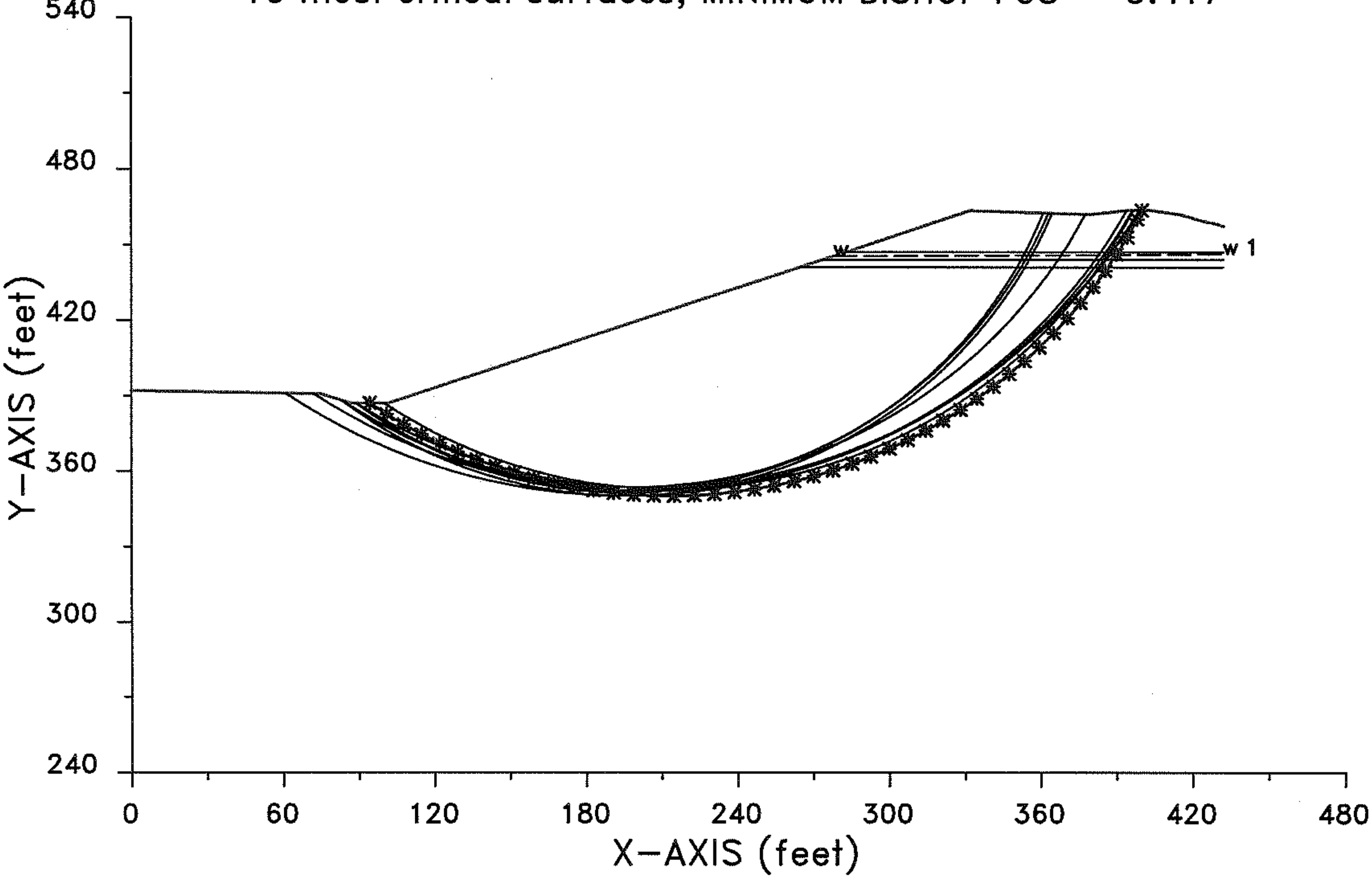
      FOS      Circle Center      Radius  Initial Terminal  Resisting
    (BISHOP)  x-coord  y-coord            x-coord  x-coord    Moment
                (ft)     (ft)       (ft)    (ft)     (ft)     (ft-lb)

 1.   3.417    213.39   560.34    210.23    94.44   400.00  3.522E+08
 2.   3.459    213.78   558.79    206.05   100.00   396.49  3.339E+08
 3.   3.479    205.79   572.77    219.49    88.89   396.18  3.645E+08
 4.   3.492    203.49   570.57    218.47    83.33   393.90  3.682E+08
 5.   3.554    197.15   557.81    204.34    83.33   377.63  3.292E+08
 6.   3.559    195.19   533.97    183.81    83.33   364.50  2.906E+08
 7.   3.568    200.38   585.18    232.87    72.22   398.96  4.094E+08
 8.   3.569    195.94   533.91    181.78    88.89   363.06  2.792E+08
 9.   3.571    195.84   529.80    178.41    88.89   361.05  2.736E+08
10.   3.585    195.17   590.95    240.78    61.11   399.48  4.384E+08

                      * * *  END OF FILE  * * *
```

2-1T 3-09-12 16:53

CAMELOT LF - EXCAVATION SEC 2-1T
10 most critical surfaces, MINIMUM BISHOP FOS = 3.417



```
  XSTABL File: 2-1T       3-09-12   16:53

         *****************************************
         *              X S T A B L              *
         *                                       *
         *        Slope Stability Analysis       *
         *               using the               *
         *            Method of Slices           *
         *                                       *
         *        Copyright (C) 1992 - 2008      *
         *   Interactive Software Designs, Inc.  *
         *        Moscow, ID 83843, U.S.A.       *
         *                                       *
         *          All Rights Reserved          *
         *                                       *
         *  Ver. 5.208                96 - 2046  *
         *****************************************


Problem Description : CAMELOT LF - EXCAVATION SEC 2-1T



-----------------------------
SEGMENT BOUNDARY COORDINATES
-----------------------------

   14 SURFACE boundary segments

Segment     x-left    y-left    x-right   y-right    Soil Unit
  No.        (ft)      (ft)       (ft)      (ft)    Below Segment

   1           .0     392.0       75.0     390.7          3
   2         75.0     390.7       86.9     387.0          3
   3         86.9     387.0      101.9     387.0          3
   4        101.9     387.0      264.8     441.0          3
   5        264.8     441.0      273.8     444.0          2
   6        273.8     444.0      283.1     447.1          1
   7        283.1     447.1      332.1     463.4          1
   8        332.1     463.4      379.6     462.0          1
   9        379.6     462.0      395.1     463.6          1
  10        395.1     463.6      402.8     463.6          1
  11        402.8     463.6      415.0     462.0          1
  12        415.0     462.0      422.4     459.7          1
  13        422.4     459.7      429.9     458.0          1
  14        429.9     458.0      432.1     457.3          1


    3 SUBSURFACE boundary segments

Segment     x-left    y-left    x-right   y-right    Soil Unit
  No.        (ft)      (ft)       (ft)      (ft)    Below Segment

   1        283.1     447.1      432.1     447.1          1
   2        273.8     444.0      432.1     444.0          2
   3        264.8     441.0      432.1     441.0          3
```

```
          --------------------------
          ISOTROPIC Soil Parameters
          --------------------------

           3 Soil unit(s) specified

          Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
          Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
           No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

            1   127.0   131.0     788.0    11.50     .000         .0       1
            2   132.0   135.0     470.0     8.30     .000         .0       1
            3   130.0   135.0    5000.0      .00     .000         .0       0


          ----------------------------------------------------------------------
----
           UNDRAINED STRENGTHS as a function of effective vertical stress
                               have been specified for  2 Soil Unit(s)
          ----------------------------------------------------------------------
----

                    Soil Unit #      Parameter a     Parameter Psi

                         1.               788.0           11.50
                         2.               470.0            8.30


           1 Water surface(s) have been specified

          Unit weight of water =    62.40  (pcf)


          Water Surface No.  1 specified by  2 coordinate points

          **********************************
                   PHREATIC SURFACE,
          **********************************

            Point       x-water      y-water
             No.         (ft)         (ft)

              1         278.20       445.40
              2         432.10       446.20


          A critical failure surface searching method, using a random
          technique for generating CIRCULAR surfaces has been specified.


            100 trial surfaces will be generated and analyzed.
```

```
      10 Surfaces initiate from each of  10 points equally spaced
    along the ground surface between  x =     50.0 ft
                                 and  x =    100.0 ft


    Each surface terminates between   x =    350.0 ft
                                and   x =    400.0 ft


    Unless further limitations were imposed, the minimum elevation
    at which a surface extends is  y =    350.0 ft


        8.0 ft line segments define each trial failure surface.



    ---------------------
    ANGULAR RESTRICTIONS
    ---------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=    -5.0 degrees



************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------



    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



      The most critical circular failure surface
      is specified by 46 coordinate points

           Point      x-surf      y-surf
            No.        (ft)        (ft)
```

```
                 1          94.44       387.00
                 2         101.13       382.60
                 3         107.97       378.46
                 4         114.97       374.58
                 5         122.10       370.97
                 6         129.38       367.63
                 7         136.77       364.57
                 8         144.27       361.80
                 9         151.88       359.31
                10         159.57       357.12
                11         167.34       355.22
                12         175.18       353.61
                13         183.07       352.31
                14         191.01       351.31
                15         198.98       350.61
                16         206.97       350.21
                17         214.97       350.12
                18         222.96       350.33
                19         230.95       350.85
                20         238.91       351.67
                21         246.83       352.79
                22         254.70       354.21
                23         262.51       355.93
                24         270.25       357.95
                25         277.91       360.26
                26         285.48       362.86
                27         292.94       365.74
                28         300.29       368.91
                29         307.51       372.35
                30         314.59       376.07
                31         321.53       380.05
                32         328.31       384.30
                33         334.92       388.80
                34         341.36       393.55
                35         347.62       398.54
                36         353.68       403.76
                37         359.53       409.21
                38         365.18       414.88
                39         370.60       420.76
                40         375.80       426.84
                41         380.76       433.12
                42         385.48       439.58
                43         389.95       446.21
                44         394.16       453.01
                45         398.12       459.97
                46         400.00       463.60

 ****  Simplified BISHOP FOS =   3.417  ****




 The following is a summary of the TEN most critical surfaces

 Problem Description : CAMELOT LF - EXCAVATION SEC 2-1T
```

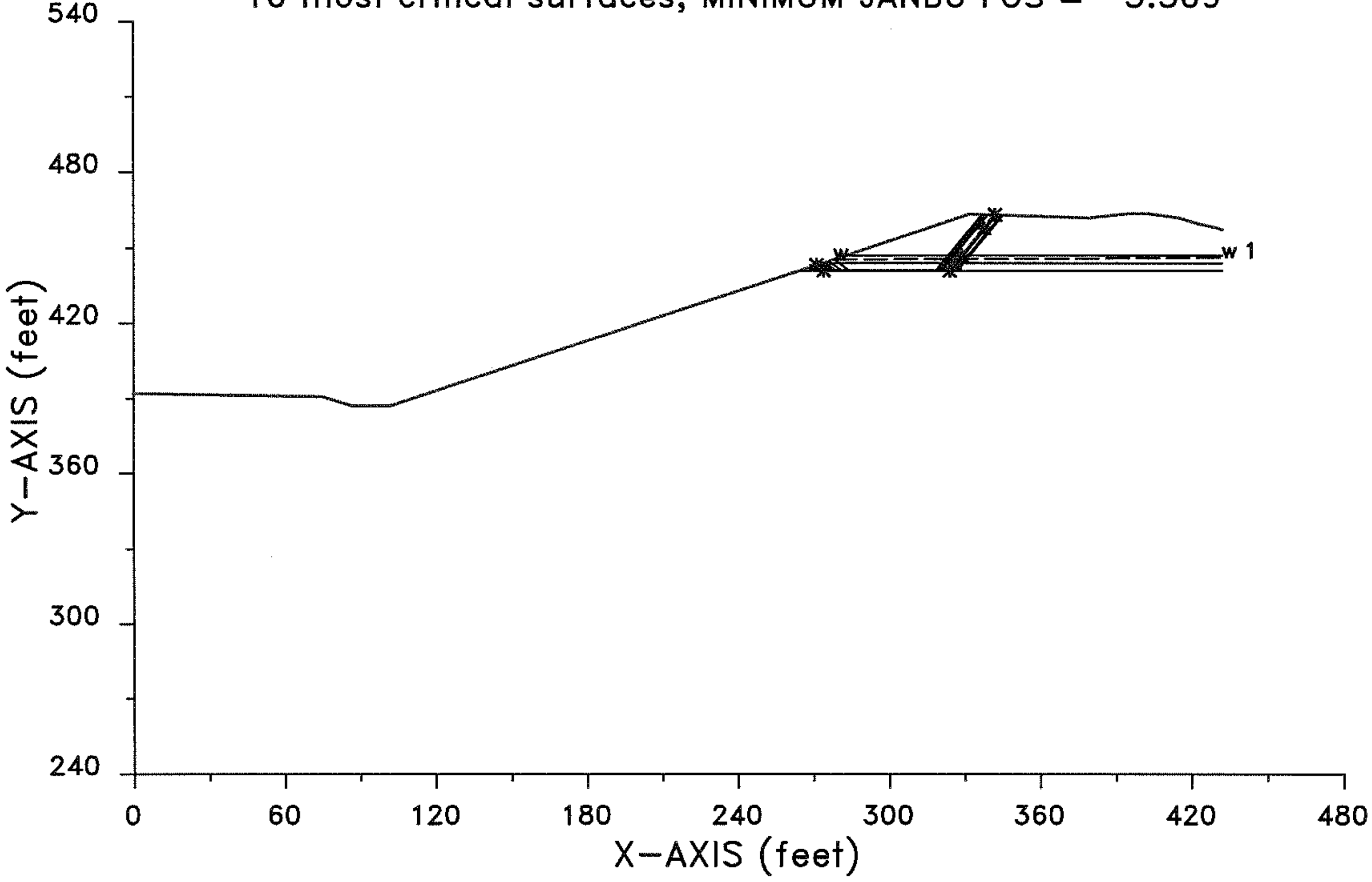
```
         FOS      Circle Center     Radius   Initial  Terminal   Resisting
       (BISHOP)  x-coord  y-coord            x-coord  x-coord     Moment
                  (ft)     (ft)      (ft)     (ft)     (ft)       (ft-lb)

  1.    3.417    213.39   560.34    210.23    94.44   400.00   3.522E+08
  2.    3.459    213.78   558.79    206.05   100.00   396.49   3.339E+08
  3.    3.479    205.79   572.77    219.49    88.89   396.18   3.645E+08
  4.    3.491    203.49   570.57    218.47    83.33   393.90   3.681E+08
  5.    3.554    197.15   557.81    204.34    83.33   377.63   3.292E+08
  6.    3.560    195.19   533.97    183.81    83.33   364.50   2.907E+08
  7.    3.568    200.38   585.18    232.87    72.22   398.96   4.093E+08
  8.    3.569    195.94   533.91    181.78    88.89   363.06   2.793E+08
  9.    3.572    195.84   529.80    178.41    88.89   361.05   2.736E+08
 10.    3.584    195.17   590.95    240.78    61.11   399.48   4.383E+08

                        * * *  END OF FILE  * * *
```

2-2E 3-09-12 16:55

CAMELOT LF - EXCAVATION SEC 2-2E
10 most critical surfaces, MINIMUM JANBU FOS = 3.309



```
XSTABL File: 2-2E       3-09-12   16:55

       *****************************************
       *              X S T A B L              *
       *                                       *
       *        Slope Stability Analysis       *
       *                using the              *
       *            Method of Slices           *
       *                                       *
       *        Copyright (C) 1992 - 2008      *
       *   Interactive Software Designs, Inc.  *
       *        Moscow, ID 83843, U.S.A.       *
       *                                       *
       *          All Rights Reserved          *
       *                                       *
       *  Ver. 5.208                96 - 2046  *
       *****************************************

Problem Description : CAMELOT LF - EXCAVATION SEC 2-2E



-----------------------------
SEGMENT BOUNDARY COORDINATES
-----------------------------

   14 SURFACE boundary segments

Segment    x-left    y-left    x-right   y-right    Soil Unit
   No.      (ft)      (ft)       (ft)      (ft)    Below Segment

    1          .0     392.0       75.0     390.7         3
    2        75.0     390.7       86.9     387.0         3
    3        86.9     387.0      101.9     387.0         3
    4       101.9     387.0      264.8     441.0         3
    5       264.8     441.0      273.8     444.0         2
    6       273.8     444.0      283.1     447.1         1
    7       283.1     447.1      332.1     463.4         1
    8       332.1     463.4      379.6     462.0         1
    9       379.6     462.0      395.1     463.6         1
   10       395.1     463.6      402.8     463.6         1
   11       402.8     463.6      415.0     462.0         1
   12       415.0     462.0      422.4     459.7         1
   13       422.4     459.7      429.9     458.0         1
   14       429.9     458.0      432.1     457.3         1

    3 SUBSURFACE boundary segments

Segment    x-left    y-left    x-right   y-right    Soil Unit
   No.      (ft)      (ft)       (ft)      (ft)    Below Segment

    1       283.1     447.1      432.1     447.1         1
    2       273.8     444.0      432.1     444.0         2
    3       264.8     441.0      432.1     441.0         3
```

```
--------------------------
ISOTROPIC Soil Parameters
--------------------------

 3 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00     .000         .0       1
  2   132.0   135.0     488.0    16.40     .000         .0       1
  3   130.0   135.0    5000.0      .00     .000         .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water      y-water
   No.          (ft)         (ft)

    1          278.20       445.40
    2          432.10       446.20


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     14.0 ft
```

```
Box         x-left      y-left     x-right     y-right        Width
no.          (ft)        (ft)        (ft)        (ft)          (ft)

 1          270.0       441.0       290.0       441.0            .2
 2          310.0       441.0       330.0       441.0            .2


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by  7 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         271.36       443.19
         2         274.16       441.09
         3         324.19       441.03
         4         326.41       444.00
         5         328.97       447.10
         6         337.87       457.90
         7         342.16       463.10

 **  Corrected JANBU FOS =    3.309  **     (Fo factor = 1.077)


Failure surface No. 2 specified by  7 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         270.36       442.85
         2         272.78       441.04
         3         321.26       441.09
         4         323.43       444.00
         5         325.99       447.10
         6         334.89       457.90
         7         339.25       463.19

 **  Corrected JANBU FOS =    3.324  **     (Fo factor = 1.077)


Failure surface No. 3 specified by  7 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         272.22       443.47
```

```
          2         275.52       441.00
          3         326.81       441.06
          4         329.01       444.00
          5         331.56       447.10
          6         340.47       457.90
          7         344.69       463.03

 **  Corrected JANBU FOS =   3.334  **    (Fo factor = 1.076)


Failure surface No. 4 specified by  8 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         273.94       444.05
          2         273.99       444.00
          3         277.98       441.02
          4         320.82       441.06
          5         323.02       444.00
          6         325.58       447.10
          7         334.48       457.90
          8         338.85       463.20

 **  Corrected JANBU FOS =   3.341  **    (Fo factor = 1.079)


Failure surface No. 5 specified by  7 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         268.61       442.27
          2         270.22       441.06
          3         320.29       441.04
          4         322.50       444.00
          5         325.06       447.10
          6         333.96       457.90
          7         338.34       463.22

 **  Corrected JANBU FOS =   3.345  **    (Fo factor = 1.076)


Failure surface No. 6 specified by  7 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         269.90       442.70
          2         272.05       441.09
          3         327.38       441.04
          4         329.59       444.00
          5         332.15       447.10
          6         341.05       457.90
          7         345.26       463.01

 **  Corrected JANBU FOS =   3.350  **    (Fo factor = 1.075)
```

```
Failure surface No. 7 specified by  7 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          273.40       443.87
         2          277.17       441.05
         3          319.64       441.05
         4          321.85       444.00
         5          324.41       447.10
         6          333.31       457.90
         7          337.71       463.23

 **  Corrected JANBU FOS =    3.366  **     (Fo factor = 1.079)


Failure surface No. 8 specified by  8 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          276.22       444.81
         2          277.20       444.00
         3          281.09       441.09
         4          324.86       441.06
         5          327.06       444.00
         6          329.62       447.10
         7          338.52       457.90
         8          342.80       463.08

 **  Corrected JANBU FOS =    3.366  **     (Fo factor = 1.080)


Failure surface No. 9 specified by  8 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          274.62       444.27
         2          274.95       444.00
         3          278.84       441.09
         4          318.84       441.08
         5          321.02       444.00
         6          323.58       447.10
         7          332.48       457.90
         8          336.90       463.26

 **  Corrected JANBU FOS =    3.413  **     (Fo factor = 1.080)


Failure surface No.10 specified by  8 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)
```

```
          1        278.42      445.54
          2        280.29      444.00
          3        284.17      441.10
          4        327.13      441.08
          5        329.32      444.00
          6        331.87      447.10
          7        340.78      457.90
          8        344.99      463.02

 **  Corrected JANBU FOS =   3.456  **    (Fo factor = 1.080)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - EXCAVATION SEC 2-2E

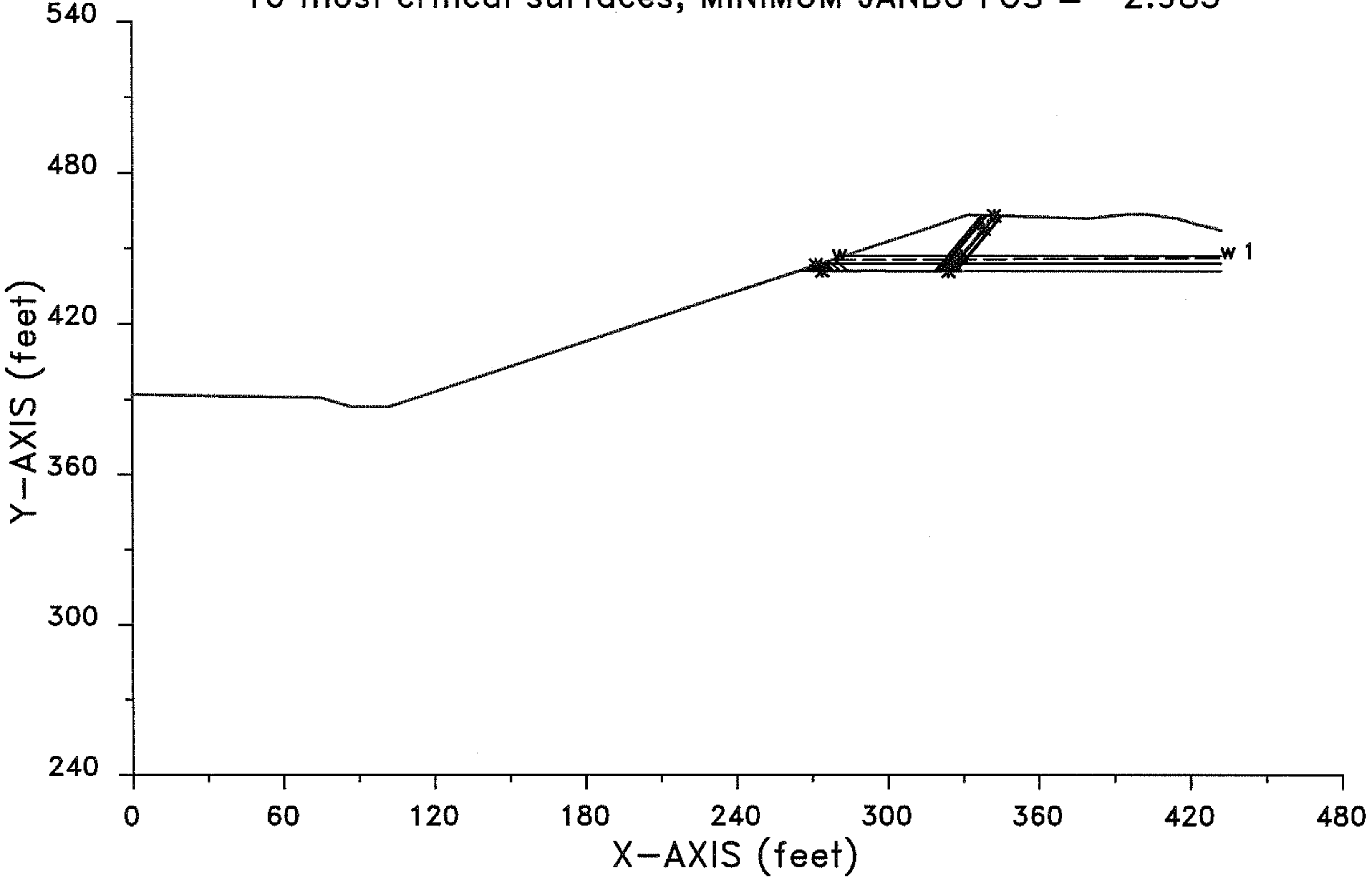
      Modified     Correction   Initial    Terminal    Available
     JANBU FOS       Factor     x-coord     x-coord     Strength
                                 (ft)        (ft)        (lb)

 1.     3.309        1.077      271.36      342.16     7.310E+04
 2.     3.324        1.077      270.36      339.25     6.996E+04
 3.     3.334        1.076      272.22      344.69     7.587E+04
 4.     3.341        1.079      273.94      338.85     6.766E+04
 5.     3.345        1.076      268.61      338.34     6.973E+04
 6.     3.350        1.075      269.90      345.26     7.772E+04
 7.     3.366        1.079      273.40      337.71     6.650E+04
 8.     3.366        1.080      276.22      342.80     7.170E+04
 9.     3.413        1.080      274.62      336.90     6.494E+04
10.     3.456        1.080      278.42      344.99     7.372E+04

                   * * *  END OF FILE  * * *
```

2-2T 3-19-12 88:31

CAMELOT LF - EXCAVATION SEC 2-2T
10 most critical surfaces, MINIMUM JANBU FOS = 2.983



```
XSTABL File: 2-2T       3-19-12   88:31

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *               using the               *
          *            Method of Slices           *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - EXCAVATION SEC 2-2T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       14 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      392.0        75.0      390.7           3
       2         75.0      390.7        86.9      387.0           3
       3         86.9      387.0       101.9      387.0           3
       4        101.9      387.0       264.8      441.0           3
       5        264.8      441.0       273.8      444.0           2
       6        273.8      444.0       283.1      447.1           1
       7        283.1      447.1       332.1      463.4           1
       8        332.1      463.4       379.6      462.0           1
       9        379.6      462.0       395.1      463.6           1
      10        395.1      463.6       402.8      463.6           1
      11        402.8      463.6       415.0      462.0           1
      12        415.0      462.0       422.4      459.7           1
      13        422.4      459.7       429.9      458.0           1
      14        429.9      458.0       432.1      457.3           1


        3 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1        283.1      447.1       432.1      447.1           1
       2        273.8      444.0       432.1      444.0           2
       3        264.8      441.0       432.1      441.0           3
```

```
--------------------------
ISOTROPIC Soil Parameters
--------------------------

 3 Soil unit(s) specified

Soil    Unit Weight    Cohesion  Friction    Pore Pressure      Water
Unit  Moist     Sat.   Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)    (pcf)     (psf)     (deg)      Ru       (psf)      No.

  1   127.0    131.0     788.0     11.50     .000         .0       1
  2   132.0    135.0     470.0      8.30     .000         .0       1
  3   130.0    135.0    5000.0       .00     .000         .0       0


----------------------------------------------------------------------
----
 UNDRAINED STRENGTHS as a function of effective vertical stress
                     have been specified for  2 Soil Unit(s)
----------------------------------------------------------------------
----


          Soil Unit #      Parameter a     Parameter Psi

               1.               788.0          11.50
               2.               470.0           8.30


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.         (ft)        (ft)

    1         278.20      445.40
    2         432.10      446.20


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.
```

```
  100 trial surfaces will be generated and analyzed.

  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     14.0 ft


Box         x-left     y-left     x-right    y-right       Width
no.          (ft)       (ft)       (ft)       (ft)          (ft)

 1          270.0      441.0      290.0      441.0            .2
 2          310.0      441.0      330.0      441.0            .2


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *



The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by  7 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         271.63       443.28
         2         274.16       441.09
         3         324.19       441.03
         4         326.76       444.00
         5         329.29       447.10
         6         338.15       457.94
         7         342.36       463.10

 **  Corrected JANBU FOS =   2.983  **    (Fo factor = 1.106)


Failure surface No. 2 specified by  7 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         272.54       443.58
         2         275.52       441.00
         3         326.81       441.06
         4         329.35       444.00
         5         331.88       447.10
```

```
          6         340.74       457.94
          7         344.89       463.02

  **   Corrected JANBU FOS =    2.986   **     (Fo factor = 1.105)


 Failure surface No. 3 specified by  7 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         270.11       442.77
          2         272.05       441.09
          3         327.38       441.04
          4         329.94       444.00
          5         332.47       447.10
          6         341.33       457.94
          7         345.47       463.01

  **   Corrected JANBU FOS =    2.995   **     (Fo factor = 1.103)


 Failure surface No. 4 specified by  7 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         270.59       442.93
          2         272.78       441.04
          3         321.26       441.09
          4         323.77       444.00
          5         326.30       447.10
          6         335.16       457.94
          7         339.44       463.18

  **   Corrected JANBU FOS =    3.016   **     (Fo factor = 1.106)


 Failure surface No. 5 specified by  8 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         276.59       444.93
          2         277.73       444.00
          3         281.09       441.09
          4         324.86       441.06
          5         327.41       444.00
          6         329.94       447.10
          7         338.80       457.94
          8         343.00       463.08

  **   Corrected JANBU FOS =    3.037   **     (Fo factor = 1.110)


 Failure surface No. 6 specified by  8 coordinate points
```

```
        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         274.32       444.17
          2         274.53       444.00
          3         277.98       441.02
          4         320.82       441.06
          5         323.36       444.00
          6         325.90       447.10
          7         334.76       457.94
          8         339.05       463.20

 **   Corrected JANBU FOS =    3.039   **     (Fo factor = 1.110)


Failure surface No. 7 specified by  7 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         268.76       442.32
          2         270.22       441.06
          3         320.29       441.04
          4         322.85       444.00
          5         325.38       447.10
          6         334.24       457.94
          7         338.54       463.21

 **   Corrected JANBU FOS =    3.039   **     (Fo factor = 1.105)


Failure surface No. 8 specified by  7 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         273.77       443.99
          2         277.17       441.05
          3         319.64       441.05
          4         322.19       444.00
          5         324.73       447.10
          6         333.58       457.94
          7         337.90       463.23

 **   Corrected JANBU FOS =    3.065   **     (Fo factor = 1.110)


Failure surface No. 9 specified by  8 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         278.78       445.66
          2         280.81       444.00
          3         284.17       441.10
          4         327.13       441.08
          5         329.66       444.00
```

```
         6        332.19       447.10
         7        341.05       457.94
         8        345.19       463.01

 **  Corrected JANBU FOS =   3.100  **    (Fo factor = 1.111)


Failure surface No.10 specified by  8 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1        274.99       444.40
         2        275.47       444.00
         3        278.84       441.09
         4        318.84       441.08
         5        321.37       444.00
         6        323.90       447.10
         7        332.76       457.94
         8        337.10       463.25

 **  Corrected JANBU FOS =   3.117  **    (Fo factor = 1.111)


*********************************************************************
**                                                                 **
**  Out of the    100 surfaces generated and analyzed by XSTABL,   **
**        4 surfaces were found to have MISLEADING FOS values.     **
**                                                                 **
*********************************************************************




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - EXCAVATION SEC 2-2T

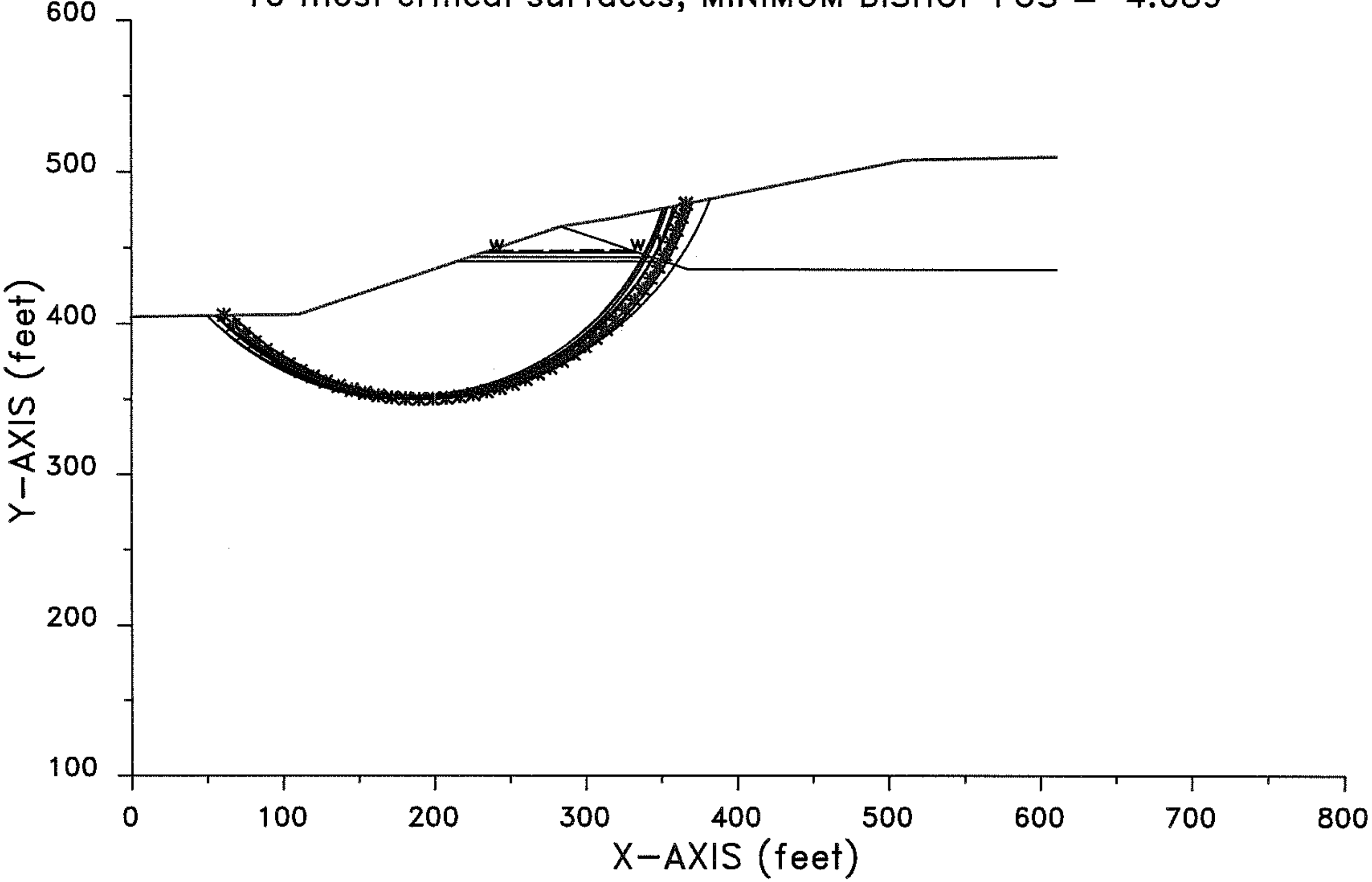
     Modified     Correction   Initial     Terminal    Available
    JANBU FOS       Factor     x-coord      x-coord     Strength
                                (ft)         (ft)        (lb)

 1.     2.983          1.106     271.63       342.36     6.261E+04
 2.     2.986          1.105     272.54       344.89     6.439E+04
 3.     2.995          1.103     270.11       345.47     6.597E+04
 4.     3.016          1.106     270.59       339.44     6.049E+04
 5.     3.037          1.110     276.59       343.00     6.122E+04
 6.     3.039          1.110     274.32       339.05     5.849E+04
 7.     3.039          1.105     268.76       338.54     6.052E+04
 8.     3.065          1.110     273.77       337.90     5.763E+04
 9.     3.100          1.111     278.78       345.19     6.244E+04
10.     3.117          1.111     274.99       337.10     5.645E+04

                     * * *  END OF FILE  * * *
```

3-1E 10-10-11 35:14

CAMELOT LF – EXCAVATION SEC 3-1E
10 most critical surfaces, MINIMUM BISHOP FOS = 4.089



```
XSTABL File: 3-1E      10-10-11   35:14

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *               using the               *
          *            Method of Slices           *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - EXCAVATION SEC 3-1E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
      No.       (ft)      (ft)      (ft)      (ft)    Below Segment

       1          .0     404.7     110.5     406.3          3
       2       110.5     406.3     215.0     441.1          3
       3       215.0     441.1     224.0     444.1          2
       4       224.0     444.1     233.0     447.1          1
       5       233.0     447.1     283.7     464.0          1
       6       283.7     464.0     320.6     470.0          4
       7       320.6     470.0     510.6     508.0          4
       8       510.6     508.0     610.6     510.0          4


        8 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
      No.       (ft)      (ft)      (ft)      (ft)    Below Segment

       1       283.7     464.0     334.4     447.1          1
       2       334.4     447.1     343.4     444.1          1
       3       343.4     444.1     352.4     441.1          2
       4       352.4     441.1     367.7     436.0          3
       5       367.7     436.0     610.6     436.0          3
       6       233.0     447.1     334.4     447.1          1
       7       224.0     444.1     343.4     444.1          2
       8       215.0     441.1     352.4     441.1          3
```

```
---------------------------
ISOTROPIC Soil Parameters
---------------------------

 4 Soil unit(s) specified

Soil    Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)     Ru        (psf)      No.

  1   127.0   131.0     854.0    11.00     .000          .0       1
  2   132.0   135.0     488.0    16.40     .000          .0       1
  3   130.0   135.0    5000.0      .00     .000          .0       0
  4    65.0    65.0     288.0    23.00     .000          .0       1


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1         236.60      448.30
    2         329.80      448.60


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     50.0 ft
                               and  x =    100.0 ft


Each surface terminates between   x =    350.0 ft
                              and   x =    400.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =    350.0 ft
```

```
* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    9.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=    -5.0 degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 44 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1           61.11       405.58
         2           67.53       399.28
         3           74.25       393.29
         4           81.26       387.65
         5           88.54       382.36
         6           96.07       377.43
         7          103.84       372.88
         8          111.82       368.72
         9          120.00       364.96
        10          128.35       361.61
        11          136.86       358.68
        12          145.50       356.16
        13          154.26       354.08
        14          163.11       352.44
        15          172.02       351.23
        16          180.99       350.46
        17          189.99       350.14
        18          198.99       350.26
        19          207.97       350.83
        20          216.91       351.84
        21          225.79       353.29
        22          234.59       355.17
        23          243.29       357.49
        24          251.86       360.23
```

```
            25          260.29      363.40
            26          268.55      366.98
            27          276.62      370.96
            28          284.48      375.33
            29          292.12      380.09
            30          299.52      385.21
            31          306.65      390.70
            32          313.51      396.53
            33          320.06      402.70
            34          326.31      409.18
            35          332.23      415.96
            36          337.80      423.02
            37          343.02      430.36
            38          347.88      437.94
            39          352.35      445.75
            40          356.43      453.77
            41          360.11      461.98
            42          363.38      470.37
            43          366.23      478.90
            44          366.30      479.14

****  Simplified BISHOP FOS =   4.089  ****




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - EXCAVATION SEC 3-1E

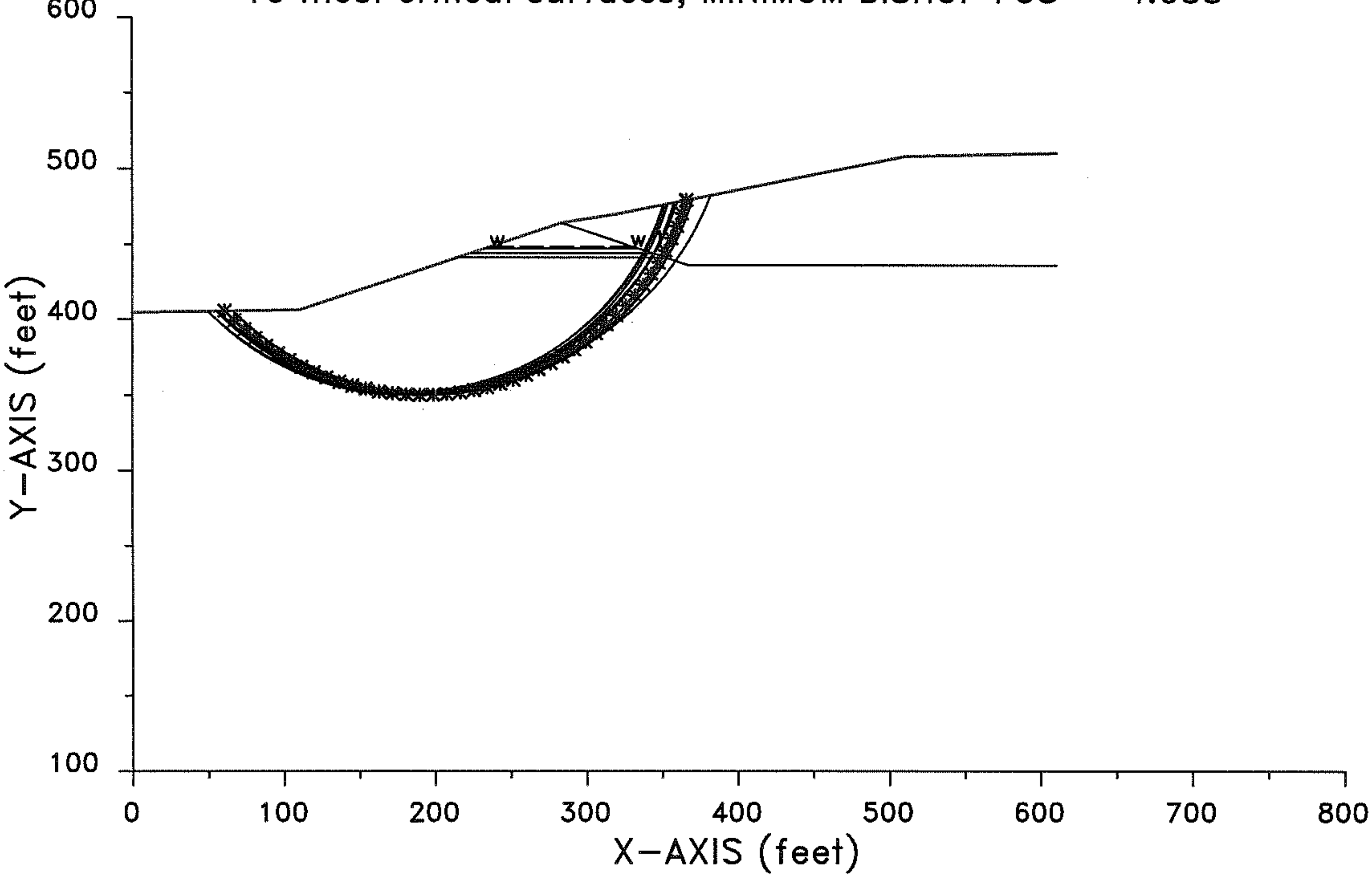
      FOS      Circle Center    Radius  Initial Terminal  Resisting
    (BISHOP)  x-coord  y-coord          x-coord  x-coord    Moment
               (ft)     (ft)     (ft)     (ft)     (ft)     (ft-lb)

 1.   4.089   192.02   532.36   182.23    61.11   366.30  3.115E+08
 2.   4.091   185.95   533.63   182.82    55.56   360.02  3.111E+08
 3.   4.091   184.13   527.74   177.41    55.56   353.99  2.986E+08
 4.   4.094   182.59   538.02   187.51    50.00   360.17  3.235E+08
 5.   4.099   192.73   555.60   203.33    55.56   382.40  3.584E+08
 6.   4.100   196.85   531.46   181.03    66.67   370.38  3.078E+08
 7.   4.101   179.59   529.86   179.66    50.00   350.95  3.043E+08
 8.   4.103   191.89   524.55   172.67    66.67   357.96  2.841E+08
 9.   4.105   196.51   533.01   181.87    66.67   370.44  3.084E+08
10.   4.106   182.72   530.03   177.99    55.56   352.38  2.962E+08

                    * * *  END OF FILE  * * *
```

3-1T 10-10-11 35:12

CAMELOT LF - EXCAVATION SEC 3-1T
10 most critical surfaces, MINIMUM BISHOP FOS = 4.088



```
XSTABL File: 3-1T      10-10-11   35:12

          ******************************************
          *                X S T A B L             *
          *                                        *
          *         Slope Stability Analysis       *
          *               using the                *
          *            Method of Slices            *
          *                                        *
          *         Copyright (C) 1992 - 2008      *
          *    Interactive Software Designs, Inc.  *
          *         Moscow, ID 83843, U.S.A.       *
          *                                        *
          *           All Rights Reserved          *
          *                                        *
          *  Ver. 5.208                 96 - 2046  *
          ******************************************


    Problem Description : CAMELOT LF - EXCAVATION SEC 3-1T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      404.7       110.5      406.3          3
       2        110.5      406.3       215.0      441.1          3
       3        215.0      441.1       224.0      444.1          2
       4        224.0      444.1       233.0      447.1          1
       5        233.0      447.1       283.7      464.0          1
       6        283.7      464.0       320.6      470.0          4
       7        320.6      470.0       510.6      508.0          4
       8        510.6      508.0       610.6      510.0          4


        8 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

       1        283.7      464.0       334.4      447.1          1
       2        334.4      447.1       343.4      444.1          1
       3        343.4      444.1       352.4      441.1          2
       4        352.4      441.1       367.7      436.0          3
       5        367.7      436.0       610.6      436.0          3
       6        233.0      447.1       334.4      447.1          1
       7        224.0      444.1       343.4      444.1          2
       8        215.0      441.1       352.4      441.1          3
```

```
          --------------------------
          ISOTROPIC Soil Parameters
          --------------------------

           4 Soil unit(s) specified

          Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
          Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
           No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.

            1   127.0   131.0     788.0    11.50     .000         .0       1
            2   132.0   135.0     470.0     8.30     .000         .0       1
            3   130.0   135.0    5000.0      .00     .000         .0       0
            4    65.0    65.0     288.0    23.00     .000         .0       1


          ----------------------------------------------------------------------
----

           UNDRAINED STRENGTHS as a function of effective vertical stress
                               have been specified for  2 Soil Unit(s)
          ----------------------------------------------------------------------
----


                    Soil Unit #      Parameter a     Parameter Psi

                         1.              788.0           11.50
                         2.              470.0            8.30


           1 Water surface(s) have been specified

          Unit weight of water =    62.40  (pcf)


          Water Surface No.  1 specified by  2 coordinate points

          **********************************
                   PHREATIC SURFACE,
          **********************************

            Point       x-water      y-water
             No.          (ft)         (ft)

              1         236.60       448.30
              2         329.80       448.60


          A critical failure surface searching method, using a random
          technique for generating CIRCULAR surfaces has been specified.


            100 trial surfaces will be generated and analyzed.
```

```
  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     50.0 ft
                             and  x =    100.0 ft


Each surface terminates between   x =    350.0 ft
                            and   x =    400.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =    350.0 ft



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    9.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=    -5.0 degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 44 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1          61.11       405.58
         2          67.53       399.28
         3          74.25       393.29
         4          81.26       387.65
         5          88.54       382.36
         6          96.07       377.43
         7         103.84       372.88
         8         111.82       368.72
         9         120.00       364.96
        10         128.35       361.61
        11         136.86       358.68
```

```
          12          145.50        356.16
          13          154.26        354.08
          14          163.11        352.44
          15          172.02        351.23
          16          180.99        350.46
          17          189.99        350.14
          18          198.99        350.26
          19          207.97        350.83
          20          216.91        351.84
          21          225.79        353.29
          22          234.59        355.17
          23          243.29        357.49
          24          251.86        360.23
          25          260.29        363.40
          26          268.55        366.98
          27          276.62        370.96
          28          284.48        375.33
          29          292.12        380.09
          30          299.52        385.21
          31          306.65        390.70
          32          313.51        396.53
          33          320.06        402.70
          34          326.31        409.18
          35          332.23        415.96
          36          337.80        423.02
          37          343.02        430.36
          38          347.88        437.94
          39          352.35        445.75
          40          356.43        453.77
          41          360.11        461.98
          42          363.38        470.37
          43          366.23        478.90
          44          366.30        479.14

****  Simplified BISHOP FOS =    4.088   ****



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - EXCAVATION SEC 3-1T

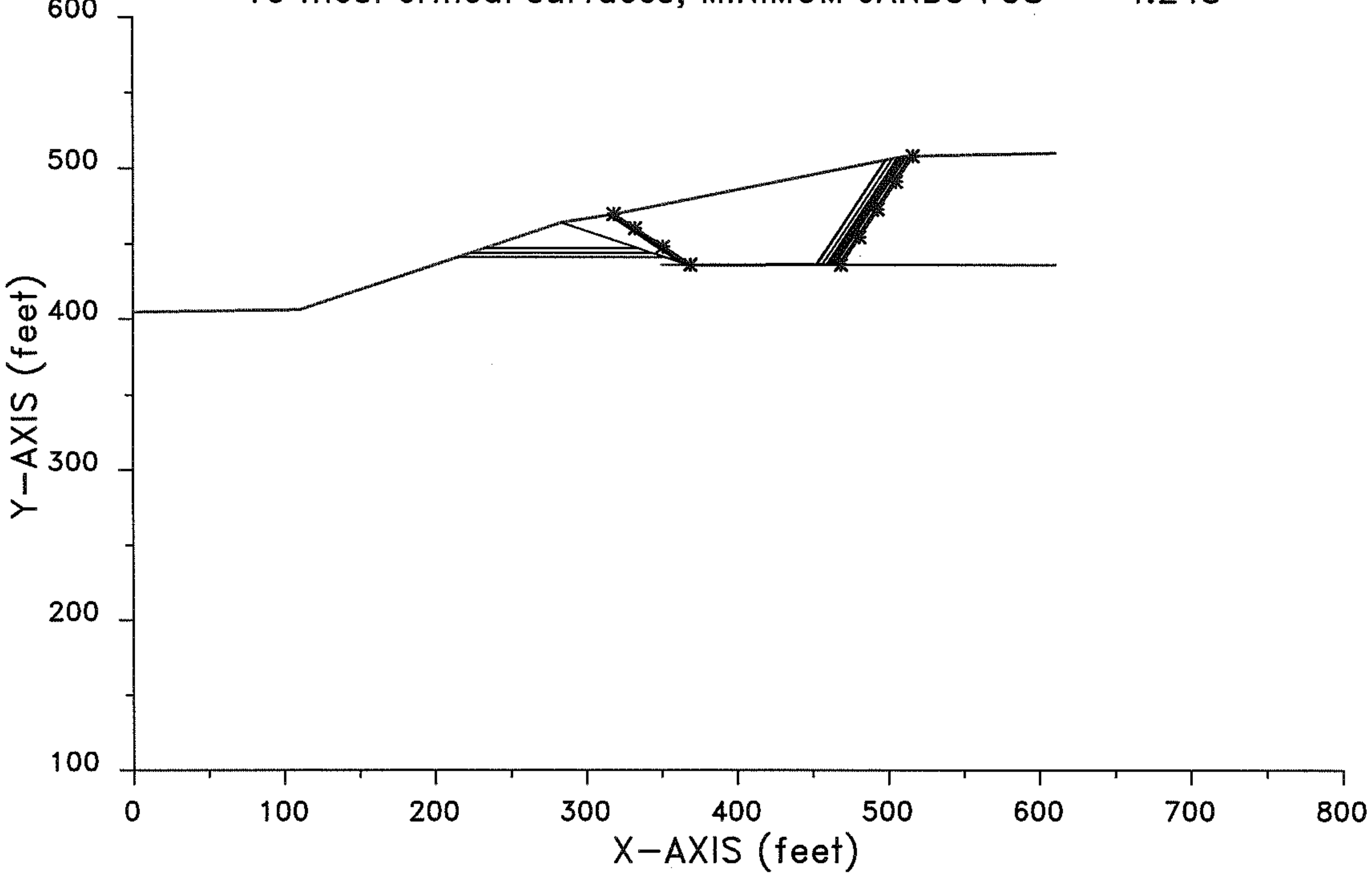
       FOS      Circle Center      Radius   Initial Terminal  Resisting
    (BISHOP)  x-coord  y-coord             x-coord  x-coord    Moment
                (ft)     (ft)       (ft)     (ft)     (ft)     (ft-lb)

 1.    4.088    192.02   532.36    182.23    61.11   366.30  3.115E+08
 2.    4.089    184.13   527.74    177.41    55.56   353.99  2.985E+08
 3.    4.089    185.95   533.63    182.82    55.56   360.02  3.110E+08
 4.    4.092    182.59   538.02    187.51    50.00   360.17  3.234E+08
 5.    4.099    192.73   555.60    203.33    55.56   382.40  3.584E+08
 6.    4.099    179.59   529.86    179.66    50.00   350.95  3.042E+08
 7.    4.100    196.85   531.46    181.03    66.67   370.38  3.078E+08
 8.    4.101    191.89   524.55    172.67    66.67   357.96  2.840E+08
```

```
  9.   4.104    182.72   530.03   177.99    55.56   352.38  2.961E+08
 10.   4.105    196.51   533.01   181.87    66.67   370.44  3.084E+08

                      * * *  END OF FILE  * * *
```

3-2E 10-10-11 35:01



CAMELOT LF - EXCAVATION SEC 3-2E
10 most critical surfaces, MINIMUM JANBU FOS = 4.248

```
XSTABL File: 3-2E      10-10-11   35:01

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *               using the               *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - EXCAVATION SEC 3-2E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left    y-left    x-right   y-right    Soil Unit
      No.        (ft)      (ft)       (ft)      (ft)    Below Segment

       1           .0     404.7      110.5     406.3         3
       2        110.5     406.3      215.0     441.1         3
       3        215.0     441.1      224.0     444.1         2
       4        224.0     444.1      233.0     447.1         1
       5        233.0     447.1      283.7     464.0         1
       6        283.7     464.0      320.6     470.0         4
       7        320.6     470.0      510.6     508.0         4
       8        510.6     508.0      610.6     510.0         4


        8 SUBSURFACE boundary segments

    Segment     x-left    y-left    x-right   y-right    Soil Unit
      No.        (ft)      (ft)       (ft)      (ft)    Below Segment

       1        283.7     464.0      334.4     447.1         1
       2        334.4     447.1      343.4     444.1         1
       3        343.4     444.1      352.4     441.1         2
       4        352.4     441.1      367.7     436.0         3
       5        367.7     436.0      610.6     436.0         3
       6        233.0     447.1      334.4     447.1         1
       7        224.0     444.1      343.4     444.1         2
       8        215.0     441.1      352.4     441.1         3
```

```
--------------------------
ISOTROPIC Soil Parameters
--------------------------

 4 Soil unit(s) specified

Soil    Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00     .000         .0       1
  2   132.0   135.0     488.0    16.40     .000         .0       1
  3   130.0   135.0    5000.0      .00     .000         .0       0
  4    65.0    65.0     288.0    23.00     .000         .0       1


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     22.0 ft


Box         x-left     y-left    x-right    y-right      Width
no.          (ft)       (ft)       (ft)       (ft)        (ft)

 1          350.0      436.0      370.0      436.0          .2
 2          450.0      436.0      470.0      436.0          .2


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first
```

```
Failure surface No. 1 specified by  9 coordinate points

      Point       x-surf       y-surf
       No.         (ft)         (ft)

        1         318.43       469.65
        2         332.55       460.31
        3         350.89       448.16
        4         369.24       436.02
        5         468.79       436.07
        6         480.93       454.42
        7         493.07       472.77
        8         505.21       491.11
        9         516.47       508.12

 **  Corrected JANBU FOS =    4.248   **     (Fo factor = 1.087)


Failure surface No. 2 specified by  9 coordinate points

      Point       x-surf       y-surf
       No.         (ft)         (ft)

        1         318.49       469.66
        2         332.57       460.33
        3         350.92       448.19
        4         369.26       436.05
        5         463.19       436.09
        6         475.33       454.44
        7         487.47       472.78
        8         499.61       491.13
        9         510.78       508.00

 **  Corrected JANBU FOS =    4.297   **     (Fo factor = 1.088)


Failure surface No. 3 specified by  9 coordinate points

      Point       x-surf       y-surf
       No.         (ft)         (ft)

        1         318.55       469.67
        2         332.67       460.32
        3         351.02       448.18
        4         369.36       436.03
        5         459.32       436.08
        6         471.46       454.43
        7         483.61       472.77
        8         495.75       491.12
        9         506.36       507.15

 **  Corrected JANBU FOS =    4.336   **     (Fo factor = 1.088)


Failure surface No. 4 specified by 10 coordinate points

      Point       x-surf       y-surf
```

```
            No.         (ft)         (ft)

             1         316.83       469.39
             2         330.14       460.58
             3         348.48       448.43
             4         366.83       436.29
             5         367.06       436.06
             6         460.57       436.01
             7         472.71       454.36
             8         484.85       472.70
             9         497.00       491.05
            10         507.85       507.45

     **   Corrected JANBU FOS =    4.343   **     (Fo factor = 1.088)


    Failure surface No. 5 specified by  9 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1         318.92       469.73
             2         333.17       460.29
             3         351.52       448.15
             4         369.86       436.01
             5         456.38       436.09
             6         468.52       454.43
             7         480.66       472.78
             8         492.80       491.12
             9         502.96       506.47

     **   Corrected JANBU FOS =    4.371   **     (Fo factor = 1.088)


    Failure surface No. 6 specified by 10 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1         316.20       469.28
             2         328.57       461.10
             3         346.91       448.96
             4         365.26       436.81
             5         366.02       436.05
             6         464.68       436.03
             7         476.83       454.38
             8         488.97       472.72
             9         501.11       491.07
            10         512.34       508.03

     **   Corrected JANBU FOS =    4.382   **     (Fo factor = 1.088)


    Failure surface No. 7 specified by  9 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)
```

```
               1         317.55       469.50
               2         331.44       460.31
               3         349.79       448.17
               4         368.13       436.03
               5         452.31       436.08
               6         464.46       454.43
               7         476.60       472.77
               8         488.74       491.12
               9         498.28       505.54

 **   Corrected JANBU FOS =    4.399   **     (Fo factor = 1.088)


Failure surface No. 8 specified by  9 coordinate points

            Point        x-surf       y-surf
             No.          (ft)         (ft)

               1         318.75       469.70
               2         332.83       460.38
               3         351.17       448.24
               4         369.52       436.10
               5         452.77       436.03
               6         464.92       454.38
               7         477.06       472.72
               8         489.20       491.07
               9         498.85       505.65

 **   Corrected JANBU FOS =    4.409   **     (Fo factor = 1.088)


Failure surface No. 9 specified by 10 coordinate points

            Point        x-surf       y-surf
             No.          (ft)         (ft)

               1         315.98       469.25
               2         328.02       461.28
               3         346.37       449.14
               4         364.71       437.00
               5         365.62       436.08
               6         461.95       436.04
               7         474.09       454.39
               8         486.24       472.73
               9         498.38       491.08
              10         509.43       507.77

 **   Corrected JANBU FOS =    4.434   **     (Fo factor = 1.088)


Failure surface No.10 specified by 10 coordinate points

            Point        x-surf       y-surf
             No.          (ft)         (ft)

               1         315.12       469.11
```

```
           2          325.86        462.00
           3          344.21        449.86
           4          362.55        437.72
           5          364.17        436.10
           6          467.13        436.08
           7          479.27        454.42
           8          491.41        472.77
           9          503.56        491.11
          10          514.79        508.08

   **   Corrected JANBU FOS =    4.484   **     (Fo factor = 1.087)




 The following is a summary of the TEN most critical surfaces

 Problem Description : CAMELOT LF - EXCAVATION SEC 3-2E

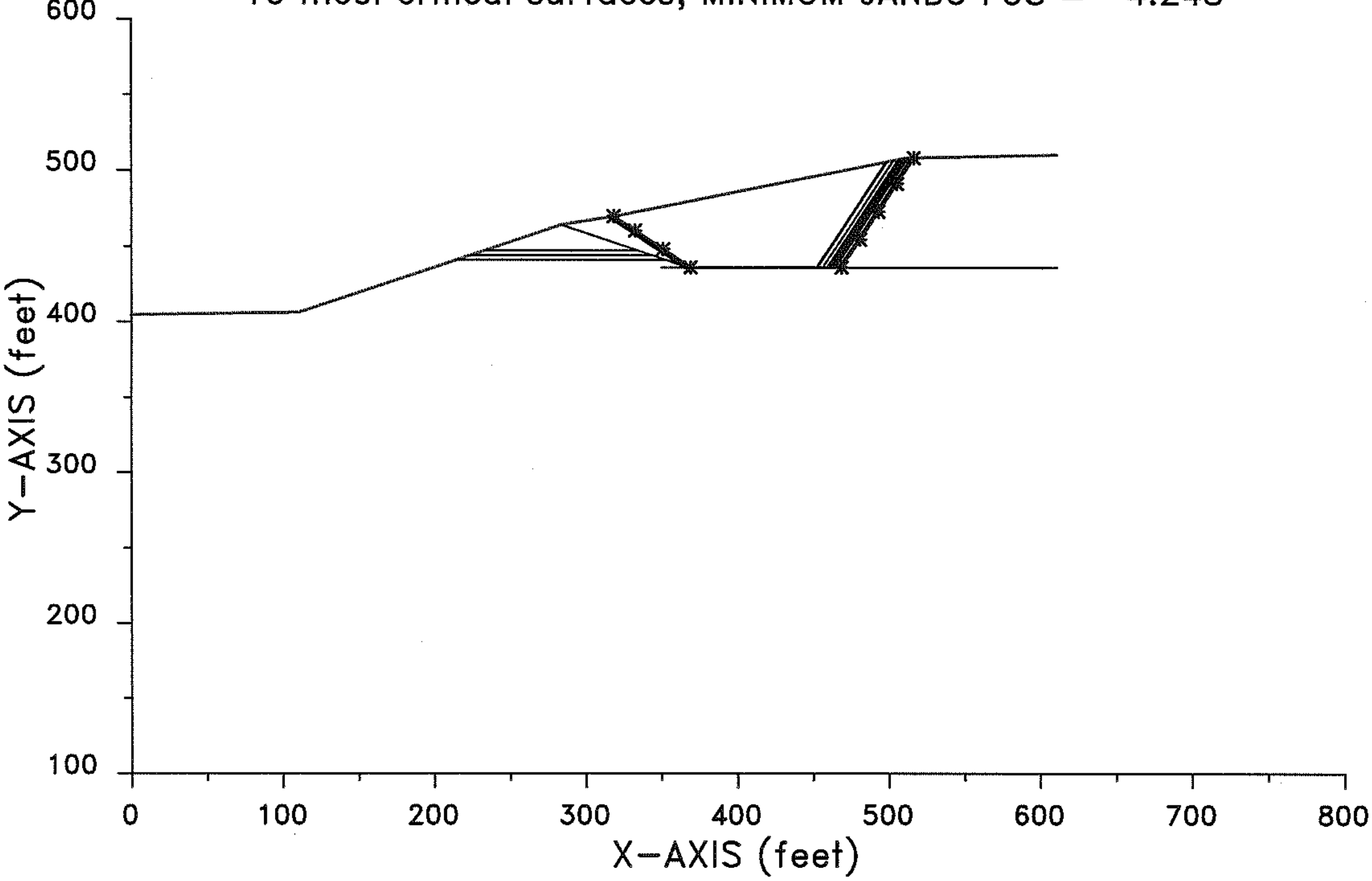
       Modified       Correction    Initial     Terminal    Available
      JANBU FOS        Factor       x-coord      x-coord     Strength
                                     (ft)         (ft)         (lb)

  1.     4.248         1.087       318.43       516.47     3.218E+05
  2.     4.297         1.088       318.49       510.78     3.081E+05
  3.     4.336         1.088       318.55       506.36     2.986E+05
  4.     4.343         1.088       316.83       507.85     3.069E+05
  5.     4.371         1.088       318.92       502.96     2.910E+05
  6.     4.382         1.088       316.20       512.34     3.243E+05
  7.     4.399         1.088       317.55       498.28     2.829E+05
  8.     4.409         1.088       318.75       498.85     2.826E+05
  9.     4.434         1.088       315.98       509.43     3.197E+05
 10.     4.484         1.087       315.12       514.79     3.419E+05

                    * * *  END OF FILE  * * *
```

3-2T 3-19-12 88:29

CAMELOT LF – EXCAVATION SEC 3-2T
10 most critical surfaces, MINIMUM JANBU FOS = 4.248



```
XSTABL File: 3-2T       3-19-12   88:29

             ******************************************
             *               X S T A B L              *
             *                                        *
             *        Slope Stability Analysis        *
             *              using the                 *
             *           Method of Slices             *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             * Ver. 5.208                 96 - 2046   *
             ******************************************


    Problem Description : CAMELOT LF - EXCAVATION SEC 3-2T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)    Below Segment

       1           .0      404.7       110.5      406.3          3
       2        110.5      406.3       215.0      441.1          3
       3        215.0      441.1       224.0      444.1          2
       4        224.0      444.1       233.0      447.1          1
       5        233.0      447.1       283.7      464.0          1
       6        283.7      464.0       320.6      470.0          4
       7        320.6      470.0       510.6      508.0          4
       8        510.6      508.0       610.6      510.0          4


        8 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)    Below Segment

       1        283.7      464.0       334.4      447.1          1
       2        334.4      447.1       343.4      444.1          1
       3        343.4      444.1       352.4      441.1          2
       4        352.4      441.1       367.7      436.0          3
       5        367.7      436.0       610.6      436.0          3
       6        233.0      447.1       334.4      447.1          1
       7        224.0      444.1       343.4      444.1          2
       8        215.0      441.1       352.4      441.1          3
```

```
--------------------------
ISOTROPIC Soil Parameters
--------------------------

 4 Soil unit(s) specified

Soil   Unit Weight   Cohesion Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept  Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)    (deg)      Ru       (psf)     No.

  1   127.0   131.0     788.0   11.50     .000         .0       1
  2   132.0   135.0     470.0    8.30     .000         .0       1
  3   130.0   135.0    5000.0     .00     .000         .0       0
  4    65.0    65.0     288.0   23.00     .000         .0       1


----------------------------------------------------------------------
----

 UNDRAINED STRENGTHS as a function of effective vertical stress
                    have been specified for  2 Soil Unit(s)
----------------------------------------------------------------------
----


          Soil Unit #      Parameter a     Parameter Psi

               1.               788.0           11.50
               2.               470.0            8.30


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     22.0 ft


Box         x-left     y-left    x-right    y-right      Width
no.          (ft)       (ft)       (ft)       (ft)        (ft)
```

```
 1          350.0       436.0       370.0       436.0           .2
 2          450.0       436.0       470.0       436.0           .2


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by  9 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          318.43       469.65
         2          332.55       460.31
         3          350.89       448.16
         4          369.24       436.02
         5          468.79       436.07
         6          480.93       454.42
         7          493.07       472.77
         8          505.21       491.11
         9          516.47       508.12

 **  Corrected JANBU FOS =    4.248   **     (Fo factor = 1.087)


Failure surface No. 2 specified by  9 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          318.49       469.66
         2          332.57       460.33
         3          350.92       448.19
         4          369.26       436.05
         5          463.19       436.09
         6          475.33       454.44
         7          487.47       472.78
         8          499.61       491.13
         9          510.78       508.00

 **  Corrected JANBU FOS =    4.297   **     (Fo factor = 1.088)


Failure surface No. 3 specified by  9 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          318.55       469.67
         2          332.67       460.32
```

```
          3         351.02       448.18
          4         369.36       436.03
          5         459.32       436.08
          6         471.46       454.43
          7         483.61       472.77
          8         495.75       491.12
          9         506.36       507.15

 **  Corrected JANBU FOS =   4.336  **    (Fo factor = 1.088)


Failure surface No. 4 specified by 10 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1         316.83       469.39
          2         330.14       460.58
          3         348.48       448.43
          4         366.83       436.29
          5         367.06       436.06
          6         460.57       436.01
          7         472.71       454.36
          8         484.85       472.70
          9         497.00       491.05
         10         507.85       507.45

 **  Corrected JANBU FOS =   4.343  **    (Fo factor = 1.088)


Failure surface No. 5 specified by  9 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1         318.92       469.73
          2         333.17       460.29
          3         351.52       448.15
          4         369.86       436.01
          5         456.38       436.09
          6         468.52       454.43
          7         480.66       472.78
          8         492.80       491.12
          9         502.96       506.47

 **  Corrected JANBU FOS =   4.371  **    (Fo factor = 1.088)


Failure surface No. 6 specified by 10 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1         316.20       469.28
          2         328.57       461.10
          3         346.91       448.96
          4         365.26       436.81
```

```
          5         366.02       436.05
          6         464.68       436.03
          7         476.83       454.38
          8         488.97       472.72
          9         501.11       491.07
         10         512.34       508.03

 **  Corrected JANBU FOS =   4.382  **    (Fo factor = 1.088)


Failure surface No. 7 specified by  9 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

          1         317.55       469.50
          2         331.44       460.31
          3         349.79       448.17
          4         368.13       436.03
          5         452.31       436.08
          6         464.46       454.43
          7         476.60       472.77
          8         488.74       491.12
          9         498.28       505.54

 **  Corrected JANBU FOS =   4.399  **    (Fo factor = 1.088)


Failure surface No. 8 specified by  9 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

          1         318.75       469.70
          2         332.83       460.38
          3         351.17       448.24
          4         369.52       436.10
          5         452.77       436.03
          6         464.92       454.38
          7         477.06       472.72
          8         489.20       491.07
          9         498.85       505.65

 **  Corrected JANBU FOS =   4.409  **    (Fo factor = 1.088)


Failure surface No. 9 specified by 10 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

          1         315.98       469.25
          2         328.02       461.28
          3         346.37       449.14
          4         364.71       437.00
          5         365.62       436.08
          6         461.95       436.04
```

```
          7        474.09       454.39
          8        486.24       472.73
          9        498.38       491.08
         10        509.43       507.77

  **  Corrected JANBU FOS =   4.434  **    (Fo factor = 1.088)


Failure surface No.10 specified by 10 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

          1        315.12       469.11
          2        325.86       462.00
          3        344.21       449.86
          4        362.55       437.72
          5        364.17       436.10
          6        467.13       436.08
          7        479.27       454.42
          8        491.41       472.77
          9        503.56       491.11
         10        514.79       508.08

  **  Corrected JANBU FOS =   4.484  **    (Fo factor = 1.087)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - EXCAVATION SEC 3-2T

      Modified     Correction   Initial     Terminal    Available
     JANBU FOS       Factor     x-coord     x-coord      Strength
                                  (ft)        (ft)         (lb)

  1.      4.248        1.087     318.43      516.47     3.218E+05
  2.      4.297        1.088     318.49      510.78     3.081E+05
  3.      4.336        1.088     318.55      506.36     2.986E+05
  4.      4.343        1.088     316.83      507.85     3.069E+05
  5.      4.371        1.088     318.92      502.96     2.910E+05
  6.      4.382        1.088     316.20      512.34     3.243E+05
  7.      4.399        1.088     317.55      498.28     2.829E+05
  8.      4.409        1.088     318.75      498.85     2.826E+05
  9.      4.434        1.088     315.98      509.43     3.197E+05
 10.      4.484        1.087     315.12      514.79     3.419E+05

                    * * *  END OF FILE  * * *
```

APPENDIX IIIJ-A-2

SLOPE STABILITY ANALYSIS FOR INTERIM FILL SLOPE

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER

3-23-12

Includes pages IIIJ-A-2-1 through IIIJ-A-2-54

Prep By: JLG
Date: 3/21/2012

Chkd By:
Date: 7-23-12

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-A
INTERIM SLOPE STABILITY ANALYSIS

Required: Evaluate the slope stability of the landfill interim slopes for the undeveloped area.

Given: Typical interim slope section locations are illustrated on Sheets IIIJ-A-2-3 and IIIJ-A-2-4.

Method:

A. Evaluate the stability of the proposed interim fill slopes
1. Determine the most critical excavation slopes in the proposed design.
2. Generalize a soil profile for the critical section using available boring logs.
3. Select material properties using average unit weights and strength parameters. (Laboratory testing summaries for the site soils are provided in Appendix IIIJ-C).
4. Perform stability analyses.
    a. Analyze the worst-case interim fill slope using XSTABL 5.2, Simplified Bishop method of circular failure surfaces, and Rankine's method of block failure surfaces. Use undrained and drained strength parameters to model the end of construction conditions.

References:

1. XSTABL 5.2 (computer program for slope stability analyses), Interactive Software Designs, Inc.
2. Day, Robert W., *Geotechnical Engineer's Portable Handbook*, McGraw-Hill, 2000.
3. Koerner, Robert M., Designing with Geosynthetics, 5th Ed., Prentice-Hall, Inc., 2005.
4. Appendix IIIG - Geology Report

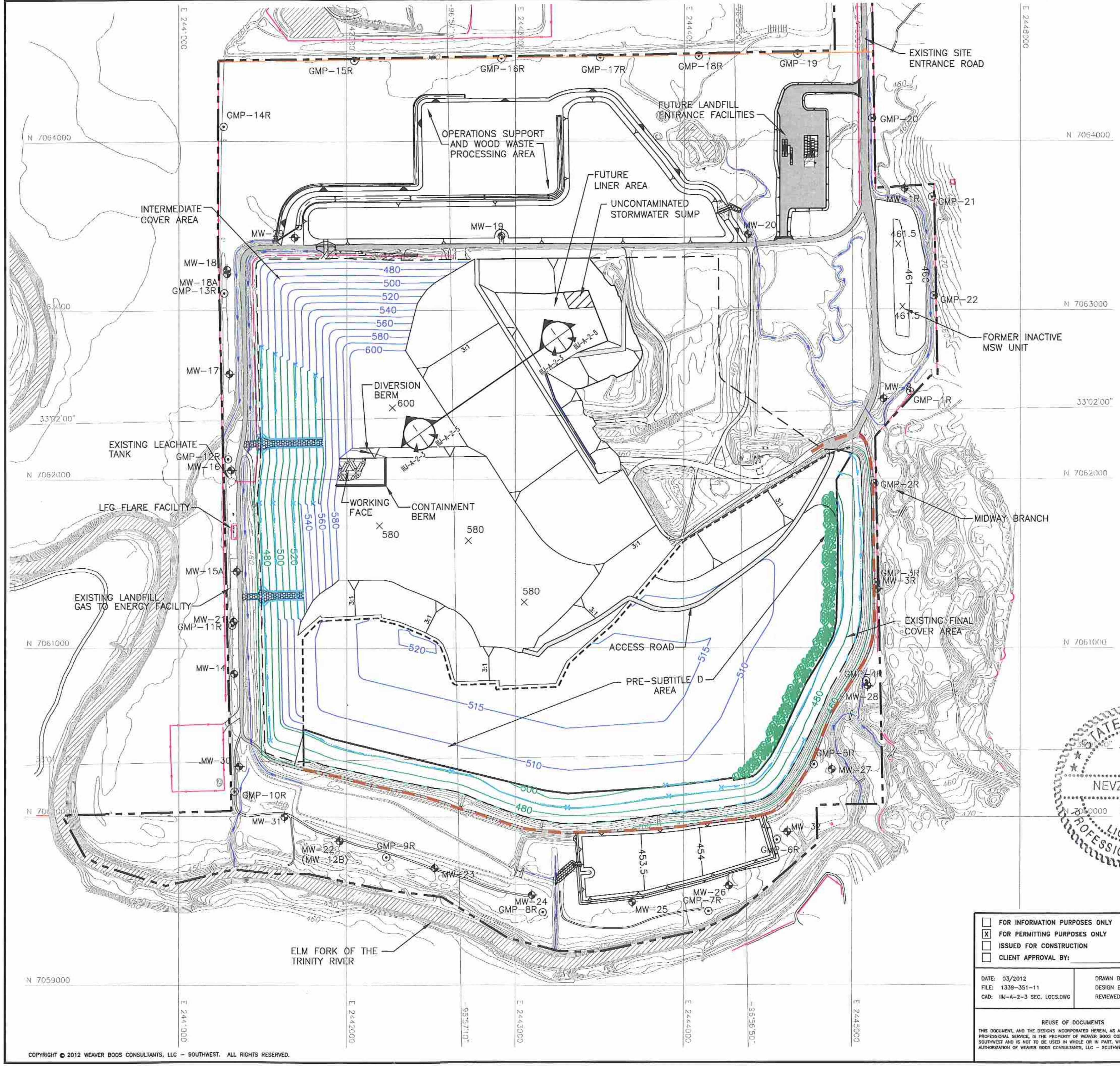
CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-A
INTERIM SLOPE STABILITY ANALYSIS

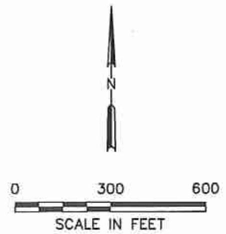
Chkd By: TV
Date: 3-23-12

Solution: A. Slope stability analyses of the proposed interim slopes

1. The locations of the most critical sections selected for the stability analysis for the proposed slopes are shown on Sheets IIIJ-A-2-3 and IIIJ-A-2-4. Sections analyzed are shown with the most critical failure surfaces on Sheets IIIJ-A-2-5 and IIIJ-A-2-6.
2. The soil profile used for each analysis was based on boring log data from previous site investigations (see Appendix IIIG-B) from the undeveloped area of the site and the geologic cross sections (see Appendix IIIG-C).
3. A summary table of the assumed material weight and strength properties is provided on Sheets IIIJ-A-2-7 through IIIJ-A-2-8. The material weight and strength parameter determination for each material type was based on previous laboratory testing results (Atterburg limits, natural moisture contents, unit weight, percent finer than #200 sieve, Standard Proctor, and strength testing , e.g. unconfined compression) and engineering judgment from previous experience with similar materials. Laboratory testing results for the site soils are included in Appendix IIIJ-C.
4. The output from the slope stability analyses on the interim fill slopes are provided on Sheets IIIJ-A-2-10 through IIIJ-A-2-54. A summary of the output can be seen on Sheet IIIJ-A-2-9.

Conclusion: Based on the above slope stability analyses, the proposed interim slopes have adequate factors of safety to be considered stable.





LEGEND

— - —	PERMIT BOUNDARY
— — —	LIMITS OF WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
500	EXISTING CONTOUR
400	PROPOSED FINAL COVER CONTOUR
▨	DRAINAGE LETDOWN
—x—	DRAINAGE SWALE
560	PROPOSED INTERMEDIATE COVER CONTOUR
600	REGRADED BUFFER ZONE AREA
— - —	LEACHATE FORCEMAIN
——	EXISTING FENCE
——	PROPOSED FENCE
— · —	APPROXIMATE LOCATION OF PROPOSED SLURRY WALL
MW-8	EXISTING GROUNDWATER MONITORING WELL
GMP-13	EXISTING LANDFILL GAS MONITORING PROBE

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. THE SECTOR DEVELOPMENT SHOWN IS FOR GENERAL CONDITIONS AND MAY NOT REFLECT THE EXACT CONFIGURATION OF THE LANDFILL. IF INTERIM 3H:1V SLOPES LONGER THAN 544 FEET ARE DEVELOPED DURING SITE OPERATIONS AN ADDITIONAL ANALYSIS WILL BE COMPLETED.

NEVZAT TURAN
84059

3-23-12

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DATE: 03/2012
FILE: 1339-351-11
CAD: IIIJ-A-2-3 SEC. LOCS.DWG

DRAWN BY: VRS
DESIGN BY: JLG
REVIEWED BY: JPY

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PREPARED FOR

CITY OF FARMERS BRANCH

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NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
SLOPE STABILITY SECTION LOCATION

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants

TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

SHEET IIIJ-A-2-3

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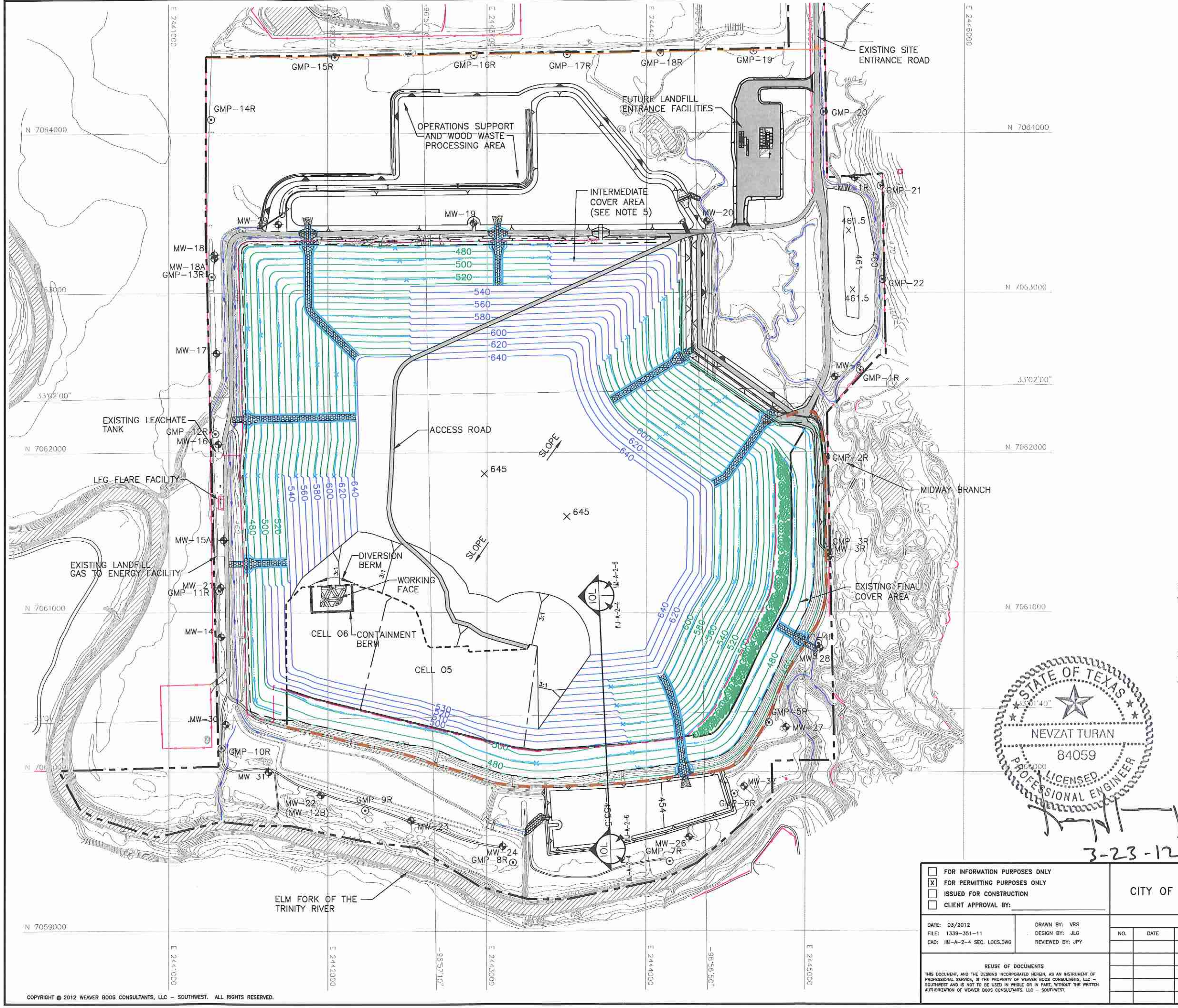

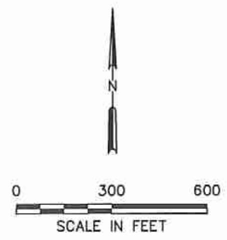

LEGEND

PERMIT BOUNDARY
LIMITS OF WASTE
N 7064000 STATE PLANE COORDINATE SYSTEM
33°02'00" GEODETIC COORDINATE SYSTEM
500 EXISTING CONTOUR
600 REGRADED BUFFER ZONE AREA
400 PROPOSED FINAL COVER CONTOUR
DRAINAGE LETDOWN
DRAINAGE SWALE
560 PROPOSED INTERMEDIATE COVER CONTOUR
LEACHATE FORCEMAIN
EXISTING FENCE
PROPOSED FENCE
APPROXIMATE LOCATION OF PROPOSED SLURRY WALL
MW-8 EXISTING GROUNDWATER MONITORING WELL
GMP-13 EXISTING LANDFILL GAS MONITORING PROBE

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. THE SECTOR DEVELOPMENT SHOWN IS FOR GENERAL CONDITIONS AND MAY NOT REFLECT THE EXACT CONFIGURATION OF THE LANDFILL. IF INTERIM OVERLINER 4H:1V SLOPES LONGER THAN 524 FEET ARE DEVELOPED DURING SITE OPERATIONS AN ADDITIONAL ANALYSIS WILL BE COMPLETED.

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MAJOR PERMIT AMENDMENT
SLOPE STABILITY SECTION LOCATION

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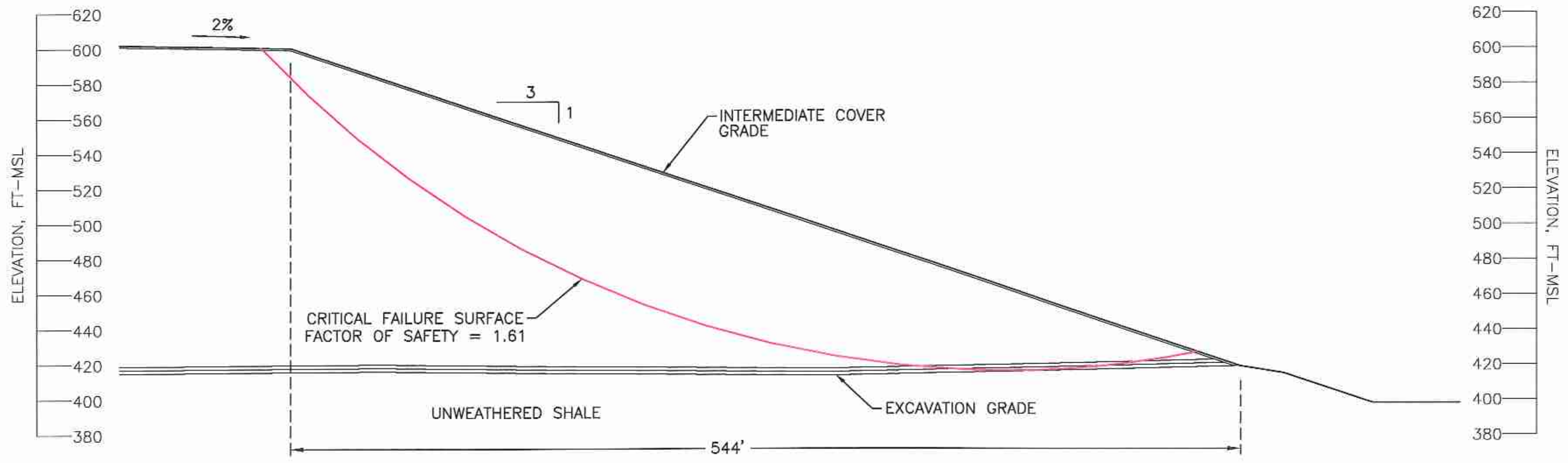
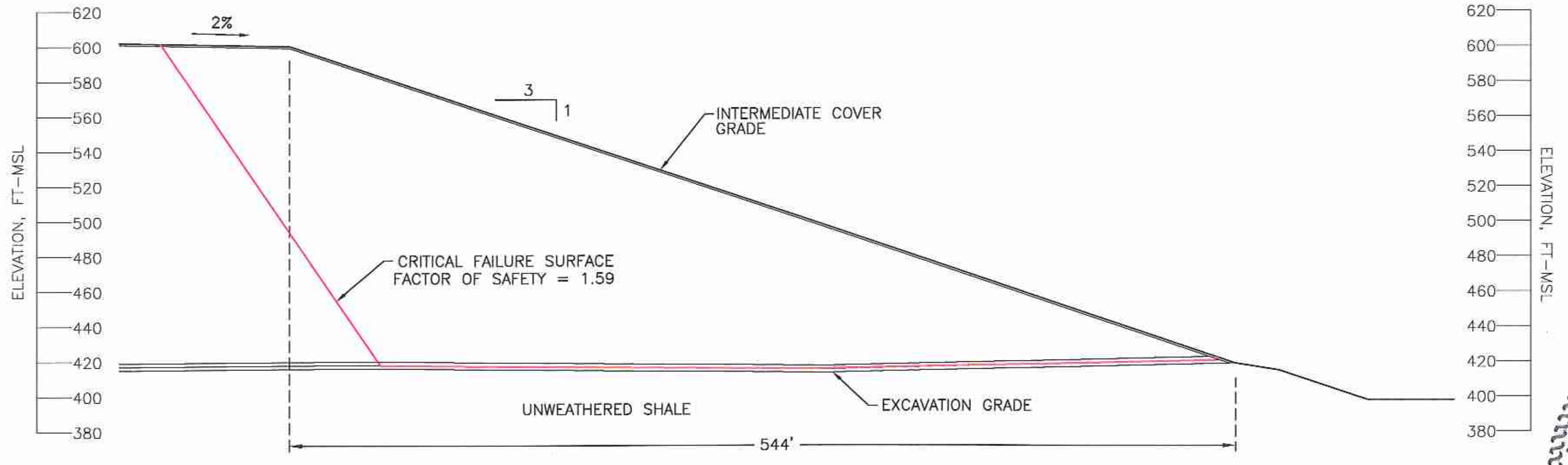


INTERIM SECTION I-1

IIIJ-A-2-3 IIIJ-A-2-5

0 50 100
SCALE IN FEET



INTERIM SECTION I-2

IIIJ-A-2-3 IIIJ-A-2-5

0 50 100
SCALE IN FEET

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84059

3-23-12

NOTES:

1. THESE SECTIONS WERE ESTABLISHED TO INDICATE THE MOST CRITICAL INTERIM SECTION DURING THE DEVELOPMENT OF THE LANDFILL BASED ON THE SEQUENCE OF DEVELOPMENT PLANS PROVIDED IN PARTS I AND II.
2. INTERIM CONDITION WAS ANALYZED CONSIDERING A 3H:1V SLOPE WITH A HORIZONTAL LENGTH OF 544 FEET OVER THE SUBTITLE D LINER SYSTEM. IF INTERIM SLOPES LONGER THAN 544 FEET ARE DEVELOPED DURING SITE OPERATIONS, AN ADDITIONAL ANALYSIS WILL BE COMPLETED.

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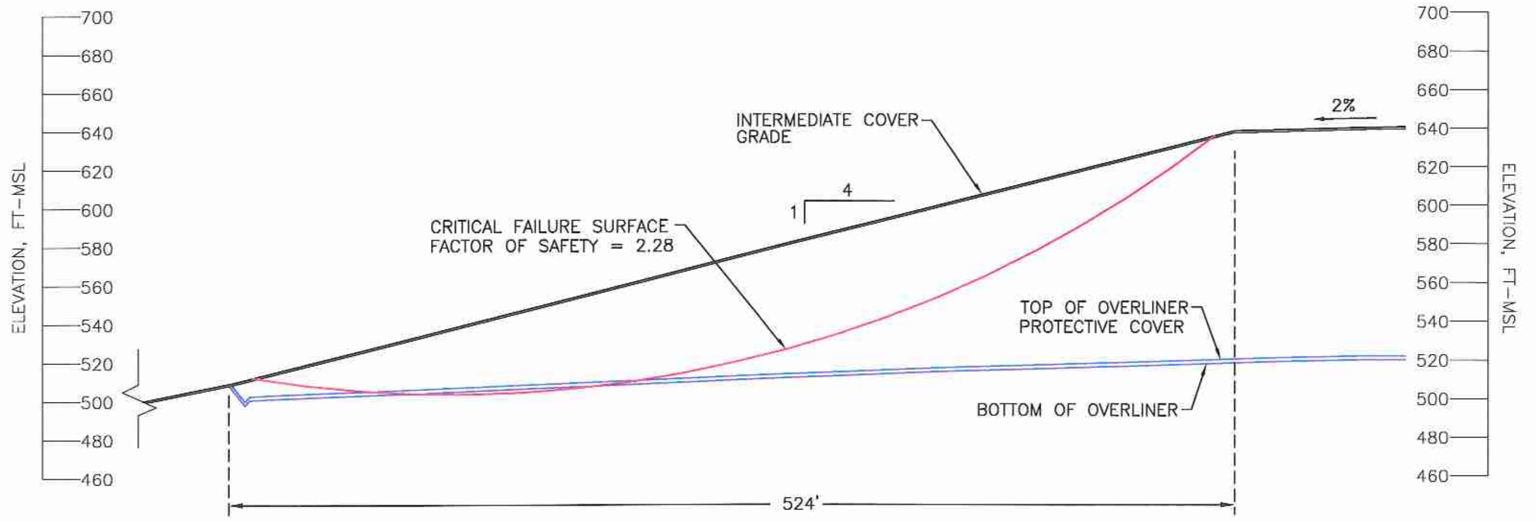
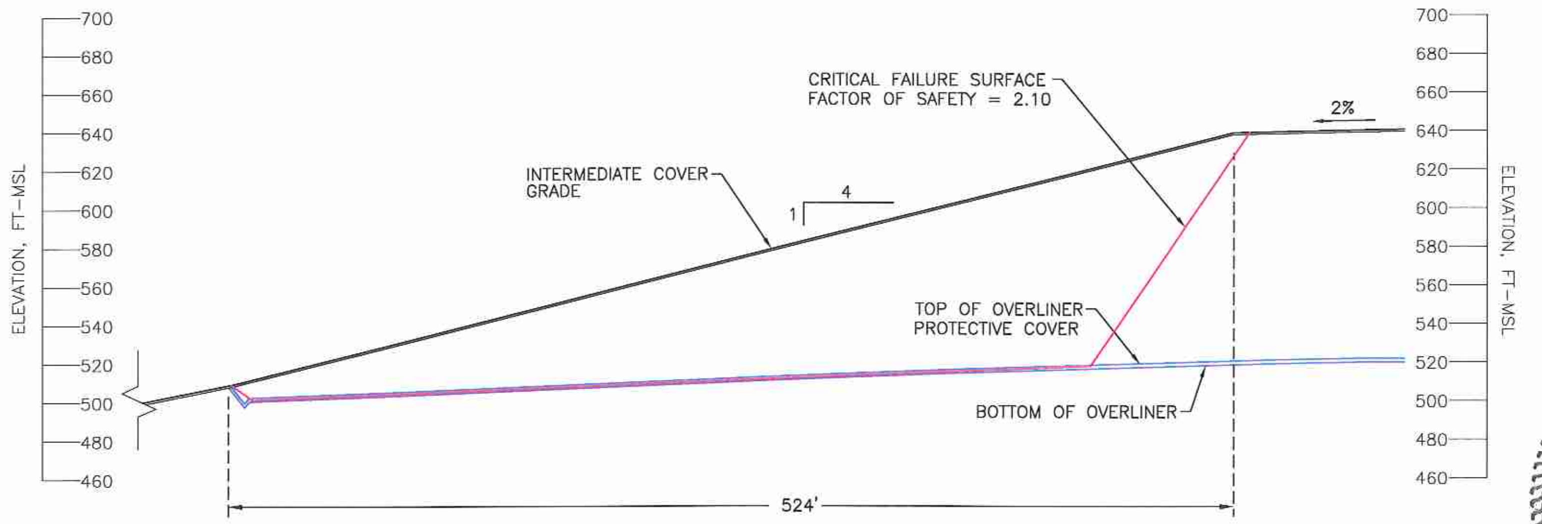


OVERLINER INTERIM SECTION IOL–1

0 50 100
SCALE IN FEET

IIIJ–A–2–4 IIIJ–A–2–6



OVERLINER INTERIM SECTION IOL–2

0 50 100
SCALE IN FEET

IIIJ–A–2–4 IIIJ–A–2–6

NEVZAT TURAN
84059

3-23-12

NOTES:

1. THESE SECTIONS WERE ESTABLISHED TO INDICATE THE MOST CRITICAL INTERIM SECTION DURING THE DEVELOPMENT OF THE LANDFILL BASED ON THE SEQUENCE OF DEVELOPMENT PLANS PROVIDED IN PARTS I AND II.

2. INTERIM CONDITION WAS ANALYZED CONSIDERING A 4H:1V SLOPE WITH A HORIZONTAL LENGTH OF 524 FEET OVER THE PRE–SUBTITLE D OVERLINER SYSTEM. IF INTERIM SLOPES LONGER THAN 524 FEET ARE DEVELOPED DURING SITE OPERATIONS, AN ADDITIONAL ANALYSIS WILL BE COMPLETED.

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MAJOR PERMIT AMENDMENT SLOPE STABILITY INTERIM SECTIONS

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

DATE: 03/2012
FILE: 1339–351–11
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DESIGN BY: JLG
REVIEWED BY: JPY

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SPRINGFIELD, IL
ST. LOUIS, MO

SHEET IIIJ–A–2–6

O:\1339\351\EXPANSION 2009\PART III–SDP\IIIJ\IIIJ–A\IIIJ–A–2–6 INTERIM SECTIONS.dwg, 3/9/2012 2:48:42 PM, rsellers

Derivation of Slope Stability Parameters:

Laboratory testing data are provided in Appendix IIIJ-C. The following includes material strength properties based on the laboratory testing results from each subsurface unit.

Material	Moist Unit Weight(1) (pcf)	Saturated Unit Weight (pcf)
Unweathered Shale	130.0	135.0

(1) The moist unit weight was calculated using dry unit weight and moisture content for the shale strata.

The strength parameters for the in-situ soils were selected based on the following:

Unweathered Shale

An unconfined compression test was performed on the unweathered shale which indicated a strength value of 29,200 lb/ft^2. Therefore, a cohesion value of 5,000 lb/ft^2 was conservatively selected for this material. Since pore pressure buildup is unlikely, only effective stress strength parameters are used for this material. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

Material	Total Stress		Effective Stress	
	Cohesion (psf)	Friction Angle (degrees)	Cohesion (psf)	Friction Angle (degrees)
Unweathered Shale	-	-	5,000	0.0

Slope stability strength parameters for constructed soil materials were selected as follows based on engineering judgment. Prior to construction, laboratory tests will be performed to verify the assumed strength parameter values using project-specific soil materials. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values.

Material	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Intermediate Cover	115	100	16
Clay Liner[(1)]	115	100	16
Protective Cover	115	100	16
Overliner Protective Cover[(2)]	115	100	16

1. A cohesion of 100 psf and internal friction angle of 16 degrees is used for the clay liner for Simplified Bishop method of the slope stability analysis. For global transitional stability analysis, the strength parameters of the weakest interface were used to model the clay liner. For peak values, an adhesion of 100 psf and an interface friction angle of 13 degrees (geonet/smooth geomembrane) is used in the Rankine Block method of the slope stability analysis to represent the weakest interface. For residual values, an adhesion of 80 psf and an interface friction angle of 8 degrees (geonet/smooth geomembrane) is used.
2. A cohesion of 100 psf and internal friction angle of 16 degrees is used for the overliner for Simplified Bishop method of the slope stability analysis. For global transitional stability analysis, the strength parameters of the weakest interface were used to model the overliner. For peak values, an adhesion of 100 psf and an interface friction angle of 18 degrees (soil/geocomposite) is used in the Rankine Block method of the slope stability analysis to represent the weakest interface. For residual values, an adhesion of 80 psf and an interface friction angle of 10 degrees (geocomposite/textured geomembrane) is used.

Soil Description	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Solid Waste	65	288	23

This information was derived from several references. Reference 3 provides a summary of several studies that have been completed to develop the shear strength parameters for MSW (refer to Chapter 6.7 in Ref. 3). MSW shear strength parameters reported in technical literature references vary widely, with friction angles as low as 10° and as high as 53° and cohesion values varying from 0 psf to 1400 psf. Many of the lower values are directly contradicted by observations of actual stable landfill slopes. A summary of a few of the studies completed is listed below.

Reference	Data Type	Results
Pagotto & Rimoldi (1987)	Back-calculation from plate bearing tests	$\phi = 22,^{\circ}$ c = 605 psf (29 kPa)
Landva & Clark (1990)	Laboratory direct shear tests on MSW	$\phi = 24,^{\circ}$ c = 460 psf (22 kPa) to $\phi = 39,^{\circ}$ c = 400 psf (19 kPa)
Richardson & Reynolds (1991)	Large direct shear tests performed in-situ	$\phi = 18^{\circ}$ to $43,^{\circ}$ c = 210 psf (10 kPa)

To provide for a conservative analysis, a cohesion of 288 psf and a friction angle of 23° were selected.

The moist unit weight is calculated at the midpoint of the average depth to represent the average unit weight of waste/cover soil within the landfill, consistent with what is used in the site life calculations in Appendix IIIN.

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-A
INTERIM SLOPE STABILITY ANALYSIS

Factor of Safety Summary for Slope Stability

Description		Minimum Factor of Safety Generated	Recommended Minimum Factor of Safety	Acceptable Factor of Safety
Slope Designation	Method of Analysis			
Interim Fill Slope I-1	Bishop-Circular	1.61	1.5	YES
Overliner Interim Fill Slope IOL-1	Bishop-Circular	2.28	1.5	YES

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Peak	Residual	Peak	Residual	Peak	Residual
Interim Fill Slope I-2	Rankine-Block	1.59	1.44	1.5	1.0	YES	YES
Overliner Interim Fill Slope IOL-2	Rankine-Block	2.10	1.47	1.5	1.0	YES	YES

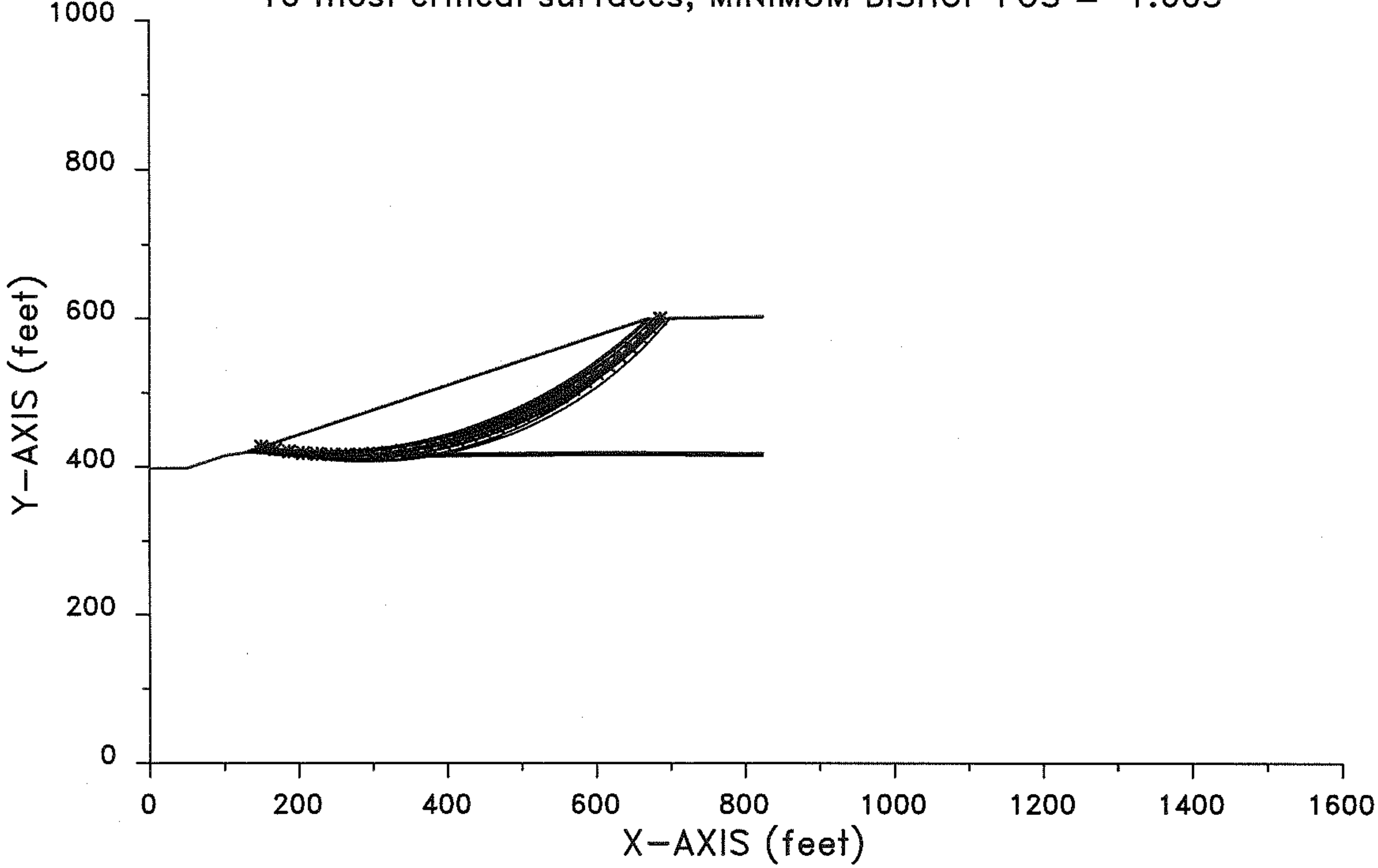
Minimum Required Interface Strength Parameters

Landfill Component	Interface	Peak		Residual	
		Adhesion (psf)	Friction Angle (degrees)	Adhesion (psf)	Friction Angle (degrees)
Liner/Overliner Systems	Protective Cover/Geocomposite	100	18	80	14
Liner/Overliner Systems	Geocomposite-Geonet/Smooth Geomembrane	100	13	80	8
Liner System	Geocomposite/Textured Geomembrane	100	21	80	10
Liner System	Smooth Geomembrane/Clay Liner	100	13	80	8
Liner System	Textured Geomembrane/Clay Liner	200	15	80	13
Overliner System	Textured Geomembrane/Geosynthetic Clay Liner	100	18	80	10
Overliner System	Geosynthetic Clay Liner/Subgrade	100	25	80	12

SLOPE STABILITY XSTABL OUTPUT FILES

I-1   10-12-11   14:40

CAMELOT LF - INTERIM SEC I-1
10 most critical surfaces, MINIMUM BISHOP FOS = 1.605



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XSTABL File: I-1       10-12-11   14:40

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *               using the                *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - INTERIM SEC I-1



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        5 SURFACE boundary segments

    Segment     x-left    y-left    x-right   y-right    Soil Unit
      No.        (ft)      (ft)      (ft)      (ft)    Below Segment

       1          .0      398.0      50.0     398.0         5
       2        50.0      398.0     101.0     415.0         5
       3       101.0      415.0     126.0     419.0         5
       4       126.0      419.0     669.0     600.0         4
       5       669.0      600.0     824.0     603.1         4


       14 SUBSURFACE boundary segments

    Segment     x-left    y-left    x-right   y-right    Soil Unit
      No.        (ft)      (ft)      (ft)      (ft)    Below Segment

       1       126.0      419.0     129.0     418.9         5
       2       129.0      418.9     134.6     420.8         2
       3       134.6      420.8     140.2     422.7         3
       4       140.2      422.7     669.2     599.0         1
       5       669.2      599.0     824.0     602.1         1
       6       140.2      422.7     360.2     417.6         3
       7       360.2      417.6     617.4     420.0         3
       8       617.4      420.0     824.0     418.7         3
       9       134.6      420.8     360.2     415.6         2
      10       360.2      415.6     617.4     418.0         2
      11       617.4      418.0     824.0     416.7         2
      12       129.0      418.9     360.2     413.6         5
```

```
    13        360.2      413.6       617.4      416.0           5
    14        617.4      416.0       824.0      414.7           5


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 5 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure       Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1    65.0    65.0     288.0    23.00      .000          .0       0
  2   115.0   120.0     100.0    16.00      .000          .0       0
  3   115.0   120.0     100.0    16.00      .000          .0       0
  4   115.0   120.0     100.0    16.00      .000          .0       0
  5   130.0   135.0    5000.0      .00      .000          .0       0


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between   x =    100.0 ft
                                 and   x =    150.0 ft


Each surface terminates between    x =    650.0 ft
                                and    x =    700.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is   y =    350.0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   19.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
```

```
                    Upper angular limit :=    -5.0 degrees



          Factors of safety have been calculated by the :

          * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


            The most critical circular failure surface
            is specified by 32 coordinate points

                 Point        x-surf       y-surf
                  No.          (ft)         (ft)

                   1          150.00       427.00
                   2          168.71       423.68
                   3          187.51       420.98
                   4          206.40       418.88
                   5          225.34       417.41
                   6          244.32       416.55
                   7          263.32       416.31
                   8          282.32       416.70
                   9          301.29       417.70
                  10          320.22       419.31
                  11          339.09       421.55
                  12          357.87       424.40
                  13          376.56       427.86
                  14          395.12       431.93
                  15          413.53       436.60
                  16          431.79       441.86
                  17          449.86       447.72
                  18          467.74       454.17
                  19          485.39       461.19
                  20          502.80       468.79
                  21          519.96       476.95
                  22          536.85       485.67
                  23          553.44       494.93
                  24          569.72       504.73
                  25          585.67       515.05
                  26          601.27       525.88
                  27          616.52       537.22
                  28          631.38       549.06
                  29          645.86       561.37
                  30          659.92       574.14
                  31          673.56       587.37
                  32          686.10       600.34

          ****   Simplified BISHOP FOS =   1.605   ****
```

```
The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - INTERIM SEC I-1

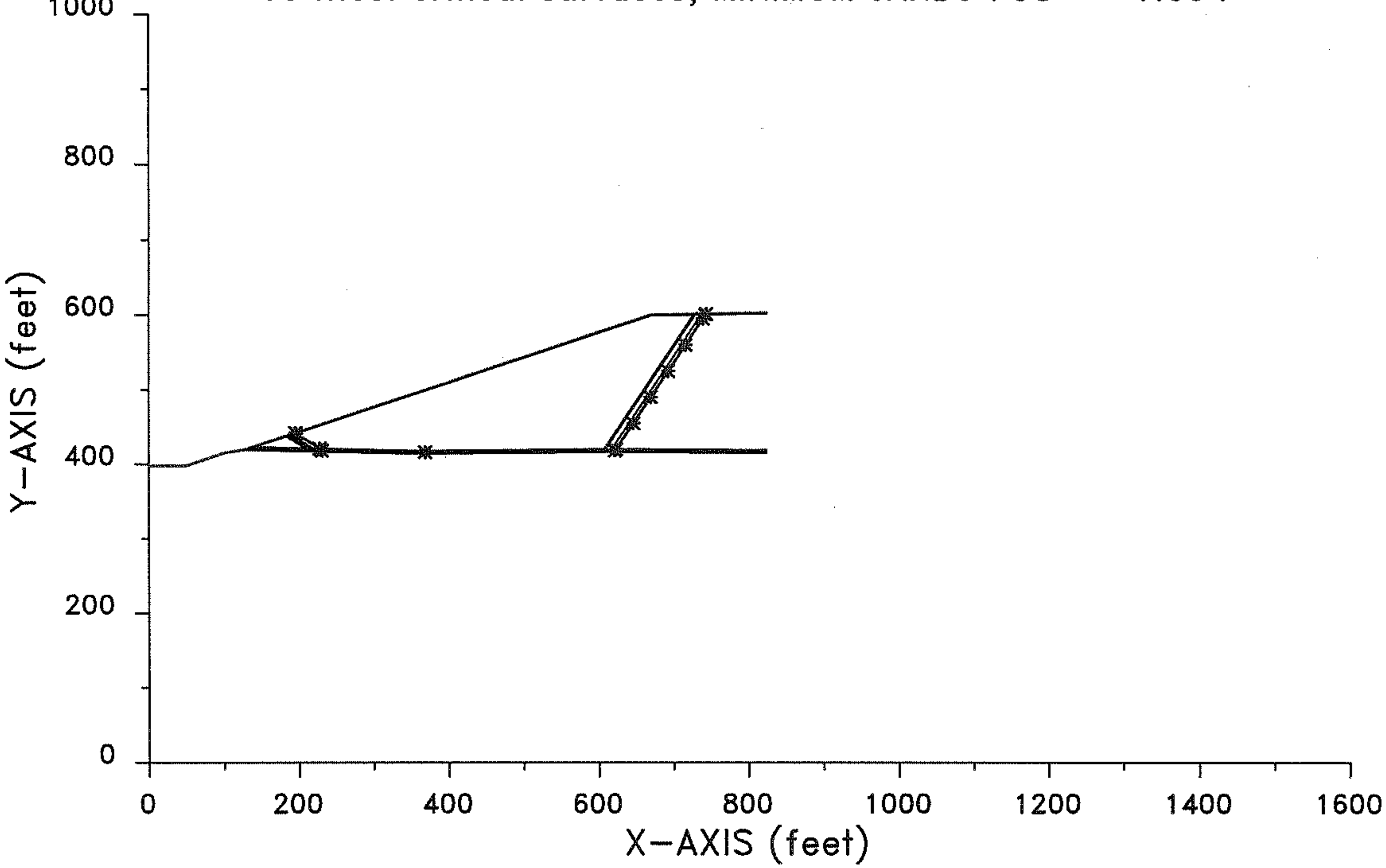
        FOS       Circle Center      Radius   Initial Terminal  Resisting
      (BISHOP)   x-coord  y-coord             x-coord  x-coord    Moment
                   (ft)     (ft)       (ft)     (ft)     (ft)     (ft-lb)

  1.    1.605    261.11   999.06     582.76   150.00   686.10   5.197E+08
  2.    1.634    219.78  1063.31     645.11   138.89   668.38   4.946E+08
  3.    1.635    236.18  1048.41     629.98   144.44   678.78   5.200E+08
  4.    1.746    235.82  1042.56     621.52   150.00   672.26   5.113E+08
  5.    2.025    265.87   988.32     573.15   150.00   687.74   6.622E+08
  6.    2.516    269.46   981.28     570.01   144.44   693.54   8.792E+08
  7.    2.578    270.80   963.15     552.64   144.44   687.59   8.640E+08
  8.    2.621    292.80   931.01     523.85   150.00   699.26   9.136E+08
  9.    2.636    287.64   910.58     502.79   150.00   683.16   8.260E+08
 10.    2.642    234.85  1030.24     617.20   133.33   677.45   8.810E+08

                       * * *  END OF FILE  * * *
```

I-2P 10-13-11 8:33

CAMELOT LF – INTERIM SEC I-2P
10 most critical surfaces, MINIMUM JANBU FOS = 1.594



```
XSTABL File: I-2P      10-13-11    8:33

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *                using the               *
             *            Method of Slices            *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             *  Ver. 5.208                96 - 2046   *
             ******************************************


    Problem Description : CAMELOT LF - INTERIM SEC I-2P



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        5 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      398.0        50.0      398.0           5
       2         50.0      398.0       101.0      415.0           5
       3        101.0      415.0       126.0      419.0           5
       4        126.0      419.0       669.0      600.0           4
       5        669.0      600.0       824.0      603.1           4


       18 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1        126.0      419.0       129.0      418.9           5
       2        129.0      418.9       134.4      420.7           3
       3        134.4      420.7       134.7      420.8           2
       4        134.7      420.8       140.2      422.7           3
       5        140.2      422.7       669.2      599.0           1
       6        669.2      599.0       824.0      602.1           1
       7        140.2      422.7       360.2      417.6           3
       8        360.2      417.6       617.4      420.0           3
       9        617.4      420.0       824.0      418.7           3
      10        134.7      420.8       360.2      415.6           2
      11        360.2      415.6       617.4      418.0           2
      12        617.4      418.0       824.0      416.8           2
```

```
    13        134.4      420.7       360.2      415.5           3
    14        360.2      415.5       617.4      417.9           3
    15        617.4      417.9       824.0      416.7           3
    16        129.0      418.9       360.2      413.6           5
    17        360.2      413.6       617.4      416.0           5
    18        617.4      416.0       824.0      414.7           5


 --------------------------
 ISOTROPIC Soil Parameters
 --------------------------

  5 Soil unit(s) specified

 Soil    Unit Weight    Cohesion  Friction     Pore Pressure        Water
 Unit  Moist     Sat.  Intercept    Angle   Parameter  Constant  Surface
  No.  (pcf)    (pcf)     (psf)     (deg)       Ru       (psf)       No.

   1     65.0     65.0     288.0     23.00      .000          .0       0
   2    115.0    120.0     100.0     13.00      .000          .0       0
   3    115.0    120.0     100.0     16.00      .000          .0       0
   4    115.0    120.0     100.0     16.00      .000          .0       0
   5    130.0    135.0    5000.0       .00      .000          .0       0


 A critical failure surface searching method, using a random
 technique for generating sliding BLOCK surfaces, has been
 specified.


 The active and passive portions of the sliding surfaces
 are generated according to the Rankine theory.


   100 trial surfaces will be generated and analyzed.


   3 boxes specified for generation of central block base


 * * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

 Length of line segments for active and passive portions of
 sliding block is     42.0 ft


 Box          x-left      y-left     x-right     y-right       Width
 no.           (ft)        (ft)        (ft)        (ft)         (ft)

  1           212.6       419.0       233.0       418.5         4.0
  2           350.0       416.1       370.0       415.7         4.0
  3           605.0       417.9       625.0       418.0         4.0

************************************************************************
```

```
   --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------



    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED JANBU METHOD   * * * * *



    The 10 most critical of all the failure surfaces examined
    are displayed below - the most critical first

    Failure surface No. 1 specified by 17 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1        195.38       442.13
             2        196.33       441.41
             3        227.66       420.67
             4        230.42       418.59
             5        230.56       418.49
             6        231.21       417.99
             7        368.52       415.75
             8        621.70       417.93
             9        621.73       417.97
            10        623.23       419.96
            11        646.41       454.99
            12        669.59       490.01
            13        692.78       525.03
            14        715.96       560.06
            15        739.14       595.08
            16        742.71       600.47
            17        743.47       601.49

     **  Corrected JANBU FOS =   1.594  **    (Fo factor = 1.081)


    Failure surface No. 2 specified by 16 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1        188.29       439.76
             2        189.25       439.05
             3        216.62       420.93
```

```
          4          218.36       419.62
          5          365.86       415.76
          6          615.65       417.85
          7          615.68       417.88
          8          615.76       417.98
          9          617.28       420.00
         10          640.46       455.02
         11          663.64       490.05
         12          686.82       525.07
         13          710.00       560.09
         14          733.18       595.11
         15          736.65       600.35
         16          737.42       601.37

  **   Corrected JANBU FOS =   1.602   **     (Fo factor = 1.081)


 Failure surface No. 3 specified by 14 coordinate points

       Point         x-surf       y-surf
        No.           (ft)         (ft)

          1          189.30       440.10
          2          190.25       439.38
          3          218.19       420.89
          4          220.22       419.36
          5          355.25       414.61
          6          605.93       417.95
          7          607.40       419.91
          8          630.58       454.93
          9          653.77       489.95
         10          676.95       524.98
         11          700.13       560.00
         12          723.31       595.02
         13          726.70       600.15
         14          727.47       601.17

  **   Corrected JANBU FOS =   1.630   **     (Fo factor = 1.081)


 Failure surface No. 4 specified by 16 coordinate points

       Point         x-surf       y-surf
        No.           (ft)         (ft)

          1          183.12       438.04
          2          184.08       437.32
          3          208.56       421.12
          4          211.33       419.03
          5          211.46       418.93
          6          213.80       417.16
          7          366.34       414.84
          8          607.74       419.89
          9          607.75       419.91
         10          630.94       454.93
         11          654.12       489.96
         12          677.30       524.98
```

```
          13         700.48       560.00
          14         723.66       595.03
          15         727.06       600.16
          16         727.83       601.18

   **   Corrected JANBU FOS =     1.631   **     (Fo factor = 1.080)


  Failure surface No. 5 specified by 15 coordinate points

         Point        x-surf       y-surf
          No.          (ft)         (ft)

           1         186.51       439.17
           2         187.47       438.45
           3         213.85       420.99
           4         215.47       419.77
           5         356.14       417.33
           6         605.71       417.79
           7         605.79       417.89
           8         607.31       419.91
           9         630.49       454.93
          10         653.67       489.95
          11         676.85       524.98
          12         700.03       560.00
          13         723.21       595.02
          14         726.61       600.15
          15         727.37       601.17

   **   Corrected JANBU FOS =     1.636   **     (Fo factor = 1.081)


  Failure surface No. 6 specified by 16 coordinate points

         Point        x-surf       y-surf
          No.          (ft)         (ft)

           1         184.56       438.52
           2         185.52       437.80
           3         210.81       421.06
           4         213.57       418.98
           5         213.71       418.87
           6         215.06       417.85
           7         350.63       415.82
           8         608.42       419.17
           9         608.99       419.92
          10         632.17       454.94
          11         655.35       489.97
          12         678.53       524.99
          13         701.71       560.01
          14         724.90       595.04
          15         728.30       600.18
          16         729.07       601.20

   **   Corrected JANBU FOS =     1.637   **     (Fo factor = 1.081)
```

```
Failure surface No. 7 specified by 16 coordinate points

      Point        x-surf       y-surf
       No.          (ft)         (ft)

        1          188.26       439.75
        2          189.22       439.04
        3          216.57       420.93
        4          219.33       418.85
        5          219.47       418.74
        6          221.62       417.12
        7          356.79       414.40
        8          607.63       419.81
        9          607.71       419.91
       10          630.89       454.93
       11          654.07       489.96
       12          677.25       524.98
       13          700.43       560.00
       14          723.61       595.03
       15          727.01       600.16
       16          727.78       601.18

 **  Corrected JANBU FOS =   1.638  **    (Fo factor = 1.081)

Failure surface No. 8 specified by 14 coordinate points

      Point        x-surf       y-surf
       No.          (ft)         (ft)

        1          189.72       440.24
        2          190.67       439.52
        3          218.84       420.88
        4          219.44       420.43
        5          366.48       413.83
        6          609.16       419.81
        7          609.25       419.92
        8          632.43       454.95
        9          655.61       489.97
       10          678.79       524.99
       11          701.97       560.02
       12          725.15       595.04
       13          728.56       600.19
       14          729.33       601.21

 **  Corrected JANBU FOS =   1.639  **    (Fo factor = 1.081)

Failure surface No. 9 specified by 14 coordinate points

      Point        x-surf       y-surf
       No.          (ft)         (ft)

        1          186.93       439.31
        2          187.89       438.59
        3          214.50       420.98
        4          214.69       420.83
```

```
            5          367.38        416.55
            6          608.95        419.65
            7          609.15        419.92
            8          632.33        454.95
            9          655.51        489.97
           10          678.69        524.99
           11          701.87        560.02
           12          725.06        595.04
           13          728.46        600.19
           14          729.23        601.20

  **  Corrected JANBU FOS =   1.640   **    (Fo factor = 1.081)


 Failure surface No.10 specified by 16 coordinate points

          Point        x-surf        y-surf
           No.          (ft)          (ft)

            1          189.27        440.09
            2          190.22        439.37
            3          218.14        420.89
            4          220.90        418.81
            5          221.04        418.70
            6          221.21        418.57
            7          353.33        415.97
            8          607.78        418.70
            9          608.70        419.92
           10          631.88        454.94
           11          655.06        489.97
           12          678.24        524.99
           13          701.42        560.01
           14          724.60        595.03
           15          728.01        600.18
           16          728.78        601.20

  **  Corrected JANBU FOS =   1.641   **    (Fo factor = 1.081)




 The following is a summary of the TEN most critical surfaces

 Problem Description : CAMELOT LF - INTERIM SEC I-2P

        Modified      Correction    Initial     Terminal     Available
       JANBU FOS        Factor      x-coord      x-coord      Strength
                                     (ft)         (ft)          (lb)

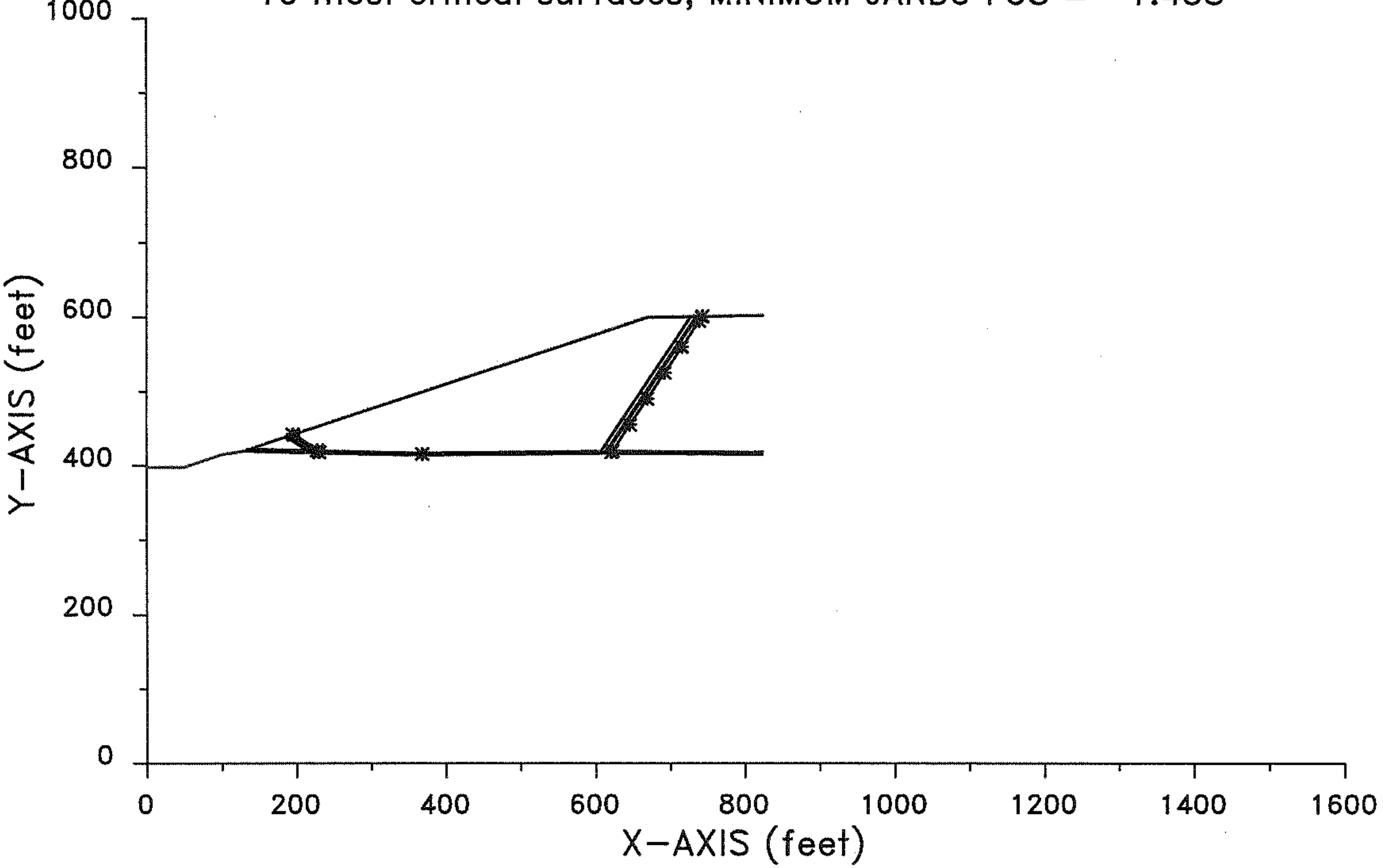
  1.      1.594         1.081       195.38       743.47      1.180E+06
  2.      1.602         1.081       188.29       737.42      1.181E+06
  3.      1.630         1.081       189.30       727.47      1.188E+06
  4.      1.631         1.080       183.12       727.83      1.198E+06
  5.      1.636         1.081       186.51       727.37      1.180E+06
  6.      1.637         1.081       184.56       729.07      1.198E+06
  7.      1.638         1.081       188.26       727.78      1.199E+06
```

```
     8.      1.639          1.081      189.72      729.33    1.200E+06
     9.      1.640          1.081      186.93      729.23    1.187E+06
    10.      1.641          1.081      189.27      728.78    1.193E+06

                        * * *  END OF FILE  * * *
```

I-2R 10-13-11 11:58

CAMELOT LF - INTERIM SEC I-2R
10 most critical surfaces, MINIMUM JANBU FOS = 1.438



```
XSTABL File: I-2R      10-13-11   11:58

          ******************************************
          *             X S T A B L                *
          *                                        *
          *        Slope Stability Analysis        *
          *                using the               *
          *            Method of Slices            *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                 96 - 2046  *
          ******************************************


    Problem Description : CAMELOT LF - INTERIM SEC I-2R




    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        5 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      398.0        50.0      398.0          5
       2         50.0      398.0       101.0      415.0          5
       3        101.0      415.0       126.0      419.0          5
       4        126.0      419.0       669.0      600.0          4
       5        669.0      600.0       824.0      603.1          4

       18 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1        126.0      419.0       129.0      418.9          5
       2        129.0      418.9       134.4      420.7          3
       3        134.4      420.7       134.7      420.8          2
       4        134.7      420.8       140.2      422.7          3
       5        140.2      422.7       669.2      599.0          1
       6        669.2      599.0       824.0      602.1          1
       7        140.2      422.7       360.2      417.6          3
       8        360.2      417.6       617.4      420.0          3
       9        617.4      420.0       824.0      418.7          3
      10        134.7      420.8       360.2      415.6          2
      11        360.2      415.6       617.4      418.0          2
      12        617.4      418.0       824.0      416.8          2
```

```
   13        134.4      420.7      360.2      415.5          3
   14        360.2      415.5      617.4      417.9          3
   15        617.4      417.9      824.0      416.7          3
   16        129.0      418.9      360.2      413.6          5
   17        360.2      413.6      617.4      416.0          5
   18        617.4      416.0      824.0      414.7          5


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 5 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1    65.0    65.0    288.0    23.00      .000         .0       0
  2   115.0   120.0     80.0     8.00      .000         .0       0
  3   115.0   120.0    100.0    16.00      .000         .0       0
  4   115.0   120.0    100.0    16.00      .000         .0       0
  5   130.0   135.0   5000.0      .00      .000         .0       0


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  3 boxes specified for generation of central block base



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     42.0 ft


Box          x-left     y-left     x-right    y-right       Width
no.           (ft)       (ft)        (ft)       (ft)         (ft)

 1           212.6      419.0      233.0      418.5          4.0
 2           350.0      416.1      370.0      415.7          4.0
 3           605.0      417.9      625.0      418.0          4.0

************************************************************************
```

```
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------



    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED JANBU METHOD   * * * * *



    The 10 most critical of all the failure surfaces examined
    are displayed below - the most critical first

    Failure surface No. 1 specified by 17 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1        195.39       442.13
             2        196.34       441.41
             3        227.67       420.67
             4        230.43       418.59
             5        230.56       418.49
             6        231.21       417.99
             7        368.52       415.75
             8        621.70       417.93
             9        621.74       417.97
            10        623.23       419.96
            11        646.42       454.99
            12        669.60       490.01
            13        692.78       525.03
            14        715.96       560.06
            15        739.14       595.08
            16        742.71       600.47
            17        743.48       601.49

     **  Corrected JANBU FOS =   1.438  **    (Fo factor = 1.081)


    Failure surface No. 2 specified by 16 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1        188.29       439.76
             2        189.25       439.05
             3        216.62       420.93
```

```
            4         218.36       419.62
            5         365.86       415.76
            6         615.65       417.85
            7         615.68       417.88
            8         615.77       417.98
            9         617.29       420.00
           10         640.47       455.02
           11         663.65       490.05
           12         686.83       525.07
           13         710.01       560.09
           14         733.19       595.11
           15         736.66       600.35
           16         737.42       601.37

  **  Corrected JANBU FOS =   1.496  **    (Fo factor = 1.081)


 Failure surface No. 3 specified by 14 coordinate points

         Point        x-surf       y-surf
          No.          (ft)         (ft)

            1         189.30       440.10
            2         190.25       439.38
            3         218.19       420.89
            4         220.22       419.36
            5         355.25       414.61
            6         605.93       417.95
            7         607.40       419.91
            8         630.58       454.93
            9         653.77       489.95
           10         676.95       524.98
           11         700.13       560.00
           12         723.31       595.02
           13         726.70       600.15
           14         727.47       601.17

  **  Corrected JANBU FOS =   1.597  **    (Fo factor = 1.081)


 Failure surface No. 4 specified by 18 coordinate points

         Point        x-surf       y-surf
          No.          (ft)         (ft)

            1         186.54       439.18
            2         187.49       438.46
            3         213.88       420.99
            4         216.64       418.91
            5         216.77       418.80
            6         219.16       417.00
            7         365.76       415.66
            8         621.33       417.59
            9         621.54       417.88
           10         621.63       417.98
           11         623.13       419.96
           12         646.31       454.99
```

```
          13          669.49        490.01
          14          692.67        525.03
          15          715.85        560.06
          16          739.03        595.08
          17          742.60        600.47
          18          743.37        601.49

 **   Corrected JANBU FOS =    1.606   **     (Fo factor = 1.081)


Failure surface No. 5 specified by 15 coordinate points

         Point        x-surf        y-surf
          No.          (ft)          (ft)

           1          197.05        442.68
           2          198.01        441.97
           3          230.27        420.61
           4          232.76        418.74
           5          351.48        415.82
           6          612.77        417.91
           7          612.81        417.96
           8          614.33        419.97
           9          637.51        454.99
          10          660.69        490.02
          11          683.87        525.04
          12          707.05        560.06
          13          730.23        595.09
          14          733.68        600.29
          15          734.44        601.31

 **   Corrected JANBU FOS =    1.606   **     (Fo factor = 1.082)


Failure surface No. 6 specified by 17 coordinate points

         Point        x-surf        y-surf
          No.          (ft)          (ft)

           1          187.51        439.50
           2          188.46        438.79
           3          215.40        420.96
           4          218.16        418.88
           5          218.20        418.85
           6          361.59        415.58
           7          620.61        416.79
           8          621.43        417.88
           9          621.51        417.98
          10          623.01        419.96
          11          646.19        454.99
          12          669.37        490.01
          13          692.56        525.03
          14          715.74        560.06
          15          738.92        595.08
          16          742.48        600.47
          17          743.25        601.48
```

```
 **  Corrected JANBU FOS =   1.608  **    (Fo factor = 1.081)


Failure surface No. 7 specified by 16 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          193.09       441.36
         2          194.04       440.64
         3          224.09       420.76
         4          226.85       418.68
         5          226.97       418.57
         6          227.88       417.88
         7          353.15       414.77
         8          607.55       418.15
         9          608.88       419.92
        10          632.06       454.94
        11          655.24       489.97
        12          678.43       524.99
        13          701.61       560.01
        14          724.79       595.04
        15          728.19       600.18
        16          728.96       601.20

 **  Corrected JANBU FOS =   1.615  **    (Fo factor = 1.081)


Failure surface No. 8 specified by 15 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          186.51       439.17
         2          187.47       438.45
         3          213.85       420.99
         4          215.47       419.77
         5          356.14       417.33
         6          605.71       417.79
         7          605.79       417.89
         8          607.31       419.91
         9          630.49       454.93
        10          653.67       489.95
        11          676.85       524.98
        12          700.03       560.00
        13          723.21       595.02
        14          726.61       600.15
        15          727.37       601.17

 **  Corrected JANBU FOS =   1.620  **    (Fo factor = 1.081)


Failure surface No. 9 specified by 18 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)
```

```
         1          185.96       438.99
         2          186.92       438.27
         3          212.99       421.01
         4          215.75       418.93
         5          215.87       418.82
         6          216.45       418.39
         7          366.61       415.66
         8          605.67       416.23
         9          606.86       417.80
        10          606.94       417.90
        11          608.46       419.92
        12          631.64       454.94
        13          654.83       489.96
        14          678.01       524.99
        15          701.19       560.01
        16          724.37       595.03
        17          727.77       600.17
        18          728.54       601.19

 **  Corrected JANBU FOS =   1.622  **    (Fo factor = 1.081)


Failure surface No.10 specified by 16 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          196.67       442.56
         2          197.62       441.84
         3          229.67       420.63
         4          232.43       418.55
         5          232.55       418.44
         6          232.61       418.40
         7          363.17       415.61
         8          616.29       418.32
         9          617.56       420.00
        10          640.74       455.02
        11          663.93       490.05
        12          687.11       525.07
        13          710.29       560.09
        14          733.47       595.11
        15          736.94       600.36
        16          737.71       601.37

 **  Corrected JANBU FOS =   1.622  **    (Fo factor = 1.081)



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - INTERIM SEC I-2R

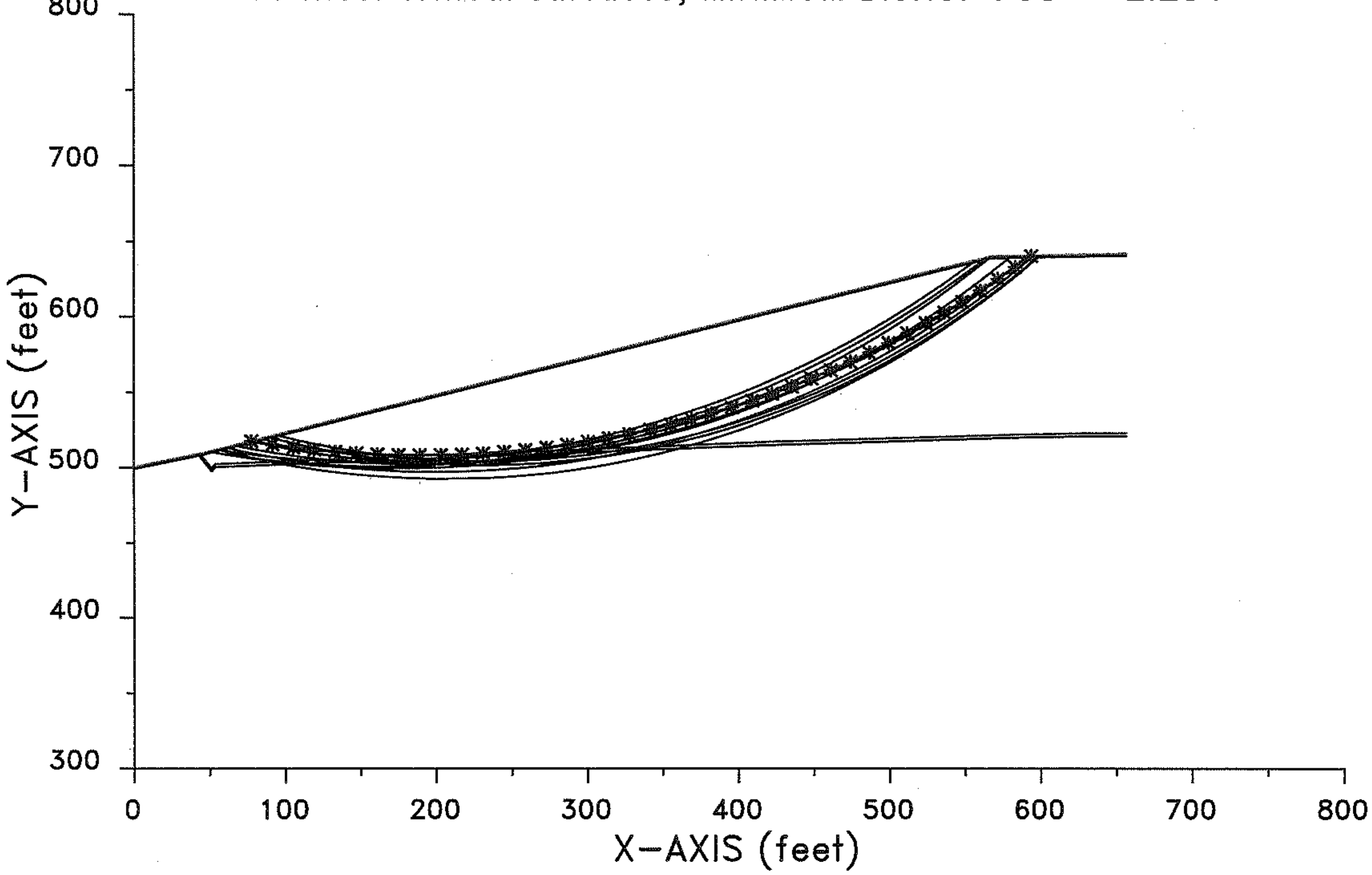
     Modified      Correction   Initial     Terminal    Available
     JANBU FOS       Factor     x-coord     x-coord      Strength
                                  (ft)        (ft)         (lb)
```

```
  1.     1.438          1.081      195.39      743.48     1.041E+06
  2.     1.496          1.081      188.29      737.42     1.088E+06
  3.     1.597          1.081      189.30      727.47     1.160E+06
  4.     1.606          1.081      186.54      743.37     1.207E+06
  5.     1.606          1.082      197.05      734.44     1.166E+06
  6.     1.608          1.081      187.51      743.25     1.206E+06
  7.     1.615          1.081      193.09      728.96     1.174E+06
  8.     1.620          1.081      186.51      727.37     1.165E+06
  9.     1.622          1.081      185.96      728.54     1.186E+06
 10.     1.622          1.081      196.67      737.71     1.191E+06

                    * * *  END OF FILE  * * *
```

IOL–1   10–12–11   14:51

CAMELOT LF – INTERIM SEC IOL–1
10 most critical surfaces, MINIMUM BISHOP FOS = 2.284



```
XSTABL File: IOL-1     10-12-11   14:51

          *****************************************
          *               X S T A B L             *
          *                                       *
          *        Slope Stability Analysis       *
          *              using the                *
          *            Method of Slices           *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - INTERIM SEC IOL-1



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        3 SURFACE boundary segments

    Segment    x-left     y-left     x-right    y-right     Soil Unit
      No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1          .0      500.3        45.7      509.5          3
       2        45.7      509.5       567.7      640.0          3
       3       567.7      640.0       656.5      641.8          3


       27 SUBSURFACE boundary segments

    Segment    x-left     y-left     x-right    y-right     Soil Unit
      No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1          .0      499.3        43.2      508.0          1
       2        43.2      508.0        44.6      508.3          2
       3        44.6      508.3        45.7      508.5          1
       4        45.7      508.5       567.7      639.0          1
       5       567.7      639.0       656.5      640.8          1
       6        44.6      508.3        51.6      499.6          2
       7        51.6      499.6        53.8      502.4          2
       8        53.8      502.4        67.7      502.9          2
       9        67.7      502.9       169.0      507.0          2
      10       169.0      507.0       196.8      508.1          2
      11       196.8      508.1       294.0      512.0          2
      12       294.0      512.0       325.1      513.2          2
      13       325.1      513.2       419.0      517.0          2
      14       419.0      517.0       585.7      522.0          2
```

```
    15        585.7     522.0      635.8     523.0            2
    16        635.8     523.0      656.5     523.0            2
    17         43.2     508.0       51.6     497.6            1
    18         51.6     497.6       53.8     500.4            1
    19         53.8     500.4       67.7     500.9            1
    20         67.7     500.9      169.0     505.0            1
    21        169.0     505.0      196.8     506.1            1
    22        196.8     506.1      294.0     510.0            1
    23        294.0     510.0      325.1     511.2            1
    24        325.1     511.2      419.0     515.0            1
    25        419.0     515.0      585.7     520.0            1
    26        585.7     520.0      635.8     521.0            1
    27        635.8     521.0      656.5     521.0            1


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 3 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1    65.0    65.0    288.0     23.00     .000         .0       0
  2   115.0   120.0    100.0     16.00     .000         .0       0
  3   115.0   120.0    100.0     16.00     .000         .0       0


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between   x =     50.0 ft
                             and   x =    100.0 ft


Each surface terminates between    x =    550.0 ft
                            and    x =    600.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   14.0 ft line segments define each trial failure surface.
```

```
---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=    -5.0 degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 40 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1          77.78       517.52
         2          91.61       515.35
         3         105.48       513.47
         4         119.39       511.88
         5         133.33       510.57
         6         147.29       509.54
         7         161.27       508.81
         8         175.27       508.36
         9         189.26       508.20
        10         203.26       508.32
        11         217.26       508.73
        12         231.24       509.43
        13         245.21       510.42
        14         259.15       511.69
        15         273.06       513.25
        16         286.94       515.10
        17         300.78       517.23
        18         314.57       519.64
        19         328.30       522.34
        20         341.98       525.31
        21         355.60       528.57
        22         369.15       532.11
        23         382.62       535.92
        24         396.01       540.01
        25         409.31       544.37
        26         422.52       549.01
        27         435.63       553.91
        28         448.64       559.09
        29         461.54       564.53
        30         474.33       570.23
```

```
          31          486.99          576.20
          32          499.53          582.42
          33          511.94          588.90
          34          524.22          595.63
          35          536.35          602.62
          36          548.34          609.85
          37          560.18          617.32
          38          571.86          625.04
          39          583.38          633.00
          40          593.82          640.53

  ****  Simplified BISHOP FOS =   2.284  ****




  The following is a summary of the TEN most critical surfaces

  Problem Description : CAMELOT LF - INTERIM SEC IOL-1

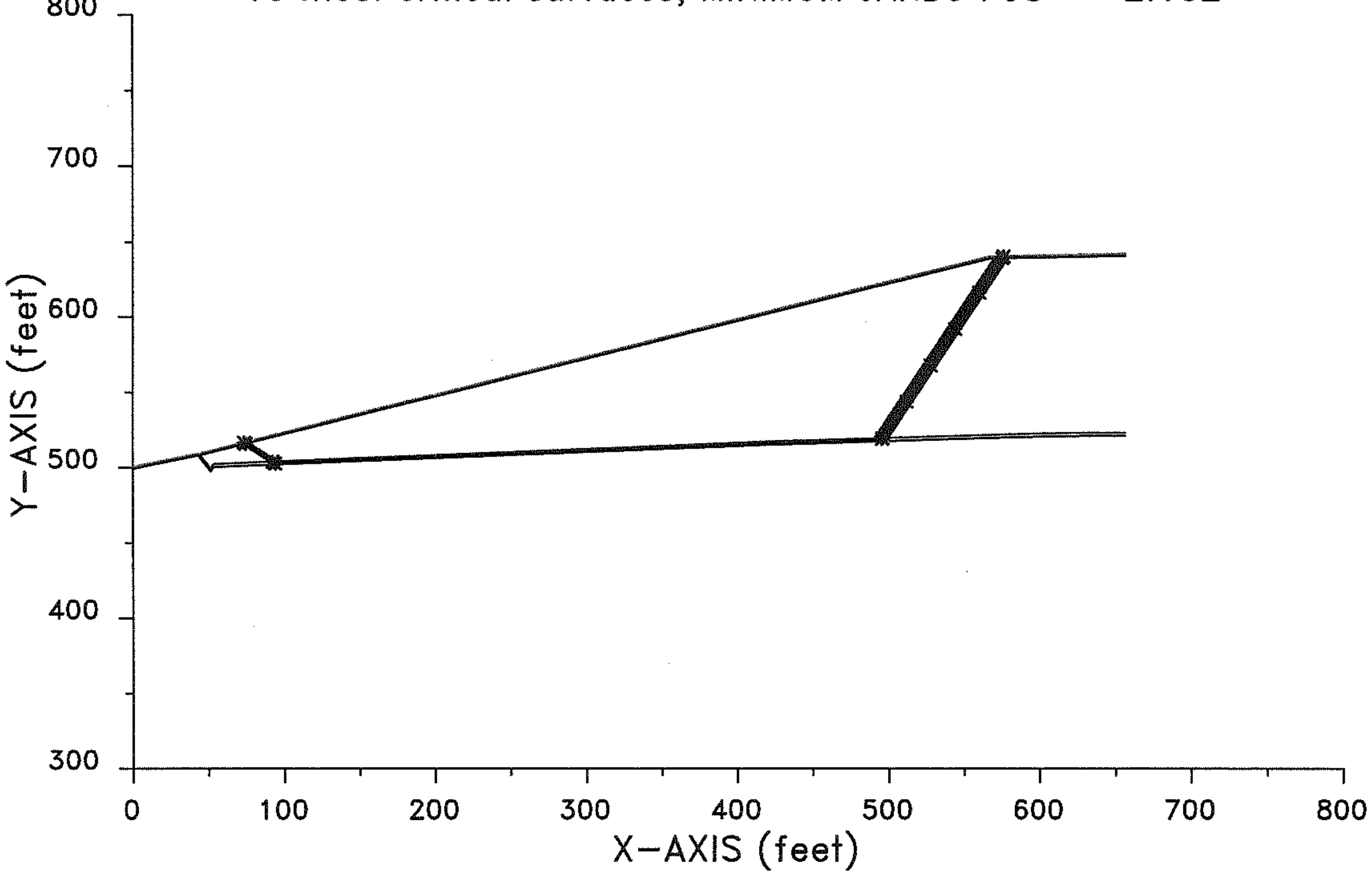
         FOS      Circle Center     Radius  Initial Terminal  Resisting
       (BISHOP)  x-coord  y-coord           x-coord  x-coord    Moment
                   (ft)     (ft)     (ft)     (ft)     (ft)     (ft-lb)

   1.   2.284    190.16  1190.07   681.88    77.78   593.82  4.853E+08
   2.   2.287    160.73  1157.05   653.60    55.56   557.11  4.239E+08
   3.   2.288    173.31  1194.04   694.50    50.00   592.75  5.626E+08
   4.   2.293    206.23  1082.39   579.30    77.78   580.47  4.377E+08
   5.   2.303    187.74  1093.64   591.43    66.67   566.95  4.228E+08
   6.   2.304    200.07  1102.59   605.40    61.11   591.13  5.222E+08
   7.   2.304    232.30  1056.53   552.33    94.44   595.62  4.431E+08
   8.   2.304    162.72  1152.17   651.42    50.00   564.09  4.596E+08
   9.   2.314    206.92  1087.68   595.29    55.56   599.96  5.711E+08
  10.   2.317    231.44  1057.73   556.01    88.89   599.12  4.709E+08

                      * * *  END OF FILE  * * *
```

IOL-2P 10-12-11 14:53

CAMELOT LF-INTERIM SEC IOL-2P
10 most critical surfaces, MINIMUM JANBU FOS = 2.102



```
XSTABL File: IOL-2P    10-12-11   14:53

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *                using the               *
          *            Method of Slices            *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046  *
          ******************************************


    Problem Description : CAMELOT LF-INTERIM SEC IOL-2P




    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        3 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      500.3        45.7      509.5           3
       2         45.7      509.5       567.7      640.0           3
       3        567.7      640.0       656.5      641.8           3


       27 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      499.3        43.2      508.0           1
       2         43.2      508.0        44.6      508.3           2
       3         44.6      508.3        45.7      508.5           1
       4         45.7      508.5       567.7      639.0           1
       5        567.7      639.0       656.5      640.8           1
       6         44.6      508.3        51.6      499.6           2
       7         51.6      499.6        53.8      502.4           2
       8         53.8      502.4        67.7      502.9           2
       9         67.7      502.9       169.0      507.0           2
      10        169.0      507.0       196.8      508.1           2
      11        196.8      508.1       294.0      512.0           2
      12        294.0      512.0       325.1      513.2           2
      13        325.1      513.2       419.0      517.0           2
      14        419.0      517.0       585.7      522.0           2
```

```
   15        585.7      522.0      635.8      523.0          2
   16        635.8      523.0      656.5      523.0          2
   17         43.2      508.0       51.6      497.6          1
   18         51.6      497.6       53.8      500.4          1
   19         53.8      500.4       67.7      500.9          1
   20         67.7      500.9      169.0      505.0          1
   21        169.0      505.0      196.8      506.1          1
   22        196.8      506.1      294.0      510.0          1
   23        294.0      510.0      325.1      511.2          1
   24        325.1      511.2      419.0      515.0          1
   25        419.0      515.0      585.7      520.0          1
   26        585.7      520.0      635.8      521.0          1
   27        635.8      521.0      656.5      521.0          1


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 3 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.

  1    65.0    65.0    288.0    23.00      .000        .0       0
  2   115.0   120.0    100.0    18.00      .000        .0       0
  3   115.0   120.0    100.0    16.00      .000        .0       0


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     29.0 ft


Box          x-left     y-left    x-right    y-right       Width
no.           (ft)       (ft)       (ft)       (ft)         (ft)

 1            91.2      502.9      112.4      503.7         2.0
```

```
     2          480.0       517.8       500.0       518.4         2.0


************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


************************************************************************
ERROR # 39
************************************************************************
The program calculated a point for the ACTIVE wedge that is outside
the defined slope geometry.  The analysis will continue, but the user
should adjust the search box or slope geometry to allow an active
wedge to be formed from all points within last box.
************************************************************************




    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED JANBU METHOD    * * * * *



    The 10 most critical of all the failure surfaces examined
    are displayed below - the most critical first

    Failure surface No. 1 specified by 12 coordinate points

           Point        x-surf       y-surf
            No.          (ft)         (ft)

             1           73.68       516.50
             2           74.68       515.74
             3           92.57       503.91
             4           94.28       502.66
             5          496.05       518.94
             6          496.33       519.32
             7          512.34       543.50
             8          528.34       567.68
             9          544.35       591.87
            10          560.35       616.05
            11          575.65       639.16
            12          576.42       640.18

     **  Corrected JANBU FOS =    2.102  **     (Fo factor = 1.070)
```

```
Failure surface No. 2 specified by 12 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1           73.10       516.35
         2           74.09       515.60
         3           91.80       503.88
         4           93.16       502.89
         5          492.66       518.88
         6          492.90       519.22
         7          508.91       543.40
         8          524.91       567.58
         9          540.92       591.76
        10          556.93       615.95
        11          572.24       639.09
        12          573.01       640.11

 **  Corrected JANBU FOS =   2.102  **    (Fo factor = 1.070)


Failure surface No. 3 specified by 12 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1           74.29       516.65
         2           75.29       515.90
         3           93.35       503.94
         4           93.37       503.92
         5          497.38       518.72
         6          497.85       519.36
         7          513.85       543.55
         8          529.86       567.73
         9          545.86       591.91
        10          561.87       616.10
        11          577.16       639.19
        12          577.92       640.21

 **  Corrected JANBU FOS =   2.102  **    (Fo factor = 1.070)


Failure surface No. 4 specified by 12 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1           72.30       516.15
         2           73.30       515.40
         3           90.77       503.83
         4           92.95       502.25
         5          494.65       518.75
         6          495.03       519.28
         7          511.04       543.46
         8          527.05       567.65
```

```
         9         543.05       591.83
        10         559.06       616.01
        11         574.36       639.14
        12         575.13       640.15

 **  Corrected JANBU FOS =   2.102  **    (Fo factor = 1.070)


Failure surface No. 5 specified by 12 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

         1          72.47       516.19
         2          73.46       515.44
         3          90.99       503.84
         4          91.44       503.52
         5         490.29       518.54
         6         490.74       519.15
         7         506.75       543.33
         8         522.75       567.52
         9         538.76       591.70
        10         554.76       615.88
        11         570.10       639.05
        12         570.86       640.06

 **  Corrected JANBU FOS =   2.103  **    (Fo factor = 1.070)


Failure surface No. 6 specified by 12 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

         1          76.20       517.12
         2          77.19       516.37
         3          95.83       504.04
         4          97.05       503.15
         5         496.81       518.94
         6         497.10       519.34
         7         513.10       543.53
         8         529.11       567.71
         9         545.12       591.89
        10         561.12       616.07
        11         576.42       639.18
        12         577.18       640.19

 **  Corrected JANBU FOS =   2.104  **    (Fo factor = 1.070)


Failure surface No. 7 specified by 12 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

         1          74.34       516.66
         2          75.33       515.91
```

```
          3          93.41        503.94
          4          94.15        503.41
          5         491.26        519.08
          6         491.32        519.17
          7         507.33        543.35
          8         523.33        567.53
          9         539.34        591.72
         10         555.35        615.90
         11         570.68        639.06
         12         571.44        640.08

 **  Corrected JANBU FOS =    2.104   **     (Fo factor = 1.070)


Failure surface No. 8 specified by 12 coordinate points

       Point         x-surf        y-surf
        No.           (ft)          (ft)

          1          74.83        516.78
          2          75.83        516.03
          3          94.05        503.97
          4          96.31        502.32
          5         493.71        518.92
          6         493.95        519.25
          7         509.95        543.43
          8         525.96        567.61
          9         541.97        591.80
         10         557.97        615.98
         11         573.28        639.11
         12         574.05        640.13

 **  Corrected JANBU FOS =    2.104   **     (Fo factor = 1.070)


Failure surface No. 9 specified by 12 coordinate points

       Point         x-surf        y-surf
        No.           (ft)          (ft)

          1          76.01        517.08
          2          77.00        516.33
          3          95.58        504.03
          4          95.61        504.01
          5         494.19        518.54
          6         494.72        519.27
          7         510.73        543.45
          8         526.73        567.64
          9         542.74        591.82
         10         558.75        616.00
         11         574.05        639.13
         12         574.82        640.14

 **  Corrected JANBU FOS =    2.105   **     (Fo factor = 1.070)


Failure surface No.10 specified by 12 coordinate points
```

```
            Point        x-surf        y-surf
             No.          (ft)          (ft)

              1           72.66        516.24
              2           73.65        515.49
              3           91.23        503.85
              4           91.95        503.33
              5          499.00        518.08
              6          499.98        519.43
              7          515.99        543.61
              8          531.99        567.79
              9          548.00        591.98
             10          564.01        616.16
             11          579.28        639.23
             12          580.04        640.25

       **  Corrected JANBU FOS =    2.106   **     (Fo factor = 1.070)




      The following is a summary of the TEN most critical surfaces

      Problem Description : CAMELOT LF-INTERIM SEC IOL-2P

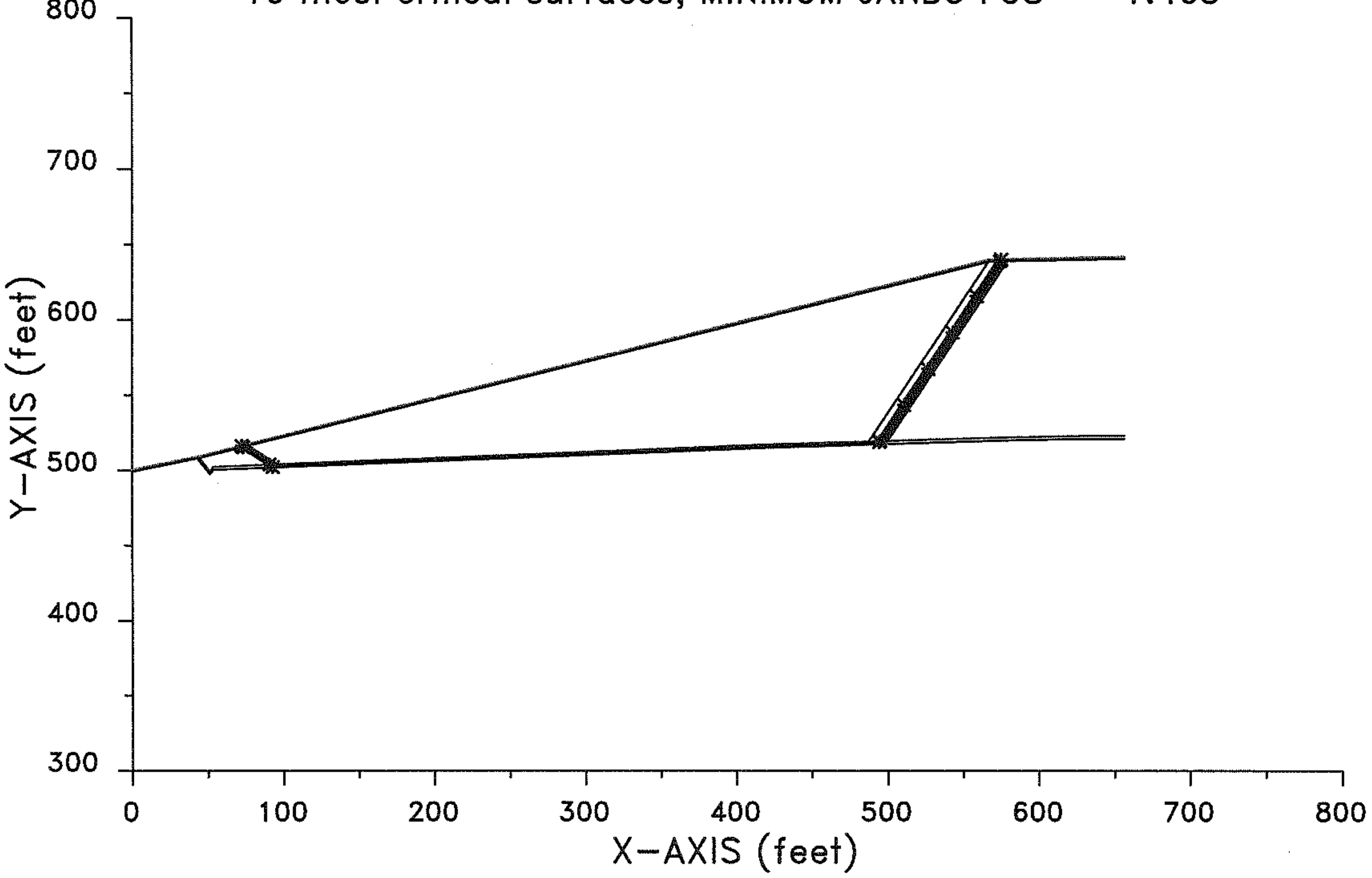
            Modified       Correction   Initial     Terminal    Available
           JANBU FOS         Factor     x-coord      x-coord     Strength
                                         (ft)         (ft)        (lb)

       1.     2.102          1.070       73.68       576.42    7.768E+05
       2.     2.102          1.070       73.10       573.01    7.643E+05
       3.     2.102          1.070       74.29       577.92    7.733E+05
       4.     2.102          1.070       72.30       575.13    7.773E+05
       5.     2.103          1.070       72.47       570.86    7.552E+05
       6.     2.104          1.070       76.20       577.18    7.754E+05
       7.     2.104          1.070       74.34       571.44    7.537E+05
       8.     2.104          1.070       74.83       574.05    7.721E+05
       9.     2.105          1.070       76.01       574.82    7.643E+05
      10.     2.106          1.070       72.66       580.04    7.901E+05

                          * * *  END OF FILE  * * *
```

IOL-2R   10-12-11   14:54

CAMELOT LF - INTERIM SEC IOL-2R
10 most critical surfaces, MINIMUM JANBU FOS =   1.465



```
XSTABL File: IOL-2R    10-12-11   14:54

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *               using the               *
          *            Method of Slices           *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          * Ver. 5.208                96 - 2046   *
          *****************************************


    Problem Description : CAMELOT LF - INTERIM SEC IOL-2R



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        3 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0       500.3        45.7      509.5          3
       2         45.7       509.5       567.7      640.0          3
       3        567.7       640.0       656.5      641.8          3


       27 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0       499.3        43.2      508.0          1
       2         43.2       508.0        44.6      508.3          2
       3         44.6       508.3        45.7      508.5          1
       4         45.7       508.5       567.7      639.0          1
       5        567.7       639.0       656.5      640.8          1
       6         44.6       508.3        51.6      499.6          2
       7         51.6       499.6        53.8      502.4          2
       8         53.8       502.4        67.7      502.9          2
       9         67.7       502.9       169.0      507.0          2
      10        169.0       507.0       196.8      508.1          2
      11        196.8       508.1       294.0      512.0          2
      12        294.0       512.0       325.1      513.2          2
      13        325.1       513.2       419.0      517.0          2
      14        419.0       517.0       585.7      522.0          2
```

```
    15        585.7      522.0       635.8      523.0            2
    16        635.8      523.0       656.5      523.0            2
    17         43.2      508.0        51.6      497.6            1
    18         51.6      497.6        53.8      500.4            1
    19         53.8      500.4        67.7      500.9            1
    20         67.7      500.9       169.0      505.0            1
    21        169.0      505.0       196.8      506.1            1
    22        196.8      506.1       294.0      510.0            1
    23        294.0      510.0       325.1      511.2            1
    24        325.1      511.2       419.0      515.0            1
    25        419.0      515.0       585.7      520.0            1
    26        585.7      520.0       635.8      521.0            1
    27        635.8      521.0       656.5      521.0            1


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 3 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure     Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1    65.0    65.0     288.0     23.00     .000        .0       0
  2   115.0   120.0      80.0     10.00     .000        .0       0
  3   115.0   120.0     100.0     16.00     .000        .0       0


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     29.0 ft


Box          x-left      y-left    x-right     y-right       Width
no.           (ft)        (ft)       (ft)        (ft)         (ft)

 1            91.2       502.9      112.4       503.7         2.0
```

```
      2         480.0      517.8      500.0      518.4       2.0


*************************************************************************
   --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
*************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
*************************************************************************

   ------------------------------------------------------------
   USER SELECTED option to maintain strength greater than zero
   ------------------------------------------------------------



   Factors of safety have been calculated by the :

   * * * * *   SIMPLIFIED JANBU METHOD   * * * * *



   The 10 most critical of all the failure surfaces examined
   are displayed below - the most critical first

   Failure surface No. 1 specified by 12 coordinate points

          Point      x-surf      y-surf
           No.        (ft)        (ft)

            1         72.52      516.20
            2         73.51      515.45
            3         91.05      503.85
            4         92.95      502.25
            5        494.65      518.75
            6        495.10      519.28
            7        511.10      543.47
            8        527.11      567.65
            9        543.11      591.83
           10        559.12      616.01
           11        574.42      639.14
           12        575.19      640.15

    **  Corrected JANBU FOS =   1.465  **    (Fo factor = 1.070)


   Failure surface No. 2 specified by 12 coordinate points

          Point      x-surf      y-surf
           No.        (ft)        (ft)

            1         71.85      516.04
            2         72.84      515.29
            3         90.18      503.81
            4         91.50      502.70
```

```
             5         494.98       517.88
             6         496.19       519.32
             7         512.20       543.50
             8         528.20       567.68
             9         544.21       591.86
            10         560.22       616.05
            11         575.51       639.16
            12         576.28       640.17

   **  Corrected JANBU FOS =   1.465  **    (Fo factor = 1.070)


  Failure surface No. 3 specified by 12 coordinate points

          Point        x-surf       y-surf
           No.          (ft)         (ft)

             1          72.73       516.26
             2          73.72       515.51
             3          91.32       503.86
             4          91.95       503.33
             5         499.00       518.08
             6         500.14       519.43
             7         516.14       543.62
             8         532.15       567.80
             9         548.16       591.98
            10         564.16       616.16
            11         579.43       639.24
            12         580.20       640.25

   **  Corrected JANBU FOS =   1.466  **    (Fo factor = 1.070)


  Failure surface No. 4 specified by 12 coordinate points

          Point        x-surf       y-surf
           No.          (ft)         (ft)

             1          73.85       516.54
             2          74.85       515.79
             3          92.79       503.92
             4          94.28       502.66
             5         496.05       518.94
             6         496.37       519.32
             7         512.38       543.50
             8         528.39       567.69
             9         544.39       591.87
            10         560.40       616.05
            11         575.70       639.16
            12         576.46       640.18

   **  Corrected JANBU FOS =   1.466  **    (Fo factor = 1.070)


  Failure surface No. 5 specified by 12 coordinate points

          Point        x-surf       y-surf
```

```
               No.          (ft)          (ft)

                1            73.23        516.38
                2            74.23        515.63
                3            91.98        503.88
                4            93.16        502.89
                5           492.66        518.88
                6           492.94        519.22
                7           508.95        543.40
                8           524.95        567.58
                9           540.96        591.77
               10           556.96        615.95
               11           572.28        639.09
               12           573.05        640.11

   **  Corrected JANBU FOS =    1.468   **     (Fo factor = 1.070)


   Failure surface No. 6 specified by 12 coordinate points

              Point        x-surf        y-surf
               No.          (ft)          (ft)

                1            75.05        516.84
                2            76.05        516.09
                3            94.34        503.98
                4            96.31        502.32
                5           493.71        518.92
                6           493.98        519.25
                7           509.99        543.43
                8           526.00        567.61
                9           542.00        591.80
               10           558.01        615.98
               11           573.32        639.11
               12           574.09        640.13

   **  Corrected JANBU FOS =    1.468   **     (Fo factor = 1.070)


   Failure surface No. 7 specified by 12 coordinate points

              Point        x-surf        y-surf
               No.          (ft)          (ft)

                1            74.29        516.65
                2            75.29        515.90
                3            93.36        503.94
                4            93.37        503.92
                5           497.38        518.72
                6           497.92        519.37
                7           513.93        543.55
                8           529.93        567.73
                9           545.94        591.92
               10           561.95        616.10
               11           577.23        639.19
               12           578.00        640.21
```

```
 **  Corrected JANBU FOS =   1.469  **    (Fo factor = 1.070)


Failure surface No. 8 specified by 12 coordinate points

       Point      x-surf       y-surf
        No.        (ft)         (ft)

         1         71.42       515.93
         2         72.42       515.18
         3         89.63       503.79
         4         91.65       502.09
         5        486.98       518.43
         6        487.50       519.05
         7        503.51       543.24
         8        519.52       567.42
         9        535.52       591.60
        10        551.53       615.79
        11        566.73       638.76
        12        567.66       639.99

 **  Corrected JANBU FOS =   1.469  **    (Fo factor = 1.070)


Failure surface No. 9 specified by 12 coordinate points

       Point      x-surf       y-surf
        No.        (ft)         (ft)

         1         76.23       517.13
         2         77.23       516.38
         3         95.87       504.04
         4         98.02       502.24
         5        495.76       518.21
         6        496.70       519.33
         7        512.71       543.51
         8        528.71       567.70
         9        544.72       591.88
        10        560.73       616.06
        11        576.02       639.17
        12        576.79       640.18

 **  Corrected JANBU FOS =   1.469  **    (Fo factor = 1.070)


Failure surface No.10 specified by 12 coordinate points

       Point      x-surf       y-surf
        No.        (ft)         (ft)

         1         76.32       517.15
         2         77.31       516.40
         3         95.99       504.04
         4         97.05       503.15
         5        496.81       518.94
         6        497.14       519.34
         7        513.15       543.53
```

```
      8        529.16      567.71
      9        545.16      591.89
     10        561.17      616.07
     11        576.46      639.18
     12        577.23      640.19

 **   Corrected JANBU FOS =    1.470   **     (Fo factor = 1.070)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - INTERIM SEC IOL-2R

      Modified      Correction   Initial     Terminal    Available
     JANBU FOS       Factor      x-coord      x-coord     Strength
                                  (ft)         (ft)        (lb)

 1.      1.465         1.070       72.52       575.19    5.089E+05
 2.      1.465         1.070       71.85       576.28    5.128E+05
 3.      1.466         1.070       72.73       580.20    5.172E+05
 4.      1.466         1.070       73.85       576.46    5.091E+05
 5.      1.468         1.070       73.23       573.05    5.015E+05
 6.      1.468         1.070       75.05       574.09    5.062E+05
 7.      1.469         1.070       74.29       578.00    5.078E+05
 8.      1.469         1.070       71.42       567.66    4.957E+05
 9.      1.469         1.070       76.23       576.79    5.153E+05
10.      1.470         1.070       76.32       577.23    5.090E+05

                    * * *  END OF FILE  * * *
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APPENDIX IIIJ-A-3

SLOPE STABILITY ANALYSIS FOR FINAL CONFIGURATION

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER

3-23-12

Includes pages IIIJ-A-3-1 through IIIJ-A-3-339

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-A
FINAL CONFIGURATION SLOPE STABILITY ANALYSIS

Required: Evaluate the slope stability of the proposed landfill final slopes.

Given: The slope stability analyses section locations are provided on Sheet IIIJ-A-3-3.

Method:

A. Evaluate the stability of the proposed final cover slopes.
1. Determine the most critical final fill height slopes in the proposed design.
2. Select a soil profile for each critical section using available boring logs near the sections.
3. Select material properties using average unit weights and strength parameters. (Laboratory testing summaries for the site soils are provided in Appendix IIIJ-C).
4. Perform stability analyses.
    a. Analyze the final fill slopes using XSTABL 5.2, Simplified Bishop method of circular failure surfaces, and Rankine's method of block failure surfaces. Use undrained and drained strength parameters to model the final proposed conditions.

References:

1. Bowles, Joseph E., *Foundation Analyses and Design*, 4th Ed., Mc-Graw-Hill, 1988.
Duncan, J.M. and Buchignani, A.L., An Engineering Manual for Slope Stability
2. *Studies*, Department of Civil Engineering-University of California-Berkeley, 1975.
3. Koerner, Robert M., *Designing with Geosynthetics*, 5th Ed., Prentice-Hall, Inc., 2005.
4. XSTABL 5.2 (computer program for slope stability analyses), Interactive Software

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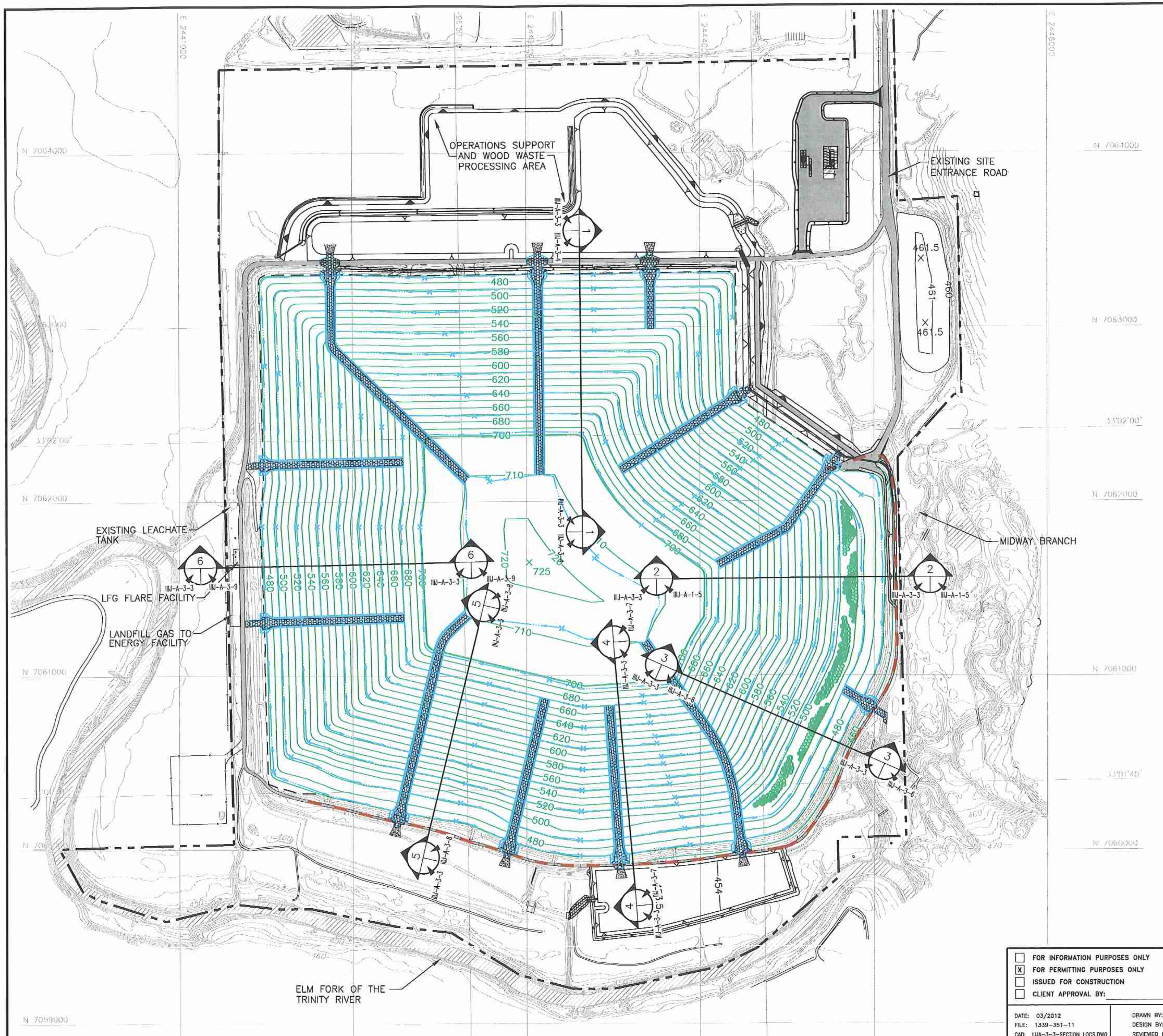
APPENDIX IIIJ-A
FINAL CONFIGURATION SLOPE STABILITY ANALYSIS

Solution: A. Slope stability analyses of the proposed final slopes

1. The locations of the most critical sections selected for the stability analysis for the proposed slopes are shown on Sheet IIIJ-A-3-3. Sections analyzed are shown with the most critical failure surfaces on Sheets IIIJ-A-3-4 through 9 (final cover slopes) and Sheets IIIJ-A-3-10 through 13 (overliner slopes).
2. The soil profile used for each analysis was based on boring log data from previous site investigations (see Appendix IIIG-B) from the undeveloped area of the site and the geologic cross sections (see Appendix IIIG-C). A generalized soil profile is shown on Sheet IIIJ-A-2.
3. A summary table of the assumed material weight and strength properties is provided on Sheets IIIJ-A-3-14 through IIIJ-A-3-15. The material weight and strength parameter determination for each material type was based on previous laboratory testing results (Atterburg limits, natural moisture contents, unit weight, percent finer than #200 sieve, Standard Proctor, and strength testing) and engineering judgment from previous experience with similar materials. Laboratory testing results for the site soils are included in Appendix IIIJ-C.
4. The output from the slope stability analyses on the final cover and overliner slopes are provided on Sheets IIIJ-A-3-17 through IIIJ-A-3-339. A summary of the output can be seen on Sheet IIIJ-A-3-16.



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0 300 600
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LEGEND

— - - —	PERMIT BOUNDARY
— — —	LIMIT OF WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
500	EXISTING CONTOUR
600	PROPOSED FINAL COVER CONTOUR
600	REGRADED BUFFER ZONE AREA
▨	PROPOSED LETDOWN STRUCTURE
→	DRAINAGE SWALE
▨	CONSTRUCTED FINAL COVER
🟩	LANDSCAPE BENCH
— · —	APPROXIMATE LOCATION OF PROPOSED SLURRY WALL

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. FINAL COVER SECTION LOCATIONS 2, 3, 4, AND 5 ARE OVERLINER SECTION LOCATIONS 1, 2, 3, AND 4 RESPECTIVELY.

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84059

3-23-12

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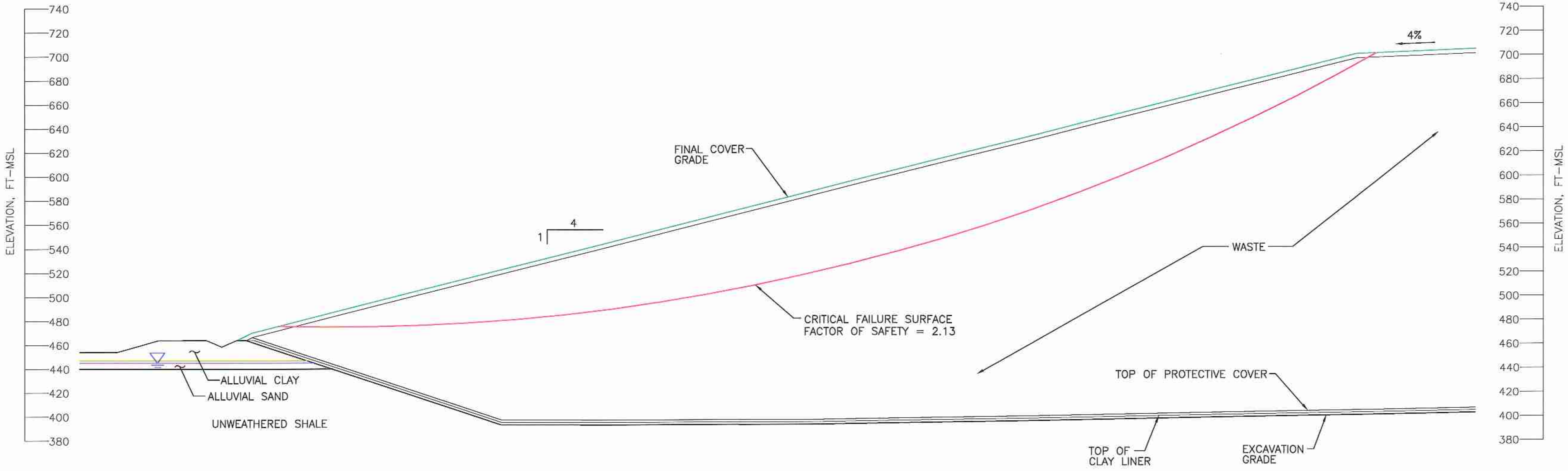

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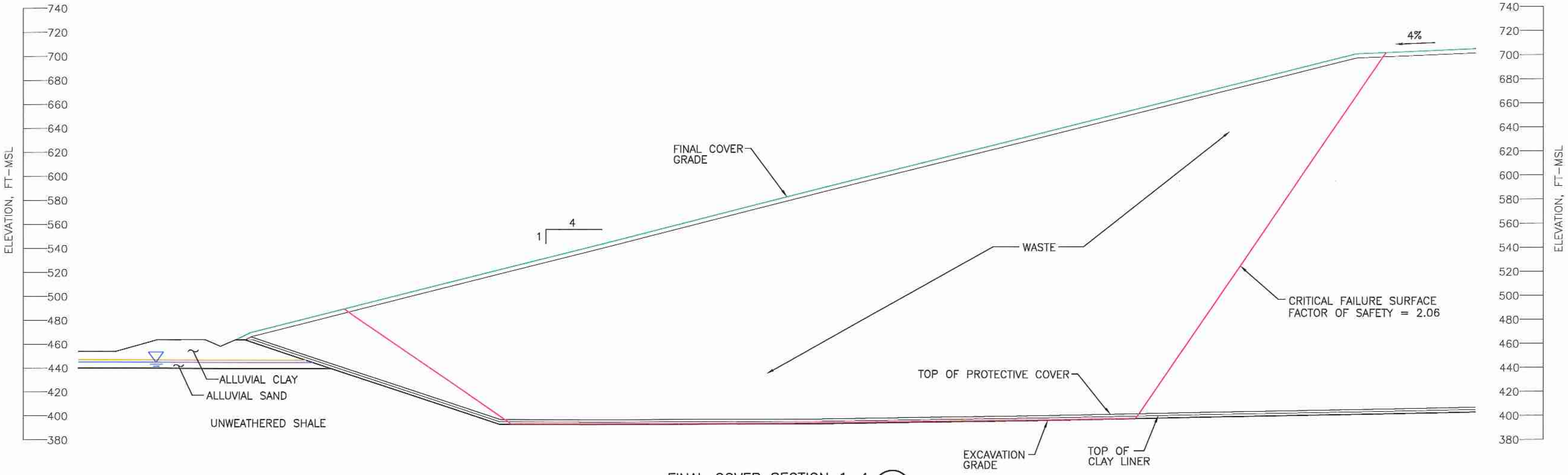

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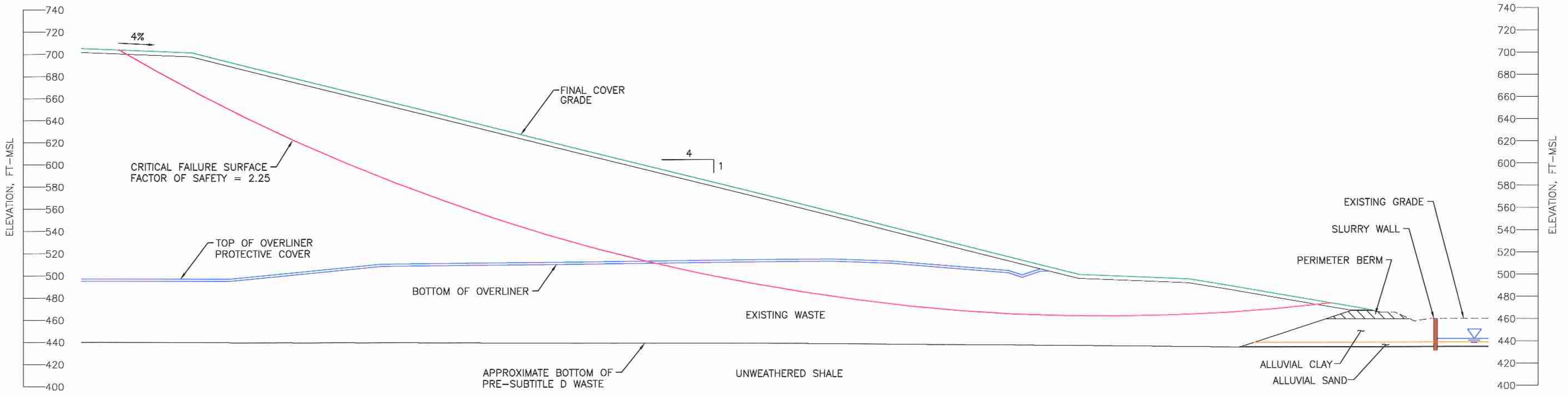

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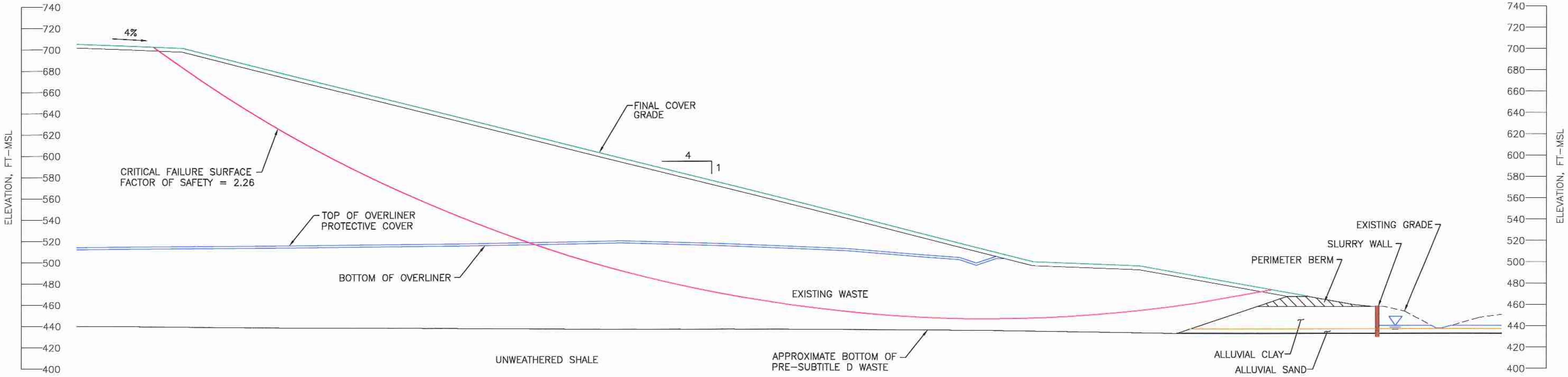

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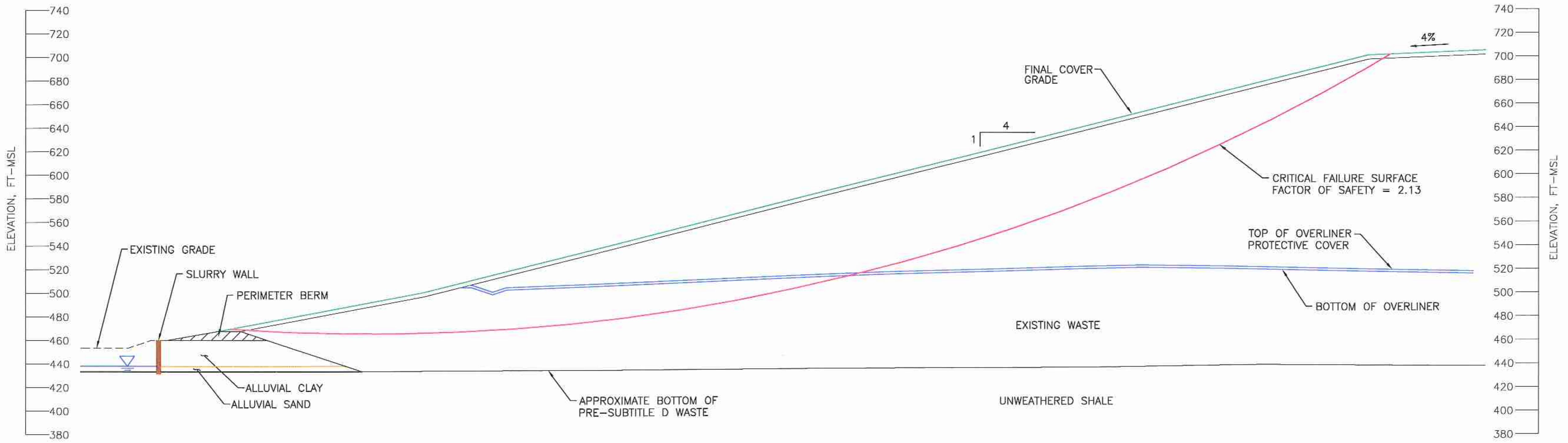

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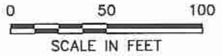

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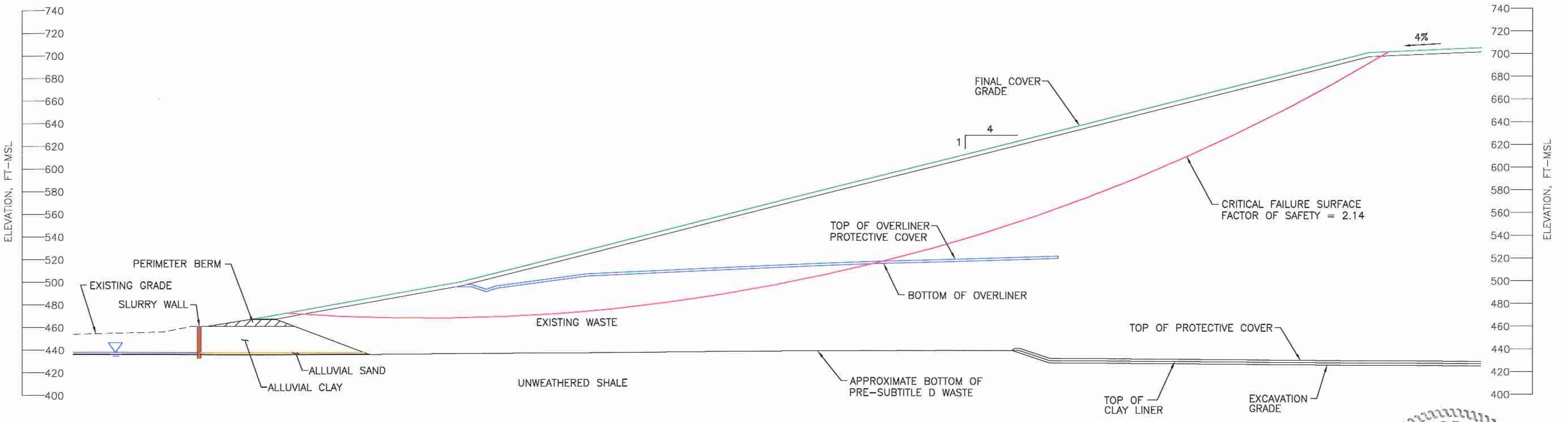

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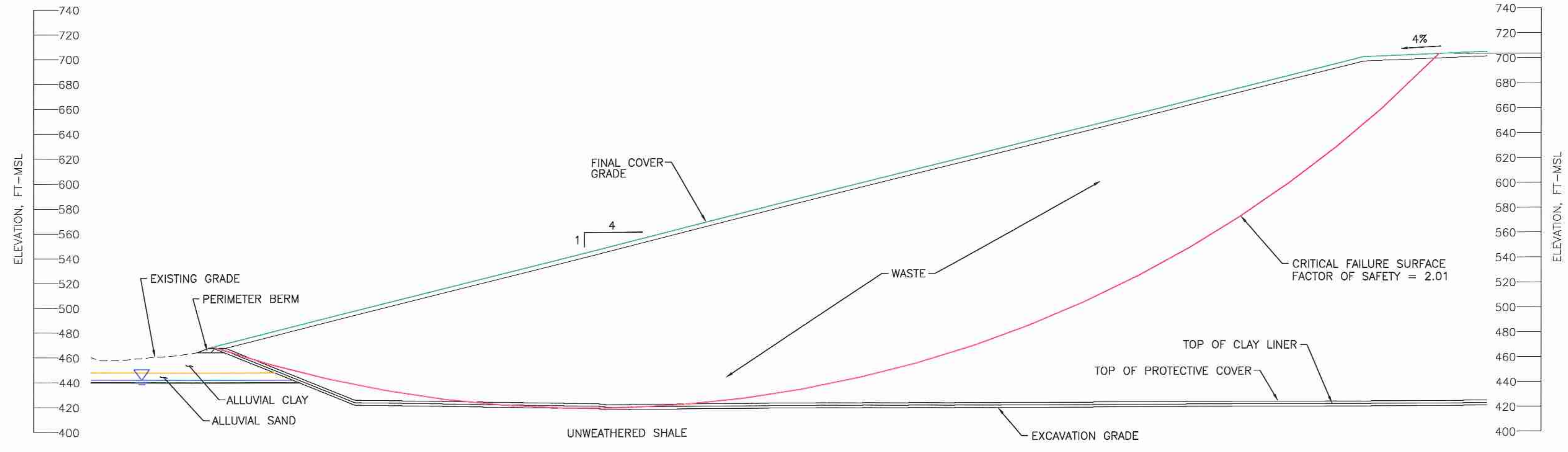

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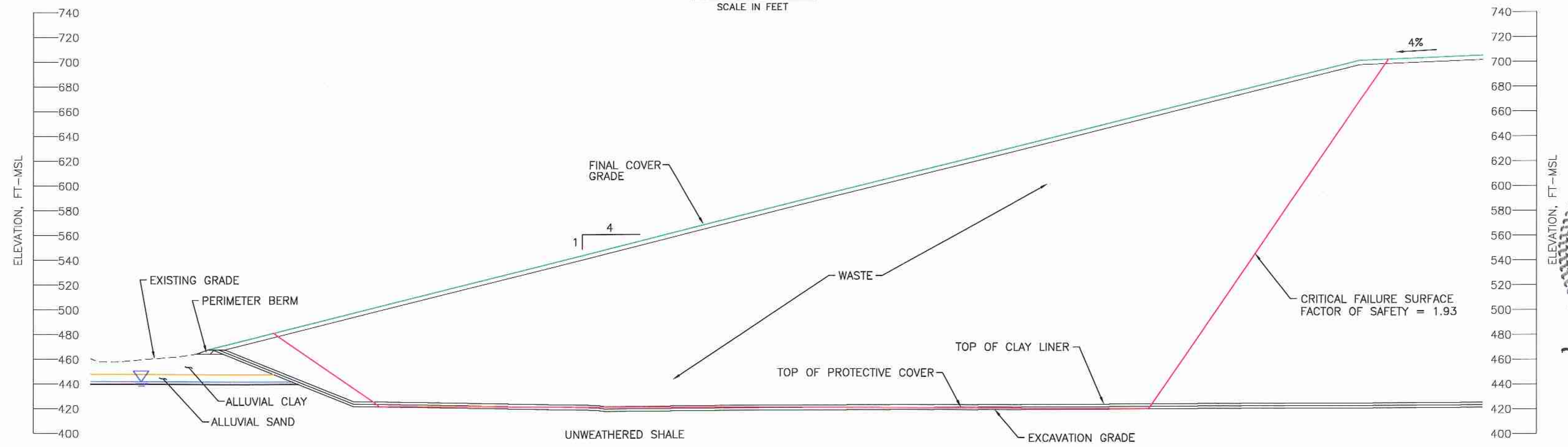

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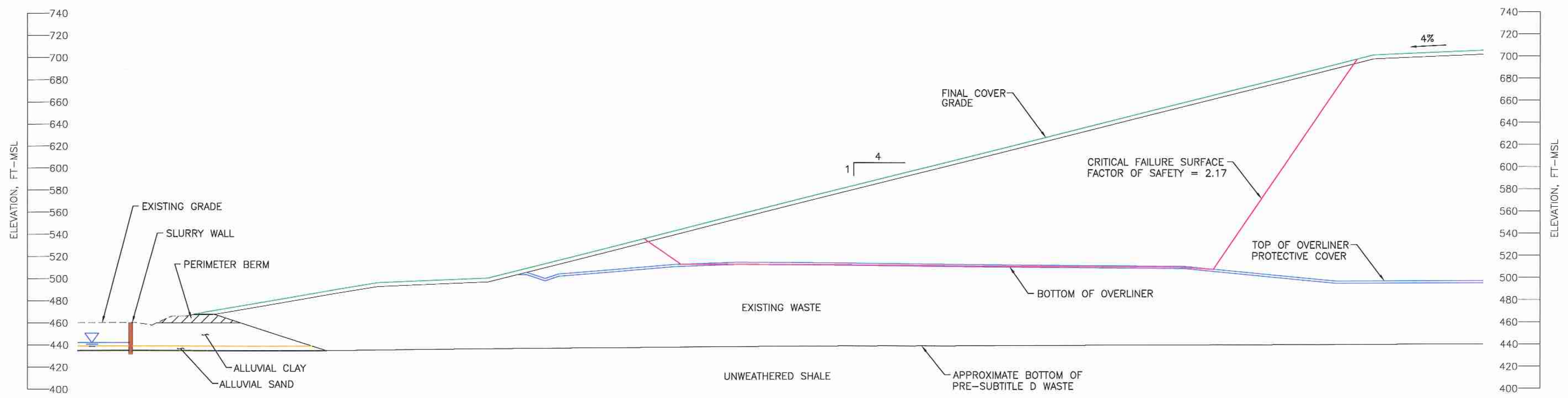

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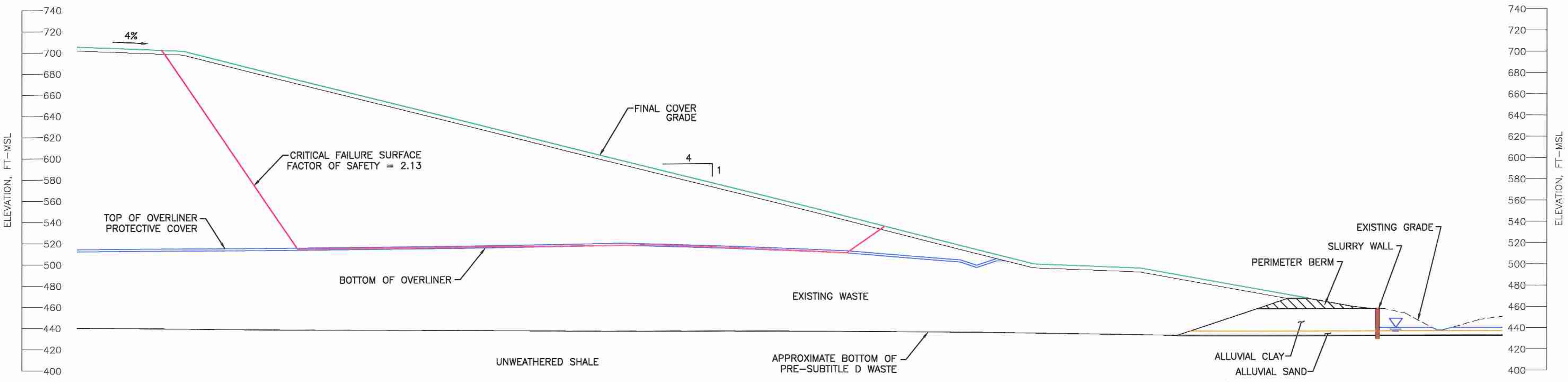

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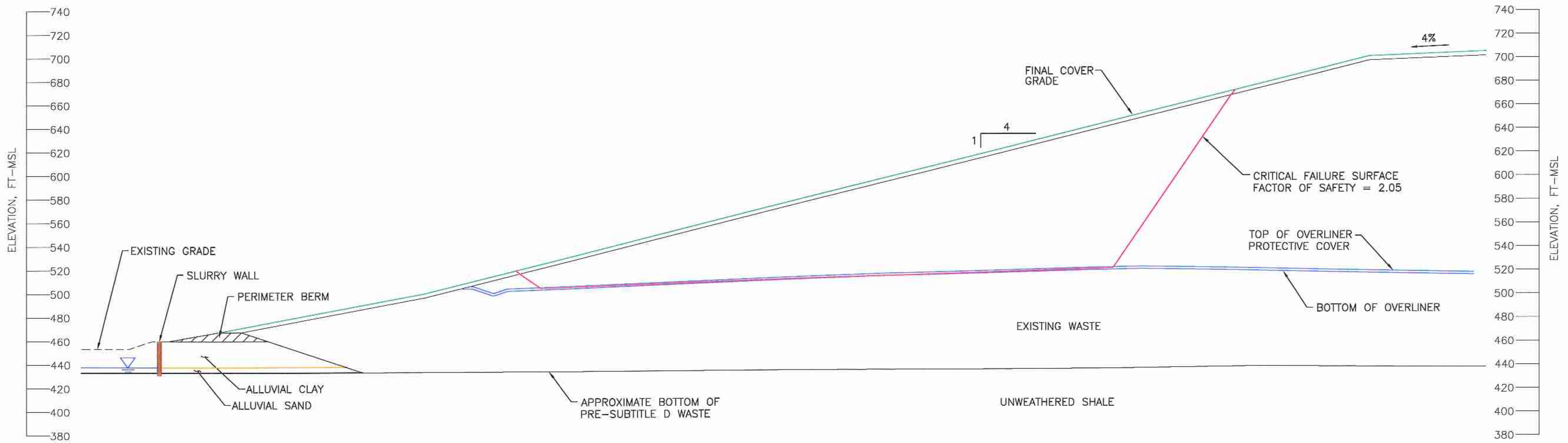

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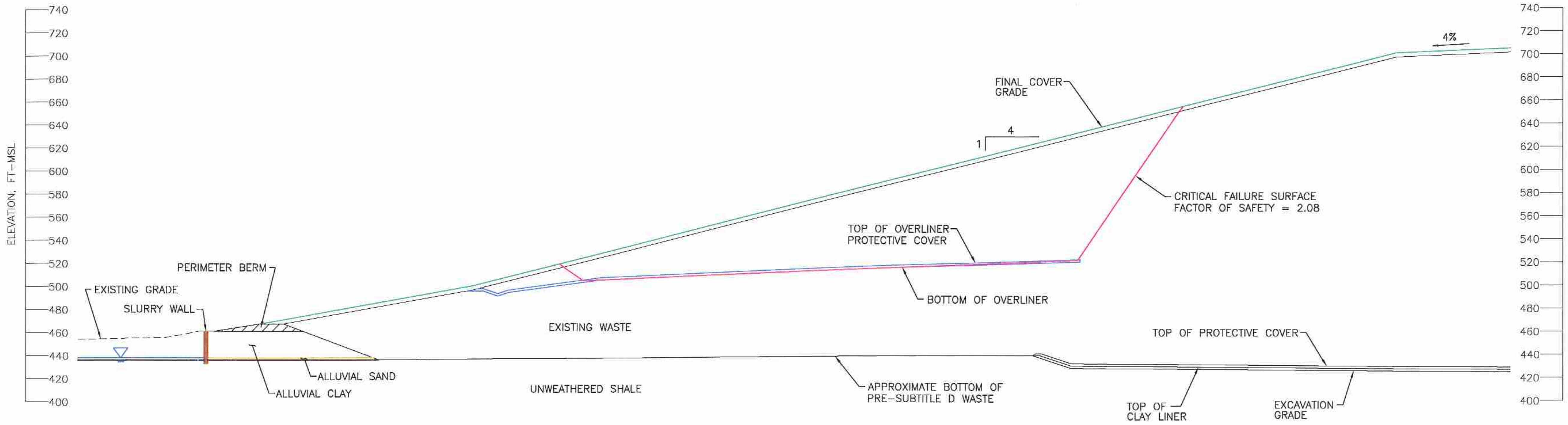

OVERLINER SECTION 4–1

4
IIIJ–A–3–3 IIIJ–A–3–13

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1. FINAL COVER SECTION LOCATIONS 2, 3, 4, AND 5 SHOWN ON SHEET IIIJ–A–3–3 ARE OVERLINER SECTION LOCATIONS 1, 2, 3, AND 4 RESPECTIVELY.

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O:\1339\351\EXPANSION 2009\PART III–SDP\IIIJ\IIIJ–A\IIIJ–A–3–13–OVERLINER SECTION.dwg, 3/9/2012 3:17:13 PM, rsellers

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DESIGN BY: JLG
REVIEWED BY: JPY

REUSE OF DOCUMENTS

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CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
SLOPE STABILITY
OVERLINER SECTION
CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

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SPRINGFIELD, IL
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SHEET IIIJ–A–3–13

Derivation of Slope Stability Parameters:

Laboratory testing data are provided in Appendix IIIJ-C. The following includes material strength properties based on the laboratory testing results from each subsurface unit.

Material	Moist Unit Weight (pcf)	Saturated Unit Weight (pcf)
Alluvial Clay[(1)]	127.0	131.0
Alluvial Sand/Gravel	132.0	135.0
Unweathered Shale	130.0	135.0
Perimeter Berm	127.0	131.0

(1) Isolated areas of fill material are modeled with the same material properties as the Alluvial Clay.

The strength parameters for the in-situ soils were selected based on the following:

Alluvial Clay

Two triaxial shear tests were performed on the alluvial clay (i.e., a clay sample and a sandy clay sample) which resulted in cohesion values of 788 lb/ft^2 and 262 lb/ft^2 (total stress) and 854 lb/ft^2 and 384 lb/ft^2 (effective stress). To be conservative, cohesion values of 788 lb/ft^2 and 854 lb/ft^2 (total and effective stress conditions, respectively) were selected. The internal friction angles were taken from the triaxial shear tests (11.5 and 28.4 degrees for total stress and 11.0 and 32.0 degrees for effective stress). To be conservative, internal friction angle values of 11.5 degrees and 11.0 degrees (total and effective stress conditions, respectively) were selected. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

Alluvial Sand/Gravel

A triaxial shear test was performed on a clayey sand which resulted in cohesion values of 470 lb/ft^2 (total stress) and 488 lb/ft^2 (effective stress). Therefore, cohesion values of 470 lb/ft^2 and 488 lb/ft^2 (total and effective stress conditions, respectively) were selected. The internal friction angles were taken from the triaxial shear test (8.3 degrees for total stress and 16.4 for effective stress.) Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

Unweathered Shale

An unconfined compression test was performed on the unweathered shale which indicated a strength value of 29,200 lb/ft^2 Therefore, a cohesion value of 5,000 lb/ft^2 was conservatively selected for this material. Since pore pressure buildup is unlikely, only effective stress strength parameters are used for this material. Moist unit weight values are calculated from each pair of moisture content and dry unit weight obtained from all laboratory testing performed on the material. These moist unit weight values were then averaged and this value is used in the slope stability analysis.

Perimeter Berm

Two triaxial shear tests were performed on the perimeter berm which resulted in cohesion values of 834 lb/ft^2 and 992 lb/ft^2 (total stress) and 1,074 lb/ft^2 and 1,076 lb/ft^2 (effective stress). To be conservative, cohesion values of 834 lb/ft^2 and 1,074 lb/ft^2 (total and effective stress conditions, respectively) were selected. The internal friction angles were taken from the triaxial shear tests (16.0 and 15.8 degrees for total stress and 13.1 and 15.0 degrees for effective stress). To be conservative, internal friction angle values of 16.0 degrees and 13.1 degrees (total and effective stress conditions, respectively) were selected. The moist unit weight value is assumed to be the same as that assigned to the compacted clay liner.

Material	Total Stress		Effective Stress	
	Cohesion (psf)	Friction Angle (degrees)	Cohesion (psf)	Friction Angle (degrees)
Alluvial Clay[(1)]	788	11.5	854	11.0
Alluvial Sand	470	8.3	488	16.4
Unweathered Shale	-	-	5,000	0.0
Perimeter Berm	834	16.0	1,074	13.1

(1) Isolated areas of fill material are modeled with the same material properties as the Alluvial Clay.

Slope stability strength parameters for constructed soil materials were selected as follows based on engineering judgment. Prior to construction, laboratory tests will be performed to verify the assumed strength parameter values

Slope stability strength parameters for constructed soil materials were selected as follows based on engineering judgment. Prior to construction, laboratory tests will be performed to verify the assumed strength parameter values using project-specific soil materials. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values.

Material	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Final Cover System	115	100	16
Clay Liner[1]	115	100	16
Protective Cover	115	100	16
Overliner Protective Cover[2]	115	100	16

1. A cohesion of 100 psf and internal friction angle of 16 degrees is used for the clay liner for Simplified Bishop method of the slope stability analysis. For global transitional stability analysis, the strength parameters of the weakest interface were used to model the clay liner. For peak values, an adhesion of 100 psf and an interface friction angle of 13 degrees (geonet/smooth geomembrane) is used in the Rankine Block method of the slope stability analysis to represent the weakest interface. For residual values, an adhesion of 80 psf and an interface friction angle of 8 degrees (geonet/smooth geomembrane) is used.
2. A cohesion of 100 psf and internal friction angle of 16 degrees is used for the overliner for Simplified Bishop method of the slope stability analysis. For global transitional stability analysis, the strength parameters of the weakest interface were used to model the overliner. For peak values, an adhesion of 100 psf and an interface friction angle of 18 degrees (soil/geocomposite) is used in the Rankine Block method of the slope stability analysis to represent the weakest interface. For residual values, an adhesion of 80 psf and an interface friction angle of 10 degrees (geocomposite/textured geomembrane) is used.

Slope stability strength parameters for the slurry wall were selected as follows based on engineering judgement and experience with this material.

Material	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Slurry Wall	75	0	5

Solid waste data used in this analysis are listed below.

Material	Moist Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
Solid Waste	65	288	23

This information was derived from several references. Reference 3 provides a summary of several studies that have been completed to develop the shear strength parameters for MSW (refer to Chapter 6.7 in Ref. 3). MSW shear strength parameters reported in technical literature references vary widely, with friction angles as low as 10° and as high as 53° and cohesion values varying from 0 psf to 1400 psf. Many of the lower values are directly contradicted by observations of actual stable landfill slopes. A summary of a few of the studies completed is listed below.

Reference	Data Type	Results
Pagotto & Rimoldi (1987)	Back-calculation from plate bearing tests	$\phi = 22,^\circ$ c = 605 psf (29 kPa)
Landva & Clark (1990)	Laboratory direct shear tests on MSW	$\phi = 24,^\circ$ c = 460 psf (22 kPa) to $\phi = 39,^\circ$ c = 400 psf (19 kPa)
Richardson & Reynolds (1991)	Large direct shear tests performed in-situ	$\phi = 18^\circ$ to $43,^\circ$ c = 210 psf (10 kPa)

To provide for a conservative analysis, a cohesion of 288 psf and a friction angle of 23° were selected.

The moist unit weight is calculated at the midpoint of the average depth to represent the average unit weight of waste/cover soil within the landfill, consistent with what is used in the site life calculations in Appendix IIIN.

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-A
FINAL CONFIGURATION SLOPE STABILITY ANALYSIS

Factor of Safety Summary for Long-Term Slope Stability

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Total Stress	Effective Stress	Total Stress	Effective Stress	Total Stress	Effective Stress
Final Cover 1-1 (Massive)	Bishop-Circular	2.14	2.17	1.3	1.5	YES	YES
Final Cover 1-2 (Perimeter)	Bishop-Circular	4.26	5.16	1.3	1.5	YES	YES
Final Cover 1-3 (Side Slope)	Bishop-Circular	2.13	2.13	1.3	1.5	YES	YES
Final Cover 2-1 (Massive)	Bishop-Circular	2.27	2.28	1.3	1.5	YES	YES
Final Cover 2-2 (Perimeter)	Bishop-Circular	6.49	6.86	1.3	1.5	YES	YES
Final Cover 2-3 (Side Slope)	Bishop-Circular	2.25	2.26	1.3	1.5	YES	YES
Final Cover 3-1 (Massive)	Bishop-Circular	2.31	2.32	1.3	1.5	YES	YES
Final Cover 3-2 (Perimeter)	Bishop-Circular	2.83	3.32	1.3	1.5	YES	YES
Final Cover 3-3 (Side Slope)	Bishop-Circular	2.26	2.26	1.3	1.5	YES	YES
Final Cover 4-1 (Massive)	Bishop-Circular	2.19	2.20	1.3	1.5	YES	YES
Final Cover 4-2 (Perimeter)	Bishop-Circular	4.74	5.48	1.3	1.5	YES	YES
Final Cover 4-3 (Side Slope)	Bishop-Circular	2.13	2.13	1.3	1.5	YES	YES
Final Cover 5-1 (Massive)	Bishop-Circular	2.23	2.25	1.3	1.5	YES	YES
Final Cover 5-2 (Perimeter)	Bishop-Circular	7.29	8.31	1.3	1.5	YES	YES
Final Cover 5-3 (Side Slope)	Bishop-Circular	2.14	2.14	1.3	1.5	YES	YES
Final Cover 6-1 (Massive)	Bishop-Circular	2.11	2.11	1.3	1.5	YES	YES
Final Cover 6-2 (Perimeter)	Bishop-Circular	5.20	6.17	1.3	1.5	YES	YES
Final Cover 6-3 (Side Slope)	Bishop-Circular	2.01	2.01	1.3	1.5	YES	YES

Description		Minimum Factor of Safety Generated		Recommended Minimum Factor of Safety		Acceptable Factor of Safety	
Slope Designation	Method of Analysis	Peak	Residual	Peak	Residual	Peak	Residual
Final Cover 1-4	Rankine-Block	2.06	1.86	1.5	1.0	YES	YES
Final Cover 6-4	Rankine-Block	1.93	1.78	1.5	1.0	YES	YES
Overliner 1-1	Rankine-Block	2.17	1.55	1.5	1.0	YES	YES
Overliner 2-1	Rankine-Block	2.13	1.51	1.5	1.0	YES	YES
Overliner 3-1	Rankine-Block	2.05	1.42	1.5	1.0	YES	YES
Overliner 4-1	Rankine-Block	2.08	1.45	1.5	1.0	YES	YES

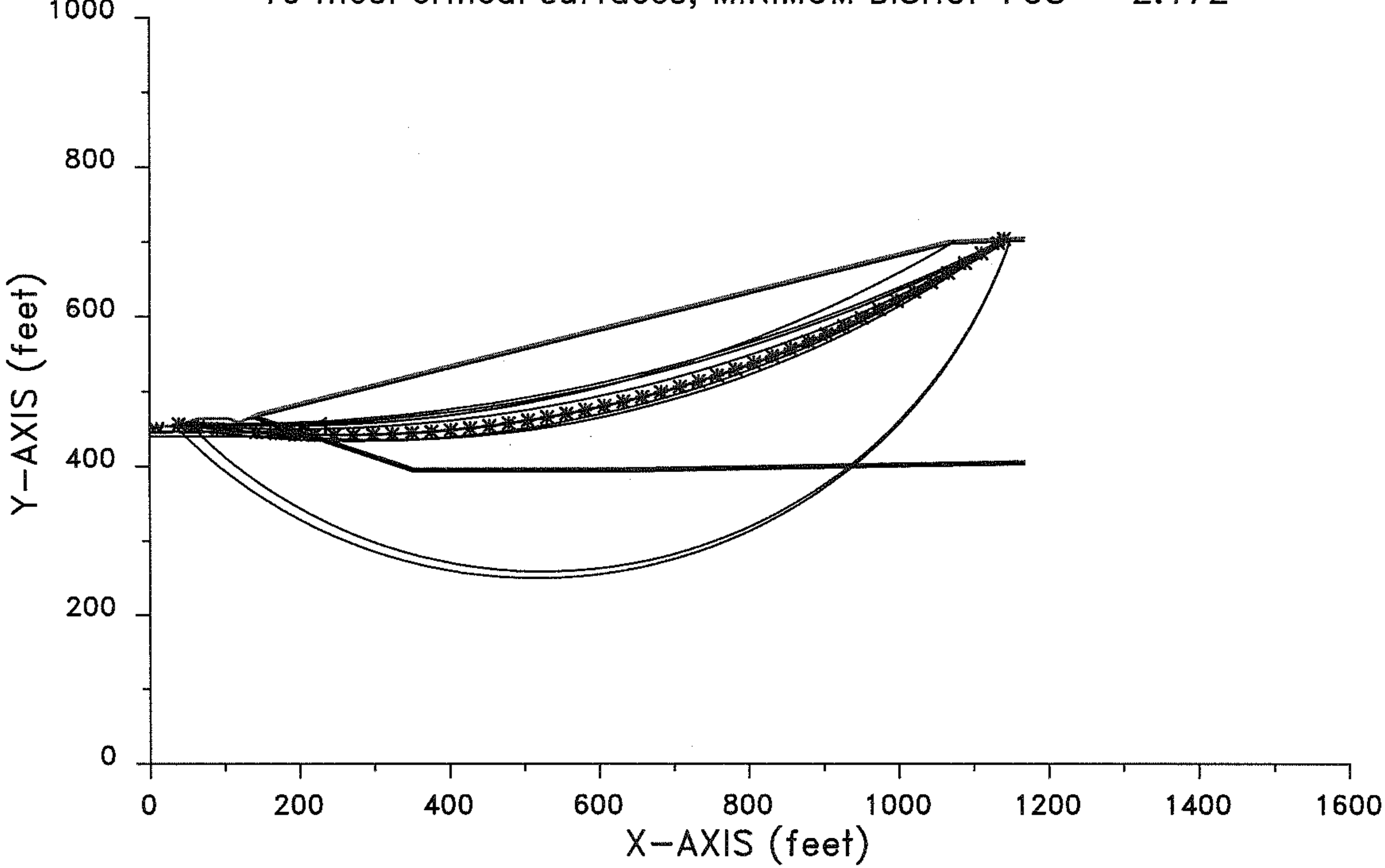
Minimum Required Interface Strength Parameters

Landfill Component	Interface	Peak		Residual	
		Adhesion (psf)	Friction Angle (deg)	Adhesion (psf)	Friction Angle (deg)
Liner/FC/Overliner Systems	Protective Cover/Geocomposite	100	18	80	14
Liner/FC Systems	Geocomposite-Geonet/Smooth Geomembrane	100	13	80	8
Overliner System	Geocomposite-Geonet/Textured Geomembrane	100	21	80	10
Liner/FC Systems	Geocomposite/Textured Geomembrane	100	21	80	10
Liner/FC Systems	Smooth Geomembrane/Clay Liner	100	13	80	8
Liner/FC Systems	Textured Geomembrane/Clay Liner	200	15	80	10
Overliner System	Textured Geomembrane/Geosynthetic Clay Liner	100	18	80	10
Overliner System	Geosynthetic Clay Liner/Subgrade	100	25	80	12

SLOPE STABILITY XSTABL OUTPUT FILES

1-1E 10-10-11 39:11

CAMELOT LF – FINAL COVER SEC 1–1E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.172



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          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *              using the                *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
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          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 1-1E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
       No.      (ft)      (ft)      (ft)      (ft)    Below Segment

       1          .0     454.0      31.0     454.0         1
       2        31.0     454.0      65.6     463.9         1
       3        65.6     463.9     105.8     464.0         1
       4       105.8     464.0     118.6     458.6         1
       5       118.6     458.6     131.4     464.0         1
       6       131.4     464.0     143.7     470.0         5
       7       143.7     470.0    1067.7     701.0         5
       8      1067.7     701.0    1167.7     705.0         5


       18 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
       No.      (ft)      (ft)      (ft)      (ft)    Below Segment

       1       131.4     464.0     139.5     464.0         1
       2       139.5     464.0     144.9     466.7         6
       3       144.9     466.7    1068.2     697.5         4
       4      1068.2     697.5    1167.7     701.5         4
       5       144.6     466.5     352.6     397.2         6
       6       352.6     397.2     617.0     396.9         6
       7       617.0     396.9    1167.7     407.0         6
       8       139.5     464.0     145.8     464.0         7
       9       145.8     464.0     352.2     395.2         7
```

```
   10       352.2     395.2     617.0     394.9          8
   11       617.0     394.9    1167.7     405.0          8
   12       139.5     464.0     190.5     447.0          1
   13       190.5     447.0     211.5     440.0          2
   14       211.5     440.0     351.9     393.2          3
   15       351.9     393.2     617.0     392.9          3
   16       617.0     392.9    1167.7     403.0          3
   17          .0     447.0     190.5     447.0          2
   18          .0     440.0     211.5     440.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.

  1   127.0   131.0     854.0    11.00      .000         .0      0
  2   132.0   135.0     488.0    16.40      .000         .0      1
  3   130.0   135.0    5000.0      .00      .000         .0      0
  4    65.0    65.0     288.0    23.00      .000         .0      0
  5   115.0   120.0     100.0    16.00      .000         .0      0
  6   115.0   120.0     100.0    16.00      .000         .0      0
  7   115.0   120.0     100.0    16.00      .000         .0      0
  8   115.0   120.0     100.0    16.00      .000         .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1            .00      445.00
    2         196.50      445.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.
```

```
  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =       .0 ft
                               and  x =     50.0 ft


Each surface terminates between   x =   1050.0 ft
                              and   x =   1150.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   26.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 46 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          38.89       456.26
         2          64.68       453.01
         3          90.53       450.17
         4         116.42       447.74
         5         142.34       445.73
         6         168.29       444.14
         7         194.26       442.96
         8         220.25       442.19
         9         246.25       441.84
        10         272.25       441.90
```

```
          11          298.24       442.38
          12          324.23       443.28
          13          350.20       444.59
          14          376.14       446.31
          15          402.05       448.45
          16          427.92       451.00
          17          453.76       453.97
          18          479.53       457.35
          19          505.26       461.13
          20          530.92       465.33
          21          556.50       469.94
          22          582.02       474.96
          23          607.44       480.38
          24          632.78       486.21
          25          658.02       492.45
          26          683.16       499.08
          27          708.19       506.12
          28          733.11       513.56
          29          757.90       521.39
          30          782.56       529.62
          31          807.09       538.24
          32          831.48       547.25
          33          855.72       556.65
          34          879.81       566.44
          35          903.74       576.61
          36          927.50       587.16
          37          951.09       598.09
          38          974.50       609.39
          39          997.74       621.07
          40         1020.78       633.11
          41         1043.62       645.53
          42         1066.27       658.30
          43         1088.70       671.44
          44         1110.93       684.93
          45         1132.93       698.78
          46         1140.82       703.92

****  Simplified BISHOP FOS =   2.172  ****



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 1-1E

       FOS       Circle Center      Radius   Initial Terminal  Resisting
     (BISHOP)   x-coord  y-coord             x-coord  x-coord    Moment
                  (ft)     (ft)       (ft)     (ft)     (ft)     (ft-lb)

  1.   2.172    255.22  2069.19   1627.37    38.89  1140.82  4.218E+09
  2.   2.174    254.38  2103.58   1661.36    38.89  1149.91  4.360E+09
  3.   2.193    194.41  2370.58   1920.63    38.89  1149.47  4.457E+09
  4.   2.207    182.82  2193.88   1739.52    50.00  1076.19  3.230E+09
  5.   2.224    122.51  2687.38   2232.69    38.89  1148.10  4.563E+09
```

```
  6.   2.228    311.72  1851.18  1416.13    50.00  1141.94  4.164E+09
  7.   2.231    107.12  2745.27  2288.29    44.44  1141.04  4.397E+09
  8.   2.423    274.53  1946.03  1512.30    27.78  1136.90  4.717E+09
  9.   2.496    524.81   919.20   660.93    50.00  1149.75  4.071E+09
 10.   2.500    515.83   919.07   669.68    33.33  1150.03  4.217E+09

                       * * *  END OF FILE  * * *
```

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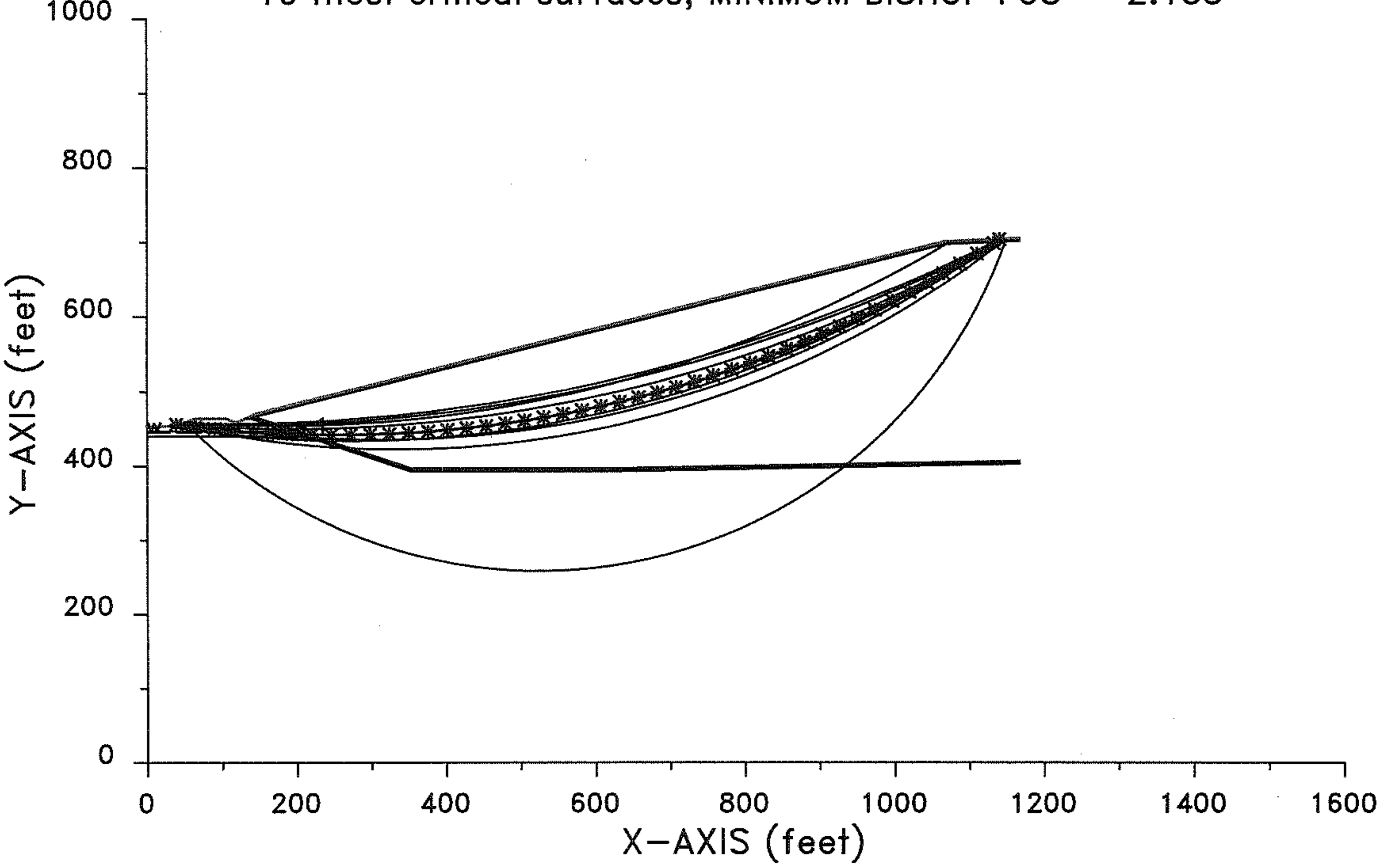
CAMELOT LF – FINAL COVER SEC 1–1T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.135



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XSTABL File: 1-1T      10-10-11   39:26

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          *               X S T A B L              *
          *                                        *
          *        Slope Stability Analysis        *
          *                using the               *
          *             Method of Slices           *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
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          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 1-1T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
      No.       (ft)      (ft)      (ft)      (ft)    Below Segment

      1           .0     454.0      31.0     454.0         1
      2         31.0     454.0      65.6     463.9         1
      3         65.6     463.9     105.8     464.0         1
      4        105.8     464.0     118.6     458.6         1
      5        118.6     458.6     131.4     464.0         1
      6        131.4     464.0     143.7     470.0         5
      7        143.7     470.0    1067.7     701.0         5
      8       1067.7     701.0    1167.7     705.0         5


       18 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
      No.       (ft)      (ft)      (ft)      (ft)    Below Segment

      1        131.4     464.0     139.5     464.0         1
      2        139.5     464.0     144.9     466.7         6
      3        144.9     466.7    1068.2     697.5         4
      4       1068.2     697.5    1167.7     701.5         4
      5        144.6     466.5     352.6     397.2         6
      6        352.6     397.2     617.0     396.9         6
      7        617.0     396.9    1167.7     407.0         6
      8        139.5     464.0     145.8     464.0         7
      9        145.8     464.0     352.2     395.2         7
```

```
     10         352.2      395.2       617.0      394.9          8
     11         617.0      394.9      1167.7      405.0          8
     12         139.5      464.0       190.5      447.0          1
     13         190.5      447.0       211.5      440.0          2
     14         211.5      440.0       351.9      393.2          3
     15         351.9      393.2       617.0      392.9          3
     16         617.0      392.9      1167.7      403.0          3
     17            .0      447.0       190.5      447.0          2
     18            .0      440.0       211.5      440.0          3


 --------------------------
 ISOTROPIC Soil Parameters
 --------------------------

  8 Soil unit(s) specified

 Soil   Unit Weight    Cohesion  Friction    Pore Pressure       Water
 Unit  Moist    Sat.  Intercept   Angle   Parameter  Constant  Surface
  No.  (pcf)   (pcf)    (psf)     (deg)       Ru       (psf)      No.

   1   127.0   131.0     788.0    11.50      .000         .0       0
   2   132.0   135.0     470.0     8.30      .000         .0       1
   3   130.0   135.0    5000.0      .00      .000         .0       0
   4    65.0    65.0     288.0    23.00      .000         .0       0
   5   115.0   120.0     100.0    16.00      .000         .0       0
   6   115.0   120.0     100.0    16.00      .000         .0       0
   7   115.0   120.0     100.0    16.00      .000         .0       0
   8   115.0   120.0     100.0    16.00      .000         .0       0


 ----------------------------------------------------------------------
  UNDRAINED STRENGTHS as a function of effective vertical stress
                     have been specified for  2 Soil Unit(s)
 ----------------------------------------------------------------------


           Soil Unit #       Parameter a      Parameter Psi

                1.               788.0            11.50
                2.               470.0             8.30


  1 Water surface(s) have been specified

 Unit weight of water =     62.40   (pcf)


 Water Surface No.  1 specified by  2 coordinate points

 **********************************
          PHREATIC SURFACE,
 **********************************

   Point      x-water     y-water
```

```
   No.           (ft)         (ft)

    1              .00       445.00
    2           196.50       445.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =        .0 ft
                             and  x =      50.0 ft


Each surface terminates between   x =   1050.0 ft
                            and   x =   1150.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   26.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 46 coordinate points
```

```
           Point         x-surf         y-surf
            No.           (ft)           (ft)

             1            38.89         456.26
             2            64.68         453.01
             3            90.53         450.17
             4           116.42         447.74
             5           142.34         445.73
             6           168.29         444.14
             7           194.26         442.96
             8           220.25         442.19
             9           246.25         441.84
            10           272.25         441.90
            11           298.24         442.38
            12           324.23         443.28
            13           350.20         444.59
            14           376.14         446.31
            15           402.05         448.45
            16           427.92         451.00
            17           453.76         453.97
            18           479.53         457.35
            19           505.26         461.13
            20           530.92         465.33
            21           556.50         469.94
            22           582.02         474.96
            23           607.44         480.38
            24           632.78         486.21
            25           658.02         492.45
            26           683.16         499.08
            27           708.19         506.12
            28           733.11         513.56
            29           757.90         521.39
            30           782.56         529.62
            31           807.09         538.24
            32           831.48         547.25
            33           855.72         556.65
            34           879.81         566.44
            35           903.74         576.61
            36           927.50         587.16
            37           951.09         598.09
            38           974.50         609.39
            39           997.74         621.07
            40          1020.78         633.11
            41          1043.62         645.53
            42          1066.27         658.30
            43          1088.70         671.44
            44          1110.93         684.93
            45          1132.93         698.78
            46          1140.82         703.92

  ****   Simplified BISHOP FOS =    2.135   ****
```

```
The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 1-1T

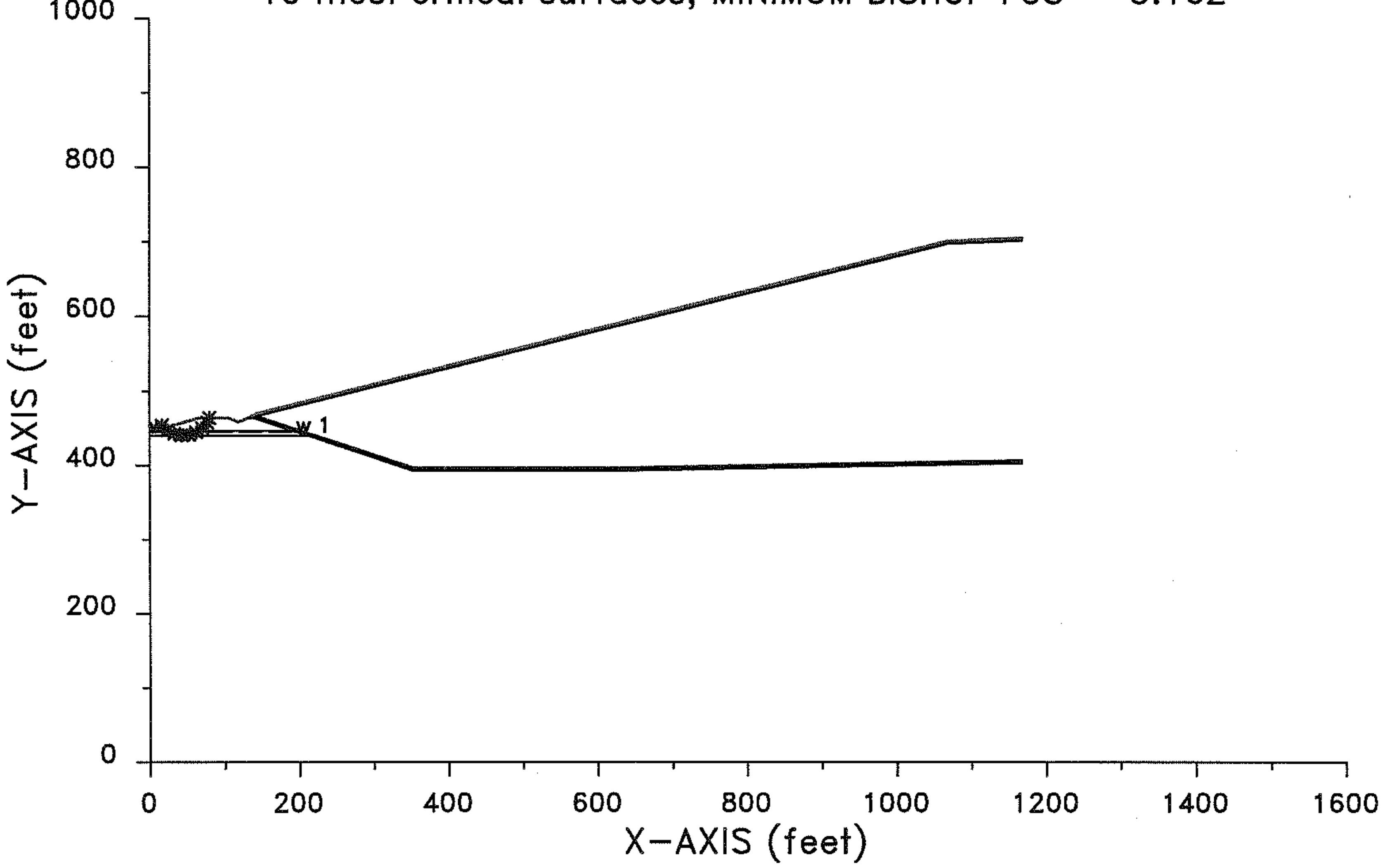
       FOS       Circle Center     Radius   Initial Terminal  Resisting
    (BISHOP)   x-coord  y-coord            x-coord  x-coord    Moment
                 (ft)     (ft)      (ft)     (ft)     (ft)     (ft-lb)

 1.   2.135    255.22  2069.19  1627.37    38.89  1140.82  4.147E+09
 2.   2.140    254.38  2103.58  1661.36    38.89  1149.91  4.291E+09
 3.   2.185    194.41  2370.58  1920.63    38.89  1149.47  4.441E+09
 4.   2.198    311.72  1851.18  1416.13    50.00  1141.94  4.108E+09
 5.   2.199    182.82  2193.88  1739.52    50.00  1076.19  3.217E+09
 6.   2.215    122.51  2687.38  2232.69    38.89  1148.10  4.546E+09
 7.   2.223    107.12  2745.27  2288.29    44.44  1141.04  4.381E+09
 8.   2.400    274.53  1946.03  1512.30    27.78  1136.90  4.673E+09
 9.   2.490    336.06  1736.84  1314.61    38.89  1149.62  4.846E+09
10.   2.493    524.81   919.20   660.93    50.00  1149.75  4.065E+09

                   * * *  END OF FILE  * * *
```

1-2E 10-10-11 39:29

CAMELOT LF - FINAL COVER SEC 1-2E
10 most critical surfaces, MINIMUM BISHOP FOS = 5.162



```
XSTABL File: 1-2E      10-10-11   39:29

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *                using the               *
             *            Method of Slices            *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             *  Ver. 5.208                96 - 2046   *
             ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 1-2E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)     Below Segment

        1          .0     454.0       31.0     454.0         1
        2        31.0     454.0       65.6     463.9         1
        3        65.6     463.9      105.8     464.0         1
        4       105.8     464.0      118.6     458.6         1
        5       118.6     458.6      131.4     464.0         1
        6       131.4     464.0      143.7     470.0         5
        7       143.7     470.0     1067.7     701.0         5
        8      1067.7     701.0     1167.7     705.0         5


       18 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)     Below Segment

        1       131.4     464.0      139.5     464.0         1
        2       139.5     464.0      144.9     466.7         6
        3       144.9     466.7     1068.2     697.5         4
        4      1068.2     697.5     1167.7     701.5         4
        5       144.6     466.5      352.6     397.2         6
        6       352.6     397.2      617.0     396.9         6
        7       617.0     396.9     1167.7     407.0         6
        8       139.5     464.0      145.8     464.0         7
        9       145.8     464.0      352.2     395.2         7
```

```
    10        352.2       395.2       617.0       394.9            8
    11        617.0       394.9      1167.7       405.0            8
    12        139.5       464.0       190.5       447.0            1
    13        190.5       447.0       211.5       440.0            2
    14        211.5       440.0       351.9       393.2            3
    15        351.9       393.2       617.0       392.9            3
    16        617.0       392.9      1167.7       403.0            3
    17           .0       447.0       190.5       447.0            2
    18           .0       440.0       211.5       440.0            3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
No.   (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.

  1   127.0   131.0     854.0    11.00      .000         .0      0
  2   132.0   135.0     488.0    16.40      .000         .0      1
  3   130.0   135.0    5000.0      .00      .000         .0      0
  4    65.0    65.0     288.0    23.00      .000         .0      0
  5   115.0   120.0     100.0    16.00      .000         .0      0
  6   115.0   120.0     100.0    16.00      .000         .0      0
  7   115.0   120.0     100.0    16.00      .000         .0      0
  8   115.0   120.0     100.0    16.00      .000         .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point        x-water      y-water
   No.          (ft)         (ft)

    1             .00       445.00
    2          196.50       445.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.
```

```
  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =       .0 ft
                             and  x =     30.0 ft


Each surface terminates between   x =     60.0 ft
                            and   x =     80.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   10.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees


************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

------------------------------------------------------------
USER SELECTED option to maintain strength greater than zero
------------------------------------------------------------



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by  9 coordinate points

         Point      x-surf      y-surf
          No.        (ft)        (ft)
```

```
              1          16.67       454.00
              2          24.13       447.34
              3          33.07       442.87
              4          42.87       440.88
              5          52.85       441.51
              6          62.32       444.73
              7          70.62       450.31
              8          77.18       457.86
              9          80.12       463.94

  ****  Simplified BISHOP FOS =   5.162  ****


 *********************************************************************
 **                                                                 **
 **  Out of the    100 surfaces generated and analyzed by XSTABL,   **
 **        2 surfaces were found to have MISLEADING FOS values.     **
 **                                                                 **
 *********************************************************************



 The following is a summary of the TEN most critical surfaces

 Problem Description : CAMELOT LF - FINAL COVER SEC 1-2E

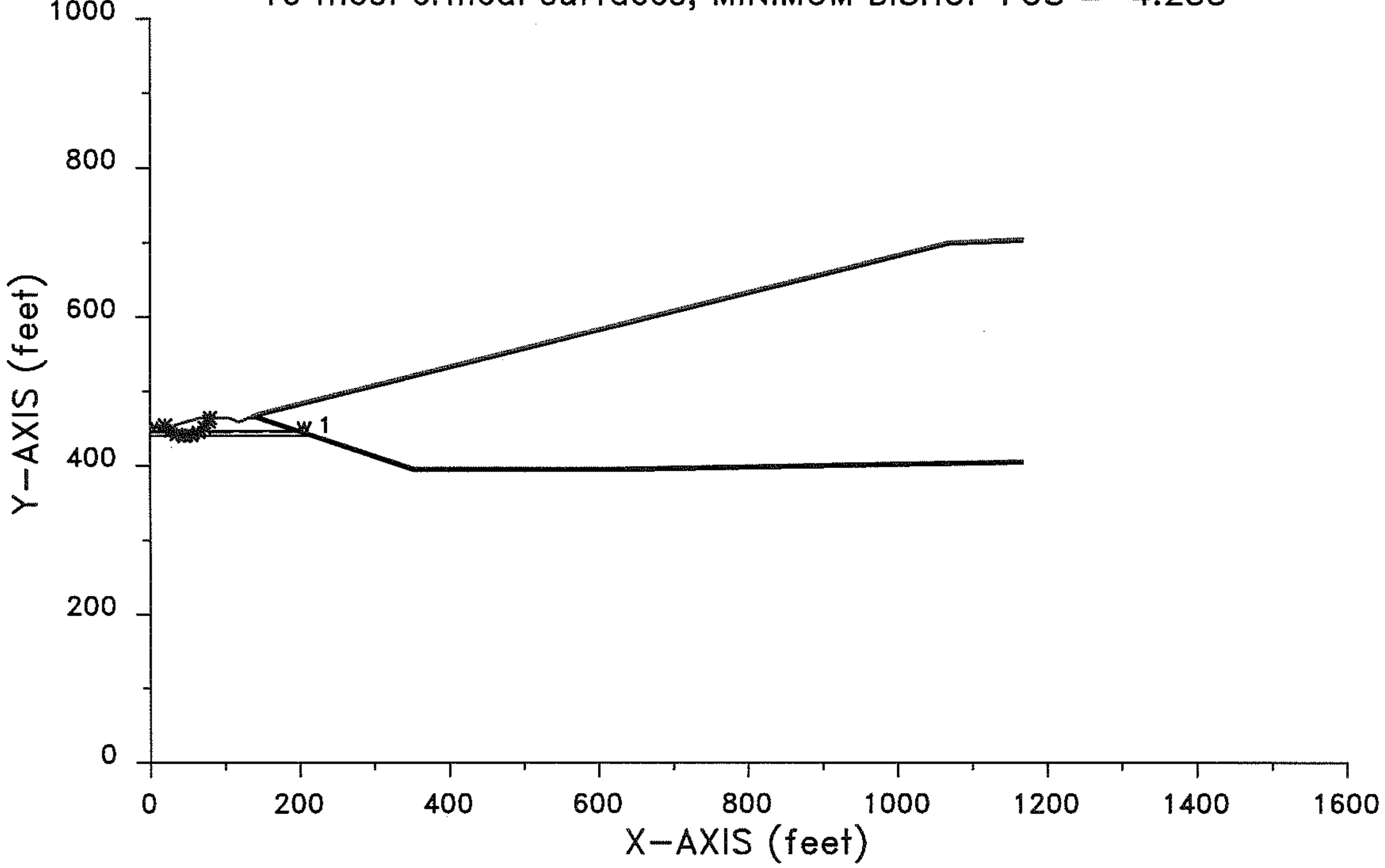
         FOS     Circle Center    Radius  Initial Terminal  Resisting
       (BISHOP)  x-coord  y-coord          x-coord  x-coord   Moment
                  (ft)     (ft)     (ft)     (ft)     (ft)    (ft-lb)

  1.    5.162    45.47   478.78    37.99    16.67    80.12  2.971E+06
  2.    5.185    47.12   477.56    35.92    20.00    80.05  2.665E+06
  3.    5.187    44.63   479.43    37.80    16.67    78.74  2.837E+06
  4.    5.200    47.70   474.64    34.54    20.00    80.16  2.681E+06
  5.    5.208    44.41   474.67    34.60    16.67    76.91  2.645E+06
  6.    5.225    42.92   481.35    40.29    13.33    79.06  3.171E+06
  7.    5.286    45.28   473.06    31.66    20.00    75.50  2.214E+06
  8.    5.303    41.81   481.51    39.59    13.33    76.94  2.965E+06
  9.    5.343    44.33   474.89    32.07    20.00    74.08  2.117E+06
 10.    5.358    44.30   477.11    33.53    20.00    74.74  2.193E+06

                       * * *  END OF FILE  * * *
```

1-2T 10-10-11 39:30

CAMELOT LF – FC SECTION 1–2T
10 most critical surfaces, MINIMUM BISHOP FOS = 4.255



```
XSTABL File: 1-2T      10-10-11   39:30

          *****************************************
          *               X S T A B L             *
          *                                       *
          *        Slope Stability Analysis       *
          *                using the              *
          *            Method of Slices           *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *           All Rights Reserved         *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FC SECTION 1-2T




    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment    x-left     y-left     x-right    y-right     Soil Unit
      No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1          .0      454.0       31.0      454.0          1
       2        31.0      454.0       65.6      463.9          1
       3        65.6      463.9      105.8      464.0          1
       4       105.8      464.0      118.6      458.6          1
       5       118.6      458.6      131.4      464.0          1
       6       131.4      464.0      143.7      470.0          5
       7       143.7      470.0     1067.7      701.0          5
       8      1067.7      701.0     1167.7      705.0          5


       18 SUBSURFACE boundary segments

    Segment    x-left     y-left     x-right    y-right     Soil Unit
      No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1       131.4      464.0      139.5      464.0          1
       2       139.5      464.0      144.9      466.7          6
       3       144.9      466.7     1068.2      697.5          4
       4      1068.2      697.5     1167.7      701.5          4
       5       144.6      466.5      352.6      397.2          6
       6       352.6      397.2      617.0      396.9          6
       7       617.0      396.9     1167.7      407.0          6
       8       139.5      464.0      145.8      464.0          7
       9       145.8      464.0      352.2      395.2          7
```

```
   10        352.2       395.2        617.0       394.9            8
   11        617.0       394.9       1167.7       405.0            8
   12        139.5       464.0        190.5       447.0            1
   13        190.5       447.0        211.5       440.0            2
   14        211.5       440.0        351.9       393.2            3
   15        351.9       393.2        617.0       392.9            3
   16        617.0       392.9       1167.7       403.0            3
   17           .0       447.0        190.5       447.0            2
   18           .0       440.0        211.5       440.0            3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)     Ru        (psf)      No.

  1   127.0   131.0     788.0    11.50      .000          .0       0
  2   132.0   135.0     470.0     8.30      .000          .0       1
  3   130.0   135.0    5000.0      .00      .000          .0       0
  4    65.0    65.0     288.0    23.00      .000          .0       0
  5   115.0   120.0     100.0    16.00      .000          .0       0
  6   115.0   120.0     100.0    16.00      .000          .0       0
  7   115.0   120.0     100.0    16.00      .000          .0       0
  8   115.0   120.0     100.0    16.00      .000          .0       0


----------------------------------------------------------------------
----
 UNDRAINED STRENGTHS as a function of effective vertical stress
                    have been specified for  2 Soil Unit(s)
----------------------------------------------------------------------
----


          Soil Unit #       Parameter a      Parameter Psi

               1.                788.0           11.50
               2.                470.0            8.30


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)

Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
```

```
    No.          (ft)         (ft)

     1            .00        445.00
     2         196.50        445.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =       .0 ft
                            and  x =     30.0 ft


Each surface terminates between   x =     60.0 ft
                           and   x =     80.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   10.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees


************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------
```

```
Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by  9 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1          20.00        454.00
         2          27.07        446.93
         3          35.87        442.18
         4          45.67        440.16
         5          55.63        441.02
         6          64.93        444.70
         7          72.78        450.89
         8          78.54        459.07
         9          80.16        463.94

****  Simplified BISHOP FOS =   4.255  ****

**********************************************************************
**                                                                  **
**  Out of the    100 surfaces generated and analyzed by XSTABL,    **
**        2 surfaces were found to have MISLEADING FOS values.      **
**                                                                  **
**********************************************************************


The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FC SECTION 1-2T

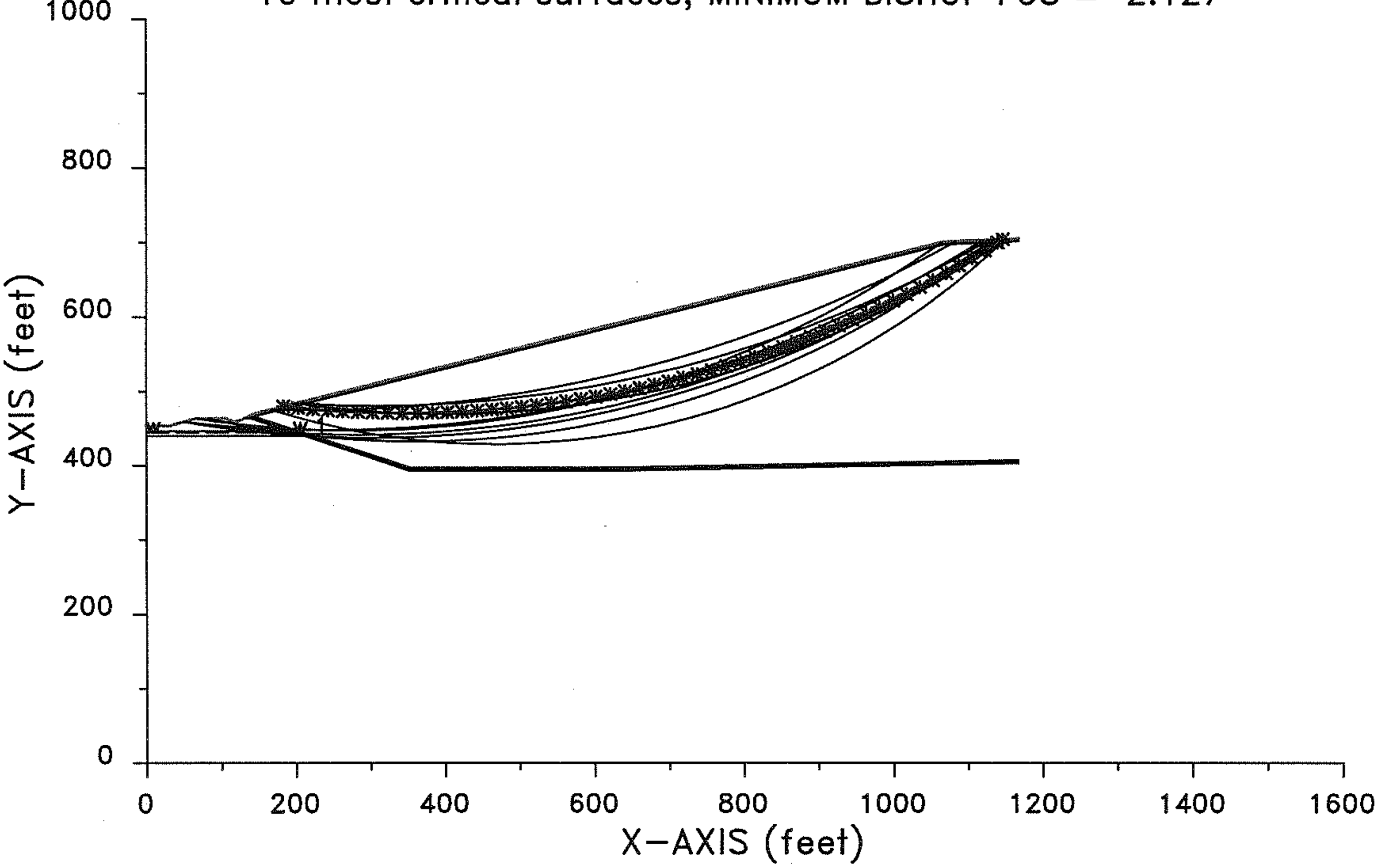
        FOS       Circle Center     Radius   Initial Terminal  Resisting
      (BISHOP)   x-coord  y-coord            x-coord  x-coord    Moment
                   (ft)     (ft)       (ft)    (ft)     (ft)     (ft-lb)

 1.    4.255      47.70   474.64     34.54    20.00    80.16  2.194E+06
 2.    4.266      45.47   478.78     37.99    16.67    80.12  2.455E+06
 3.    4.288      44.41   474.67     34.60    16.67    76.91  2.178E+06
 4.    4.313      47.12   477.56     35.92    20.00    80.05  2.217E+06
 5.    4.335      44.63   479.43     37.80    16.67    78.74  2.371E+06
 6.    4.347      42.92   481.35     40.29    13.33    79.06  2.638E+06
 7.    4.417      45.28   473.06     31.66    20.00    75.50  1.850E+06
 8.    4.466      41.81   481.51     39.59    13.33    76.94  2.498E+06
 9.    4.548      38.79   488.15     46.88     6.67    78.65  3.233E+06
10.    4.557      51.25   471.52     30.19    26.67    80.21  1.768E+06

                    * * *  END OF FILE  * * *
```

1-3E 10-10-11 39:31

CAMELOT LF – FINAL COVER SEC 1–3E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.127



```
XSTABL File: 1-3E      10-10-11   39:31

          ******************************************
          *                X S T A B L             *
          *                                        *
          *        Slope Stability Analysis        *
          *                using the               *
          *             Method of Slices           *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 1-3E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      454.0        31.0      454.0           1
       2         31.0      454.0        65.6      463.9           1
       3         65.6      463.9       105.8      464.0           1
       4        105.8      464.0       118.6      458.6           1
       5        118.6      458.6       131.4      464.0           1
       6        131.4      464.0       143.7      470.0           5
       7        143.7      470.0      1067.7      701.0           5
       8       1067.7      701.0      1167.7      705.0           5


       18 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1        131.4      464.0       139.5      464.0           1
       2        139.5      464.0       144.9      466.7           6
       3        144.9      466.7      1068.2      697.5           4
       4       1068.2      697.5      1167.7      701.5           4
       5        144.6      466.5       352.6      397.2           6
       6        352.6      397.2       617.0      396.9           6
       7        617.0      396.9      1167.7      407.0           6
       8        139.5      464.0       145.8      464.0           7
       9        145.8      464.0       352.2      395.2           7
```

```
   10        352.2       395.2        617.0       394.9             8
   11        617.0       394.9       1167.7       405.0             8
   12        139.5       464.0        190.5       447.0             1
   13        190.5       447.0        211.5       440.0             2
   14        211.5       440.0        351.9       393.2             3
   15        351.9       393.2        617.0       392.9             3
   16        617.0       392.9       1167.7       403.0             3
   17           .0       447.0        190.5       447.0             2
   18           .0       440.0        211.5       440.0             3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00      .000         .0       0
  2   132.0   135.0     488.0    16.40      .000         .0       1
  3   130.0   135.0    5000.0      .00      .000         .0       0
  4    65.0    65.0     288.0    23.00      .000         .0       0
  5   115.0   120.0     100.0    16.00      .000         .0       0
  6   115.0   120.0     100.0    16.00      .000         .0       0
  7   115.0   120.0     100.0    16.00      .000         .0       0
  8   115.0   120.0     100.0    16.00      .000         .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1            .00      445.00
    2         196.50      445.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.
```

```
  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     50.0 ft
                             and  x =    200.0 ft


Each surface terminates between   x =   1050.0 ft
                            and   x =   1150.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   20.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 52 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1        183.33       479.91
         2        203.22       477.83
         3        223.14       476.02
         4        243.08       474.47
         5        263.04       473.20
         6        283.02       472.19
         7        303.00       471.46
         8        323.00       470.99
         9        343.00       470.79
        10        363.00       470.86
        11        382.99       471.21
        12        402.98       471.82
        13        422.97       472.70
```

```
           14        442.93      473.85
           15        462.88      475.27
           16        482.81      476.95
           17        502.71      478.91
           18        522.59      481.13
           19        542.43      483.62
           20        562.24      486.38
           21        582.01      489.41
           22        601.74      492.70
           23        621.42      496.25
           24        641.05      500.08
           25        660.63      504.16
           26        680.15      508.51
           27        699.61      513.12
           28        719.01      518.00
           29        738.34      523.13
           30        757.60      528.53
           31        776.78      534.18
           32        795.89      540.09
           33        814.92      546.26
           34        833.86      552.69
           35        852.71      559.36
           36        871.47      566.30
           37        890.13      573.48
           38        908.70      580.92
           39        927.16      588.60
           40        945.52      596.54
           41        963.77      604.72
           42        981.91      613.14
           43        999.94      621.81
           44       1017.84      630.72
           45       1035.62      639.87
           46       1053.28      649.26
           47       1070.81      658.89
           48       1088.21      668.75
           49       1105.48      678.85
           50       1122.60      689.18
           51       1139.59      699.73
           52       1146.49      704.15

****   Simplified BISHOP FOS =    2.127   ****



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 1-3E

        FOS        Circle Center      Radius   Initial  Terminal   Resisting
      (BISHOP)   x-coord   y-coord             x-coord   x-coord     Moment
                   (ft)      (ft)       (ft)     (ft)      (ft)      (ft-lb)

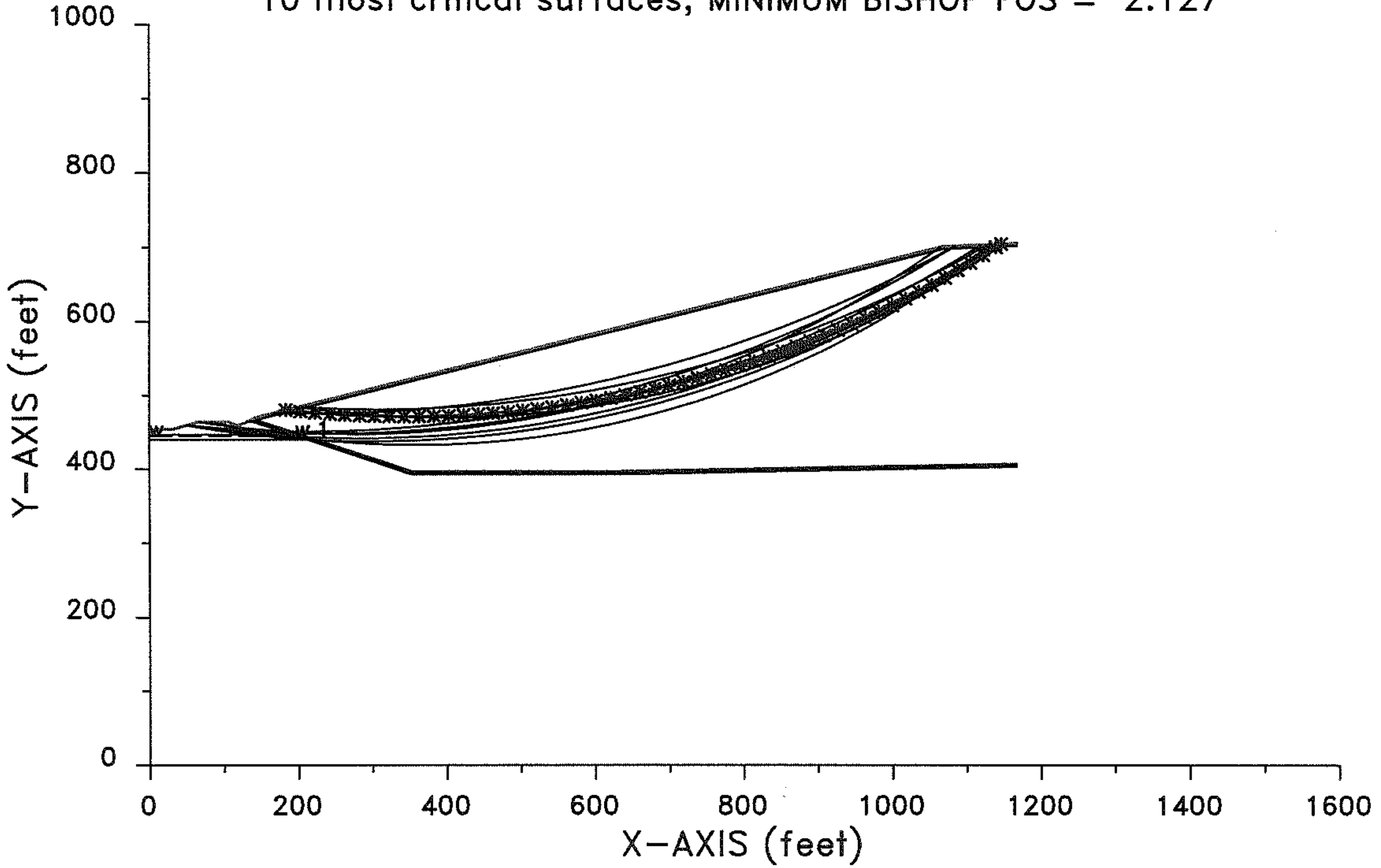
  1.    2.127     347.65   1955.02   1484.24    183.33   1146.49   3.099E+09
  2.    2.133     396.40   1794.72   1325.28    200.00   1149.60   2.941E+09
```

```
  3.   2.139    306.90  2106.04  1625.49   200.00  1128.34  2.817E+09
  4.   2.146    359.88  1666.02  1233.47    83.33  1131.27  3.614E+09
  5.   2.151    219.64  2236.82  1761.87   166.67  1084.14  2.614E+09
  6.   2.164    282.38  1956.50  1515.00    50.00  1134.17  3.966E+09
  7.   2.164    277.10  1801.58  1354.13    66.67  1065.00  2.900E+09
  8.   2.165    301.75  1885.71  1448.32    50.00  1138.86  4.015E+09
  9.   2.170    243.20  2081.83  1633.85    50.00  1119.83  3.801E+09
 10.   2.182    466.72  1414.30   985.35   166.67  1149.99  3.188E+09

                   * * *  END OF FILE  * * *
```

1-3T 10-10-11 39:33

CAMELOT LF - FINAL COVER SEC 1-3T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.127



```
XSTABL File: 1-3T       10-10-11   39:33

          *****************************************
          *               X S T A B L             *
          *                                       *
          *        Slope Stability Analysis       *
          *                using the              *
          *            Method of Slices           *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 1-3T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)        (ft)     Below Segment

       1           .0      454.0       31.0      454.0           1
       2         31.0      454.0       65.6      463.9           1
       3         65.6      463.9      105.8      464.0           1
       4        105.8      464.0      118.6      458.6           1
       5        118.6      458.6      131.4      464.0           1
       6        131.4      464.0      143.7      470.0           5
       7        143.7      470.0     1067.7      701.0           5
       8       1067.7      701.0     1167.7      705.0           5


       18 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)        (ft)     Below Segment

       1        131.4      464.0      139.5      464.0           1
       2        139.5      464.0      144.9      466.7           6
       3        144.9      466.7     1068.2      697.5           4
       4       1068.2      697.5     1167.7      701.5           4
       5        144.6      466.5      352.6      397.2           6
       6        352.6      397.2      617.0      396.9           6
       7        617.0      396.9     1167.7      407.0           6
       8        139.5      464.0      145.8      464.0           7
       9        145.8      464.0      352.2      395.2           7
```

```
   10        352.2      395.2      617.0      394.9          8
   11        617.0      394.9     1167.7      405.0          8
   12        139.5      464.0      190.5      447.0          1
   13        190.5      447.0      211.5      440.0          2
   14        211.5      440.0      351.9      393.2          3
   15        351.9      393.2      617.0      392.9          3
   16        617.0      392.9     1167.7      403.0          3
   17           .0      447.0      190.5      447.0          2
   18           .0      440.0      211.5      440.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure       Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     788.0    11.50      .000         .0        0
  2   132.0   135.0     470.0     8.30      .000         .0        1
  3   130.0   135.0    5000.0      .00      .000         .0        0
  4    65.0    65.0     288.0    23.00      .000         .0        0
  5   115.0   120.0     100.0    16.00      .000         .0        0
  6   115.0   120.0     100.0    16.00      .000         .0        0
  7   115.0   120.0     100.0    16.00      .000         .0        0
  8   115.0   120.0     100.0    16.00      .000         .0        0


----------------------------------------------------------------------
----
 UNDRAINED STRENGTHS as a function of effective vertical stress
                     have been specified for  2 Soil Unit(s)
----------------------------------------------------------------------
----


          Soil Unit #       Parameter a      Parameter Psi

               1.                788.0           11.50
               2.                470.0            8.30



 1 Water surface(s) have been specified

Unit weight of water =     62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point      x-water     y-water
```

```
 No.          (ft)         (ft)

  1             .00       445.00
  2          196.50       445.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     50.0 ft
                              and  x =    200.0 ft


Each surface terminates between   x =   1050.0 ft
                             and   x =   1150.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   20.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 52 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)
```

```
           1        183.33       479.91
           2        203.22       477.83
           3        223.14       476.02
           4        243.08       474.47
           5        263.04       473.20
           6        283.02       472.19
           7        303.00       471.46
           8        323.00       470.99
           9        343.00       470.79
          10        363.00       470.86
          11        382.99       471.21
          12        402.98       471.82
          13        422.97       472.70
          14        442.93       473.85
          15        462.88       475.27
          16        482.81       476.95
          17        502.71       478.91
          18        522.59       481.13
          19        542.43       483.62
          20        562.24       486.38
          21        582.01       489.41
          22        601.74       492.70
          23        621.42       496.25
          24        641.05       500.08
          25        660.63       504.16
          26        680.15       508.51
          27        699.61       513.12
          28        719.01       518.00
          29        738.34       523.13
          30        757.60       528.53
          31        776.78       534.18
          32        795.89       540.09
          33        814.92       546.26
          34        833.86       552.69
          35        852.71       559.36
          36        871.47       566.30
          37        890.13       573.48
          38        908.70       580.92
          39        927.16       588.60
          40        945.52       596.54
          41        963.77       604.72
          42        981.91       613.14
          43        999.94       621.81
          44       1017.84       630.72
          45       1035.62       639.87
          46       1053.28       649.26
          47       1070.81       658.89
          48       1088.21       668.75
          49       1105.48       678.85
          50       1122.60       689.18
          51       1139.59       699.73
          52       1146.49       704.15

 ****   Simplified BISHOP FOS =   2.127   ****
```

```
The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 1-3T

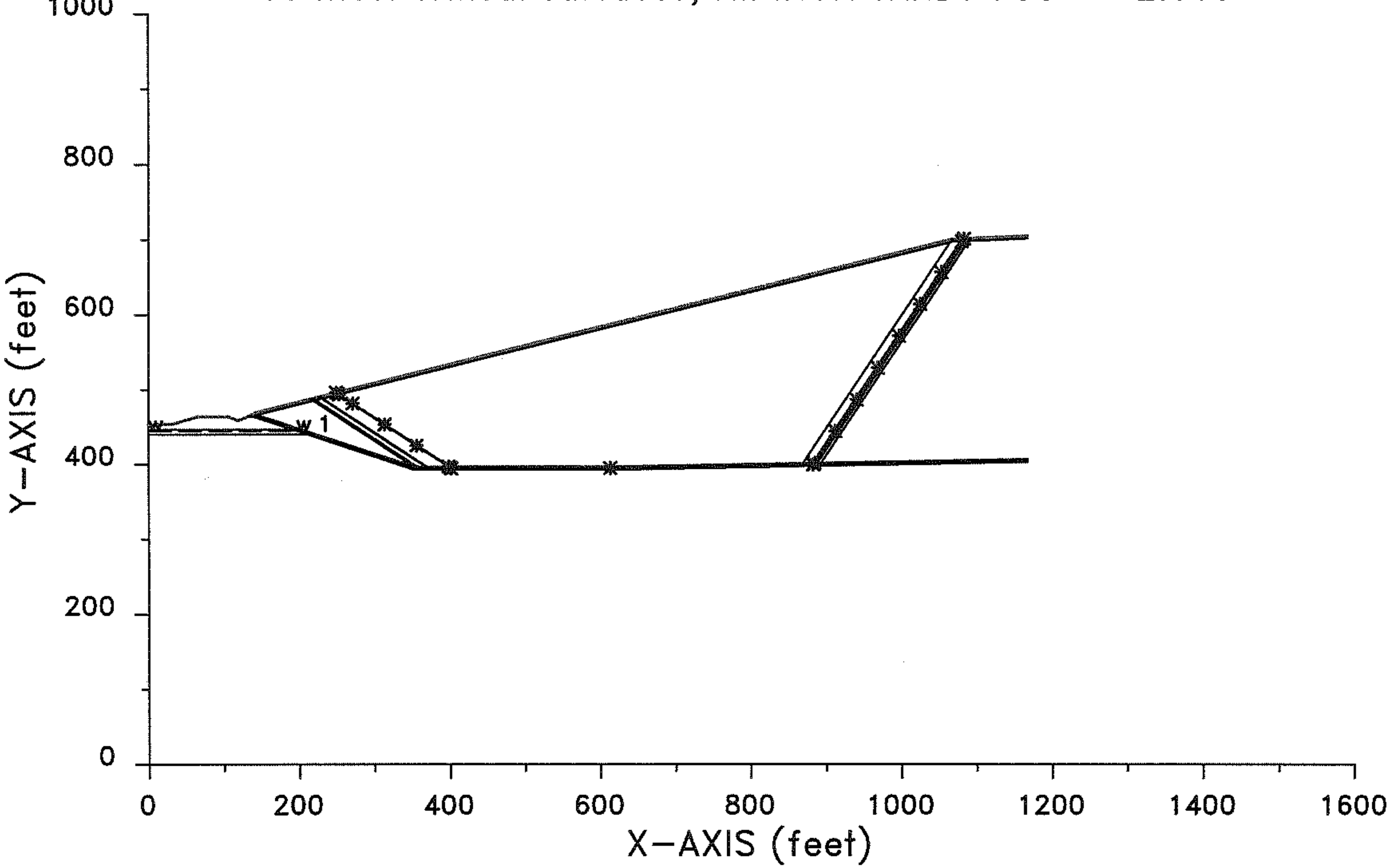
        FOS       Circle Center     Radius   Initial Terminal  Resisting
      (BISHOP)  x-coord  y-coord             x-coord  x-coord    Moment
                  (ft)     (ft)      (ft)      (ft)     (ft)     (ft-lb)

 1.    2.127    347.65  1955.02  1484.24   183.33  1146.49  3.099E+09
 2.    2.128    359.88  1666.02  1233.47    83.33  1131.27  3.585E+09
 3.    2.129    301.75  1885.71  1448.32    50.00  1138.86  3.949E+09
 4.    2.133    396.40  1794.72  1325.28   200.00  1149.60  2.941E+09
 5.    2.139    306.90  2106.04  1625.49   200.00  1128.34  2.817E+09
 6.    2.139    282.38  1956.50  1515.00    50.00  1134.17  3.921E+09
 7.    2.151    219.64  2236.82  1761.87   166.67  1084.14  2.614E+09
 8.    2.156    277.10  1801.58  1354.13    66.67  1065.00  2.890E+09
 9.    2.162    243.20  2081.83  1633.85    50.00  1119.83  3.787E+09
10.    2.178    215.49  2083.30  1632.28    50.00  1084.64  3.314E+09

                    * * *  END OF FILE  * * *
```

1-4P 10-13-11 10:17

CAMELOT LF - FINAL COVER SEC 1-4P
10 most critical surfaces, MINIMUM JANBU FOS = 2.060



```
XSTABL File: 1-4P      10-13-11   10:17

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 1-4P



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      454.0        31.0      454.0           1
       2         31.0      454.0        65.6      463.9           1
       3         65.6      463.9       105.8      464.0           1
       4        105.8      464.0       118.6      458.6           1
       5        118.6      458.6       131.4      464.0           1
       6        131.4      464.0       143.7      470.0           5
       7        143.7      470.0      1067.7      701.0           5
       8       1067.7      701.0      1167.7      705.0           5


       24 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1        131.4      464.0       139.5      464.0           1
       2        139.5      464.0       139.6      464.1           7
       3        139.6      464.1       144.9      466.7           6
       4        144.9      466.7      1068.2      697.5           4
       5       1068.2      697.5      1167.7      701.5           4
       6        144.6      466.5       352.6      397.2           6
       7        352.6      397.2       617.0      396.9           6
       8        617.0      396.9      1167.7      407.0           6
       9        139.6      464.1       145.8      464.1           7
```

```
   10       145.8     464.1      352.2     395.2          7
   11       352.2     395.2      617.0     395.0          8
   12       617.0     395.0     1167.7     405.1          8
   13       139.7     464.0      145.8     464.0          6
   14       145.8     464.0      352.2     395.1          6
   15       352.2     395.1      617.0     394.9          6
   16       617.0     394.9     1167.7     405.0          6
   17       139.5     464.0      139.7     464.0          1
   18       139.7     464.0      190.5     447.0          1
   19       190.5     447.0      211.5     440.0          2
   20       211.5     440.0      351.9     393.2          3
   21       351.9     393.2      617.0     392.9          3
   22       617.0     392.9     1167.7     403.0          3
   23          .0     447.0      190.5     447.0          2
   24          .0     440.0      211.5     440.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle   Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru        (psf)     No.

  1   127.0   131.0     854.0    11.00      .000         .0      0
  2   132.0   135.0     488.0    16.40      .000         .0      1
  3   130.0   135.0    5000.0      .00      .000         .0      0
  4    65.0    65.0     288.0    23.00      .000         .0      0
  5   115.0   120.0     100.0    16.00      .000         .0      0
  6   115.0   120.0     100.0    16.00      .000         .0      0
  7   115.0   120.0     100.0    13.00      .000         .0      0
  8   115.0   120.0     100.0    13.00      .000         .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point        x-water      y-water
   No.          (ft)         (ft)

    1            .00       445.00
    2         196.50       445.00
```

```
A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  3 boxes specified for generation of central block base



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     51.0 ft


Box          x-left      y-left     x-right     y-right        Width
no.           (ft)        (ft)        (ft)        (ft)          (ft)

 1           356.4       395.2       406.4       395.1          4.0
 2           567.0       395.0       617.0       394.9          4.0
 3           841.4       399.0       891.4       400.0          4.0



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *



The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 21 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1        249.17       496.37
         2        252.76       493.66
         3        271.00       481.59
         4        313.53       453.45
         5        356.05       425.30
         6        398.58       397.15
         7        401.22       395.16
         8        401.34       395.06
         9        402.01       394.56
        10        613.29       394.93
        11        883.14       399.78
        12        883.22       399.88
```

```
       13          884.67       401.81
       14          912.82       444.34
       15          940.97       486.87
       16          969.12       529.39
       17          997.26       571.92
       18         1025.41       614.45
       19         1053.56       656.98
       20         1080.72       698.00
       21         1083.45       701.63

 **  Corrected JANBU FOS =   2.060  **    (Fo factor = 1.086)


Failure surface No. 2 specified by 20 coordinate points

      Point        x-surf       y-surf
       No.          (ft)         (ft)

        1          227.64       490.98
        2          231.23       488.28
        3          241.27       481.63
        4          283.80       453.48
        5          326.33       425.33
        6          368.86       397.18
        7          370.52       395.93
        8          606.66       394.90
        9          868.04       399.43
       10          868.09       399.51
       11          868.17       399.61
       12          869.63       401.53
       13          897.77       444.06
       14          925.92       486.59
       15          954.07       529.12
       16          982.22       571.65
       17         1010.37       614.17
       18         1038.52       656.70
       19         1064.99       696.70
       20         1068.25       701.02

 **  Corrected JANBU FOS =   2.095  **    (Fo factor = 1.085)


Failure surface No. 3 specified by 21 coordinate points

      Point        x-surf       y-surf
       No.          (ft)         (ft)

        1          215.88       488.04
        2          219.46       485.34
        3          225.04       481.65
        4          267.57       453.50
        5          310.10       425.35
        6          352.63       397.20
        7          355.29       395.20
        8          355.41       395.10
        9          357.47       393.55
       10          584.45       395.80
```

```
         11          886.65       399.93
         12          886.67       399.95
         13          888.12       401.87
         14          916.27       444.40
         15          944.42       486.93
         16          972.57       529.46
         17         1000.72       571.99
         18         1028.87       614.51
         19         1057.02       657.04
         20         1084.22       698.14
         21         1086.95       701.77

 **  Corrected JANBU FOS =   2.117   **    (Fo factor = 1.084)


Failure surface No. 4 specified by 20 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1          218.30       488.65
          2          221.89       485.95
          3          228.40       481.64
          4          270.93       453.49
          5          313.45       425.34
          6          355.98       397.20
          7          358.64       395.20
          8          358.76       395.10
          9          360.53       393.76
         10          603.62       395.94
         11          888.60       401.43
         12          888.95       401.89
         13          917.10       444.42
         14          945.25       486.94
         15          973.39       529.47
         16         1001.54       572.00
         17         1029.69       614.53
         18         1057.84       657.06
         19         1085.06       698.18
         20         1087.79       701.80

 **  Corrected JANBU FOS =   2.117   **    (Fo factor = 1.084)


Failure surface No. 5 specified by 20 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1          218.55       488.71
          2          222.14       486.01
          3          228.74       481.64
          4          271.27       453.49
          5          313.79       425.34
          6          356.32       397.20
          7          357.10       396.61
          8          594.63       393.02
```

```
         9          890.73       398.09
        10          892.13       399.95
        11          892.21       400.05
        12          893.67       401.97
        13          921.81       444.50
        14          949.96       487.03
        15          978.11       529.56
        16         1006.26       572.09
        17         1034.41       614.62
        18         1062.56       657.14
        19         1089.85       698.37
        20         1092.58       702.00

  **   Corrected JANBU FOS =    2.123   **     (Fo factor = 1.085)


 Failure surface No. 6 specified by 20 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          218.15       488.61
         2          221.74       485.91
         3          228.19       481.64
         4          270.72       453.49
         5          313.25       425.35
         6          355.77       397.20
         7          357.38       395.99
         8          608.10       394.10
         9          884.06       398.12
        10          885.35       399.82
        11          885.43       399.92
        12          886.88       401.85
        13          915.03       444.38
        14          943.18       486.91
        15          971.33       529.43
        16          999.47       571.96
        17         1027.62       614.49
        18         1055.77       657.02
        19         1082.96       698.09
        20         1085.69       701.72

  **   Corrected JANBU FOS =    2.124   **     (Fo factor = 1.085)


 Failure surface No. 7 specified by 20 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          215.30       487.90
         2          218.89       485.20
         3          223.48       482.16
         4          266.01       454.01
         5          308.54       425.86
         6          351.07       397.71
         7          354.40       395.20
```

```
          8          354.53       395.10
          9          356.46       393.64
         10          608.58       393.19
         11          869.26       401.02
         12          869.64       401.53
         13          897.79       444.06
         14          925.94       486.59
         15          954.09       529.12
         16          982.24       571.65
         17         1010.39       614.17
         18         1038.53       656.70
         19         1065.01       696.70
         20         1068.27       701.02

 **   Corrected JANBU FOS =    2.124   **     (Fo factor = 1.085)


Failure surface No. 8 specified by 22 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1          226.56       490.71
          2          230.15       488.01
          3          239.79       481.63
          4          282.32       453.48
          5          324.85       425.33
          6          367.37       397.18
          7          370.02       395.19
          8          370.15       395.09
          9          372.48       393.33
         10          606.40       394.79
         11          882.22       399.43
         12          882.48       399.77
         13          882.56       399.87
         14          884.01       401.80
         15          912.16       444.33
         16          940.31       486.85
         17          968.46       529.38
         18          996.61       571.91
         19         1024.76       614.44
         20         1052.91       656.97
         21         1080.05       697.98
         22         1082.78       701.60

 **   Corrected JANBU FOS =    2.124   **     (Fo factor = 1.085)


Failure surface No. 9 specified by 21 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1          226.60       490.73
          2          230.19       488.02
          3          239.84       481.63
          4          282.37       453.48
```

```
         5          324.90        425.33
         6          367.43        397.18
         7          370.08        395.19
         8          370.12        395.16
         9          595.98        394.66
        10          880.41        398.59
        11          881.29        399.75
        12          881.37        399.85
        13          882.82        401.78
        14          910.97        444.30
        15          939.12        486.83
        16          967.26        529.36
        17          995.41        571.89
        18         1023.56        614.42
        19         1051.71        656.94
        20         1078.84        697.93
        21         1081.57        701.55

 **  Corrected JANBU FOS =   2.126  **    (Fo factor = 1.085)


Failure surface No.10 specified by 20 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1          218.45        488.69
         2          222.04        485.98
         3          228.60        481.64
         4          271.13        453.49
         5          313.66        425.34
         6          356.18        397.20
         7          358.48        395.47
         8          598.23        393.39
         9          879.88        398.43
        10          880.87        399.74
        11          880.95        399.84
        12          882.40        401.77
        13          910.55        444.30
        14          938.70        486.82
        15          966.85        529.35
        16          995.00        571.88
        17         1023.15        614.41
        18         1051.30        656.94
        19         1078.42        697.91
        20         1081.15        701.54

 **  Corrected JANBU FOS =   2.128  **    (Fo factor = 1.085)



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 1-4P
```

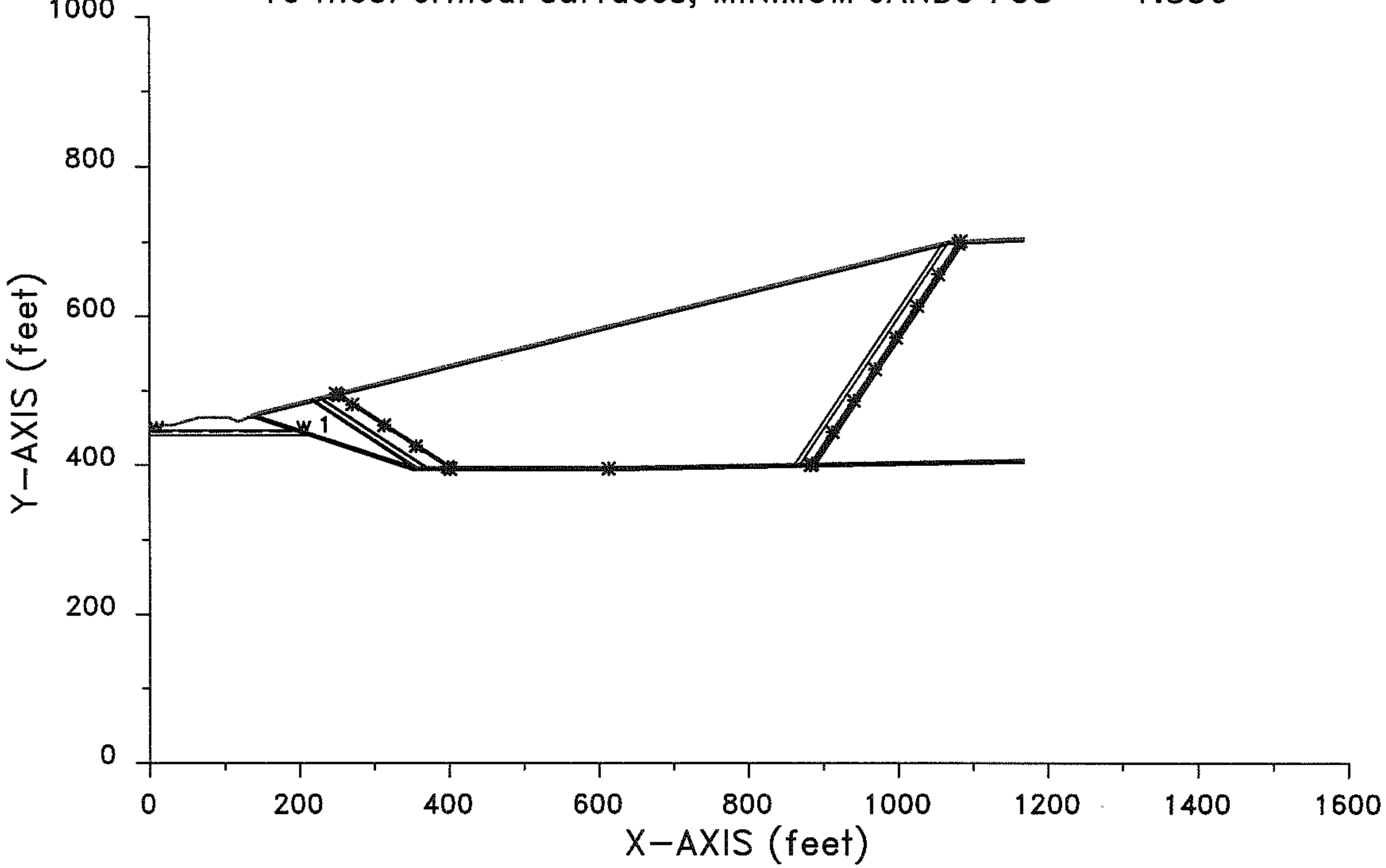
```
        Modified      Correction   Initial     Terminal    Available
       JANBU FOS        Factor      x-coord     x-coord     Strength
                                     (ft)        (ft)        (lb)

  1.      2.060        1.086       249.17      1083.45     3.184E+06
  2.      2.095        1.085       227.64      1068.25     3.236E+06
  3.      2.117        1.084       215.88      1086.95     3.473E+06
  4.      2.117        1.084       218.30      1087.79     3.468E+06
  5.      2.123        1.085       218.55      1092.58     3.535E+06
  6.      2.124        1.085       218.15      1085.69     3.479E+06
  7.      2.124        1.085       215.30      1068.27     3.369E+06
  8.      2.124        1.085       226.56      1082.78     3.418E+06
  9.      2.126        1.085       226.60      1081.57     3.409E+06
 10.      2.128        1.085       218.45      1081.15     3.457E+06

                     * * *   END OF FILE   * * *
```

1-4R 10-13-11 10:16

CAMELOT LF – FINAL COVER SEC 1–4R
10 most critical surfaces, MINIMUM JANBU FOS = 1.856



```
         *******************************************
         *              X S T A B L                *
         *                                         *
         *        Slope Stability Analysis         *
         *               using the                 *
         *           Method of Slices              *
         *                                         *
         *        Copyright (C) 1992 - 2008        *
         *   Interactive Software Designs, Inc.    *
         *        Moscow, ID 83843, U.S.A.         *
         *                                         *
         *          All Rights Reserved            *
         *                                         *
         *  Ver. 5.208                 96 - 2046   *
         *******************************************


Problem Description : CAMELOT LF - FINAL COVER SEC 1-4R



-----------------------------
SEGMENT BOUNDARY COORDINATES
-----------------------------

    8 SURFACE boundary segments

Segment     x-left     y-left     x-right    y-right     Soil Unit
  No.        (ft)       (ft)       (ft)       (ft)     Below Segment

   1           .0       454.0       31.0      454.0          1
   2         31.0       454.0       65.6      463.9          1
   3         65.6       463.9      105.8      464.0          1
   4        105.8       464.0      118.6      458.6          1
   5        118.6       458.6      131.4      464.0          1
   6        131.4       464.0      143.7      470.0          5
   7        143.7       470.0     1067.7      701.0          5
   8       1067.7       701.0     1167.7      705.0          5


   24 SUBSURFACE boundary segments

Segment     x-left     y-left     x-right    y-right     Soil Unit
  No.        (ft)       (ft)       (ft)       (ft)     Below Segment

   1        131.4       464.0      139.5      464.0          1
   2        139.5       464.0      139.6      464.1          7
   3        139.6       464.1      144.9      466.7          6
   4        144.9       466.7     1068.2      697.5          4
   5       1068.2       697.5     1167.7      701.5          4
   6        144.6       466.5      352.6      397.2          6
   7        352.6       397.2      617.0      396.9          6
   8        617.0       396.9     1167.7      407.0          6
   9        139.6       464.1      145.8      464.1          7
```

```
     10        145.8      464.1      352.2      395.2          7
     11        352.2      395.2      617.0      395.0          8
     12        617.0      395.0     1167.7      405.1          8
     13        139.7      464.0      145.8      464.0          6
     14        145.8      464.0      352.2      395.1          6
     15        352.2      395.1      617.0      394.9          6
     16        617.0      394.9     1167.7      405.0          6
     17        139.5      464.0      139.7      464.0          1
     18        139.7      464.0      190.5      447.0          1
     19        190.5      447.0      211.5      440.0          2
     20        211.5      440.0      351.9      393.2          3
     21        351.9      393.2      617.0      392.9          3
     22        617.0      392.9     1167.7      403.0          3
     23           .0      447.0      190.5      447.0          2
     24           .0      440.0      211.5      440.0          3


 --------------------------
 ISOTROPIC Soil Parameters
 --------------------------

  8 Soil unit(s) specified

 Soil   Unit Weight   Cohesion  Friction    Pore Pressure     Water
 Unit  Moist    Sat.  Intercept   Angle  Parameter Constant  Surface
  No.  (pcf)   (pcf)    (psf)     (deg)      Ru      (psf)      No.

   1   127.0   131.0     854.0    11.00     .000        .0       0
   2   132.0   135.0     488.0    16.40     .000        .0       1
   3   130.0   135.0    5000.0      .00     .000        .0       0
   4    65.0    65.0     288.0    23.00     .000        .0       0
   5   115.0   120.0     100.0    16.00     .000        .0       0
   6   115.0   120.0     100.0    16.00     .000        .0       0
   7   115.0   120.0      80.0     8.00     .000        .0       0
   8   115.0   120.0      80.0     8.00     .000        .0       0


  1 Water surface(s) have been specified

 Unit weight of water =    62.40  (pcf)


 Water Surface No.  1 specified by  2 coordinate points

 **********************************
          PHREATIC SURFACE,
 **********************************

   Point       x-water     y-water
    No.         (ft)        (ft)

    1             .00      445.00
    2          196.50      445.00
```

```
A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  3 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     51.0 ft


Box         x-left      y-left     x-right     y-right       Width
no.          (ft)        (ft)        (ft)        (ft)         (ft)

 1           356.4       395.2       406.4       395.1         4.0
 2           567.0       395.0       617.0       394.9         4.0
 3           841.4       399.0       891.4       400.0         4.0


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 21 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          249.18       496.37
         2          252.77       493.67
         3          271.01       481.59
         4          313.54       453.45
         5          356.07       425.30
         6          398.59       397.15
         7          401.23       395.16
         8          401.34       395.06
         9          402.01       394.56
        10          613.29       394.93
        11          883.14       399.78
        12          883.22       399.88
```

```
        13          884.67       401.81
        14          912.82       444.34
        15          940.97       486.87
        16          969.12       529.39
        17          997.26       571.92
        18         1025.41       614.45
        19         1053.56       656.98
        20         1080.72       698.00
        21         1083.45       701.63

 **  Corrected JANBU FOS =   1.856   **    (Fo factor = 1.086)


Failure surface No. 2 specified by 20 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          227.64       490.98
         2          231.23       488.28
         3          241.27       481.63
         4          283.80       453.48
         5          326.33       425.33
         6          368.86       397.18
         7          370.52       395.93
         8          606.66       394.90
         9          868.04       399.43
        10          868.09       399.51
        11          868.18       399.61
        12          869.63       401.53
        13          897.78       444.06
        14          925.93       486.59
        15          954.08       529.12
        16          982.23       571.65
        17         1010.38       614.17
        18         1038.53       656.70
        19         1065.00       696.70
        20         1068.26       701.02

 **  Corrected JANBU FOS =   2.000   **    (Fo factor = 1.085)


Failure surface No. 3 specified by 22 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          226.57       490.72
         2          230.16       488.01
         3          239.80       481.63
         4          282.33       453.48
         5          324.86       425.33
         6          367.38       397.18
         7          370.03       395.19
         8          370.15       395.09
         9          372.48       393.33
        10          606.40       394.79
```

```
            11         882.22       399.43
            12         882.48       399.77
            13         882.57       399.87
            14         884.02       401.80
            15         912.17       444.33
            16         940.32       486.85
            17         968.47       529.38
            18         996.62       571.91
            19        1024.76       614.44
            20        1052.91       656.97
            21        1080.06       697.98
            22        1082.79       701.60

  **  Corrected JANBU FOS =   2.091  **    (Fo factor = 1.085)


 Failure surface No. 4 specified by 21 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1         226.60       490.73
             2         230.19       488.02
             3         239.85       481.63
             4         282.38       453.48
             5         324.90       425.33
             6         367.43       397.18
             7         370.08       395.19
             8         370.12       395.16
             9         595.98       394.66
            10         880.41       398.59
            11         881.29       399.75
            12         881.37       399.85
            13         882.83       401.78
            14         910.97       444.30
            15         939.12       486.83
            16         967.27       529.36
            17         995.42       571.89
            18        1023.57       614.42
            19        1051.72       656.94
            20        1078.85       697.93
            21        1081.58       701.56

  **  Corrected JANBU FOS =   2.095  **    (Fo factor = 1.085)


 Failure surface No. 5 specified by 21 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1         215.88       488.05
             2         219.47       485.34
             3         225.06       481.65
             4         267.58       453.50
             5         310.11       425.35
             6         352.64       397.20
```

```
           7          355.30       395.20
           8          355.41       395.10
           9          357.47       393.55
          10          584.45       395.80
          11          886.65       399.93
          12          886.67       399.95
          13          888.12       401.87
          14          916.27       444.40
          15          944.42       486.93
          16          972.57       529.46
          17         1000.72       571.99
          18         1028.87       614.51
          19         1057.02       657.04
          20         1084.22       698.14
          21         1086.95       701.77

  **  Corrected JANBU FOS =   2.108   **     (Fo factor = 1.084)


 Failure surface No. 6 specified by 20 coordinate points

        Point         x-surf       y-surf
         No.           (ft)         (ft)

           1          218.31       488.65
           2          221.90       485.95
           3          228.41       481.64
           4          270.94       453.49
           5          313.46       425.34
           6          355.99       397.20
           7          358.65       395.20
           8          358.76       395.10
           9          360.53       393.76
          10          603.62       395.94
          11          888.60       401.43
          12          888.95       401.89
          13          917.10       444.42
          14          945.25       486.94
          15          973.39       529.47
          16         1001.54       572.00
          17         1029.69       614.53
          18         1057.84       657.06
          19         1085.06       698.18
          20         1087.79       701.80

  **  Corrected JANBU FOS =   2.112   **     (Fo factor = 1.084)


 Failure surface No. 7 specified by 20 coordinate points

        Point         x-surf       y-surf
         No.           (ft)         (ft)

           1          252.66       497.24
           2          256.25       494.54
           3          275.81       481.59
           4          318.34       453.44
```

```
         5          360.87        425.29
         6          403.40        397.14
         7          405.80        395.33
         8          570.69        394.75
         9          860.82        399.36
        10          860.83        399.37
        11          860.92        399.47
        12          862.37        401.40
        13          890.52        443.93
        14          918.67        486.46
        15          946.81        528.98
        16          974.96        571.51
        17         1003.11        614.04
        18         1031.26        656.57
        19         1056.40        694.55
        20         1059.77        699.02

  **  Corrected JANBU FOS =   2.115  **    (Fo factor = 1.086)


 Failure surface No. 8 specified by 20 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1          218.15        488.61
         2          221.74        485.91
         3          228.19        481.64
         4          270.72        453.49
         5          313.25        425.35
         6          355.77        397.20
         7          357.38        395.99
         8          608.10        394.10
         9          884.06        398.12
        10          885.35        399.82
        11          885.43        399.92
        12          886.89        401.85
        13          915.04        444.38
        14          943.18        486.91
        15          971.33        529.43
        16          999.48        571.96
        17         1027.63        614.49
        18         1055.78        657.02
        19         1082.97        698.09
        20         1085.70        701.72

  **  Corrected JANBU FOS =   2.116  **    (Fo factor = 1.085)


 Failure surface No. 9 specified by 22 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1          228.27        491.14
         2          231.86        488.44
         3          242.15        481.63
```

```
         4         284.68        453.48
         5         327.21        425.33
         6         369.74        397.18
         7         372.39        395.18
         8         372.50        395.08
         9         373.88        394.04
        10         568.77        395.80
        11         888.90        399.37
        12         889.30        399.89
        13         889.39        400.00
        14         890.84        401.92
        15         918.99        444.45
        16         947.14        486.98
        17         975.29        529.51
        18        1003.43        572.03
        19        1031.58        614.56
        20        1059.73        657.09
        21        1086.98        698.25
        22        1089.71        701.88

  **  Corrected JANBU FOS =   2.117  **    (Fo factor = 1.085)


Failure surface No.10 specified by 20 coordinate points

       Point       x-surf        y-surf
        No.         (ft)          (ft)

         1         215.31        487.90
         2         218.90        485.20
         3         223.50        482.15
         4         266.03        454.00
         5         308.56        425.85
         6         351.09        397.70
         7         354.41        395.20
         8         354.53        395.10
         9         356.46        393.64
        10         608.58        393.19
        11         869.26        401.02
        12         869.64        401.53
        13         897.79        444.06
        14         925.94        486.59
        15         954.09        529.12
        16         982.24        571.65
        17        1010.39        614.17
        18        1038.53        656.70
        19        1065.01        696.70
        20        1068.27        701.02

  **  Corrected JANBU FOS =   2.118  **    (Fo factor = 1.085)



The following is a summary of the TEN most critical surfaces
```

```
Problem Description : CAMELOT LF - FINAL COVER SEC 1-4R

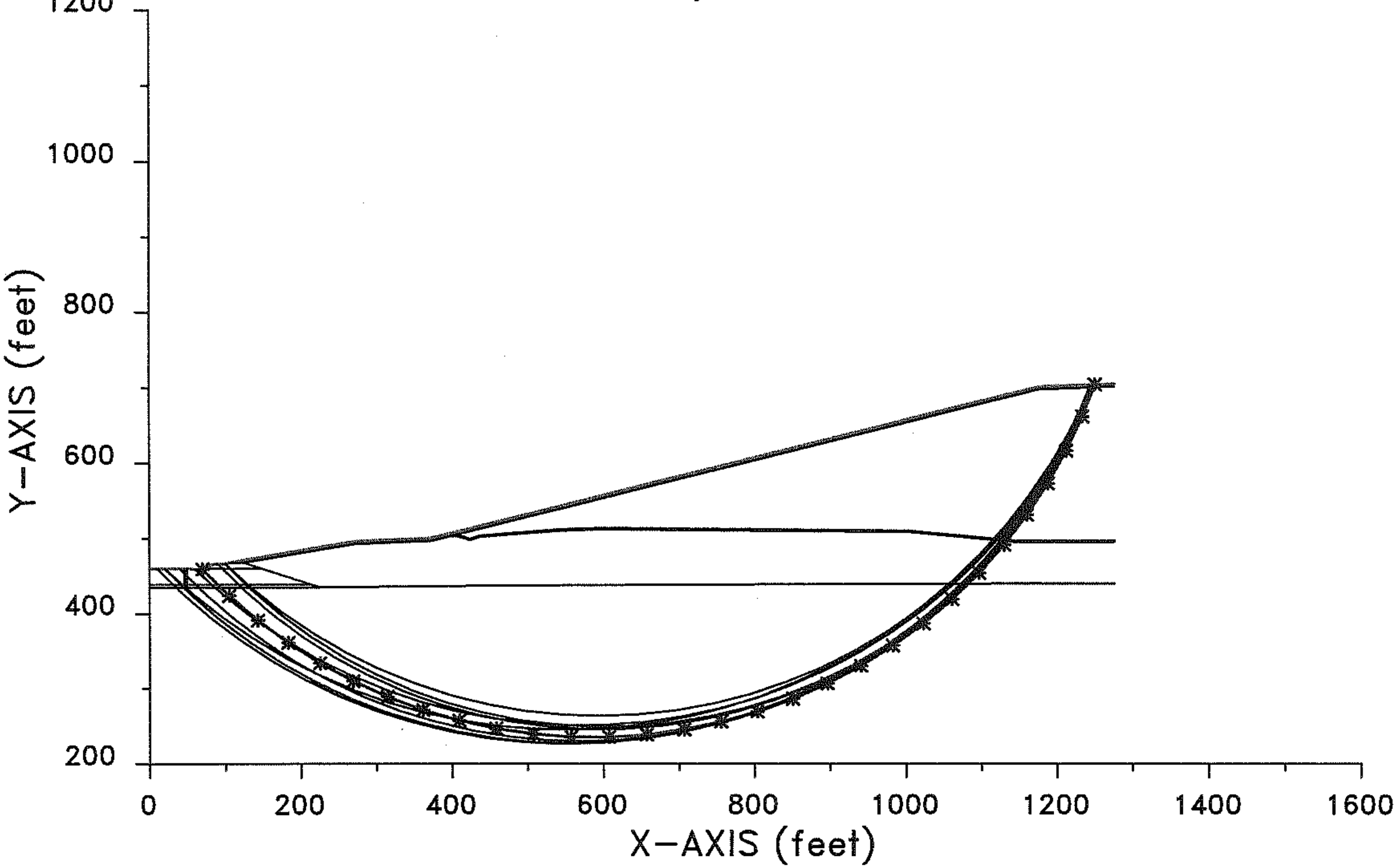
       Modified         Correction   Initial     Terminal     Available
      JANBU FOS           Factor     x-coord      x-coord      Strength
                                      (ft)         (ft)         (lb)

  1.     1.856            1.086       249.18      1083.45     2.796E+06
  2.     2.000            1.085       227.64      1068.26     3.056E+06
  3.     2.091            1.085       226.57      1082.79     3.353E+06
  4.     2.095            1.085       226.60      1081.58     3.349E+06
  5.     2.108            1.084       215.88      1086.95     3.456E+06
  6.     2.112            1.084       218.31      1087.79     3.457E+06
  7.     2.115            1.086       252.66      1059.77     3.091E+06
  8.     2.116            1.085       218.15      1085.70     3.464E+06
  9.     2.117            1.085       228.27      1089.71     3.433E+06
 10.     2.118            1.085       215.31      1068.27     3.357E+06

                        * * *  END OF FILE  * * *
```

2-1E 10-10-11 39:44

CAMELOT LF – FINAL COVER SEC 2-1E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.275



```
XSTABL File: 2-1E      10-10-11   39:44

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *               using the               *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 2-1E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

      1            .0      460.0        46.3      460.0           1
      2          46.3      460.0        49.3      460.0           8
      3          49.3      460.0        52.3      460.0           1
      4          52.3      460.0        64.7      458.4           1
      5          64.7      458.4        66.8      457.7           1
      6          66.8      457.7        71.9      460.0           1
      7          71.9      460.0        85.3      466.0           7
      8          85.3      466.0        98.2      466.0           7
      9          98.2      466.0       105.5      467.7           7
     10         105.5      467.7       117.0      470.0           5
     11         117.0      470.0       235.0      490.0           5
     12         235.0      490.0       272.2      496.0           5
     13         272.2      496.0       371.9      500.0           5
     14         371.9      500.0      1175.9      701.0           5
     15        1175.9      701.0      1275.9      705.0           5

       47 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

      1         105.5      467.7       124.2      467.7           7
      2         124.2      467.7       235.6      486.5           4
```

```
      3        235.6      486.5      272.6      492.5          4
      4        272.6      492.5      372.4      496.5          4
      5        372.4      496.5      398.3      503.0          4
      6        398.3      503.0      406.3      505.0          6
      7        406.3      505.0     1176.4      697.5          4
      8       1176.4      697.5     1275.9      701.5          4
      9        406.3      505.0      407.4      505.0          6
     10        407.4      505.0      416.7      501.9          6
     11        416.7      501.9      423.7      499.6          6
     12        423.7      499.6      436.0      503.7          6
     13        436.0      503.7      542.0      512.0          6
     14        542.0      512.0      597.3      513.7          6
     15        597.3      513.7      794.9      512.0          6
     16        794.9      512.0     1004.3      510.0          6
     17       1004.3      510.0     1141.7      497.0          6
     18       1141.7      497.0     1275.9      497.0          6
     19        398.3      503.0      407.1      503.0          4
     20        407.1      503.0      416.1      500.0          4
     21        416.1      500.0      423.7      497.5          4
     22        423.7      497.5      436.4      501.7          4
     23        436.4      501.7      542.1      510.0          4
     24        542.1      510.0      597.3      511.7          4
     25        597.3      511.7      794.9      510.0          4
     26        794.9      510.0     1004.2      508.0          4
     27       1004.2      508.0     1141.6      495.0          4
     28       1141.6      495.0     1275.9      495.0          4
     29        124.2      467.7      148.0      460.0          7
     30        148.0      460.0      213.0      439.0          1
     31        213.0      439.0      226.0      434.8          2
     32        226.0      434.8      456.9      437.0          3
     33        456.9      437.0      885.9      439.0          3
     34        885.9      439.0     1225.9      440.0          3
     35       1225.9      440.0     1275.9      440.0          3
     36         46.3      460.0       46.4      439.0          1
     37           .0      439.0       46.4      439.0          2
     38         49.3      460.0       49.4      439.0          8
     39         71.9      460.0      148.0      460.0          1
     40         49.4      439.0      213.0      439.0          2
     41         46.4      439.0       46.5      434.8          2
     42           .0      434.8       46.5      434.8          3
     43         49.4      439.0       49.5      434.8          8
     44         49.5      434.8      226.0      434.8          3
     45         46.5      434.8       46.6      431.8          3
     46         49.5      434.8       49.6      431.8          8
     47         46.6      431.8       49.6      431.8          3


    --------------------------
    ISOTROPIC Soil Parameters
    --------------------------

     8 Soil unit(s) specified

    Soil   Unit Weight   Cohesion  Friction    Pore Pressure     Water
    Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
     No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.
```

```
 1   127.0   131.0     854.0    11.00      .000          .0      0
 2   132.0   135.0     488.0    16.40      .000          .0      1
 3   130.0   135.0    5000.0      .00      .000          .0      0
 4    65.0    65.0     288.0    23.00      .000          .0      0
 5   115.0   120.0     100.0    16.00      .000          .0      0
 6   115.0   120.0     100.0    16.00      .000          .0      0
 7   115.0   120.0    1074.0    13.10      .000          .0      0
 8    75.0    75.0        .0     5.00      .000          .0      0


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between   x =     10.0 ft
                             and   x =    100.0 ft


Each surface terminates between    x =   1100.0 ft
                            and    x =   1250.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   50.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 30 coordinate points
```

```
      Point       x-surf        y-surf
       No.         (ft)          (ft)

        1          70.00        459.14
        2         105.37        423.80
        3         143.15        391.05
        4         183.16        361.06
        5         225.19        333.98
        6         269.04        309.95
        7         314.47        289.08
        8         361.27        271.49
        9         409.20        257.25
       10         458.02        246.44
       11         507.48        239.12
       12         557.34        235.33
       13         607.34        235.07
       14         657.23        238.36
       15         706.76        245.17
       16         755.69        255.48
       17         803.76        269.23
       18         850.74        286.34
       19         896.39        306.75
       20         940.48        330.33
       21         982.79        356.98
       22        1023.10        386.56
       23        1061.21        418.92
       24        1096.94        453.90
       25        1130.10        491.32
       26        1160.52        531.00
       27        1188.06        572.74
       28        1212.57        616.32
       29        1233.93        661.52
       30        1250.43        703.98

****   Simplified BISHOP FOS =    2.275   ****




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 2-1E

      FOS      Circle Center     Radius   Initial Terminal   Resisting
   (BISHOP)   x-coord  y-coord            x-coord  x-coord     Moment
                (ft)     (ft)      (ft)     (ft)     (ft)      (ft-lb)

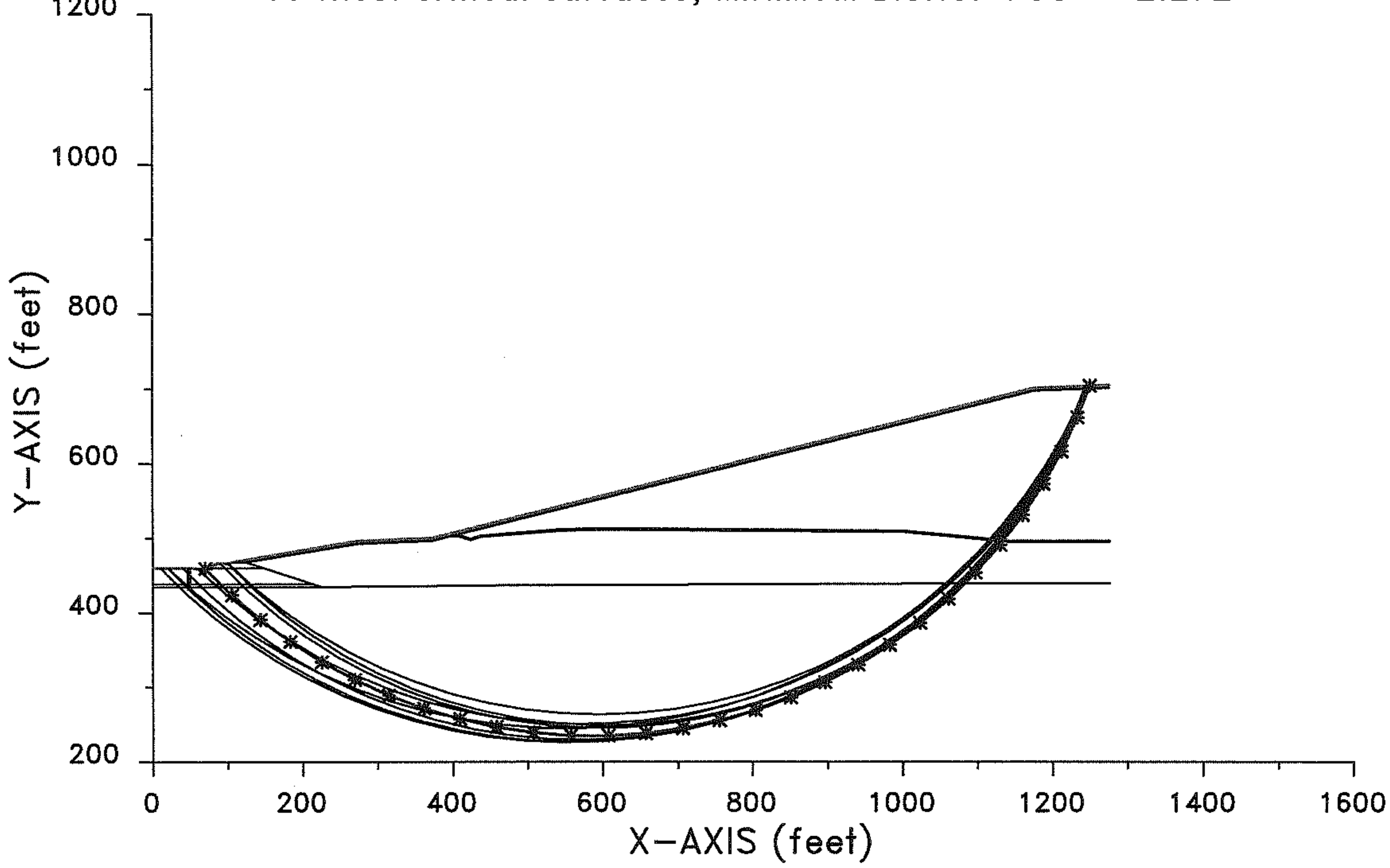
 1.   2.275    585.94   940.08   705.33    70.00  1250.43   4.597E+09
 2.   2.275    570.17   954.93   725.28    40.00  1250.19   4.830E+09
 3.   2.277    602.43   936.79   688.25   100.00  1249.88   4.329E+09
 4.   2.283    596.57   937.22   691.85    90.00  1247.45   4.386E+09
 5.   2.284    557.81   963.27   736.56    20.00  1246.99   4.962E+09
 6.   2.289    556.70   961.40   734.47    20.00  1244.24   4.938E+09
 7.   2.293    551.86   971.53   745.17    10.00  1247.19   5.060E+09
```

```
  8.   2.298    572.31   984.30   733.76    60.00  1249.98  4.721E+09
  9.   2.303    593.84   965.50   702.11   100.00  1244.89  4.321E+09
 10.   2.310    549.64  1003.64   758.99    20.00  1246.47  5.008E+09

                      * * *  END OF FILE  * * *
```

2-1T 10-10-11 39:46

CAMELOT LF – FINAL COVER SEC 2-1T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.272



```
XSTABL File: 2-1T       10-10-11   39:46

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *                using the               *
             *            Method of Slices            *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             *  Ver. 5.208                96 - 2046   *
             ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 2-1T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      460.0        46.3      460.0           1
       2         46.3      460.0        49.3      460.0           8
       3         49.3      460.0        52.3      460.0           1
       4         52.3      460.0        64.7      458.4           1
       5         64.7      458.4        66.8      457.7           1
       6         66.8      457.7        71.9      460.0           1
       7         71.9      460.0        85.3      466.0           7
       8         85.3      466.0        98.2      466.0           7
       9         98.2      466.0       105.5      467.7           7
      10        105.5      467.7       117.0      470.0           5
      11        117.0      470.0       235.0      490.0           5
      12        235.0      490.0       272.2      496.0           5
      13        272.2      496.0       371.9      500.0           5
      14        371.9      500.0      1175.9      701.0           5
      15       1175.9      701.0      1275.9      705.0           5

       47 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

       1        105.5      467.7       124.2      467.7           7
       2        124.2      467.7       235.6      486.5           4
```

```
      3        235.6      486.5       272.6      492.5           4
      4        272.6      492.5       372.4      496.5           4
      5        372.4      496.5       398.3      503.0           4
      6        398.3      503.0       406.3      505.0           6
      7        406.3      505.0      1176.4      697.5           4
      8       1176.4      697.5      1275.9      701.5           4
      9        406.3      505.0       407.4      505.0           6
     10        407.4      505.0       416.7      501.9           6
     11        416.7      501.9       423.7      499.6           6
     12        423.7      499.6       436.0      503.7           6
     13        436.0      503.7       542.0      512.0           6
     14        542.0      512.0       597.3      513.7           6
     15        597.3      513.7       794.9      512.0           6
     16        794.9      512.0      1004.3      510.0           6
     17       1004.3      510.0      1141.7      497.0           6
     18       1141.7      497.0      1275.9      497.0           6
     19        398.3      503.0       407.1      503.0           4
     20        407.1      503.0       416.1      500.0           4
     21        416.1      500.0       423.7      497.5           4
     22        423.7      497.5       436.4      501.7           4
     23        436.4      501.7       542.1      510.0           4
     24        542.1      510.0       597.3      511.7           4
     25        597.3      511.7       794.9      510.0           4
     26        794.9      510.0      1004.2      508.0           4
     27       1004.2      508.0      1141.6      495.0           4
     28       1141.6      495.0      1275.9      495.0           4
     29        124.2      467.7       148.0      460.0           7
     30        148.0      460.0       213.0      439.0           1
     31        213.0      439.0       226.0      434.8           2
     32        226.0      434.8       456.9      437.0           3
     33        456.9      437.0       885.9      439.0           3
     34        885.9      439.0      1225.9      440.0           3
     35       1225.9      440.0      1275.9      440.0           3
     36         46.3      460.0        46.4      439.0           1
     37           .0      439.0        46.4      439.0           2
     38         49.3      460.0        49.4      439.0           8
     39         71.9      460.0       148.0      460.0           1
     40         49.4      439.0       213.0      439.0           2
     41         46.4      439.0        46.5      434.8           2
     42           .0      434.8        46.5      434.8           3
     43         49.4      439.0        49.5      434.8           8
     44         49.5      434.8       226.0      434.8           3
     45         46.5      434.8        46.6      431.8           3
     46         49.5      434.8        49.6      431.8           8
     47         46.6      431.8        49.6      431.8           3


  --------------------------
  ISOTROPIC Soil Parameters
  --------------------------

   8 Soil unit(s) specified

  Soil   Unit Weight   Cohesion  Friction    Pore Pressure       Water
  Unit  Moist    Sat.  Intercept   Angle   Parameter  Constant  Surface
   No.  (pcf)   (pcf)    (psf)     (deg)       Ru       (psf)      No.
```

```
   1   127.0   131.0     788.0    11.50      .000        .0      0
   2   132.0   135.0     470.0     8.30      .000        .0      1
   3   130.0   135.0    5000.0      .00      .000        .0      0
   4    65.0    65.0     288.0    23.00      .000        .0      0
   5   115.0   120.0     100.0    16.00      .000        .0      0
   6   115.0   120.0     100.0    16.00      .000        .0      0
   7   115.0   120.0     834.0    16.00      .000        .0      0
   8    75.0    75.0        .0     5.00      .000        .0      0


-----------------------------------------------------------------------
----
  UNDRAINED STRENGTHS as a function of effective vertical stress
                    have been specified for  3 Soil Unit(s)
-----------------------------------------------------------------------
----

         Soil Unit #      Parameter a     Parameter Psi

              1.              788.0           11.50
              2.              470.0            8.30
              7.              834.0           16.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     10.0 ft
                             and  x =    100.0 ft


Each surface terminates between   x =   1100.0 ft
                            and   x =   1250.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   50.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
```

```
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

 * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 30 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1           70.00       459.14
         2          105.37       423.80
         3          143.15       391.05
         4          183.16       361.06
         5          225.19       333.98
         6          269.04       309.95
         7          314.47       289.08
         8          361.27       271.49
         9          409.20       257.25
        10          458.02       246.44
        11          507.48       239.12
        12          557.34       235.33
        13          607.34       235.07
        14          657.23       238.36
        15          706.76       245.17
        16          755.69       255.48
        17          803.76       269.23
        18          850.74       286.34
        19          896.39       306.75
        20          940.48       330.33
        21          982.79       356.98
        22         1023.10       386.56
        23         1061.21       418.92
        24         1096.94       453.90
        25         1130.10       491.32
        26         1160.52       531.00
        27         1188.06       572.74
        28         1212.57       616.32
        29         1233.93       661.52
        30         1250.43       703.98

****  Simplified BISHOP FOS =   2.272  ****



The following is a summary of the TEN most critical surfaces
```

```
Problem Description : CAMELOT LF - FINAL COVER SEC 2-1T

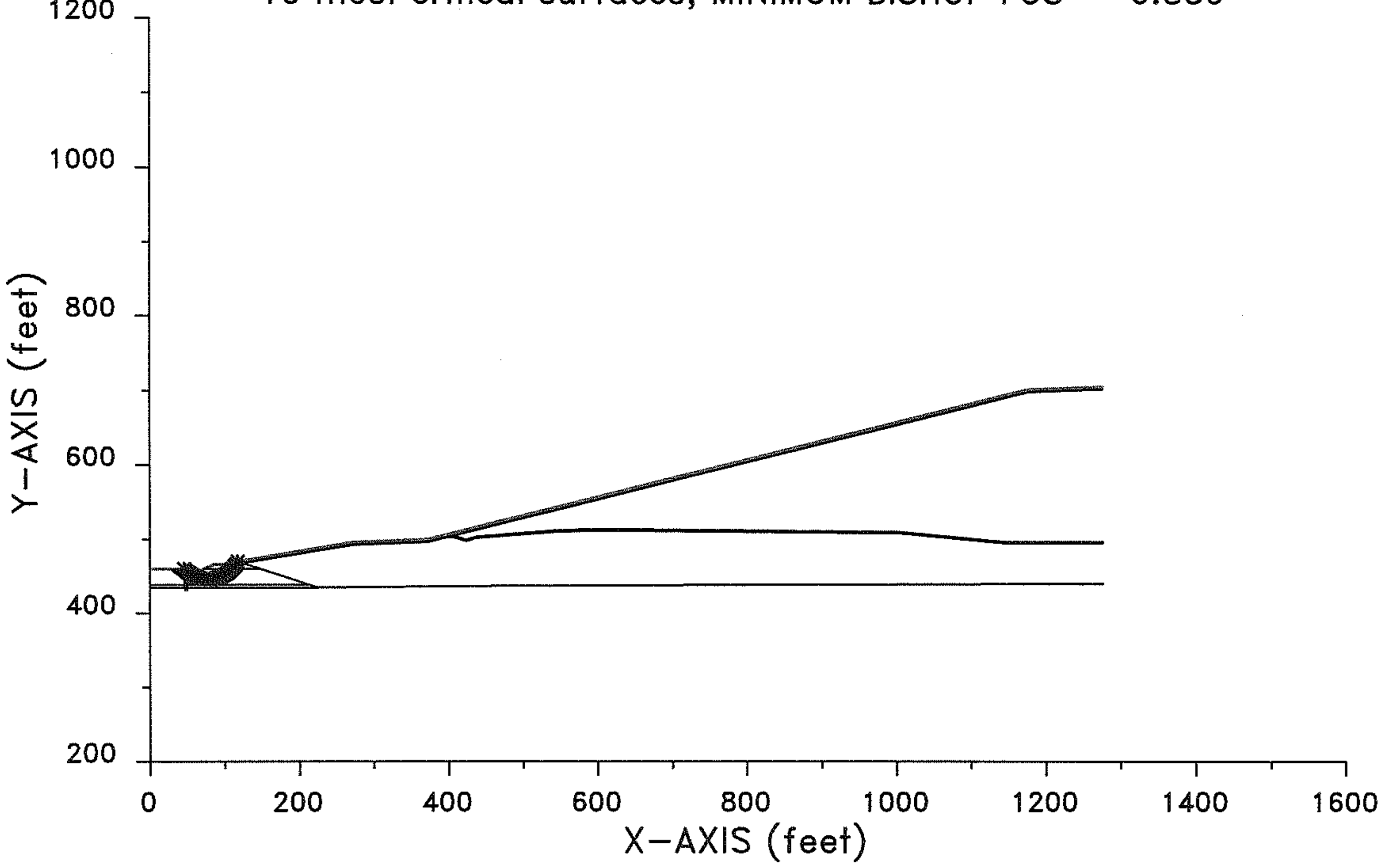
       FOS       Circle Center      Radius   Initial Terminal   Resisting
     (BISHOP)  x-coord  y-coord             x-coord  x-coord     Moment
                (ft)     (ft)        (ft)     (ft)     (ft)      (ft-lb)

 1.    2.272    585.94   940.08    705.33    70.00  1250.43   4.590E+09
 2.    2.272    602.43   936.79    688.25   100.00  1249.88   4.319E+09
 3.    2.272    570.17   954.93    725.28    40.00  1250.19   4.825E+09
 4.    2.278    596.57   937.22    691.85    90.00  1247.45   4.377E+09
 5.    2.281    557.81   963.27    736.56    20.00  1246.99   4.956E+09
 6.    2.286    556.70   961.40    734.47    20.00  1244.24   4.932E+09
 7.    2.290    551.86   971.53    745.17    10.00  1247.19   5.054E+09
 8.    2.294    572.31   984.30    733.76    60.00  1249.98   4.715E+09
 9.    2.298    593.84   965.50    702.11   100.00  1244.89   4.311E+09
10.    2.307    549.64  1003.64    758.99    20.00  1246.47   5.002E+09

                    * * *  END OF FILE  * * *
```

2-2E 10-10-11 39:48

CAMELOT LF – FINAL COVER SEC 2-2E
10 most critical surfaces, MINIMUM BISHOP FOS = 6.859



```
XSTABL File: 2-2E      10-10-11   39:48

          ******************************************
          *                X S T A B L             *
          *                                        *
          *         Slope Stability Analysis       *
          *                 using the              *
          *             Method of Slices           *
          *                                        *
          *         Copyright (C) 1992 - 2008      *
          *    Interactive Software Designs, Inc.  *
          *         Moscow, ID 83843, U.S.A.       *
          *                                        *
          *           All Rights Reserved          *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 2-2E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      460.0        46.3      460.0          1
       2         46.3      460.0        49.3      460.0          8
       3         49.3      460.0        52.3      460.0          1
       4         52.3      460.0        64.7      458.4          1
       5         64.7      458.4        66.8      457.7          1
       6         66.8      457.7        71.9      460.0          1
       7         71.9      460.0        85.3      466.0          7
       8         85.3      466.0        98.2      466.0          7
       9         98.2      466.0       105.5      467.7          7
      10        105.5      467.7       117.0      470.0          5
      11        117.0      470.0       235.0      490.0          5
      12        235.0      490.0       272.2      496.0          5
      13        272.2      496.0       371.9      500.0          5
      14        371.9      500.0      1175.9      701.0          5
      15       1175.9      701.0      1275.9      705.0          5

       47 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

       1        105.5      467.7       124.2      467.7          7
       2        124.2      467.7       235.6      486.5          4
```

```
      3        235.6     486.5      272.6     492.5          4
      4        272.6     492.5      372.4     496.5          4
      5        372.4     496.5      398.3     503.0          4
      6        398.3     503.0      406.3     505.0          6
      7        406.3     505.0     1176.4     697.5          4
      8       1176.4     697.5     1275.9     701.5          4
      9        406.3     505.0      407.4     505.0          6
     10        407.4     505.0      416.7     501.9          6
     11        416.7     501.9      423.7     499.6          6
     12        423.7     499.6      436.0     503.7          6
     13        436.0     503.7      542.0     512.0          6
     14        542.0     512.0      597.3     513.7          6
     15        597.3     513.7      794.9     512.0          6
     16        794.9     512.0     1004.3     510.0          6
     17       1004.3     510.0     1141.7     497.0          6
     18       1141.7     497.0     1275.9     497.0          6
     19        398.3     503.0      407.1     503.0          4
     20        407.1     503.0      416.1     500.0          4
     21        416.1     500.0      423.7     497.5          4
     22        423.7     497.5      436.4     501.7          4
     23        436.4     501.7      542.1     510.0          4
     24        542.1     510.0      597.3     511.7          4
     25        597.3     511.7      794.9     510.0          4
     26        794.9     510.0     1004.2     508.0          4
     27       1004.2     508.0     1141.6     495.0          4
     28       1141.6     495.0     1275.9     495.0          4
     29        124.2     467.7      148.0     460.0          7
     30        148.0     460.0      213.0     439.0          1
     31        213.0     439.0      226.0     434.8          2
     32        226.0     434.8      456.9     437.0          3
     33        456.9     437.0      885.9     439.0          3
     34        885.9     439.0     1225.9     440.0          3
     35       1225.9     440.0     1275.9     440.0          3
     36         46.3     460.0       46.4     439.0          1
     37           .0     439.0       46.4     439.0          2
     38         49.3     460.0       49.4     439.0          8
     39         71.9     460.0      148.0     460.0          1
     40         49.4     439.0      213.0     439.0          2
     41         46.4     439.0       46.5     434.8          2
     42           .0     434.8       46.5     434.8          3
     43         49.4     439.0       49.5     434.8          8
     44         49.5     434.8      226.0     434.8          3
     45         46.5     434.8       46.6     431.8          3
     46         49.5     434.8       49.6     431.8          8
     47         46.6     431.8       49.6     431.8          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle   Parameter Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.
```

```
  1   127.0   131.0     854.0    11.00      .000          .0       0
  2   132.0   135.0     488.0    16.40      .000          .0       1
  3   130.0   135.0    5000.0      .00      .000          .0       0
  4    65.0    65.0     288.0    23.00      .000          .0       0
  5   115.0   120.0     100.0    16.00      .000          .0       0
  6   115.0   120.0     100.0    16.00      .000          .0       0
  7   115.0   120.0    1074.0    13.10      .000          .0       0
  8    75.0    75.0        .0     5.00      .000          .0       0


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     10.0 ft
                             and  x =     50.0 ft


Each surface terminates between   x =     80.0 ft
                            and   x =    120.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =      .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    2.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
```

```
   is specified by 44 coordinate points

         Point        x-surf        y-surf
          No.          (ft)          (ft)

           1           45.56        460.00
           2           46.99        458.60
           3           48.48        457.27
           4           50.03        456.01
           5           51.63        454.81
           6           53.29        453.69
           7           54.99        452.64
           8           56.74        451.67
           9           58.53        450.78
          10           60.36        449.97
          11           62.22        449.24
          12           64.11        448.59
          13           66.03        448.03
          14           67.98        447.55
          15           69.94        447.16
          16           71.91        446.86
          17           73.90        446.65
          18           75.90        446.52
          19           77.90        446.49
          20           79.90        446.54
          21           81.89        446.68
          22           83.88        446.91
          23           85.86        447.22
          24           87.81        447.63
          25           89.75        448.12
          26           91.67        448.69
          27           93.56        449.35
          28           95.41        450.10
          29           97.23        450.92
          30           99.02        451.82
          31          100.76        452.81
          32          102.46        453.87
          33          104.10        455.00
          34          105.70        456.21
          35          107.24        457.48
          36          108.72        458.82
          37          110.14        460.23
          38          111.50        461.70
          39          112.79        463.23
          40          114.02        464.81
          41          115.17        466.45
          42          116.24        468.13
          43          117.25        469.86
          44          117.35        470.06

 ****   Simplified BISHOP FOS =    6.859   ****
```

```
*********************************************************************
**                                                                 **
**  Out of the    100 surfaces generated and analyzed by XSTABL,   **
**       30 surfaces were found to have MISLEADING FOS values.     **
**                                                                 **
*********************************************************************




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 2-2E

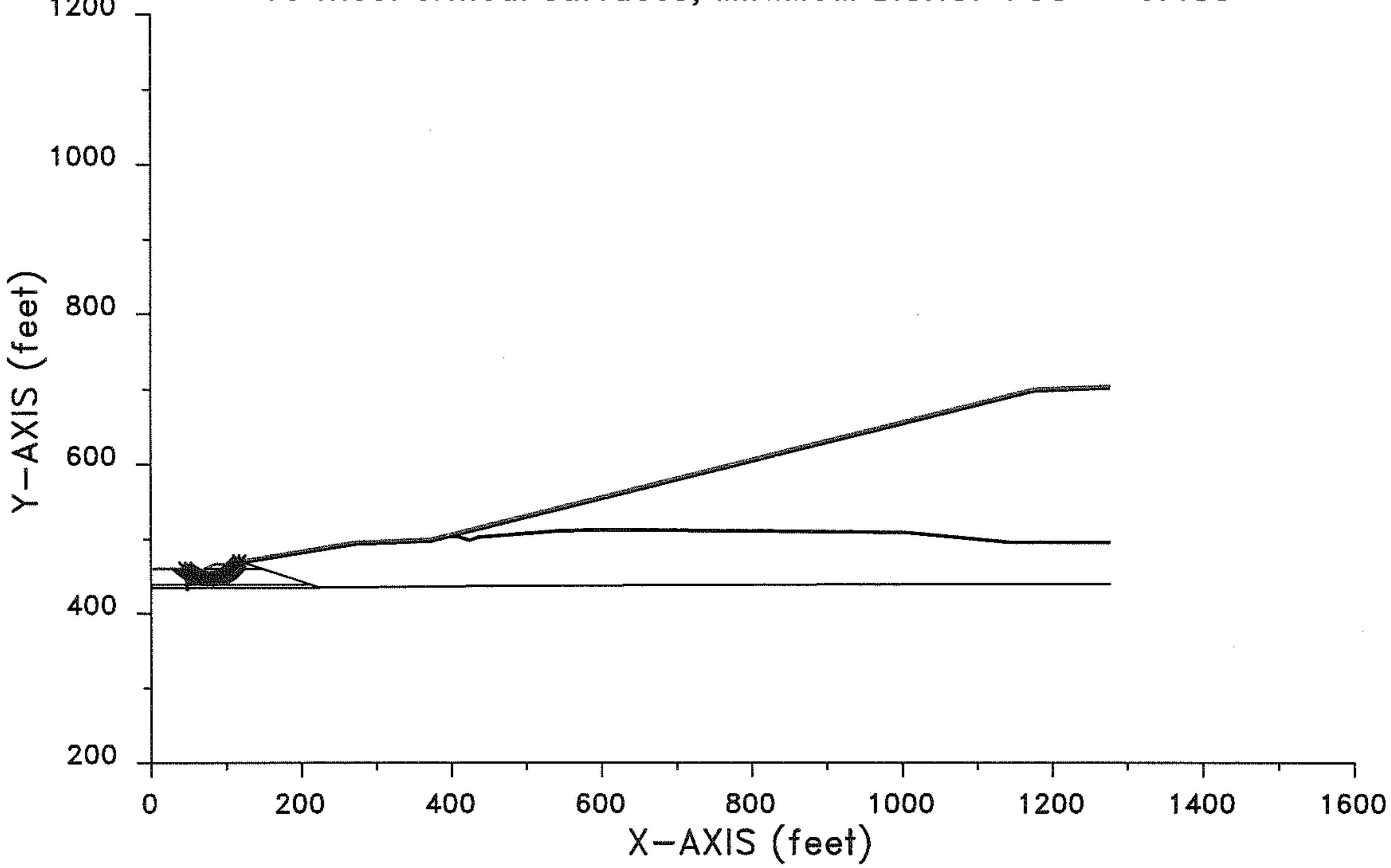
       FOS      Circle Center    Radius  Initial Terminal  Resisting
    (BISHOP)  x-coord  y-coord           x-coord  x-coord    Moment
                (ft)     (ft)     (ft)     (ft)     (ft)    (ft-lb)

 1.    6.859     77.74   491.56     45.07    45.56   117.35  4.042E+06
 2.    6.872     76.12   493.60     48.53    41.11   118.67  4.801E+06
 3.    6.902     77.58   492.60     45.70    45.56   117.34  4.050E+06
 4.    7.442     73.92   492.91     46.47    41.11   113.99  4.202E+06
 5.    7.685     69.52   503.19     60.06    27.78   119.93  7.102E+06
 6.    7.743     78.56   507.42     55.36    50.00   119.76  4.334E+06
 7.    7.771     78.54   508.15     55.97    50.00   119.94  4.378E+06
 8.    8.080     70.02   508.43     61.43    32.22   118.09  6.223E+06
 9.    8.103     73.79   515.67     64.55    41.11   119.88  5.496E+06
10.    8.158     69.97   511.04     63.49    32.22   118.66  6.377E+06

                   *  *  *  END OF FILE  *  *  *
```

2-2T 10-10-11 39:58

CAMELOT LF – FINAL COVER SEC 2-2T
10 most critical surfaces, MINIMUM BISHOP FOS = 6.485



```
XSTABL File: 2-2T      10-10-11   39:58

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 2-2T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

       1          .0     460.0       46.3     460.0         1
       2        46.3     460.0       49.3     460.0         8
       3        49.3     460.0       52.3     460.0         1
       4        52.3     460.0       64.7     458.4         1
       5        64.7     458.4       66.8     457.7         1
       6        66.8     457.7       71.9     460.0         1
       7        71.9     460.0       85.3     466.0         7
       8        85.3     466.0       98.2     466.0         7
       9        98.2     466.0      105.5     467.7         7
      10       105.5     467.7      117.0     470.0         5
      11       117.0     470.0      235.0     490.0         5
      12       235.0     490.0      272.2     496.0         5
      13       272.2     496.0      371.9     500.0         5
      14       371.9     500.0     1175.9     701.0         5
      15      1175.9     701.0     1275.9     705.0         5

       47 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

       1       105.5     467.7      124.2     467.7         7
       2       124.2     467.7      235.6     486.5         4
```

```
   3        235.6     486.5      272.6     492.5          4
   4        272.6     492.5      372.4     496.5          4
   5        372.4     496.5      398.3     503.0          4
   6        398.3     503.0      406.3     505.0          6
   7        406.3     505.0     1176.4     697.5          4
   8       1176.4     697.5     1275.9     701.5          4
   9        406.3     505.0      407.4     505.0          6
  10        407.4     505.0      416.7     501.9          6
  11        416.7     501.9      423.7     499.6          6
  12        423.7     499.6      436.0     503.7          6
  13        436.0     503.7      542.0     512.0          6
  14        542.0     512.0      597.3     513.7          6
  15        597.3     513.7      794.9     512.0          6
  16        794.9     512.0     1004.3     510.0          6
  17       1004.3     510.0     1141.7     497.0          6
  18       1141.7     497.0     1275.9     497.0          6
  19        398.3     503.0      407.1     503.0          4
  20        407.1     503.0      416.1     500.0          4
  21        416.1     500.0      423.7     497.5          4
  22        423.7     497.5      436.4     501.7          4
  23        436.4     501.7      542.1     510.0          4
  24        542.1     510.0      597.3     511.7          4
  25        597.3     511.7      794.9     510.0          4
  26        794.9     510.0     1004.2     508.0          4
  27       1004.2     508.0     1141.6     495.0          4
  28       1141.6     495.0     1275.9     495.0          4
  29        124.2     467.7      148.0     460.0          7
  30        148.0     460.0      213.0     439.0          1
  31        213.0     439.0      226.0     434.8          2
  32        226.0     434.8      456.9     437.0          3
  33        456.9     437.0      885.9     439.0          3
  34        885.9     439.0     1225.9     440.0          3
  35       1225.9     440.0     1275.9     440.0          3
  36         46.3     460.0       46.4     439.0          1
  37           .0     439.0       46.4     439.0          2
  38         49.3     460.0       49.4     439.0          8
  39         71.9     460.0      148.0     460.0          1
  40         49.4     439.0      213.0     439.0          2
  41         46.4     439.0       46.5     434.8          2
  42           .0     434.8       46.5     434.8          3
  43         49.4     439.0       49.5     434.8          8
  44         49.5     434.8      226.0     434.8          3
  45         46.5     434.8       46.6     431.8          3
  46         49.5     434.8       49.6     431.8          8
  47         46.6     431.8       49.6     431.8          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)     Ru       (psf)      No.
```

```
   1   127.0   131.0     788.0    11.50       .000          .0      0
   2   132.0   135.0     470.0     8.30       .000          .0      1
   3   130.0   135.0    5000.0      .00       .000          .0      0
   4    65.0    65.0     288.0    23.00       .000          .0      0
   5   115.0   120.0     100.0    16.00       .000          .0      0
   6   115.0   120.0     100.0    16.00       .000          .0      0
   7   115.0   120.0     834.0    16.00       .000          .0      0
   8    75.0    75.0        .0     5.00       .000          .0      0


 ----------------------------------------------------------------------
----
  UNDRAINED STRENGTHS as a function of effective vertical stress
                      have been specified for  3 Soil Unit(s)
 ----------------------------------------------------------------------
----


          Soil Unit #       Parameter a      Parameter Psi

               1.               788.0            11.50
               2.               470.0             8.30
               7.               834.0            16.00



 A critical failure surface searching method, using a random
 technique for generating CIRCULAR surfaces has been specified.


   100 trial surfaces will be generated and analyzed.


   10 Surfaces initiate from each of  10 points equally spaced
 along the ground surface between   x =     10.0 ft
                                  and   x =     50.0 ft


 Each surface terminates between    x =     80.0 ft
                                 and    x =    120.0 ft


 Unless further limitations were imposed, the minimum elevation
 at which a surface extends is   y =       .0 ft



 * * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

     2.0 ft line segments define each trial failure surface.



 ---------------------
 ANGULAR RESTRICTIONS
 ---------------------

   The first segment of each failure surface will be inclined
```

```
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 44 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1          45.56       460.00
          2          46.99       458.60
          3          48.48       457.27
          4          50.03       456.01
          5          51.63       454.81
          6          53.29       453.69
          7          54.99       452.64
          8          56.74       451.67
          9          58.53       450.78
         10          60.36       449.97
         11          62.22       449.24
         12          64.11       448.59
         13          66.03       448.03
         14          67.98       447.55
         15          69.94       447.16
         16          71.91       446.86
         17          73.90       446.65
         18          75.90       446.52
         19          77.90       446.49
         20          79.90       446.54
         21          81.89       446.68
         22          83.88       446.91
         23          85.86       447.22
         24          87.81       447.63
         25          89.75       448.12
         26          91.67       448.69
         27          93.56       449.35
         28          95.41       450.10
         29          97.23       450.92
         30          99.02       451.82
         31         100.76       452.81
         32         102.46       453.87
         33         104.10       455.00
         34         105.70       456.21
         35         107.24       457.48
         36         108.72       458.82
         37         110.14       460.23
```

```
        38         111.50       461.70
        39         112.79       463.23
        40         114.02       464.81
        41         115.17       466.45
        42         116.24       468.13
        43         117.25       469.86
        44         117.35       470.06

****  Simplified BISHOP FOS =   6.485  ****


*********************************************************************
**                                                                 **
**  Out of the    100 surfaces generated and analyzed by XSTABL,  **
**       26 surfaces were found to have MISLEADING FOS values.     **
**                                                                 **
*********************************************************************



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 2-2T

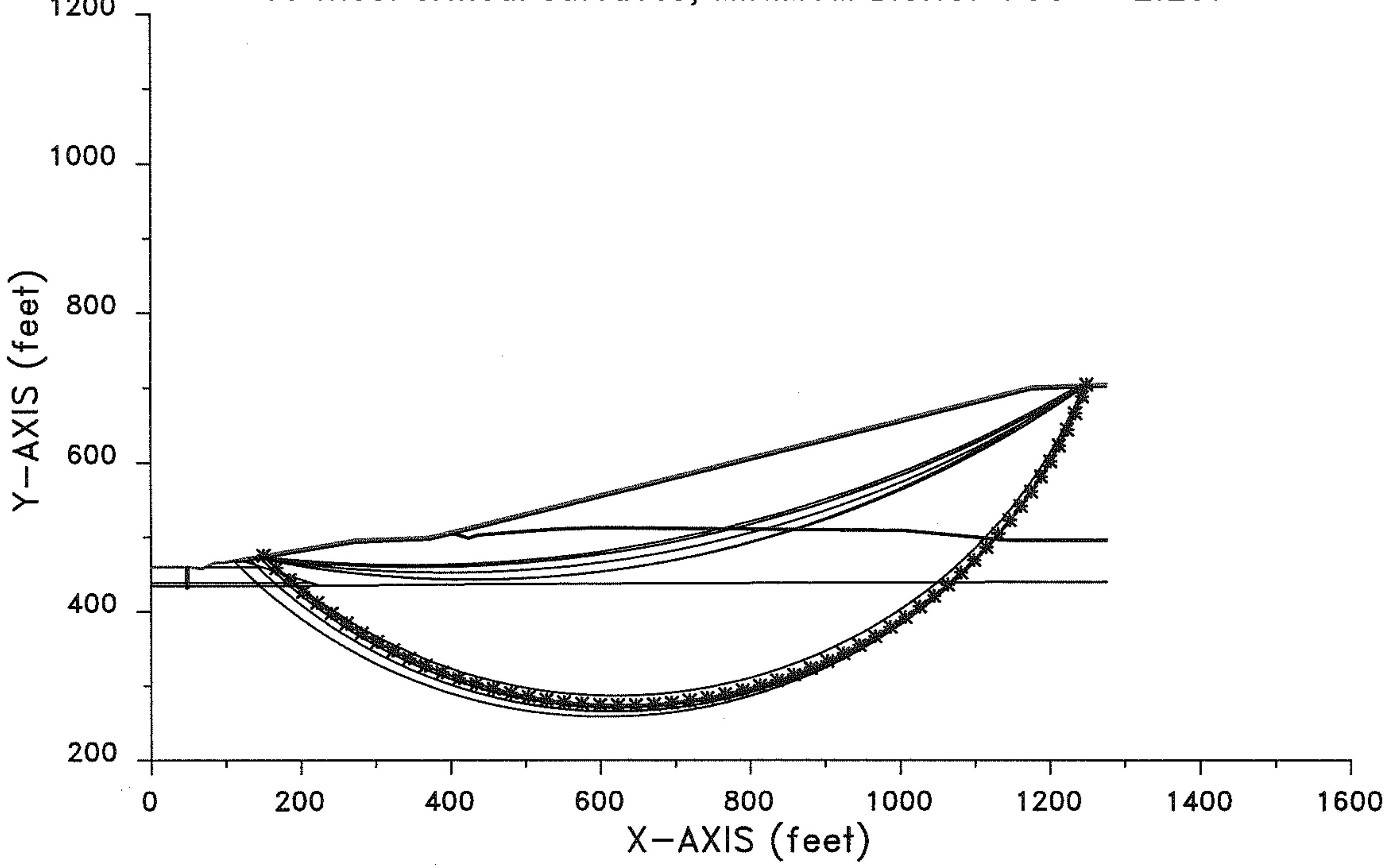
       FOS       Circle Center     Radius   Initial Terminal  Resisting
    (BISHOP)   x-coord  y-coord            x-coord  x-coord    Moment
                 (ft)     (ft)       (ft)     (ft)     (ft)    (ft-lb)

 1.   6.485     77.74   491.56      45.07    45.56   117.35  3.821E+06
 2.   6.512     76.12   493.60      48.53    41.11   118.67  4.550E+06
 3.   6.517     77.58   492.60      45.70    45.56   117.34  3.824E+06
 4.   7.016     73.92   492.91      46.47    41.11   113.99  3.961E+06
 5.   7.184     78.56   507.42      55.36    50.00   119.76  4.021E+06
 6.   7.207     78.54   508.15      55.97    50.00   119.94  4.060E+06
 7.   7.290     69.52   503.19      60.06    27.78   119.93  6.737E+06
 8.   7.532     73.79   515.67      64.55    41.11   119.88  5.108E+06
 9.   7.594     70.02   508.43      61.43    32.22   118.09  5.848E+06
10.   7.656     69.97   511.04      63.49    32.22   118.66  5.984E+06

                      * * *  END OF FILE  * * *
```

2-3E 10-10-11 40:01

CAMELOT LF - FINAL COVER SEC 2-3E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.257



```
XSTABL File: 2-3E      10-10-11   40:01

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *                using the               *
             *            Method of Slices            *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             * Ver. 5.208                  96 - 2046  *
             ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 2-3E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1           .0     460.0       46.3     460.0        1
        2         46.3     460.0       49.3     460.0        8
        3         49.3     460.0       52.3     460.0        1
        4         52.3     460.0       64.7     458.4        1
        5         64.7     458.4       66.8     457.7        1
        6         66.8     457.7       71.9     460.0        1
        7         71.9     460.0       85.3     466.0        7
        8         85.3     466.0       98.2     466.0        7
        9         98.2     466.0      105.5     467.7        7
       10        105.5     467.7      117.0     470.0        5
       11        117.0     470.0      235.0     490.0        5
       12        235.0     490.0      272.2     496.0        5
       13        272.2     496.0      371.9     500.0        5
       14        371.9     500.0     1175.9     701.0        5
       15       1175.9     701.0     1275.9     705.0        5

       47 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1        105.5     467.7      124.2     467.7        7
        2        124.2     467.7      235.6     486.5        4
```

```
     3       235.6     486.5      272.6     492.5          4
     4       272.6     492.5      372.4     496.5          4
     5       372.4     496.5      398.3     503.0          4
     6       398.3     503.0      406.3     505.0          6
     7       406.3     505.0     1176.4     697.5          4
     8      1176.4     697.5     1275.9     701.5          4
     9       406.3     505.0      407.4     505.0          6
    10       407.4     505.0      416.7     501.9          6
    11       416.7     501.9      423.7     499.6          6
    12       423.7     499.6      436.0     503.7          6
    13       436.0     503.7      542.0     512.0          6
    14       542.0     512.0      597.3     513.7          6
    15       597.3     513.7      794.9     512.0          6
    16       794.9     512.0     1004.3     510.0          6
    17      1004.3     510.0     1141.7     497.0          6
    18      1141.7     497.0     1275.9     497.0          6
    19       398.3     503.0      407.1     503.0          4
    20       407.1     503.0      416.1     500.0          4
    21       416.1     500.0      423.7     497.5          4
    22       423.7     497.5      436.4     501.7          4
    23       436.4     501.7      542.1     510.0          4
    24       542.1     510.0      597.3     511.7          4
    25       597.3     511.7      794.9     510.0          4
    26       794.9     510.0     1004.2     508.0          4
    27      1004.2     508.0     1141.6     495.0          4
    28      1141.6     495.0     1275.9     495.0          4
    29       124.2     467.7      148.0     460.0          7
    30       148.0     460.0      213.0     439.0          1
    31       213.0     439.0      226.0     434.8          2
    32       226.0     434.8      456.9     437.0          3
    33       456.9     437.0      885.9     439.0          3
    34       885.9     439.0     1225.9     440.0          3
    35      1225.9     440.0     1275.9     440.0          3
    36        46.3     460.0       46.4     439.0          1
    37          .0     439.0       46.4     439.0          2
    38        49.3     460.0       49.4     439.0          8
    39        71.9     460.0      148.0     460.0          1
    40        49.4     439.0      213.0     439.0          2
    41        46.4     439.0       46.5     434.8          2
    42          .0     434.8       46.5     434.8          3
    43        49.4     439.0       49.5     434.8          8
    44        49.5     434.8      226.0     434.8          3
    45        46.5     434.8       46.6     431.8          3
    46        49.5     434.8       49.6     431.8          8
    47        46.6     431.8       49.6     431.8          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru      (psf)      No.
```

```
  1   127.0   131.0     854.0    11.00       .000          .0      0
  2   132.0   135.0     488.0    16.40       .000          .0      1
  3   130.0   135.0    5000.0      .00       .000          .0      0
  4    65.0    65.0     288.0    23.00       .000          .0      0
  5   115.0   120.0     100.0    16.00       .000          .0      0
  6   115.0   120.0     100.0    16.00       .000          .0      0
  7   115.0   120.0    1074.0    13.10       .000          .0      0
  8    75.0    75.0        .0     5.00       .000          .0      0


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between   x =     90.0 ft
                            and   x =    150.0 ft


Each surface terminates between    x =   1150.0 ft
                           and    x =   1250.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   24.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *
```

```
The most critical circular failure surface
is specified by 57 coordinate points

     Point        x-surf       y-surf
      No.          (ft)         (ft)

        1         150.00       475.59
        2         167.02       458.68
        3         184.65       442.38
        4         202.85       426.74
        5         221.60       411.76
        6         240.88       397.47
        7         260.66       383.88
        8         280.92       371.01
        9         301.63       358.89
       10         322.77       347.52
       11         344.30       336.91
       12         366.20       327.10
       13         388.44       318.07
       14         410.99       309.86
       15         433.82       302.46
       16         456.91       295.90
       17         480.21       290.17
       18         503.71       285.28
       19         527.37       281.25
       20         551.16       278.07
       21         575.04       275.75
       22         599.00       274.29
       23         622.99       273.70
       24         646.99       273.97
       25         670.96       275.11
       26         694.88       277.12
       27         718.71       279.98
       28         742.42       283.71
       29         765.98       288.28
       30         789.36       293.70
       31         812.53       299.97
       32         835.45       307.06
       33         858.11       314.98
       34         880.47       323.70
       35         902.49       333.23
       36         924.16       343.55
       37         945.45       354.64
       38         966.31       366.50
       39         986.74       379.09
       40        1006.70       392.42
       41        1026.17       406.46
       42        1045.12       421.19
       43        1063.52       436.59
       44        1081.36       452.65
       45        1098.60       469.34
       46        1115.24       486.64
       47        1131.23       504.53
       48        1146.58       522.99
       49        1161.24       541.98
       50        1175.21       561.50
```

```
         51        1188.47       581.50
         52        1201.00       601.97
         53        1212.78       622.88
         54        1223.80       644.20
         55        1234.05       665.91
         56        1243.50       687.97
         57        1249.68       703.95

 ****  Simplified BISHOP FOS =   2.257  ****



 The following is a summary of the TEN most critical surfaces

 Problem Description : CAMELOT LF - FINAL COVER SEC 2-3E

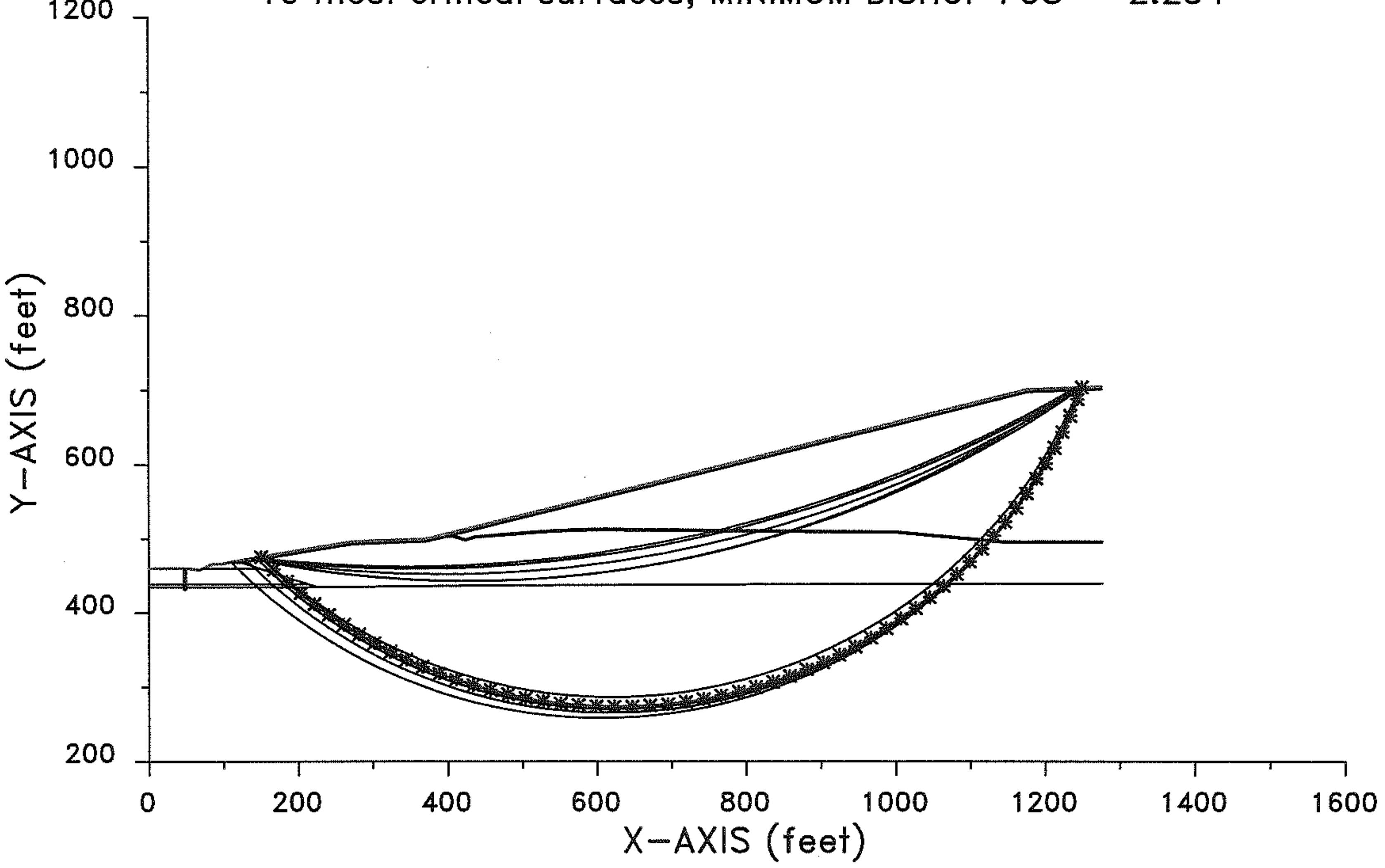
        FOS       Circle Center      Radius   Initial Terminal   Resisting
      (BISHOP)  x-coord  y-coord              x-coord  x-coord    Moment
                  (ft)     (ft)        (ft)     (ft)     (ft)     (ft-lb)

  1.    2.257    627.38   938.99     665.30    150.00  1249.68   3.906E+09
  2.    2.260    623.47   937.64     667.13    143.33  1248.32   3.948E+09
  3.    2.262    427.10  1844.28    1401.37    136.67  1241.08   3.831E+09
  4.    2.262    428.13  1869.01    1425.78    136.67  1249.93   3.950E+09
  5.    2.262    393.03  2036.92    1584.47    136.67  1249.49   3.933E+09
  6.    2.264    616.75   942.25     676.66    130.00  1250.02   4.076E+09
  7.    2.272    354.19  2219.33    1759.50    136.67  1248.17   3.917E+09
  8.    2.273    347.54  2241.17    1778.47    143.33  1241.31   3.759E+09
  9.    2.278    620.15   965.46     678.98    150.00  1246.64   3.907E+09
 10.    2.278    605.55   947.32     689.02    110.00  1250.08   4.255E+09

                     * * *  END OF FILE  * * *
```

2-3T 10-10-11 40:03

CAMELOT LF – FINAL COVER SEC 2–3T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.254



```
XSTABL File: 2-3T      10-10-11   40:03

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *               using the               *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 2-3T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
      No.       (ft)      (ft)       (ft)      (ft)    Below Segment

       1          .0     460.0       46.3     460.0          1
       2        46.3     460.0       49.3     460.0          8
       3        49.3     460.0       52.3     460.0          1
       4        52.3     460.0       64.7     458.4          1
       5        64.7     458.4       66.8     457.7          1
       6        66.8     457.7       71.9     460.0          1
       7        71.9     460.0       85.3     466.0          7
       8        85.3     466.0       98.2     466.0          7
       9        98.2     466.0      105.5     467.7          7
      10       105.5     467.7      117.0     470.0          5
      11       117.0     470.0      235.0     490.0          5
      12       235.0     490.0      272.2     496.0          5
      13       272.2     496.0      371.9     500.0          5
      14       371.9     500.0     1175.9     701.0          5
      15      1175.9     701.0     1275.9     705.0          5

       47 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
      No.       (ft)      (ft)       (ft)      (ft)    Below Segment

       1       105.5     467.7      124.2     467.7          7
       2       124.2     467.7      235.6     486.5          4
```

```
     3       235.6      486.5       272.6      492.5          4
     4       272.6      492.5       372.4      496.5          4
     5       372.4      496.5       398.3      503.0          4
     6       398.3      503.0       406.3      505.0          6
     7       406.3      505.0      1176.4      697.5          4
     8      1176.4      697.5      1275.9      701.5          4
     9       406.3      505.0       407.4      505.0          6
    10       407.4      505.0       416.7      501.9          6
    11       416.7      501.9       423.7      499.6          6
    12       423.7      499.6       436.0      503.7          6
    13       436.0      503.7       542.0      512.0          6
    14       542.0      512.0       597.3      513.7          6
    15       597.3      513.7       794.9      512.0          6
    16       794.9      512.0      1004.3      510.0          6
    17      1004.3      510.0      1141.7      497.0          6
    18      1141.7      497.0      1275.9      497.0          6
    19       398.3      503.0       407.1      503.0          4
    20       407.1      503.0       416.1      500.0          4
    21       416.1      500.0       423.7      497.5          4
    22       423.7      497.5       436.4      501.7          4
    23       436.4      501.7       542.1      510.0          4
    24       542.1      510.0       597.3      511.7          4
    25       597.3      511.7       794.9      510.0          4
    26       794.9      510.0      1004.2      508.0          4
    27      1004.2      508.0      1141.6      495.0          4
    28      1141.6      495.0      1275.9      495.0          4
    29       124.2      467.7       148.0      460.0          7
    30       148.0      460.0       213.0      439.0          1
    31       213.0      439.0       226.0      434.8          2
    32       226.0      434.8       456.9      437.0          3
    33       456.9      437.0       885.9      439.0          3
    34       885.9      439.0      1225.9      440.0          3
    35      1225.9      440.0      1275.9      440.0          3
    36        46.3      460.0        46.4      439.0          1
    37          .0      439.0        46.4      439.0          2
    38        49.3      460.0        49.4      439.0          8
    39        71.9      460.0       148.0      460.0          1
    40        49.4      439.0       213.0      439.0          2
    41        46.4      439.0        46.5      434.8          2
    42          .0      434.8        46.5      434.8          3
    43        49.4      439.0        49.5      434.8          8
    44        49.5      434.8       226.0      434.8          3
    45        46.5      434.8        46.6      431.8          3
    46        49.5      434.8        49.6      431.8          8
    47        46.6      431.8        49.6      431.8          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.
```

```
  1   127.0   131.0     788.0    11.50      .000         .0      0
  2   132.0   135.0     470.0     8.30      .000         .0      1
  3   130.0   135.0    5000.0      .00      .000         .0      0
  4    65.0    65.0     288.0    23.00      .000         .0      0
  5   115.0   120.0     100.0    16.00      .000         .0      0
  6   115.0   120.0     100.0    16.00      .000         .0      0
  7   115.0   120.0     834.0    16.00      .000         .0      0
  8    75.0    75.0        .0     5.00      .000         .0      0


 ----------------------------------------------------------------------
----

  UNDRAINED STRENGTHS as a function of effective vertical stress
                      have been specified for  3 Soil Unit(s)
 ----------------------------------------------------------------------
----


            Soil Unit #      Parameter a     Parameter Psi

                 1.              788.0           11.50
                 2.              470.0            8.30
                 7.              834.0           16.00


 A critical failure surface searching method, using a random
 technique for generating CIRCULAR surfaces has been specified.


   100 trial surfaces will be generated and analyzed.


   10 Surfaces initiate from each of  10 points equally spaced
 along the ground surface between  x =     90.0 ft
                                 and  x =    150.0 ft


 Each surface terminates between   x =   1150.0 ft
                                and   x =   1250.0 ft


 Unless further limitations were imposed, the minimum elevation
 at which a surface extends is  y =       .0 ft


 * * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    24.0 ft line segments define each trial failure surface.


 ---------------------
 ANGULAR RESTRICTIONS
 ---------------------

   The first segment of each failure surface will be inclined
```

```
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 57 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         150.00       475.59
          2         167.02       458.68
          3         184.65       442.38
          4         202.85       426.74
          5         221.60       411.76
          6         240.88       397.47
          7         260.66       383.88
          8         280.92       371.01
          9         301.63       358.89
         10         322.77       347.52
         11         344.30       336.91
         12         366.20       327.10
         13         388.44       318.07
         14         410.99       309.86
         15         433.82       302.46
         16         456.91       295.90
         17         480.21       290.17
         18         503.71       285.28
         19         527.37       281.25
         20         551.16       278.07
         21         575.04       275.75
         22         599.00       274.29
         23         622.99       273.70
         24         646.99       273.97
         25         670.96       275.11
         26         694.88       277.12
         27         718.71       279.98
         28         742.42       283.71
         29         765.98       288.28
         30         789.36       293.70
         31         812.53       299.97
         32         835.45       307.06
         33         858.11       314.98
         34         880.47       323.70
         35         902.49       333.23
         36         924.16       343.55
```

```
          37         945.45        354.64
          38         966.31        366.50
          39         986.74        379.09
          40        1006.70        392.42
          41        1026.17        406.46
          42        1045.12        421.19
          43        1063.52        436.59
          44        1081.36        452.65
          45        1098.60        469.34
          46        1115.24        486.64
          47        1131.23        504.53
          48        1146.58        522.99
          49        1161.24        541.98
          50        1175.21        561.50
          51        1188.47        581.50
          52        1201.00        601.97
          53        1212.78        622.88
          54        1223.80        644.20
          55        1234.05        665.91
          56        1243.50        687.97
          57        1249.68        703.95

****  Simplified BISHOP FOS =   2.254  ****




The following is a summary of the TEN most critical surfaces

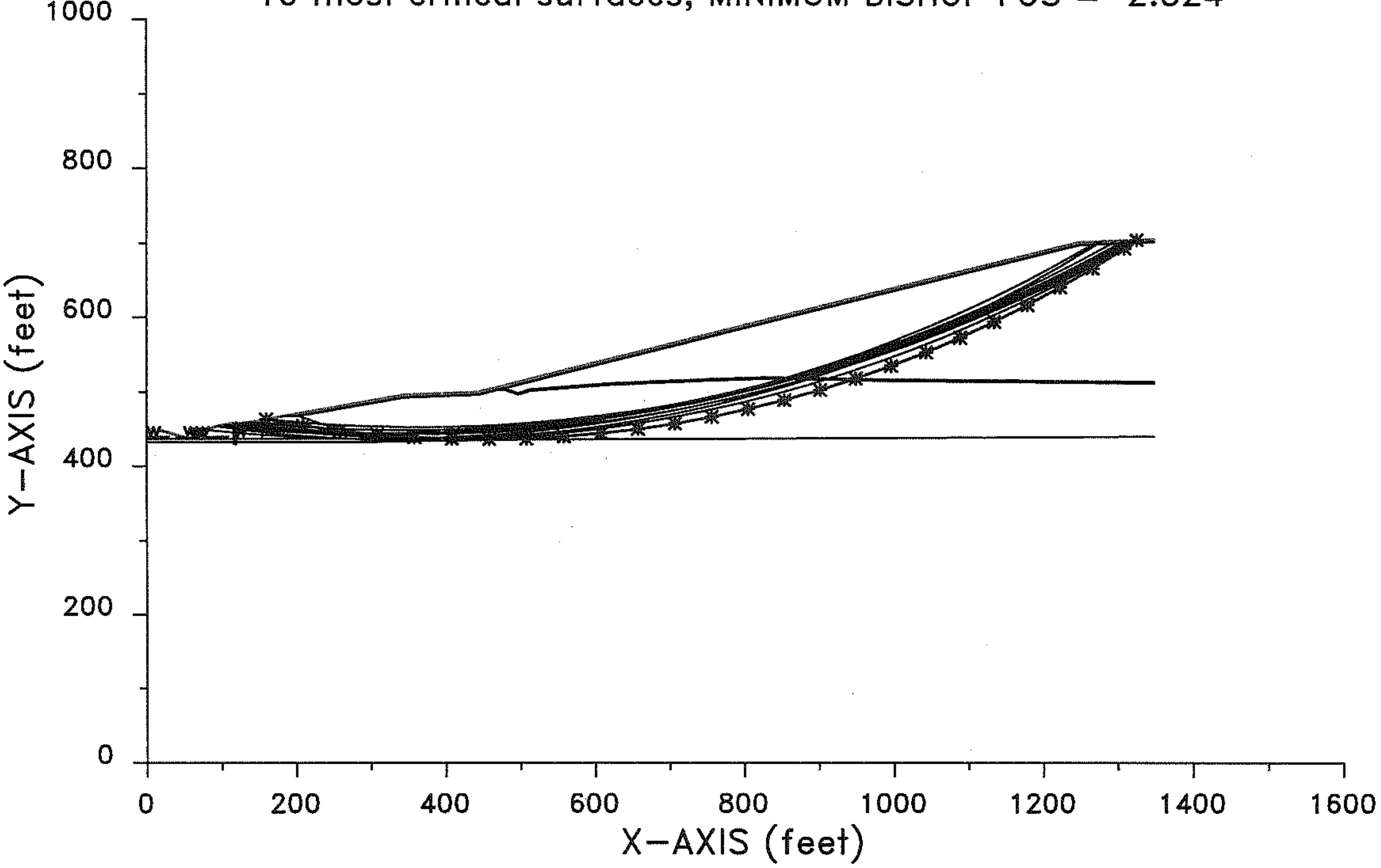
Problem Description : CAMELOT LF - FINAL COVER SEC 2-3T

        FOS       Circle Center      Radius   Initial Terminal  Resisting
      (BISHOP)   x-coord  y-coord              x-coord  x-coord    Moment
                   (ft)     (ft)       (ft)      (ft)     (ft)     (ft-lb)

  1.    2.254    627.38    938.99    665.30    150.00  1249.68  3.901E+09
  2.    2.256    623.47    937.64    667.13    143.33  1248.32  3.942E+09
  3.    2.259    616.75    942.25    676.66    130.00  1250.02  4.068E+09
  4.    2.262    427.10   1844.28   1401.37    136.67  1241.08  3.831E+09
  5.    2.262    428.13   1869.01   1425.78    136.67  1249.93  3.950E+09
  6.    2.262    393.03   2036.92   1584.47    136.67  1249.49  3.933E+09
  7.    2.272    354.19   2219.33   1759.50    136.67  1248.17  3.917E+09
  8.    2.273    605.55    947.32    689.02    110.00  1250.08  4.245E+09
  9.    2.273    347.54   2241.17   1778.47    143.33  1241.31  3.759E+09
 10.    2.275    620.15    965.46    678.98    150.00  1246.64  3.901E+09

                         * * *  END OF FILE  * * *
```

3-1E 3-07-12 14:34


CAMELOT LF – FINAL COVER SEC 3-1E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.324

```
XSTABL File: 3-1E        3-07-12   14:34

          *****************************************
          *             X S T A B L               *
          *                                       *
          *       Slope Stability Analysis        *
          *              using the                *
          *           Method of Slices            *
          *                                       *
          *       Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.  *
          *       Moscow, ID 83843, U.S.A.        *
          *                                       *
          *         All Rights Reserved           *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 3-1E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
      No.       (ft)      (ft)      (ft)      (ft)    Below Segment

       1          .0     450.9      21.0     448.1          1
       2        21.0     448.1      56.0     438.1          1
       3        56.0     438.1      62.0     438.1          1
       4        62.0     438.1      92.0     454.1          1
       5        92.0     454.1     112.0     458.1          1
       6       112.0     458.1     116.3     458.1          1
       7       116.3     458.1     119.3     458.1          8
       8       119.3     458.1     123.8     458.1          1
       9       123.8     458.1     141.0     460.0          7
      10       141.0     460.0     183.6     467.7          7
      11       183.6     467.7     196.5     470.0          5
      12       196.5     470.0     343.4     496.0          5
      13       343.4     496.0     443.7     500.0          5
      14       443.7     500.0    1247.7     701.0          5
      15      1247.7     701.0    1347.7     705.0          5

       45 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
      No.       (ft)      (ft)      (ft)      (ft)    Below Segment

       1       183.6     467.7     203.5     467.7          7
       2       203.5     467.7     343.8     492.5          4
```

```
     3        343.8       492.5       444.2       496.5            4
     4        444.2       496.5       470.1       503.0            4
     5        470.1       503.0       478.1       505.0            6
     6        478.1       505.0      1248.2       697.5            4
     7       1248.2       697.5      1347.7       701.5            4
     8        478.1       505.0       479.1       505.0            6
     9        479.1       505.0       497.9       498.8            6
    10        497.9       498.8       513.3       503.9            6
    11        513.3       503.9       555.5       507.0            6
    12        555.5       507.0       619.8       512.0            6
    13        619.8       512.0       744.8       517.0            6
    14        744.8       517.0       833.4       519.8            6
    15        833.4       519.8       990.9       517.0            6
    16        990.9       517.0      1347.7       514.0            6
    17        470.1       503.0       478.8       503.0            4
    18        478.8       503.0       497.9       496.7            4
    19        497.9       496.7       513.7       501.9            4
    20        513.7       501.9       555.7       505.0            4
    21        555.7       505.0       619.9       510.0            4
    22        619.9       510.0       744.9       515.0            4
    23        744.9       515.0       833.4       517.8            4
    24        833.4       517.8       990.9       515.0            4
    25        990.9       515.0      1347.7       512.0            4
    26        203.5       467.7       232.2       458.1            7
    27        232.2       458.1       295.5       437.0            1
    28        295.5       437.0       308.1       432.8            2
    29        308.1       432.8       316.0       433.0            3
    30        316.0       433.0       496.8       436.0            3
    31        496.8       436.0       802.4       437.0            3
    32        802.4       437.0      1206.5       439.0            3
    33       1206.5       439.0      1347.7       440.0            3
    34        123.8       458.1       232.2       458.1            1
    35        116.3       458.1       116.4       437.0            1
    36           .0       437.0       116.4       437.0            2
    37        119.3       460.0       119.4       437.0            8
    38        119.4       437.0       295.5       437.0            2
    39        116.4       437.0       116.5       432.8            2
    40           .0       432.8       116.5       432.8            3
    41        119.4       437.0       119.5       432.8            8
    42        119.5       432.8       308.1       432.8            3
    43        116.5       432.8       116.6       429.8            3
    44        119.5       432.8       119.6       432.8            3
    45        116.6       429.8       119.6       429.8            3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0    854.0     11.00     .000          .0       1
  2   132.0   135.0    488.0     16.40     .000          .0       1
```

```
  3   130.0   135.0    5000.0      .00      .000         .0      0
  4    65.0    65.0     288.0    23.00      .000         .0      0
  5   115.0   120.0     100.0    16.00      .000         .0      0
  6   115.0   120.0     100.0    16.00      .000         .0      0
  7   115.0   120.0    1074.0    13.10      .000         .0      0
  8    75.0    75.0        .0     5.00      .000         .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  6 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.         (ft)        (ft)

    1            .00      440.00
    2          49.40      440.00
    3          56.00      438.10
    4          62.00      438.10
    5          65.60      440.00
    6         116.40      440.00



A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     60.0 ft
                             and  x =    160.0 ft


Each surface terminates between   x =   1250.0 ft
                            and   x =   1325.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =    350.0 ft


   50.0 ft line segments define each trial failure surface.



---------------------
```

```
    ANGULAR RESTRICTIONS
    --------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=  (slope angle - 5.0) degrees



***********************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
***********************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
***********************************************************************

    ----------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ----------------------------------------------------------


ERROR #48: NEGATIVE effective stress calculated for at least
          1 slice(s) out of 58 slices for surface #    59


Circular surface (FOS=  2.4044) is defined by: xcenter =    340.74
ycenter =    2252.95   Init. Pt. =    115.56   Seg. Length =  50.00
-------------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 26 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1        160.00       463.43
             2        209.27       454.94
             3        258.79       448.03
             4        308.51       442.71
             5        358.37       438.98
             6        408.32       436.84
             7        458.32       436.31
             8        508.31       437.37
```

```
         9        558.24       440.03
        10        608.06       444.29
        11        657.71       450.14
        12        707.16       457.57
        13        756.34       466.58
        14        805.21       477.16
        15        853.71       489.30
        16        901.80       502.98
        17        949.43       518.20
        18        996.55       534.92
        19       1043.11       553.15
        20       1089.06       572.86
        21       1134.36       594.03
        22       1178.96       616.63
        23       1222.81       640.65
        24       1265.87       666.06
        25       1308.10       692.84
        26       1324.64       704.08

****  Simplified BISHOP FOS =   2.324  ****



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 3-1E

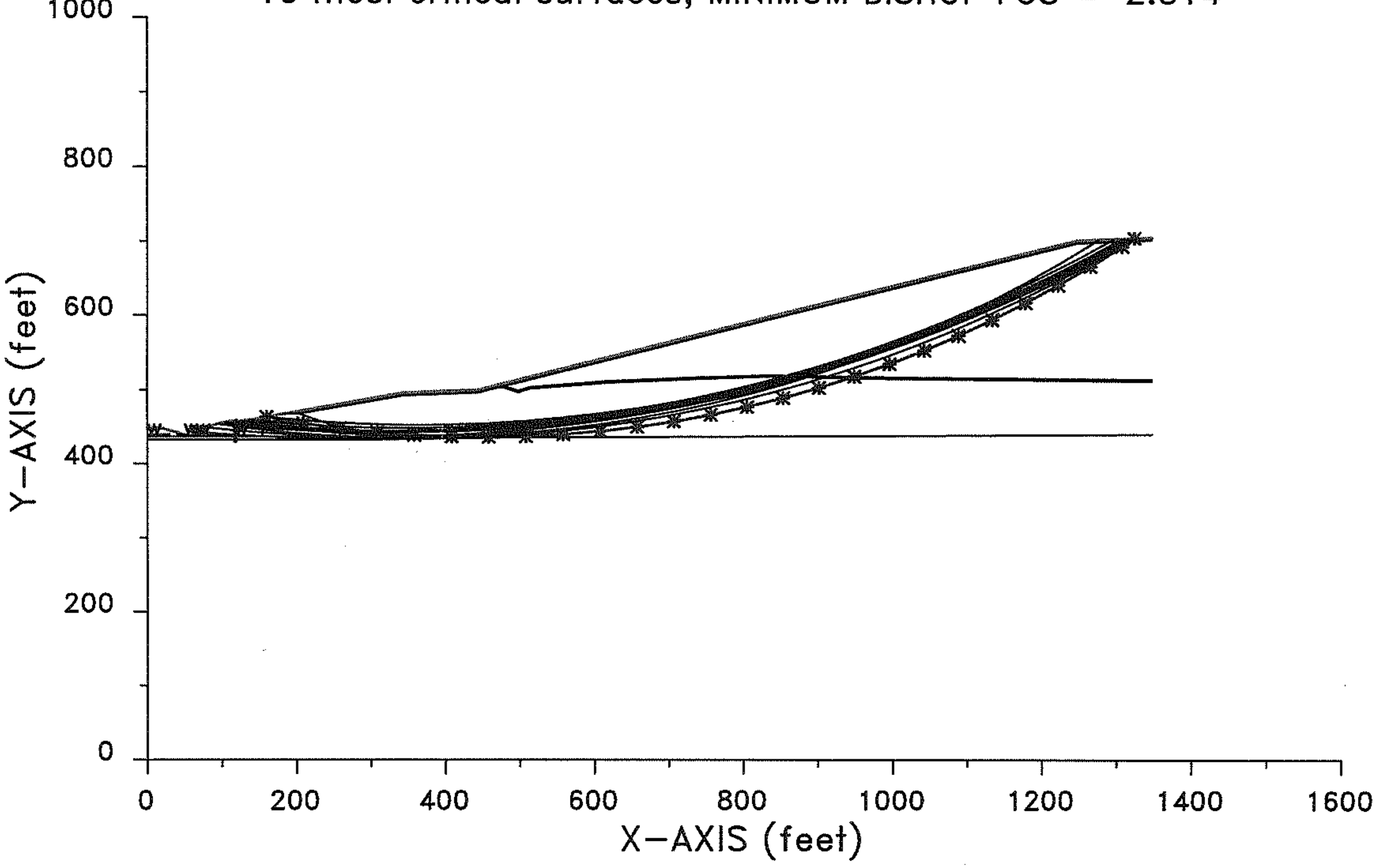
       FOS      Circle Center    Radius   Initial Terminal  Resisting
    (BISHOP)  x-coord  y-coord            x-coord  x-coord    Moment
                (ft)     (ft)     (ft)      (ft)     (ft)    (ft-lb)

 1.   2.324    450.07  1999.38  1563.10    160.00  1324.64  4.580E+09
 2.   2.353    363.46  2388.60  1935.89    160.00  1316.85  4.489E+09
 3.   2.366    362.29  2304.57  1861.13    126.67  1310.92  4.711E+09
 4.   2.374    343.08  2363.73  1915.13    137.78  1296.68  4.387E+09
 5.   2.387    376.61  2101.33  1663.84    115.56  1276.71  4.239E+09
 6.   2.387    363.85  2281.34  1846.89     93.33  1324.40  5.259E+09
 7.   2.398    322.39  2453.35  2008.62    104.44  1308.44  4.855E+09
 8.   2.402    314.16  2522.25  2079.64     93.33  1323.27  5.266E+09
 9.   2.404    340.74  2252.95  1808.92    115.56  1271.57  4.144E+09
10.   2.405    307.70  2504.60  2068.05     82.22  1324.81  5.549E+09

                    * * *  END OF FILE  * * *
```

3-1T 3-07-12 14:36

CAMELOT LF – FINAL COVER SEC 3-1T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.314



```
XSTABL File: 3-1T        3-07-12   14:36

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *              using the                *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


   Problem Description : CAMELOT LF - FINAL COVER SEC 3-1T




   -----------------------------
   SEGMENT BOUNDARY COORDINATES
   -----------------------------

      15 SURFACE boundary segments

   Segment     x-left     y-left     x-right    y-right      Soil Unit
     No.        (ft)       (ft)       (ft)       (ft)     Below Segment

      1           .0      450.9       21.0      448.1           1
      2         21.0      448.1       56.0      438.1           1
      3         56.0      438.1       62.0      438.1           1
      4         62.0      438.1       92.0      454.1           1
      5         92.0      454.1      112.0      458.1           1
      6        112.0      458.1      116.3      458.1           1
      7        116.3      458.1      119.3      458.1           8
      8        119.3      458.1      123.8      458.1           1
      9        123.8      458.1      141.0      460.0           7
     10        141.0      460.0      183.6      467.7           7
     11        183.6      467.7      196.5      470.0           5
     12        196.5      470.0      343.4      496.0           5
     13        343.4      496.0      443.7      500.0           5
     14        443.7      500.0     1247.7      701.0           5
     15       1247.7      701.0     1347.7      705.0           5

      45 SUBSURFACE boundary segments

   Segment     x-left     y-left     x-right    y-right      Soil Unit
     No.        (ft)       (ft)       (ft)       (ft)     Below Segment

      1        183.6      467.7      203.5      467.7           7
      2        203.5      467.7      343.8      492.5           4
```

```
     3         343.8      492.5       444.2      496.5           4
     4         444.2      496.5       470.1      503.0           4
     5         470.1      503.0       478.1      505.0           6
     6         478.1      505.0      1248.2      697.5           4
     7        1248.2      697.5      1347.7      701.5           4
     8         478.1      505.0       479.1      505.0           6
     9         479.1      505.0       497.9      498.8           6
    10         497.9      498.8       513.3      503.9           6
    11         513.3      503.9       555.5      507.0           6
    12         555.5      507.0       619.8      512.0           6
    13         619.8      512.0       744.8      517.0           6
    14         744.8      517.0       833.4      519.8           6
    15         833.4      519.8       990.9      517.0           6
    16         990.9      517.0      1347.7      514.0           6
    17         470.1      503.0       478.8      503.0           4
    18         478.8      503.0       497.9      496.7           4
    19         497.9      496.7       513.7      501.9           4
    20         513.7      501.9       555.7      505.0           4
    21         555.7      505.0       619.9      510.0           4
    22         619.9      510.0       744.9      515.0           4
    23         744.9      515.0       833.4      517.8           4
    24         833.4      517.8       990.9      515.0           4
    25         990.9      515.0      1347.7      512.0           4
    26         203.5      467.7       232.2      458.1           7
    27         232.2      458.1       295.5      437.0           1
    28         295.5      437.0       308.1      432.8           2
    29         308.1      432.8       316.0      433.0           3
    30         316.0      433.0       496.8      436.0           3
    31         496.8      436.0       802.4      437.0           3
    32         802.4      437.0      1206.5      439.0           3
    33        1206.5      439.0      1347.7      440.0           3
    34         123.8      458.1       232.2      458.1           1
    35         116.3      458.1       116.4      437.0           1
    36            .0      437.0       116.4      437.0           2
    37         119.3      460.0       119.4      437.0           8
    38         119.4      437.0       295.5      437.0           2
    39         116.4      437.0       116.5      432.8           2
    40            .0      432.8       116.5      432.8           3
    41         119.4      437.0       119.5      432.8           8
    42         119.5      432.8       308.1      432.8           3
    43         116.5      432.8       116.6      429.8           3
    44         119.5      432.8       119.6      432.8           3
    45         116.6      429.8       119.6      429.8           3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight    Cohesion  Friction     Pore Pressure        Water
Unit  Moist    Sat.   Intercept   Angle   Parameter  Constant   Surface
 No.  (pcf)   (pcf)     (psf)     (deg)      Ru        (psf)       No.

  1   127.0   131.0      788.0    11.50       .000          .0       1
  2   132.0   135.0      470.0     8.30       .000          .0       1
```

```
   3   130.0   135.0    5000.0      .00       .000          .0      0
   4    65.0    65.0     288.0    23.00       .000          .0      0
   5   115.0   120.0     100.0    16.00       .000          .0      0
   6   115.0   120.0     100.0    16.00       .000          .0      0
   7   115.0   120.0     834.0    16.00       .000          .0      0
   8    75.0    75.0        .0     5.00       .000          .0      0


----------------------------------------------------------------------
----
 UNDRAINED STRENGTHS as a function of effective vertical stress
                   have been specified for  3 Soil Unit(s)
----------------------------------------------------------------------
----


          Soil Unit #      Parameter a     Parameter Psi

               1.              788.0            11.50
               2.              470.0             8.30
               7.              834.0            16.00


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  6 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water      y-water
   No.          (ft)         (ft)

    1            .00        440.00
    2          49.40        440.00
    3          56.00        438.10
    4          62.00        438.10
    5          65.60        440.00
    6         116.40        440.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     60.0 ft
                              and  x =    160.0 ft
```

```
    Each surface terminates between    x =   1250.0 ft
                                and    x =   1325.0 ft


    Unless further limitations were imposed, the minimum elevation
    at which a surface extends is  y =    350.0 ft


       50.0 ft line segments define each trial failure surface.



    ---------------------
    ANGULAR RESTRICTIONS
    ---------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=  (slope angle - 5.0) degrees



**********************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
**********************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
**********************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


ERROR #48: NEGATIVE effective stress calculated for at least
          1 slice(s) out of 58 slices for surface #    59


Circular surface (FOS=  2.3950) is defined by: xcenter =    340.74
ycenter =   2252.95   Init. Pt. =    115.56   Seg. Length =  50.00
------------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 26 coordinate points
```

```
           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1         160.00       463.43
             2         209.27       454.94
             3         258.79       448.03
             4         308.51       442.71
             5         358.37       438.98
             6         408.32       436.84
             7         458.32       436.31
             8         508.31       437.37
             9         558.24       440.03
            10         608.06       444.29
            11         657.71       450.14
            12         707.16       457.57
            13         756.34       466.58
            14         805.21       477.16
            15         853.71       489.30
            16         901.80       502.98
            17         949.43       518.20
            18         996.55       534.92
            19        1043.11       553.15
            20        1089.06       572.86
            21        1134.36       594.03
            22        1178.96       616.63
            23        1222.81       640.65
            24        1265.87       666.06
            25        1308.10       692.84
            26        1324.64       704.08

 ****  Simplified BISHOP FOS =   2.314   ****

 The following is a summary of the TEN most critical surfaces

 Problem Description : CAMELOT LF - FINAL COVER SEC 3-1T

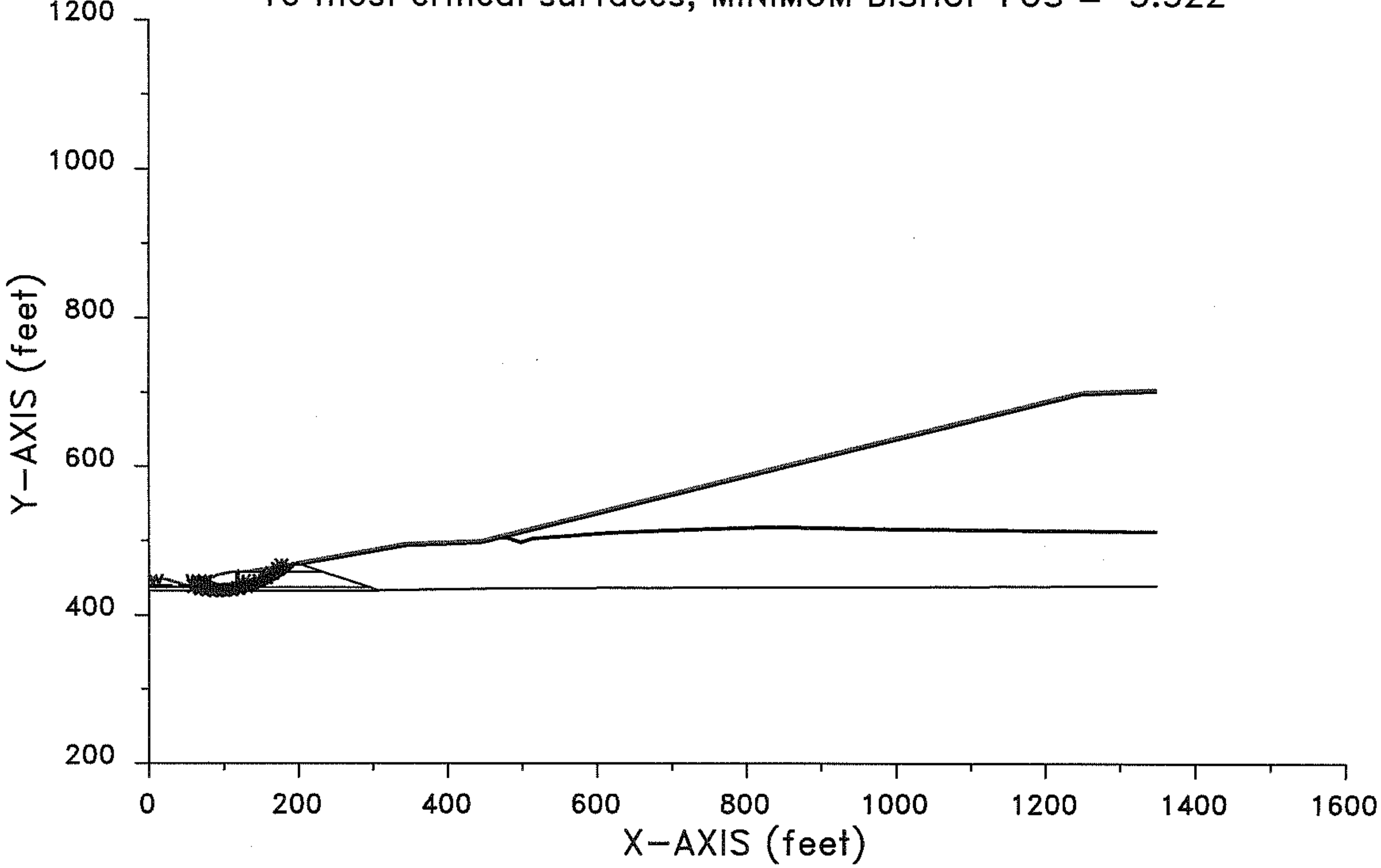
          FOS     Circle Center    Radius   Initial Terminal  Resisting
       (BISHOP)  x-coord  y-coord           x-coord  x-coord    Moment
                   (ft)     (ft)      (ft)     (ft)     (ft)     (ft-lb)

  1.    2.314    450.07  1999.38  1563.10   160.00  1324.64  4.561E+09
  2.    2.327    268.39  2636.89  2202.78    71.11  1325.03  5.659E+09
  3.    2.339    363.46  2388.60  1935.89   160.00  1316.85  4.462E+09
  4.    2.357    362.29  2304.57  1861.13   126.67  1310.92  4.694E+09
  5.    2.363    343.08  2363.73  1915.13   137.78  1296.68  4.368E+09
  6.    2.364    363.85  2281.34  1846.89    93.33  1324.40  5.209E+09
  7.    2.377    376.61  2101.33  1663.84   115.56  1276.71  4.222E+09
  8.    2.384    307.70  2504.60  2068.05    82.22  1324.81  5.499E+09
  9.    2.388    322.39  2453.35  2008.62   104.44  1308.44  4.837E+09
 10.    2.393    314.16  2522.25  2079.64    93.33  1323.27  5.245E+09

                     * * *  END OF FILE  * * *
```

3-2E 3-07-12 13:39

CAMELOT LF – FINAL COVER SEC 3-2E
10 most critical surfaces, MINIMUM BISHOP FOS = 3.322



```
XSTABL File: 3-2E       3-07-12   13:39

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *               using the               *
          *            Method of Slices           *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 3-2E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)    Below Segment

       1           .0      450.9        21.0      448.1          1
       2         21.0      448.1        56.0      438.1          1
       3         56.0      438.1        62.0      438.1          1
       4         62.0      438.1        92.0      454.1          1
       5         92.0      454.1       112.0      458.1          1
       6        112.0      458.1       116.3      458.1          1
       7        116.3      458.1       119.3      458.1          8
       8        119.3      458.1       123.8      458.1          1
       9        123.8      458.1       141.0      460.0          7
      10        141.0      460.0       183.6      467.7          7
      11        183.6      467.7       196.5      470.0          5
      12        196.5      470.0       343.4      496.0          5
      13        343.4      496.0       443.7      500.0          5
      14        443.7      500.0      1247.7      701.0          5
      15       1247.7      701.0      1347.7      705.0          5

       45 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)    Below Segment

       1        183.6      467.7       203.5      467.7          7
       2        203.5      467.7       343.8      492.5          4
```

```
    3        343.8     492.5      444.2     496.5          4
    4        444.2     496.5      470.1     503.0          4
    5        470.1     503.0      478.1     505.0          6
    6        478.1     505.0     1248.2     697.5          4
    7       1248.2     697.5     1347.7     701.5          4
    8        478.1     505.0      479.1     505.0          6
    9        479.1     505.0      497.9     498.8          6
   10        497.9     498.8      513.3     503.9          6
   11        513.3     503.9      555.5     507.0          6
   12        555.5     507.0      619.8     512.0          6
   13        619.8     512.0      744.8     517.0          6
   14        744.8     517.0      833.4     519.8          6
   15        833.4     519.8      990.9     517.0          6
   16        990.9     517.0     1347.7     514.0          6
   17        470.1     503.0      478.8     503.0          4
   18        478.8     503.0      497.9     496.7          4
   19        497.9     496.7      513.7     501.9          4
   20        513.7     501.9      555.7     505.0          4
   21        555.7     505.0      619.9     510.0          4
   22        619.9     510.0      744.9     515.0          4
   23        744.9     515.0      833.4     517.8          4
   24        833.4     517.8      990.9     515.0          4
   25        990.9     515.0     1347.7     512.0          4
   26        203.5     467.7      232.2     458.1          7
   27        232.2     458.1      295.5     437.0          1
   28        295.5     437.0      308.1     432.8          2
   29        308.1     432.8      316.0     433.0          3
   30        316.0     433.0      496.8     436.0          3
   31        496.8     436.0      802.4     437.0          3
   32        802.4     437.0     1206.5     439.0          3
   33       1206.5     439.0     1347.7     440.0          3
   34        123.8     458.1      232.2     458.1          1
   35        116.3     458.1      116.4     437.0          1
   36           .0     437.0      116.4     437.0          2
   37        119.3     460.0      119.4     437.0          8
   38        119.4     437.0      295.5     437.0          2
   39        116.4     437.0      116.5     432.8          2
   40           .0     432.8      116.5     432.8          3
   41        119.4     437.0      119.5     432.8          8
   42        119.5     432.8      308.1     432.8          3
   43        116.5     432.8      116.6     429.8          3
   44        119.5     432.8      119.6     432.8          3
   45        116.6     429.8      119.6     429.8          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure     Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.

  1   127.0   131.0    854.0     11.00     .000         .0       1
  2   132.0   135.0    488.0     16.40     .000         .0       1
```

```
  3   130.0   135.0   5000.0      .00      .000        .0      0
  4    65.0    65.0    288.0    23.00      .000        .0      0
  5   115.0   120.0    100.0    16.00      .000        .0      0
  6   115.0   120.0    100.0    16.00      .000        .0      0
  7   115.0   120.0   1074.0    13.10      .000        .0      0
  8    75.0    75.0       .0     5.00      .000        .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  6 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point        x-water      y-water
   No.          (ft)         (ft)

    1              .00       440.00
    2            49.40       440.00
    3            56.00       438.10
    4            62.00       438.10
    5            65.60       440.00
    6           116.40       440.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     60.0 ft
                             and  x =    100.0 ft


Each surface terminates between   x =    170.0 ft
                            and   x =    200.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   10.0 ft line segments define each trial failure surface.


---------------------
```

```
    ANGULAR RESTRICTIONS
    --------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=  (slope angle - 5.0) degrees



************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 14 coordinate points

           Point      x-surf      y-surf
            No.        (ft)        (ft)

             1         60.00      438.10
             2         69.70      435.65
             3         79.56      434.02
             4         89.53      433.21
             5         99.53      433.23
             6        109.49      434.08
             7        119.35      435.76
             8        129.03      438.25
             9        138.48      441.54
            10        147.62      445.60
            11        156.39      450.41
            12        164.73      455.93
            13        172.58      462.12
            14        177.35      466.57

    ****  Simplified BISHOP FOS =   3.322  ****
```

```
*********************************************************************
**                                                                 **
**  Out of the    100 surfaces generated and analyzed by XSTABL,  **
**        6 surfaces were found to have MISLEADING FOS values.    **
**                                                                 **
*********************************************************************



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 3-2E

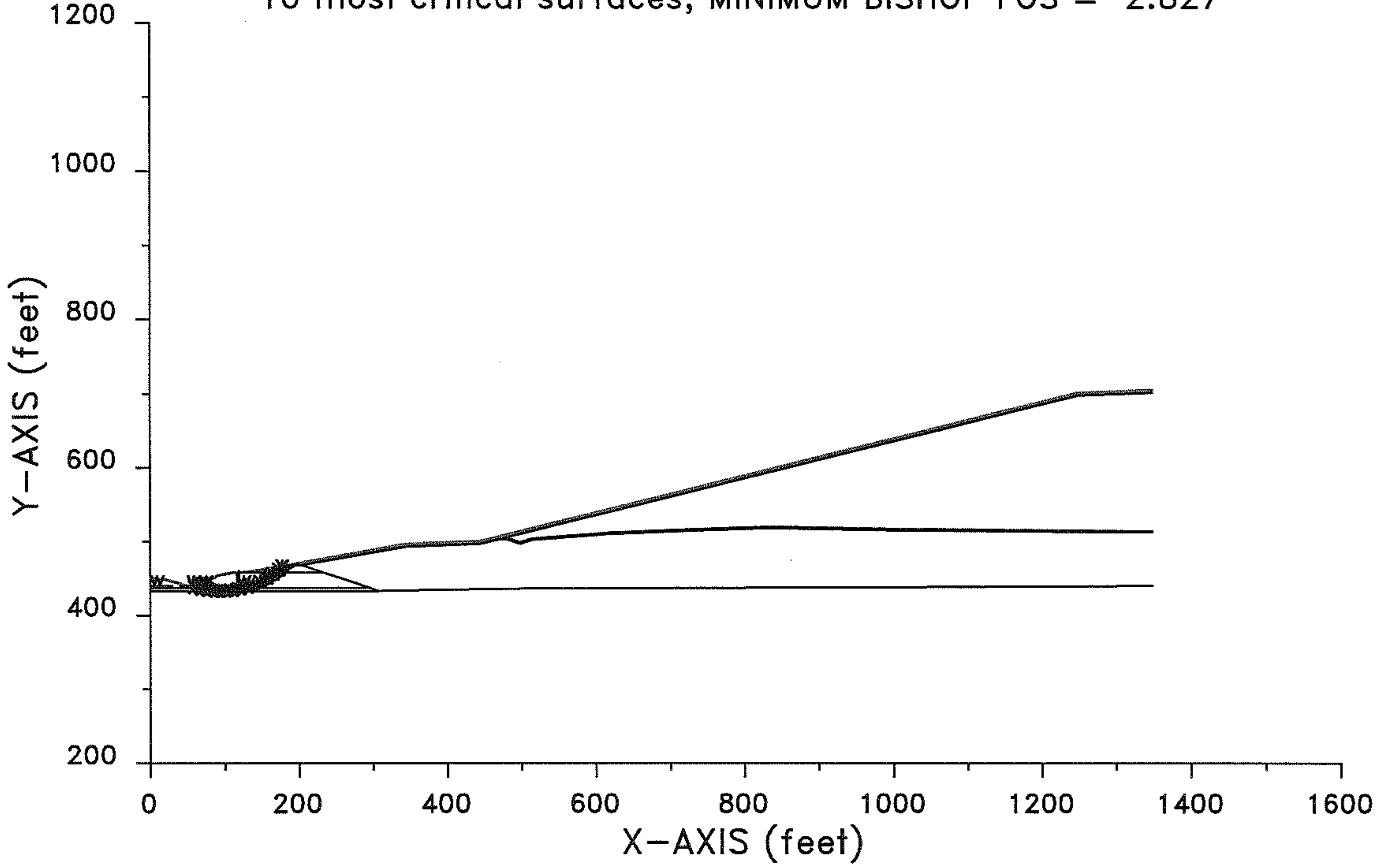
      FOS      Circle Center    Radius   Initial Terminal  Resisting
    (BISHOP)  x-coord  y-coord           x-coord  x-coord    Moment
                (ft)     (ft)     (ft)     (ft)     (ft)     (ft-lb)

 1.   3.322    94.27   553.34   120.22    60.00   177.35  1.644E+07
 2.   3.500    92.75   600.87   166.03    60.00   194.34  2.545E+07
 3.   3.572    87.78   576.05   140.72    60.00   175.70  1.824E+07
 4.   4.463   118.00   525.50    92.81    73.33   191.64  1.551E+07
 5.   4.494   100.51   588.39   149.99    68.89   191.39  2.195E+07
 6.   4.663    96.43   628.30   188.55    68.89   199.59  2.840E+07
 7.   4.684   109.46   526.93    94.33    68.89   182.55  1.662E+07
 8.   4.704    96.90   582.53   143.51    68.89   182.76  1.941E+07
 9.   4.835    71.91   701.16   261.86    64.44   194.00  3.760E+07
10.   4.906   121.09   545.08   107.66    77.78   198.54  1.662E+07

                   * * *  END OF FILE  * * *
```

3-2T 3-07-12 13:41

CAMELOT LF – FINAL COVER SEC 3-2T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.827



```
XSTABL File: 3-2T       3-07-12   13:41

             *******************************************
             *              X S T A B L                *
             *                                         *
             *        Slope Stability Analysis         *
             *                using the                *
             *            Method of Slices             *
             *                                         *
             *        Copyright (C) 1992 - 2008        *
             *   Interactive Software Designs, Inc.    *
             *        Moscow, ID 83843, U.S.A.         *
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             *          All Rights Reserved            *
             *                                         *
             *  Ver. 5.208                 96 - 2046   *
             *******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 3-2T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1          .0     450.9       21.0     448.1         1
        2        21.0     448.1       56.0     438.1         1
        3        56.0     438.1       62.0     438.1         1
        4        62.0     438.1       92.0     454.1         1
        5        92.0     454.1      112.0     458.1         1
        6       112.0     458.1      116.3     458.1         1
        7       116.3     458.1      119.3     458.1         8
        8       119.3     458.1      123.8     458.1         1
        9       123.8     458.1      141.0     460.0         7
       10       141.0     460.0      183.6     467.7         7
       11       183.6     467.7      196.5     470.0         5
       12       196.5     470.0      343.4     496.0         5
       13       343.4     496.0      443.7     500.0         5
       14       443.7     500.0     1247.7     701.0         5
       15      1247.7     701.0     1347.7     705.0         5

       45 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1       183.6     467.7      203.5     467.7         7
        2       203.5     467.7      343.8     492.5         4
```

```
     3        343.8      492.5      444.2      496.5           4
     4        444.2      496.5      470.1      503.0           4
     5        470.1      503.0      478.1      505.0           6
     6        478.1      505.0     1248.2      697.5           4
     7       1248.2      697.5     1347.7      701.5           4
     8        478.1      505.0      479.1      505.0           6
     9        479.1      505.0      497.9      498.8           6
    10        497.9      498.8      513.3      503.9           6
    11        513.3      503.9      555.5      507.0           6
    12        555.5      507.0      619.8      512.0           6
    13        619.8      512.0      744.8      517.0           6
    14        744.8      517.0      833.4      519.8           6
    15        833.4      519.8      990.9      517.0           6
    16        990.9      517.0     1347.7      514.0           6
    17        470.1      503.0      478.8      503.0           4
    18        478.8      503.0      497.9      496.7           4
    19        497.9      496.7      513.7      501.9           4
    20        513.7      501.9      555.7      505.0           4
    21        555.7      505.0      619.9      510.0           4
    22        619.9      510.0      744.9      515.0           4
    23        744.9      515.0      833.4      517.8           4
    24        833.4      517.8      990.9      515.0           4
    25        990.9      515.0     1347.7      512.0           4
    26        203.5      467.7      232.2      458.1           7
    27        232.2      458.1      295.5      437.0           1
    28        295.5      437.0      308.1      432.8           2
    29        308.1      432.8      316.0      433.0           3
    30        316.0      433.0      496.8      436.0           3
    31        496.8      436.0      802.4      437.0           3
    32        802.4      437.0     1206.5      439.0           3
    33       1206.5      439.0     1347.7      440.0           3
    34        123.8      458.1      232.2      458.1           1
    35        116.3      458.1      116.4      437.0           1
    36           .0      437.0      116.4      437.0           2
    37        119.3      460.0      119.4      437.0           8
    38        119.4      437.0      295.5      437.0           2
    39        116.4      437.0      116.5      432.8           2
    40           .0      432.8      116.5      432.8           3
    41        119.4      437.0      119.5      432.8           8
    42        119.5      432.8      308.1      432.8           3
    43        116.5      432.8      116.6      429.8           3
    44        119.5      432.8      119.6      432.8           3
    45        116.6      429.8      119.6      429.8           3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     788.0    11.50     .000         .0       1
  2   132.0   135.0     470.0     8.30     .000         .0       1
```

```
    3   130.0   135.0    5000.0      .00      .000        .0      0
    4    65.0    65.0     288.0    23.00      .000        .0      0
    5   115.0   120.0     100.0    16.00      .000        .0      0
    6   115.0   120.0     100.0    16.00      .000        .0      0
    7   115.0   120.0     834.0    16.00      .000        .0      0
    8    75.0    75.0        .0     5.00      .000        .0      0


  ----------------------------------------------------------------------
----
   UNDRAINED STRENGTHS as a function of effective vertical stress
                       have been specified for  3 Soil Unit(s)
  ----------------------------------------------------------------------
----

             Soil Unit #      Parameter a     Parameter Psi

                  1.              788.0          11.50
                  2.              470.0           8.30
                  7.              834.0          16.00


   1 Water surface(s) have been specified

  Unit weight of water =    62.40  (pcf)


  Water Surface No.  1 specified by  6 coordinate points

  **********************************
           PHREATIC SURFACE,
  **********************************

    Point       x-water     y-water
     No.         (ft)        (ft)

      1            .00      440.00
      2          49.40      440.00
      3          56.00      438.10
      4          62.00      438.10
      5          65.60      440.00
      6         116.40      440.00


  A critical failure surface searching method, using a random
  technique for generating CIRCULAR surfaces has been specified.


    100 trial surfaces will be generated and analyzed.


    10 Surfaces initiate from each of  10 points equally spaced
  along the ground surface between  x =     60.0 ft
                                   and  x =    100.0 ft
```

```
    Each surface terminates between   x =    170.0 ft
                                and   x =    200.0 ft


    Unless further limitations were imposed, the minimum elevation
    at which a surface extends is  y =       .0 ft


       10.0 ft line segments define each trial failure surface.



    ---------------------
    ANGULAR RESTRICTIONS
    ---------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=  (slope angle - 5.0) degrees



************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 14 coordinate points

           Point      x-surf      y-surf
            No.        (ft)        (ft)

             1        60.00      438.10
             2        69.70      435.65
             3        79.56      434.02
             4        89.53      433.21
             5        99.53      433.23
```

```
         6          109.49        434.08
         7          119.35        435.76
         8          129.03        438.25
         9          138.48        441.54
        10          147.62        445.60
        11          156.39        450.41
        12          164.73        455.93
        13          172.58        462.12
        14          177.35        466.57


****   Simplified BISHOP FOS =    2.827   ****



**********************************************************************
**                                                                  **
**  Out of the     100 surfaces generated and analyzed by XSTABL,   **
**         6 surfaces were found to have MISLEADING FOS values.     **
**                                                                  **
**********************************************************************




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 3-2T

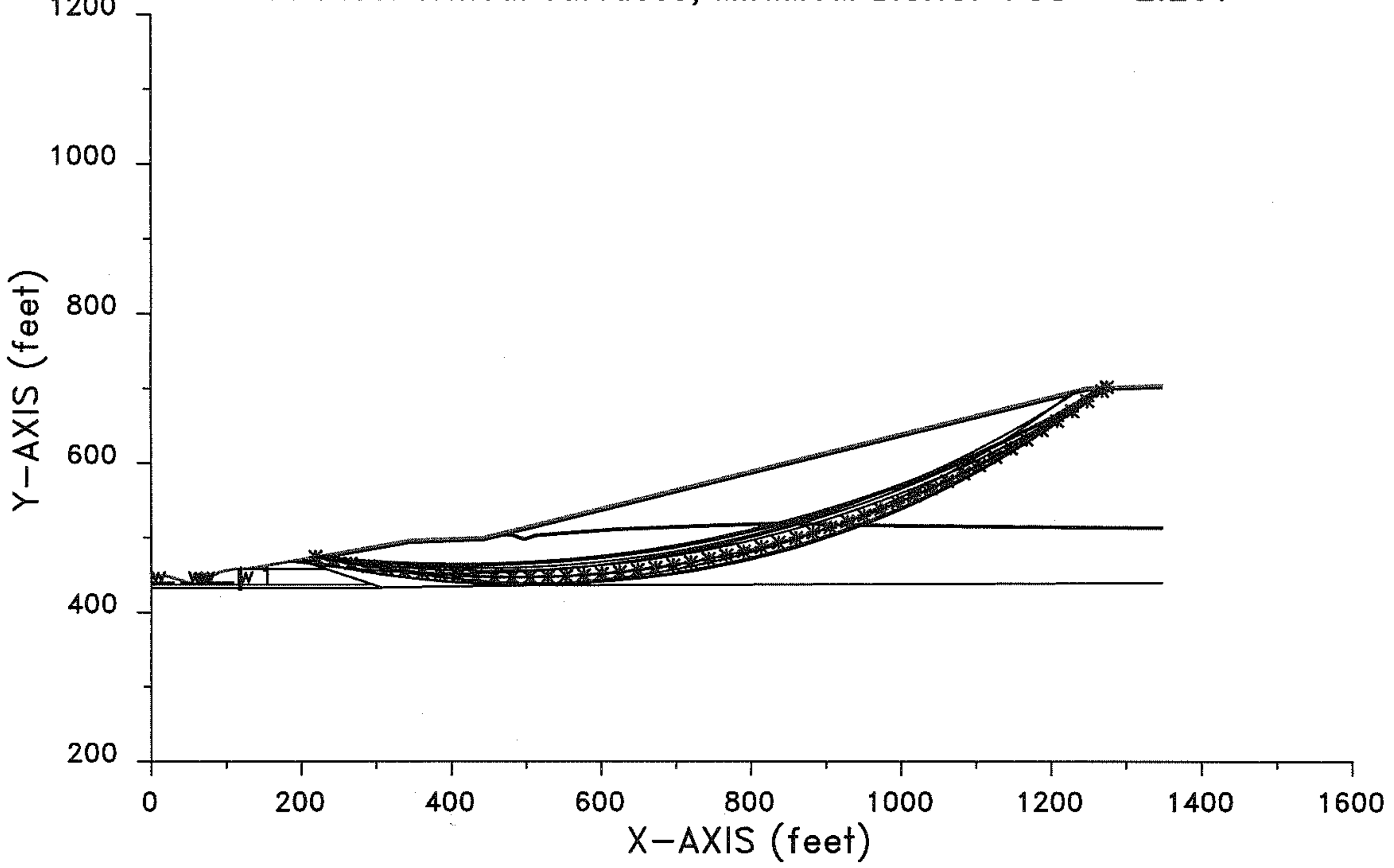
        FOS       Circle Center      Radius   Initial  Terminal  Resisting
      (BISHOP)   x-coord   y-coord             x-coord  x-coord    Moment
                   (ft)      (ft)       (ft)     (ft)     (ft)     (ft-lb)

  1.    2.827      94.27    553.34    120.22     60.00   177.35  1.399E+07
  2.    3.066      92.75    600.87    166.03     60.00   194.34  2.230E+07
  3.    3.146      87.78    576.05    140.72     60.00   175.70  1.607E+07
  4.    3.776     118.00    525.50     92.81     73.33   191.64  1.312E+07
  5.    4.098     109.46    526.93     94.33     68.89   182.55  1.454E+07
  6.    4.263     100.51    588.39    149.99     68.89   191.39  2.083E+07
  7.    4.408      96.43    628.30    188.55     68.89   199.59  2.685E+07
  8.    4.427     116.76    498.55     65.02     77.78   172.86  7.108E+06
  9.    4.444      96.90    582.53    143.51     68.89   182.76  1.834E+07
 10.    4.477     118.51    515.52     80.13     77.78   182.49  9.773E+06

                      * * *  END OF FILE  * * *
```

3-3E 3-07-12 13:44

CAMELOT LF - FINAL COVER SEC 3-3E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.261



```
XSTABL File: 3-3E       3-07-12   13:44

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


   Problem Description : CAMELOT LF - FINAL COVER SEC 3-3E



   -----------------------------
   SEGMENT BOUNDARY COORDINATES
   -----------------------------

      15 SURFACE boundary segments

   Segment     x-left     y-left     x-right    y-right     Soil Unit
     No.        (ft)       (ft)       (ft)       (ft)     Below Segment

      1           .0       450.9       21.0      448.1           1
      2         21.0       448.1       56.0      438.1           1
      3         56.0       438.1       62.0      438.1           1
      4         62.0       438.1       92.0      454.1           1
      5         92.0       454.1      112.0      458.1           1
      6        112.0       458.1      116.3      458.1           1
      7        116.3       458.1      119.3      458.1           8
      8        119.3       458.1      123.8      458.1           1
      9        123.8       458.1      141.0      460.0           7
     10        141.0       460.0      183.6      467.7           7
     11        183.6       467.7      196.5      470.0           5
     12        196.5       470.0      343.4      496.0           5
     13        343.4       496.0      443.7      500.0           5
     14        443.7       500.0     1247.7      701.0           5
     15       1247.7       701.0     1347.7      705.0           5

      45 SUBSURFACE boundary segments

   Segment     x-left     y-left     x-right    y-right     Soil Unit
     No.        (ft)       (ft)       (ft)       (ft)     Below Segment

      1        183.6       467.7      203.5      467.7           7
      2        203.5       467.7      343.8      492.5           4
```

```
     3        343.8      492.5      444.2      496.5         4
     4        444.2      496.5      470.1      503.0         4
     5        470.1      503.0      478.1      505.0         6
     6        478.1      505.0     1248.2      697.5         4
     7       1248.2      697.5     1347.7      701.5         4
     8        478.1      505.0      479.1      505.0         6
     9        479.1      505.0      497.9      498.8         6
    10        497.9      498.8      513.3      503.9         6
    11        513.3      503.9      555.5      507.0         6
    12        555.5      507.0      619.8      512.0         6
    13        619.8      512.0      744.8      517.0         6
    14        744.8      517.0      833.4      519.8         6
    15        833.4      519.8      990.9      517.0         6
    16        990.9      517.0     1347.7      514.0         6
    17        470.1      503.0      478.8      503.0         4
    18        478.8      503.0      497.9      496.7         4
    19        497.9      496.7      513.7      501.9         4
    20        513.7      501.9      555.7      505.0         4
    21        555.7      505.0      619.9      510.0         4
    22        619.9      510.0      744.9      515.0         4
    23        744.9      515.0      833.4      517.8         4
    24        833.4      517.8      990.9      515.0         4
    25        990.9      515.0     1347.7      512.0         4
    26        203.5      467.7      232.2      458.1         7
    27        232.2      458.1      295.5      437.0         1
    28        295.5      437.0      308.1      432.8         2
    29        308.1      432.8      316.0      433.0         3
    30        316.0      433.0      496.8      436.0         3
    31        496.8      436.0      802.4      437.0         3
    32        802.4      437.0     1206.5      439.0         3
    33       1206.5      439.0     1347.7      440.0         3
    34        123.8      458.1      232.2      458.1         1
    35        116.3      458.1      116.4      437.0         1
    36           .0      437.0      116.4      437.0         2
    37        119.3      460.0      119.4      437.0         8
    38        119.4      437.0      295.5      437.0         2
    39        116.4      437.0      116.5      432.8         2
    40           .0      432.8      116.5      432.8         3
    41        119.4      437.0      119.5      432.8         8
    42        119.5      432.8      308.1      432.8         3
    43        116.5      432.8      116.6      429.8         3
    44        119.5      432.8      119.6      432.8         3
    45        116.6      429.8      119.6      429.8         3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00      .000        .0       1
  2   132.0   135.0     488.0    16.40      .000        .0       1
```

```
  3   130.0    135.0     5000.0       .00       .000          .0       0
  4    65.0     65.0      288.0     23.00       .000          .0       0
  5   115.0    120.0      100.0     16.00       .000          .0       0
  6   115.0    120.0      100.0     16.00       .000          .0       0
  7   115.0    120.0     1074.0     13.10       .000          .0       0
  8    75.0     75.0         .0      5.00       .000          .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  6 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.         (ft)        (ft)

    1            .00      440.00
    2          49.40      440.00
    3          56.00      438.10
    4          62.00      438.10
    5          65.60      440.00
    6         116.40      440.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =    180.0 ft
                             and  x =    230.0 ft


Each surface terminates between   x =   1225.0 ft
                            and   x =   1275.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   24.0 ft line segments define each trial failure surface.
```

```
---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 48 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         218.89       473.96
          2         242.45       469.37
          3         266.08       465.20
          4         289.79       461.45
          5         313.56       458.13
          6         337.38       455.23
          7         361.25       452.76
          8         385.16       450.72
          9         409.11       449.10
         10         433.08       447.92
         11         457.07       447.16
         12         481.07       446.83
         13         505.07       446.93
         14         529.06       447.46
         15         553.04       448.42
         16         577.00       449.80
         17         600.93       451.62
         18         624.83       453.86
         19         648.68       456.53
         20         672.48       459.62
         21         696.22       463.14
         22         719.89       467.08
         23         743.49       471.45
         24         767.01       476.24
         25         790.44       481.44
         26         813.77       487.07
         27         837.00       493.11
         28         860.11       499.57
         29         883.11       506.43
```

```
          30          905.98        513.71
          31          928.72        521.40
          32          951.31        529.49
          33          973.76        537.98
          34          996.05        546.87
          35         1018.18        556.16
          36         1040.14        565.85
          37         1061.92        575.93
          38         1083.52        586.39
          39         1104.93        597.24
          40         1126.14        608.47
          41         1147.15        620.07
          42         1167.94        632.05
          43         1188.52        644.40
          44         1208.87        657.12
          45         1229.00        670.20
          46         1248.89        683.63
          47         1268.53        697.42
          48         1274.93        702.09

 ****  Simplified BISHOP FOS =   2.261  ****



 The following is a summary of the TEN most critical surfaces

 Problem Description : CAMELOT LF - FINAL COVER SEC 3-3E

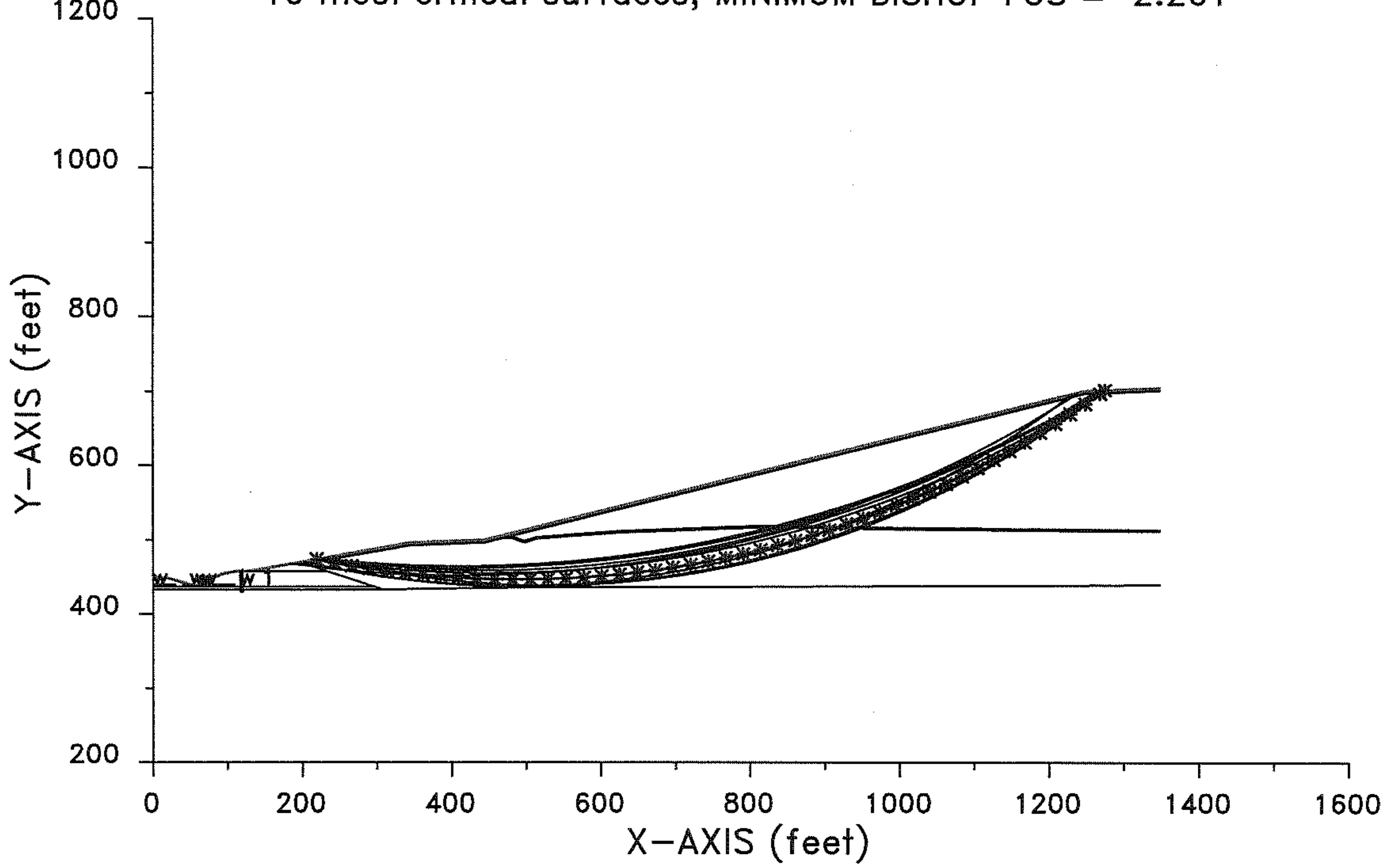
         FOS      Circle Center     Radius   Initial Terminal  Resisting
       (BISHOP)  x-coord  y-coord            x-coord  x-coord    Moment
                   (ft)     (ft)      (ft)     (ft)     (ft)     (ft-lb)

  1.    2.261    487.50  1789.21  1342.40   218.89  1274.93  3.266E+09
  2.    2.263    488.15  1773.40  1327.04   218.89  1271.02  3.220E+09
  3.    2.264    525.49  1626.92  1188.31   230.00  1271.51  3.168E+09
  4.    2.265    453.18  1947.43  1491.98   218.89  1274.81  3.240E+09
  5.    2.274    496.31  1711.63  1275.00   202.22  1274.95  3.436E+09
  6.    2.280    415.34  2120.58  1658.29   218.89  1274.18  3.221E+09
  7.    2.283    409.10  2150.61  1685.80   224.44  1271.17  3.132E+09
  8.    2.288    447.79  1885.61  1426.41   230.00  1239.08  2.745E+09
  9.    2.303    483.02  1647.69  1209.72   202.22  1230.69  2.957E+09
 10.    2.317    410.82  2040.08  1588.09   185.56  1265.66  3.433E+09

                        * * *  END OF FILE  * * *
```

3-3T 3-07-12 13:47

CAMELOT LF – FINAL COVER SEC 3-3T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.261



```
XSTABL File: 3-3T       3-07-12   13:47

          *****************************************
          *             X S T A B L               *
          *                                       *
          *       Slope Stability Analysis        *
          *             using the                 *
          *          Method of Slices             *
          *                                       *
          *       Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.  *
          *       Moscow, ID 83843, U.S.A.        *
          *                                       *
          *         All Rights Reserved           *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 3-3T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

      1           .0       450.9        21.0      448.1          1
      2          21.0      448.1        56.0      438.1          1
      3          56.0      438.1        62.0      438.1          1
      4          62.0      438.1        92.0      454.1          1
      5          92.0      454.1       112.0      458.1          1
      6         112.0      458.1       116.3      458.1          1
      7         116.3      458.1       119.3      458.1          8
      8         119.3      458.1       123.8      458.1          1
      9         123.8      458.1       141.0      460.0          7
     10         141.0      460.0       183.6      467.7          7
     11         183.6      467.7       196.5      470.0          5
     12         196.5      470.0       343.4      496.0          5
     13         343.4      496.0       443.7      500.0          5
     14         443.7      500.0      1247.7      701.0          5
     15        1247.7      701.0      1347.7      705.0          5

       45 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

      1         183.6      467.7       203.5      467.7          7
      2         203.5      467.7       343.8      492.5          4
```

```
    3         343.8       492.5       444.2       496.5            4
    4         444.2       496.5       470.1       503.0            4
    5         470.1       503.0       478.1       505.0            6
    6         478.1       505.0      1248.2       697.5            4
    7        1248.2       697.5      1347.7       701.5            4
    8         478.1       505.0       479.1       505.0            6
    9         479.1       505.0       497.9       498.8            6
   10         497.9       498.8       513.3       503.9            6
   11         513.3       503.9       555.5       507.0            6
   12         555.5       507.0       619.8       512.0            6
   13         619.8       512.0       744.8       517.0            6
   14         744.8       517.0       833.4       519.8            6
   15         833.4       519.8       990.9       517.0            6
   16         990.9       517.0      1347.7       514.0            6
   17         470.1       503.0       478.8       503.0            4
   18         478.8       503.0       497.9       496.7            4
   19         497.9       496.7       513.7       501.9            4
   20         513.7       501.9       555.7       505.0            4
   21         555.7       505.0       619.9       510.0            4
   22         619.9       510.0       744.9       515.0            4
   23         744.9       515.0       833.4       517.8            4
   24         833.4       517.8       990.9       515.0            4
   25         990.9       515.0      1347.7       512.0            4
   26         203.5       467.7       232.2       458.1            7
   27         232.2       458.1       295.5       437.0            1
   28         295.5       437.0       308.1       432.8            2
   29         308.1       432.8       316.0       433.0            3
   30         316.0       433.0       496.8       436.0            3
   31         496.8       436.0       802.4       437.0            3
   32         802.4       437.0      1206.5       439.0            3
   33        1206.5       439.0      1347.7       440.0            3
   34         123.8       458.1       232.2       458.1            1
   35         116.3       458.1       116.4       437.0            1
   36            .0       437.0       116.4       437.0            2
   37         119.3       460.0       119.4       437.0            8
   38         119.4       437.0       295.5       437.0            2
   39         116.4       437.0       116.5       432.8            2
   40            .0       432.8       116.5       432.8            3
   41         119.4       437.0       119.5       432.8            8
   42         119.5       432.8       308.1       432.8            3
   43         116.5       432.8       116.6       429.8            3
   44         119.5       432.8       119.6       432.8            3
   45         116.6       429.8       119.6       429.8            3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight    Cohesion  Friction    Pore Pressure       Water
Unit  Moist    Sat.  Intercept   Angle   Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)       Ru       (psf)      No.

  1   127.0   131.0     788.0    11.50      .000         .0        1
  2   132.0   135.0     470.0     8.30      .000         .0        1
```

```
   3   130.0   135.0    5000.0      .00       .000         .0      0
   4    65.0    65.0     288.0    23.00       .000         .0      0
   5   115.0   120.0     100.0    16.00       .000         .0      0
   6   115.0   120.0     100.0    16.00       .000         .0      0
   7   115.0   120.0     834.0    16.00       .000         .0      0
   8    75.0    75.0        .0     5.00       .000         .0      0


----------------------------------------------------------------------
----

 UNDRAINED STRENGTHS as a function of effective vertical stress
                     have been specified for  3 Soil Unit(s)
----------------------------------------------------------------------
----


          Soil Unit #      Parameter a     Parameter Psi

               1.              788.0          11.50
               2.              470.0           8.30
               7.              834.0          16.00



 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  6 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point      x-water      y-water
   No.         (ft)         (ft)

    1           .00       440.00
    2         49.40       440.00
    3         56.00       438.10
    4         62.00       438.10
    5         65.60       440.00
    6        116.40       440.00



A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =    180.0 ft
                             and  x =    230.0 ft
```

```
Each surface terminates between   x =   1225.0 ft
                            and   x =   1275.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   24.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 48 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1        218.89       473.96
         2        242.45       469.37
         3        266.08       465.20
         4        289.79       461.45
         5        313.56       458.13
         6        337.38       455.23
         7        361.25       452.76
         8        385.16       450.72
         9        409.11       449.10
        10        433.08       447.92
        11        457.07       447.16
        12        481.07       446.83
        13        505.07       446.93
        14        529.06       447.46
        15        553.04       448.42
        16        577.00       449.80
        17        600.93       451.62
```

```
          18        624.83      453.86
          19        648.68      456.53
          20        672.48      459.62
          21        696.22      463.14
          22        719.89      467.08
          23        743.49      471.45
          24        767.01      476.24
          25        790.44      481.44
          26        813.77      487.07
          27        837.00      493.11
          28        860.11      499.57
          29        883.11      506.43
          30        905.98      513.71
          31        928.72      521.40
          32        951.31      529.49
          33        973.76      537.98
          34        996.05      546.87
          35       1018.18      556.16
          36       1040.14      565.85
          37       1061.92      575.93
          38       1083.52      586.39
          39       1104.93      597.24
          40       1126.14      608.47
          41       1147.15      620.07
          42       1167.94      632.05
          43       1188.52      644.40
          44       1208.87      657.12
          45       1229.00      670.20
          46       1248.89      683.63
          47       1268.53      697.42
          48       1274.93      702.09

****  Simplified BISHOP FOS =   2.261  ****


The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 3-3T

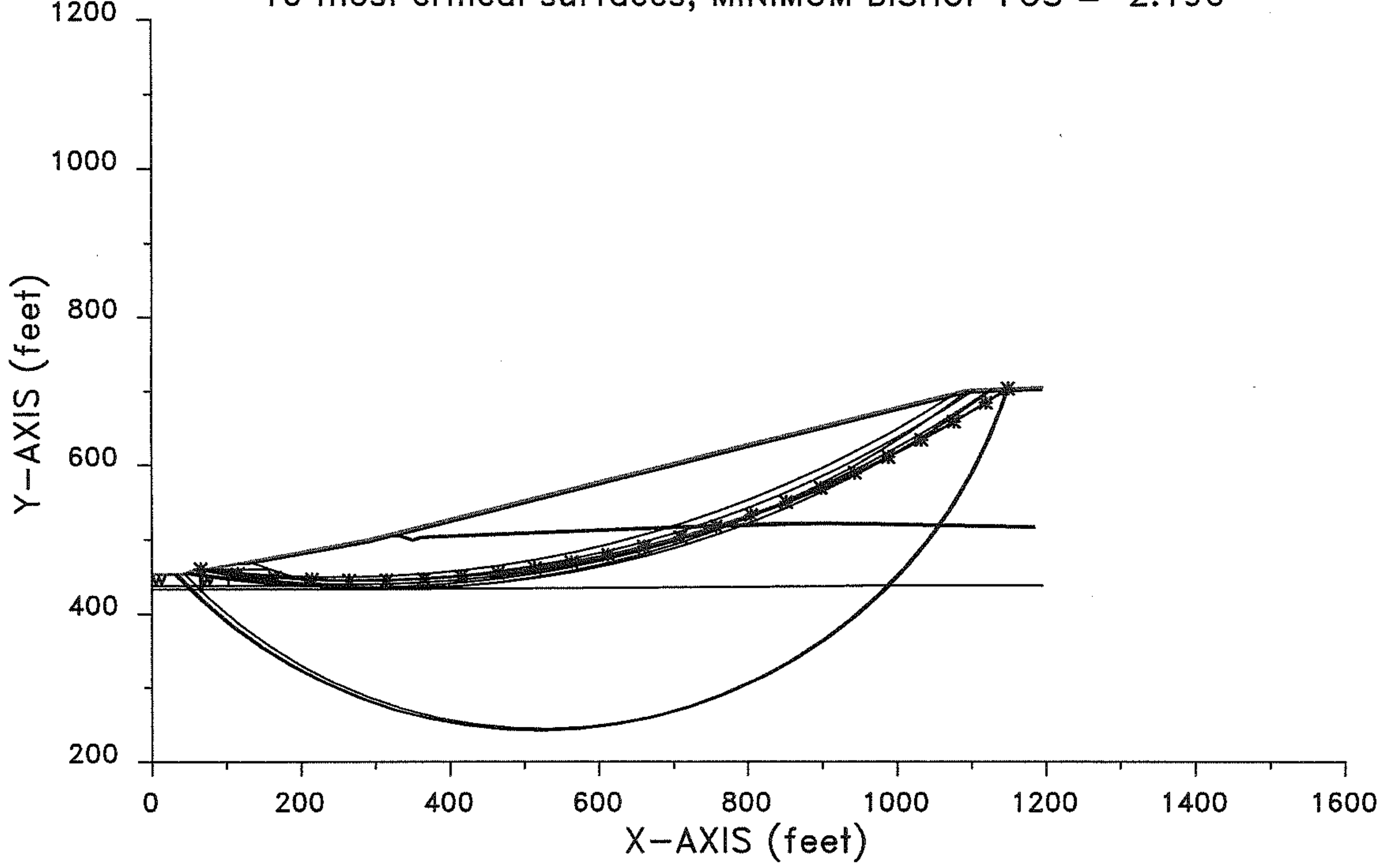
      FOS      Circle Center    Radius   Initial Terminal  Resisting
    (BISHOP)  x-coord  y-coord           x-coord  x-coord    Moment
               (ft)     (ft)     (ft)     (ft)     (ft)     (ft-lb)

 1.   2.261   487.50  1789.21  1342.40   218.89  1274.93  3.266E+09
 2.   2.263   488.15  1773.40  1327.04   218.89  1271.02  3.220E+09
 3.   2.264   525.49  1626.92  1188.31   230.00  1271.51  3.168E+09
 4.   2.265   453.18  1947.43  1491.98   218.89  1274.81  3.240E+09
 5.   2.274   496.31  1711.63  1275.00   202.22  1274.95  3.436E+09
 6.   2.280   415.34  2120.58  1658.29   218.89  1274.18  3.221E+09
 7.   2.283   409.10  2150.61  1685.80   224.44  1271.17  3.132E+09
 8.   2.288   447.79  1885.61  1426.41   230.00  1239.08  2.745E+09
 9.   2.303   483.02  1647.69  1209.72   202.22  1230.69  2.957E+09
10.   2.310   410.82  2040.08  1588.09   185.56  1265.66  3.423E+09


                   * * *  END OF FILE  * * *
```

4-1E 10-10-11 40:20

CAMELOT LF – FINAL COVER SEC 4-1E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.196



```
XSTABL File: 4-1E      10-10-11   40:20

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 4-1E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)    Below Segment

        1          .0      453.3        40.0      453.3          1
        2        40.0      453.3        59.9      460.0          1
        3        59.9      460.0        64.5      460.0          1
        4        64.5      460.0        67.5      460.0          8
        5        67.5      460.0        73.3      460.0          1
        6        73.3      460.0       116.6      467.7          7
        7       116.6      467.7       129.4      470.0          5
        8       129.4      470.0       291.1      500.0          5
        9       291.1      500.0      1095.1      701.0          5
       10      1095.1      701.0      1195.1      705.0          5


       43 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)    Below Segment

        1       116.6      467.7       132.3      467.7          7
        2       132.3      467.7       291.8      496.6          4
        3       291.8      496.6       322.3      504.2          4
        4       322.3      504.2       330.3      506.2          6
        5       330.3      506.2      1095.6      697.5          4
        6      1095.6      697.5      1195.1      701.5          4
        7       330.3      506.2       332.6      506.2          6
```

```
   8        332.6      506.2       350.1      500.3            6
   9        350.1      500.3       361.5      504.1            6
  10        361.5      504.1       434.5      507.0            6
  11        434.5      507.0       684.5      517.0            6
  12        684.5      517.0       851.2      523.0            6
  13        851.2      523.0       901.3      523.0            6
  14        901.3      523.0       979.0      522.0            6
  15        979.0      522.0      1184.6      518.0            6
  16        322.3      504.2       332.3      504.2            4
  17        332.3      504.2       350.1      498.2            4
  18        350.1      498.2       361.9      502.1            4
  19        361.9      502.1       434.6      505.0            4
  20        434.6      505.0       684.6      515.0            4
  21        684.6      515.0       851.3      520.0            4
  22        851.3      520.0       901.3      521.0            4
  23        901.3      521.0       979.0      520.0            4
  24        979.0      520.0      1184.6      516.0            4
  25        136.3      467.7       159.4      460.0            7
  26        159.4      460.0       225.4      438.0            1
  27        225.4      438.0       239.5      433.3            2
  28        239.5      433.3       579.8      435.0            3
  29        579.8      435.0       879.3      437.0            3
  30        879.3      437.0      1005.0      439.0            3
  31       1005.0      439.0      1195.1      438.0            3
  32         73.3      460.0       159.4      460.0            1
  33         64.5      460.0        64.6      438.0            1
  34           .0      438.0        64.6      438.0            2
  35         67.5      460.0        67.6      438.0            8
  36         67.6      438.0       225.4      438.0            2
  37         64.6      438.0        64.7      433.3            2
  38           .0      433.3        64.7      433.2            3
  39         67.6      438.0        67.7      433.3            8
  40         67.7      433.3       239.5      433.3            3
  41         64.7      433.3        64.8      430.3            3
  42         67.7      433.3        67.8      430.3            8
  43         64.8      430.3        67.8      430.3            3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)     Ru        (psf)      No.

  1   127.0   131.0    854.0     11.00     .000         .0       0
  2   132.0   135.0    488.0     16.40     .000         .0       1
  3   130.0   135.0   5000.0       .00     .000         .0       0
  4    65.0    65.0    288.0     23.00     .000         .0       0
  5   115.0   120.0    100.0     16.00     .000         .0       0
  6   115.0   120.0    100.0     16.00     .000         .0       0
  7   115.0   120.0   1074.0     13.10     .000         .0       0
  8    75.0    75.0       .0      5.00     .000         .0       0
```

```
 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1            .00      438.00
    2          64.50      438.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     30.0 ft
                             and  x =     70.0 ft


Each surface terminates between   x =   1050.0 ft
                            and   x =   1150.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   50.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees
```

```
*************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
*************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
*************************************************************************

    -------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    -------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 24 coordinate points

           Point        x-surf       y-surf
            No.          (ft)         (ft)

             1           65.56       460.00
             2          115.18       453.88
             3          164.97       449.34
             4          214.88       446.37
             5          264.87       444.98
             6          314.87       445.17
             7          364.83       446.95
             8          414.72       450.30
             9          464.48       455.22
            10          514.05       461.72
            11          563.40       469.78
            12          612.47       479.39
            13          661.21       490.55
            14          709.57       503.25
            15          757.50       517.47
            16          804.96       533.20
            17          851.91       550.41
            18          898.28       569.11
            19          944.04       589.26
            20          989.14       610.85
            21         1033.53       633.85
            22         1077.18       658.24
            23         1120.03       684.00
            24         1149.77       703.19


    ****  Simplified BISHOP FOS =   2.196  ****
```

```
The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 4-1E

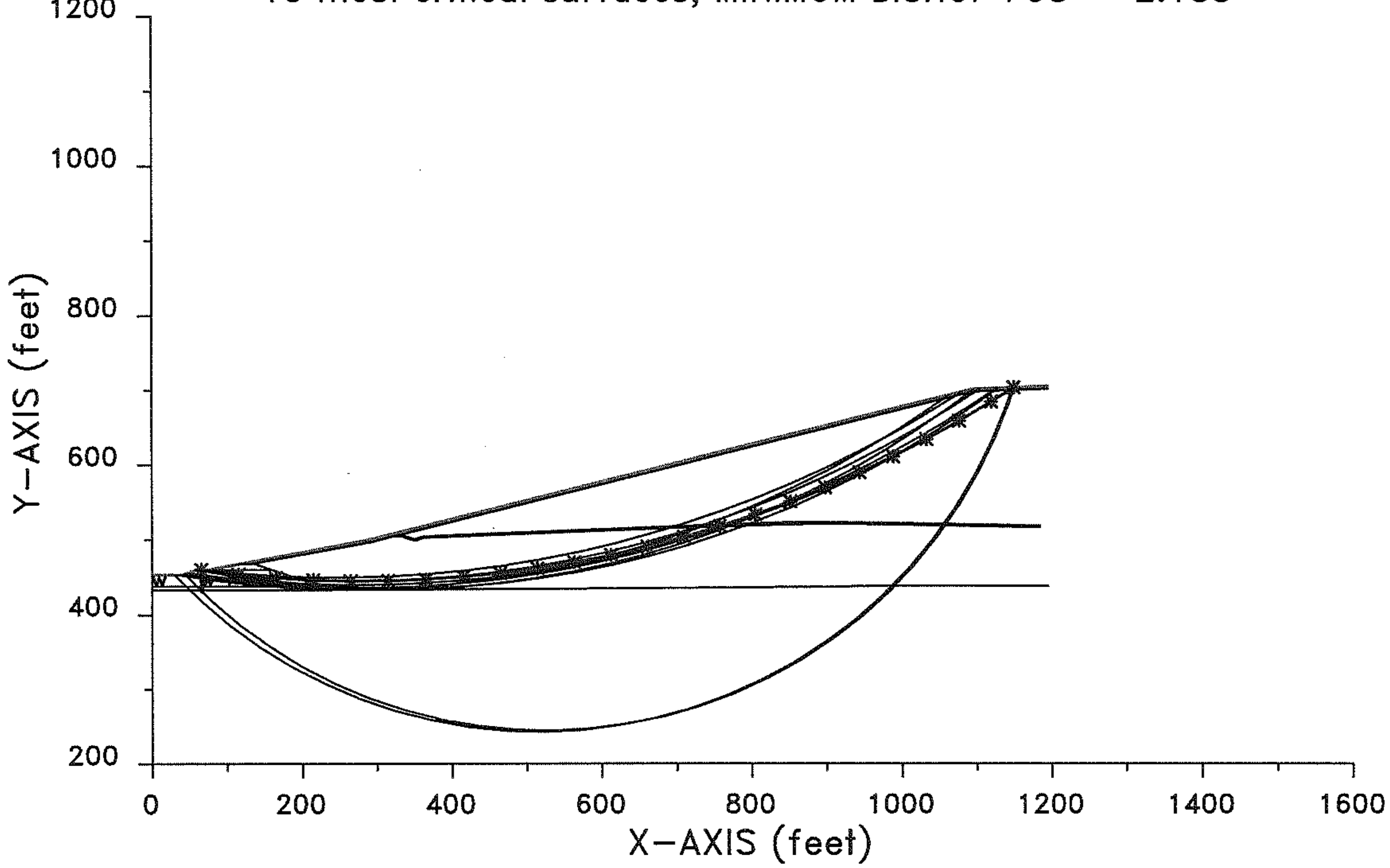
       FOS       Circle Center     Radius   Initial Terminal  Resisting
    (BISHOP)   x-coord  y-coord             x-coord  x-coord    Moment
                 (ft)     (ft)       (ft)     (ft)     (ft)     (ft-lb)

 1.    2.196    283.81  2026.48  1581.61     65.56  1149.77  3.911E+09
 2.    2.197    326.96  1772.57  1337.49     70.00  1128.78  3.584E+09
 3.    2.207    273.88  2028.41  1588.67     47.78  1149.93  4.101E+09
 4.    2.214    278.09  1921.78  1486.02     43.33  1127.00  3.823E+09
 5.    2.215    272.05  1924.99  1480.10     61.11  1104.68  3.311E+09
 6.    2.218    317.57  1704.82  1270.96     61.11  1097.14  3.221E+09
 7.    2.231    248.57  1971.85  1522.36     70.00  1081.20  3.035E+09
 8.    2.237    524.73   900.61   656.38     43.33  1150.25  4.021E+09
 9.    2.243    515.61   908.03   665.28     30.00  1148.08  4.122E+09
10.    2.243    518.65   902.88   660.74     34.44  1147.98  4.086E+09

                    * * *  END OF FILE  * * *
```

4-1T   10-10-11   40:21

CAMELOT LF – FINAL COVER SEC 4-1T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.188



```
XSTABL File: 4-1T      10-10-11   40:21

            ******************************************
            *              X S T A B L               *
            *                                        *
            *        Slope Stability Analysis        *
            *              using the                 *
            *          Method of Slices              *
            *                                        *
            *        Copyright (C) 1992 - 2008       *
            *   Interactive Software Designs, Inc.   *
            *        Moscow, ID 83843, U.S.A.        *
            *                                        *
            *          All Rights Reserved           *
            *                                        *
            *  Ver. 5.208                96 - 2046   *
            ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 4-1T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)      Below Segment

       1           .0       453.3       40.0      453.3           1
       2         40.0       453.3       59.9      460.0           1
       3         59.9       460.0       64.5      460.0           1
       4         64.5       460.0       67.5      460.0           8
       5         67.5       460.0       73.3      460.0           1
       6         73.3       460.0      116.6      467.7           7
       7        116.6       467.7      129.4      470.0           5
       8        129.4       470.0      291.1      500.0           5
       9        291.1       500.0     1095.1      701.0           5
      10       1095.1       701.0     1195.1      705.0           5


       43 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)      Below Segment

       1        116.6       467.7      132.3      467.7           7
       2        132.3       467.7      291.8      496.6           4
       3        291.8       496.6      322.3      504.2           4
       4        322.3       504.2      330.3      506.2           6
       5        330.3       506.2     1095.6      697.5           4
       6       1095.6       697.5     1195.1      701.5           4
       7        330.3       506.2      332.6      506.2           6
```

```
    8        332.6      506.2      350.1      500.3          6
    9        350.1      500.3      361.5      504.1          6
   10        361.5      504.1      434.5      507.0          6
   11        434.5      507.0      684.5      517.0          6
   12        684.5      517.0      851.2      523.0          6
   13        851.2      523.0      901.3      523.0          6
   14        901.3      523.0      979.0      522.0          6
   15        979.0      522.0     1184.6      518.0          6
   16        322.3      504.2      332.3      504.2          4
   17        332.3      504.2      350.1      498.2          4
   18        350.1      498.2      361.9      502.1          4
   19        361.9      502.1      434.6      505.0          4
   20        434.6      505.0      684.6      515.0          4
   21        684.6      515.0      851.3      520.0          4
   22        851.3      520.0      901.3      521.0          4
   23        901.3      521.0      979.0      520.0          4
   24        979.0      520.0     1184.6      516.0          4
   25        136.3      467.7      159.4      460.0          7
   26        159.4      460.0      225.4      438.0          1
   27        225.4      438.0      239.5      433.3          2
   28        239.5      433.3      579.8      435.0          3
   29        579.8      435.0      879.3      437.0          3
   30        879.3      437.0     1005.0      439.0          3
   31       1005.0      439.0     1195.1      438.0          3
   32         73.3      460.0      159.4      460.0          1
   33         64.5      460.0       64.6      438.0          1
   34           .0      438.0       64.6      438.0          2
   35         67.5      460.0       67.6      438.0          8
   36         67.6      438.0      225.4      438.0          2
   37         64.6      438.0       64.7      433.3          2
   38           .0      433.3       64.7      433.2          3
   39         67.6      438.0       67.7      433.3          8
   40         67.7      433.3      239.5      433.3          3
   41         64.7      433.3       64.8      430.3          3
   42         67.7      433.3       67.8      430.3          8
   43         64.8      430.3       67.8      430.3          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.

  1   127.0   131.0     788.0    11.50     .000         .0      0
  2   132.0   135.0     470.0     8.30     .000         .0      1
  3   130.0   135.0    5000.0      .00     .000         .0      0
  4    65.0    65.0     288.0    23.00     .000         .0      0
  5   115.0   120.0     100.0    16.00     .000         .0      0
  6   115.0   120.0     100.0    16.00     .000         .0      0
  7   115.0   120.0     834.0    16.00     .000         .0      0
  8    75.0    75.0        .0     5.00     .000         .0      0
```

```
          ---------------------------------------------------------------------
----
            UNDRAINED STRENGTHS as a function of effective vertical stress
                                have been specified for  3 Soil Unit(s)
          ---------------------------------------------------------------------
----

                   Soil Unit #      Parameter a     Parameter Psi

                        1.             788.0           11.50
                        2.             470.0            8.30
                        7.             834.0           16.00


           1 Water surface(s) have been specified

          Unit weight of water =    62.40  (pcf)


          Water Surface No.  1 specified by  2 coordinate points

          **********************************
                   PHREATIC SURFACE,
          **********************************

            Point       x-water      y-water
             No.          (ft)         (ft)

              1            .00        438.00
              2          64.50        438.00


          A critical failure surface searching method, using a random
          technique for generating CIRCULAR surfaces has been specified.


            100 trial surfaces will be generated and analyzed.


            10 Surfaces initiate from each of  10 points equally spaced
          along the ground surface between  x =     30.0 ft
                                       and  x =     70.0 ft


          Each surface terminates between   x =   1050.0 ft
                                      and   x =   1150.0 ft


          Unless further limitations were imposed, the minimum elevation
          at which a surface extends is  y =       .0 ft


             50.0 ft line segments define each trial failure surface.
```

```
    ---------------------
    ANGULAR RESTRICTIONS
    ---------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=  (slope angle - 5.0) degrees



**********************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
**********************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
**********************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 24 coordinate points

           Point        x-surf       y-surf
            No.          (ft)         (ft)

             1           65.56       460.00
             2          115.18       453.88
             3          164.97       449.34
             4          214.88       446.37
             5          264.87       444.98
             6          314.87       445.17
             7          364.83       446.95
             8          414.72       450.30
             9          464.48       455.22
            10          514.05       461.72
            11          563.40       469.78
            12          612.47       479.39
            13          661.21       490.55
            14          709.57       503.25
            15          757.50       517.47
```

```
              16          804.96       533.20
              17          851.91       550.41
              18          898.28       569.11
              19          944.04       589.26
              20          989.14       610.85
              21         1033.53       633.85
              22         1077.18       658.24
              23         1120.03       684.00
              24         1149.77       703.19

      ****  Simplified BISHOP FOS =   2.188  ****




      The following is a summary of the TEN most critical surfaces

      Problem Description : CAMELOT LF - FINAL COVER SEC 4-1T

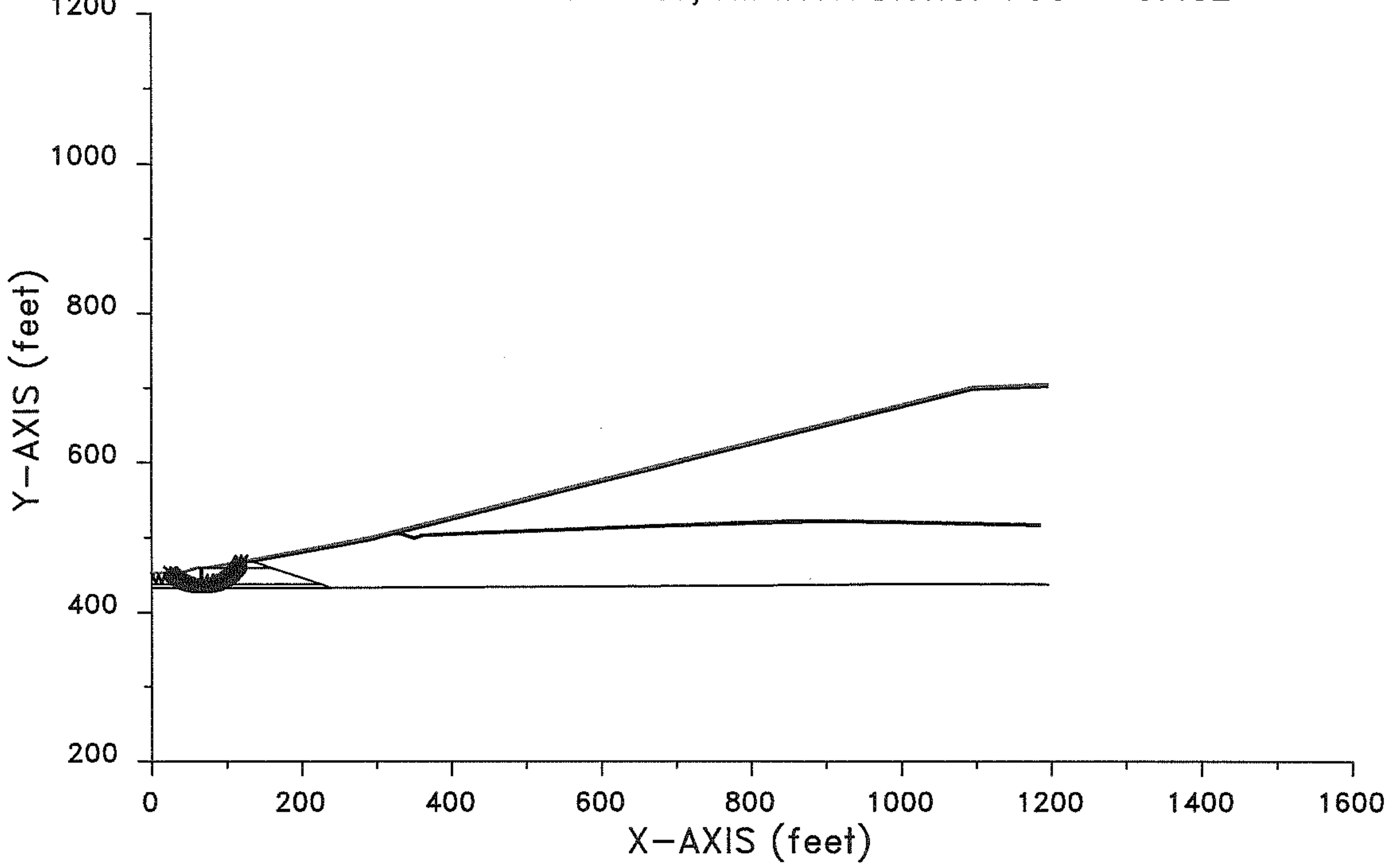
              FOS      Circle Center    Radius  Initial Terminal  Resisting
            (BISHOP)  x-coord  y-coord          x-coord  x-coord   Moment
                        (ft)     (ft)     (ft)    (ft)     (ft)    (ft-lb)

       1.    2.188    283.81  2026.48  1581.61    65.56  1149.77  3.898E+09
       2.    2.189    326.96  1772.57  1337.49    70.00  1128.78  3.571E+09
       3.    2.191    278.09  1921.78  1486.02    43.33  1127.00  3.783E+09
       4.    2.199    273.88  2028.41  1588.67    47.78  1149.93  4.086E+09
       5.    2.204    317.57  1704.82  1270.96    61.11  1097.14  3.201E+09
       6.    2.205    264.03  1796.81  1362.99    34.44  1063.40  3.098E+09
       7.    2.206    272.05  1924.99  1480.10    61.11  1104.68  3.299E+09
       8.    2.222    248.57  1971.85  1522.36    70.00  1081.20  3.024E+09
       9.    2.234    524.73   900.61   656.38    43.33  1150.25  4.015E+09
      10.    2.240    515.61   908.03   665.28    30.00  1148.08  4.117E+09

                          * * *  END OF FILE  * * *
```

4-2E   10-10-11   40:24

CAMELOT LF – FINAL COVER SEC 4-2E
10 most critical surfaces, MINIMUM BISHOP FOS = 5.482



```
XSTABL File: 4-2E      10-10-11   40:24

          ******************************************
          *               X S T A B L              *
          *                                        *
          *         Slope Stability Analysis       *
          *               using the                *
          *             Method of Slices           *
          *                                        *
          *         Copyright (C) 1992 - 2008      *
          *    Interactive Software Designs, Inc.  *
          *         Moscow, ID 83843, U.S.A.       *
          *                                        *
          *           All Rights Reserved          *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 4-2E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)    Below Segment

       1           .0      453.3        40.0      453.3          1
       2         40.0      453.3        59.9      460.0          1
       3         59.9      460.0        64.5      460.0          1
       4         64.5      460.0        67.5      460.0          8
       5         67.5      460.0        73.3      460.0          1
       6         73.3      460.0       116.6      467.7          7
       7        116.6      467.7       129.4      470.0          5
       8        129.4      470.0       291.1      500.0          5
       9        291.1      500.0      1095.1      701.0          5
      10       1095.1      701.0      1195.1      705.0          5


       43 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)    Below Segment

       1        116.6      467.7       132.3      467.7          7
       2        132.3      467.7       291.8      496.6          4
       3        291.8      496.6       322.3      504.2          4
       4        322.3      504.2       330.3      506.2          6
       5        330.3      506.2      1095.6      697.5          4
       6       1095.6      697.5      1195.1      701.5          4
       7        330.3      506.2       332.6      506.2          6
```

```
     8        332.6      506.2       350.1      500.3            6
     9        350.1      500.3       361.5      504.1            6
    10        361.5      504.1       434.5      507.0            6
    11        434.5      507.0       684.5      517.0            6
    12        684.5      517.0       851.2      523.0            6
    13        851.2      523.0       901.3      523.0            6
    14        901.3      523.0       979.0      522.0            6
    15        979.0      522.0      1184.6      518.0            6
    16        322.3      504.2       332.3      504.2            4
    17        332.3      504.2       350.1      498.2            4
    18        350.1      498.2       361.9      502.1            4
    19        361.9      502.1       434.6      505.0            4
    20        434.6      505.0       684.6      515.0            4
    21        684.6      515.0       851.3      520.0            4
    22        851.3      520.0       901.3      521.0            4
    23        901.3      521.0       979.0      520.0            4
    24        979.0      520.0      1184.6      516.0            4
    25        136.3      467.7       159.4      460.0            7
    26        159.4      460.0       225.4      438.0            1
    27        225.4      438.0       239.5      433.3            2
    28        239.5      433.3       579.8      435.0            3
    29        579.8      435.0       879.3      437.0            3
    30        879.3      437.0      1005.0      439.0            3
    31       1005.0      439.0      1195.1      438.0            3
    32         73.3      460.0       159.4      460.0            1
    33         64.5      460.0        64.6      438.0            1
    34           .0      438.0        64.6      438.0            2
    35         67.5      460.0        67.6      438.0            8
    36         67.6      438.0       225.4      438.0            2
    37         64.6      438.0        64.7      433.3            2
    38           .0      433.3        64.7      433.2            3
    39         67.6      438.0        67.7      433.3            8
    40         67.7      433.3       239.5      433.3            3
    41         64.7      433.3        64.8      430.3            3
    42         67.7      433.3        67.8      430.3            8
    43         64.8      430.3        67.8      430.3            3


  --------------------------
  ISOTROPIC Soil Parameters
  --------------------------

   8 Soil unit(s) specified

  Soil    Unit Weight    Cohesion  Friction     Pore Pressure        Water
  Unit   Moist    Sat.  Intercept    Angle  Parameter  Constant   Surface
   No.   (pcf)   (pcf)     (psf)     (deg)       Ru      (psf)       No.

    1    127.0   131.0     854.0     11.00      .000         .0        0
    2    132.0   135.0     488.0     16.40      .000         .0        1
    3    130.0   135.0    5000.0       .00      .000         .0        0
    4     65.0    65.0     288.0     23.00      .000         .0        0
    5    115.0   120.0     100.0     16.00      .000         .0        0
    6    115.0   120.0     100.0     16.00      .000         .0        0
    7    115.0   120.0    1074.0     13.10      .000         .0        0
    8     75.0    75.0        .0      5.00      .000         .0        0
```

```
 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point      x-water     y-water
   No.         (ft)        (ft)

    1            .00      438.00
    2          64.50      438.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     25.0 ft
                              and  x =     50.0 ft


Each surface terminates between   x =    100.0 ft
                             and   x =    120.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    2.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees
```

```
**********************************************************************
   --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
**********************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
**********************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



      The most critical circular failure surface
      is specified by 57 coordinate points

           Point        x-surf       y-surf
            No.          (ft)         (ft)

             1          25.00        453.30
             2          26.42        451.89
             3          27.89        450.53
             4          29.40        449.23
             5          30.96        447.97
             6          32.56        446.77
             7          34.20        445.63
             8          35.88        444.54
             9          37.59        443.50
            10          39.34        442.53
            11          41.12        441.62
            12          42.93        440.77
            13          44.76        439.98
            14          46.63        439.25
            15          48.52        438.59
            16          50.42        438.00
            17          52.35        437.46
            18          54.30        437.00
            19          56.26        436.60
            20          58.23        436.27
            21          60.21        436.01
            22          62.20        435.81
            23          64.20        435.68
            24          66.20        435.62
            25          68.20        435.63
            26          70.20        435.70
            27          72.19        435.85
```

```
         28          74.18       436.06
         29          76.16       436.34
         30          78.13       436.69
         31          80.09       437.10
         32          82.03       437.58
         33          83.95       438.13
         34          85.86       438.74
         35          87.74       439.42
         36          89.60       440.16
         37          91.43       440.96
         38          93.23       441.83
         39          95.00       442.76
         40          96.74       443.74
         41          98.45       444.79
         42         100.12       445.89
         43         101.75       447.05
         44         103.34       448.26
         45         104.88       449.53
         46         106.39       450.85
         47         107.84       452.22
         48         109.25       453.64
         49         110.61       455.10
         50         111.92       456.62
         51         113.18       458.17
         52         114.38       459.77
         53         115.53       461.41
         54         116.62       463.08
         55         117.66       464.79
         56         118.63       466.54
         57         119.50       468.22

****  Simplified BISHOP FOS =   5.482  ****


*******************************************************************
**                                                               **
**  Out of the    100 surfaces generated and analyzed by XSTABL,  **
**        5 surfaces were found to have MISLEADING FOS values.    **
**                                                               **
*******************************************************************



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 4-2E

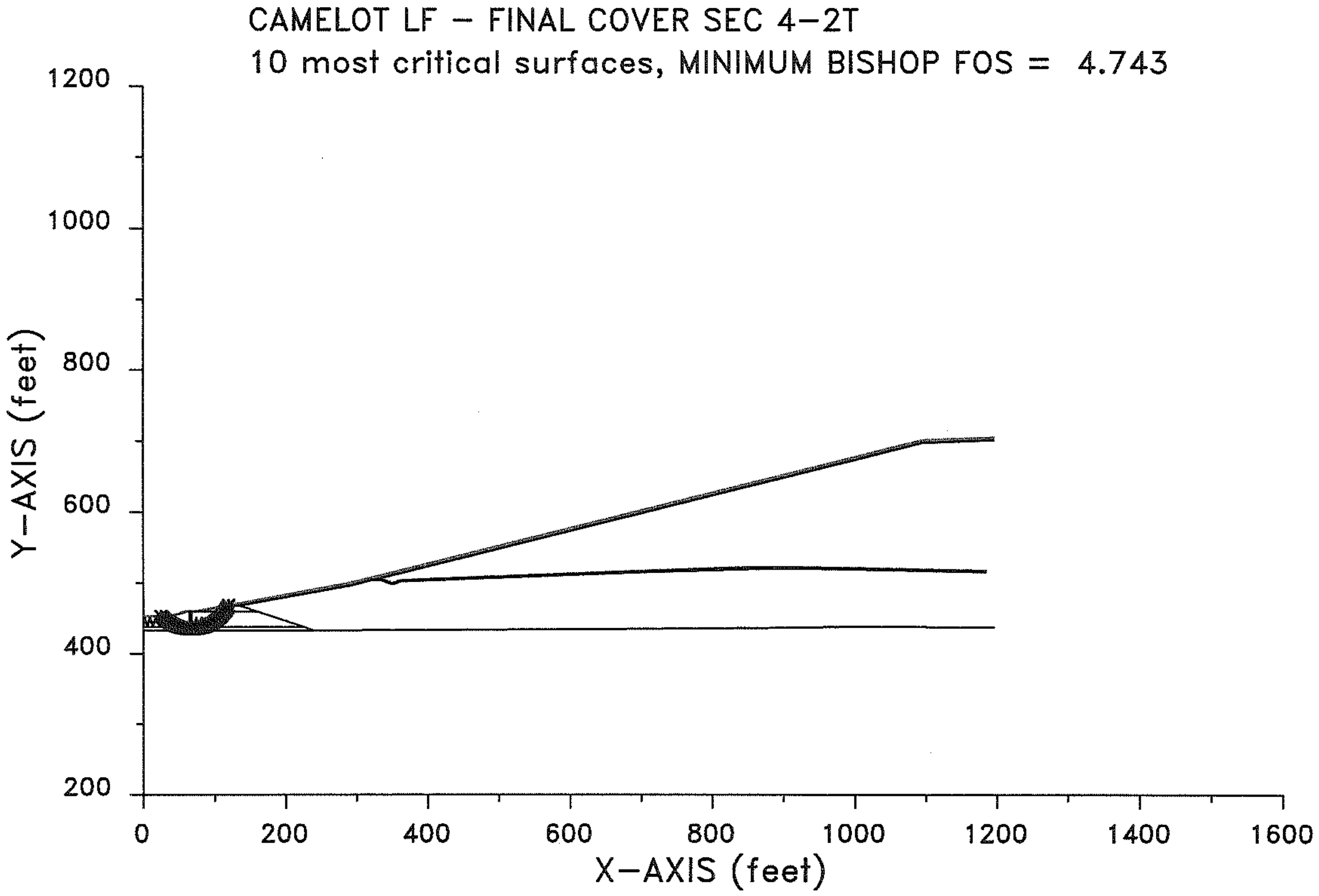
        FOS      Circle Center      Radius   Initial Terminal  Resisting
      (BISHOP)  x-coord  y-coord             x-coord  x-coord    Moment
                 (ft)     (ft)        (ft)     (ft)     (ft)     (ft-lb)

  1.    5.482     66.96   494.24     58.63    25.00   119.50   7.802E+06
  2.    5.516     68.45   492.62     56.57    27.78   119.46   7.334E+06
```

```
  3.   5.536      68.27   492.38     56.28     27.78    119.05  7.260E+06
  4.   5.577      67.91   495.82     58.46     27.78    119.43  7.386E+06
  5.   5.631      71.59   490.15     53.11     33.33    120.01  6.543E+06
  6.   5.833      67.86   500.92     60.49     30.56    118.64  6.962E+06
  7.   5.899      71.59   493.84     53.87     36.11    118.91  6.038E+06
  8.   5.899      67.39   489.36     51.55     30.56    113.95  6.006E+06
  9.   5.900      63.91   495.08     57.09     25.00    113.71  6.897E+06
 10.   5.956      73.85   491.00     51.42     38.89    119.97  5.766E+06

                        * * *  END OF FILE  * * *
```

4-2T 10-10-11 40:26



CAMELOT LF – FINAL COVER SEC 4-2T
10 most critical surfaces, MINIMUM BISHOP FOS = 4.743

```
XSTABL File: 4-2T      10-10-11   40:26

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *              using the                 *
             *           Method of Slices             *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             *  Ver. 5.208                96 - 2046   *
             ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 4-2T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0      453.3        40.0      453.3          1
       2         40.0      453.3        59.9      460.0          1
       3         59.9      460.0        64.5      460.0          1
       4         64.5      460.0        67.5      460.0          8
       5         67.5      460.0        73.3      460.0          1
       6         73.3      460.0       116.6      467.7          7
       7        116.6      467.7       129.4      470.0          5
       8        129.4      470.0       291.1      500.0          5
       9        291.1      500.0      1095.1      701.0          5
      10       1095.1      701.0      1195.1      705.0          5


       43 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)        (ft)       (ft)     Below Segment

       1        116.6      467.7       132.3      467.7          7
       2        132.3      467.7       291.8      496.6          4
       3        291.8      496.6       322.3      504.2          4
       4        322.3      504.2       330.3      506.2          6
       5        330.3      506.2      1095.6      697.5          4
       6       1095.6      697.5      1195.1      701.5          4
       7        330.3      506.2       332.6      506.2          6
```

```
    8         332.6      506.2       350.1      500.3            6
    9         350.1      500.3       361.5      504.1            6
   10         361.5      504.1       434.5      507.0            6
   11         434.5      507.0       684.5      517.0            6
   12         684.5      517.0       851.2      523.0            6
   13         851.2      523.0       901.3      523.0            6
   14         901.3      523.0       979.0      522.0            6
   15         979.0      522.0      1184.6      518.0            6
   16         322.3      504.2       332.3      504.2            4
   17         332.3      504.2       350.1      498.2            4
   18         350.1      498.2       361.9      502.1            4
   19         361.9      502.1       434.6      505.0            4
   20         434.6      505.0       684.6      515.0            4
   21         684.6      515.0       851.3      520.0            4
   22         851.3      520.0       901.3      521.0            4
   23         901.3      521.0       979.0      520.0            4
   24         979.0      520.0      1184.6      516.0            4
   25         136.3      467.7       159.4      460.0            7
   26         159.4      460.0       225.4      438.0            1
   27         225.4      438.0       239.5      433.3            2
   28         239.5      433.3       579.8      435.0            3
   29         579.8      435.0       879.3      437.0            3
   30         879.3      437.0      1005.0      439.0            3
   31        1005.0      439.0      1195.1      438.0            3
   32          73.3      460.0       159.4      460.0            1
   33          64.5      460.0        64.6      438.0            1
   34            .0      438.0        64.6      438.0            2
   35          67.5      460.0        67.6      438.0            8
   36          67.6      438.0       225.4      438.0            2
   37          64.6      438.0        64.7      433.3            2
   38            .0      433.3        64.7      433.2            3
   39          67.6      438.0        67.7      433.3            8
   40          67.7      433.3       239.5      433.3            3
   41          64.7      433.3        64.8      430.3            3
   42          67.7      433.3        67.8      430.3            8
   43          64.8      430.3        67.8      430.3            3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight    Cohesion  Friction     Pore Pressure       Water
Unit  Moist    Sat.  Intercept    Angle   Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)      (deg)      Ru        (psf)      No.

  1   127.0   131.0      788.0    11.50      .000         .0        0
  2   132.0   135.0      470.0     8.30      .000         .0        1
  3   130.0   135.0     5000.0      .00      .000         .0        0
  4    65.0    65.0      288.0    23.00      .000         .0        0
  5   115.0   120.0      100.0    16.00      .000         .0        0
  6   115.0   120.0      100.0    16.00      .000         .0        0
  7   115.0   120.0      834.0    16.00      .000         .0        0
  8    75.0    75.0         .0     5.00      .000         .0        0
```

```
          ----------------------------------------------------------------------
----

           UNDRAINED STRENGTHS as a function of effective vertical stress
                                 have been specified for  3 Soil Unit(s)
          ----------------------------------------------------------------------
----


                    Soil Unit #      Parameter a     Parameter Psi

                         1.              788.0           11.50
                         2.              470.0            8.30
                         7.              834.0           16.00



           1 Water surface(s) have been specified

          Unit weight of water =    62.40  (pcf)


          Water Surface No.  1 specified by  2 coordinate points

          **********************************
                   PHREATIC SURFACE,
          **********************************

            Point       x-water      y-water
             No.          (ft)         (ft)

              1            .00       438.00
              2          64.50       438.00



          A critical failure surface searching method, using a random
          technique for generating CIRCULAR surfaces has been specified.


            100 trial surfaces will be generated and analyzed.


            10 Surfaces initiate from each of  10 points equally spaced
          along the ground surface between  x =     25.0 ft
                                       and  x =     50.0 ft


          Each surface terminates between   x =    100.0 ft
                                      and   x =    120.0 ft


          Unless further limitations were imposed, the minimum elevation
          at which a surface extends is  y =       .0 ft


          * * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *
```

```
    2.0 ft line segments define each trial failure surface.


  ---------------------
  ANGULAR RESTRICTIONS
  ---------------------

    The first segment of each failure surface will be inclined
    within the angular range defined by :

            Lower angular limit :=   -45.0 degrees
            Upper angular limit :=  (slope angle - 5.0) degrees



************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

  ------------------------------------------------------------
  USER SELECTED option to maintain strength greater than zero
  ------------------------------------------------------------


  Factors of safety have been calculated by the :

  * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


    The most critical circular failure surface
    is specified by 57 coordinate points

         Point        x-surf       y-surf
          No.          (ft)         (ft)

           1          25.00       453.30
           2          26.42       451.89
           3          27.89       450.53
           4          29.40       449.23
           5          30.96       447.97
           6          32.56       446.77
           7          34.20       445.63
           8          35.88       444.54
           9          37.59       443.50
          10          39.34       442.53
          11          41.12       441.62
          12          42.93       440.77
          13          44.76       439.98
```

```
          14          46.63       439.25
          15          48.52       438.59
          16          50.42       438.00
          17          52.35       437.46
          18          54.30       437.00
          19          56.26       436.60
          20          58.23       436.27
          21          60.21       436.01
          22          62.20       435.81
          23          64.20       435.68
          24          66.20       435.62
          25          68.20       435.63
          26          70.20       435.70
          27          72.19       435.85
          28          74.18       436.06
          29          76.16       436.34
          30          78.13       436.69
          31          80.09       437.10
          32          82.03       437.58
          33          83.95       438.13
          34          85.86       438.74
          35          87.74       439.42
          36          89.60       440.16
          37          91.43       440.96
          38          93.23       441.83
          39          95.00       442.76
          40          96.74       443.74
          41          98.45       444.79
          42         100.12       445.89
          43         101.75       447.05
          44         103.34       448.26
          45         104.88       449.53
          46         106.39       450.85
          47         107.84       452.22
          48         109.25       453.64
          49         110.61       455.10
          50         111.92       456.62
          51         113.18       458.17
          52         114.38       459.77
          53         115.53       461.41
          54         116.62       463.08
          55         117.66       464.79
          56         118.63       466.54
          57         119.50       468.22

 ****  Simplified BISHOP FOS =   4.743  ****


 **********************************************************************
 **                                                                  **
 **  Out of the    100 surfaces generated and analyzed by XSTABL,    **
 **        5 surfaces were found to have MISLEADING FOS values.      **
 **                                                                  **
 **********************************************************************
```

```
The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 4-2T

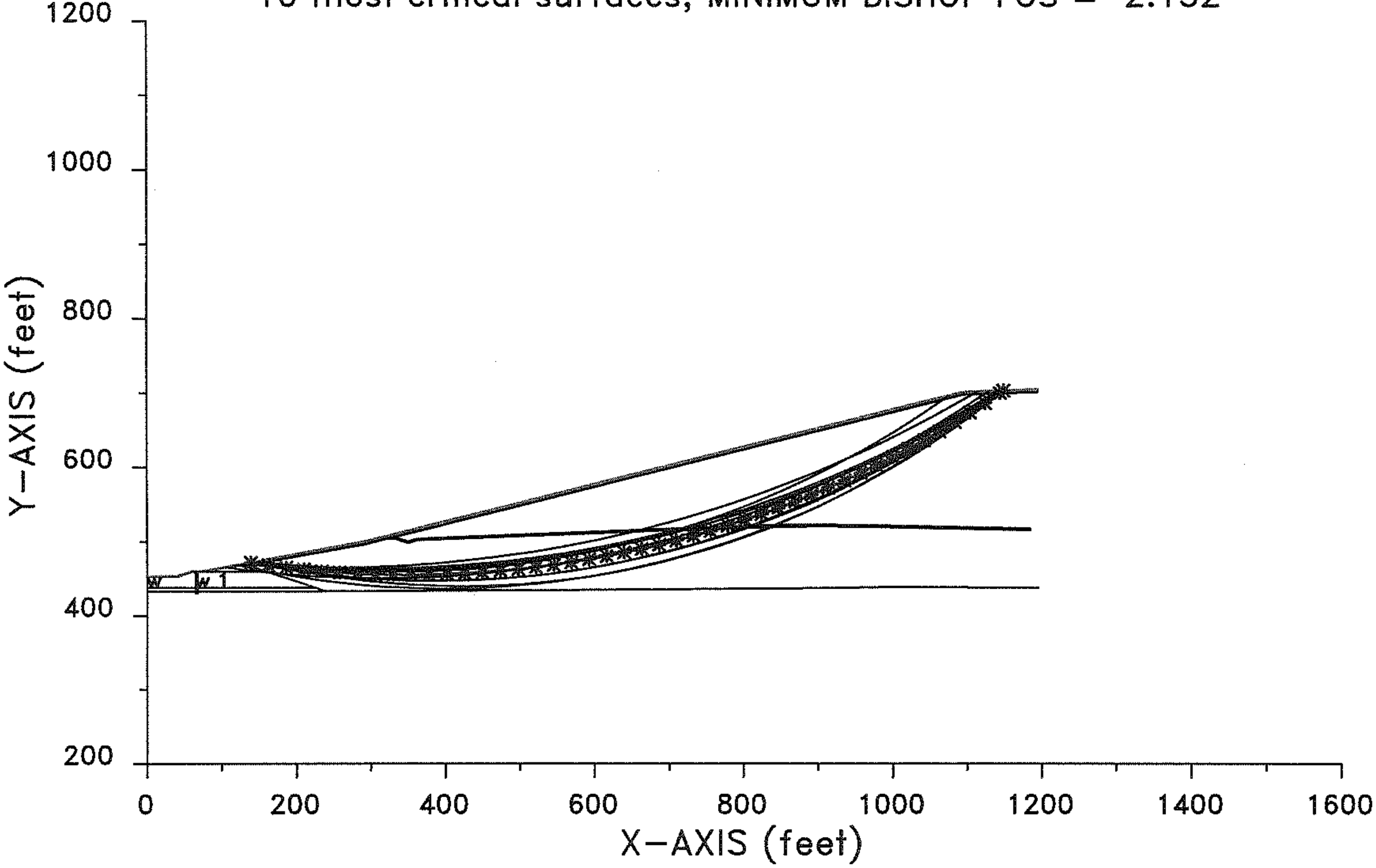
       FOS       Circle Center     Radius   Initial Terminal  Resisting
     (BISHOP)   x-coord  y-coord            x-coord  x-coord   Moment
                  (ft)     (ft)      (ft)     (ft)     (ft)    (ft-lb)

 1.    4.743     66.96   494.24     58.63    25.00   119.50  6.750E+06
 2.    4.823     68.45   492.62     56.57    27.78   119.46  6.412E+06
 3.    4.847     68.27   492.38     56.28    27.78   119.05  6.356E+06
 4.    5.081     71.59   490.15     53.11    33.33   120.01  5.905E+06
 5.    5.087     67.91   495.82     58.46    27.78   119.43  6.737E+06
 6.    5.532     67.39   489.36     51.55    30.56   113.95  5.632E+06
 7.    5.553     67.86   500.92     60.49    30.56   118.64  6.628E+06
 8.    5.613     63.91   495.08     57.09    25.00   113.71  6.562E+06
 9.    5.631     71.59   493.84     53.87    36.11   118.91  5.764E+06
10.    5.689     68.70   506.17     63.60    33.33   119.76  6.518E+06

                   * * *  END OF FILE  * * *
```

4-3E 10-10-11 40:29

CAMELOT LF – FINAL COVER SEC 4-3E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.132



```
XSTABL File: 4-3E      10-10-11   40:29

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *                using the               *
             *            Method of Slices            *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             *  Ver. 5.208                96 - 2046   *
             ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 4-3E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.        (ft)      (ft)       (ft)      (ft)    Below Segment

        1          .0     453.3       40.0     453.3         1
        2        40.0     453.3       59.9     460.0         1
        3        59.9     460.0       64.5     460.0         1
        4        64.5     460.0       67.5     460.0         8
        5        67.5     460.0       73.3     460.0         1
        6        73.3     460.0      116.6     467.7         7
        7       116.6     467.7      129.4     470.0         5
        8       129.4     470.0      291.1     500.0         5
        9       291.1     500.0     1095.1     701.0         5
       10      1095.1     701.0     1195.1     705.0         5


       43 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.        (ft)      (ft)       (ft)      (ft)    Below Segment

        1       116.6     467.7      132.3     467.7         7
        2       132.3     467.7      291.8     496.6         4
        3       291.8     496.6      322.3     504.2         4
        4       322.3     504.2      330.3     506.2         6
        5       330.3     506.2     1095.6     697.5         4
        6      1095.6     697.5     1195.1     701.5         4
        7       330.3     506.2      332.6     506.2         6
```

```
     8        332.6      506.2      350.1      500.3          6
     9        350.1      500.3      361.5      504.1          6
    10        361.5      504.1      434.5      507.0          6
    11        434.5      507.0      684.5      517.0          6
    12        684.5      517.0      851.2      523.0          6
    13        851.2      523.0      901.3      523.0          6
    14        901.3      523.0      979.0      522.0          6
    15        979.0      522.0     1184.6      518.0          6
    16        322.3      504.2      332.3      504.2          4
    17        332.3      504.2      350.1      498.2          4
    18        350.1      498.2      361.9      502.1          4
    19        361.9      502.1      434.6      505.0          4
    20        434.6      505.0      684.6      515.0          4
    21        684.6      515.0      851.3      520.0          4
    22        851.3      520.0      901.3      521.0          4
    23        901.3      521.0      979.0      520.0          4
    24        979.0      520.0     1184.6      516.0          4
    25        136.3      467.7      159.4      460.0          7
    26        159.4      460.0      225.4      438.0          1
    27        225.4      438.0      239.5      433.3          2
    28        239.5      433.3      579.8      435.0          3
    29        579.8      435.0      879.3      437.0          3
    30        879.3      437.0     1005.0      439.0          3
    31       1005.0      439.0     1195.1      438.0          3
    32         73.3      460.0      159.4      460.0          1
    33         64.5      460.0       64.6      438.0          1
    34           .0      438.0       64.6      438.0          2
    35         67.5      460.0       67.6      438.0          8
    36         67.6      438.0      225.4      438.0          2
    37         64.6      438.0       64.7      433.3          2
    38           .0      433.3       64.7      433.2          3
    39         67.6      438.0       67.7      433.3          8
    40         67.7      433.3      239.5      433.3          3
    41         64.7      433.3       64.8      430.3          3
    42         67.7      433.3       67.8      430.3          8
    43         64.8      430.3       67.8      430.3          3


-------------------------
ISOTROPIC Soil Parameters
-------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction     Pore Pressure       Water
Unit  Moist    Sat.  Intercept   Angle   Parameter  Constant   Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru        (psf)      No.

  1   127.0   131.0     854.0    11.00      .000         .0       0
  2   132.0   135.0     488.0    16.40      .000         .0       1
  3   130.0   135.0    5000.0      .00      .000         .0       0
  4    65.0    65.0     288.0    23.00      .000         .0       0
  5   115.0   120.0     100.0    16.00      .000         .0       0
  6   115.0   120.0     100.0    16.00      .000         .0       0
  7   115.0   120.0    1074.0    13.10      .000         .0       0
  8    75.0    75.0        .0     5.00      .000         .0       0
```

```
 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

*********************************
         PHREATIC SURFACE,
*********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1            .00      438.00
    2          64.50      438.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =    100.0 ft
                             and  x =    150.0 ft


Each surface terminates between   x =   1050.0 ft
                            and   x =   1150.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   24.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees
```

```
Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 46 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          138.89       471.76
         2          162.64       468.33
         3          186.45       465.30
         4          210.31       462.67
         5          234.20       460.46
         6          258.14       458.65
         7          282.09       457.25
         8          306.07       456.26
         9          330.07       455.68
        10          354.07       455.50
        11          378.07       455.74
        12          402.06       456.38
        13          426.03       457.44
        14          449.99       458.90
        15          473.92       460.77
        16          497.81       463.05
        17          521.66       465.74
        18          545.46       468.83
        19          569.20       472.33
        20          592.88       476.23
        21          616.49       480.54
        22          640.03       485.24
        23          663.48       490.35
        24          686.83       495.86
        25          710.10       501.76
        26          733.26       508.06
        27          756.30       514.76
        28          779.23       521.85
        29          802.04       529.32
        30          824.71       537.19
        31          847.25       545.44
        32          869.64       554.07
        33          891.89       563.08
        34          913.97       572.47
        35          935.90       582.24
        36          957.65       592.38
        37          979.23       602.89
        38         1000.62       613.76
        39         1021.83       625.00
        40         1042.84       636.60
```

```
        41        1063.65       648.55
        42        1084.25       660.86
        43        1104.65       673.52
        44        1124.82       686.52
        45        1144.77       699.87
        46        1149.54       703.18

****  Simplified BISHOP FOS =   2.132  ****




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 4-3E

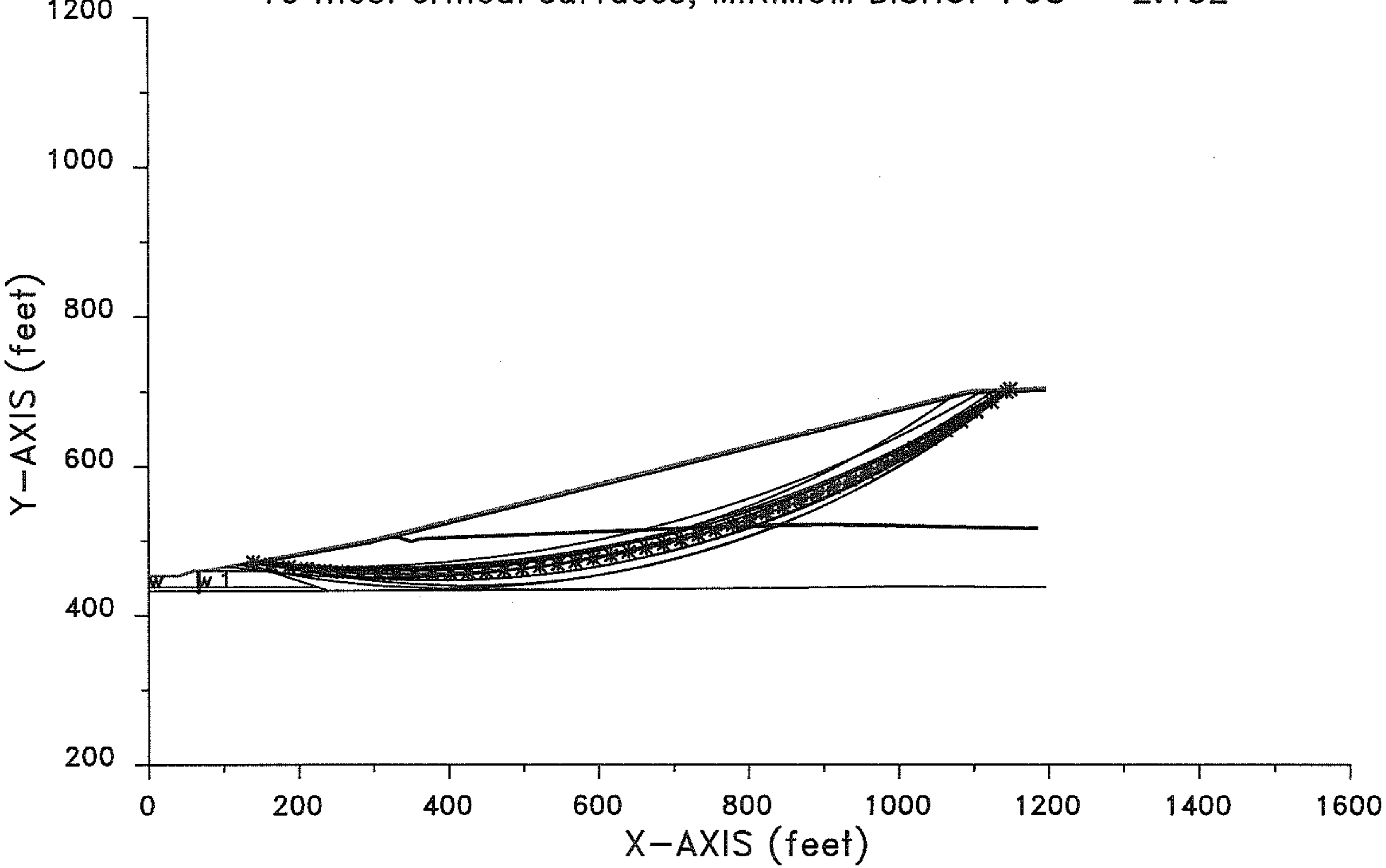
        FOS      Circle Center    Radius  Initial Terminal  Resisting
      (BISHOP)  x-coord  y-coord          x-coord  x-coord    Moment
                  (ft)     (ft)     (ft)    (ft)     (ft)     (ft-lb)

 1.    2.132    352.21  1862.97  1407.47   138.89  1149.54  3.239E+09
 2.    2.135    385.51  1692.60  1245.50   138.89  1141.52  3.130E+09
 3.    2.135    386.28  1715.34  1267.95   138.89  1149.91  3.231E+09
 4.    2.137    314.61  2022.68  1560.85   138.89  1148.32  3.250E+09
 5.    2.139    307.84  2041.52  1577.22   144.44  1141.84  3.132E+09
 6.    2.147    422.79  1556.60  1116.62   150.00  1142.51  3.059E+09
 7.    2.150    337.78  1731.21  1271.34   150.00  1076.07  2.379E+09
 8.    2.159    397.07  1633.67  1196.94   122.22  1149.91  3.392E+09
 9.    2.161    250.48  2160.32  1695.06   127.78  1114.04  2.932E+09
10.    2.172    313.08  1903.34  1452.51   105.56  1130.07  3.317E+09

                        * * *  END OF FILE  * * *
```

4-3T 10-10-11 40:31

CAMELOT LF – FINAL COVER SEC 4-3T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.132



```
XSTABL File: 4-3T       10-10-11   40:31

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *               using the               *
          *            Method of Slices           *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 4-3T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)      Below Segment

       1           .0      453.3       40.0      453.3            1
       2         40.0      453.3       59.9      460.0            1
       3         59.9      460.0       64.5      460.0            1
       4         64.5      460.0       67.5      460.0            8
       5         67.5      460.0       73.3      460.0            1
       6         73.3      460.0      116.6      467.7            7
       7        116.6      467.7      129.4      470.0            5
       8        129.4      470.0      291.1      500.0            5
       9        291.1      500.0     1095.1      701.0            5
      10       1095.1      701.0     1195.1      705.0            5


       43 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)      Below Segment

       1        116.6      467.7      132.3      467.7            7
       2        132.3      467.7      291.8      496.6            4
       3        291.8      496.6      322.3      504.2            4
       4        322.3      504.2      330.3      506.2            6
       5        330.3      506.2     1095.6      697.5            4
       6       1095.6      697.5     1195.1      701.5            4
       7        330.3      506.2      332.6      506.2            6
```

```
   8       332.6     506.2      350.1     500.3          6
   9       350.1     500.3      361.5     504.1          6
  10       361.5     504.1      434.5     507.0          6
  11       434.5     507.0      684.5     517.0          6
  12       684.5     517.0      851.2     523.0          6
  13       851.2     523.0      901.3     523.0          6
  14       901.3     523.0      979.0     522.0          6
  15       979.0     522.0     1184.6     518.0          6
  16       322.3     504.2      332.3     504.2          4
  17       332.3     504.2      350.1     498.2          4
  18       350.1     498.2      361.9     502.1          4
  19       361.9     502.1      434.6     505.0          4
  20       434.6     505.0      684.6     515.0          4
  21       684.6     515.0      851.3     520.0          4
  22       851.3     520.0      901.3     521.0          4
  23       901.3     521.0      979.0     520.0          4
  24       979.0     520.0     1184.6     516.0          4
  25       136.3     467.7      159.4     460.0          7
  26       159.4     460.0      225.4     438.0          1
  27       225.4     438.0      239.5     433.3          2
  28       239.5     433.3      579.8     435.0          3
  29       579.8     435.0      879.3     437.0          3
  30       879.3     437.0     1005.0     439.0          3
  31      1005.0     439.0     1195.1     438.0          3
  32        73.3     460.0      159.4     460.0          1
  33        64.5     460.0       64.6     438.0          1
  34          .0     438.0       64.6     438.0          2
  35        67.5     460.0       67.6     438.0          8
  36        67.6     438.0      225.4     438.0          2
  37        64.6     438.0       64.7     433.3          2
  38          .0     433.3       64.7     433.2          3
  39        67.6     438.0       67.7     433.3          8
  40        67.7     433.3      239.5     433.3          3
  41        64.7     433.3       64.8     430.3          3
  42        67.7     433.3       67.8     430.3          8
  43        64.8     430.3       67.8     430.3          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     788.0    11.50     .000         .0       0
  2   132.0   135.0     470.0     8.30     .000         .0       1
  3   130.0   135.0    5000.0      .00     .000         .0       0
  4    65.0    65.0     288.0    23.00     .000         .0       0
  5   115.0   120.0     100.0    16.00     .000         .0       0
  6   115.0   120.0     100.0    16.00     .000         .0       0
  7   115.0   120.0     834.0    16.00     .000         .0       0
  8    75.0    75.0        .0     5.00     .000         .0       0
```

```
----------------------------------------------------------------------
----
  UNDRAINED STRENGTHS as a function of effective vertical stress
                    have been specified for  3 Soil Unit(s)
----------------------------------------------------------------------
----


          Soil Unit #      Parameter a     Parameter Psi

               1.               788.0          11.50
               2.               470.0           8.30
               7.               834.0          16.00


  1 Water surface(s) have been specified

 Unit weight of water =    62.40  (pcf)


 Water Surface No.  1 specified by  2 coordinate points

 **********************************
          PHREATIC SURFACE,
 **********************************

   Point       x-water     y-water
    No.         (ft)        (ft)

     1            .00      438.00
     2          64.50      438.00


 A critical failure surface searching method, using a random
 technique for generating CIRCULAR surfaces has been specified.


   100 trial surfaces will be generated and analyzed.


   10 Surfaces initiate from each of  10 points equally spaced
 along the ground surface between  x =    100.0 ft
                              and  x =    150.0 ft


 Each surface terminates between   x =   1050.0 ft
                             and   x =   1150.0 ft


 Unless further limitations were imposed, the minimum elevation
 at which a surface extends is  y =       .0 ft


 * * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *
```

```
   24.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 46 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1        138.89       471.76
         2        162.64       468.33
         3        186.45       465.30
         4        210.31       462.67
         5        234.20       460.46
         6        258.14       458.65
         7        282.09       457.25
         8        306.07       456.26
         9        330.07       455.68
        10        354.07       455.50
        11        378.07       455.74
        12        402.06       456.38
        13        426.03       457.44
        14        449.99       458.90
        15        473.92       460.77
        16        497.81       463.05
        17        521.66       465.74
        18        545.46       468.83
        19        569.20       472.33
        20        592.88       476.23
        21        616.49       480.54
        22        640.03       485.24
        23        663.48       490.35
        24        686.83       495.86
        25        710.10       501.76
        26        733.26       508.06
```

```
          27          756.30       514.76
          28          779.23       521.85
          29          802.04       529.32
          30          824.71       537.19
          31          847.25       545.44
          32          869.64       554.07
          33          891.89       563.08
          34          913.97       572.47
          35          935.90       582.24
          36          957.65       592.38
          37          979.23       602.89
          38         1000.62       613.76
          39         1021.83       625.00
          40         1042.84       636.60
          41         1063.65       648.55
          42         1084.25       660.86
          43         1104.65       673.52
          44         1124.82       686.52
          45         1144.77       699.87
          46         1149.54       703.18

****  Simplified BISHOP FOS =   2.132  ****




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 4-3T

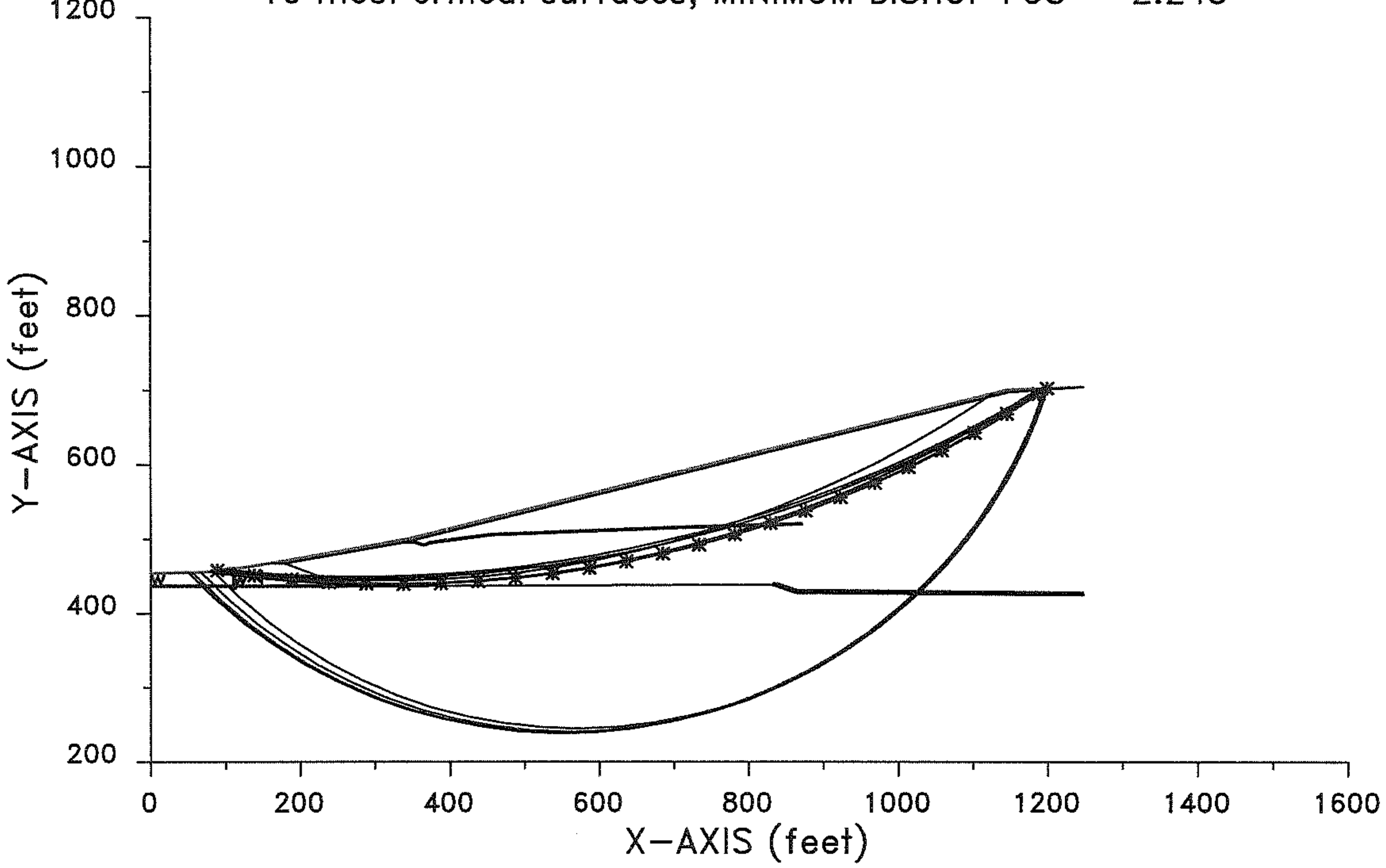
        FOS      Circle Center     Radius   Initial Terminal  Resisting
      (BISHOP)  x-coord  y-coord            x-coord  x-coord    Moment
                  (ft)     (ft)      (ft)     (ft)     (ft)     (ft-lb)

 1.     2.132    352.21  1862.97  1407.47   138.89  1149.54  3.239E+09
 2.     2.135    385.51  1692.60  1245.50   138.89  1141.52  3.130E+09
 3.     2.135    386.28  1715.34  1267.95   138.89  1149.91  3.231E+09
 4.     2.137    314.61  2022.68  1560.85   138.89  1148.32  3.250E+09
 5.     2.139    307.84  2041.52  1577.22   144.44  1141.84  3.132E+09
 6.     2.147    422.79  1556.60  1116.62   150.00  1142.51  3.059E+09
 7.     2.150    337.78  1731.21  1271.34   150.00  1076.07  2.379E+09
 8.     2.154    397.07  1633.67  1196.94   122.22  1149.91  3.385E+09
 9.     2.161    250.48  2160.32  1695.06   127.78  1114.04  2.932E+09
10.     2.163    313.08  1903.34  1452.51   105.56  1130.07  3.302E+09

                       * * *  END OF FILE  * * *
```

5-1E 10-10-11 40:33

CAMELOT LF – FINAL COVER SEC 5-1E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.245



```
XSTABL File: 5-1E      10-10-11   40:33

             *******************************************
             *              X S T A B L                *
             *                                         *
             *         Slope Stability Analysis        *
             *                 using the               *
             *             Method of Slices            *
             *                                         *
             *         Copyright (C) 1992 - 2008       *
             *    Interactive Software Designs, Inc.   *
             *         Moscow, ID 83843, U.S.A.        *
             *                                         *
             *           All Rights Reserved           *
             *                                         *
             *  Ver. 5.208                 96 - 2046   *
             *******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 5-1E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1          .0     454.0       78.8     456.0         1
        2        78.8     456.0      105.3     461.2         1
        3       105.3     461.2      109.7     461.2         1
        4       109.7     461.2      112.7     461.2        11
        5       112.7     461.2      118.2     461.2         1
        6       118.2     461.2      157.8     467.6        10
        7       157.8     467.6      172.9     470.0         5
        8       172.9     470.0      342.7     500.0         5
        9       342.7     500.0     1146.7     701.0         5
       10      1146.7     701.0     1246.7     705.0         5


       47 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1       157.8     467.6      179.3     467.6        10
        2       179.3     467.6      337.9     495.6         4
        3       337.9     495.6      343.4     496.6         9
        4       343.4     496.6      347.5     497.6         9
        5       347.5     497.6     1147.2     697.5         4
        6      1147.2     697.5     1246.7     705.0         4
        7       347.5     497.6      352.4     497.6         9
```

```
    8       352.4      497.6      365.1      493.3          9
    9       365.1      493.3      374.1      496.4          9
   10       374.1      496.4      454.4      507.0          4
   11       454.4      507.0      704.5      517.0          9
   12       704.5      517.0      871.2      522.0          9
   13       337.9      495.6      352.1      495.6          4
   14       352.1      495.6      365.1      491.2          4
   15       365.1      491.2      374.6      494.4          4
   16       374.6      494.4      454.6      505.0          4
   17       454.6      505.0      704.6      515.0          4
   18       704.6      515.0      871.3      520.0          4
   19       179.3      467.6      196.2      461.2         10
   20       196.2      461.2      257.6      438.0          1
   21       257.6      438.0      262.1      436.3          2
   22       262.1      436.3      372.0      437.0          3
   23       372.0      437.0      779.4      439.0          3
   24       779.4      439.0      830.6      439.0          3
   25       830.6      439.0      833.0      440.9          6
   26       833.0      440.9      837.5      440.9          6
   27       837.5      440.9      864.2      432.0          6
   28       864.2      432.0     1110.2      430.0          6
   29      1110.2      430.0     1246.7      429.0          6
   30       830.6      439.0      836.9      439.0          7
   31       836.9      439.0      863.9      430.0          7
   32       863.9      430.0     1110.2      428.0          8
   33      1110.2      428.0     1246.7      427.0          8
   34       830.6      439.0      863.6      428.0          3
   35       863.6      428.0     1110.2      426.0          3
   36      1110.2      426.0     1246.7      425.0          3
   37       109.7      461.2      109.8      438.0          1
   38          .0      438.0      109.8      438.0          2
   39       112.7      461.2      112.8      438.0         11
   40       112.8      438.0      257.6      438.0          2
   41       109.8      438.0      109.9      436.3          2
   42          .0      436.3      109.9      436.3          3
   43       112.8      438.0      112.9      436.3         11
   44       112.9      436.3      262.1      436.3          3
   45       109.9      436.3      110.0      433.3          3
   46       112.9      436.3      113.0      433.3         11
   47       110.0      433.3      113.0      433.0          3


---------------------------
ISOTROPIC Soil Parameters
---------------------------

11 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure       Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00     .000         .0        0
  2   132.0   135.0     488.0    16.40     .000         .0        1
  3   130.0   135.0    5000.0      .00     .000         .0        0
  4    65.0    65.0     288.0    23.00     .000         .0        0
  5   115.0   120.0     100.0    16.00     .000         .0        0
```

```
  6   115.0   120.0     100.0   16.00      .000          .0      0
  7   115.0   120.0     100.0   16.00      .000          .0      0
  8   115.0   120.0     100.0   16.00      .000          .0      0
  9   115.0   120.0     100.0   16.00      .000          .0      0
 10   115.0   120.0    1074.0   13.10      .000          .0      0
 11    75.0    75.0        .0    5.00      .000          .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

*********************************
         PHREATIC SURFACE,
*********************************

  Point      x-water     y-water
   No.        (ft)        (ft)

    1           .00      438.00
    2        109.70      438.00



A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     50.0 ft
                              and  x =    100.0 ft


Each surface terminates between   x =   1100.0 ft
                             and   x =   1200.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   50.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
```

```
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 25 coordinate points

        Point      x-surf      y-surf
         No.        (ft)        (ft)

          1         88.89      457.98
          2        138.43      451.20
          3        188.15      445.99
          4        238.02      442.36
          5        287.98      440.31
          6        337.98      439.85
          7        387.97      440.97
          8        437.89      443.68
          9        487.71      447.98
         10        537.36      453.85
         11        586.80      461.29
         12        635.99      470.30
         13        684.86      480.86
         14        733.37      492.97
         15        781.47      506.60
         16        829.12      521.76
         17        876.26      538.43
         18        922.85      556.57
         19        968.84      576.19
         20       1014.19      597.26
         21       1058.84      619.75
         22       1102.76      643.65
         23       1145.90      668.93
         24       1188.21      695.57
         25       1199.39      703.11

****  Simplified BISHOP FOS =   2.245  ****



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 5-1E
```

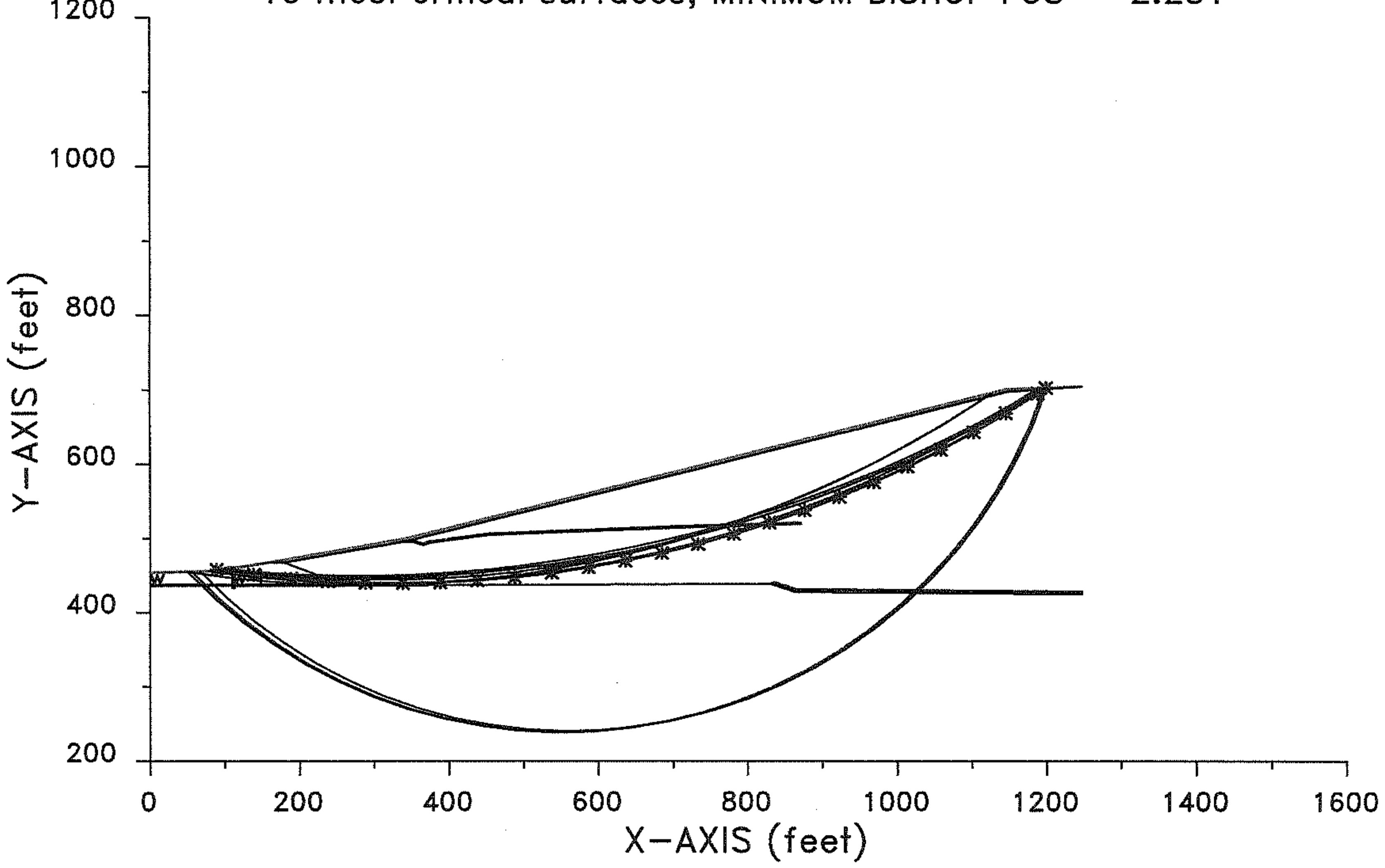
```
          FOS        Circle Center      Radius    Initial  Terminal   Resisting
       (BISHOP)    x-coord  y-coord               x-coord   x-coord    Moment
                    (ft)     (ft)        (ft)       (ft)      (ft)     (ft-lb)

   1.   2.245      327.50  2016.01   1576.19     88.89   1199.39   4.118E+09
   2.   2.256      284.45  2206.67   1759.60     88.89   1198.25   4.127E+09
   3.   2.258      311.98  2025.18   1586.59     77.78   1188.16   4.067E+09
   4.   2.258      276.31  2233.79   1784.01     94.44   1192.03   3.982E+09
   5.   2.275      313.24  1884.63   1440.34    100.00   1126.13   3.101E+09
   6.   2.304      560.60   914.38    674.06     66.67   1200.64   4.243E+09
   7.   2.306      549.77   924.47    685.51     50.00   1198.21   4.358E+09
   8.   2.306      553.44   918.73    680.12     55.56   1198.22   4.311E+09
   9.   2.309      552.78   917.34    678.68     55.56   1196.53   4.296E+09
  10.   2.310      569.68   908.14    663.45     83.33   1200.18   4.111E+09

                         * * *  END OF FILE  * * *
```

5-1T 10-10-11 40:42

CAMELOT LF – FINAL COVER SEC 5-1T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.231



```
XSTABL File: 5-1T      10-10-11   40:42

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *              using the                *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 5-1T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1          .0       454.0       78.8      456.0           1
       2        78.8       456.0      105.3      461.2           1
       3       105.3       461.2      109.7      461.2           1
       4       109.7       461.2      112.7      461.2          11
       5       112.7       461.2      118.2      461.2           1
       6       118.2       461.2      157.8      467.6          10
       7       157.8       467.6      172.9      470.0           5
       8       172.9       470.0      342.7      500.0           5
       9       342.7       500.0     1146.7      701.0           5
      10      1146.7       701.0     1246.7      705.0           5


       47 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1       157.8       467.6      179.3      467.6          10
       2       179.3       467.6      337.9      495.6           4
       3       337.9       495.6      343.4      496.6           9
       4       343.4       496.6      347.5      497.6           9
       5       347.5       497.6     1147.2      697.5           4
       6      1147.2       697.5     1246.7      705.0           4
       7       347.5       497.6      352.4      497.6           9
```

```
     8        352.4      497.6       365.1      493.3          9
     9        365.1      493.3       374.1      496.4          9
    10        374.1      496.4       454.4      507.0          4
    11        454.4      507.0       704.5      517.0          9
    12        704.5      517.0       871.2      522.0          9
    13        337.9      495.6       352.1      495.6          4
    14        352.1      495.6       365.1      491.2          4
    15        365.1      491.2       374.6      494.4          4
    16        374.6      494.4       454.6      505.0          4
    17        454.6      505.0       704.6      515.0          4
    18        704.6      515.0       871.3      520.0          4
    19        179.3      467.6       196.2      461.2         10
    20        196.2      461.2       257.6      438.0          1
    21        257.6      438.0       262.1      436.3          2
    22        262.1      436.3       372.0      437.0          3
    23        372.0      437.0       779.4      439.0          3
    24        779.4      439.0       830.6      439.0          3
    25        830.6      439.0       833.0      440.9          6
    26        833.0      440.9       837.5      440.9          6
    27        837.5      440.9       864.2      432.0          6
    28        864.2      432.0      1110.2      430.0          6
    29       1110.2      430.0      1246.7      429.0          6
    30        830.6      439.0       836.9      439.0          7
    31        836.9      439.0       863.9      430.0          7
    32        863.9      430.0      1110.2      428.0          8
    33       1110.2      428.0      1246.7      427.0          8
    34        830.6      439.0       863.6      428.0          3
    35        863.6      428.0      1110.2      426.0          3
    36       1110.2      426.0      1246.7      425.0          3
    37        109.7      461.2       109.8      438.0          1
    38           .0      438.0       109.8      438.0          2
    39        112.7      461.2       112.8      438.0         11
    40        112.8      438.0       257.6      438.0          2
    41        109.8      438.0       109.9      436.3          2
    42           .0      436.3       109.9      436.3          3
    43        112.8      438.0       112.9      436.3         11
    44        112.9      436.3       262.1      436.3          3
    45        109.9      436.3       110.0      433.3          3
    46        112.9      436.3       113.0      433.3         11
    47        110.0      433.3       113.0      433.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

11 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure       Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     788.0    11.50      .000         .0       0
  2   132.0   135.0     470.0     8.30      .000         .0       1
  3   130.0   135.0    5000.0      .00      .000         .0       0
  4    65.0    65.0     288.0    23.00      .000         .0       0
  5   115.0   120.0     100.0    16.00      .000         .0       0
```

```
    6   115.0   120.0     100.0    16.00      .000         .0     0
    7   115.0   120.0     100.0    16.00      .000         .0     0
    8   115.0   120.0     100.0    16.00      .000         .0     0
    9   115.0   120.0     100.0    16.00      .000         .0     0
   10   115.0   120.0     834.0    16.00      .000         .0     0
   11    75.0    75.0        .0     5.00      .000         .0     0


 ----------------------------------------------------------------------
----
   UNDRAINED STRENGTHS as a function of effective vertical stress
                     have been specified for  3 Soil Unit(s)
 ----------------------------------------------------------------------
----

            Soil Unit #      Parameter a     Parameter Psi

                 1.              788.0          11.50
                 2.              470.0           8.30
                10.              834.0          16.00


  1 Water surface(s) have been specified

 Unit weight of water =    62.40  (pcf)


 Water Surface No.  1 specified by  2 coordinate points

 **********************************
          PHREATIC SURFACE,
 **********************************

   Point      x-water     y-water
    No.         (ft)        (ft)

     1           .00      438.00
     2        109.70      438.00


 A critical failure surface searching method, using a random
 technique for generating CIRCULAR surfaces has been specified.


   100 trial surfaces will be generated and analyzed.


   10 Surfaces initiate from each of  10 points equally spaced
 along the ground surface between  x =     50.0 ft
                                 and  x =    100.0 ft


 Each surface terminates between   x =   1100.0 ft
                                and   x =   1200.0 ft
```

```
Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   50.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 25 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1          88.89       457.98
         2         138.43       451.20
         3         188.15       445.99
         4         238.02       442.36
         5         287.98       440.31
         6         337.98       439.85
         7         387.97       440.97
         8         437.89       443.68
         9         487.71       447.98
        10         537.36       453.85
        11         586.80       461.29
        12         635.99       470.30
        13         684.86       480.86
        14         733.37       492.97
        15         781.47       506.60
        16         829.12       521.76
        17         876.26       538.43
        18         922.85       556.57
        19         968.84       576.19
        20        1014.19       597.26
        21        1058.84       619.75
        22        1102.76       643.65
```

```
          23        1145.90      668.93
          24        1188.21      695.57
          25        1199.39      703.11

****  Simplified BISHOP FOS =   2.231  ****



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 5-1T

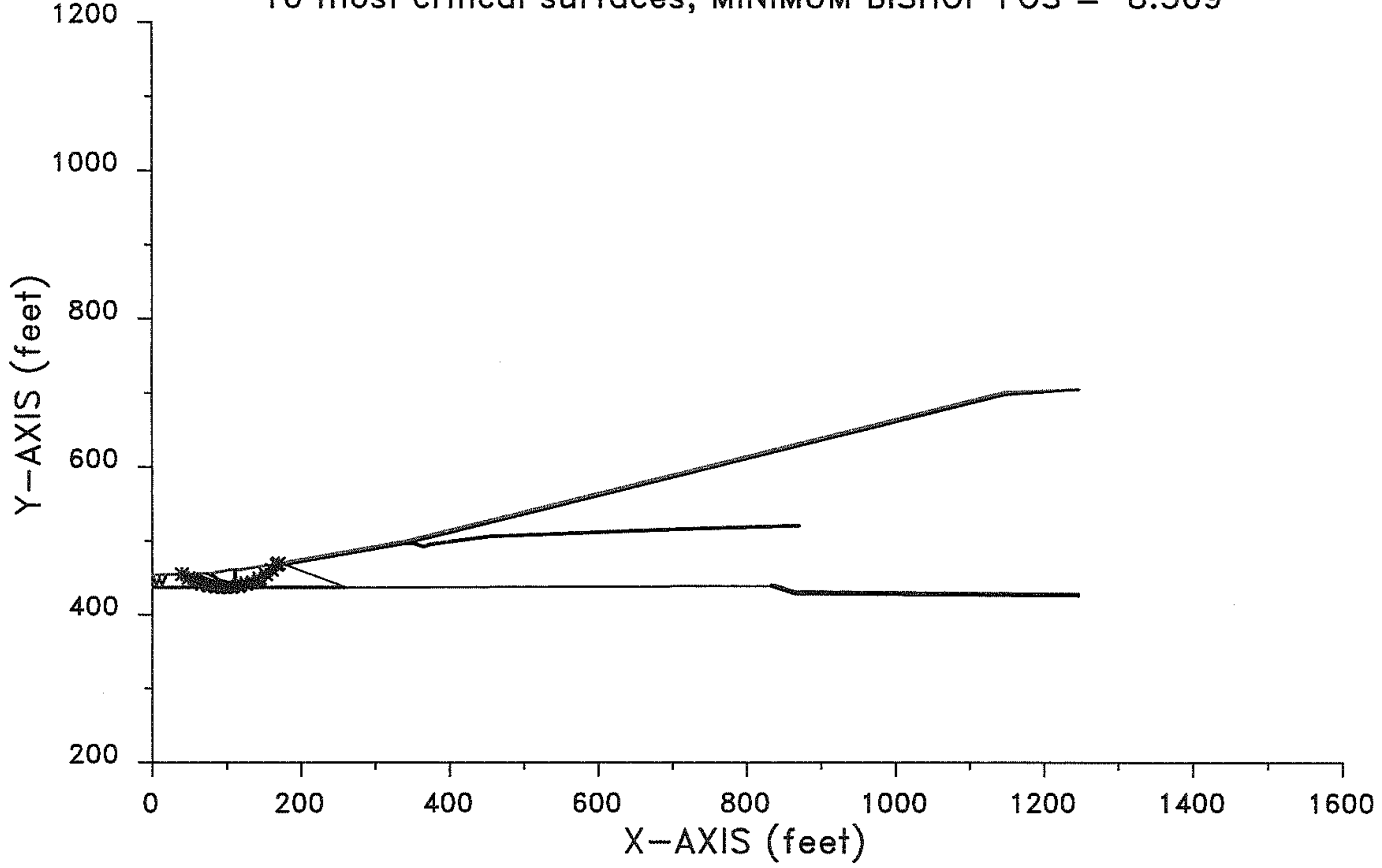
         FOS        Circle Center       Radius   Initial Terminal  Resisting
       (BISHOP)   x-coord  y-coord              x-coord  x-coord    Moment
                    (ft)     (ft)         (ft)     (ft)     (ft)     (ft-lb)

  1.    2.231     327.50  2016.01  1576.19     88.89  1199.39  4.092E+09
  2.    2.241     284.45  2206.67  1759.60     88.89  1198.25  4.098E+09
  3.    2.241     276.31  2233.79  1784.01     94.44  1192.03  3.952E+09
  4.    2.244     311.98  2025.18  1586.59     77.78  1188.16  4.042E+09
  5.    2.257     313.24  1884.63  1440.34    100.00  1126.13  3.076E+09
  6.    2.292     284.79  1936.33  1499.55     50.00  1127.48  3.411E+09
  7.    2.302     560.60   914.38   674.06     66.67  1200.64  4.239E+09
  8.    2.304     549.77   924.47   685.51     50.00  1198.21  4.354E+09
  9.    2.304     553.44   918.73   680.12     55.56  1198.22  4.307E+09
 10.    2.307     552.78   917.34   678.68     55.56  1196.53  4.292E+09

                    *  *  *   END OF FILE   *  *  *
```

5-2E 10-10-11 40:49

CAMELOT LF – FINAL COVER SEC 5–2E
10 most critical surfaces, MINIMUM BISHOP FOS = 8.309



```
XSTABL File: 5-2E      10-10-11   40:49

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                 96 - 2046  *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 5-2E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment    x-left     y-left     x-right    y-right      Soil Unit
      No.       (ft)       (ft)       (ft)       (ft)      Below Segment

       1          .0       454.0       78.8      456.0           1
       2        78.8       456.0      105.3      461.2           1
       3       105.3       461.2      109.7      461.2           1
       4       109.7       461.2      112.7      461.2          11
       5       112.7       461.2      118.2      461.2           1
       6       118.2       461.2      157.8      467.6          10
       7       157.8       467.6      172.9      470.0           5
       8       172.9       470.0      342.7      500.0           5
       9       342.7       500.0     1146.7      701.0           5
      10      1146.7       701.0     1246.7      705.0           5


       47 SUBSURFACE boundary segments

    Segment    x-left     y-left     x-right    y-right      Soil Unit
      No.       (ft)       (ft)       (ft)       (ft)      Below Segment

       1       157.8       467.6      179.3      467.6          10
       2       179.3       467.6      337.9      495.6           4
       3       337.9       495.6      343.4      496.6           9
       4       343.4       496.6      347.5      497.6           9
       5       347.5       497.6     1147.2      697.5           4
       6      1147.2       697.5     1246.7      705.0           4
       7       347.5       497.6      352.4      497.6           9
```

```
    8       352.4      497.6      365.1      493.3          9
    9       365.1      493.3      374.1      496.4          9
   10       374.1      496.4      454.4      507.0          4
   11       454.4      507.0      704.5      517.0          9
   12       704.5      517.0      871.2      522.0          9
   13       337.9      495.6      352.1      495.6          4
   14       352.1      495.6      365.1      491.2          4
   15       365.1      491.2      374.6      494.4          4
   16       374.6      494.4      454.6      505.0          4
   17       454.6      505.0      704.6      515.0          4
   18       704.6      515.0      871.3      520.0          4
   19       179.3      467.6      196.2      461.2         10
   20       196.2      461.2      257.6      438.0          1
   21       257.6      438.0      262.1      436.3          2
   22       262.1      436.3      372.0      437.0          3
   23       372.0      437.0      779.4      439.0          3
   24       779.4      439.0      830.6      439.0          3
   25       830.6      439.0      833.0      440.9          6
   26       833.0      440.9      837.5      440.9          6
   27       837.5      440.9      864.2      432.0          6
   28       864.2      432.0     1110.2      430.0          6
   29      1110.2      430.0     1246.7      429.0          6
   30       830.6      439.0      836.9      439.0          7
   31       836.9      439.0      863.9      430.0          7
   32       863.9      430.0     1110.2      428.0          8
   33      1110.2      428.0     1246.7      427.0          8
   34       830.6      439.0      863.6      428.0          3
   35       863.6      428.0     1110.2      426.0          3
   36      1110.2      426.0     1246.7      425.0          3
   37       109.7      461.2      109.8      438.0          1
   38          .0      438.0      109.8      438.0          2
   39       112.7      461.2      112.8      438.0         11
   40       112.8      438.0      257.6      438.0          2
   41       109.8      438.0      109.9      436.3          2
   42          .0      436.3      109.9      436.3          3
   43       112.8      438.0      112.9      436.3         11
   44       112.9      436.3      262.1      436.3          3
   45       109.9      436.3      110.0      433.3          3
   46       112.9      436.3      113.0      433.3         11
   47       110.0      433.3      113.0      433.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

11 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist   Sat.   Intercept   Angle   Parameter Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.

  1   127.0   131.0     854.0    11.00     .000         .0       0
  2   132.0   135.0     488.0    16.40     .000         .0       1
  3   130.0   135.0    5000.0      .00     .000         .0       0
  4    65.0    65.0     288.0    23.00     .000         .0       0
  5   115.0   120.0     100.0    16.00     .000         .0       0
```

```
  6   115.0   120.0     100.0    16.00      .000        .0      0
  7   115.0   120.0     100.0    16.00      .000        .0      0
  8   115.0   120.0     100.0    16.00      .000        .0      0
  9   115.0   120.0     100.0    16.00      .000        .0      0
 10   115.0   120.0    1074.0    13.10      .000        .0      0
 11    75.0    75.0        .0     5.00      .000        .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1            .00      438.00
    2         109.70      438.00



A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     20.0 ft
                              and  x =     80.0 ft


Each surface terminates between   x =    140.0 ft
                             and   x =    170.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


   10.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
```

```
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=  (slope angle - 5.0) degrees



************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------



    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



      The most critical circular failure surface
      is specified by 16 coordinate points

           Point        x-surf       y-surf
            No.          (ft)         (ft)

             1           40.00       455.02
             2           48.44       449.65
             3           57.38       445.17
             4           66.73       441.63
             5           76.40       439.06
             6           86.27       437.48
             7           96.25       436.92
             8          106.24       437.37
             9          116.14       438.84
            10          125.83       441.31
            11          135.21       444.76
            12          144.20       449.14
            13          152.70       454.41
            14          160.62       460.52
            15          167.87       467.40
            16          169.66       469.48

    ****  Simplified BISHOP FOS =   8.309  ****
```

```
**********************************************************************
**                                                                  **
**  Out of the    100 surfaces generated and analyzed by XSTABL,    **
**        7 surfaces were found to have MISLEADING FOS values.      **
**                                                                  **
**********************************************************************




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 5-2E

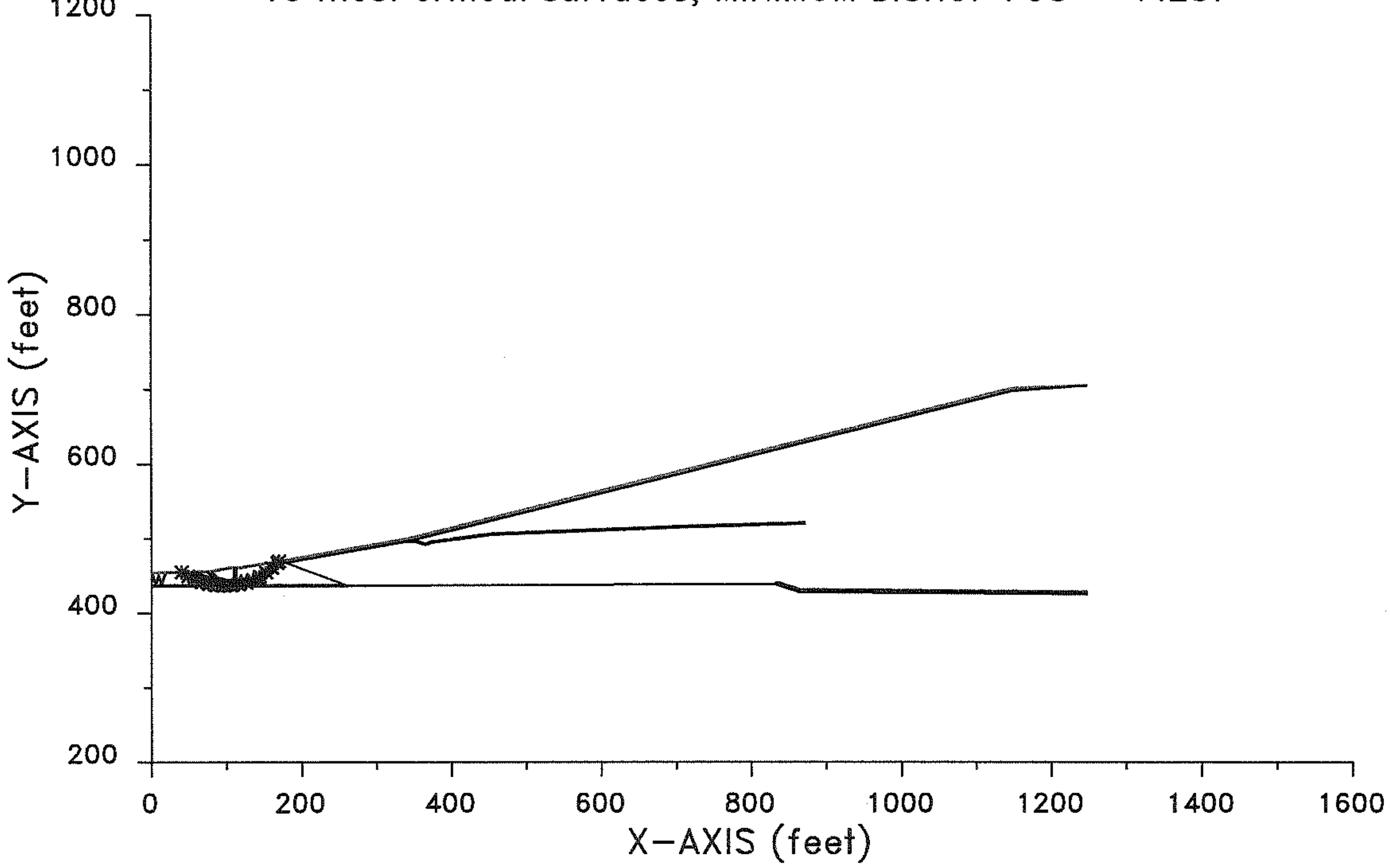
       FOS       Circle Center      Radius   Initial  Terminal  Resisting
     (BISHOP)   x-coord  y-coord            x-coord   x-coord    Moment
                  (ft)     (ft)       (ft)     (ft)      (ft)    (ft-lb)

  1.   8.309      96.78   535.03     98.12    40.00    169.66  1.764E+07
  2.   8.516     102.83   529.78     89.38    53.33    168.47  1.396E+07
  3.   8.599     121.03   490.44     53.42    80.00    170.12  7.631E+06
  4.   8.660     113.81   518.68     74.73    73.33    169.89  9.679E+06
  5.   8.726     105.76   501.89     65.15    60.00    161.32  9.879E+06
  6.   8.741     105.69   506.63     68.55    60.00    162.35  1.029E+07
  7.   8.807      98.03   543.27    101.97    46.67    168.08  1.615E+07
  8.   8.845     105.22   539.06     94.99    60.00    169.80  1.329E+07
  9.   8.915      93.78   527.97     90.63    40.00    161.75  1.521E+07
 10.   8.989     120.10   492.26     53.91    80.00    168.64  7.621E+06

                         * * *  END OF FILE  * * *
```

5-2T 10-10-11 40:51

CAMELOT LF – FINAL COVER SEC 5-2T
10 most critical surfaces, MINIMUM BISHOP FOS = 7.287



```
XSTABL File: 5-2T      10-10-11   40:51

             ******************************************
             *                X S T A B L             *
             *                                        *
             *         Slope Stability Analysis       *
             *                using the               *
             *            Method of Slices            *
             *                                        *
             *         Copyright (C) 1992 - 2008      *
             *    Interactive Software Designs, Inc.  *
             *         Moscow, ID 83843, U.S.A.       *
             *                                        *
             *           All Rights Reserved          *
             *                                        *
             *  Ver. 5.208                96 - 2046   *
             ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 5-2T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1           .0      454.0       78.8      456.0          1
       2         78.8      456.0      105.3      461.2          1
       3        105.3      461.2      109.7      461.2          1
       4        109.7      461.2      112.7      461.2         11
       5        112.7      461.2      118.2      461.2          1
       6        118.2      461.2      157.8      467.6         10
       7        157.8      467.6      172.9      470.0          5
       8        172.9      470.0      342.7      500.0          5
       9        342.7      500.0     1146.7      701.0          5
      10       1146.7      701.0     1246.7      705.0          5


       47 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1        157.8      467.6      179.3      467.6         10
       2        179.3      467.6      337.9      495.6          4
       3        337.9      495.6      343.4      496.6          9
       4        343.4      496.6      347.5      497.6          9
       5        347.5      497.6     1147.2      697.5          4
       6       1147.2      697.5     1246.7      705.0          4
       7        347.5      497.6      352.4      497.6          9
```

```
   8       352.4      497.6      365.1      493.3          9
   9       365.1      493.3      374.1      496.4          9
  10       374.1      496.4      454.4      507.0          4
  11       454.4      507.0      704.5      517.0          9
  12       704.5      517.0      871.2      522.0          9
  13       337.9      495.6      352.1      495.6          4
  14       352.1      495.6      365.1      491.2          4
  15       365.1      491.2      374.6      494.4          4
  16       374.6      494.4      454.6      505.0          4
  17       454.6      505.0      704.6      515.0          4
  18       704.6      515.0      871.3      520.0          4
  19       179.3      467.6      196.2      461.2         10
  20       196.2      461.2      257.6      438.0          1
  21       257.6      438.0      262.1      436.3          2
  22       262.1      436.3      372.0      437.0          3
  23       372.0      437.0      779.4      439.0          3
  24       779.4      439.0      830.6      439.0          3
  25       830.6      439.0      833.0      440.9          6
  26       833.0      440.9      837.5      440.9          6
  27       837.5      440.9      864.2      432.0          6
  28       864.2      432.0     1110.2      430.0          6
  29      1110.2      430.0     1246.7      429.0          6
  30       830.6      439.0      836.9      439.0          7
  31       836.9      439.0      863.9      430.0          7
  32       863.9      430.0     1110.2      428.0          8
  33      1110.2      428.0     1246.7      427.0          8
  34       830.6      439.0      863.6      428.0          3
  35       863.6      428.0     1110.2      426.0          3
  36      1110.2      426.0     1246.7      425.0          3
  37       109.7      461.2      109.8      438.0          1
  38          .0      438.0      109.8      438.0          2
  39       112.7      461.2      112.8      438.0         11
  40       112.8      438.0      257.6      438.0          2
  41       109.8      438.0      109.9      436.3          2
  42          .0      436.3      109.9      436.3          3
  43       112.8      438.0      112.9      436.3         11
  44       112.9      436.3      262.1      436.3          3
  45       109.9      436.3      110.0      433.3          3
  46       112.9      436.3      113.0      433.3         11
  47       110.0      433.3      113.0      433.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

11 Soil unit(s) specified

Soil   Unit Weight    Cohesion  Friction    Pore Pressure        Water
Unit  Moist    Sat.   Intercept   Angle   Parameter  Constant   Surface
 No.  (pcf)   (pcf)     (psf)     (deg)      Ru        (psf)      No.

  1   127.0   131.0     788.0     11.50      .000          .0       0
  2   132.0   135.0     470.0      8.30      .000          .0       1
  3   130.0   135.0    5000.0       .00      .000          .0       0
  4    65.0    65.0     288.0     23.00      .000          .0       0
  5   115.0   120.0     100.0     16.00      .000          .0       0
```

```
    6   115.0   120.0     100.0    16.00      .000         .0     0
    7   115.0   120.0     100.0    16.00      .000         .0     0
    8   115.0   120.0     100.0    16.00      .000         .0     0
    9   115.0   120.0     100.0    16.00      .000         .0     0
   10   115.0   120.0     834.0    16.00      .000         .0     0
   11    75.0    75.0        .0     5.00      .000         .0     0


  ----------------------------------------------------------------------
----
   UNDRAINED STRENGTHS as a function of effective vertical stress
                     have been specified for  3 Soil Unit(s)
  ----------------------------------------------------------------------
----

            Soil Unit #      Parameter a     Parameter Psi

                 1.              788.0           11.50
                 2.              470.0            8.30
                10.              834.0           16.00


   1 Water surface(s) have been specified

  Unit weight of water =    62.40  (pcf)


  Water Surface No.  1 specified by  2 coordinate points

  **********************************
           PHREATIC SURFACE,
  **********************************

    Point       x-water     y-water
     No.         (ft)        (ft)

      1           .00       438.00
      2        109.70       438.00


  A critical failure surface searching method, using a random
  technique for generating CIRCULAR surfaces has been specified.


    100 trial surfaces will be generated and analyzed.


    10 Surfaces initiate from each of  10 points equally spaced
  along the ground surface between  x =     20.0 ft
                                  and  x =     80.0 ft


  Each surface terminates between   x =    140.0 ft
                                 and   x =    170.0 ft
```

```
    Unless further limitations were imposed, the minimum elevation
    at which a surface extends is  y =       .0 ft


       10.0 ft line segments define each trial failure surface.



    ---------------------
    ANGULAR RESTRICTIONS
    ---------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=  (slope angle - 5.0) degrees

************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 16 coordinate points

           Point      x-surf      y-surf
            No.        (ft)        (ft)

             1         40.00      455.02
             2         48.44      449.65
             3         57.38      445.17
             4         66.73      441.63
             5         76.40      439.06
             6         86.27      437.48
             7         96.25      436.92
             8        106.24      437.37
             9        116.14      438.84
            10        125.83      441.31
```

```
         11          135.21       444.76
         12          144.20       449.14
         13          152.70       454.41
         14          160.62       460.52
         15          167.87       467.40
         16          169.66       469.48

****  Simplified BISHOP FOS =   7.287  ****


**********************************************************************
**                                                                  **
**  Out of the    100 surfaces generated and analyzed by XSTABL,   **
**        4 surfaces were found to have MISLEADING FOS values.     **
**                                                                  **
**********************************************************************



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 5-2T

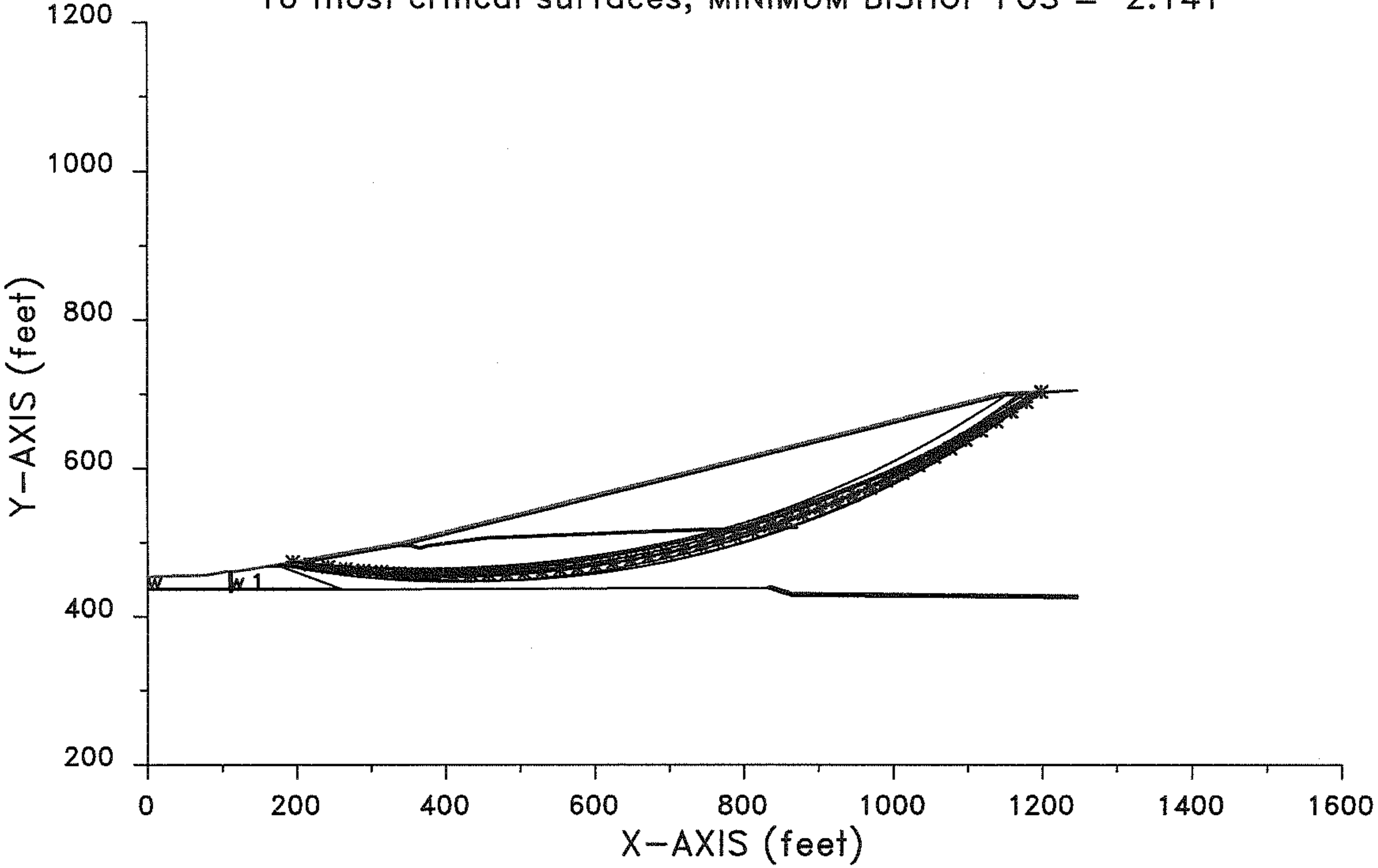
        FOS       Circle Center      Radius   Initial Terminal  Resisting
     (BISHOP)   x-coord  y-coord              x-coord  x-coord    Moment
                  (ft)     (ft)        (ft)     (ft)     (ft)     (ft-lb)

 1.    7.287     96.78   535.03      98.12    40.00   169.66  1.547E+07
 2.    7.660    105.76   501.89      65.15    60.00   161.32  8.673E+06
 3.    7.679    121.03   490.44      53.42    80.00   170.12  6.815E+06
 4.    7.896    102.83   529.78      89.38    53.33   168.47  1.295E+07
 5.    7.910     93.78   527.97      90.63    40.00   161.75  1.350E+07
 6.    7.942    113.81   518.68      74.73    73.33   169.89  8.877E+06
 7.    8.104    105.22   539.06      94.99    60.00   169.80  1.218E+07
 8.    8.138     98.03   543.27     101.97    46.67   168.08  1.492E+07
 9.    8.155    105.69   506.63      68.55    60.00   162.35  9.601E+06
10.    8.299    113.76   489.68      52.71    73.33   161.66  6.545E+06

                    * * *  END OF FILE  * * *
```

5-3E 10-10-11 40:52

CAMELOT LF – FINAL COVER SEC 5-3E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.141



```
XSTABL File: 5-3E      10-10-11   40:52

          ******************************************
          *               X S T A B L              *
          *                                        *
          *        Slope Stability Analysis        *
          *                using the               *
          *            Method of Slices            *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 5-3E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1           .0      454.0       78.8      456.0          1
       2         78.8      456.0      105.3      461.2          1
       3        105.3      461.2      109.7      461.2          1
       4        109.7      461.2      112.7      461.2         11
       5        112.7      461.2      118.2      461.2          1
       6        118.2      461.2      157.8      467.6         10
       7        157.8      467.6      172.9      470.0          5
       8        172.9      470.0      342.7      500.0          5
       9        342.7      500.0     1146.7      701.0          5
      10       1146.7      701.0     1246.7      705.0          5

       47 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1        157.8      467.6      179.3      467.6         10
       2        179.3      467.6      337.9      495.6          4
       3        337.9      495.6      343.4      496.6          9
       4        343.4      496.6      347.5      497.6          9
       5        347.5      497.6     1147.2      697.5          4
       6       1147.2      697.5     1246.7      705.0          4
       7        347.5      497.6      352.4      497.6          9
```

```
   8       352.4      497.6      365.1      493.3          9
   9       365.1      493.3      374.1      496.4          9
  10       374.1      496.4      454.4      507.0          4
  11       454.4      507.0      704.5      517.0          9
  12       704.5      517.0      871.2      522.0          9
  13       337.9      495.6      352.1      495.6          4
  14       352.1      495.6      365.1      491.2          4
  15       365.1      491.2      374.6      494.4          4
  16       374.6      494.4      454.6      505.0          4
  17       454.6      505.0      704.6      515.0          4
  18       704.6      515.0      871.3      520.0          4
  19       179.3      467.6      196.2      461.2         10
  20       196.2      461.2      257.6      438.0          1
  21       257.6      438.0      262.1      436.3          2
  22       262.1      436.3      372.0      437.0          3
  23       372.0      437.0      779.4      439.0          3
  24       779.4      439.0      830.6      439.0          3
  25       830.6      439.0      833.0      440.9          6
  26       833.0      440.9      837.5      440.9          6
  27       837.5      440.9      864.2      432.0          6
  28       864.2      432.0     1110.2      430.0          6
  29      1110.2      430.0     1246.7      429.0          6
  30       830.6      439.0      836.9      439.0          7
  31       836.9      439.0      863.9      430.0          7
  32       863.9      430.0     1110.2      428.0          8
  33      1110.2      428.0     1246.7      427.0          8
  34       830.6      439.0      863.6      428.0          3
  35       863.6      428.0     1110.2      426.0          3
  36      1110.2      426.0     1246.7      425.0          3
  37       109.7      461.2      109.8      438.0          1
  38          .0      438.0      109.8      438.0          2
  39       112.7      461.2      112.8      438.0         11
  40       112.8      438.0      257.6      438.0          2
  41       109.8      438.0      109.9      436.3          2
  42          .0      436.3      109.9      436.3          3
  43       112.8      438.0      112.9      436.3         11
  44       112.9      436.3      262.1      436.3          3
  45       109.9      436.3      110.0      433.3          3
  46       112.9      436.3      113.0      433.3         11
  47       110.0      433.3      113.0      433.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

11 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00     .000         .0        0
  2   132.0   135.0     488.0    16.40     .000         .0        1
  3   130.0   135.0    5000.0      .00     .000         .0        0
  4    65.0    65.0     288.0    23.00     .000         .0        0
  5   115.0   120.0     100.0    16.00     .000         .0        0
```

```
  6   115.0   120.0     100.0    16.00      .000         .0      0
  7   115.0   120.0     100.0    16.00      .000         .0      0
  8   115.0   120.0     100.0    16.00      .000         .0      0
  9   115.0   120.0     100.0    16.00      .000         .0      0
 10   115.0   120.0    1074.0    13.10      .000         .0      0
 11    75.0    75.0        .0     5.00      .000         .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1             .00      438.00
    2          109.70      438.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =    175.0 ft
                             and  x =    200.0 ft


Each surface terminates between    x =   1100.0 ft
                            and    x =   1200.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   24.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
```

```
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 46 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1          194.44       473.81
          2          218.18       470.22
          3          241.97       467.05
          4          265.81       464.30
          5          289.69       461.96
          6          313.61       460.03
          7          337.57       458.52
          8          361.54       457.43
          9          385.53       456.76
         10          409.53       456.50
         11          433.53       456.66
         12          457.52       457.24
         13          481.50       458.23
         14          505.46       459.64
         15          529.39       461.47
         16          553.29       463.71
         17          577.14       466.37
         18          600.94       469.45
         19          624.69       472.93
         20          648.37       476.83
         21          671.98       481.14
         22          695.51       485.87
         23          718.95       490.99
         24          742.31       496.53
         25          765.56       502.47
         26          788.71       508.82
         27          811.74       515.56
         28          834.65       522.71
         29          857.43       530.25
         30          880.08       538.19
         31          902.59       546.52
         32          924.95       555.24
         33          947.15       564.35
```

```
           34         969.20       573.85
           35         991.07       583.72
           36        1012.77       593.98
           37        1034.29       604.61
           38        1055.62       615.61
           39        1076.75       626.98
           40        1097.68       638.72
           41        1118.41       650.82
           42        1138.92       663.28
           43        1159.22       676.10
           44        1179.28       689.26
           45        1199.12       702.77
           46        1199.60       703.12

  ****  Simplified BISHOP FOS =   2.141  ****



  The following is a summary of the TEN most critical surfaces

  Problem Description : CAMELOT LF - FINAL COVER SEC 5-3E

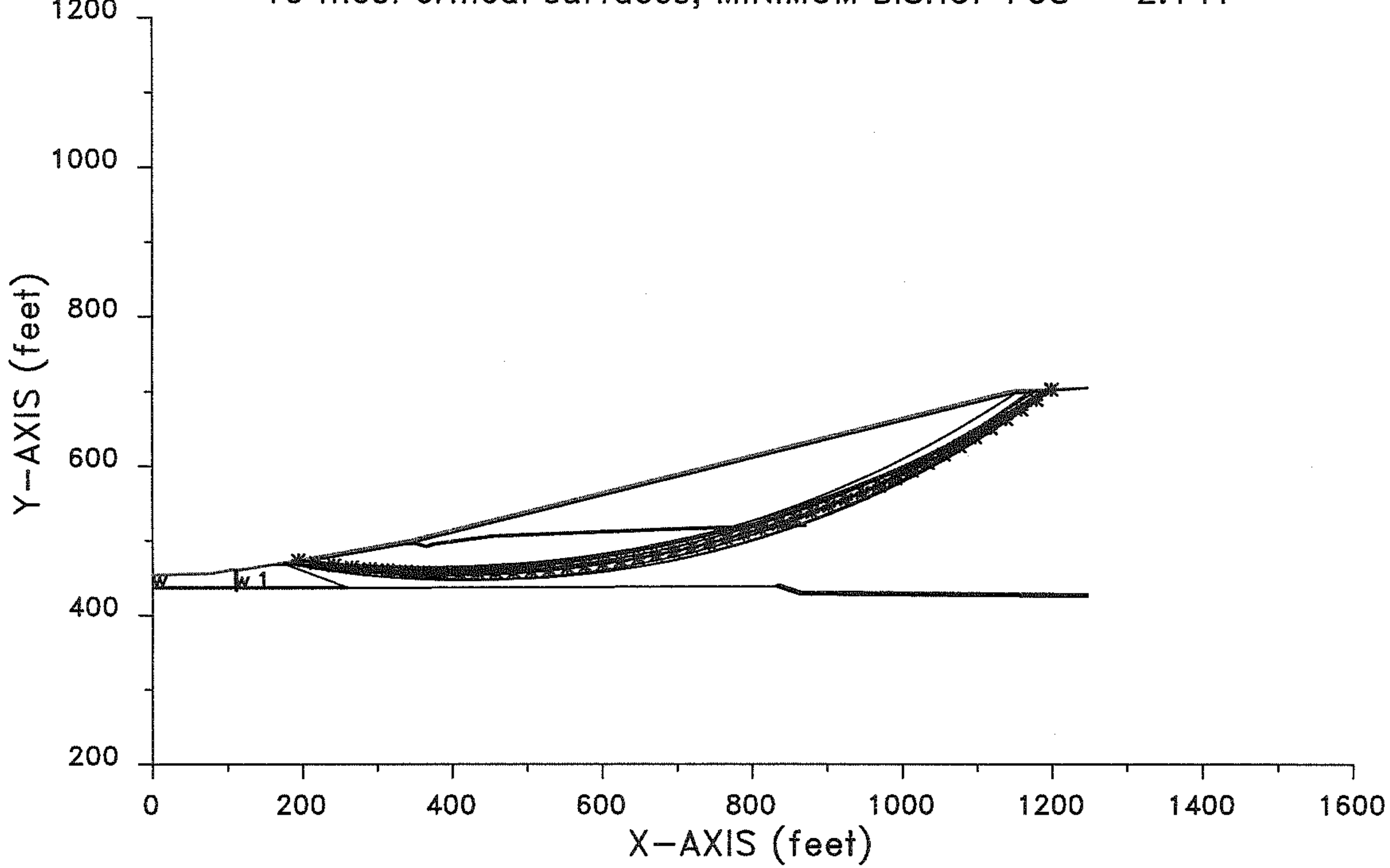
          FOS        Circle Center    Radius   Initial Terminal  Resisting
        (BISHOP)   x-coord  y-coord            x-coord  x-coord    Moment
                     (ft)     (ft)      (ft)     (ft)     (ft)     (ft-lb)

   1.    2.141     412.34  1836.50  1380.00   194.44  1199.60  3.161E+09
   2.    2.143     381.76  1873.63  1417.52   177.78  1180.16  3.058E+09
   3.    2.143     393.11  1872.48  1418.98   175.00  1196.67  3.282E+09
   4.    2.144     444.04  1672.51  1224.41   194.44  1191.61  3.059E+09
   5.    2.144     376.54  1989.01  1526.11   194.44  1198.27  3.167E+09
   6.    2.145     415.48  1697.50  1250.48   175.00  1172.24  2.983E+09
   7.    2.145     444.92  1694.70  1246.32   194.44  1199.93  3.158E+09
   8.    2.146     367.90  2010.76  1545.91   197.22  1191.89  3.073E+09
   9.    2.148     361.75  2026.60  1566.58   177.78  1199.91  3.321E+09
  10.    2.151     366.51  1861.28  1403.17   177.78  1156.08  2.772E+09

                       * * *  END OF FILE  * * *
```

5-3T 10-10-11 40:55

CAMELOT LF – FINAL COVER SEC 5-3T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.141



```
XSTABL File: 5-3T      10-10-11   40:55

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *                using the               *
          *            Method of Slices            *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 5-3T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
      No.       (ft)      (ft)       (ft)      (ft)    Below Segment

       1          .0     454.0       78.8     456.0          1
       2        78.8     456.0      105.3     461.2          1
       3       105.3     461.2      109.7     461.2          1
       4       109.7     461.2      112.7     461.2         11
       5       112.7     461.2      118.2     461.2          1
       6       118.2     461.2      157.8     467.6         10
       7       157.8     467.6      172.9     470.0          5
       8       172.9     470.0      342.7     500.0          5
       9       342.7     500.0     1146.7     701.0          5
      10      1146.7     701.0     1246.7     705.0          5


       47 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
      No.       (ft)      (ft)       (ft)      (ft)    Below Segment

       1       157.8     467.6      179.3     467.6         10
       2       179.3     467.6      337.9     495.6          4
       3       337.9     495.6      343.4     496.6          9
       4       343.4     496.6      347.5     497.6          9
       5       347.5     497.6     1147.2     697.5          4
       6      1147.2     697.5     1246.7     705.0          4
       7       347.5     497.6      352.4     497.6          9
```

```
     8        352.4      497.6      365.1      493.3          9
     9        365.1      493.3      374.1      496.4          9
    10        374.1      496.4      454.4      507.0          4
    11        454.4      507.0      704.5      517.0          9
    12        704.5      517.0      871.2      522.0          9
    13        337.9      495.6      352.1      495.6          4
    14        352.1      495.6      365.1      491.2          4
    15        365.1      491.2      374.6      494.4          4
    16        374.6      494.4      454.6      505.0          4
    17        454.6      505.0      704.6      515.0          4
    18        704.6      515.0      871.3      520.0          4
    19        179.3      467.6      196.2      461.2         10
    20        196.2      461.2      257.6      438.0          1
    21        257.6      438.0      262.1      436.3          2
    22        262.1      436.3      372.0      437.0          3
    23        372.0      437.0      779.4      439.0          3
    24        779.4      439.0      830.6      439.0          3
    25        830.6      439.0      833.0      440.9          6
    26        833.0      440.9      837.5      440.9          6
    27        837.5      440.9      864.2      432.0          6
    28        864.2      432.0     1110.2      430.0          6
    29       1110.2      430.0     1246.7      429.0          6
    30        830.6      439.0      836.9      439.0          7
    31        836.9      439.0      863.9      430.0          7
    32        863.9      430.0     1110.2      428.0          8
    33       1110.2      428.0     1246.7      427.0          8
    34        830.6      439.0      863.6      428.0          3
    35        863.6      428.0     1110.2      426.0          3
    36       1110.2      426.0     1246.7      425.0          3
    37        109.7      461.2      109.8      438.0          1
    38           .0      438.0      109.8      438.0          2
    39        112.7      461.2      112.8      438.0         11
    40        112.8      438.0      257.6      438.0          2
    41        109.8      438.0      109.9      436.3          2
    42           .0      436.3      109.9      436.3          3
    43        112.8      438.0      112.9      436.3         11
    44        112.9      436.3      262.1      436.3          3
    45        109.9      436.3      110.0      433.3          3
    46        112.9      436.3      113.0      433.3         11
    47        110.0      433.3      113.0      433.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

11 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction     Pore Pressure       Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     788.0    11.50     .000         .0        0
  2   132.0   135.0     470.0     8.30     .000         .0        1
  3   130.0   135.0    5000.0      .00     .000         .0        0
  4    65.0    65.0     288.0    23.00     .000         .0        0
  5   115.0   120.0     100.0    16.00     .000         .0        0
```

```
     6   115.0   120.0     100.0    16.00       .000          .0      0
     7   115.0   120.0     100.0    16.00       .000          .0      0
     8   115.0   120.0     100.0    16.00       .000          .0      0
     9   115.0   120.0     100.0    16.00       .000          .0      0
    10   115.0   120.0     834.0    16.00       .000          .0      0
    11    75.0    75.0        .0     5.00       .000          .0      0


 ----------------------------------------------------------------------
----
    UNDRAINED STRENGTHS as a function of effective vertical stress
                        have been specified for  3 Soil Unit(s)
 ----------------------------------------------------------------------
----


          Soil Unit #      Parameter a     Parameter Psi

               1.              788.0           11.50
               2.              470.0            8.30
              10.              834.0           16.00


  1 Water surface(s) have been specified

 Unit weight of water =    62.40  (pcf)


 Water Surface No.  1 specified by  2 coordinate points

 **********************************
          PHREATIC SURFACE,
 **********************************

   Point       x-water      y-water
    No.         (ft)         (ft)

     1            .00       438.00
     2         109.70       438.00


 A critical failure surface searching method, using a random
 technique for generating CIRCULAR surfaces has been specified.


   100 trial surfaces will be generated and analyzed.


   10 Surfaces initiate from each of  10 points equally spaced
 along the ground surface between  x =    175.0 ft
                                 and  x =    200.0 ft


 Each surface terminates between    x =   1100.0 ft
                                and    x =   1200.0 ft
```

```
Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   24.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 46 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          194.44       473.81
         2          218.18       470.22
         3          241.97       467.05
         4          265.81       464.30
         5          289.69       461.96
         6          313.61       460.03
         7          337.57       458.52
         8          361.54       457.43
         9          385.53       456.76
        10          409.53       456.50
        11          433.53       456.66
        12          457.52       457.24
        13          481.50       458.23
        14          505.46       459.64
        15          529.39       461.47
        16          553.29       463.71
        17          577.14       466.37
        18          600.94       469.45
        19          624.69       472.93
```

```
        20          648.37        476.83
        21          671.98        481.14
        22          695.51        485.87
        23          718.95        490.99
        24          742.31        496.53
        25          765.56        502.47
        26          788.71        508.82
        27          811.74        515.56
        28          834.65        522.71
        29          857.43        530.25
        30          880.08        538.19
        31          902.59        546.52
        32          924.95        555.24
        33          947.15        564.35
        34          969.20        573.85
        35          991.07        583.72
        36         1012.77        593.98
        37         1034.29        604.61
        38         1055.62        615.61
        39         1076.75        626.98
        40         1097.68        638.72
        41         1118.41        650.82
        42         1138.92        663.28
        43         1159.22        676.10
        44         1179.28        689.26
        45         1199.12        702.77
        46         1199.60        703.12

****  Simplified BISHOP FOS =   2.141  ****



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 5-3T

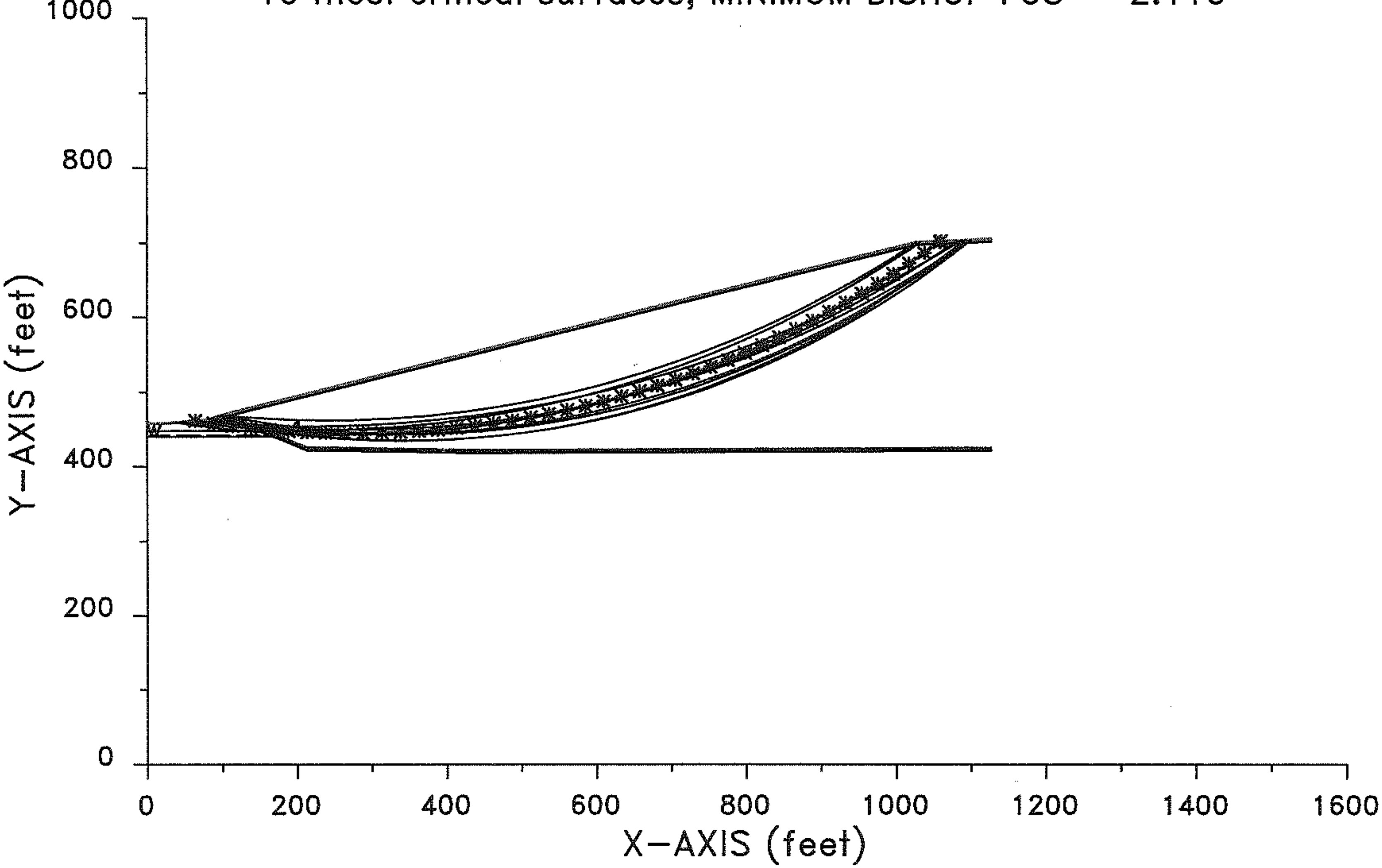
        FOS      Circle Center     Radius   Initial Terminal  Resisting
      (BISHOP)  x-coord  y-coord            x-coord  x-coord    Moment
                 (ft)     (ft)      (ft)     (ft)     (ft)     (ft-lb)

  1.    2.141    412.34  1836.50  1380.00   194.44  1199.60  3.161E+09
  2.    2.143    381.76  1873.63  1417.52   177.78  1180.16  3.058E+09
  3.    2.143    393.11  1872.48  1418.98   175.00  1196.67  3.282E+09
  4.    2.144    444.04  1672.51  1224.41   194.44  1191.61  3.059E+09
  5.    2.144    376.54  1989.01  1526.11   194.44  1198.27  3.167E+09
  6.    2.145    415.48  1697.50  1250.48   175.00  1172.24  2.983E+09
  7.    2.145    444.92  1694.70  1246.32   194.44  1199.93  3.158E+09
  8.    2.146    367.90  2010.76  1545.91   197.22  1191.89  3.073E+09
  9.    2.148    361.75  2026.60  1566.58   177.78  1199.91  3.321E+09
 10.    2.151    366.51  1861.28  1403.17   177.78  1156.08  2.772E+09

                    * * *  END OF FILE  * * *
```

6-1E 10-10-11 40:57

CAMELOT LF - FINAL COVER SEC 6-1E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.110



```
XSTABL File: 6-1E      10-10-11   40:57

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *              using the                *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 6-1E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
      No.       (ft)      (ft)      (ft)      (ft)    Below Segment

      1          .0      460.4       6.0     458.0         1
      2         6.0      458.0      22.0     458.0         1
      3        22.0      458.0      51.6     460.7         1
      4        51.6      460.7      69.3     462.0         1
      5        69.3      462.0      85.5     464.4         1
      6        85.5      464.4      95.1     468.0         9
      7        95.1      468.0    1027.1     701.0         5
      8      1027.1      701.0    1127.1     705.0         5


       23 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right    Soil Unit
      No.       (ft)      (ft)      (ft)      (ft)    Below Segment

      1        95.1      468.0      99.2     468.0         1
      2        99.2      468.0     104.1     468.0         7
      3       104.1      468.0     109.1     468.0         6
      4       109.1      468.0    1027.6     697.5         4
      5      1027.6      697.5    1127.3     701.5         4
      6       109.1      468.0     213.2     425.9         6
      7       213.2      425.9     408.8     422.9         6
      8       408.8      422.9     416.4     422.0         6
      9       416.4      422.0    1127.1     425.3         6
```

```
    10        104.1      468.0       213.2      423.9          7
    11        213.2      423.9       408.8      420.9          8
    12        408.8      420.9       416.4      420.0          8
    13        416.4      420.0      1127.3      423.3          8
    14         99.2      468.0       108.1      464.4          9
    15        108.1      464.4       148.8      448.0          8
    16        148.8      448.0       168.5      440.0          2
    17        168.5      440.0       213.2      421.9          3
    18        213.2      421.9       408.8      418.9          3
    19        408.8      418.9       416.4      418.0          3
    20        416.4      418.0      1127.1      421.3          3
    21         85.5      464.4       108.1      464.4          9
    22           .0      448.0       148.8      448.0          2
    23           .0      440.0       168.5      440.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 9 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure     Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.

  1   127.0   131.0     854.0    11.00     .000         .0       0
  2   132.0   135.0     488.0    16.40     .000         .0       1
  3   130.0   135.0    5000.0      .00     .000         .0       0
  4    65.0    65.0     288.0    23.00     .000         .0       0
  5   115.0   120.0     100.0    16.00     .000         .0       0
  6   115.0   120.0     100.0    16.00     .000         .0       0
  7   115.0   120.0     100.0    16.00     .000         .0       0
  8   115.0   120.0     100.0    16.00     .000         .0       0
  9   115.0   120.0    1074.0    13.10     .000         .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water      y-water
   No.          (ft)         (ft)

    1            .00       442.00
    2         163.60       442.00
```

```
A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     20.0 ft
                             and  x =    100.0 ft


Each surface terminates between   x =   1000.0 ft
                            and   x =   1100.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   25.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees




Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 44 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1          64.44       461.64
         2          89.16       457.88
         3         113.94       454.58
         4         138.78       451.75
```

```
         5        163.67      449.39
         6        188.60      447.50
         7        213.56      446.08
         8        238.54      445.14
         9        263.53      444.67
        10        288.53      444.67
        11        313.53      445.14
        12        338.51      446.09
        13        363.47      447.51
        14        388.40      449.40
        15        413.29      451.76
        16        438.13      454.59
        17        462.91      457.89
        18        487.62      461.66
        19        512.26      465.89
        20        536.82      470.59
        21        561.28      475.76
        22        585.64      481.38
        23        609.88      487.47
        24        634.01      494.01
        25        658.01      501.01
        26        681.88      508.46
        27        705.60      516.36
        28        729.16      524.70
        29        752.57      533.49
        30        775.80      542.73
        31        798.85      552.40
        32        821.72      562.50
        33        844.39      573.04
        34        866.86      584.00
        35        889.12      595.38
        36        911.16      607.18
        37        932.97      619.40
        38        954.54      632.03
        39        975.88      645.06
        40        996.96      658.50
        41       1017.79      672.33
        42       1038.35      686.55
        43       1058.63      701.16
        44       1060.18      702.32


****  Simplified BISHOP FOS =   2.110  ****




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 6-1E

       FOS      Circle Center    Radius   Initial Terminal  Resisting
     (BISHOP)  x-coord  y-coord           x-coord  x-coord   Moment
                 (ft)     (ft)     (ft)     (ft)     (ft)    (ft-lb)

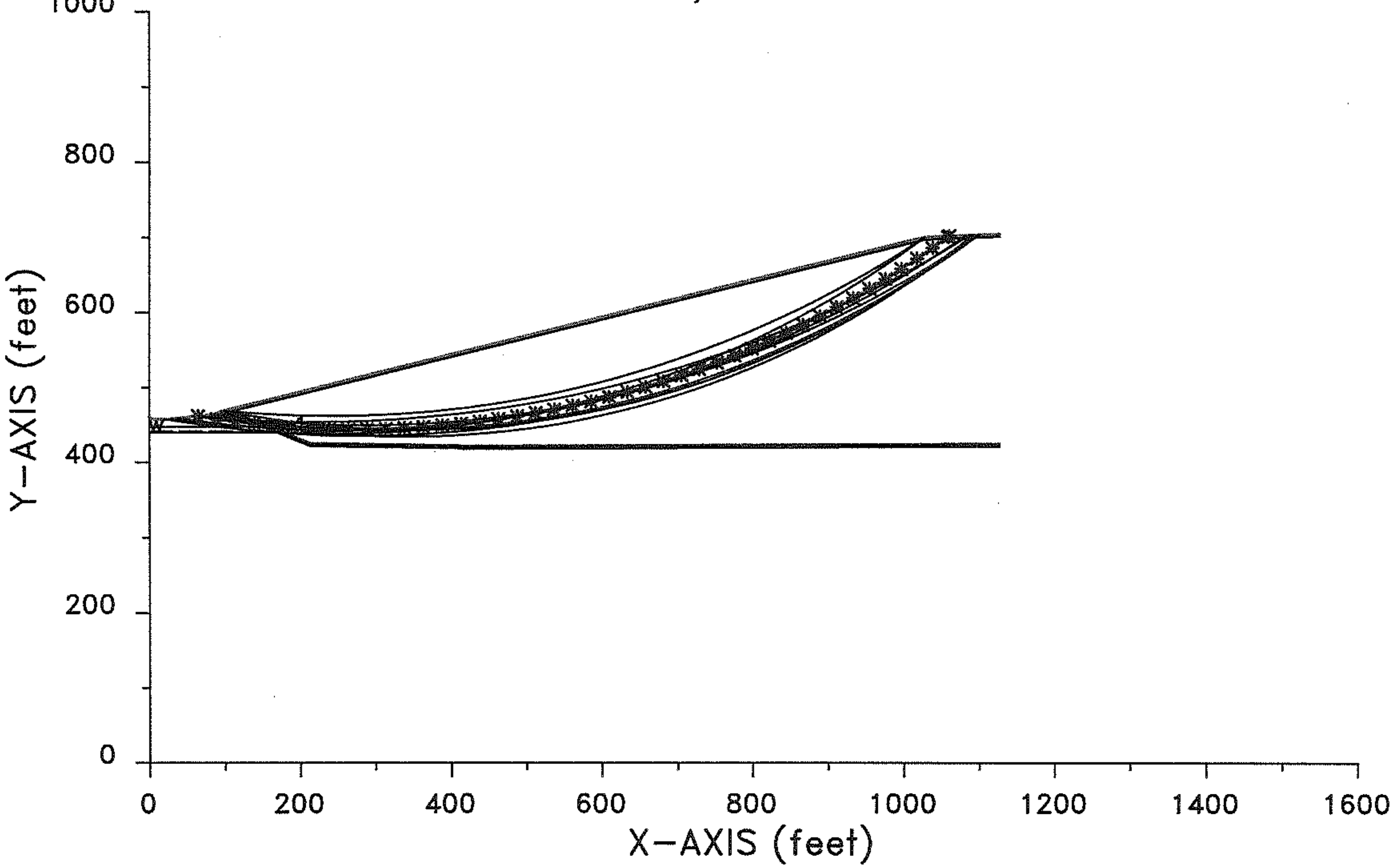
 1.   2.110    275.99  1766.63  1322.02    64.44  1060.18  3.176E+09
```

```
 2.    2.112     243.85  1866.76  1404.92   100.00  1027.98  2.542E+09
 3.    2.112     284.40  1878.73  1429.19    82.22  1098.10  3.549E+09
 4.    2.116     347.24  1639.78  1196.38   100.00  1092.09  3.225E+09
 5.    2.116     315.82  1750.13  1307.26    82.22  1099.58  3.527E+09
 6.    2.121     221.71  2081.01  1626.98    64.44  1087.30  3.606E+09
 7.    2.124     343.66  1606.55  1172.17    82.22  1090.99  3.393E+09
 8.    2.126     345.00  1627.67  1193.06    82.22  1099.93  3.505E+09
 9.    2.130     225.30  1869.04  1420.07    46.67  1033.22  2.974E+09
10.    2.131     258.64  1871.90  1429.62    37.78  1082.01  3.643E+09

                         * * *  END OF FILE  * * *
```

6-1T 10-10-11 40:59

CAMELOT LF - FINAL COVER SEC 6-1T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.105



```
XSTABL File: 6-1T      10-10-11   40:59

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 6-1T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1           .0       460.4        6.0       458.0          1
       2          6.0       458.0       22.0       458.0          1
       3         22.0       458.0       51.6       460.7          1
       4         51.6       460.7       69.3       462.0          1
       5         69.3       462.0       85.5       464.4          1
       6         85.5       464.4       95.1       468.0          9
       7         95.1       468.0     1027.1       701.0          5
       8       1027.1       701.0     1127.1       705.0          5


       23 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1         95.1       468.0       99.2       468.0          1
       2         99.2       468.0      104.1       468.0          7
       3        104.1       468.0      109.1       468.0          6
       4        109.1       468.0     1027.6       697.5          4
       5       1027.6       697.5     1127.3       701.5          4
       6        109.1       468.0      213.2       425.9          6
       7        213.2       425.9      408.8       422.9          6
       8        408.8       422.9      416.4       422.0          6
       9        416.4       422.0     1127.1       425.3          6
```

```
   10        104.1      468.0      213.2      423.9          7
   11        213.2      423.9      408.8      420.9          8
   12        408.8      420.9      416.4      420.0          8
   13        416.4      420.0     1127.3      423.3          8
   14         99.2      468.0      108.1      464.4          9
   15        108.1      464.4      148.8      448.0          8
   16        148.8      448.0      168.5      440.0          2
   17        168.5      440.0      213.2      421.9          3
   18        213.2      421.9      408.8      418.9          3
   19        408.8      418.9      416.4      418.0          3
   20        416.4      418.0     1127.1      421.3          3
   21         85.5      464.4      108.1      464.4          9
   22           .0      448.0      148.8      448.0          2
   23           .0      440.0      168.5      440.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 9 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     788.0    11.50     .000         .0        0
  2   132.0   135.0     470.0     8.30     .000         .0        1
  3   130.0   135.0    5000.0      .00     .000         .0        0
  4    65.0    65.0     288.0    23.00     .000         .0        0
  5   115.0   120.0     100.0    16.00     .000         .0        0
  6   115.0   120.0     100.0    16.00     .000         .0        0
  7   115.0   120.0     100.0    16.00     .000         .0        0
  8   115.0   120.0     100.0    16.00     .000         .0        0
  9   115.0   120.0     834.0    16.00     .000         .0        0


----------------------------------------------------------------------
----
 UNDRAINED STRENGTHS as a function of effective vertical stress
                    have been specified for  3 Soil Unit(s)
----------------------------------------------------------------------
----

          Soil Unit #       Parameter a      Parameter Psi

               1.                788.0            11.50
               2.                470.0             8.30
               9.                834.0            16.00


 1 Water surface(s) have been specified

Unit weight of water =    62.40   (pcf)
```

```
Water Surface No.  1 specified by  2 coordinate points

*********************************
         PHREATIC SURFACE,
*********************************

  Point       x-water     y-water
   No.         (ft)        (ft)

    1            .00      442.00
    2         163.60      442.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =      20.0 ft
                             and  x =     100.0 ft


Each surface terminates between   x =   1000.0 ft
                            and   x =   1100.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   25.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :
```

```
* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 44 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1           64.44       461.64
         2           89.16       457.88
         3          113.94       454.58
         4          138.78       451.75
         5          163.67       449.39
         6          188.60       447.50
         7          213.56       446.08
         8          238.54       445.14
         9          263.53       444.67
        10          288.53       444.67
        11          313.53       445.14
        12          338.51       446.09
        13          363.47       447.51
        14          388.40       449.40
        15          413.29       451.76
        16          438.13       454.59
        17          462.91       457.89
        18          487.62       461.66
        19          512.26       465.89
        20          536.82       470.59
        21          561.28       475.76
        22          585.64       481.38
        23          609.88       487.47
        24          634.01       494.01
        25          658.01       501.01
        26          681.88       508.46
        27          705.60       516.36
        28          729.16       524.70
        29          752.57       533.49
        30          775.80       542.73
        31          798.85       552.40
        32          821.72       562.50
        33          844.39       573.04
        34          866.86       584.00
        35          889.12       595.38
        36          911.16       607.18
        37          932.97       619.40
        38          954.54       632.03
        39          975.88       645.06
        40          996.96       658.50
        41         1017.79       672.33
        42         1038.35       686.55
        43         1058.63       701.16
        44         1060.18       702.32


****  Simplified BISHOP FOS =   2.105  ****
```

```
The following is a summary of the TEN most critical surfaces

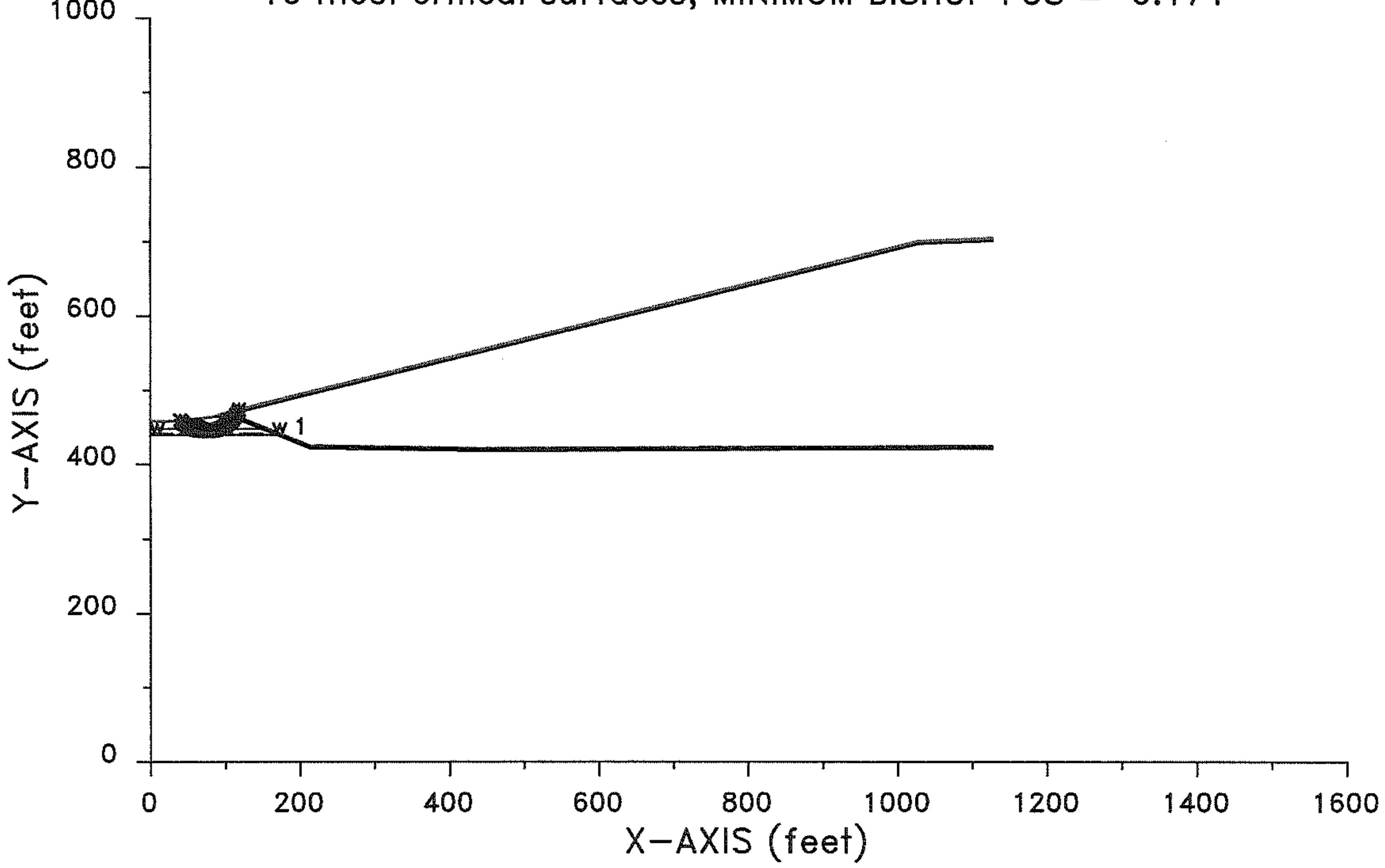
Problem Description : CAMELOT LF - FINAL COVER SEC 6-1T

      FOS       Circle Center     Radius   Initial Terminal  Resisting
    (BISHOP)   x-coord  y-coord             x-coord  x-coord    Moment
                 (ft)     (ft)      (ft)      (ft)     (ft)    (ft-lb)

 1.   2.105    275.99  1766.63  1322.02     64.44  1060.18  3.168E+09
 2.   2.108    284.40  1878.73  1429.19     82.22  1098.10  3.541E+09
 3.   2.112    315.82  1750.13  1307.26     82.22  1099.58  3.520E+09
 4.   2.112    243.85  1866.76  1404.92    100.00  1027.98  2.542E+09
 5.   2.115    221.71  2081.01  1626.98     64.44  1087.30  3.596E+09
 6.   2.116    347.24  1639.78  1196.38    100.00  1092.09  3.225E+09
 7.   2.117    281.61  1816.52  1381.21     28.89  1099.95  3.879E+09
 8.   2.117    258.64  1871.90  1429.62     37.78  1082.01  3.618E+09
 9.   2.119    243.98  1741.57  1302.97     20.00  1028.12  3.013E+09
10.   2.120    343.66  1606.55  1172.17     82.22  1090.99  3.387E+09

                     * * *  END OF FILE  * * *
```

6-2E 10-10-11 41:01



CAMELOT LF - FINAL COVER SEC 6-2E
10 most critical surfaces, MINIMUM BISHOP FOS = 6.171

```
XSTABL File: 6-2E      10-10-11   41:01

          ******************************************
          *              X S T A B L               *
          *                                        *
          *       Slope Stability Analysis         *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *       Copyright (C) 1992 - 2008        *
          *   Interactive Software Designs, Inc.   *
          *       Moscow, ID 83843, U.S.A.         *
          *                                        *
          *         All Rights Reserved            *
          *                                        *
          *  Ver. 5.208                 96 - 2046  *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 6-2E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1           .0       460.4        6.0       458.0          1
       2          6.0       458.0       22.0       458.0          1
       3         22.0       458.0       51.6       460.7          1
       4         51.6       460.7       69.3       462.0          1
       5         69.3       462.0       85.5       464.4          1
       6         85.5       464.4       95.1       468.0          9
       7         95.1       468.0     1027.1       701.0          5
       8       1027.1       701.0     1127.1       705.0          5


       23 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)     Below Segment

       1         95.1       468.0       99.2       468.0          1
       2         99.2       468.0      104.1       468.0          7
       3        104.1       468.0      109.1       468.0          6
       4        109.1       468.0     1027.6       697.5          4
       5       1027.6       697.5     1127.3       701.5          4
       6        109.1       468.0      213.2       425.9          6
       7        213.2       425.9      408.8       422.9          6
       8        408.8       422.9      416.4       422.0          6
       9        416.4       422.0     1127.1       425.3          6
```

```
   10        104.1      468.0      213.2      423.9          7
   11        213.2      423.9      408.8      420.9          8
   12        408.8      420.9      416.4      420.0          8
   13        416.4      420.0     1127.3      423.3          8
   14         99.2      468.0      108.1      464.4          9
   15        108.1      464.4      148.8      448.0          8
   16        148.8      448.0      168.5      440.0          2
   17        168.5      440.0      213.2      421.9          3
   18        213.2      421.9      408.8      418.9          3
   19        408.8      418.9      416.4      418.0          3
   20        416.4      418.0     1127.1      421.3          3
   21         85.5      464.4      108.1      464.4          9
   22           .0      448.0      148.8      448.0          2
   23           .0      440.0      168.5      440.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 9 Soil unit(s) specified

Soil    Unit Weight    Cohesion  Friction     Pore Pressure      Water
Unit  Moist     Sat.   Intercept   Angle   Parameter  Constant  Surface
 No.  (pcf)    (pcf)     (psf)     (deg)       Ru       (psf)     No.

  1   127.0    131.0     854.0     11.00      .000         .0       0
  2   132.0    135.0     488.0     16.40      .000         .0       1
  3   130.0    135.0    5000.0       .00      .000         .0       0
  4    65.0     65.0     288.0     23.00      .000         .0       0
  5   115.0    120.0     100.0     16.00      .000         .0       0
  6   115.0    120.0     100.0     16.00      .000         .0       0
  7   115.0    120.0     100.0     16.00      .000         .0       0
  8   115.0    120.0     100.0     16.00      .000         .0       0
  9   115.0    120.0    1074.0     13.10      .000         .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40   (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point        x-water      y-water
   No.          (ft)         (ft)

    1            .00       442.00
    2         163.60       442.00
```

```
A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =      40.0 ft
                             and  x =      80.0 ft


Each surface terminates between   x =      90.0 ft
                            and   x =     120.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    2.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 49 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1          40.00       459.64
         2          41.42       458.24
         3          42.90       456.89
         4          44.43       455.60
```

```
          5           46.02        454.38
          6           47.65        453.23
          7           49.33        452.15
          8           51.06        451.13
          9           52.82        450.19
         10           54.62        449.32
         11           56.46        448.53
         12           58.32        447.81
         13           60.22        447.17
         14           62.14        446.61
         15           64.08        446.13
         16           66.04        445.73
         17           68.02        445.41
         18           70.00        445.18
         19           72.00        445.02
         20           73.99        444.95
         21           75.99        444.96
         22           77.99        445.05
         23           79.98        445.23
         24           81.97        445.49
         25           83.94        445.83
         26           85.89        446.25
         27           87.83        446.75
         28           89.74        447.33
         29           91.63        447.99
         30           93.49        448.73
         31           95.32        449.54
         32           97.11        450.43
         33           98.86        451.39
         34          100.58        452.43
         35          102.24        453.53
         36          103.87        454.70
         37          105.44        455.94
         38          106.96        457.24
         39          108.42        458.60
         40          109.83        460.02
         41          111.17        461.50
         42          112.46        463.03
         43          113.68        464.62
         44          114.83        466.25
         45          115.91        467.93
         46          116.93        469.66
         47          117.87        471.42
         48          118.74        473.22
         49          119.07        473.99

****  Simplified BISHOP FOS =   6.171  ****


********************************************************************
**                                                                **
**  Out of the    100 surfaces generated and analyzed by XSTABL,  **
**      21 surfaces were found to have MISLEADING FOS values.     **
**                                                                **
********************************************************************
```

```
The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 6-2E

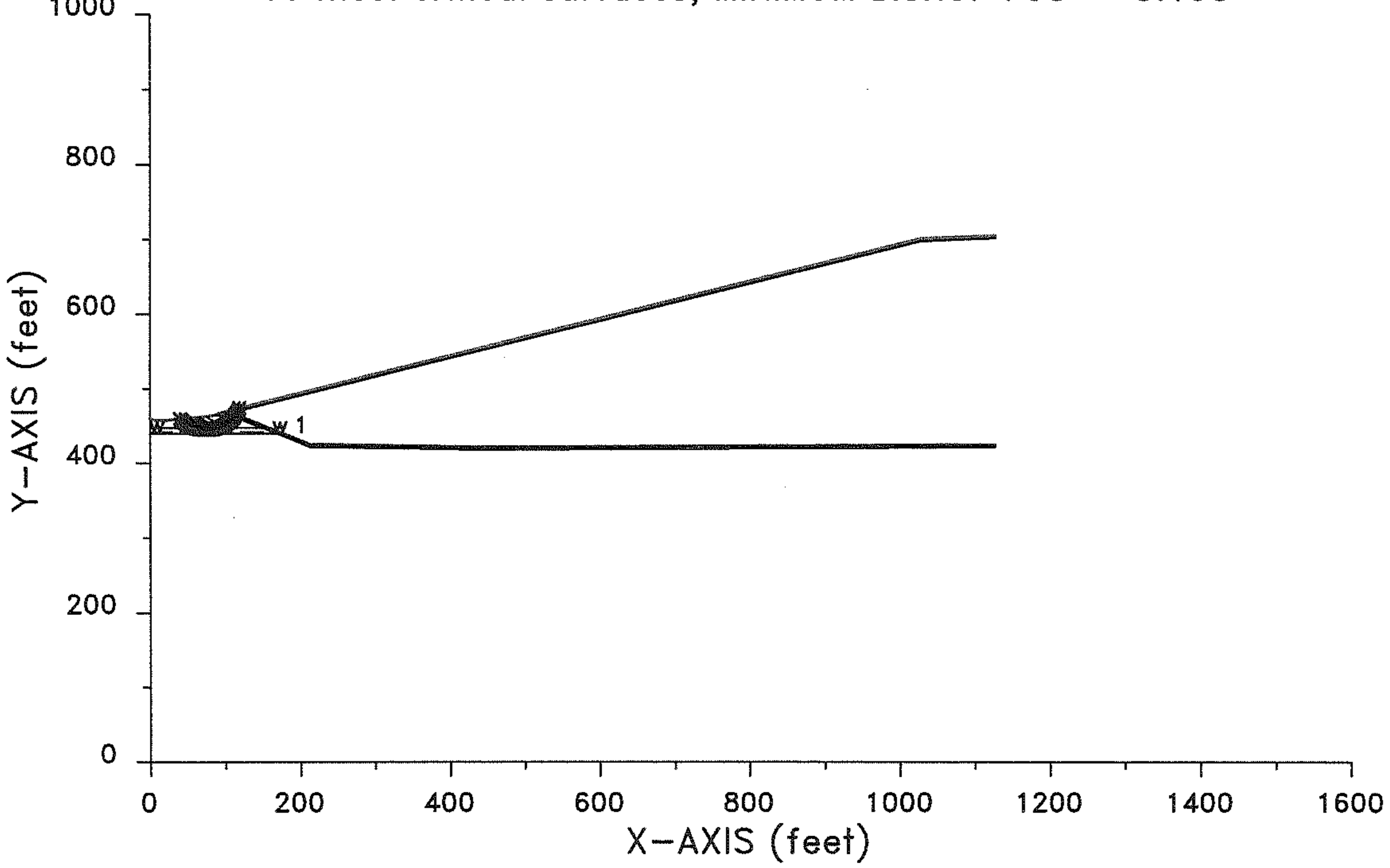
       FOS      Circle Center     Radius   Initial Terminal  Resisting
     (BISHOP)  x-coord  y-coord            x-coord  x-coord    Moment
                 (ft)     (ft)      (ft)     (ft)     (ft)     (ft-lb)

 1.    6.171    74.73   493.33     48.38    40.00   119.07   4.698E+06
 2.    6.215    77.17   491.41     45.33    44.44   119.01   4.153E+06
 3.    6.252    86.69   487.74     35.89    62.22   119.93   2.464E+06
 4.    6.262    89.73   483.46     31.63    66.67   119.98   2.058E+06
 5.    6.262    88.93   486.24     33.05    66.67   119.69   2.051E+06
 6.    6.325    76.86   491.05     44.85    44.44   118.24   4.096E+06
 7.    6.373    82.46   488.54     40.20    53.33   120.00   3.389E+06
 8.    6.417    76.61   494.25     46.95    44.44   118.94   4.287E+06
 9.    6.592    85.28   487.79     34.98    62.22   117.21   2.289E+06
10.    6.595    83.03   490.09     38.40    57.78   117.72   2.755E+06

                       * * *  END OF FILE  * * *
```

6-2T 10-10-11 41:04

CAMELOT LF – FINAL COVER SEC 6-2T
10 most critical surfaces, MINIMUM BISHOP FOS = 5.195



```
XSTABL File: 6-2T      10-10-11   41:04

            ******************************************
            *              X S T A B L               *
            *                                        *
            *       Slope Stability Analysis         *
            *              using the                 *
            *           Method of Slices             *
            *                                        *
            *       Copyright (C) 1992 - 2008        *
            *  Interactive Software Designs, Inc.    *
            *       Moscow, ID 83843, U.S.A.         *
            *                                        *
            *         All Rights Reserved            *
            *                                        *
            * Ver. 5.208                96 - 2046    *
            ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 6-2T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment    x-left     y-left    x-right    y-right     Soil Unit
      No.       (ft)       (ft)       (ft)       (ft)    Below Segment

       1          .0      460.4        6.0      458.0          1
       2         6.0      458.0       22.0      458.0          1
       3        22.0      458.0       51.6      460.7          1
       4        51.6      460.7       69.3      462.0          1
       5        69.3      462.0       85.5      464.4          1
       6        85.5      464.4       95.1      468.0          9
       7        95.1      468.0     1027.1      701.0          5
       8      1027.1      701.0     1127.1      705.0          5


       23 SUBSURFACE boundary segments

    Segment    x-left     y-left    x-right    y-right     Soil Unit
      No.       (ft)       (ft)       (ft)       (ft)    Below Segment

       1        95.1      468.0       99.2      468.0          1
       2        99.2      468.0      104.1      468.0          7
       3       104.1      468.0      109.1      468.0          6
       4       109.1      468.0     1027.6      697.5          4
       5      1027.6      697.5     1127.3      701.5          4
       6       109.1      468.0      213.2      425.9          6
       7       213.2      425.9      408.8      422.9          6
       8       408.8      422.9      416.4      422.0          6
       9       416.4      422.0     1127.1      425.3          6
```

```
  10       104.1     468.0      213.2     423.9           7
  11       213.2     423.9      408.8     420.9           8
  12       408.8     420.9      416.4     420.0           8
  13       416.4     420.0     1127.3     423.3           8
  14        99.2     468.0      108.1     464.4           9
  15       108.1     464.4      148.8     448.0           8
  16       148.8     448.0      168.5     440.0           2
  17       168.5     440.0      213.2     421.9           3
  18       213.2     421.9      408.8     418.9           3
  19       408.8     418.9      416.4     418.0           3
  20       416.4     418.0     1127.1     421.3           3
  21        85.5     464.4      108.1     464.4           9
  22          .0     448.0      148.8     448.0           2
  23          .0     440.0      168.5     440.0           3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 9 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     788.0    11.50     .000         .0       0
  2   132.0   135.0     470.0     8.30     .000         .0       1
  3   130.0   135.0    5000.0      .00     .000         .0       0
  4    65.0    65.0     288.0    23.00     .000         .0       0
  5   115.0   120.0     100.0    16.00     .000         .0       0
  6   115.0   120.0     100.0    16.00     .000         .0       0
  7   115.0   120.0     100.0    16.00     .000         .0       0
  8   115.0   120.0     100.0    16.00     .000         .0       0
  9   115.0   120.0     834.0    16.00     .000         .0       0


----------------------------------------------------------------------

 UNDRAINED STRENGTHS as a function of effective vertical stress
                    have been specified for  3 Soil Unit(s)
----------------------------------------------------------------------


          Soil Unit #       Parameter a      Parameter Psi

               1.                788.0            11.50
               2.                470.0             8.30
               9.                834.0            16.00


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)
```

```
Water Surface No.  1 specified by  2 coordinate points

*********************************
         PHREATIC SURFACE,
*********************************

  Point       x-water     y-water
   No.         (ft)        (ft)

    1           .00       442.00
    2        163.60       442.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =     40.0 ft
                             and  x =     80.0 ft


Each surface terminates between   x =     90.0 ft
                            and   x =    120.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    2.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *
```

```
The most critical circular failure surface
is specified by 49 coordinate points

     Point       x-surf       y-surf
      No.         (ft)         (ft)

       1          40.00       459.64
       2          41.42       458.24
       3          42.90       456.89
       4          44.43       455.60
       5          46.02       454.38
       6          47.65       453.23
       7          49.33       452.15
       8          51.06       451.13
       9          52.82       450.19
      10          54.62       449.32
      11          56.46       448.53
      12          58.32       447.81
      13          60.22       447.17
      14          62.14       446.61
      15          64.08       446.13
      16          66.04       445.73
      17          68.02       445.41
      18          70.00       445.18
      19          72.00       445.02
      20          73.99       444.95
      21          75.99       444.96
      22          77.99       445.05
      23          79.98       445.23
      24          81.97       445.49
      25          83.94       445.83
      26          85.89       446.25
      27          87.83       446.75
      28          89.74       447.33
      29          91.63       447.99
      30          93.49       448.73
      31          95.32       449.54
      32          97.11       450.43
      33          98.86       451.39
      34         100.58       452.43
      35         102.24       453.53
      36         103.87       454.70
      37         105.44       455.94
      38         106.96       457.24
      39         108.42       458.60
      40         109.83       460.02
      41         111.17       461.50
      42         112.46       463.03
      43         113.68       464.62
      44         114.83       466.25
      45         115.91       467.93
      46         116.93       469.66
      47         117.87       471.42
      48         118.74       473.22
```

```
        49          119.07       473.99

****  Simplified BISHOP FOS =    5.195  ****


*******************************************************************
**                                                               **
**  Out of the    100 surfaces generated and analyzed by XSTABL, **
**       13 surfaces were found to have MISLEADING FOS values.   **
**                                                               **
*******************************************************************




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 6-2T

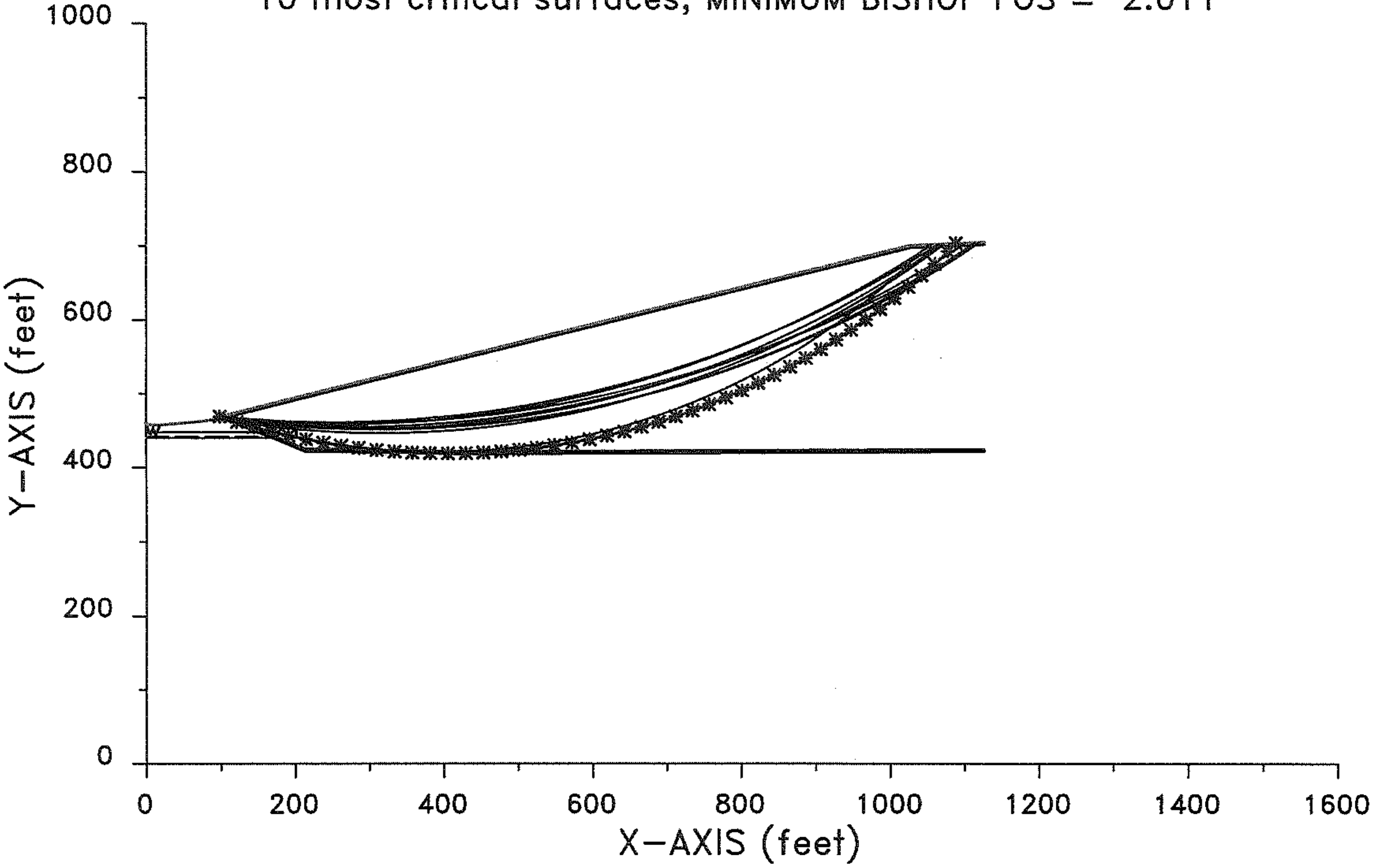
       FOS        Circle Center      Radius   Initial Terminal  Resisting
     (BISHOP)   x-coord  y-coord              x-coord  x-coord    Moment
                  (ft)     (ft)       (ft)      (ft)     (ft)     (ft-lb)

 1.    5.195      74.73    493.33     48.38     40.00   119.07  3.955E+06
 2.    5.357      77.17    491.41     45.33     44.44   119.01  3.579E+06
 3.    5.464      76.86    491.05     44.85     44.44   118.24  3.538E+06
 4.    5.710      76.61    494.25     46.95     44.44   118.94  3.814E+06
 5.    5.761      88.93    486.24     33.05     66.67   119.69  1.887E+06
 6.    5.787      86.69    487.74     35.89     62.22   119.93  2.281E+06
 7.    5.796      89.73    483.46     31.63     66.67   119.98  1.904E+06
 8.    5.974      82.46    488.54     40.20     53.33   120.00  3.176E+06
 9.    6.024      94.06    480.02     25.19     75.56   118.49  1.175E+06
10.    6.059      85.28    487.79     34.98     62.22   117.21  2.104E+06

                   * * *  END OF FILE  * * *
```

6-3E   10-10-11   41:05

CAMELOT LF – FINAL COVER SEC 6-3E
10 most critical surfaces, MINIMUM BISHOP FOS = 2.011



```
XSTABL File: 6-3E      10-10-11   41:05

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 6-3E



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1           .0      460.4        6.0      458.0            1
       2          6.0      458.0       22.0      458.0            1
       3         22.0      458.0       51.6      460.7            1
       4         51.6      460.7       69.3      462.0            1
       5         69.3      462.0       85.5      464.4            1
       6         85.5      464.4       95.1      468.0            9
       7         95.1      468.0     1027.1      701.0            5
       8       1027.1      701.0     1127.1      705.0            5


       23 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right      Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1         95.1      468.0       99.2      468.0            1
       2         99.2      468.0      104.1      468.0            7
       3        104.1      468.0      109.1      468.0            6
       4        109.1      468.0     1027.6      697.5            4
       5       1027.6      697.5     1127.3      701.5            4
       6        109.1      468.0      213.2      425.9            6
       7        213.2      425.9      408.8      422.9            6
       8        408.8      422.9      416.4      422.0            6
       9        416.4      422.0     1127.1      425.3            6
```

```
   10        104.1      468.0      213.2      423.9           7
   11        213.2      423.9      408.8      420.9           8
   12        408.8      420.9      416.4      420.0           8
   13        416.4      420.0     1127.3      423.3           8
   14         99.2      468.0      108.1      464.4           9
   15        108.1      464.4      148.8      448.0           8
   16        148.8      448.0      168.5      440.0           2
   17        168.5      440.0      213.2      421.9           3
   18        213.2      421.9      408.8      418.9           3
   19        408.8      418.9      416.4      418.0           3
   20        416.4      418.0     1127.1      421.3           3
   21         85.5      464.4      108.1      464.4           9
   22           .0      448.0      148.8      448.0           2
   23           .0      440.0      168.5      440.0           3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 9 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00     .000         .0       0
  2   132.0   135.0     488.0    16.40     .000         .0       1
  3   130.0   135.0    5000.0      .00     .000         .0       0
  4    65.0    65.0     288.0    23.00     .000         .0       0
  5   115.0   120.0     100.0    16.00     .000         .0       0
  6   115.0   120.0     100.0    16.00     .000         .0       0
  7   115.0   120.0     100.0    16.00     .000         .0       0
  8   115.0   120.0     100.0    16.00     .000         .0       0
  9   115.0   120.0    1074.0    13.10     .000         .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1            .00      442.00
    2         163.60      442.00
```

```
    A critical failure surface searching method, using a random
    technique for generating CIRCULAR surfaces has been specified.


      100 trial surfaces will be generated and analyzed.


      10 Surfaces initiate from each of  10 points equally spaced
    along the ground surface between  x =      90.0 ft
                                 and  x =     100.0 ft


    Each surface terminates between   x =   1050.0 ft
                                and   x =   1120.0 ft


    Unless further limitations were imposed, the minimum elevation
    at which a surface extends is  y =        .0 ft


    * * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

       24.0 ft line segments define each trial failure surface.



    ---------------------
    ANGULAR RESTRICTIONS
    ---------------------

      The first segment of each failure surface will be inclined
      within the angular range defined by :

              Lower angular limit :=   -45.0 degrees
              Upper angular limit :=  (slope angle - 5.0) degrees



************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


    Factors of safety have been calculated by the :
```

```
* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


  The most critical circular failure surface
  is specified by 46 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1           98.89       468.95
         2          121.74       461.61
         3          144.77       454.85
         4          167.95       448.66
         5          191.29       443.05
         6          214.76       438.02
         7          238.34       433.58
         8          262.03       429.72
         9          285.81       426.46
        10          309.66       423.79
        11          333.57       421.72
        12          357.52       420.24
        13          381.51       419.36
        14          405.51       419.08
        15          429.51       419.39
        16          453.49       420.31
        17          477.44       421.82
        18          501.35       423.92
        19          525.20       426.62
        20          548.97       429.91
        21          572.65       433.80
        22          596.23       438.27
        23          619.69       443.33
        24          643.02       448.97
        25          666.20       455.19
        26          689.22       461.99
        27          712.06       469.35
        28          734.71       477.29
        29          757.16       485.78
        30          779.38       494.83
        31          801.38       504.43
        32          823.13       514.58
        33          844.62       525.27
        34          865.84       536.48
        35          886.77       548.23
        36          907.40       560.49
        37          927.72       573.25
        38          947.72       586.53
        39          967.38       600.29
        40          986.69       614.54
        41         1005.64       629.27
        42         1024.22       644.47
        43         1042.41       660.12
        44         1060.21       676.22
        45         1077.60       692.76
        46         1088.29       703.45
```

```
****  Simplified BISHOP FOS =   2.011  ****



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 6-3E

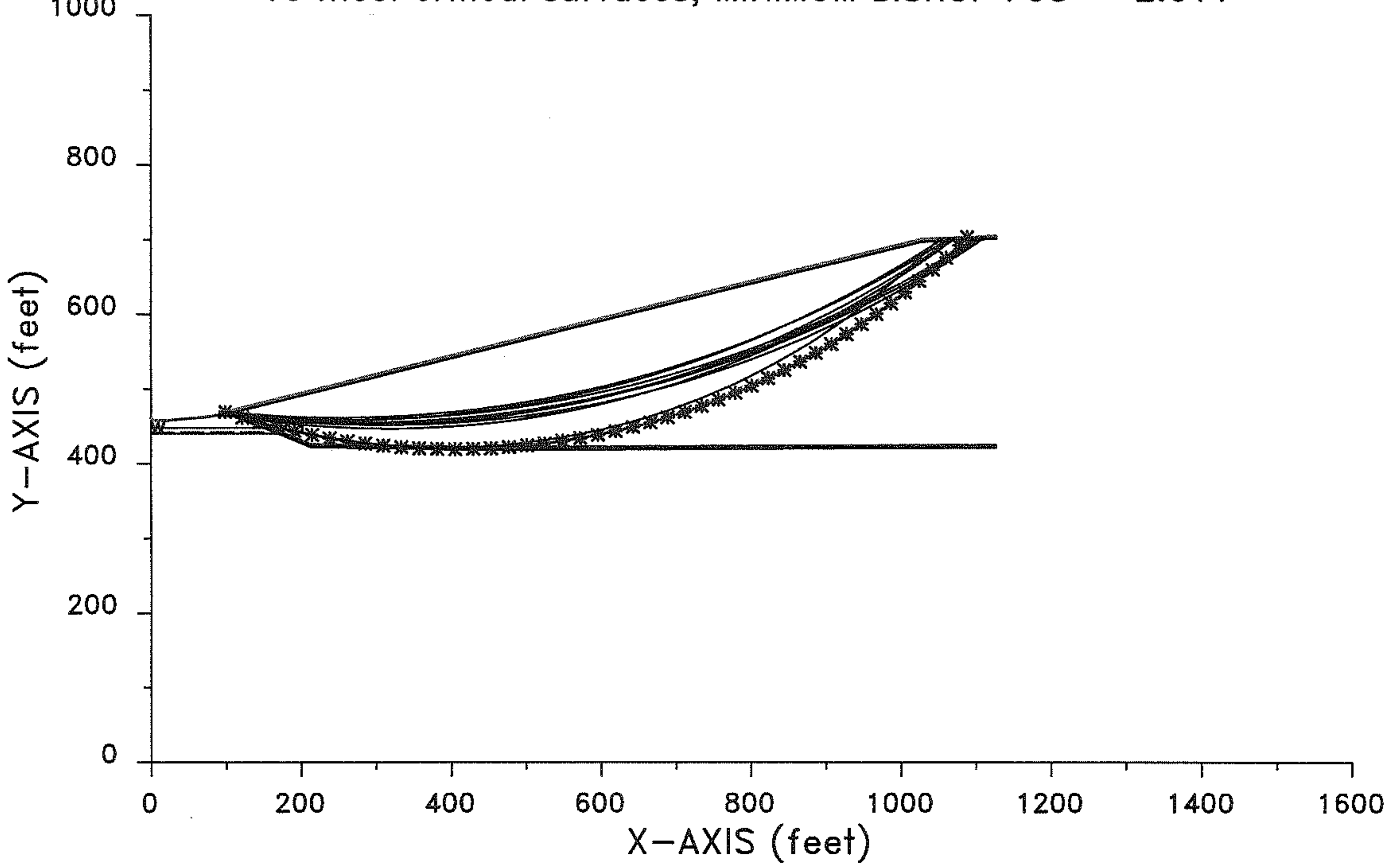
       FOS      Circle Center    Radius   Initial Terminal  Resisting
     (BISHOP)  x-coord  y-coord           x-coord  x-coord   Moment
                (ft)     (ft)      (ft)     (ft)     (ft)    (ft-lb)

 1.    2.011    404.88  1382.77   963.69    98.89  1088.29  2.967E+09
 2.    2.064    392.09  1336.00   914.66   100.00  1051.32  2.664E+09
 3.    2.103    251.61  1954.70  1493.19   100.00  1064.99  2.980E+09
 4.    2.103    258.11  1887.32  1428.97    94.44  1056.42  2.916E+09
 5.    2.104    293.68  1777.46  1325.36    93.33  1069.18  3.054E+09
 6.    2.109    316.00  1692.25  1245.60    92.22  1072.60  3.093E+09
 7.    2.111    282.26  1928.74  1473.57    93.33  1101.61  3.483E+09
 8.    2.113    314.56  1840.28  1388.64    97.78  1113.32  3.543E+09
 9.    2.116    313.88  1864.20  1412.17    97.78  1119.94  3.632E+09
10.    2.117    267.85  2062.39  1602.77    97.78  1119.60  3.705E+09

                   * * *  END OF FILE  * * *
```

6-3T 10-10-11 41:08

CAMELOT LF - FINAL COVER SEC 6-3T
10 most critical surfaces, MINIMUM BISHOP FOS = 2.011



```
XSTABL File: 6-3T      10-10-11   41:08

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *                using the               *
             *            Method of Slices            *
             *                                        *
             *        Copyright (C) 1992 - 2008       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             *  Ver. 5.208                 96 - 2046  *
             ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 6-3T



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1          .0     460.4        6.0     458.0         1
        2         6.0     458.0       22.0     458.0         1
        3        22.0     458.0       51.6     460.7         1
        4        51.6     460.7       69.3     462.0         1
        5        69.3     462.0       85.5     464.4         1
        6        85.5     464.4       95.1     468.0         9
        7        95.1     468.0     1027.1     701.0         5
        8      1027.1     701.0     1127.1     705.0         5


       23 SUBSURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1        95.1     468.0       99.2     468.0         1
        2        99.2     468.0      104.1     468.0         7
        3       104.1     468.0      109.1     468.0         6
        4       109.1     468.0     1027.6     697.5         4
        5      1027.6     697.5     1127.3     701.5         4
        6       109.1     468.0      213.2     425.9         6
        7       213.2     425.9      408.8     422.9         6
        8       408.8     422.9      416.4     422.0         6
        9       416.4     422.0     1127.1     425.3         6
```

```
   10        104.1      468.0      213.2      423.9          7
   11        213.2      423.9      408.8      420.9          8
   12        408.8      420.9      416.4      420.0          8
   13        416.4      420.0     1127.3      423.3          8
   14         99.2      468.0      108.1      464.4          9
   15        108.1      464.4      148.8      448.0          8
   16        148.8      448.0      168.5      440.0          2
   17        168.5      440.0      213.2      421.9          3
   18        213.2      421.9      408.8      418.9          3
   19        408.8      418.9      416.4      418.0          3
   20        416.4      418.0     1127.1      421.3          3
   21         85.5      464.4      108.1      464.4          9
   22           .0      448.0      148.8      448.0          2
   23           .0      440.0      168.5      440.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 9 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure     Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)     No.

  1   127.0   131.0     788.0    11.50     .000         .0       0
  2   132.0   135.0     470.0     8.30     .000         .0       1
  3   130.0   135.0    5000.0      .00     .000         .0       0
  4    65.0    65.0     288.0    23.00     .000         .0       0
  5   115.0   120.0     100.0    16.00     .000         .0       0
  6   115.0   120.0     100.0    16.00     .000         .0       0
  7   115.0   120.0     100.0    16.00     .000         .0       0
  8   115.0   120.0     100.0    16.00     .000         .0       0
  9   115.0   120.0     834.0    16.00     .000         .0       0


----------------------------------------------------------------------
----
 UNDRAINED STRENGTHS as a function of effective vertical stress
                     have been specified for  3 Soil Unit(s)
----------------------------------------------------------------------
----

          Soil Unit #       Parameter a      Parameter Psi

               1.               788.0            11.50
               2.               470.0             8.30
               9.               834.0            16.00


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)
```

```
Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1            .00       442.00
    2         163.60       442.00


A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


  100 trial surfaces will be generated and analyzed.


  10 Surfaces initiate from each of  10 points equally spaced
along the ground surface between  x =      90.0 ft
                             and  x =     100.0 ft


Each surface terminates between   x =    1050.0 ft
                            and   x =    1120.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

   24.0 ft line segments define each trial failure surface.


---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees


************************************************************************
    --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
************************************************************************
```

```
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
************************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------


    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED BISHOP METHOD   * * * * *


      The most critical circular failure surface
      is specified by 46 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

             1          98.89       468.95
             2         121.74       461.61
             3         144.77       454.85
             4         167.95       448.66
             5         191.29       443.05
             6         214.76       438.02
             7         238.34       433.58
             8         262.03       429.72
             9         285.81       426.46
            10         309.66       423.79
            11         333.57       421.72
            12         357.52       420.24
            13         381.51       419.36
            14         405.51       419.08
            15         429.51       419.39
            16         453.49       420.31
            17         477.44       421.82
            18         501.35       423.92
            19         525.20       426.62
            20         548.97       429.91
            21         572.65       433.80
            22         596.23       438.27
            23         619.69       443.33
            24         643.02       448.97
            25         666.20       455.19
            26         689.22       461.99
            27         712.06       469.35
            28         734.71       477.29
            29         757.16       485.78
            30         779.38       494.83
            31         801.38       504.43
            32         823.13       514.58
            33         844.62       525.27
```

```
          34         865.84       536.48
          35         886.77       548.23
          36         907.40       560.49
          37         927.72       573.25
          38         947.72       586.53
          39         967.38       600.29
          40         986.69       614.54
          41        1005.64       629.27
          42        1024.22       644.47
          43        1042.41       660.12
          44        1060.21       676.22
          45        1077.60       692.76
          46        1088.29       703.45


****  Simplified BISHOP FOS =   2.011  ****




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 6-3T

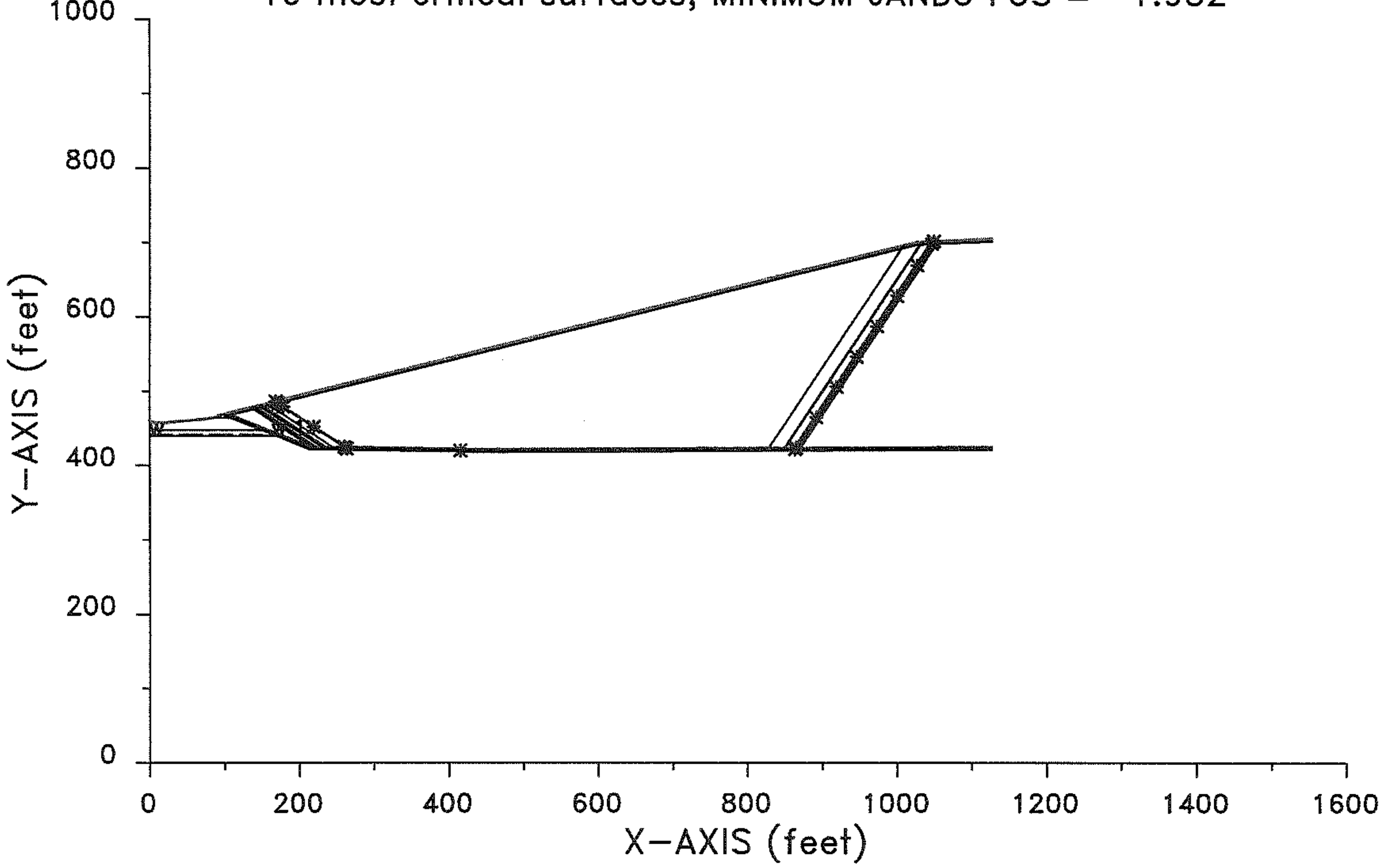
        FOS      Circle Center    Radius   Initial Terminal  Resisting
     (BISHOP)  x-coord  y-coord            x-coord  x-coord    Moment
                 (ft)     (ft)      (ft)     (ft)     (ft)     (ft-lb)

 1.    2.011    404.88  1382.77   963.69    98.89  1088.29  2.967E+09
 2.    2.064    392.09  1336.00   914.66   100.00  1051.32  2.664E+09
 3.    2.102    293.68  1777.46  1325.36    93.33  1069.18  3.051E+09
 4.    2.102    258.11  1887.32  1428.97    94.44  1056.42  2.914E+09
 5.    2.103    251.61  1954.70  1493.19   100.00  1064.99  2.980E+09
 6.    2.106    316.00  1692.25  1245.60    92.22  1072.60  3.089E+09
 7.    2.110    282.26  1928.74  1473.57    93.33  1101.61  3.480E+09
 8.    2.113    314.56  1840.28  1388.64    97.78  1113.32  3.543E+09
 9.    2.115    278.76  1967.07  1512.81    90.00  1111.89  3.669E+09
10.    2.116    255.17  2060.30  1602.22    91.11  1108.43  3.647E+09

                     * * *  END OF FILE  * * *
```

6-4P 10-13-11 10:39

CAMELOT LF – FINAL COVER SEC 6–4P
10 most critical surfaces, MINIMUM JANBU FOS = 1.932



```
XSTABL File: 6-4P      10-13-11   10:39

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 6-4P



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1           .0      460.4        6.0      458.0           1
       2          6.0      458.0       22.0      458.0           1
       3         22.0      458.0       51.6      460.7           1
       4         51.6      460.7       69.3      462.0           1
       5         69.3      462.0       85.5      464.4           1
       6         85.5      464.4       95.1      468.0           9
       7         95.1      468.0     1027.1      701.0           5
       8       1027.1      701.0     1127.1      705.0           5


       28 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1         95.1      468.0       99.2      468.0           1
       2         99.2      468.0      104.0      468.0           6
       3        104.0      468.0      104.2      468.0           7
       4        104.2      468.0      109.1      468.0           6
       5        109.1      468.0     1027.6      697.5           4
       6       1027.6      697.5     1127.3      701.5           4
       7        109.1      468.0      213.2      425.9           6
       8        213.2      425.9      408.8      422.9           6
       9        408.8      422.9      416.4      422.0           6
```

```
   10       416.4     422.0    1127.1      425.3           6
   11       104.2     468.0     213.2      423.9           7
   12       213.2     423.9     408.8      421.0           8
   13       408.8     421.0     416.4      420.1           8
   14       416.4     420.1    1127.1      423.4           8
   15       104.0     468.0     213.2      423.9           6
   16       213.2     423.9     408.8      420.9           6
   17       408.8     420.9     416.4      420.0           6
   18       416.4     420.0    1127.1      423.3           6
   19        99.2     468.0     108.1      464.4           9
   20       108.1     464.4     148.8      448.0           8
   21       148.8     448.0     168.5      440.0           2
   22       168.5     440.0     213.2      421.9           3
   23       213.2     421.9     408.8      418.9           3
   24       408.8     418.9     416.4      418.0           3
   25       416.4     418.0    1127.1      421.3           3
   26        85.5     464.4     108.1      464.4           9
   27          .0     448.0     148.8      448.0           2
   28          .0     440.0     168.5      440.0           3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 9 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00      .000        .0       0
  2   132.0   135.0     488.0    16.40      .000        .0       1
  3   130.0   135.0    5000.0      .00      .000        .0       0
  4    65.0    65.0     288.0    23.00      .000        .0       0
  5   115.0   120.0     100.0    16.00      .000        .0       0
  6   115.0   120.0     100.0    16.00      .000        .0       0
  7   115.0   120.0     100.0    13.00      .000        .0       0
  8   115.0   120.0     100.0    13.00      .000        .0       0
  9   115.0   120.0    1074.0    13.10      .000        .0       0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.         (ft)        (ft)
```

```
    1            .00       442.00
    2         163.60       442.00


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  3 boxes specified for generation of central block base



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     49.0 ft


Box          x-left      y-left     x-right     y-right      Width
no.           (ft)        (ft)        (ft)        (ft)        (ft)

 1           218.1       423.8       268.1       423.1         4.0
 2           408.8       420.9       416.4       420.0         4.0
 3           821.9       421.9       871.9       422.1         4.0


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD    * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 21 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1        168.41       486.33
         2        171.90       483.69
         3        178.59       479.27
         4        219.45       452.22
         5        260.31       425.18
         6        262.98       423.16
         7        263.02       423.14
```

```
         8        263.71      422.61
         9        415.84      420.08
        10        863.64      422.01
        11        863.69      422.08
        12        863.77      422.18
        13        865.21      424.08
        14        892.25      464.94
        15        919.30      505.80
        16        946.34      546.67
        17        973.39      587.53
        18       1000.43      628.39
        19       1027.48      669.25
        20       1046.68      698.27
        21       1049.42      701.89

 **  Corrected JANBU FOS =   1.932  **    (Fo factor = 1.081)


Failure surface No. 2 specified by 18 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1        147.29      481.05
         2        150.79      478.42
         3        189.67      452.68
         4        230.53      425.63
         5        232.22      424.36
         6        414.83      420.17
         7        848.54      421.90
         8        848.61      422.01
         9        848.69      422.11
        10        850.13      424.01
        11        877.18      464.87
        12        904.22      505.73
        13        931.27      546.60
        14        958.31      587.46
        15        985.36      628.32
        16       1012.40      669.18
        17       1031.24      697.65
        18       1033.98      701.28

 **  Corrected JANBU FOS =   1.936  **    (Fo factor = 1.081)


Failure surface No. 3 specified by 18 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1        135.81      478.18
         2        139.30      475.55
         3        173.48      452.93
         4        214.34      425.88
         5        216.90      423.84
         6        219.17      422.13
         7        411.45      421.42
```

```
           8          867.15         422.10
           9          867.23         422.19
          10          868.66         424.10
          11          895.71         464.96
          12          922.75         505.82
          13          949.80         546.68
          14          976.84         587.54
          15         1003.89         628.40
          16         1030.93         669.26
          17         1050.23         698.41
          18         1052.96         702.03

  **   Corrected JANBU FOS =    1.967   **     (Fo factor = 1.080)


 Failure surface No. 4 specified by 20 coordinate points

         Point        x-surf         y-surf
          No.          (ft)           (ft)

           1          146.19         480.77
           2          149.68         478.14
           3          188.12         452.70
           4          228.98         425.66
           5          231.67         423.63
           6          231.69         423.62
           7          234.18         421.74
           8          414.79         420.06
           9          862.72         421.67
          10          863.02         422.07
          11          863.10         422.17
          12          864.54         424.08
          13          891.59         464.94
          14          918.63         505.80
          15          945.68         546.66
          16          972.72         587.52
          17          999.76         628.38
          18         1026.81         669.24
          19         1046.00         698.24
          20         1048.73         701.87

  **   Corrected JANBU FOS =    1.976   **     (Fo factor = 1.081)


 Failure surface No. 5 specified by 18 coordinate points

         Point        x-surf         y-surf
          No.          (ft)           (ft)

           1          138.10         478.75
           2          141.59         476.12
           3          176.70         452.88
           4          217.56         425.83
           5          220.26         423.80
           6          220.27         423.79
           7          222.23         422.31
           8          414.37         421.26
```

```
       9          869.10        423.58
      10          869.50        424.10
      11          896.55        464.96
      12          923.59        505.82
      13          950.64        546.69
      14          977.68        587.55
      15         1004.73        628.41
      16         1031.77        669.27
      17         1051.08        698.44
      18         1053.81        702.07

 **  Corrected JANBU FOS =   1.976  **    (Fo factor = 1.080)


Failure surface No. 6 specified by 17 coordinate points

     Point        x-surf        y-surf
      No.          (ft)          (ft)

       1          156.65        483.39
       2          160.15        480.75
       3          162.01        479.52
       4          202.87        452.48
       5          243.73        425.43
       6          245.01        424.47
       7          414.60        420.00
       8          849.39        422.57
       9          850.47        424.02
      10          877.52        464.88
      11          904.56        505.74
      12          931.61        546.60
      13          958.65        587.46
      14          985.70        628.32
      15         1012.74        669.18
      16         1031.60        697.66
      17         1034.33        701.29

 **  Corrected JANBU FOS =   1.983  **    (Fo factor = 1.081)


Failure surface No. 7 specified by 18 coordinate points

     Point        x-surf        y-surf
      No.          (ft)          (ft)

       1          140.85        479.44
       2          144.34        476.81
       3          180.59        452.82
       4          221.45        425.77
       5          224.15        423.74
       6          224.15        423.73
       7          225.70        422.57
       8          411.83        420.92
       9          848.96        423.25
      10          849.54        424.01
      11          876.58        464.87
      12          903.63        505.73
```

```
             13          930.67       546.59
             14          957.72       587.45
             15          984.76       628.31
             16         1011.81       669.17
             17         1030.64       697.62
             18         1033.37       701.25

     **  Corrected JANBU FOS =    1.985   **     (Fo factor = 1.080)


    Failure surface No. 8 specified by 18 coordinate points

            Point        x-surf       y-surf
             No.          (ft)         (ft)

              1          136.89       478.45
              2          140.38       475.82
              3          174.99       452.90
              4          215.85       425.86
              5          218.56       423.82
              6          218.56       423.82
              7          221.04       421.95
              8          415.01       419.24
              9          828.75       423.90
             10          828.76       423.91
             11          855.80       464.78
             12          882.85       505.64
             13          909.89       546.50
             14          936.93       587.36
             15          963.98       628.22
             16          991.02       669.08
             17         1006.32       692.18
             18         1009.68       696.65

     **  Corrected JANBU FOS =    1.985   **     (Fo factor = 1.081)


    Failure surface No. 9 specified by 20 coordinate points

            Point        x-surf       y-surf
             No.          (ft)         (ft)

              1          147.88       481.19
              2          151.37       478.56
              3          190.49       452.67
              4          231.35       425.62
              5          234.05       423.59
              6          234.06       423.58
              7          235.58       422.43
              8          409.07       421.67
              9          869.40       421.51
             10          869.85       422.11
             11          869.93       422.21
             12          871.37       424.11
             13          898.41       464.97
             14          925.46       505.83
             15          952.50       546.69
```

```
        16         979.55       587.55
        17        1006.59       628.41
        18        1033.64       669.28
        19        1052.99       698.52
        20        1055.73       702.15

 **  Corrected JANBU FOS =    1.986   **    (Fo factor = 1.080)


Failure surface No.10 specified by 18 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          149.98       481.72
         2          153.47       479.09
         3          193.46       452.62
         4          234.32       425.58
         5          237.01       423.55
         6          237.03       423.53
         7          237.88       422.89
         8          413.75       419.22
         9          861.98       423.86
        10          862.14       424.07
        11          889.18       464.93
        12          916.23       505.79
        13          943.27       546.65
        14          970.32       587.51
        15          997.36       628.37
        16         1024.41       669.23
        17         1043.54       698.14
        18         1046.27       701.77

 **  Corrected JANBU FOS =    1.986   **    (Fo factor = 1.080)


The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - FINAL COVER SEC 6-4P

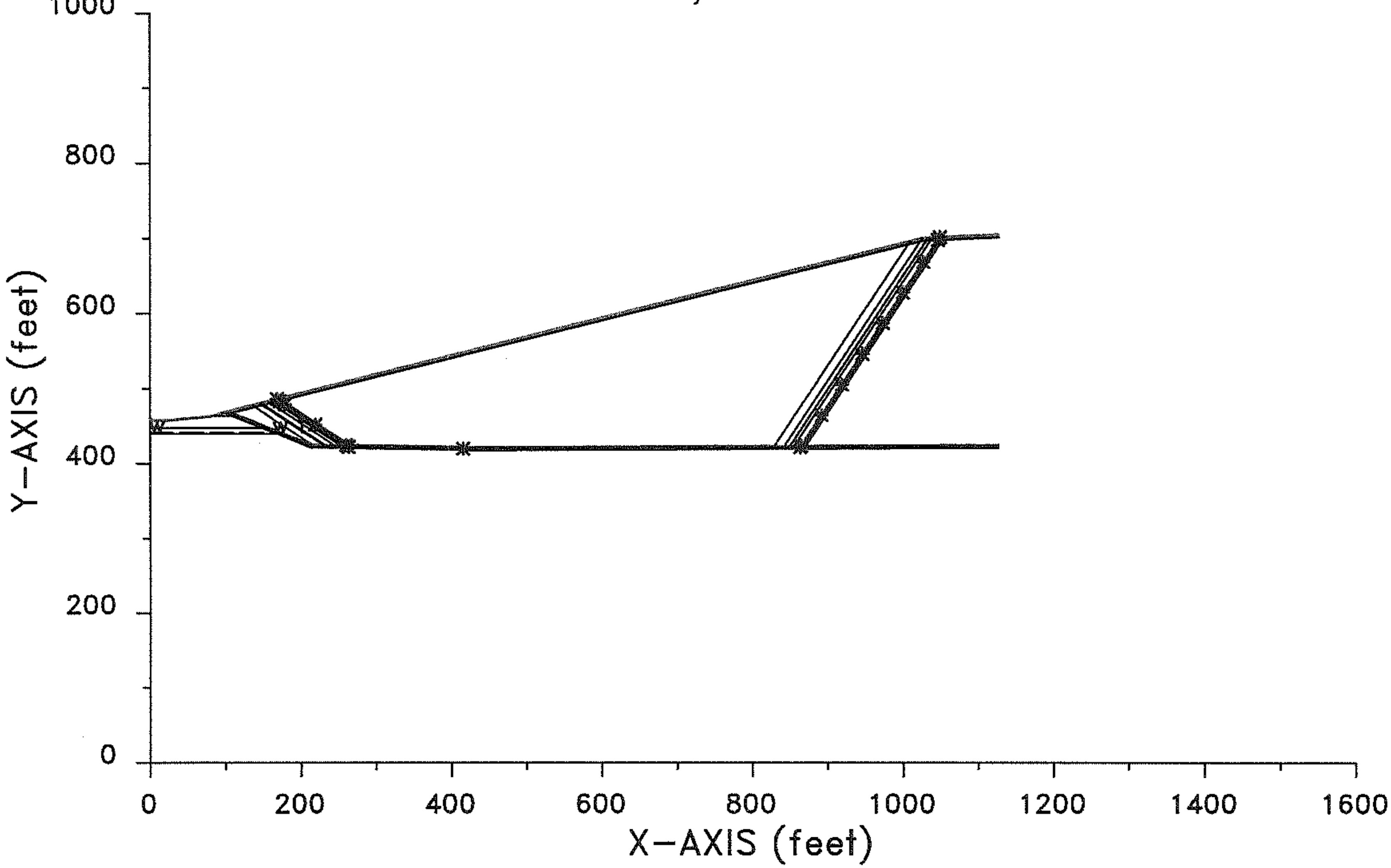
      Modified      Correction    Initial     Terminal    Available
      JANBU FOS       Factor      x-coord      x-coord     Strength
                                    (ft)         (ft)        (lb)

 1.       1.932          1.081     168.41      1049.42    2.909E+06
 2.       1.936          1.081     147.29      1033.98    2.879E+06
 3.       1.967          1.080     135.81      1052.96    3.078E+06
 4.       1.976          1.081     146.19      1048.73    3.058E+06
 5.       1.976          1.080     138.10      1053.81    3.094E+06
 6.       1.983          1.081     156.65      1034.33    2.940E+06
 7.       1.985          1.080     140.85      1033.37    2.975E+06
 8.       1.985          1.081     136.89      1009.68    2.857E+06
 9.       1.986          1.080     147.88      1055.73    3.098E+06
10.       1.986          1.080     149.98      1046.27    3.048E+06

                     * * *  END OF FILE  * * *
```

6-4R   10-13-11   10:42

CAMELOT LF – FINAL COVER SEC 6–4R
10 most critical surfaces, MINIMUM JANBU FOS =   1.783



```
XSTABL File: 6-4R      10-13-11   10:42

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - FINAL COVER SEC 6-4R



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

        8 SURFACE boundary segments

    Segment     x-left     y-left    x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)    Below Segment

       1           .0      460.4        6.0      458.0           1
       2          6.0      458.0       22.0      458.0           1
       3         22.0      458.0       51.6      460.7           1
       4         51.6      460.7       69.3      462.0           1
       5         69.3      462.0       85.5      464.4           1
       6         85.5      464.4       95.1      468.0           9
       7         95.1      468.0     1027.1      701.0           5
       8       1027.1      701.0     1127.1      705.0           5


       28 SUBSURFACE boundary segments

    Segment     x-left     y-left    x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)    Below Segment

       1         95.1      468.0       99.2      468.0           1
       2         99.2      468.0      104.0      468.0           6
       3        104.0      468.0      104.2      468.0           7
       4        104.2      468.0      109.1      468.0           6
       5        109.1      468.0     1027.6      697.5           4
       6       1027.6      697.5     1127.3      701.5           4
       7        109.1      468.0      213.2      425.9           6
       8        213.2      425.9      408.8      422.9           6
       9        408.8      422.9      416.4      422.0           6
      10        416.4      422.0     1127.1      425.3           6
```

```
      11        104.2      468.0      213.2      423.9           7
      12        213.2      423.9      408.8      421.0           8
      13        408.8      421.0      416.4      420.1           8
      14        416.4      420.1     1127.1      423.4           8
      15        104.0      468.0      213.2      423.9           6
      16        213.2      423.9      408.8      420.9           6
      17        408.8      420.9      416.4      420.0           6
      18        416.4      420.0     1127.1      423.3           6
      19         99.2      468.0      108.1      464.4           9
      20        108.1      464.4      148.8      448.0           8
      21        148.8      448.0      168.5      440.0           2
      22        168.5      440.0      213.2      421.9           3
      23        213.2      421.9      408.8      418.9           3
      24        408.8      418.9      416.4      418.0           3
      25        416.4      418.0     1127.1      421.3           3
      26         85.5      464.4      108.1      464.4           9
      27           .0      448.0      148.8      448.0           2
      28           .0      440.0      168.5      440.0           3


   --------------------------
   ISOTROPIC Soil Parameters
   --------------------------

    9 Soil unit(s) specified

   Soil    Unit Weight    Cohesion  Friction     Pore Pressure       Water
   Unit  Moist     Sat.  Intercept    Angle  Parameter  Constant   Surface
    No.  (pcf)    (pcf)    (psf)      (deg)       Ru       (psf)      No.

     1   127.0    131.0     854.0     11.00      .000          .0       0
     2   132.0    135.0     488.0     16.40      .000          .0       1
     3   130.0    135.0    5000.0       .00      .000          .0       0
     4    65.0     65.0     288.0     23.00      .000          .0       0
     5   115.0    120.0     100.0     16.00      .000          .0       0
     6   115.0    120.0     100.0     16.00      .000          .0       0
     7   115.0    120.0      80.0      8.00      .000          .0       0
     8   115.0    120.0      80.0      8.00      .000          .0       0
     9   115.0    120.0    1074.0     13.10      .000          .0       0


    1 Water surface(s) have been specified

   Unit weight of water =     62.40  (pcf)


   Water Surface No.  1 specified by  2 coordinate points

   **********************************
            PHREATIC SURFACE,
   **********************************

     Point       x-water      y-water
      No.          (ft)         (ft)

       1             .00       442.00
```

```
    2          163.60       442.00


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  3 boxes specified for generation of central block base



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     49.0 ft


Box         x-left      y-left     x-right     y-right       Width
no.          (ft)        (ft)        (ft)        (ft)         (ft)

 1          218.1       423.8       268.1       423.1         4.0
 2          408.8       420.9       416.4       420.0         4.0
 3          821.9       421.9       871.9       422.1         4.0



Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *



The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 21 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          168.41       486.33
         2          171.90       483.69
         3          178.59       479.27
         4          219.45       452.22
         5          260.31       425.18
         6          262.99       423.16
         7          263.02       423.14
         8          263.71       422.61
```

```
          9         415.84       420.08
         10         863.64       422.01
         11         863.69       422.08
         12         863.78       422.18
         13         865.21       424.08
         14         892.26       464.94
         15         919.30       505.80
         16         946.35       546.67
         17         973.39       587.53
         18        1000.44       628.39
         19        1027.48       669.25
         20        1046.69       698.27
         21        1049.42       701.89

  **  Corrected JANBU FOS =   1.783  **    (Fo factor = 1.081)


 Failure surface No. 2 specified by 18 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1         147.29       481.05
          2         150.79       478.42
          3         189.67       452.68
          4         230.53       425.63
          5         232.22       424.36
          6         414.83       420.17
          7         848.54       421.90
          8         848.61       422.01
          9         848.70       422.11
         10         850.14       424.01
         11         877.18       464.87
         12         904.23       505.73
         13         931.27       546.60
         14         958.32       587.46
         15         985.36       628.32
         16        1012.41       669.18
         17        1031.25       697.65
         18        1033.99       701.28

  **  Corrected JANBU FOS =   1.832  **    (Fo factor = 1.081)


 Failure surface No. 3 specified by 19 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1         171.85       487.19
          2         175.34       484.55
          3         183.44       479.19
          4         224.30       452.15
          5         265.16       425.10
          6         267.50       423.34
          7         409.36       420.59
          8         841.32       421.95
```

```
          9         841.34       421.97
         10         841.42       422.07
         11         842.86       423.98
         12         869.91       464.84
         13         896.95       505.70
         14         924.00       546.56
         15         951.04       587.42
         16         978.09       628.28
         17        1005.13       669.14
         18        1023.17       696.39
         19        1026.53       700.86

 **  Corrected JANBU FOS =   1.934  **    (Fo factor = 1.082)


Failure surface No. 4 specified by 18 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1         135.97       478.22
          2         139.46       475.59
          3         173.70       452.92
          4         214.56       425.88
          5         216.90       423.84
          6         219.17       422.13
          7         411.45       421.42
          8         867.15       422.10
          9         867.23       422.19
         10         868.67       424.10
         11         895.72       464.96
         12         922.76       505.82
         13         949.81       546.68
         14         976.85       587.54
         15        1003.90       628.40
         16        1030.94       669.26
         17        1050.23       698.41
         18        1052.96       702.03

 **  Corrected JANBU FOS =   1.941  **    (Fo factor = 1.080)


Failure surface No. 5 specified by 20 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1         146.19       480.77
          2         149.69       478.14
          3         188.12       452.70
          4         228.98       425.66
          5         231.67       423.63
          6         231.69       423.62
          7         234.18       421.74
          8         414.79       420.06
          9         862.72       421.67
         10         863.02       422.07
```

```
          11          863.11        422.17
          12          864.55        424.08
          13          891.59        464.94
          14          918.64        505.80
          15          945.68        546.66
          16          972.73        587.52
          17          999.77        628.38
          18         1026.82        669.24
          19         1046.01        698.24
          20         1048.74        701.87

 **  Corrected JANBU FOS =   1.944  **    (Fo factor = 1.081)


Failure surface No. 6 specified by 17 coordinate points

         Point        x-surf        y-surf
          No.          (ft)          (ft)

           1          156.65        483.39
           2          160.15        480.75
           3          162.01        479.52
           4          202.87        452.48
           5          243.73        425.43
           6          245.01        424.47
           7          414.60        420.00
           8          849.39        422.57
           9          850.47        424.02
          10          877.52        464.88
          11          904.56        505.74
          12          931.61        546.60
          13          958.65        587.46
          14          985.70        628.32
          15         1012.74        669.18
          16         1031.60        697.66
          17         1034.33        701.29

 **  Corrected JANBU FOS =   1.946  **    (Fo factor = 1.081)


Failure surface No. 7 specified by 19 coordinate points

         Point        x-surf        y-surf
          No.          (ft)          (ft)

           1          162.43        484.83
           2          165.92        482.20
           3          170.16        479.40
           4          211.02        452.35
           5          251.88        425.31
           6          254.56        423.29
           7          254.58        423.27
           8          255.56        422.53
           9          410.00        419.49
          10          828.27        422.16
          11          829.59        423.92
          12          856.64        464.78
```

```
             13        883.68        505.64
             14        910.73        546.50
             15        937.77        587.36
             16        964.82        628.22
             17        991.86        669.08
             18       1007.32        692.43
             19       1010.68        696.89

   **  Corrected JANBU FOS =    1.956   **    (Fo factor = 1.082)


 Failure surface No. 8 specified by 17 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

              1        170.42        486.83
              2        173.91        484.19
              3        181.42        479.22
              4        222.28        452.18
              5        263.14        425.13
              6        264.19        424.34
              7        410.97        419.80
              8        849.12        422.49
              9        850.27        424.01
             10        877.31        464.87
             11        904.36        505.74
             12        931.40        546.60
             13        958.45        587.46
             14        985.49        628.32
             15       1012.54        669.18
             16       1031.38        697.65
             17       1034.12        701.28

   **  Corrected JANBU FOS =    1.956   **    (Fo factor = 1.082)


 Failure surface No. 9 specified by 19 coordinate points

           Point       x-surf       y-surf
            No.         (ft)         (ft)

              1        164.56        485.36
              2        168.06        482.73
              3        173.16        479.35
              4        214.02        452.31
              5        254.88        425.26
              6        257.56        423.24
              7        257.59        423.22
              8        257.68        423.15
              9        410.87        418.99
             10        854.28        422.16
             11        855.70        424.04
             12        882.74        464.90
             13        909.79        505.76
             14        936.83        546.62
             15        963.88        587.48
```

```
          16         990.92       628.34
          17        1017.97       669.20
          18        1036.94       697.87
          19        1039.68       701.50

  **   Corrected JANBU FOS =    1.964   **     (Fo factor = 1.081)

 Failure surface No.10 specified by 20 coordinate points

         Point        x-surf       y-surf
          No.          (ft)         (ft)

           1         147.88       481.19
           2         151.37       478.56
           3         190.49       452.67
           4         231.35       425.62
           5         234.05       423.59
           6         234.06       423.58
           7         235.58       422.43
           8         409.07       421.67
           9         869.40       421.51
          10         869.85       422.11
          11         869.94       422.21
          12         871.38       424.11
          13         898.42       464.97
          14         925.47       505.83
          15         952.51       546.69
          16         979.56       587.55
          17        1006.60       628.41
          18        1033.65       669.28
          19        1053.00       698.52
          20        1055.73       702.15

  **   Corrected JANBU FOS =    1.969   **     (Fo factor = 1.080)


 The following is a summary of the TEN most critical surfaces

 Problem Description : CAMELOT LF - FINAL COVER SEC 6-4R

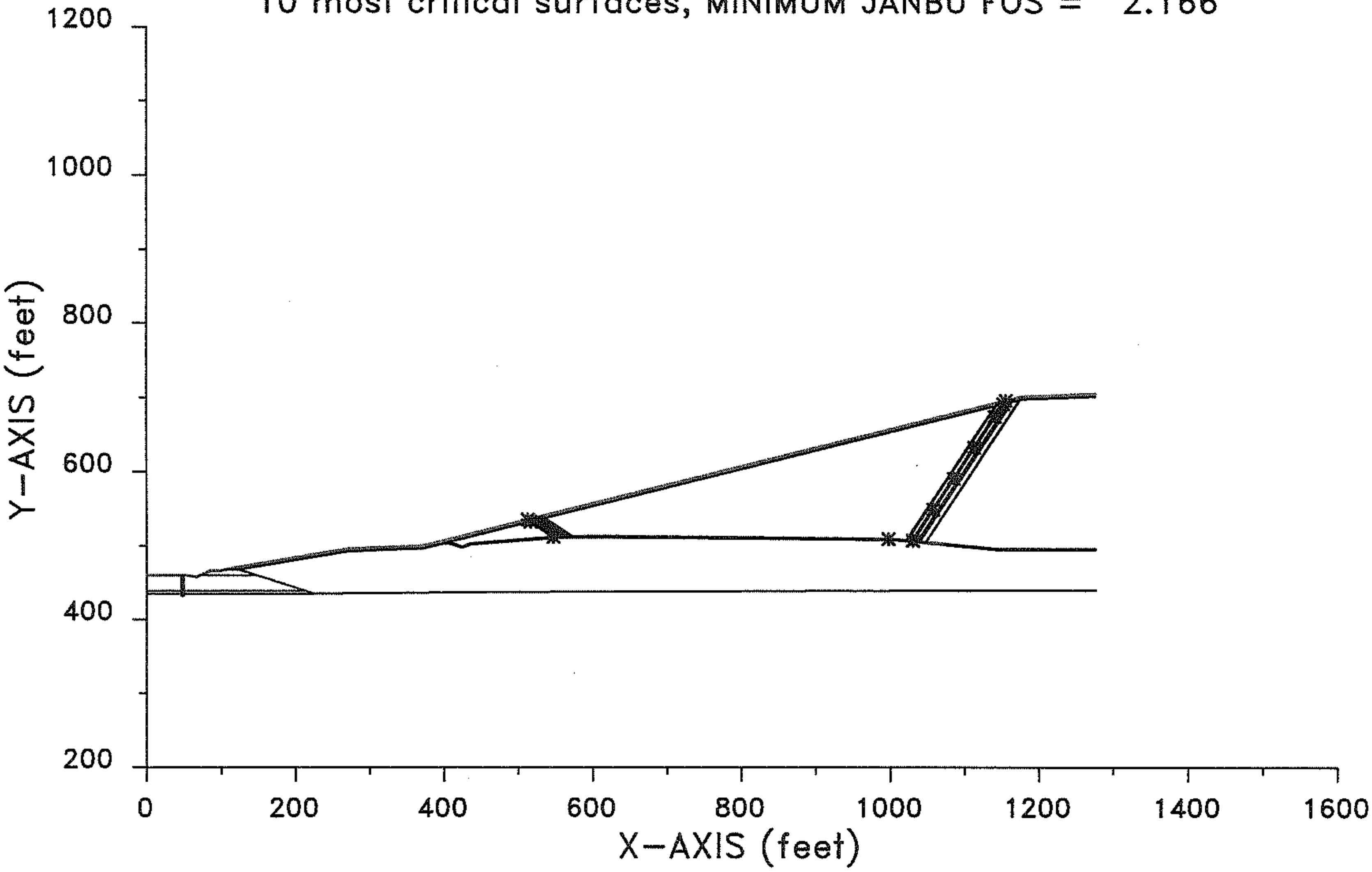
       Modified     Correction   Initial    Terminal    Available
      JANBU FOS       Factor     x-coord     x-coord    Strength
                                   (ft)        (ft)        (lb)

  1.     1.783        1.081      168.41     1049.42    2.641E+06
  2.     1.832        1.081      147.29     1033.99    2.694E+06
  3.     1.934        1.082      171.85     1026.53    2.754E+06
  4.     1.941        1.080      135.97     1052.96    3.029E+06
  5.     1.944        1.081      146.19     1048.74    2.998E+06
  6.     1.946        1.081      156.65     1034.33    2.874E+06
  7.     1.956        1.082      162.43     1010.68    2.740E+06
  8.     1.956        1.082      170.42     1034.12    2.851E+06
  9.     1.964        1.081      164.56     1039.68    2.929E+06
 10.     1.969        1.080      147.88     1055.73    3.066E+06


                      * * *  END OF FILE  * * *
```

1-1P 10-12-11 10:30

CAMELOT LF – OVERLINER SEC 1–1P
10 most critical surfaces, MINIMUM JANBU FOS = 2.166



```
XSTABL File: 1-1P      10-12-11   10:30

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *               using the                *
             *            Method of Slices            *
             *                                        *
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             *  Ver. 5.208                96 - 2046   *
             ******************************************


    Problem Description : CAMELOT LF - OVERLINER SEC 1-1P



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment     x-left    y-left    x-right   y-right    Soil Unit
      No.        (ft)      (ft)      (ft)      (ft)    Below Segment

       1           .0     460.0      46.3     460.0         1
       2         46.3     460.0      49.3     460.0         8
       3         49.3     460.0      52.3     460.0         1
       4         52.3     460.0      64.7     458.4         1
       5         64.7     458.4      66.8     457.7         1
       6         66.8     457.7      71.9     460.0         1
       7         71.9     460.0      85.3     466.0         7
       8         85.3     466.0      98.2     466.0         7
       9         98.2     466.0     105.5     467.7         7
      10        105.5     467.7     117.0     470.0         5
      11        117.0     470.0     235.0     490.0         5
      12        235.0     490.0     272.2     496.0         5
      13        272.2     496.0     371.9     500.0         5
      14        371.9     500.0    1175.9     701.0         5
      15       1175.9     701.0    1275.9     705.0         5

       47 SUBSURFACE boundary segments

    Segment     x-left    y-left    x-right   y-right    Soil Unit
      No.        (ft)      (ft)      (ft)      (ft)    Below Segment

       1        105.5     467.7     124.2     467.7         7
       2        124.2     467.7     235.6     486.5         4
```

```
    3        235.6     486.5      272.6     492.5          4
    4        272.6     492.5      372.4     496.5          4
    5        372.4     496.5      398.3     503.0          4
    6        398.3     503.0      406.3     505.0          6
    7        406.3     505.0     1176.4     697.5          4
    8       1176.4     697.5     1275.9     701.5          4
    9        406.3     505.0      407.4     505.0          6
   10        407.4     505.0      416.7     501.9          6
   11        416.7     501.9      423.7     499.6          6
   12        423.7     499.6      436.0     503.7          6
   13        436.0     503.7      542.0     512.0          6
   14        542.0     512.0      597.3     513.7          6
   15        597.3     513.7      794.9     512.0          6
   16        794.9     512.0     1004.3     510.0          6
   17       1004.3     510.0     1141.7     497.0          6
   18       1141.7     497.0     1275.9     497.0          6
   19        398.3     503.0      407.1     503.0          4
   20        407.1     503.0      416.1     500.0          4
   21        416.1     500.0      423.7     497.5          4
   22        423.7     497.5      436.4     501.7          4
   23        436.4     501.7      542.1     510.0          4
   24        542.1     510.0      597.3     511.7          4
   25        597.3     511.7      794.9     510.0          4
   26        794.9     510.0     1004.2     508.0          4
   27       1004.2     508.0     1141.6     495.0          4
   28       1141.6     495.0     1275.9     495.0          4
   29        124.2     467.7      148.0     460.0          7
   30        148.0     460.0      213.0     439.0          1
   31        213.0     439.0      226.0     434.8          2
   32        226.0     434.8      456.9     437.0          3
   33        456.9     437.0      885.9     439.0          3
   34        885.9     439.0     1225.9     440.0          3
   35       1225.9     440.0     1275.9     440.0          3
   36         46.3     460.0       46.4     439.0          1
   37           .0     439.0       46.4     439.0          2
   38         49.3     460.0       49.4     439.0          8
   39         71.9     460.0      148.0     460.0          1
   40         49.4     439.0      213.0     439.0          2
   41         46.4     439.0       46.5     434.8          2
   42           .0     434.8       46.5     434.8          3
   43         49.4     439.0       49.5     434.8          8
   44         49.5     434.8      226.0     434.8          3
   45         46.5     434.8       46.6     431.8          3
   46         49.5     434.8       49.6     431.8          8
   47         46.6     431.8       49.6     431.8          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.
```

```
   1   127.0   131.0     854.0    11.00      .000          .0      0
   2   132.0   135.0     488.0    16.40      .000          .0      1
   3   130.0   135.0    5000.0      .00      .000          .0      0
   4    65.0    65.0     288.0    23.00      .000          .0      0
   5   115.0   120.0     100.0    16.00      .000          .0      0
   6   115.0   120.0     100.0    18.00      .000          .0      0
   7   115.0   120.0    1074.0    13.10      .000          .0      0
   8    75.0    75.0        .0     5.00      .000          .0      0


 A critical failure surface searching method, using a random
 technique for generating sliding BLOCK surfaces, has been
 specified.


 The active and passive portions of the sliding surfaces
 are generated according to the Rankine theory.


   100 trial surfaces will be generated and analyzed.


   3 boxes specified for generation of central block base


 * * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

 Length of line segments for active and passive portions of
 sliding block is      50.0 ft


 Box          x-left      y-left     x-right     y-right       Width
 no.           (ft)        (ft)        (ft)        (ft)         (ft)

  1            542.0       511.0       592.0       512.5         2.0
  2            954.2       509.5      1004.2       509.0         2.0
  3           1020.6       507.5      1070.4       502.7         2.0


 Factors of safety have been calculated by the :

 * * * * *   SIMPLIFIED JANBU METHOD   * * * * *


 The 10 most critical of all the failure surfaces examined
 are displayed below - the most critical first

 Failure surface No. 1 specified by 13 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         512.72       535.20
```

```
         2         516.31       532.50
         3         547.04       512.15
         4         547.12       512.10
         5         997.64       509.46
         6        1030.42       507.42
         7        1030.50       507.52
         8        1058.09       549.22
         9        1085.69       590.91
        10        1113.29       632.60
        11        1140.89       674.30
        12        1152.25       691.46
        13        1155.61       695.93

  **   Corrected JANBU FOS =   2.166  **    (Fo factor = 1.078)


 Failure surface No. 2 specified by 13 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         515.56       535.92
         2         519.15       533.21
         3         550.79       512.27
         4         550.97       512.14
         5         977.74       509.64
         6        1036.74       506.84
         7        1036.80       506.92
         8        1064.40       548.62
         9        1092.00       590.31
        10        1119.59       632.01
        11        1147.19       673.70
        12        1160.28       693.47
        13        1163.64       697.94

  **   Corrected JANBU FOS =   2.170  **    (Fo factor = 1.078)


 Failure surface No. 3 specified by 13 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         511.45       534.89
         2         515.04       532.18
         3         545.37       512.10
         4         545.62       511.92
         5         996.84       509.70
         6        1046.91       505.09
         7        1047.51       505.91
         8        1075.11       547.61
         9        1102.71       589.30
        10        1130.30       630.99
        11        1157.90       672.69
        12        1173.91       696.88
        13        1177.05       701.05
```

```
 **  Corrected JANBU FOS =   2.179  **     (Fo factor = 1.078)


Failure surface No. 4 specified by 13 coordinate points

       Point        x-surf      y-surf
        No.          (ft)        (ft)

         1          525.52      538.40
         2          529.11      535.70
         3          563.90      512.67
         4          564.11      512.52
         5          976.30      510.06
         6         1020.78      507.20
         7         1021.63      508.36
         8         1049.23      550.05
         9         1076.82      591.75
        10         1104.42      633.44
        11         1132.02      675.14
        12         1140.95      688.64
        13         1144.32      693.10

 **  Corrected JANBU FOS =   2.185  **     (Fo factor = 1.079)


Failure surface No. 5 specified by 13 coordinate points

       Point        x-surf      y-surf
        No.          (ft)        (ft)

         1          521.41      537.38
         2          525.00      534.67
         3          558.48      512.51
         4          558.77      512.30
         5          995.40      508.12
         6         1030.95      507.45
         7         1030.98      507.48
         8         1058.57      549.17
         9         1086.17      590.86
        10         1113.77      632.56
        11         1141.36      674.25
        12         1152.85      691.61
        13         1156.22      696.08

 **  Corrected JANBU FOS =   2.185  **     (Fo factor = 1.079)


Failure surface No. 6 specified by 13 coordinate points

       Point        x-surf      y-surf
        No.          (ft)        (ft)

         1          530.19      539.57
         2          533.78      536.87
         3          570.04      512.86
         4          570.15      512.79
         5         1003.86      509.06
```

```
           6        1036.48      506.83
           7        1036.57      506.95
           8        1064.16      548.64
           9        1091.76      590.34
          10        1119.36      632.03
          11        1146.95      673.72
          12        1159.97      693.39
          13        1163.34      697.86

   **  Corrected JANBU FOS =   2.186  **    (Fo factor = 1.079)


  Failure surface No. 7 specified by 13 coordinate points

          Point       x-surf       y-surf
           No.         (ft)         (ft)

           1          524.37       538.12
           2          527.96       535.41
           3          562.38       512.63
           4          562.95       512.21
           5         1001.39       509.58
           6         1022.12       506.89
           7         1023.09       508.22
           8         1050.68       549.92
           9         1078.28       591.61
          10         1105.88       633.31
          11         1133.47       675.00
          12         1142.81       689.10
          13         1146.17       693.57

   **  Corrected JANBU FOS =   2.186  **    (Fo factor = 1.079)


  Failure surface No. 8 specified by 13 coordinate points

          Point       x-surf       y-surf
           No.         (ft)         (ft)

           1          517.12       536.31
           2          520.71       533.60
           3          552.84       512.33
           4          552.91       512.29
           5          963.57       509.89
           6         1039.78       506.01
           7         1040.21       506.60
           8         1067.81       548.30
           9         1095.40       589.99
          10         1123.00       631.69
          11         1150.60       673.38
          12         1164.61       694.55
          13         1167.98       699.02

   **  Corrected JANBU FOS =   2.187  **    (Fo factor = 1.078)


  Failure surface No. 9 specified by 13 coordinate points
```

```
         Point        x-surf         y-surf
          No.          (ft)           (ft)

           1          532.22         540.08
           2          535.81         537.37
           3          572.72         512.94
           4          573.46         512.41
           5          993.28         509.47
           6         1028.71         507.32
           7         1028.96         507.67
           8         1056.56         549.36
           9         1084.15         591.06
          10         1111.75         632.75
          11         1139.35         674.44
          12         1150.29         690.97
          13         1153.65         695.44

 **   Corrected JANBU FOS =    2.189   **     (Fo factor = 1.079)


Failure surface No.10 specified by 13 coordinate points

         Point        x-surf         y-surf
          No.          (ft)           (ft)

           1          528.83         539.23
           2          532.42         536.53
           3          568.25         512.81
           4          568.91         512.33
           5          992.35         509.01
           6         1047.98         505.14
           7         1048.47         505.82
           8         1076.07         547.52
           9         1103.66         589.21
          10         1131.26         630.90
          11         1158.86         672.60
          12         1175.13         697.18
          13         1178.07         701.09

 **   Corrected JANBU FOS =    2.190   **     (Fo factor = 1.079)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - OVERLINER SEC 1-1P

        Modified      Correction    Initial     Terminal    Available
       JANBU FOS        Factor      x-coord      x-coord     Strength
                                     (ft)         (ft)         (lb)

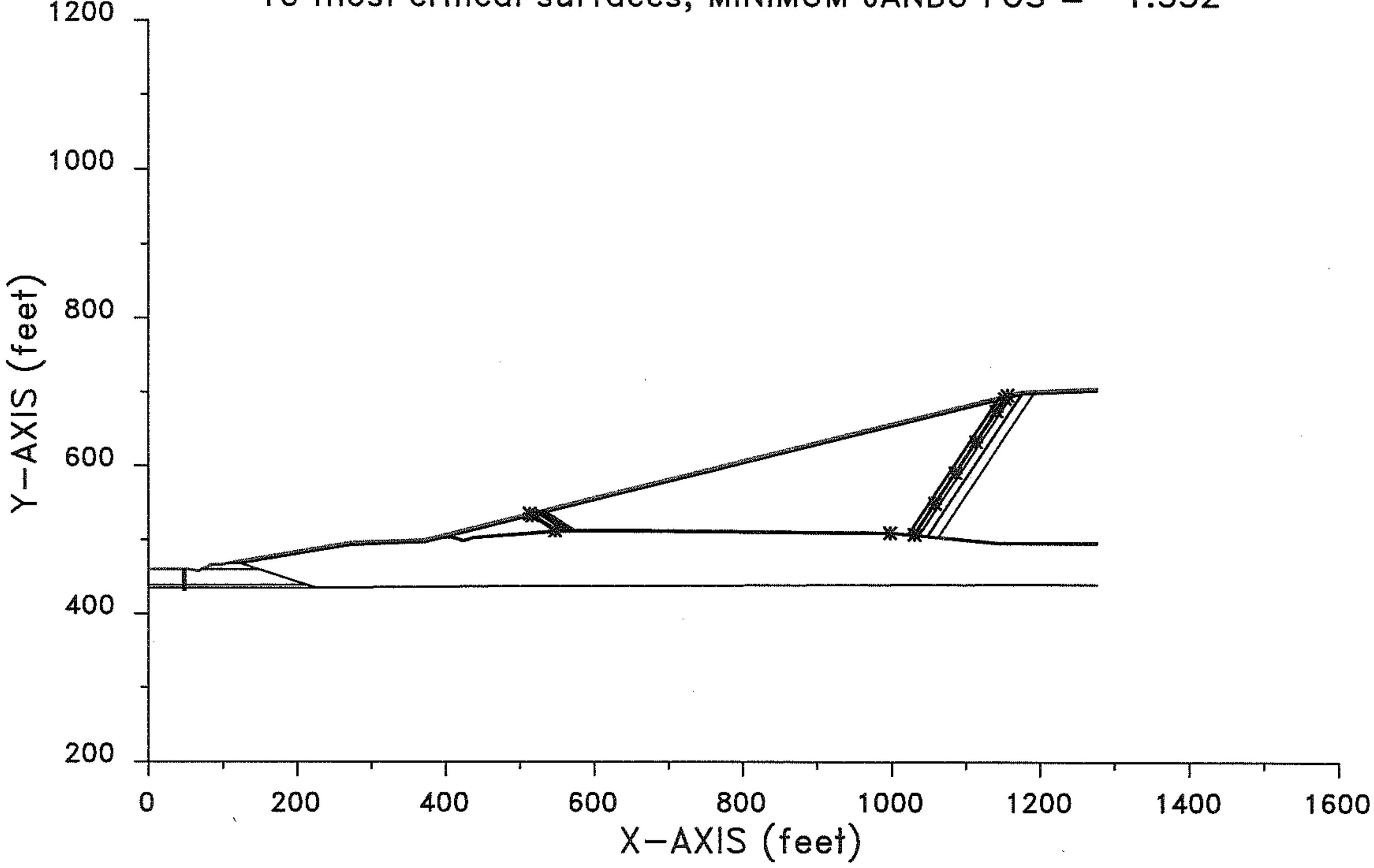
 1.       2.166          1.078       512.72      1155.61     1.514E+06
 2.       2.170          1.078       515.56      1163.64     1.546E+06
 3.       2.179          1.078       511.45      1177.05     1.614E+06
```

```
  4.      2.185          1.079      525.52     1144.32     1.456E+06
  5.      2.185          1.079      521.41     1156.22     1.529E+06
  6.      2.186          1.079      530.19     1163.34     1.533E+06
  7.      2.186          1.079      524.37     1146.17     1.469E+06
  8.      2.187          1.078      517.12     1167.98     1.574E+06
  9.      2.189          1.079      532.22     1153.65     1.493E+06
 10.      2.190          1.079      528.83     1178.07     1.607E+06

                    * * *  END OF FILE  * * *
```

1-1R 10-12-11 10:31

CAMELOT LF - OVERLINER SEC 1-1R
10 most critical surfaces, MINIMUM JANBU FOS = 1.552



```
XSTABL File: 1-1R      10-12-11   10:31

          ******************************************
          *             X S T A B L                *
          *                                        *
          *       Slope Stability Analysis         *
          *              using the                 *
          *           Method of Slices             *
          *                                        *
          *       Copyright (C) 1992 - 2008        *
          *   Interactive Software Designs, Inc.   *
          *       Moscow, ID 83843, U.S.A.         *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                 96 - 2046  *
          ******************************************


    Problem Description : CAMELOT LF - OVERLINER SEC 1-1R



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1           .0      460.0       46.3      460.0          1
       2         46.3      460.0       49.3      460.0          8
       3         49.3      460.0       52.3      460.0          1
       4         52.3      460.0       64.7      458.4          1
       5         64.7      458.4       66.8      457.7          1
       6         66.8      457.7       71.9      460.0          1
       7         71.9      460.0       85.3      466.0          7
       8         85.3      466.0       98.2      466.0          7
       9         98.2      466.0      105.5      467.7          7
      10        105.5      467.7      117.0      470.0          5
      11        117.0      470.0      235.0      490.0          5
      12        235.0      490.0      272.2      496.0          5
      13        272.2      496.0      371.9      500.0          5
      14        371.9      500.0     1175.9      701.0          5
      15       1175.9      701.0     1275.9      705.0          5

       47 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1        105.5      467.7      124.2      467.7          7
       2        124.2      467.7      235.6      486.5          4
```

```
   3       235.6     486.5      272.6     492.5          4
   4       272.6     492.5      372.4     496.5          4
   5       372.4     496.5      398.3     503.0          4
   6       398.3     503.0      406.3     505.0          6
   7       406.3     505.0     1176.4     697.5          4
   8      1176.4     697.5     1275.9     701.5          4
   9       406.3     505.0      407.4     505.0          6
  10       407.4     505.0      416.7     501.9          6
  11       416.7     501.9      423.7     499.6          6
  12       423.7     499.6      436.0     503.7          6
  13       436.0     503.7      542.0     512.0          6
  14       542.0     512.0      597.3     513.7          6
  15       597.3     513.7      794.9     512.0          6
  16       794.9     512.0     1004.3     510.0          6
  17      1004.3     510.0     1141.7     497.0          6
  18      1141.7     497.0     1275.9     497.0          6
  19       398.3     503.0      407.1     503.0          4
  20       407.1     503.0      416.1     500.0          4
  21       416.1     500.0      423.7     497.5          4
  22       423.7     497.5      436.4     501.7          4
  23       436.4     501.7      542.1     510.0          4
  24       542.1     510.0      597.3     511.7          4
  25       597.3     511.7      794.9     510.0          4
  26       794.9     510.0     1004.2     508.0          4
  27      1004.2     508.0     1141.6     495.0          4
  28      1141.6     495.0     1275.9     495.0          4
  29       124.2     467.7      148.0     460.0          7
  30       148.0     460.0      213.0     439.0          1
  31       213.0     439.0      226.0     434.8          2
  32       226.0     434.8      456.9     437.0          3
  33       456.9     437.0      885.9     439.0          3
  34       885.9     439.0     1225.9     440.0          3
  35      1225.9     440.0     1275.9     440.0          3
  36        46.3     460.0       46.4     439.0          1
  37          .0     439.0       46.4     439.0          2
  38        49.3     460.0       49.4     439.0          8
  39        71.9     460.0      148.0     460.0          1
  40        49.4     439.0      213.0     439.0          2
  41        46.4     439.0       46.5     434.8          2
  42          .0     434.8       46.5     434.8          3
  43        49.4     439.0       49.5     434.8          8
  44        49.5     434.8      226.0     434.8          3
  45        46.5     434.8       46.6     431.8          3
  46        49.5     434.8       49.6     431.8          8
  47        46.6     431.8       49.6     431.8          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru      (psf)      No.
```

```
  1   127.0   131.0     854.0    11.00      .000         .0      0
  2   132.0   135.0     488.0    16.40      .000         .0      1
  3   130.0   135.0    5000.0      .00      .000         .0      0
  4    65.0    65.0     288.0    23.00      .000         .0      0
  5   115.0   120.0     100.0    16.00      .000         .0      0
  6   115.0   120.0      80.0    10.00      .000         .0      0
  7   115.0   120.0    1074.0    13.10      .000         .0      0
  8    75.0    75.0        .0     5.00      .000         .0      0


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  3 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     50.0 ft


Box         x-left     y-left    x-right    y-right      Width
no.          (ft)       (ft)       (ft)       (ft)        (ft)

 1          542.0      511.0      592.0      512.5        2.0
 2          954.2      509.5     1004.2      509.0        2.0
 3         1020.6      507.5     1070.4      502.7        2.0


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 13 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1        512.72      535.21
```

```
         2          516.31        532.50
         3          547.05        512.16
         4          547.12        512.10
         5          997.64        509.46
         6         1030.42        507.42
         7         1030.51        507.52
         8         1058.11        549.21
         9         1085.70        590.91
        10         1113.30        632.60
        11         1140.90        674.30
        12         1152.26        691.47
        13         1155.62        695.93

 **  Corrected JANBU FOS =   1.552  **    (Fo factor = 1.078)


Failure surface No. 2 specified by 13 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1          515.58        535.92
         2          519.17        533.21
         3          550.81        512.27
         4          550.97        512.14
         5          977.74        509.64
         6         1036.74        506.84
         7         1036.81        506.92
         8         1064.41        548.62
         9         1092.01        590.31
        10         1119.60        632.01
        11         1147.20        673.70
        12         1160.29        693.47
        13         1163.65        697.94

 **  Corrected JANBU FOS =   1.557  **    (Fo factor = 1.078)


Failure surface No. 3 specified by 13 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1          511.47        534.89
         2          515.06        532.19
         3          545.41        512.10
         4          545.62        511.92
         5          996.84        509.70
         6         1046.91        505.09
         7         1047.60        505.90
         8         1075.19        547.60
         9         1102.79        589.29
        10         1130.39        630.99
        11         1157.98        672.68
        12         1174.02        696.90
        13         1177.14        701.05
```

```
 **  Corrected JANBU FOS =   1.569  **    (Fo factor = 1.078)


Failure surface No. 4 specified by 13 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1         524.42       538.13
         2         528.02       535.42
         3         562.46       512.63
         4         562.95       512.21
         5        1001.39       509.58
         6        1022.12       506.89
         7        1023.22       508.21
         8        1050.82       549.90
         9        1078.42       591.60
        10        1106.01       633.29
        11        1133.61       674.99
        12        1142.98       689.15
        13        1146.35       693.61

 **  Corrected JANBU FOS =   1.573  **    (Fo factor = 1.079)


Failure surface No. 5 specified by 13 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1         525.54       538.41
         2         529.13       535.70
         3         563.92       512.67
         4         564.11       512.52
         5         976.30       510.06
         6        1020.78       507.20
         7        1021.75       508.35
         8        1049.35       550.04
         9        1076.94       591.74
        10        1104.54       633.43
        11        1132.14       675.13
        12        1141.11       688.68
        13        1144.47       693.14

 **  Corrected JANBU FOS =   1.574  **    (Fo factor = 1.079)


Failure surface No. 6 specified by 13 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1         530.20       539.57
         2         533.79       536.87
         3         570.06       512.86
         4         570.15       512.79
         5        1003.86       509.06
```

```
         6        1036.48      506.83
         7        1036.58      506.95
         8        1064.17      548.64
         9        1091.77      590.33
        10        1119.37      632.03
        11        1146.96      673.72
        12        1159.99      693.40
        13        1163.35      697.86

 **  Corrected JANBU FOS =   1.578  **    (Fo factor = 1.079)


Failure surface No. 7 specified by 13 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1         528.89      539.25
         2         532.48      536.54
         3         568.34      512.81
         4         568.91      512.33
         5         992.35      509.01
         6        1047.98      505.14
         7        1048.54      505.81
         8        1076.14      547.51
         9        1103.73      589.20
        10        1131.33      630.90
        11        1158.93      672.59
        12        1175.22      697.20
        13        1178.15      701.09

 **  Corrected JANBU FOS =   1.578  **    (Fo factor = 1.079)


Failure surface No. 8 specified by 13 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1         532.29      540.10
         2         535.88      537.39
         3         572.81      512.95
         4         573.46      512.41
         5         993.28      509.47
         6        1028.71      507.32
         7        1029.00      507.66
         8        1056.59      549.36
         9        1084.19      591.05
        10        1111.79      632.75
        11        1139.38      674.44
        12        1150.33      690.98
        13        1153.70      695.45

 **  Corrected JANBU FOS =   1.581  **    (Fo factor = 1.079)


Failure surface No. 9 specified by 13 coordinate points
```

```
        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         521.43       537.38
          2         525.02       534.68
          3         558.52       512.51
          4         558.77       512.30
          5         995.40       508.12
          6        1030.95       507.45
          7        1030.98       507.48
          8        1058.58       549.17
          9        1086.17       590.86
         10        1113.77       632.56
         11        1141.37       674.25
         12        1152.86       691.62
         13        1156.22       696.08

 **  Corrected JANBU FOS =   1.584  **    (Fo factor = 1.079)


Failure surface No.10 specified by 13 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         529.87       539.49
          2         533.46       536.79
          3         569.63       512.85
          4         569.73       512.77
          5         991.36       509.70
          6        1061.79       503.41
          7        1062.68       504.48
          8        1090.28       546.17
          9        1117.88       587.86
         10        1145.47       629.56
         11        1173.07       671.25
         12        1190.83       698.08
         13        1193.56       701.71

 **  Corrected JANBU FOS =   1.584  **    (Fo factor = 1.079)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - OVERLINER SEC 1-1R

       Modified     Correction   Initial    Terminal    Available
      JANBU FOS       Factor     x-coord     x-coord     Strength
                                  (ft)        (ft)        (lb)

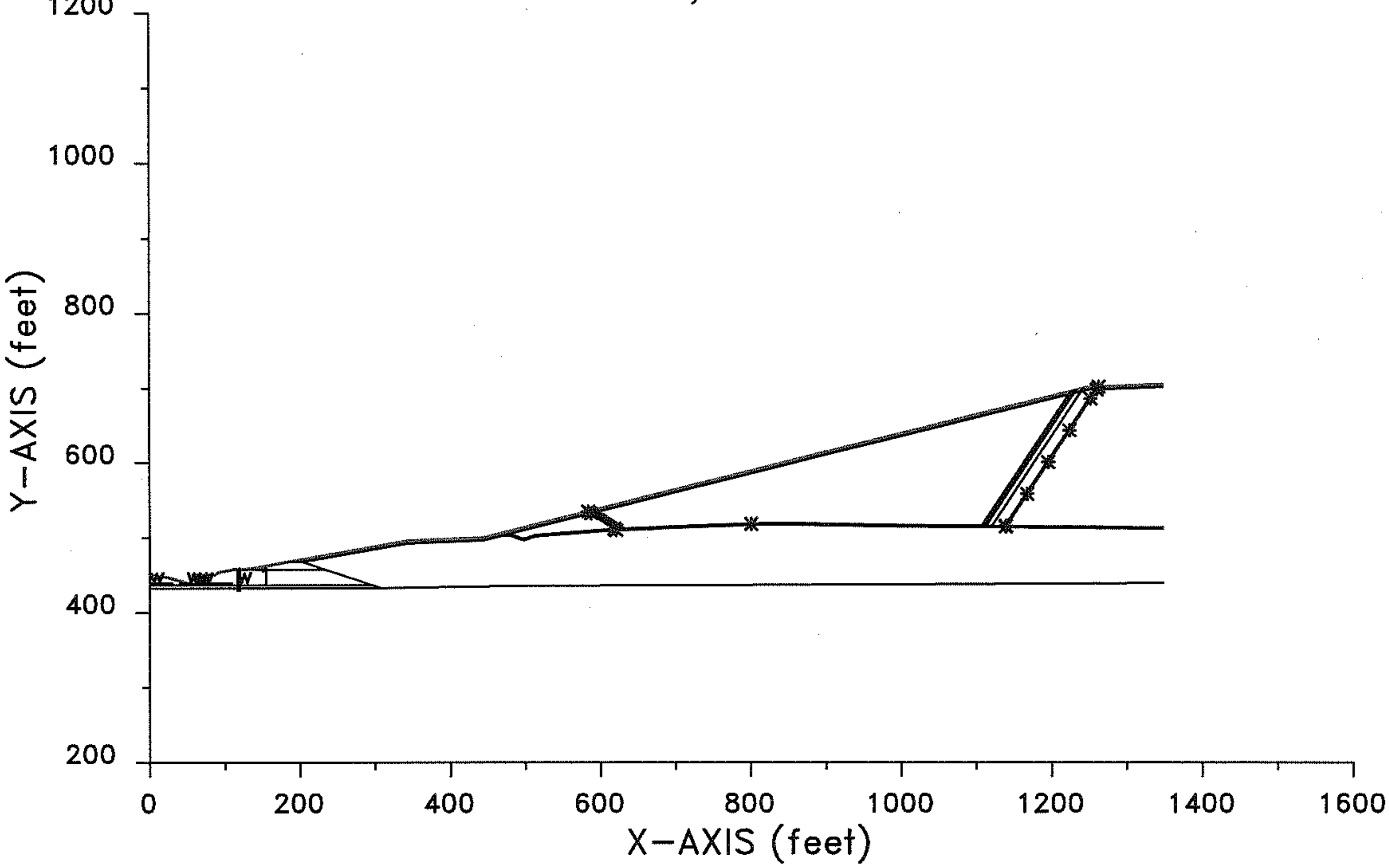
 1.     1.552         1.078      512.72     1155.62    1.014E+06
 2.     1.557         1.078      515.58     1163.65    1.036E+06
 3.     1.569         1.078      511.47     1177.14    1.088E+06
```

```
  4.     1.573          1.079       524.42      1146.35     9.885E+05
  5.     1.574          1.079       525.54      1144.47     9.807E+05
  6.     1.578          1.079       530.20      1163.35     1.034E+06
  7.     1.578          1.079       528.89      1178.15     1.082E+06
  8.     1.581          1.079       532.29      1153.70     1.008E+06
  9.     1.584          1.079       521.43      1156.22     1.038E+06
 10.     1.584          1.079       529.87      1193.56     1.129E+06

                     * * *  END OF FILE  * * *
```

2-1P 3-09-12 13:37

CAMELOT LF – OVERLINER SEC 2–1P
10 most critical surfaces, MINIMUM JANBU FOS = 2.132



```
XSTABL File: 2-1P       3-09-12   13:37

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *              using the                *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - OVERLINER SEC 2-1P



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1           .0      450.9       21.0      448.1           1
       2         21.0      448.1       56.0      438.1           1
       3         56.0      438.1       62.0      438.1           1
       4         62.0      438.1       92.0      454.1           1
       5         92.0      454.1      112.0      458.1           1
       6        112.0      458.1      116.3      458.1           1
       7        116.3      458.1      119.3      458.1           8
       8        119.3      458.1      123.8      458.1           1
       9        123.8      458.1      141.0      460.0           7
      10        141.0      460.0      183.6      467.7           7
      11        183.6      467.7      196.5      470.0           5
      12        196.5      470.0      343.4      496.0           5
      13        343.4      496.0      443.7      500.0           5
      14        443.7      500.0     1247.7      701.0           5
      15       1247.7      701.0     1347.7      705.0           5

       45 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1        183.6      467.7      203.5      467.7           7
       2        203.5      467.7      343.8      492.5           4
```

```
      3       343.8      492.5      444.2      496.5          4
      4       444.2      496.5      470.1      503.0          4
      5       470.1      503.0      478.1      505.0          6
      6       478.1      505.0     1248.2      697.5          4
      7      1248.2      697.5     1347.7      701.5          4
      8       478.1      505.0      479.1      505.0          6
      9       479.1      505.0      497.9      498.8          6
     10       497.9      498.8      513.3      503.9          6
     11       513.3      503.9      555.5      507.0          6
     12       555.5      507.0      619.8      512.0          6
     13       619.8      512.0      744.8      517.0          6
     14       744.8      517.0      833.4      519.8          6
     15       833.4      519.8      990.9      517.0          6
     16       990.9      517.0     1347.7      514.0          6
     17       470.1      503.0      478.8      503.0          4
     18       478.8      503.0      497.9      496.7          4
     19       497.9      496.7      513.7      501.9          4
     20       513.7      501.9      555.7      505.0          4
     21       555.7      505.0      619.9      510.0          4
     22       619.9      510.0      744.9      515.0          4
     23       744.9      515.0      833.4      517.8          4
     24       833.4      517.8      990.9      515.0          4
     25       990.9      515.0     1347.7      512.0          4
     26       203.5      467.7      232.2      458.1          7
     27       232.2      458.1      295.5      437.0          1
     28       295.5      437.0      308.1      432.8          2
     29       308.1      432.8      316.0      433.0          3
     30       316.0      433.0      496.8      436.0          3
     31       496.8      436.0      802.4      437.0          3
     32       802.4      437.0     1206.5      439.0          3
     33      1206.5      439.0     1347.7      440.0          3
     34       123.8      458.1      232.2      458.1          1
     35       116.3      458.1      116.4      437.0          1
     36          .0      437.0      116.4      437.0          2
     37       119.3      460.0      119.4      437.0          8
     38       119.4      437.0      295.5      437.0          2
     39       116.4      437.0      116.5      432.8          2
     40          .0      432.8      116.5      432.8          3
     41       119.4      437.0      119.5      432.8          8
     42       119.5      432.8      308.1      432.8          3
     43       116.5      432.8      116.6      429.8          3
     44       119.5      432.8      119.6      432.8          3
     45       116.6      429.8      119.6      429.8          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight    Cohesion  Friction    Pore Pressure        Water
Unit  Moist    Sat.  Intercept    Angle  Parameter  Constant   Surface
 No.  (pcf)   (pcf)    (psf)      (deg)     Ru        (psf)      No.

  1   127.0   131.0     854.0     11.00     .000          .0       1
  2   132.0   135.0     488.0     16.40     .000          .0       1
```

```
  3   130.0   135.0    5000.0       .00       .000          .0        0
  4    65.0    65.0     288.0     23.00       .000          .0        0
  5   115.0   120.0     100.0     16.00       .000          .0        0
  6   115.0   120.0     100.0     18.00       .000          .0        0
  7   115.0   120.0    1074.0     13.10       .000          .0        0
  8    75.0    75.0        .0      5.00       .000          .0        0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  6 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.         (ft)        (ft)

    1            .00       440.00
    2          49.40       440.00
    3          56.00       438.10
    4          62.00       438.10
    5          65.60       440.00
    6         116.40       440.00


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  3 boxes specified for generation of central block base



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is      51.0 ft


Box          x-left      y-left     x-right     y-right        Width
no.           (ft)        (ft)        (ft)        (ft)          (ft)
```

```
  1           619.8        511.0        669.8        512.0            2.0
  2           783.5        517.2        833.4        518.8            2.0
  3          1093.9        515.1       1143.9        514.7            2.0


Factors of safety have been calculated by the :

 * * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 13 coordinate points

        Point      x-surf      y-surf
         No.        (ft)        (ft)

          1        584.01      535.08
          2        587.60      532.37
          3        618.52      511.90
          4        620.87      510.20
          5        800.91      518.18
          6       1139.15      514.75
          7       1139.88      515.75
          8       1168.03      558.28
          9       1196.18      600.80
         10       1224.33      643.33
         11       1252.48      685.86
         12       1260.51      697.99
         13       1263.24      701.62

 **  Corrected JANBU FOS =   2.132  **    (Fo factor = 1.076)


Failure surface No. 2 specified by 13 coordinate points

        Point      x-surf      y-surf
         No.        (ft)        (ft)

          1        587.57      535.97
          2        591.16      533.26
          3        623.09      512.13
          4        623.42      511.89
          5        826.05      519.19
          6       1120.32      515.01
          7       1120.97      515.91
          8       1149.12      558.43
          9       1177.27      600.96
         10       1205.41      643.49
         11       1233.56      686.02
         12       1239.77      695.39
         13       1243.13      699.86

 **  Corrected JANBU FOS =   2.137  **    (Fo factor = 1.076)
```

```
Failure surface No. 3 specified by 13 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1        585.17      535.37
         2        588.76      532.66
         3        619.96      512.01
         4        620.78      511.42
         5        824.52      518.11
         6       1136.56      513.89
         7       1137.92      515.76
         8       1166.07      558.29
         9       1194.22      600.82
        10       1222.37      643.35
        11       1250.52      685.88
        12       1258.48      697.91
        13       1261.22      701.54

 **  Corrected JANBU FOS =   2.137  **    (Fo factor = 1.076)


Failure surface No. 4 specified by 13 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1        589.17      536.37
         2        592.76      533.66
         3        625.16      512.21
         4        627.40      510.59
         5        803.40      518.03
         6       1120.96      515.50
         7       1121.25      515.90
         8       1149.40      558.43
         9       1177.55      600.96
        10       1205.70      643.49
        11       1233.85      686.02
        12       1240.11      695.48
        13       1243.47      699.94

 **  Corrected JANBU FOS =   2.139  **    (Fo factor = 1.076)


Failure surface No. 5 specified by 13 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1        591.63      536.98
         2        595.22      534.28
         3        628.36      512.34
         4        628.77      512.05
         5        806.99      518.33
         6       1110.11      515.87
```

```
         7         1110.20       516.00
         8         1138.35       558.53
         9         1166.50       601.05
        10         1194.65       643.58
        11         1222.80       686.11
        12         1226.80       692.15
        13         1230.16       696.62

  **  Corrected JANBU FOS =    2.142   **    (Fo factor = 1.077)


Failure surface No. 6 specified by 13 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1          589.57       536.47
         2          593.16       533.76
         3          625.68       512.24
         4          626.73       511.47
         5          815.50       519.15
         6         1112.52       514.82
         7         1113.35       515.97
         8         1141.50       558.50
         9         1169.65       601.03
        10         1197.80       643.55
        11         1225.95       686.08
        12         1230.59       693.10
        13         1233.96       697.56

  **  Corrected JANBU FOS =    2.145   **    (Fo factor = 1.077)


Failure surface No. 7 specified by 14 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1          592.31       537.15
         2          595.90       534.45
         3          629.24       512.38
         4          631.85       510.48
         5          631.86       510.47
         6          817.70       519.01
         7         1111.81       515.49
         8         1112.17       515.98
         9         1140.32       558.51
        10         1168.47       601.04
        11         1196.62       643.56
        12         1224.77       686.09
        13         1229.17       692.74
        14         1232.53       697.21

  **  Corrected JANBU FOS =    2.146   **    (Fo factor = 1.077)


Failure surface No. 8 specified by 13 coordinate points
```

```
            Point       x-surf       y-surf
             No.         (ft)         (ft)

              1         595.00       537.83
              2         598.59       535.12
              3         632.74       512.52
              4         633.92       511.66
              5         823.08       518.46
              6        1120.54       514.84
              7        1121.31       515.90
              8        1149.46       558.43
              9        1177.61       600.96
             10        1205.76       643.49
             11        1233.91       686.02
             12        1240.18       695.50
             13        1243.55       699.96

      **   Corrected JANBU FOS =    2.147   **     (Fo factor = 1.077)


      Failure surface No. 9 specified by 13 coordinate points

            Point       x-surf       y-surf
             No.         (ft)         (ft)

              1         585.67       535.49
              2         589.26       532.79
              3         620.62       512.03
              4         621.50       511.39
              5         817.89       519.23
              6        1105.89       514.18
              7        1107.23       516.02
              8        1135.38       558.55
              9        1163.53       601.08
             10        1191.68       643.61
             11        1219.83       686.13
             12        1223.22       691.26
             13        1226.58       695.72

      **   Corrected JANBU FOS =    2.148   **     (Fo factor = 1.077)


      Failure surface No.10 specified by 14 coordinate points

            Point       x-surf       y-surf
             No.         (ft)         (ft)

              1         585.77       535.52
              2         589.36       532.81
              3         620.74       512.04
              4         621.23       511.68
              5         828.58       517.97
              6        1110.91       513.97
              7        1110.92       513.99
              8        1112.36       515.98
              9        1140.51       558.51
```

```
         10       1168.66      601.04
         11       1196.81      643.56
         12       1224.96      686.09
         13       1229.40      692.80
         14       1232.76      697.27

 **  Corrected JANBU FOS =   2.152  **    (Fo factor = 1.077)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - OVERLINER SEC 2-1P

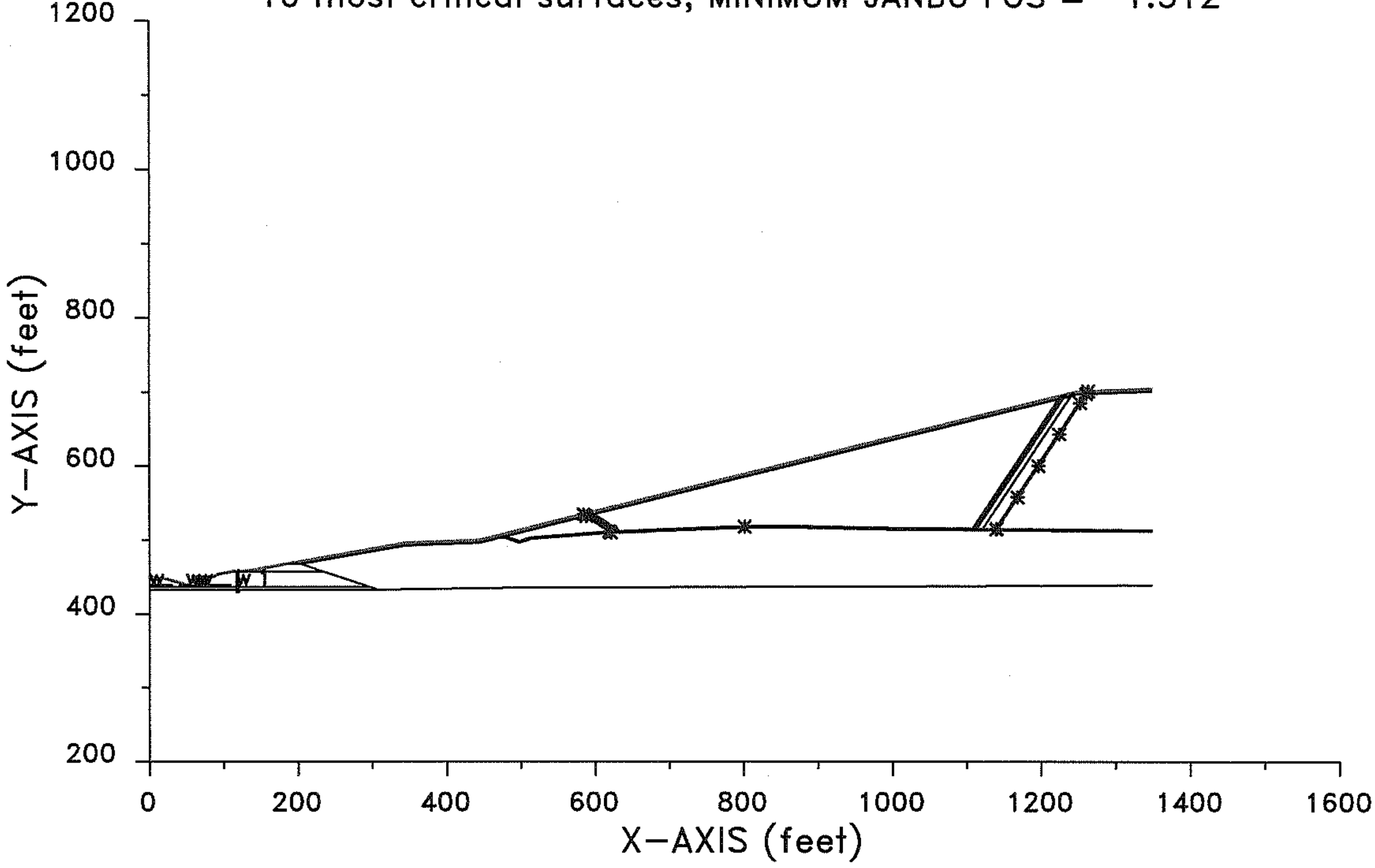
      Modified     Correction   Initial    Terminal   Available
      JANBU FOS      Factor     x-coord    x-coord     Strength
                                 (ft)       (ft)        (lb)

 1.      2.132        1.076      584.01     1263.24    1.594E+06
 2.      2.137        1.076      587.57     1243.13    1.489E+06
 3.      2.137        1.076      585.17     1261.22    1.588E+06
 4.      2.139        1.076      589.17     1243.47    1.502E+06
 5.      2.142        1.077      591.63     1230.16    1.438E+06
 6.      2.145        1.077      589.57     1233.96    1.456E+06
 7.      2.146        1.077      592.31     1232.53    1.451E+06
 8.      2.147        1.077      595.00     1243.55    1.497E+06
 9.      2.148        1.077      585.67     1226.58    1.434E+06
10.      2.152        1.077      585.77     1232.76    1.473E+06

                  * * *  END OF FILE  * * *
```

2-1R 3-09-12 13:40

CAMELOT LF - OVERLINER SEC 2-1R
10 most critical surfaces, MINIMUM JANBU FOS = 1.512



```
XSTABL File: 2-1R       3-09-12   13:40

             *****************************************
             *              X S T A B L              *
             *                                       *
             *        Slope Stability Analysis       *
             *               using the               *
             *            Method of Slices           *
             *                                       *
             *        Copyright (C) 1992 - 2008      *
             *   Interactive Software Designs, Inc.  *
             *        Moscow, ID 83843, U.S.A.       *
             *                                       *
             *          All Rights Reserved          *
             *                                       *
             *  Ver. 5.208                96 - 2046  *
             *****************************************


    Problem Description : CAMELOT LF - OVERLINER SEC 2-1R



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       15 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)    Below Segment

      1            .0      450.9       21.0      448.1          1
      2          21.0      448.1       56.0      438.1          1
      3          56.0      438.1       62.0      438.1          1
      4          62.0      438.1       92.0      454.1          1
      5          92.0      454.1      112.0      458.1          1
      6         112.0      458.1      116.3      458.1          1
      7         116.3      458.1      119.3      458.1          8
      8         119.3      458.1      123.8      458.1          1
      9         123.8      458.1      141.0      460.0          7
     10         141.0      460.0      183.6      467.7          7
     11         183.6      467.7      196.5      470.0          5
     12         196.5      470.0      343.4      496.0          5
     13         343.4      496.0      443.7      500.0          5
     14         443.7      500.0     1247.7      701.0          5
     15        1247.7      701.0     1347.7      705.0          5

       45 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)    Below Segment

      1         183.6      467.7      203.5      467.7          7
      2         203.5      467.7      343.8      492.5          4
```

```
     3          343.8       492.5        444.2       496.5             4
     4          444.2       496.5        470.1       503.0             4
     5          470.1       503.0        478.1       505.0             6
     6          478.1       505.0       1248.2       697.5             4
     7         1248.2       697.5       1347.7       701.5             4
     8          478.1       505.0        479.1       505.0             6
     9          479.1       505.0        497.9       498.8             6
    10          497.9       498.8        513.3       503.9             6
    11          513.3       503.9        555.5       507.0             6
    12          555.5       507.0        619.8       512.0             6
    13          619.8       512.0        744.8       517.0             6
    14          744.8       517.0        833.4       519.8             6
    15          833.4       519.8        990.9       517.0             6
    16          990.9       517.0       1347.7       514.0             6
    17          470.1       503.0        478.8       503.0             4
    18          478.8       503.0        497.9       496.7             4
    19          497.9       496.7        513.7       501.9             4
    20          513.7       501.9        555.7       505.0             4
    21          555.7       505.0        619.9       510.0             4
    22          619.9       510.0        744.9       515.0             4
    23          744.9       515.0        833.4       517.8             4
    24          833.4       517.8        990.9       515.0             4
    25          990.9       515.0       1347.7       512.0             4
    26          203.5       467.7        232.2       458.1             7
    27          232.2       458.1        295.5       437.0             1
    28          295.5       437.0        308.1       432.8             2
    29          308.1       432.8        316.0       433.0             3
    30          316.0       433.0        496.8       436.0             3
    31          496.8       436.0        802.4       437.0             3
    32          802.4       437.0       1206.5       439.0             3
    33         1206.5       439.0       1347.7       440.0             3
    34          123.8       458.1        232.2       458.1             1
    35          116.3       458.1        116.4       437.0             1
    36             .0       437.0        116.4       437.0             2
    37          119.3       460.0        119.4       437.0             8
    38          119.4       437.0        295.5       437.0             2
    39          116.4       437.0        116.5       432.8             2
    40             .0       432.8        116.5       432.8             3
    41          119.4       437.0        119.5       432.8             8
    42          119.5       432.8        308.1       432.8             3
    43          116.5       432.8        116.6       429.8             3
    44          119.5       432.8        119.6       432.8             3
    45          116.6       429.8        119.6       429.8             3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure       Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)     Ru        (psf)      No.

  1   127.0   131.0     854.0    11.00      .000         .0       1
  2   132.0   135.0     488.0    16.40      .000         .0       1
```

```
  3   130.0   135.0    5000.0      .00       .000          .0      0
  4    65.0    65.0     288.0    23.00       .000          .0      0
  5   115.0   120.0     100.0    16.00       .000          .0      0
  6   115.0   120.0      80.0    10.00       .000          .0      0
  7   115.0   120.0    1074.0    13.10       .000          .0      0
  8    75.0    75.0        .0     5.00       .000          .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  6 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.         (ft)        (ft)

    1            .00      440.00
    2          49.40      440.00
    3          56.00      438.10
    4          62.00      438.10
    5          65.60      440.00
    6         116.40      440.00


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  3 boxes specified for generation of central block base



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     51.0 ft


Box          x-left     y-left    x-right    y-right      Width
no.           (ft)       (ft)      (ft)       (ft)        (ft)
```

```
    1          619.8      511.0      669.8      512.0        2.0
    2          783.5      517.2      833.4      518.8        2.0
    3         1093.9      515.1     1143.9      514.7        2.0


***********************************************************************
   --  WARNING  --  WARNING  --  WARNING  --  WARNING  --  (# 48)
***********************************************************************
Negative effective stresses were calculated at the base of a slice.
This warning is usually reported for cases where slices have low self
weight and a relatively high "c" shear strength parameter.  In such
cases, this effect can only be eliminated by reducing the "c" value.
***********************************************************************

    ------------------------------------------------------------
    USER SELECTED option to maintain strength greater than zero
    ------------------------------------------------------------



    Factors of safety have been calculated by the :

    * * * * *   SIMPLIFIED JANBU METHOD   * * * * *



    The 10 most critical of all the failure surfaces examined
    are displayed below - the most critical first

    Failure surface No. 1 specified by 13 coordinate points

           Point        x-surf       y-surf
            No.          (ft)         (ft)

             1          584.24       535.13
             2          587.83       532.43
             3          618.81       511.92
             4          620.87       510.20
             5          800.91       518.18
             6         1139.15       514.75
             7         1139.99       515.75
             8         1168.14       558.27
             9         1196.29       600.80
            10         1224.44       643.33
            11         1252.59       685.86
            12         1260.62       698.00
            13         1263.36       701.63

     **  Corrected JANBU FOS =   1.512  **     (Fo factor = 1.076)


    Failure surface No. 2 specified by 13 coordinate points

           Point        x-surf       y-surf
            No.          (ft)         (ft)

             1          585.25       535.39
```

```
          2         588.84      532.68
          3         620.07      512.01
          4         620.78      511.42
          5         824.52      518.11
          6        1136.56      513.89
          7        1138.13      515.76
          8        1166.28      558.29
          9        1194.43      600.82
         10        1222.58      643.35
         11        1250.73      685.87
         12        1258.70      697.92
         13        1261.43      701.55

  **  Corrected JANBU FOS =   1.515  **    (Fo factor = 1.076)


 Failure surface No. 3 specified by 13 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         587.60      535.98
          2         591.19      533.27
          3         623.13      512.13
          4         623.42      511.89
          5         826.05      519.19
          6        1120.32      515.01
          7        1121.07      515.91
          8        1149.22      558.43
          9        1177.37      600.96
         10        1205.51      643.49
         11        1233.66      686.02
         12        1239.89      695.42
         13        1243.25      699.89

  **  Corrected JANBU FOS =   1.524  **    (Fo factor = 1.076)


 Failure surface No. 4 specified by 13 coordinate points

        Point       x-surf       y-surf
         No.         (ft)         (ft)

          1         589.39      536.42
          2         592.98      533.72
          3         625.45      512.23
          4         627.40      510.59
          5         803.40      518.03
          6        1120.96      515.50
          7        1121.30      515.90
          8        1149.45      558.43
          9        1177.59      600.96
         10        1205.74      643.49
         11        1233.89      686.02
         12        1240.16      695.49
         13        1243.53      699.96
```

```
 **  Corrected JANBU FOS =   1.527  **    (Fo factor = 1.076)


Failure surface No. 5 specified by 13 coordinate points

      Point        x-surf       y-surf
       No.          (ft)         (ft)

        1          585.76       535.51
        2          589.35       532.81
        3          620.73       512.04
        4          621.50       511.39
        5          817.89       519.23
        6         1105.89       514.18
        7         1107.44       516.02
        8         1135.59       558.55
        9         1163.74       601.08
       10         1191.89       643.60
       11         1220.03       686.13
       12         1223.47       691.32
       13         1226.83       695.78

 **  Corrected JANBU FOS =   1.530  **    (Fo factor = 1.077)


Failure surface No. 6 specified by 13 coordinate points

      Point        x-surf       y-surf
       No.          (ft)         (ft)

        1          589.67       536.49
        2          593.27       533.79
        3          625.82       512.24
        4          626.73       511.47
        5          815.50       519.15
        6         1112.52       514.82
        7         1113.48       515.97
        8         1141.63       558.50
        9         1169.78       601.03
       10         1197.93       643.55
       11         1226.08       686.08
       12         1230.75       693.14
       13         1234.11       697.60

 **  Corrected JANBU FOS =   1.531  **    (Fo factor = 1.077)


Failure surface No. 7 specified by 13 coordinate points

      Point        x-surf       y-surf
       No.          (ft)         (ft)

        1          591.67       536.99
        2          595.26       534.29
        3          628.42       512.34
        4          628.77       512.05
        5          806.99       518.33
```

```
         6       1110.11      515.87
         7       1110.22      516.00
         8       1138.37      558.52
         9       1166.51      601.05
        10       1194.66      643.58
        11       1222.81      686.11
        12       1226.81      692.15
        13       1230.18      696.62

 **  Corrected JANBU FOS =   1.531  **    (Fo factor = 1.077)


Failure surface No. 8 specified by 13 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1        595.12      537.85
         2        598.71      535.15
         3        632.89      512.52
         4        633.92      511.66
         5        823.08      518.46
         6       1120.54      514.84
         7       1121.43      515.90
         8       1149.58      558.43
         9       1177.73      600.96
        10       1205.88      643.49
        11       1234.03      686.02
        12       1240.33      695.53
        13       1243.69      700.00

 **  Corrected JANBU FOS =   1.533  **    (Fo factor = 1.077)


Failure surface No. 9 specified by 14 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1        592.56      537.22
         2        596.16      534.51
         3        629.57      512.39
         4        631.85      510.48
         5        631.86      510.47
         6        817.70      519.01
         7       1111.81      515.49
         8       1112.23      515.98
         9       1140.37      558.51
        10       1168.52      601.04
        11       1196.67      643.56
        12       1224.82      686.09
        13       1229.23      692.76
        14       1232.60      697.22

 **  Corrected JANBU FOS =   1.535  **    (Fo factor = 1.077)
```

```
Failure surface No.10 specified by 14 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1          585.81        535.53
         2          589.41        532.82
         3          620.80        512.04
         4          621.23        511.68
         5          828.58        517.97
         6         1110.91        513.97
         7         1110.92        513.99
         8         1112.58        515.98
         9         1140.73        558.51
        10         1168.88        601.03
        11         1197.03        643.56
        12         1225.18        686.09
        13         1229.66        692.87
        14         1233.03        697.33

 **  Corrected JANBU FOS =   1.538  **     (Fo factor = 1.077)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - OVERLINER SEC 2-1R

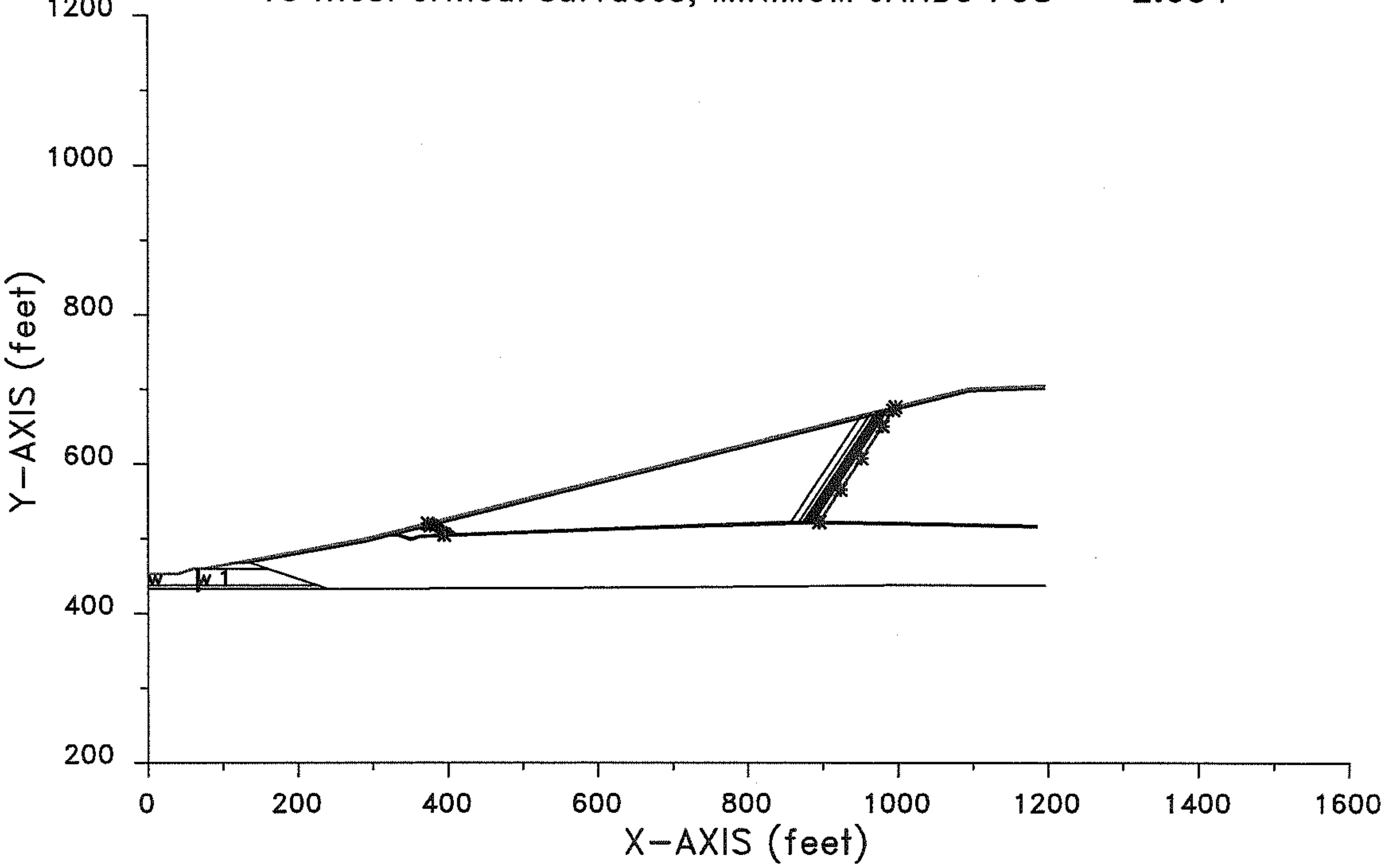
      Modified      Correction    Initial     Terminal     Available
     JANBU FOS        Factor      x-coord      x-coord      Strength
                                   (ft)         (ft)          (lb)

 1.     1.512         1.076       584.24      1263.36     1.058E+06
 2.     1.515         1.076       585.25      1261.43     1.055E+06
 3.     1.524         1.076       587.60      1243.25     9.940E+05
 4.     1.527         1.076       589.39      1243.53     1.003E+06
 5.     1.530         1.077       585.76      1226.83     9.574E+05
 6.     1.531         1.077       589.67      1234.11     9.732E+05
 7.     1.531         1.077       591.67      1230.18     9.620E+05
 8.     1.533         1.077       595.12      1243.69     1.001E+06
 9.     1.535         1.077       592.56      1232.60     9.713E+05
10.     1.538         1.077       585.81      1233.03     9.875E+05

                   * * *  END OF FILE  * * *
```

3-1P   10-12-11   10:36

CAMELOT LF – OVERLINER SEC 3-1P
10 most critical surfaces, MINIMUM JANBU FOS =   2.054



```
XSTABL File: 3-1P      10-12-11   10:36

          *****************************************
          *              X S T A B L              *
          *                                       *
          *        Slope Stability Analysis       *
          *              using the                *
          *           Method of Slices            *
          *                                       *
          *        Copyright (C) 1992 - 2008      *
          *   Interactive Software Designs, Inc.  *
          *        Moscow, ID 83843, U.S.A.       *
          *                                       *
          *          All Rights Reserved          *
          *                                       *
          *  Ver. 5.208                96 - 2046  *
          *****************************************


    Problem Description : CAMELOT LF - OVERLINER SEC 3-1P



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1          .0       453.3       40.0      453.3          1
       2        40.0       453.3       59.9      460.0          1
       3        59.9       460.0       64.5      460.0          1
       4        64.5       460.0       67.5      460.0          8
       5        67.5       460.0       73.3      460.0          1
       6        73.3       460.0      116.6      467.7          7
       7       116.6       467.7      129.4      470.0          5
       8       129.4       470.0      291.1      500.0          5
       9       291.1       500.0     1095.1      701.0          5
      10      1095.1       701.0     1195.1      705.0          5


       43 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1       116.6       467.7      132.3      467.7          7
       2       132.3       467.7      291.8      496.6          4
       3       291.8       496.6      322.3      504.2          4
       4       322.3       504.2      330.3      506.2          6
       5       330.3       506.2     1095.6      697.5          4
       6      1095.6       697.5     1195.1      701.5          4
       7       330.3       506.2      332.6      506.2          6
```

```
    8       332.6     506.2      350.1     500.3         6
    9       350.1     500.3      361.5     504.1         6
   10       361.5     504.1      434.5     507.0         6
   11       434.5     507.0      684.5     517.0         6
   12       684.5     517.0      851.2     523.0         6
   13       851.2     523.0      901.3     523.0         6
   14       901.3     523.0      979.0     522.0         6
   15       979.0     522.0     1184.6     518.0         6
   16       322.3     504.2      332.3     504.2         4
   17       332.3     504.2      350.1     498.2         4
   18       350.1     498.2      361.9     502.1         4
   19       361.9     502.1      434.6     505.0         4
   20       434.6     505.0      684.6     515.0         4
   21       684.6     515.0      851.3     520.0         4
   22       851.3     520.0      901.3     521.0         4
   23       901.3     521.0      979.0     520.0         4
   24       979.0     520.0     1184.6     516.0         4
   25       136.3     467.7      159.4     460.0         7
   26       159.4     460.0      225.4     438.0         1
   27       225.4     438.0      239.5     433.3         2
   28       239.5     433.3      579.8     435.0         3
   29       579.8     435.0      879.3     437.0         3
   30       879.3     437.0     1005.0     439.0         3
   31      1005.0     439.0     1195.1     438.0         3
   32        73.3     460.0      159.4     460.0         1
   33        64.5     460.0       64.6     438.0         1
   34          .0     438.0       64.6     438.0         2
   35        67.5     460.0       67.6     438.0         8
   36        67.6     438.0      225.4     438.0         2
   37        64.6     438.0       64.7     433.3         2
   38          .0     433.3       64.7     433.2         3
   39        67.6     438.0       67.7     433.3         8
   40        67.7     433.3      239.5     433.3         3
   41        64.7     433.3       64.8     430.3         3
   42        67.7     433.3       67.8     430.3         8
   43        64.8     430.3       67.8     430.3         3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)      (psf)   (deg)      Ru      (psf)      No.

  1   127.0    131.0     854.0    11.00      .000         .0      0
  2   132.0    135.0     488.0    16.40      .000         .0      1
  3   130.0    135.0    5000.0      .00      .000         .0      0
  4    65.0     65.0     288.0    23.00      .000         .0      0
  5   115.0    120.0     100.0    16.00      .000         .0      0
  6   115.0    120.0     100.0    18.00      .000         .0      0
  7   115.0    120.0    1074.0    13.10      .000         .0      0
  8    75.0     75.0        .0     5.00      .000         .0      0
```

```
 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point      x-water      y-water
   No.         (ft)         (ft)

    1            .00       438.00
    2          64.50       438.00


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     51.0 ft


Box         x-left     y-left    x-right    y-right      Width
no.          (ft)       (ft)       (ft)       (ft)        (ft)

 1          389.7      504.2      439.6      506.2         2.0
 2          851.2      521.0      901.3      522.0         2.0


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *
```

```
The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 11 coordinate points

       Point       x-surf      y-surf
        No.         (ft)        (ft)

         1         372.61      520.38
         2         376.20      517.67
         3         394.71      505.42
         4         394.81      505.35
         5         894.73      522.27
         6         895.26      523.00
         7         923.41      565.53
         8         951.56      608.06
         9         979.71      650.58
        10         993.94      672.09
        11         997.30      676.55

 **  Corrected JANBU FOS =   2.054  **     (Fo factor = 1.071)


Failure surface No. 2 specified by 11 coordinate points

       Point       x-surf      y-surf
        No.         (ft)        (ft)

         1         371.19      520.02
         2         374.78      517.32
         3         392.87      505.35
         4         394.31      504.30
         5         882.90      522.33
         6         883.39      523.00
         7         911.54      565.53
         8         939.68      608.06
         9         967.83      650.58
        10         979.71      668.53
        11         983.07      672.99

 **  Corrected JANBU FOS =   2.056  **     (Fo factor = 1.070)


Failure surface No. 3 specified by 11 coordinate points

       Point       x-surf      y-surf
        No.         (ft)        (ft)

         1         368.77      519.42
         2         372.36      516.71
         3         389.72      505.22
         4         390.26      504.83
         5         876.98      521.94
         6         877.75      523.00
         7         905.90      565.53
         8         934.05      608.06
         9         962.20      650.58
```

```
        10         972.96       666.84
        11         976.32       671.30

  **  Corrected JANBU FOS =   2.056   **    (Fo factor = 1.070)


 Failure surface No. 4 specified by 11 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         373.47       520.59
         2         377.06       517.89
         3         395.83       505.46
         4         396.64       504.87
         5         879.40       522.51
         6         879.76       523.00
         7         907.91       565.53
         8         936.06       608.06
         9         964.21       650.58
        10         975.37       667.45
        11         978.73       671.91

  **  Corrected JANBU FOS =   2.057   **    (Fo factor = 1.071)


 Failure surface No. 5 specified by 11 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         376.66       521.39
         2         380.25       518.69
         3         399.98       505.63
         4         400.08       505.56
         5         886.75       522.02
         6         887.45       523.00
         7         915.60       565.53
         8         943.75       608.06
         9         971.90       650.58
        10         984.59       669.75
        11         987.95       674.21

  **  Corrected JANBU FOS =   2.061   **    (Fo factor = 1.071)


 Failure surface No. 6 specified by 11 coordinate points

       Point       x-surf       y-surf
        No.         (ft)         (ft)

         1         376.18       521.27
         2         379.77       518.56
         3         399.35       505.60
         4         399.54       505.46
         5         866.73       521.44
         6         867.86       523.00
```

```
          7          896.01       565.53
          8          924.16       608.06
          9          952.31       650.58
         10          961.11       663.88
         11          964.47       668.34

 **  Corrected JANBU FOS =   2.067  **    (Fo factor = 1.071)


Failure surface No. 7 specified by 11 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1          383.24       523.03
          2          386.83       520.33
          3          408.53       505.97
          4          409.60       505.19
          5          878.31       522.16
          6          878.92       523.00
          7          907.07       565.53
          8          935.22       608.06
          9          963.37       650.58
         10          974.36       667.20
         11          977.73       671.66

 **  Corrected JANBU FOS =   2.068  **    (Fo factor = 1.071)


Failure surface No. 8 specified by 11 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1          382.03       522.73
          2          385.62       520.03
          3          406.95       505.91
          4          407.58       505.45
          5          875.35       521.96
          6          876.11       523.00
          7          904.25       565.53
          8          932.40       608.06
          9          960.55       650.58
         10          970.99       666.35
         11          974.35       670.81

 **  Corrected JANBU FOS =   2.069  **    (Fo factor = 1.071)


Failure surface No. 9 specified by 11 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1          377.07       521.49
          2          380.66       518.79
          3          400.51       505.65
```

```
          4         400.79      505.44
          5         856.48      521.59
          6         857.50      523.00
          7         885.65      565.53
          8         913.80      608.06
          9         941.95      650.58
         10         948.70      660.78
         11         952.06      665.24

 **  Corrected JANBU FOS =   2.069  **    (Fo factor = 1.071)


Failure surface No.10 specified by 11 coordinate points

       Point        x-surf      y-surf
        No.          (ft)        (ft)

          1         385.57      523.62
          2         389.16      520.91
          3         411.56      506.09
          4         411.77      505.94
          5         873.34      522.22
          6         873.91      523.00
          7         902.06      565.53
          8         930.20      608.06
          9         958.35      650.58
         10         968.35      665.69
         11         971.71      670.15

 **  Corrected JANBU FOS =   2.070  **    (Fo factor = 1.072)



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - OVERLINER SEC 3-1P

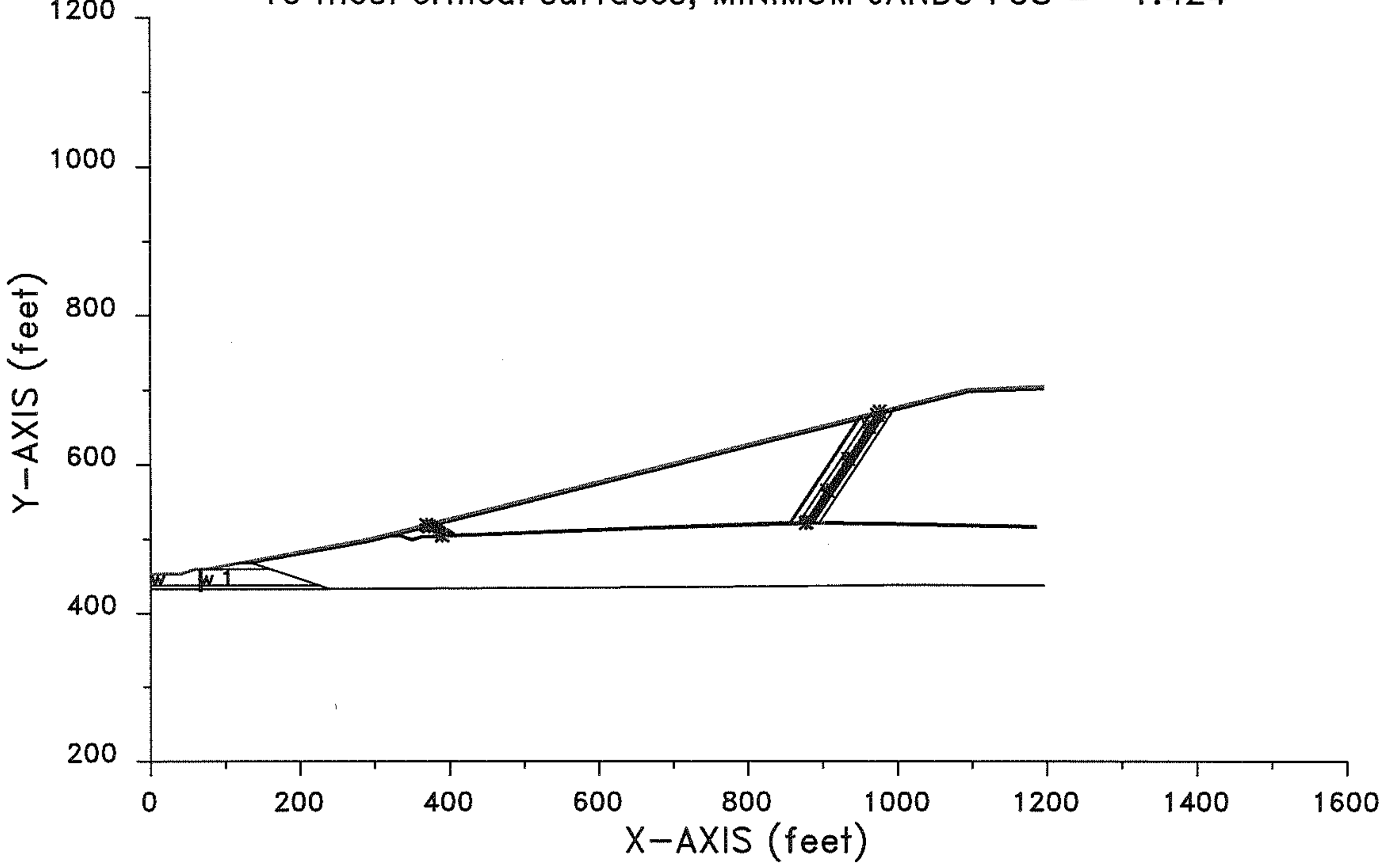
      Modified     Correction   Initial    Terminal    Available
      JANBU FOS      Factor     x-coord     x-coord     Strength
                                  (ft)        (ft)        (lb)

 1.     2.054         1.071      372.61      997.30    1.188E+06
 2.     2.056         1.070      371.19      983.07    1.147E+06
 3.     2.056         1.070      368.77      976.32    1.122E+06
 4.     2.057         1.071      373.47      978.73    1.125E+06
 5.     2.061         1.071      376.66      987.95    1.156E+06
 6.     2.067         1.071      376.18      964.47    1.081E+06
 7.     2.068         1.071      383.24      977.73    1.123E+06
 8.     2.069         1.071      382.03      974.35    1.110E+06
 9.     2.069         1.071      377.07      952.06    1.038E+06
10.     2.070         1.072      385.57      971.71    1.094E+06

                   * * *  END OF FILE  * * *
```

3-1R 10-12-11 10:38

CAMELOT LF – OVERLINER SEC 3-1R
10 most critical surfaces, MINIMUM JANBU FOS = 1.424



```
XSTABL File: 3-1R      10-12-11   10:38

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *                using the               *
          *            Method of Slices            *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - OVERLINER SEC 3-1R



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1           .0      453.3       40.0      453.3           1
       2         40.0      453.3       59.9      460.0           1
       3         59.9      460.0       64.5      460.0           1
       4         64.5      460.0       67.5      460.0           8
       5         67.5      460.0       73.3      460.0           1
       6         73.3      460.0      116.6      467.7           7
       7        116.6      467.7      129.4      470.0           5
       8        129.4      470.0      291.1      500.0           5
       9        291.1      500.0     1095.1      701.0           5
      10       1095.1      701.0     1195.1      705.0           5


       43 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
       No.       (ft)       (ft)       (ft)       (ft)     Below Segment

       1        116.6      467.7      132.3      467.7           7
       2        132.3      467.7      291.8      496.6           4
       3        291.8      496.6      322.3      504.2           4
       4        322.3      504.2      330.3      506.2           6
       5        330.3      506.2     1095.6      697.5           4
       6       1095.6      697.5     1195.1      701.5           4
       7        330.3      506.2      332.6      506.2           6
```

```
    8       332.6      506.2      350.1      500.3          6
    9       350.1      500.3      361.5      504.1          6
   10       361.5      504.1      434.5      507.0          6
   11       434.5      507.0      684.5      517.0          6
   12       684.5      517.0      851.2      523.0          6
   13       851.2      523.0      901.3      523.0          6
   14       901.3      523.0      979.0      522.0          6
   15       979.0      522.0     1184.6      518.0          6
   16       322.3      504.2      332.3      504.2          4
   17       332.3      504.2      350.1      498.2          4
   18       350.1      498.2      361.9      502.1          4
   19       361.9      502.1      434.6      505.0          4
   20       434.6      505.0      684.6      515.0          4
   21       684.6      515.0      851.3      520.0          4
   22       851.3      520.0      901.3      521.0          4
   23       901.3      521.0      979.0      520.0          4
   24       979.0      520.0     1184.6      516.0          4
   25       136.3      467.7      159.4      460.0          7
   26       159.4      460.0      225.4      438.0          1
   27       225.4      438.0      239.5      433.3          2
   28       239.5      433.3      579.8      435.0          3
   29       579.8      435.0      879.3      437.0          3
   30       879.3      437.0     1005.0      439.0          3
   31      1005.0      439.0     1195.1      438.0          3
   32        73.3      460.0      159.4      460.0          1
   33        64.5      460.0       64.6      438.0          1
   34          .0      438.0       64.6      438.0          2
   35        67.5      460.0       67.6      438.0          8
   36        67.6      438.0      225.4      438.0          2
   37        64.6      438.0       64.7      433.3          2
   38          .0      433.3       64.7      433.2          3
   39        67.6      438.0       67.7      433.3          8
   40        67.7      433.3      239.5      433.3          3
   41        64.7      433.3       64.8      430.3          3
   42        67.7      433.3       67.8      430.3          8
   43        64.8      430.3       67.8      430.3          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 8 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction     Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle   Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0    11.00     .000         .0       0
  2   132.0   135.0     488.0    16.40     .000         .0       1
  3   130.0   135.0    5000.0      .00     .000         .0       0
  4    65.0    65.0     288.0    23.00     .000         .0       0
  5   115.0   120.0     100.0    16.00     .000         .0       0
  6   115.0   120.0      80.0    10.00     .000         .0       0
  7   115.0   120.0    1074.0    13.10     .000         .0       0
  8    75.0    75.0        .0     5.00     .000         .0       0
```

```
 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point       x-water     y-water
   No.          (ft)        (ft)

    1            .00       438.00
    2          64.50       438.00


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     51.0 ft


Box          x-left      y-left     x-right     y-right        Width
no.           (ft)        (ft)        (ft)        (ft)          (ft)

 1           389.7       504.2       439.6       506.2          2.0
 2           851.2       521.0       901.3       522.0          2.0


Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *
```

```
The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 11 coordinate points

      Point       x-surf       y-surf
       No.         (ft)         (ft)

        1         368.82       519.43
        2         372.41       516.73
        3         389.79       505.22
        4         390.26       504.83
        5         876.98       521.94
        6         877.87       523.00
        7         906.02       565.53
        8         934.17       608.06
        9         962.31       650.58
       10         973.10       666.88
       11         976.46       671.34

 **  Corrected JANBU FOS =   1.424  **    (Fo factor = 1.070)


Failure surface No. 2 specified by 11 coordinate points

      Point       x-surf       y-surf
       No.         (ft)         (ft)

        1         371.33       520.06
        2         374.92       517.35
        3         393.05       505.35
        4         394.31       504.30
        5         882.90       522.33
        6         883.46       523.00
        7         911.61       565.53
        8         939.76       608.06
        9         967.91       650.58
       10         979.80       668.55
       11         983.16       673.02

 **  Corrected JANBU FOS =   1.424  **    (Fo factor = 1.070)


Failure surface No. 3 specified by 11 coordinate points

      Point       x-surf       y-surf
       No.         (ft)         (ft)

        1         372.62       520.38
        2         376.21       517.68
        3         394.73       505.42
        4         394.81       505.35
        5         894.73       522.27
        6         895.34       523.00
        7         923.49       565.53
        8         951.64       608.06
        9         979.79       650.58
```

```
        10          994.04       672.11
        11          997.40       676.58

  **   Corrected JANBU FOS =    1.424   **     (Fo factor = 1.071)


 Failure surface No. 4 specified by 11 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          373.55       520.61
         2          377.14       517.91
         3          395.93       505.47
         4          396.64       504.87
         5          879.40       522.51
         6          879.82       523.00
         7          907.96       565.53
         8          936.11       608.06
         9          964.26       650.58
        10          975.43       667.46
        11          978.80       671.92

  **   Corrected JANBU FOS =    1.428   **     (Fo factor = 1.071)


 Failure surface No. 5 specified by 11 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          376.67       521.39
         2          380.26       518.69
         3          399.99       505.63
         4          400.08       505.56
         5          886.75       522.02
         6          887.56       523.00
         7          915.71       565.53
         8          943.86       608.06
         9          972.01       650.58
        10          984.72       669.78
        11          988.08       674.25

  **   Corrected JANBU FOS =    1.431   **     (Fo factor = 1.071)


 Failure surface No. 6 specified by 11 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          376.20       521.27
         2          379.79       518.57
         3          399.37       505.60
         4          399.54       505.46
         5          866.73       521.44
         6          868.04       523.00
```

```
          7          896.19       565.53
          8          924.34       608.06
          9          952.49       650.58
         10          961.32       663.94
         11          964.69       668.40

 **   Corrected JANBU FOS =    1.436   **     (Fo factor = 1.071)


Failure surface No. 7 specified by 11 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1          377.10       521.50
          2          380.69       518.80
          3          400.55       505.65
          4          400.79       505.44
          5          856.48       521.59
          6          857.66       523.00
          7          885.81       565.53
          8          913.96       608.06
          9          942.11       650.58
         10          948.89       660.83
         11          952.25       665.29

 **   Corrected JANBU FOS =    1.439   **     (Fo factor = 1.071)


Failure surface No. 8 specified by 11 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1          382.09       522.75
          2          385.68       520.04
          3          407.03       505.91
          4          407.58       505.45
          5          875.35       521.96
          6          876.22       523.00
          7          904.37       565.53
          8          932.52       608.06
          9          960.67       650.58
         10          971.13       666.39
         11          974.49       670.85

 **   Corrected JANBU FOS =    1.439   **     (Fo factor = 1.071)


Failure surface No. 9 specified by 11 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1          383.35       523.06
          2          386.93       520.36
          3          408.67       505.97
```

```
           4          409.60       505.19
           5          878.31       522.16
           6          879.02       523.00
           7          907.17       565.53
           8          935.32       608.06
           9          963.46       650.58
          10          974.48       667.22
          11          977.84       671.68

  **  Corrected JANBU FOS =    1.440   **     (Fo factor = 1.071)


Failure surface No.10 specified by 11 coordinate points

        Point         x-surf       y-surf
         No.           (ft)         (ft)

           1          378.95       521.96
           2          382.54       519.26
           3          402.95       505.75
           4          404.61       504.36
           5          854.83       521.89
           6          855.77       523.00
           7          883.92       565.53
           8          912.07       608.06
           9          940.21       650.58
          10          946.62       660.26
          11          949.98       664.72

  **  Corrected JANBU FOS =    1.440   **     (Fo factor = 1.071)



The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - OVERLINER SEC 3-1R

        Modified      Correction    Initial     Terminal    Available
       JANBU FOS        Factor      x-coord      x-coord     Strength
                                     (ft)         (ft)         (lb)

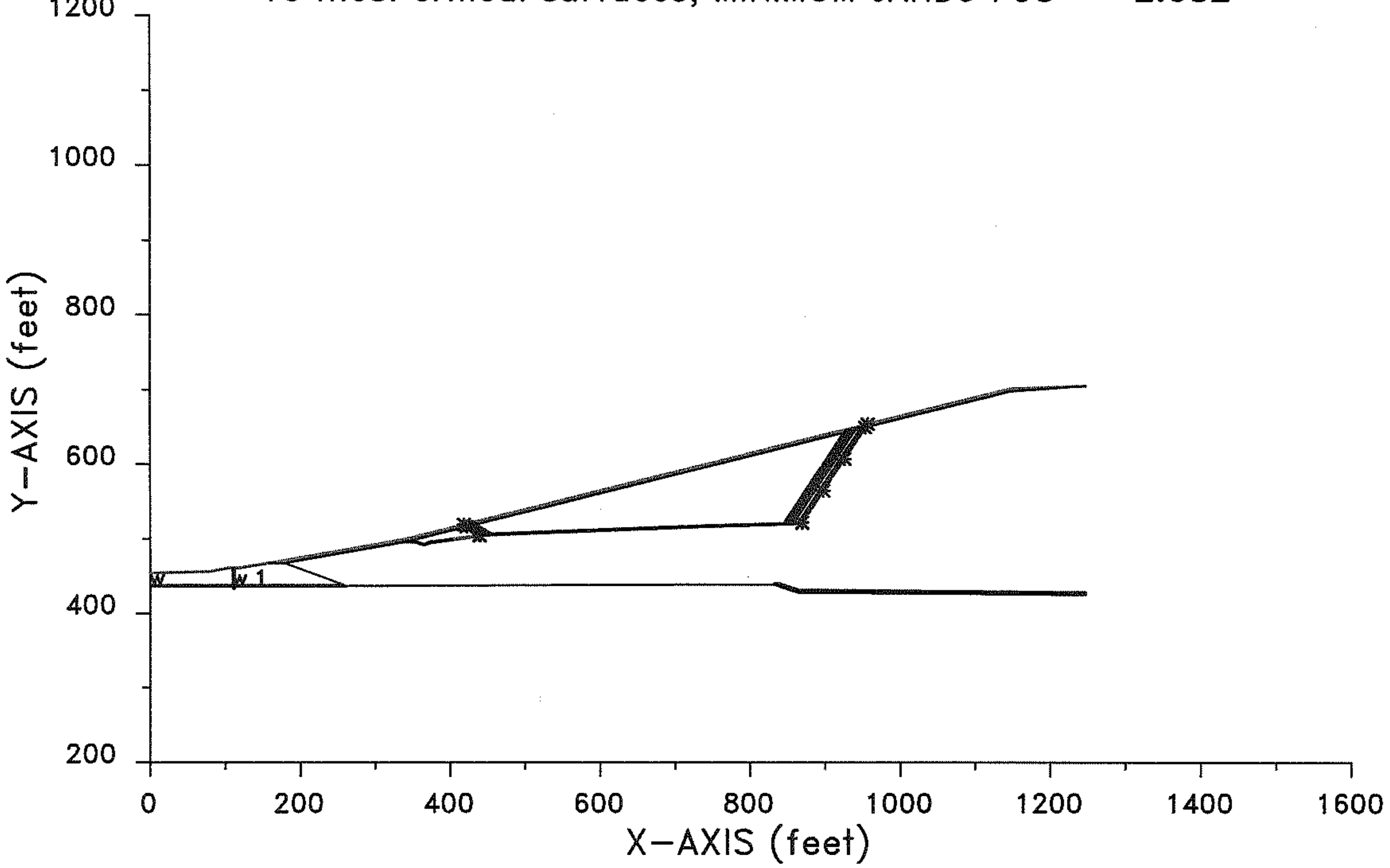
  1.      1.424          1.070       368.82       976.46     7.302E+05
  2.      1.424          1.070       371.33       983.16     7.462E+05
  3.      1.424          1.071       372.62       997.40     7.732E+05
  4.      1.428          1.071       373.55       978.80     7.333E+05
  5.      1.431          1.071       376.67       988.08     7.536E+05
  6.      1.436          1.071       376.20       964.69     7.059E+05
  7.      1.439          1.071       377.10       952.25     6.789E+05
  8.      1.439          1.071       382.09       974.49     7.260E+05
  9.      1.440          1.071       383.35       977.84     7.339E+05
 10.      1.440          1.071       378.95       949.98     6.783E+05

                    * * *  END OF FILE  * * *
```

4-1P 10-12-11 10:48

CAMELOT LF - OVERLINER SEC 4-1P

10 most critical surfaces, MINIMUM JANBU FOS = 2.082



```
XSTABL File: 4-1P      10-12-11   10:48

          ******************************************
          *              X S T A B L               *
          *                                        *
          *       Slope Stability Analysis         *
          *             using the                  *
          *          Method of Slices              *
          *                                        *
          *       Copyright (C) 1992 - 2008        *
          *   Interactive Software Designs, Inc.   *
          *       Moscow, ID 83843, U.S.A.         *
          *                                        *
          *         All Rights Reserved            *
          *                                        *
          *  Ver. 5.208                 96 - 2046  *
          ******************************************


    Problem Description : CAMELOT LF - OVERLINER SEC 4-1P



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1           .0      454.0       78.8      456.0           1
       2         78.8      456.0      105.3      461.2           1
       3        105.3      461.2      109.7      461.2           1
       4        109.7      461.2      112.7      461.2          11
       5        112.7      461.2      118.2      461.2           1
       6        118.2      461.2      157.8      467.6          10
       7        157.8      467.6      172.9      470.0           5
       8        172.9      470.0      342.7      500.0           5
       9        342.7      500.0     1146.7      701.0           5
      10       1146.7      701.0     1246.7      705.0           5


       47 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)       (ft)       (ft)     Below Segment

       1        157.8      467.6      179.3      467.6          10
       2        179.3      467.6      337.9      495.6           4
       3        337.9      495.6      343.4      496.6           9
       4        343.4      496.6      347.5      497.6           9
       5        347.5      497.6     1147.2      697.5           4
       6       1147.2      697.5     1246.7      705.0           4
       7        347.5      497.6      352.4      497.6           9
```

```
     8        352.4     497.6      365.1     493.3          9
     9        365.1     493.3      374.1     496.4          9
    10        374.1     496.4      454.4     507.0          9
    11        454.4     507.0      704.5     517.0          9
    12        704.5     517.0      871.2     522.0          9
    13        337.9     495.6      352.1     495.6          4
    14        352.1     495.6      365.1     491.2          4
    15        365.1     491.2      374.6     494.4          4
    16        374.6     494.4      454.6     505.0          4
    17        454.6     505.0      704.6     515.0          4
    18        704.6     515.0      871.3     520.0          4
    19        179.3     467.6      196.2     461.2         10
    20        196.2     461.2      257.6     438.0          1
    21        257.6     438.0      262.1     436.3          2
    22        262.1     436.3      372.0     437.0          3
    23        372.0     437.0      779.4     439.0          3
    24        779.4     439.0      830.6     439.0          3
    25        830.6     439.0      833.0     440.9          6
    26        833.0     440.9      837.5     440.9          6
    27        837.5     440.9      864.2     432.0          6
    28        864.2     432.0     1110.2     430.0          6
    29       1110.2     430.0     1246.7     429.0          6
    30        830.6     439.0      836.9     439.0          7
    31        836.9     439.0      863.9     430.0          7
    32        863.9     430.0     1110.2     428.0          8
    33       1110.2     428.0     1246.7     427.0          8
    34        830.6     439.0      863.6     428.0          3
    35        863.6     428.0     1110.2     426.0          3
    36       1110.2     426.0     1246.7     425.0          3
    37        109.7     461.2      109.8     438.0          1
    38           .0     438.0      109.8     438.0          2
    39        112.7     461.2      112.8     438.0         11
    40        112.8     438.0      257.6     438.0          2
    41        109.8     438.0      109.9     436.3          2
    42           .0     436.3      109.9     436.3          3
    43        112.8     438.0      112.9     436.3         11
    44        112.9     436.3      262.1     436.3          3
    45        109.9     436.3      110.0     433.3          3
    46        112.9     436.3      113.0     433.3         11
    47        110.0     433.3      113.0     433.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

11 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure       Water
Unit  Moist    Sat.  Intercept   Angle   Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru        (psf)      No.

  1   127.0   131.0     854.0    11.00     .000         .0        0
  2   132.0   135.0     488.0    16.40     .000         .0        1
  3   130.0   135.0    5000.0      .00     .000         .0        0
  4    65.0    65.0     288.0    23.00     .000         .0        0
  5   115.0   120.0     100.0    16.00     .000         .0        0
```

```
  6   115.0   120.0     100.0    16.00      .000         .0      0
  7   115.0   120.0     100.0    18.00      .000         .0      0
  8   115.0   120.0     100.0    18.00      .000         .0      0
  9   115.0   120.0     100.0    18.00      .000         .0      0
 10   115.0   120.0    1074.0    13.10      .000         .0      0
 11    75.0    75.0        .0     5.00      .000         .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point      x-water     y-water
   No.        (ft)        (ft)

    1           .00      438.00
    2        109.70      438.00


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     51.0 ft


Box          x-left     y-left    x-right    y-right      Width
no.           (ft)       (ft)      (ft)       (ft)         (ft)

 1           405.0      499.4     454.6      506.0         2.0
 2           821.3      519.5     871.3      521.0         2.0
```

```
Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 10 coordinate points

      Point       x-surf       y-surf
       No.         (ft)         (ft)

        1         418.34       518.91
        2         421.93       516.21
        3         438.93       504.96
        4         439.48       504.56
        5         869.28       521.52
        6         869.60       521.95
        7         897.75       564.48
        8         925.89       607.01
        9         953.79       649.15
       10         957.15       653.61

 **  Corrected JANBU FOS =   2.082  **    (Fo factor = 1.070)


Failure surface No. 2 specified by 10 coordinate points

      Point       x-surf       y-surf
       No.         (ft)         (ft)

        1         419.34       519.16
        2         422.93       516.46
        3         440.07       505.11
        4         440.14       505.06
        5         864.12       521.54
        6         864.31       521.79
        7         892.45       564.32
        8         920.60       606.85
        9         947.58       647.60
       10         950.93       652.06

 **  Corrected JANBU FOS =   2.084  **    (Fo factor = 1.070)


Failure surface No. 3 specified by 10 coordinate points

      Point       x-surf       y-surf
       No.         (ft)         (ft)

        1         429.50       521.70
        2         433.09       519.00
        3         451.75       506.65
        4         452.71       505.95
```

```
        5         868.27       521.66
        6         868.45       521.92
        7         896.60       564.45
        8         924.75       606.97
        9         952.45       648.82
       10         955.81       653.28

 **  Corrected JANBU FOS =   2.090  **    (Fo factor = 1.071)


Failure surface No. 4 specified by 10 coordinate points

       Point      x-surf       y-surf
        No.        (ft)         (ft)

        1         422.86       520.04
        2         426.45       517.33
        3         444.12       505.64
        4         444.73       505.19
        5         858.01       520.90
        6         858.53       521.62
        7         886.68       564.15
        8         914.83       606.68
        9         940.80       645.91
       10         944.15       650.36

 **  Corrected JANBU FOS =   2.093  **    (Fo factor = 1.071)


Failure surface No. 5 specified by 10 coordinate points

       Point      x-surf       y-surf
        No.        (ft)         (ft)

        1         422.35       519.91
        2         425.94       517.21
        3         443.53       505.57
        4         443.75       505.41
        5         851.18       520.80
        6         851.62       521.41
        7         879.77       563.94
        8         907.92       606.47
        9         932.68       643.88
       10         936.04       648.34

 **  Corrected JANBU FOS =   2.096  **    (Fo factor = 1.071)


Failure surface No. 6 specified by 10 coordinate points

       Point      x-surf       y-surf
        No.        (ft)         (ft)

        1         429.28       521.65
        2         432.87       518.94
        3         451.49       506.62
        4         451.83       506.37
```

```
          5          868.30        520.68
          6          869.22        521.94
          7          897.37        564.47
          8          925.52        607.00
          9          953.35        649.04
         10          956.71        653.50

 **   Corrected JANBU FOS =    2.096   **     (Fo factor = 1.071)


Failure surface No. 7 specified by 10 coordinate points

        Point        x-surf        y-surf
         No.          (ft)          (ft)

          1          429.85        521.79
          2          433.44        519.08
          3          452.14        506.70
          4          452.78        506.24
          5          854.26        521.40
          6          854.33        521.49
          7          882.48        564.02
          8          910.63        606.55
          9          935.86        644.67
         10          939.22        649.13

 **   Corrected JANBU FOS =    2.099   **     (Fo factor = 1.071)


Failure surface No. 8 specified by 10 coordinate points

        Point        x-surf        y-surf
         No.          (ft)          (ft)

          1          431.71        522.25
          2          435.30        519.55
          3          454.28        506.98
          4          454.35        506.93
          5          862.98        520.65
          6          863.80        521.78
          7          891.95        564.31
          8          920.09        606.83
          9          946.98        647.45
         10          950.34        651.91

 **   Corrected JANBU FOS =    2.100   **     (Fo factor = 1.072)


Failure surface No. 9 specified by 10 coordinate points

        Point        x-surf        y-surf
         No.          (ft)          (ft)

          1          425.22        520.63
          2          428.81        517.92
          3          446.83        506.00
          4          447.30        505.66
```

```
          5          847.72       520.42
          6          848.37       521.32
          7          876.52       563.84
          8          904.67       606.37
          9          928.86       642.92
         10          932.22       647.38

 **  Corrected JANBU FOS =   2.102  **    (Fo factor = 1.071)


Failure surface No.10 specified by 10 coordinate points

       Point         x-surf       y-surf
        No.           (ft)         (ft)

          1          429.92       521.81
          2          433.51       519.10
          3          452.23       506.71
          4          453.02       506.14
          5          844.60       521.02
          6          844.73       521.21
          7          872.88       563.73
          8          901.03       606.26
          9          924.59       641.85
         10          927.95       646.31

 **  Corrected JANBU FOS =   2.104  **    (Fo factor = 1.071)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - OVERLINER SEC 4-1P

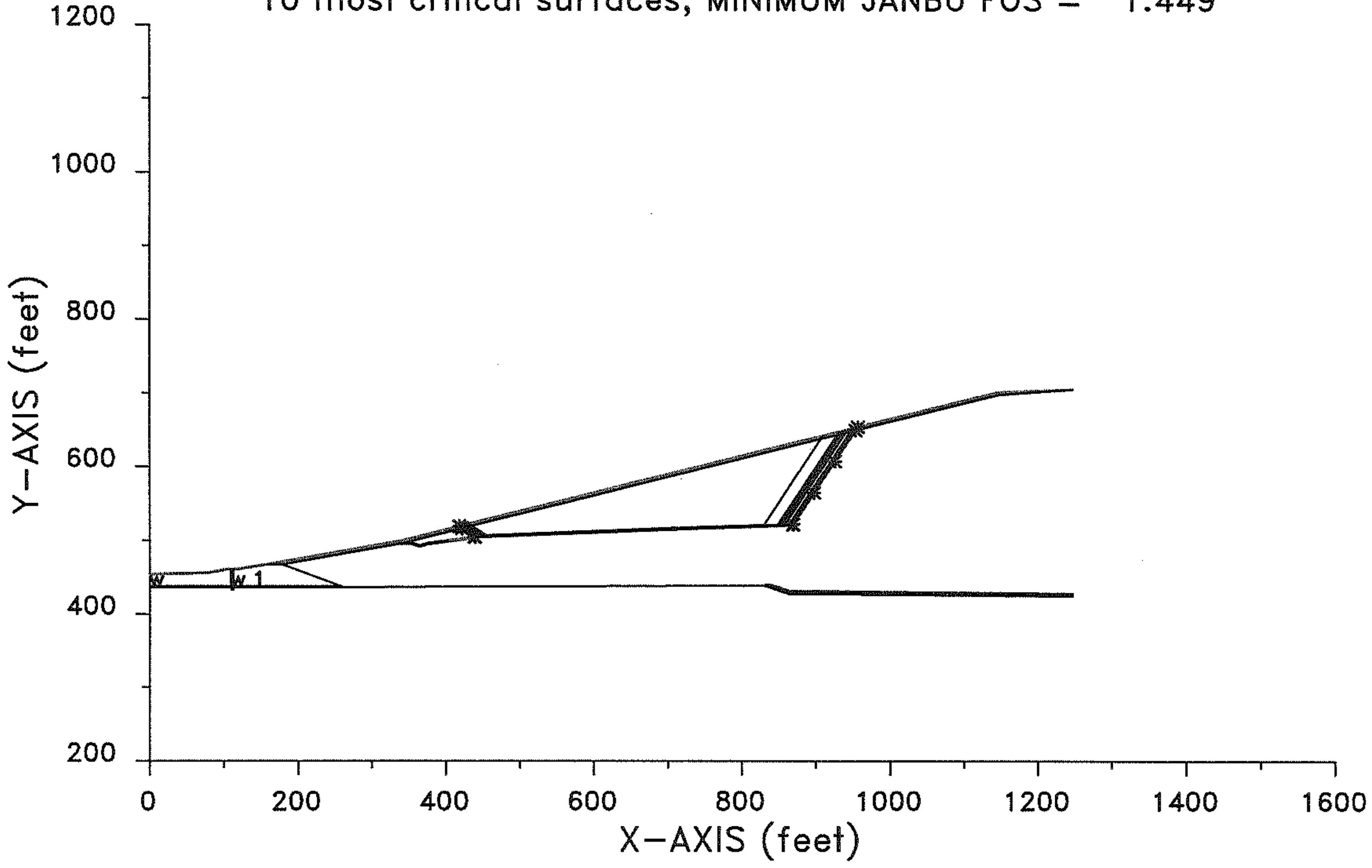
       Modified    Correction   Initial    Terminal    Available
      JANBU FOS      Factor     x-coord     x-coord     Strength
                                 (ft)        (ft)         (lb)

 1.      2.082       1.070      418.34      957.15    9.051E+05
 2.      2.084       1.070      419.34      950.93    8.817E+05
 3.      2.090       1.071      429.50      955.81    8.878E+05
 4.      2.093       1.071      422.86      944.15    8.656E+05
 5.      2.096       1.071      422.35      936.04    8.404E+05
 6.      2.096       1.071      429.28      956.71    8.954E+05
 7.      2.099       1.071      429.85      939.22    8.378E+05
 8.      2.100       1.072      431.71      950.34    8.716E+05
 9.      2.102       1.071      425.22      932.22    8.301E+05
10.      2.104       1.071      429.92      927.95    8.086E+05

                   * * *  END OF FILE  * * *
```

4-1R 10-12-11 10:49

CAMELOT LF - OVERLINER SEC 4-1R
10 most critical surfaces, MINIMUM JANBU FOS = 1.449



```
XSTABL File: 4-1R      10-12-11   10:49

          ******************************************
          *              X S T A B L               *
          *                                        *
          *        Slope Stability Analysis        *
          *                using the               *
          *            Method of Slices            *
          *                                        *
          *        Copyright (C) 1992 - 2008       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.208                96 - 2046   *
          ******************************************


    Problem Description : CAMELOT LF - OVERLINER SEC 4-1R



    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       10 SURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)    Below Segment

       1           .0      454.0        78.8      456.0          1
       2         78.8      456.0       105.3      461.2          1
       3        105.3      461.2       109.7      461.2          1
       4        109.7      461.2       112.7      461.2         11
       5        112.7      461.2       118.2      461.2          1
       6        118.2      461.2       157.8      467.6         10
       7        157.8      467.6       172.9      470.0          5
       8        172.9      470.0       342.7      500.0          5
       9        342.7      500.0      1146.7      701.0          5
      10       1146.7      701.0      1246.7      705.0          5


       47 SUBSURFACE boundary segments

    Segment     x-left     y-left     x-right    y-right     Soil Unit
      No.        (ft)       (ft)        (ft)       (ft)    Below Segment

       1        157.8      467.6       179.3      467.6         10
       2        179.3      467.6       337.9      495.6          4
       3        337.9      495.6       343.4      496.6          9
       4        343.4      496.6       347.5      497.6          9
       5        347.5      497.6      1147.2      697.5          4
       6       1147.2      697.5      1246.7      705.0          4
       7        347.5      497.6       352.4      497.6          9
```

```
    8        352.4      497.6       365.1      493.3          9
    9        365.1      493.3       374.1      496.4          9
   10        374.1      496.4       454.4      507.0          9
   11        454.4      507.0       704.5      517.0          9
   12        704.5      517.0       871.2      522.0          9
   13        337.9      495.6       352.1      495.6          4
   14        352.1      495.6       365.1      491.2          4
   15        365.1      491.2       374.6      494.4          4
   16        374.6      494.4       454.6      505.0          4
   17        454.6      505.0       704.6      515.0          4
   18        704.6      515.0       871.3      520.0          4
   19        179.3      467.6       196.2      461.2         10
   20        196.2      461.2       257.6      438.0          1
   21        257.6      438.0       262.1      436.3          2
   22        262.1      436.3       372.0      437.0          3
   23        372.0      437.0       779.4      439.0          3
   24        779.4      439.0       830.6      439.0          3
   25        830.6      439.0       833.0      440.9          6
   26        833.0      440.9       837.5      440.9          6
   27        837.5      440.9       864.2      432.0          6
   28        864.2      432.0      1110.2      430.0          6
   29       1110.2      430.0      1246.7      429.0          6
   30        830.6      439.0       836.9      439.0          7
   31        836.9      439.0       863.9      430.0          7
   32        863.9      430.0      1110.2      428.0          8
   33       1110.2      428.0      1246.7      427.0          8
   34        830.6      439.0       863.6      428.0          3
   35        863.6      428.0      1110.2      426.0          3
   36       1110.2      426.0      1246.7      425.0          3
   37        109.7      461.2       109.8      438.0          1
   38           .0      438.0       109.8      438.0          2
   39        112.7      461.2       112.8      438.0         11
   40        112.8      438.0       257.6      438.0          2
   41        109.8      438.0       109.9      436.3          2
   42           .0      436.3       109.9      436.3          3
   43        112.8      438.0       112.9      436.3         11
   44        112.9      436.3       262.1      436.3          3
   45        109.9      436.3       110.0      433.3          3
   46        112.9      436.3       113.0      433.3         11
   47        110.0      433.3       113.0      433.0          3


--------------------------
ISOTROPIC Soil Parameters
--------------------------

11 Soil unit(s) specified

Soil   Unit Weight    Cohesion  Friction    Pore Pressure        Water
Unit  Moist    Sat.   Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)     (psf)     (deg)      Ru       (psf)      No.

  1   127.0   131.0     854.0     11.00     .000         .0        0
  2   132.0   135.0     488.0     16.40     .000         .0        1
  3   130.0   135.0    5000.0       .00     .000         .0        0
  4    65.0    65.0     288.0     23.00     .000         .0        0
  5   115.0   120.0     100.0     16.00     .000         .0        0
```

```
  6   115.0   120.0     100.0    16.00       .000         .0      0
  7   115.0   120.0     100.0    18.00       .000         .0      0
  8   115.0   120.0     100.0    18.00       .000         .0      0
  9   115.0   120.0      80.0    10.00       .000         .0      0
 10   115.0   120.0    1074.0    13.10       .000         .0      0
 11    75.0    75.0        .0     5.00       .000         .0      0


 1 Water surface(s) have been specified

Unit weight of water =    62.40  (pcf)


Water Surface No.  1 specified by  2 coordinate points

**********************************
         PHREATIC SURFACE,
**********************************

  Point      x-water     y-water
   No.         (ft)        (ft)

    1            .00      438.00
    2         109.70      438.00


A critical failure surface searching method, using a random
technique for generating sliding BLOCK surfaces, has been
specified.


The active and passive portions of the sliding surfaces
are generated according to the Rankine theory.


  100 trial surfaces will be generated and analyzed.


  2 boxes specified for generation of central block base


* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

Length of line segments for active and passive portions of
sliding block is     51.0 ft


Box         x-left     y-left     x-right    y-right      Width
no.          (ft)       (ft)       (ft)       (ft)         (ft)

 1           405.0      499.4      454.6      506.0         2.0
 2           821.3      519.5      871.3      521.0         2.0
```

```
Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED JANBU METHOD   * * * * *


The 10 most critical of all the failure surfaces examined
are displayed below - the most critical first

Failure surface No. 1 specified by 10 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1         418.40        518.92
         2         421.99        516.22
         3         438.99        504.97
         4         439.48        504.56
         5         869.28        521.52
         6         869.65        521.95
         7         897.80        564.48
         8         925.94        607.01
         9         953.85        649.17
        10         957.21        653.63

 **  Corrected JANBU FOS =   1.449  **    (Fo factor = 1.070)


Failure surface No. 2 specified by 10 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1         419.35        519.16
         2         422.94        516.46
         3         440.08        505.11
         4         440.14        505.06
         5         864.12        521.54
         6         864.33        521.79
         7         892.48        564.32
         8         920.63        606.85
         9         947.61        647.61
        10         950.97        652.07

 **  Corrected JANBU FOS =   1.453  **    (Fo factor = 1.070)


Failure surface No. 3 specified by 10 coordinate points

       Point        x-surf        y-surf
        No.          (ft)          (ft)

         1         422.92        520.06
         2         426.51        517.35
         3         444.19        505.65
         4         444.73        505.19
```

```
         5          858.01       520.90
         6          858.62       521.62
         7          886.76       564.15
         8          914.91       606.68
         9          940.89       645.93
        10          944.25       650.39

 **   Corrected JANBU FOS =    1.461   **     (Fo factor = 1.071)


Failure surface No. 4 specified by 10 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          429.60       521.73
         2          433.19       519.02
         3          451.86       506.66
         4          452.71       505.95
         5          868.27       521.66
         6          868.48       521.92
         7          896.63       564.45
         8          924.78       606.97
         9          952.48       648.83
        10          955.84       653.29

 **   Corrected JANBU FOS =    1.462   **     (Fo factor = 1.071)


Failure surface No. 5 specified by 10 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          429.32       521.65
         2          432.91       518.95
         3          451.53       506.62
         4          451.83       506.37
         5          868.30       520.68
         6          869.37       521.95
         7          897.51       564.47
         8          925.66       607.00
         9          953.52       649.09
        10          956.88       653.54

 **   Corrected JANBU FOS =    1.464   **     (Fo factor = 1.071)


Failure surface No. 6 specified by 10 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

         1          422.37       519.92
         2          425.96       517.21
         3          443.55       505.57
         4          443.75       505.41
```

```
          5         851.18       520.80
          6         851.69       521.41
          7         879.84       563.94
          8         907.99       606.47
          9         932.76       643.90
         10         936.12       648.36

 **   Corrected JANBU FOS =    1.465   **     (Fo factor = 1.071)


Failure surface No. 7 specified by 10 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1         431.71       522.25
          2         435.30       519.55
          3         454.29       506.98
          4         454.35       506.93
          5         862.98       520.65
          6         863.93       521.78
          7         892.08       564.31
          8         920.22       606.84
          9         947.13       647.49
         10         950.49       651.95

 **   Corrected JANBU FOS =    1.470   **     (Fo factor = 1.072)


Failure surface No. 8 specified by 10 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1         425.27       520.64
          2         428.86       517.94
          3         446.88       506.01
          4         447.30       505.66
          5         847.72       520.42
          6         848.48       521.32
          7         876.62       563.85
          8         904.77       606.37
          9         928.98       642.95
         10         932.34       647.41

 **   Corrected JANBU FOS =    1.470   **     (Fo factor = 1.071)


Failure surface No. 9 specified by 10 coordinate points

       Point        x-surf       y-surf
        No.          (ft)         (ft)

          1         429.91       521.80
          2         433.50       519.10
          3         452.21       506.71
          4         452.78       506.24
```

```
          5          854.26       521.40
          6          854.34       521.49
          7          882.49       564.02
          8          910.64       606.55
          9          935.88       644.68
         10          939.24       649.13

  **  Corrected JANBU FOS =    1.471   **     (Fo factor = 1.071)


Failure surface No.10 specified by 10 coordinate points

        Point        x-surf       y-surf
         No.          (ft)         (ft)

          1          421.95       519.81
          2          425.54       517.11
          3          443.07       505.50
          4          443.77       504.92
          5          829.44       520.34
          6          829.79       520.76
          7          857.94       563.29
          8          886.08       605.81
          9          907.03       637.47
         10          910.39       641.92

  **  Corrected JANBU FOS =    1.477   **     (Fo factor = 1.071)




The following is a summary of the TEN most critical surfaces

Problem Description : CAMELOT LF - OVERLINER SEC 4-1R

       Modified     Correction   Initial     Terminal     Available
      JANBU FOS       Factor     x-coord      x-coord      Strength
                                   (ft)         (ft)         (lb)

  1.     1.449         1.070      418.40       957.21     5.918E+05
  2.     1.453         1.070      419.35       950.97     5.776E+05
  3.     1.461         1.071      422.92       944.25     5.676E+05
  4.     1.462         1.071      429.60       955.84     5.832E+05
  5.     1.464         1.071      429.32       956.88     5.878E+05
  6.     1.465         1.071      422.37       936.12     5.518E+05
  7.     1.470         1.072      431.71       950.49     5.734E+05
  8.     1.470         1.071      425.27       932.34     5.456E+05
  9.     1.471         1.071      429.91       939.24     5.519E+05
 10.     1.477         1.071      421.95       910.39     5.089E+05

                     * * *  END OF FILE  * * *
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APPENDIX IIIJ-A-4

INFINITE SLOPE STABILITY ANALYSIS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER

3-23-12

Includes pages IIIJ-A-4-1 through IIIJ-A-4-21

Required: Evaluate the slope stability of the proposed landfill slopes for the undeveloped area and the stability of the liner, overliner, and final cover systems.

Procedure:

A. Liner System Stability
  1. Anchor Trench Design
  2. Infinite Slope Stability
    a. 3H:1V Sideslope (Saturated Protective Cover)

B. Overliner System Stability
  1. Infinite Slope Stability
    a. 4 Percent Top slope (Saturated Overliner Protective Cover)
    b. 20 Percent Sideslope (Saturated Overliner Protective Cover)

C. Final Cover System Stability
  1. Infinite Slope Stability
    a. 25 Percent Sideslope (Saturated Erosion Layer)
    b. 4 Percent Top slope (Saturated Erosion Layer)

Method:

A. Evaluate the stability of the proposed liner, overliner, and final cover systems using infinite slope stability analysis.

1. Verify that the tensile stress in the liner system will be less than the yield stress by using Koerner's method for determination of shear stress in liner systems considering cohesion/adhesion forces. Provide anchor trench design considering pullout of the geomembrane.
2. Use Duncan and Buchignani's method for infinite stability analyses to evaluate the interface stability of the liner system using peak and residual shear strength values.
3. Use Duncan and Buchignani's method for infinite stability analyses to evaluate the interface stability of the overliner system using peak and residual shear strength values.
4. Use Duncan and Buchignani's method for infinite stability analyses to evaluate the interface stability of the final cover system using peak and residual shear strength values.

Contents:

1. Verification that the tensile stress in the liner system will be less than yield stress is provided on Sheets IIIJ-A-4-2 through IIIJ-A-4-4.
2. Anchor trench design is provided on Sheets IIIJ-A-4-5 through IIIJ-A-4-6.
3. Infinite stability analyses to evaluate the interface stability of the liner system is provided on Sheets IIIJ-A-4-7 through IIIJ-A-4-9.
4. Infinite stability analyses to evaluate the interface stability of the overliner system is provided on Sheets IIIJ-A-4-10 through IIIJ-A-4-22.
5. Infinite stability analyses to evaluate the interface stability of the final cover system is provided on Sheets IIIJ-A-4-23 through IIIJ-A-4-26.

References:

1. Koerner, Robert M., *Designing with Geosynthetics*, 3rd Edition, Prentice-Hall Inc., 1994.
2. Duncan, J.M. and Buchignani, A. L., *An Engineering Manual for Slope Stability Studies*, Department of Civil Engineering - University of California-Berkeley, 1975.
3. TRI, Interface Friction/Direct Shear Testing & Slope Stability Issues Short Course, November 12-13, 1998, Austin, Texas.
4. US Army Corps of Engineers, *Slope Stability*, Engineering and Design Manual, EM 1110-2-1902, October 31, 2003.
5. Koerner, Robert M., *Analysis and Design of Veneer Cover Soils*, 1998 Sixth International Conference of Geosynthetics.
6. Koerner, George R. and Narejo, Dhani, *Direct Shear Database of Geosynthetic-to-Geosynthetic and Geosynthetic-to-Soil Interfaces,* GRI Report #30, June 14, 2005.
7. Gilbert, Robert B., *Peak Versus Residual Strength for Waste Containment Systems,* Proceedings of the 15th GRI Conference, December 13, 2001.
8. NAVFAC Soil Mechanics Design Manual DM-7.01, September 1986.
9. CETCO Bentomat Direct Shear Testing Summary.

Prep By: JLG
Date: 3/21/2012

CAMELOT LANDFILL
1339-351-11
COMPOSITE LINER SYSTEM
STABILITY ANALYSIS

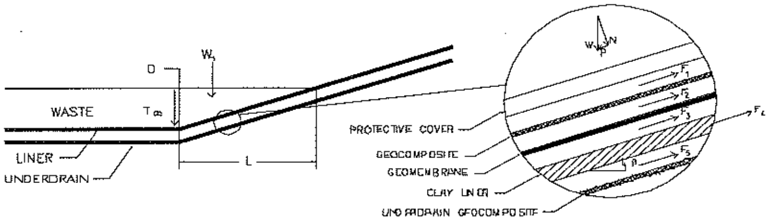
Chkd By:
Date: 3-27-12

A. Liner System Stability

Note: 1. Liner system consists of a 2-foot-thick compacted clay liner with a maximum hydraulic conductivity of 1×10^{-7} cm/s, a 60-mil-thick HDPE Flexible Membrane Liner (FML), and a drainage geocomposite overlain by a 2 foot-thick protective cover.

1. Anchor Trench Design

a. Verify that tensile stress in liner system is less than yield stress for the liner system.



Definition of terms/variables:

W_E =
Weight of equipment, lb (used per foot of slope width)
Assume a Caterpillar D8T WH Track-Type Tractor
Operation Weight = 85,150 lb
Number of Tracks = 2
W_W = Track Width = 1.84 ft
W_{PC} = Weight of solid waste, lb (used per foot of slope width)
W_T = Weight of protective cover, lb (used per foot of slope width)
T_{PC}= Combined weight of equipment, solid waste, and protective cover, lb (used per foot of slope width)
W = Friction force on edge of protective cover, lb/ft
N = Net force of equipment, waste, and protective cover on liner system, lb/ft
P = W cos(β) - normal force on liner system, lb/ft
β = W sin(β) - shearing force on liner system, lb/ft
slope angle, deg

F_1 = Resistance of protective cover/geocomposite interface, lb/ft
F_2 = Resistance of geocomposite/textured geomembrane interface, lb/ft
F_3 = Resistance of textured geomembrane/clay liner interface, lb/ft
F_4= Resistance of clay liner internal, lb/ft
F_5 = Resistance of clay liner/underdrain geocomposite interface, lb/ft

$F_1 = (N * \mathrm{TAN}(\Delta_1)) + (Ca_1 * L / \mathrm{COS}\ (\beta))$
$F_2 = (N * \mathrm{TAN}(\Delta_2)) + (Ca_2 * L / \mathrm{COS}\ (\beta))$
$F_3 = (N * \mathrm{TAN}(\Delta_3)) + (Ca_3 * L / \mathrm{COS}\ (\beta))$
$F_4 = (N * \mathrm{TAN}(\phi_4)) + (C_4 * L / \mathrm{COS}\ (\beta))$
$F_5 = (N * \mathrm{TAN}(\Delta_5)) + (Ca_5 * L / \mathrm{COS}\ (\beta))$

Δ_1 = Interface friction angle between protective cover/drainage geocomposite, deg
C_{a1} = Adhesion between protective cover/drainage geocomposite, psf
Δ_2 = Interface friction angle between drainage geocomposite/textured geomembrane, deg
C_{a2} = Adhesion between drainage geocomposite/textured geomembrane, psf
Δ_3 = Interface friction angle between textured geomembrane/compacted clay liner, deg
C_{a3} = Adhesion between textured geomembrane/compacted clay liner, psf
ϕ_4 = Internal friction angle compacted clay liner, deg
C_4 = Cohesion of compacted clay liner, psf
Δ_5 = Interface friction angle between compacted clay liner/underdrain geocomposite, deg
C_{a5} = Adhesion between compacted clay liner/underdrain geocomposite, psf

γ_{was} = Unit weight of solid waste (including daily cover), pcf
D_{was} = Individual lift height, ft
ϕ_{was} = Internal friction angle of waste, deg
γ_{pc} = Unit weight of protective cover, pcf
D_{pc} = Individual lift height, ft
ϕ_{pc} = Internal friction angle of protective cover, deg
L = Horizontal length of lift, ft

Parameters:

$\beta_{sideslope}$ = 18.43 deg
Δ_1 = 18 deg
C_{a1} = 100 lb/sf
Δ_2 = 21 deg
C_{a2} = 100 lb/sf
Δ_3 = 15 deg
C_{a3} = 200 lb/sf
ϕ_4 = 13 deg
C_4 = 125 lb/sf
Δ_5 = 18 deg
C_{a5} = 100 lb/sf

γ_{was} = 65 pcf
D_{was} = 10 ft
ϕ_{was} = 23 deg
γ_{pc} = 115 pcf
D_{pc} = 2 ft
ϕ_{pc} = 18 deg
L = 30 ft

Note:
Interface friction strength values are selected conservatively from laboratory testing of similar material/interfaces. Prior to construction, laboratory tests will be performed to verify the assumed values for interface adhesion and friction angle using project-specific soil and synthetic materials. The interface friction testing will be performed for the specific conditions analyzed. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values using the procedure presented in the following sections.

Calculations:

Weight of Equipment

$$W_E = \frac{\text{Operational Weight / Number of tracks}}{\text{Width of Track}} \qquad W_E = 23{,}139 \text{ lb / ft}$$

Weight of Solid Waste

$$W_W = \frac{D_{was} \times L \times \gamma_{was}}{2} \qquad W_W = 9{,}750 \text{ lb / ft}$$

Weight of Protective Cover

$$W_{PC} = D_{pc} \times \gamma_{pc} \times \frac{L}{\cos(\beta_{sideslope})} \qquad W_{PC} = 7{,}273 \text{ lb / ft}$$

Combined weight of equipment, solid waste, and protective cover, lb

$$W_T = W_E + W_W + W_{PC} \qquad W_T = 40{,}162 \text{ lb / ft}$$

Friction Force on Edge of Protective Cover

$$T_{PC} = k_o \times \sigma_v \times \tan \phi_{pc} \times D$$

where: $k_o = 1 - \sin \phi_{pc}$

$$\sigma_v = \frac{D \times \gamma_{pc}}{2}$$

$T_{PC} =$ 52 lb / ft

Net Force of Protective Cover on Liner System

$$W = W_T - T_{PC}$$

$W =$ 40,110 lb / ft

$N =$ 38,052 lb / ft

$P_{sideslope} =$ 12,684 lb / ft

Resistance of Protective Cover/Geocomposite Interface = $F_1 =$ 15,526 lb / ft

$P_{sideslope} < F_1$ Therefore, protective cover soil is stable on the drainage geocomposite and a driving force equal to P is transferred to the next interface.

Resistance of Geocomposite/Textured Geomembrane Interface = $F_2 =$ 17,769 lb / ft

$P_{sideslope} < F_2$ Therefore, geocomposite is stable on the textured geomembrane and a driving force equal to P is transferred to the next interface.

Resistance of Textured Geomembrane/Clay Liner Interface = $F_3 =$ 16,521 lb / ft

$P_{sideslope} < F_3$ Therefore, textured geomembrane is stable on the clay liner and a driving force equal to P is transferred to the next interface.

Resistance of Clay Liner Internal = $F_4 =$ 12,738 lb / ft

$P_{sideslope} < F_4$ Therefore, the clay liner internally is stable and a driving force equal to P is transferred to the next interface.

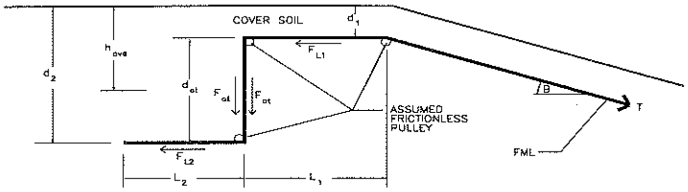
Resistance of Clay Liner/Geocomposite Interface = $F_5 =$ 15,526 lb / ft

$P_{sideslope} < F_5$ Therefore, clay liner is stable on the underdrain geocomposite and a driving force equal to P is transferred to the next interface.

The Actual Tensile Force on liner system (T_{act}) = 0 lb / ft

b. Verify anchor trench design is adequate for pullout of geomembrane.

Force Diagram for Liner System



$T = \quad F_{L1} + F_{L2} + F_{at}$

Where T is the tensile force necessary for pullout

$F_{L1} = (q_1 \tan\Delta)(L_1)$

q_1 = Surcharge pressure = $d_1 \times \gamma_{soil}$
d_1= Depth of soil, ft
γ_{soil} = Unit weight of soil, pcf
Δ = Interface friction angle, degrees (lowest interface friction angle value for the liner system components)
L_1= Length of runout, ft (2-foot thick clay liner configuration is used conservatively)

$F_{L2} = (q_2 \tan\Delta)(L_2)$

q_2 = Surcharge pressure = $d_2 \times \gamma_{soil}$
d_2= Depth of soil, ft
γ_{soil} = Unit weight of soil, pcf
Δ = Interface friction angle, degrees (lowest interface friction angle value for the liner system components)
L_2= Length of runout, ft

$F_{at} = (V \tan\Delta)(d_{at})$

V = Average horizontal stress = $K_o \times y$
K_o = 1 - sin(r)
r = Internal friction angle of soil, degrees
y = $\gamma_{soil} \times h_{ave}$
γ_{soil} = Unit weight of soil, pcf
Δ = Interface friction angle, degrees (lowest interface friction angle value for the liner system components)
h_{ave} = Average depth of trench, ft
d_{at} = Depth of trench, ft

<u>Parameters:</u>

γ_{soil} = 115.0 pcf
Δ = 15.0 deg
r = 18.0 deg

d_1 = 2.0 ft
L_1 = 6.0 ft
d_2 = 4.0 ft
L_2 = 2.0 ft
d_{at} = 2.0 ft
h_{ave} = 3.0 ft

Calculations:

F_{L1} = 369.8 lb / ft

F_{L2} = 246.5 lb / ft

F_{at} = 127.8 lb / ft

T = 744.0 lb / ft

Compare force required for pullout (T) with the actual tensile force in the geomembrane from Part 1:

T = 744 lb / ft

T_{act} = 0 lb / ft

$T > T_{act}$

Therefore, the runout lengths are sufficient to prevent pullout.

2. Infinite Slope Stability

a. 4H:1V Sideslope (Saturated Protective Cover)

Calculate factor of safety:

$$F.S. = A\frac{\tan\Delta}{\tan\beta} + B\frac{C_a}{\gamma H}$$

See Stability Charts for Infinite Slopes on page IIIJ-A-4-21 for procedure.

where: H = thickness of material above interface (ft)

Note:
Interface friction strength values are selected conservatively from laboratory testing of similar material/interfaces. Prior to construction, laboratory tests will be performed to verify the assumed values for interface adhesion and friction angle using project-specific soil and synthetic materials. The interface friction testing will be performed for the specific conditions analyzed. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values using the procedure presented in the following sections.

Protective Cover/Geocomposite Interface:

	PEAK			RESIDUAL	
Δ =	18	deg	Δ =	14	deg
$\beta_{sideslope}$ =	18.43	deg	$\beta_{sideslope}$ =	18.43	deg
A =	0.48		A =	0.48	
C_a =	100	psf	C_a =	80	psf
B =	3.3		B =	3.3	
γ =	120	pcf	γ =	120	pcf
H =	2	ft	H =	2	ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^2\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

r_u = 0.47

slope ratio, b= 3.00 Therefore parameter A is equal to 0.48 and parameter B is equal to 3.3 according to the charts on page IIIJ-A-4-21.

$\boxed{F.S._{(peak)} = 1.8}$ $\boxed{F.S._{(residual)} = 1.5}$

Geocomposite/Textured Geomembrane Interface:

PEAK

$\Delta =$ 21 deg
$\beta_{sideslope} =$ 18.43 deg
$A =$ 0.48
$C_a =$ 100 psf
$B =$ 3.3
$\gamma =$ 120 pcf
$H =$ 2 ft

RESIDUAL

$\Delta =$ 10 deg
$\beta_{sideslope} =$ 18.43 deg
$A =$ 0.48
$C_a =$ 80 psf
$B =$ 3.3
$\gamma =$ 120 pcf
$H =$ 2 ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^2\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

$r_u =$ 0.47

slope ratio, b= 3.00 Therefore parameter A is equal to 0.48 and parameter B is equal to 3.3 according to the charts on page IIIJ-A-4-21.

$\text{F.S.}_{(peak)} =$ 1.9

$\text{F.S.}_{(residual)} =$ 1.4

Textured Geomembrane/Clay Liner Interface:

PEAK

$\Delta =$ 15 deg
$\beta_{sideslope} =$ 18.43 deg
$A =$ 1.0
$C_a =$ 200 psf
$B =$ 3.3
$\gamma =$ 120 pcf
$H =$ 2 ft

RESIDUAL

$\Delta =$ 10 deg
$\beta_{sideslope} =$ 18.43 deg
$A =$ 1.0
$C_a =$ 80 psf
$B =$ 3.3
$\gamma =$ 120 pcf
$H =$ 2 ft

No impact of saturated protective cover on this interface therefore;

$r_u =$ 0

slope ratio, b= 3.00 Therefore parameter A is equal to 1 and parameter B is equal to 3.3 according to the charts on page IIIJ-A-4-21.

$\text{F.S.}_{(peak)} =$ 3.6

$\text{F.S.}_{(residual)} =$ 1.6

Clay Liner Internal:

Φ = 18 deg
$\beta_{sideslope}$ = 18.43 deg
A = 1.0
C = 100 psf
B = 3.3
γ = 120 pcf
H = 2 ft

No impact of saturated protective cover on this interface therefore;

r_u = 0

slope ratio, b= 3.00 Therefore parameter A is equal to 1 and parameter B is equal to 3.3 according to the charts on page IIIJ-A-4-21.

F.S.$_{(peak)}$ = 2.3

Clay Liner/Underdrain Geocomposite Interface:

PEAK			RESIDUAL		
Δ =	18	deg	Δ =	10	deg
$\beta_{sideslope}$ =	18.43	deg	$\beta_{sideslope}$ =	18.43	deg
A =	1.0		A =	1.0	
C_a =	200	psf	C_a =	80	psf
B =	3.3		B =	3.3	
γ =	120	pcf	γ =	120	pcf
H =	2	ft	H =	2	ft

No impact of saturated protective cover on this interface therefore;

r_u = 0

slope ratio, b= 3.00 Therefore parameter A is equal to 1 and parameter B is equal to 3.3 according to the charts on page IIIJ-A-4-21.

F.S.$_{(peak)}$ = 3.7

F.S.$_{(residual)}$ = 1.6

A factor of safety of 1.5 is acceptable for long-term stability (Ref. 5, page 22) using peak shear strength parameters and a factor of safety of 1.0 is acceptable when using residual strength parameters (Ref. 7, page 38). Therefore, the liner system is stable as designed. All the assumptions and values in the above demonstrations will be verified prior to construction.

B. Overliner System Stability

Note: 1. The overliner system consists of a prepared subgrade, a reinforced geosynthetic clay liner, a 40-mil-thick LLDPE Flexible Membrane Liner (FML) textured on both sides, a double-sided geocomposite drainage layer, and 2-foot-thick protective cover soil.

1. Infinite Slope Stability

a. 4 Percent Top slope (Saturated Overliner Protective Cover)

Calculate factor of safety:

$$F.S. = A\frac{\tan\Delta}{\tan\beta} + B\frac{C_a}{\gamma H}$$

See Stability Charts for Infinite Slopes on page IIIJ-A-4-21 for procedure.

where: H = thickness of material above interface (ft)

Note:
Interface friction strength values are selected conservatively from laboratory testing of similar material/interfaces. Prior to construction, laboratory tests will be performed to verify the assumed values for interface adhesion and friction angle using project-specific soil and synthetic materials. The interface friction testing will be performed for the specific conditions analyzed. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values using the procedure presented in the following sections.

Protective Cover/ Geocomposite Interface:

PEAK			RESIDUAL		
$\Delta =$	18	deg	$\Delta =$	14	deg
$\beta_{4\%} =$	2.29	deg	$\beta_{4\%} =$	2.29	deg
$A =$	0.47		$A =$	0.47	
$C_a =$	100	psf	$C_a =$	80	psf
$B =$	6.3		$B =$	6.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
$H =$	2	ft	$H =$	2	ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^2\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

$$r_u = 0.52$$

slope ratio, b= 25.00 Therefore parameter A is equal to 0.47 and parameter B is equal to 6.3 according to the charts on page IIIJ-A-4-21.

$\boxed{F.S._{(peak)} = 6.4}$ $\boxed{F.S._{(residual)} = 5.0}$

Prep By: JLG
Date: 3/21/2012

Chkd By: ✓
Date: 3-23-12

Geocomposite/Textured Geomembrane Interface:

	PEAK			RESIDUAL	
Δ =	21	deg	Δ =	10	deg
$\beta_{4\%}$ =	2.29	deg	$\beta_{4\%}$ =	2.29	deg
A =	0.47		A =	0.47	
C_a =	100	psf	C_a =	80	psf
B =	6.3		B =	6.3	
γ =	120	pcf	γ =	120	pcf
H =	2	ft	H =	2	ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^4\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

r_u = 0.52

slope ratio, b= 25.00 Therefore parameter A is equal to 0.47 and parameter B is equal to 6.3 according to the charts on page IIIJ-A-4-21.

F.S.$_{(peak)}$ = 7.1

F.S.$_{(residual)}$ = 4.2

Textured Geomembrane/Geosynthetic Clay Liner Interface:

	PEAK			RESIDUAL	
Δ =	18	deg	Δ =	10	deg
$\beta_{4\%}$ =	2.29	deg	$\beta_{4\%}$ =	2.29	deg
A =	1.00		A =	1.00	
C_a =	100	psf	C_a =	80	psf
B =	6.3		B =	6.3	
γ =	120	pcf	γ =	120	pcf
H =	2	ft	H =	2	ft

No impact of saturated protective cover on this interface therefore;

r_u = 0

slope ratio, b= 25.00 Therefore parameter A is equal to 1 and parameter B is equal to 6.3 according to the charts on page IIIJ-A-4-21.

F.S.$_{(peak)}$ = 10.7

F.S.$_{(residual)}$ = 6.5

Geosynthetic Clay Liner Internal:

	PEAK			RESIDUAL	
$\Phi =$	24	deg	$\Phi =$	11	deg
$\beta_{4\%} =$	2.29	deg	$\beta_{4\%} =$	2.29	deg
A =	1.00		A =	1.00	
C =	100	psf	C =	80	psf
B =	6.3		B =	6.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
H =	2	ft	H =	2	ft

No impact of saturated protective cover on this interface therefore;

$r_u =$ 0

slope ratio, b= 25.00 Therefore parameter A is equal to 1 and parameter B is equal to 6.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)} =$	13.8	$F.S._{(residual)} =$	7.0

Geosynthetic Clay Liner/Subgrade Interface:

	PEAK			RESIDUAL	
$\Delta =$	25	deg	$\Delta =$	12	deg
$\beta_{4\%} =$	2.29	deg	$\beta_{4\%} =$	2.29	deg
A =	1.00		A =	1.00	
$C_a =$	100	psf	$C_a =$	80	psf
B =	6.3		B =	6.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
H =	2	ft	H =	2	ft

No impact of saturated protective cover on this interface therefore;

$r_u =$ 0

slope ratio, b= 25.00 Therefore parameter A is equal to 1 and parameter B is equal to 6.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)} =$	14.3	$F.S._{(residual)} =$	7.4

b. 20 Percent Sideslope (Saturated Overliner Protective Cover)

Protective Cover/Geocomposite Interface:

	PEAK			RESIDUAL	
$\Delta =$	18	deg	$\Delta =$	14	deg
$\beta_{20\%} =$	11.31	deg	$\beta_{20\%} =$	11.31	deg
$A =$	0.49		$A =$	0.49	
$C_a =$	100	psf	$C_a =$	80	psf
$B =$	5.3		$B =$	5.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
$H =$	2	ft	$H =$	2	ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^2\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

$r_u =$ 0.50

slope ratio, b= 5.00 Therefore parameter A is equal to 0.49 and parameter B is equal to 5.3 according to the charts on page IIIJ-A-4-21.

$\boxed{\text{F.S.}_{(peak)} = 3.0}$ $\boxed{\text{F.S.}_{(residual)} = 2.4}$

Geocomposite/Textured Geomembrane Interface:

	PEAK			RESIDUAL	
Δ =	21	deg	Δ =	10	deg
$\beta_{20\%}$ =	11.31	deg	$\beta_{20\%}$ =	11.31	deg
A =	0.49		A =	0.49	
C_a =	100	psf	C_a =	80	psf
B =	5.3		B =	5.3	
γ =	120	pcf	γ =	120	pcf
H =	2	ft	H =	2	ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^2\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

r_u = 0.50

slope ratio, b= 5.00 Therefore parameter A is equal to 0.49 and parameter B is equal to 5.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)}$ = 3.1

$F.S._{(residual)}$ = 2.2

Chkd By:
Date: 3-23-12

Textured Geomembrane/Geosynthetic Clay Liner Interface:

	PEAK			RESIDUAL	
$\Delta =$	18	deg	$\Delta =$	10	deg
$\beta_{20\%} =$	11.31	deg	$\beta_{20\%} =$	11.31	deg
A =	1.00		A =	1.00	
$C_a =$	100	psf	$C_a =$	80	psf
B =	5.3		B =	5.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
H =	2	ft	H =	2	ft

No impact of saturated protective cover on this interface therefore;

$r_u =$ 0

slope ratio, b= 5.00 Therefore parameter A is equal to 1 and parameter B is equal to 5.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)} =$ 3.8

$F.S._{(residual)} =$ 2.6

Geosynthetic Clay Liner Internal:

	PEAK			RESIDUAL	
$\Phi =$	24	deg	$\Phi =$	11	deg
$\beta_{20\%} =$	11.31	deg	$\beta_{20\%} =$	11.31	deg
A =	1.00		A =	1.00	
C =	100	psf	C =	80	psf
B =	5.3		B =	5.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
H =	2	ft	H =	2	ft

No impact of saturated protective cover on this interface therefore;

$r_u =$ 0

slope ratio, b= 5.00 Therefore parameter A is equal to 1 and parameter B is equal to 5.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)} =$ 4.4

$F.S._{(residual)} =$ 2.7

Geosynthetic Clay Liner/Subgrade Interface:

	PEAK			RESIDUAL	
$\Delta =$	25	deg	$\Delta =$	12	deg
$\beta_{20\%} =$	11.31	deg	$\beta_{20\%} =$	11.31	deg
$A =$	1.00		$A =$	1.00	
$C_a =$	100	psf	$C_a =$	80	psf
$B =$	5.3		$B =$	5.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
$H =$	2	ft	$H =$	2	ft

No impact of saturated protective cover on this interface therefore;

$r_u =$ 0

slope ratio, b= 5.00 Therefore parameter A is equal to 1 and parameter B is equal to 5.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)} =$ 4.5

$F.S._{(residual)} =$ 2.8

A factor of safety of 1.5 is acceptable for long-term stability (Ref. 5, page 22) using peak shear strength parameters and a factor of safety of 1.0 is acceptable when using residual strength parameters (Ref. 7, page 38). Therefore, the overliner system is stable as designed. All the assumptions and values in the above demonstrations will be verified prior to construction.

C. Final Cover System Stability

Note:

1. The Subtitle D final cover system for the site consists of an 18-inch-thick compacted clay infiltration layer with a maximum hydraulic conductivity of 1×10^{-5} cm/s, a 40-mil LLDPE flexible membrane liner (textured on sideslopes and smooth on top slopes), a 250-mil-thick drainage geocomposite (double-sided on sideslopes and single-sided on top slopes), and a 24-inch-thick erosion layer.

1. Infinite Slope Stability

a. 25 Percent Sideslope (Saturated Erosion Layer)

Calculate factor of safety:

$$F.S. = A\frac{\tan\Delta}{\tan\beta} + B\frac{C_a}{\gamma H}$$

See Stability Charts for Infinite Slopes on page IIIJ-A-4-21 for procedure.

where: H = thickness of material above interface (ft)

Note:
Interface friction strength values are selected conservatively from laboratory testing of similar material/interfaces. Prior to construction, laboratory tests will be performed to verify the assumed values for interface adhesion and friction angle using project-specific soil and synthetic materials. The interface friction testing will be performed for the specific conditions analyzed. If test results differ from the assumed values, this analysis will be updated for acceptable factor of safety values using the procedure presented in the following sections.

Erosion Layer/Geocomposite Interface:

PEAK			RESIDUAL		
$\Delta =$	18	deg	$\Delta =$	14	deg
$\beta_{25\%} =$	14.04	deg	$\beta_{25\%} =$	14.04	deg
A =	0.48		A =	0.48	
$C_a =$	100	psf	$C_a =$	80	psf
B =	4.3		B =	4.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
H =	2	ft	H =	2	ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^2\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

$r_u =$ 0.49

slope ratio, b= 4.00 Therefore parameter A is equal to 0.48 and parameter B is equal to 4.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)} =$ 2.4

$F.S._{(residual)} =$ 1.9

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FINAL COVER SYSTEM
INFINITE SLOPE STABILITY ANALYSIS

Geocomposite/Textured Geomembrane Interface:

	PEAK			RESIDUAL	
$\Delta =$	21	deg	$\Delta =$	10	deg
$\beta_{25\%} =$	14.04	deg	$\beta_{25\%} =$	14.04	deg
A =	0.48		A =	0.48	
$C_a =$	100	psf	$C_a =$	80	psf
B =	4.3		B =	4.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
H =	2	ft	H =	2	ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^2\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

$r_u =$ 0.49

slope ratio, b= 4.00 Therefore parameter A is equal to 0.48 and parameter B is equal to 4.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)} =$ 2.5

$F.S._{(residual)} =$ 1.8

Textured Geomembrane/Clay Liner Interface:

	PEAK			RESIDUAL	
$\Delta =$	15	deg	$\Delta =$	10	deg
$\beta_{25\%} =$	14.04	deg	$\beta_{25\%} =$	14.04	deg
A =	1.0		A =	1.0	
$C_a =$	200	psf	$C_a =$	80	psf
B =	4.3		B =	4.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
H =	2	ft	H =	2	ft

No impact of saturated protective cover on this interface therefore;

$r_u =$ 0

slope ratio, b= 4.00 Therefore, parameters A is equal to 1 and parameter B is equal to 4.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)} =$ 4.7

$F.S._{(residual)} =$ 2.1

b. 4 Percent Top slope (Saturated Erosion Layer)

Erosion Layer/Geocomposite Interface:

	PEAK			RESIDUAL	
$\Delta =$	18	deg	$\Delta =$	14	deg
$\beta_{4\%} =$	2.29	deg	$\beta_{4\%} =$	2.29	deg
$A =$	0.47		$A =$	0.47	
$C_a =$	100	psf	$C_a =$	80	psf
$B =$	6.3		$B =$	6.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
$H =$	2	ft	$H =$	2	ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^2\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

$r_u =$ 0.52

slope ratio, b= 25.00 Therefore parameter A is equal to 0.47 and parameter B is equal to 6.3 according to the charts on page IIIJ-A-4-21.

$\text{F.S.}_{(\text{peak})} =$ 6.4

$\text{F.S.}_{(\text{residual})} =$ 5.0

Geonet/Smooth Geomembrane Interface:

	PEAK			RESIDUAL	
$\Delta =$	13	deg	$\Delta =$	8	deg
$\beta_{4\%} =$	2.29	deg	$\beta_{4\%} =$	2.29	deg
$A =$	0.47		$A =$	0.47	
$C_a =$	100	psf	$C_a =$	80	psf
$B =$	6.3		$B =$	6.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
$H =$	2	ft	$H =$	2	ft

Assuming saturated protective cover soil, then maximum head on liner is equal to H. Therefore r_u and parameter A are as calculated below.

$$r_u = (H \times \gamma_w \times \cos^2\beta) / (T \times \gamma)$$

where T is the maximum head on the liner and γ_w is 62.4 pcf.

$r_u =$ 0.52

slope ratio, b= 25.00 Therefore parameter A is equal to 0.47 and parameter B is equal to 6.3 according to the charts on page IIIJ-A-4-21.

$\text{F.S.}_{(\text{peak})} =$ 5.3

$\text{F.S.}_{(\text{residual})} =$ 3.8

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FINAL COVER SYSTEM
INFINITE SLOPE STABILITY ANALYSIS

Chkd By:
Date: 3-23-12

Smooth Geomembrane/Compacted Clay Infiltration Layer Interface:

	PEAK			RESIDUAL	
$\Delta =$	13	deg	$\Delta =$	8	deg
$\beta_{4\%} =$	2.29	deg	$\beta_{4\%} =$	2.29	deg
$A =$	1.0		$A =$	1.0	
$C_a =$	100	psf	$C_a =$	80	psf
$B =$	6.3		$B =$	6.3	
$\gamma =$	120	pcf	$\gamma =$	120	pcf
$H =$	2	ft	$H =$	2	ft

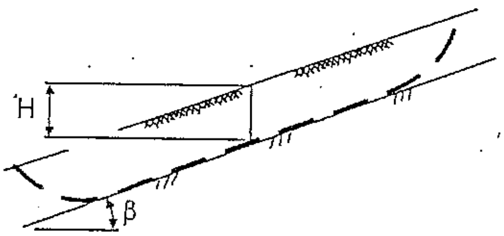
No impact of saturated protective cover on this interface therefore;

$r_u =$ 0

slope ratio, b= 25.00 Therefore, parameters A is equal to 1 and parameter B is equal to 6.3 according to the charts on page IIIJ-A-4-21.

$F.S._{(peak)} =$	8.4		$F.S._{(residual)} =$	5.6

A factor of safety of 1.5 is acceptable for long-term stability using peak shear strength parameters (Ref. 5, page 22) and a factor of safety of 1.0 is acceptable for long-term stability using residual strength parameters (Ref. 7, page 38). Therefore, the final cover system is stable as designed. All the assumptions and values in the above demonstrations will be verified prior to construction.



γ = total unit weight of soil

γ_w = unit weight of water

c' = cohesion intercept

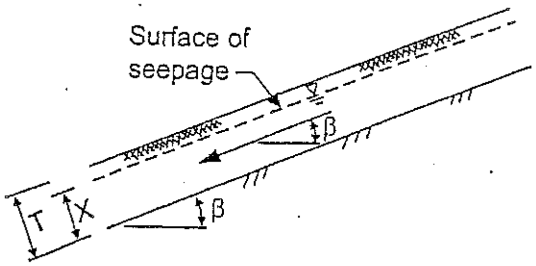
ϕ' = friction angle

r_u = pore pressure ratio = u/γH

u = pore pressure at depth H

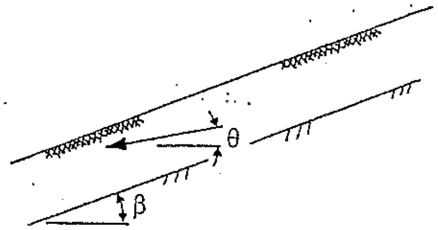
Steps:

1. Determine r_u from measured pore pressure or formulas at right.
2. Determine A and B from charts below.
3. Calculate $F = A\frac{\tan\phi'}{\tan\beta} + B\frac{c'}{\gamma H}$



Seepage parallel to slope

$$r_u = \frac{X}{T}\frac{\gamma_w}{\gamma}\cos^2\beta$$



Seepage emerging from slope

$$r_u = \frac{\gamma_w}{\gamma}\frac{1}{1+\tan\beta\tan\theta}$$

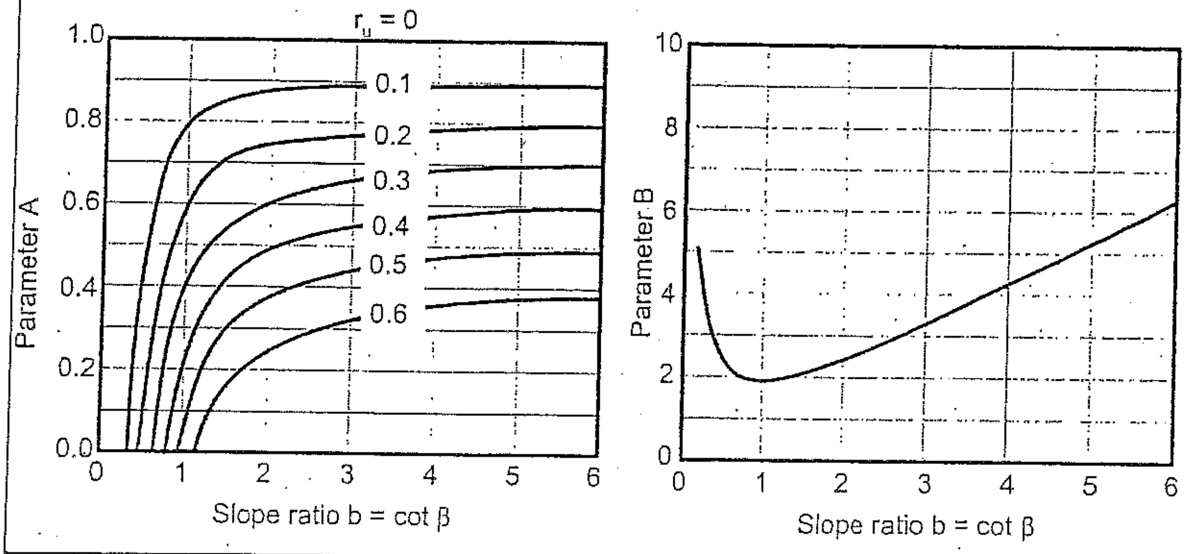


Figure E-7. Slope stability charts for infinite slopes (after Duncan, Buchianani, and DeWet 1987)

APPENDIX IIIJ-B

SETTLEMENT, STRAIN, AND HEAVE ANALYSES

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Includes page IIIJ-B-1

CONTENTS

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INTRODUCTION

This appendix includes the settlement analysis for the foundation soils, overliner system, and final cover system. The following details this appendix.

- Appendix IIIJ-B-1 includes the settlement, strain, and heave analyses for the foundation soils.
- Appendix IIIJ-B-2 includes the settlement and strain analyses for the overliner system.
- Appendix IIIJ-B-3 includes the settlement and strain analysis for the final cover system.

APPENDIX IIIJ-B-1

LINER SYSTEM SETTLEMENT, STRAIN, AND HEAVE ANALYSES

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Includes pages IIIJ-B-1-1 through IIIJ-B-1-26

APPENDIX IIIJ-B
FOUNDATION SETTLEMENT, HEAVE, AND STRAIN

Required:

1. Estimate the settlement of the landfill subgrade.

Method:

1. Waste filling and liner and final cover installation will result in loading of the foundation soils, causing consolidation. The magnitude of consolidation will be a function of the net stress increase and properties of the foundation soils. Net stress increase is assumed to be the addition of the load to the excavation grades.

A. Select critical locations for settlement.

The evaluation points were chosen at specific locations to analyze the post-settlement slopes of the leachate collection system. Evaluation point locations are shown on Sheet IIIJ-B-1-2.

B. Use unit weight and consolidation test strength values from available laboratory results.

Description of Contents:

- Sheet IIIJ-B-1-2 shows the excavation plan and top of unweathered shale contours.
- Sheets IIIJ-B-1-1 through IIIJ-B-1-19 detail the foundation settlement calculations.
- Sheets IIIJ-B-1-20 through and IIIJ-B-1-22 provide a summary of the post-settlement slopes.
- Sheets IIIJ-B-1-23 and IIIJ-B-1-24 provide the heave analysis.
- Sheets IIIJ-B-1-25 and IIIJ-B-1-26 detail the liner strain calculations.

References:

1. Day, Robert W., Geotechnical Engineer's Portable Handbook, 2000.
2. Das, Braja M., Principles of Geotechnical Engineering, 4th edition, 1998.
3. Dunn, I.S., Anderson, L.R., and Kiefer, F.W., Fundamentals of Geotechnical Analysis, 1st Edition, 1980.
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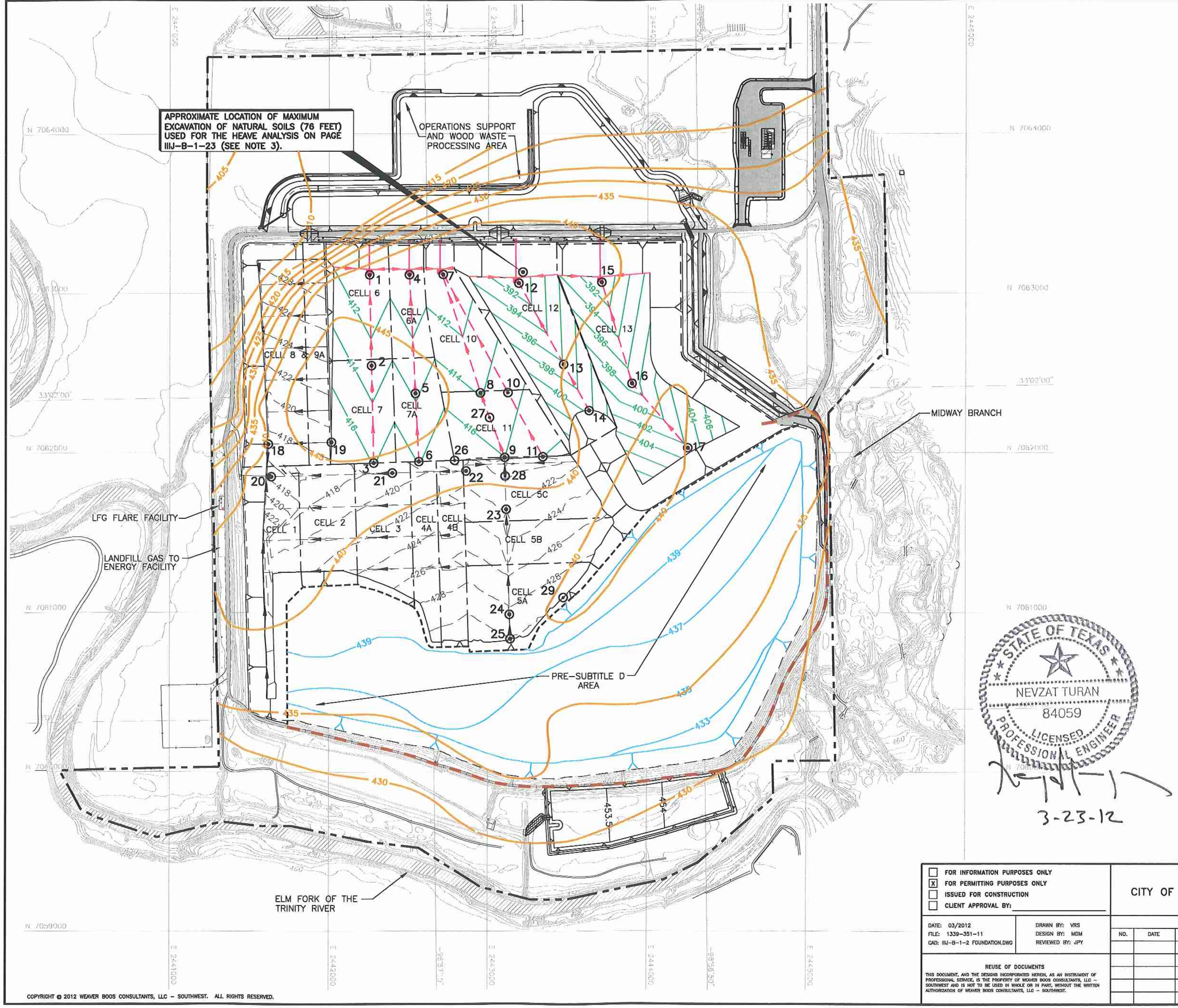

N

0 300 600
SCALE IN FEET

LEGEND

— - - —	PERMIT BOUNDARY
— — — —	LIMITS OF WASTE
- - - - -	LIMITS OF PRE-SUBTITLE D WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
500	EXISTING CONTOUR
— - —	CELL BOUNDARY
398	PROPOSED EXCAVATION CONTOUR
— —	PROPOSED LEACHATE LINE
■	PROPOSED LEACHATE COLLECTION SUMP
—•	PROPOSED LEACHATE RISER
422	AS-BUILT TOP OF SUBTITLE D GEOMEMBRANE LINER (SEE NOTE 4)
—◄—	EXISTING LEACHATE LINE
■	EXISTING LEACHATE COLLECTION SUMP
—○	EXISTING LEACHATE RISER
435	PRE-SUBTITLE D BOTTOM OF WASTE CONTOUR
435	TOP OF SHALE CONTOUR (SEE NOTE 5)
Y Y Y	3H:1V SLOPE (TYPICAL)
— · — ·	APPROXIMATE LOCATION OF PROPOSED SLURRY WALL (SEE NOTE 6)
⊙26	EVALUATION POINT

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3-23-12

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.
3. THE LOCATION SHOWN INDICATES NATURAL SOILS TO BE EXCAVATED. THERE MAY BE RECENTLY DISTURBED AREAS TO PLACE SOIL STOCKPILES.
4. AS-BUILT TOP OF GEOMEMBRANE LINER CONTOURS WERE DEVELOPED FROM HISTORICAL SLERS MAINTAINED IN THE SITE OPERATING PLAN.
5. TOP OF SHALE CONTOURS REPRODUCED FROM APPENDIX IIIG-GEOLOGY REPORT.
6. REFER TO APPENDIX IIIA FOR SLURRY WALL INFORMATION.

☐ FOR INFORMATION PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY:

DATE: 03/2012
FILE: 1339-351-11
CAD: IIIJ-B-1-2 FOUNDATION.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

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PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT FOUNDATION SETTLEMENT EVALUATION POINTS

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

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GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

SHEET IIIJ-B-1-2

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIJ\IIIJ-B\IIIJ-B-1-2 FOUNDATION SETTLEMENT.dwg, sford, 1:2

Solution:

The following equation was used to calculate the effective overburden stress. The shale is assumed to be unsaturated; therefore, the dry unit weight will be used.

$$p_{o(n)} = 0.5H_{o(n)}\gamma_n + \sum_{i=1}^{i=n-1}(H_{o(i)}\gamma_i)$$

The following equation was used to calculate the increase in overburden stress due to the development of the landfill using moist unit weights.

$$\Delta p = H_{liner}\gamma_{liner} + H_{pc}\gamma_{pc} + H_{waste}\gamma_{waste} + H_{fc}\gamma_{fc}$$

The following equations were used to calculate the settlement.

If $p_o + \Delta p < p_c$:

$$S = \frac{C_r H_o}{1+e_0} Log\left(\frac{p_o + \Delta p}{p_o}\right)$$

If $p_o + \Delta p > p_c$:

$$S = \frac{C_c H_o}{1+e_0} Log\left(\frac{p_o + \Delta p}{p_c}\right) + \frac{C_r H_o}{1+e_0} Log\left(\frac{p_c}{p_o}\right)$$

The following equation was used to calculate the final height of each layer after settlement.

$$H_f = H_o - S$$

Definition of Variables:

H_o = Initial Thickness of Sublayer (ft)
γ_{dry} = Dry Unit Weight (pcf)
γ_w = Unit Weight of Water (pcf)
γ_{waste} = Unit Weight of Waste (pcf)
e_o = In-Situ Void Ratio
p_o = Initial Average Effective Overburden Pressure (psf)
Δp = Increase in Vertical Pressure (psf)
p_c = Preconsolidation Pressure (psf)
S = Settlement (ft)
C_c = Compression Index
C_r = Recompression Index
H_f = Final Thickness of Sublayer (ft)

Symbols for Indices:

$_{pc}$= Protective Cover
$_{liner}$= Liner
$_{waste}$= Waste
$_n$= Number of Layers Including Landfill System Components
(i.e., liner system, waste, etc.)
$_{fc}$= Final Cover

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APPENDIX IIIJ-B
FOUNDATION SETTLEMENT AND STRAIN

INCREASE IN OVERBURDEN STRESS DUE TO DEVELOPMENT OF LANDFILL:

Note: Weights of materials above the evaluated strata are assumed to have moist units weights for the purpose of calculating the overburden pressure generated by these layers to estimate Δp. The unit weight of waste was based on the average waste thickness using the Unit Weight Profile for Waste/Daily Cover within an MSW Landfill chart from Ref. 5.

Evaluation Point 1

Final Cover Elevation (ft-msl)=	515.0	Top of Waste Elevation (ft-msl)=	511.5
Top of Protective Cover Elevation (ft-msl)=	414.0	Top of Liner Elevation (ft-msl)=	412.0

Waste Thickness (ft)=	97.5	γ_{waste}(pcf)=	56	$p_{(waste)}$ (psf)=	5460.0
Protective Cover Thickness (ft)=	2.0	γ_{pc} (pcf)=	120	$p_{(pc)}$ (psf)=	240
Liner Thickness (ft)=	2.0	γ_{liner} (pcf)=	120	$p_{(liner)}$ (psf)=	240
Final Cover Thickness (ft)=	3.5	γ_{fc} (pcf)=	115	$p_{(fc)}$ (psf)=	402.5
				Δp (psf)=	6342.5

Evaluation Point 2

Final Cover Elevation (ft-msl)=	655.9	Top of Waste Elevation (ft-msl)=	652.4
Top of Protective Cover Elevation (ft-msl)=	416.8	Top of Liner Elevation (ft-msl)=	414.8

Waste Thickness (ft)=	235.6	γ_{waste}(pcf)=	75	$p_{(waste)}$ (psf)=	17670.0
Protective Cover Thickness (ft)=	2.0	γ_{pc} (pcf)=	120	$p_{(pc)}$ (psf)=	240
Liner Thickness (ft)=	2.0	γ_{liner} (pcf)=	120	$p_{(liner)}$ (psf)=	240
Final Cover Thickness (ft)=	3.5	γ_{fc} (pcf)=	115	$p_{(fc)}$ (psf)=	402.5
				Δp (psf)=	18552.5

Evaluation Point 3

Final Cover Elevation (ft-msl)=	670.0	Top of Waste Elevation (ft-msl)=	666.5
Top of Protective Cover Elevation (ft-msl)=	419.9	Top of Liner Elevation (ft-msl)=	417.9

Waste Thickness (ft)=	246.6	γ_{waste}(pcf)=	76	$p_{(waste)}$ (psf)=	18741.6
Protective Cover Thickness (ft)=	2.0	γ_{pc} (pcf)=	120	$p_{(pc)}$ (psf)=	240
Liner Thickness (ft)=	2.0	γ_{liner} (pcf)=	120	$p_{(liner)}$ (psf)=	240
Final Cover Thickness (ft)=	3.5	γ_{fc} (pcf)=	115	$p_{(fc)}$ (psf)=	402.5
				Δp (psf)=	19624.1

Evaluation Point 4

Final Cover Elevation (ft-msl)=	515.0	Top of Waste Elevation (ft-msl)=	511.5
Top of Protective Cover Elevation (ft-msl)=	414.0	Top of Liner Elevation (ft-msl)=	412.0

Waste Thickness (ft)=	97.5	γ_{waste}(pcf)=	56	$p_{(waste)}$ (psf)=	5460.0
Protective Cover Thickness (ft)=	2.0	γ_{pc} (pcf)=	120	$p_{(pc)}$ (psf)=	240
Liner Thickness (ft)=	2.0	γ_{liner} (pcf)=	120	$p_{(liner)}$ (psf)=	240
Final Cover Thickness (ft)=	3.5	γ_{fc} (pcf)=	115	$p_{(fc)}$ (psf)=	402.5
				Δp (psf)=	6342.5

Evaluation Point 5

Final Cover Elevation (ft-msl)=	701.0	Top of Waste Elevation (ft-msl)=	697.5
Top of Protective Cover Elevation (ft-msl)=	417.7	Top of Liner Elevation (ft-msl)=	415.7

Waste Thickness (ft)=	279.8	γ_{waste}(pcf)=	78	$p_{(waste)}$ (psf)=	21824.4
Protective Cover Thickness (ft)=	2.0	γ_{pc} (pcf)=	120	$p_{(pc)}$ (psf)=	240
Liner Thickness (ft)=	2.0	γ_{liner} (pcf)=	120	$p_{(liner)}$ (psf)=	240
Final Cover Thickness (ft)=	3.5	γ_{fc} (pcf)=	115	$p_{(fc)}$ (psf)=	402.5
				Δp (psf)=	22706.9

Evaluation Point 6

Final Cover Elevation (ft-msl)=	707.2	Top of Waste Elevation (ft-msl)=	703.7
Top of Protective Cover Elevation (ft-msl)=	419.9	Top of Liner Elevation (ft-msl)=	417.9

Waste Thickness (ft)=	283.8	γ_{waste}(pcf)=	78	$p_{(waste)}$ (psf)=	22136.4
Protective Cover Thickness (ft)=	2.0	γ_{pc} (pcf)=	120	$p_{(pc)}$ (psf)=	240
Liner Thickness (ft)=	2.0	γ_{liner} (pcf)=	120	$p_{(liner)}$ (psf)=	240
Final Cover Thickness (ft)=	3.5	γ_{fc} (pcf)=	115	$p_{(fc)}$ (psf)=	402.5
				Δp (psf)=	23018.9

Evaluation Point 7

Final Cover Elevation (ft-msl)= 515.0
Top of Waste Elevation (ft-msl)= 511.5
Top of Protective Cover Elevation (ft-msl)= 413.9
Top of Liner Elevation (ft-msl)= 411.9

Waste Thickness (ft)= 97.6
γ_{waste}(pcf)= 56
$p_{(waste)}$ (psf)= 5465.6
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 6468.1

Evaluation Point 8

Final Cover Elevation (ft-msl)= 701.0
Top of Waste Elevation (ft-msl)= 697.5
Top of Protective Cover Elevation (ft-msl)= 417.8
Top of Liner Elevation (ft-msl)= 415.8

Waste Thickness (ft)= 279.7
γ_{waste}(pcf)= 78
$p_{(waste)}$ (psf)= 21816.6
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 22819.1

Evaluation Point 9

Final Cover Elevation (ft-msl)= 715.4
Top of Waste Elevation (ft-msl)= 711.9
Top of Protective Cover Elevation (ft-msl)= 420.0
Top of Liner Elevation (ft-msl)= 418.0

Waste Thickness (ft)= 291.9
γ_{waste}(pcf)= 79
$p_{(waste)}$ (psf)= 23060.1
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 23942.6

Evaluation Point 10

Final Cover Elevation (ft-msl)= 701.0
Top of Waste Elevation (ft-msl)= 697.5
Top of Protective Cover Elevation (ft-msl)= 418.1
Top of Liner Elevation (ft-msl)= 416.1

Waste Thickness (ft)= 279.4
γ_{waste}(pcf)= 78
$p_{(waste)}$ (psf)= 21793.2
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 22675.7

Evaluation Point 11

Final Cover Elevation (ft-msl)= 707.2
Top of Waste Elevation (ft-msl)= 703.7
Top of Protective Cover Elevation (ft-msl)= 420.4
Top of Liner Elevation (ft-msl)= 418.4

Waste Thickness (ft)= 283.3
γ_{waste}(pcf)= 78
$p_{(waste)}$ (psf)= 22097.4
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 22979.9

Evaluation Point 12

Final Cover Elevation (ft-msl)= 529.7
Top of Waste Elevation (ft-msl)= 526.2
Top of Protective Cover Elevation (ft-msl)= 394.4
Top of Liner Elevation (ft-msl)= 392.4

Waste Thickness (ft)= 131.8
γ_{waste}(pcf)= 61
$p_{(waste)}$ (psf)= 8039.8
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 9042.3

Prep By: MDM
Date: 3/21/2012

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Date: 3/23/2012

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Evaluation Point 13

Final Cover Elevation (ft-msl)= 653.8
Top of Waste Elevation (ft-msl)= 650.3
Top of Protective Cover Elevation (ft-msl)= 400.2
Top of Liner Elevation (ft-msl)= 398.2

Waste Thickness (ft)= 250.1
γ_{waste}(pcf)= 76
$p_{(waste)}$ (psf)= 19007.6
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 20010.1

Evaluation Point 14

Final Cover Elevation (ft-msl)= 639.6
Top of Waste Elevation (ft-msl)= 636.1
Top of Protective Cover Elevation (ft-msl)= 403.5
Top of Liner Elevation (ft-msl)= 401.5

Waste Thickness (ft)= 232.6
γ_{waste}(pcf)= 74
$p_{(waste)}$ (psf)= 17212.4
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 18214.9

Evaluation Point 15

Final Cover Elevation (ft-msl)= 529.7
Top of Waste Elevation (ft-msl)= 526.2
Top of Protective Cover Elevation (ft-msl)= 394.3
Top of Liner Elevation (ft-msl)= 392.3

Waste Thickness (ft)= 131.9
γ_{waste}(pcf)= 61
$p_{(waste)}$ (psf)= 8045.9
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 8928.4

Evaluation Point 16

Final Cover Elevation (ft-msl)= 560.3
Top of Waste Elevation (ft-msl)= 556.8
Top of Protective Cover Elevation (ft-msl)= 400.9
Top of Liner Elevation (ft-msl)= 398.9

Waste Thickness (ft)= 155.9
γ_{waste}(pcf)= 65
$p_{(waste)}$ (psf)= 10133.5
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 11016.0

Evaluation Point 17

Final Cover Elevation (ft-msl)= 580.2
Top of Waste Elevation (ft-msl)= 576.7
Top of Protective Cover Elevation (ft-msl)= 406.3
Top of Liner Elevation (ft-msl)= 404.3

Waste Thickness (ft)= 170.4
γ_{waste}(pcf)= 67
$p_{(waste)}$ (psf)= 11416.8
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 12299.3

Evaluation Point 18

Final Cover Elevation (ft-msl)= 501.6
Top of Waste Elevation (ft-msl)= 498.1
Top of Protective Cover Elevation (ft-msl)= 419.2
Top of Liner Elevation (ft-msl)= 417.2

Waste Thickness (ft)= 78.9
γ_{waste}(pcf)= 53
$p_{(waste)}$ (psf)= 4181.7
Protective Cover Thickness (ft)= 2.0
γ_{pc} (pcf)= 120
$p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0
γ_{liner} (pcf)= 120
$p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5
γ_{fc} (pcf)= 115
$p_{(fc)}$ (psf)= 402.5
Δp (psf)= 5064.2

Evaluation Point 19

Final Cover Elevation (ft-msl)= 599.4 Top of Waste Elevation (ft-msl)= 595.9
Top of Protective Cover Elevation (ft-msl)= 421.2 Top of Liner Elevation (ft-msl)= 419.2

Waste Thickness (ft)= 174.7 γ_{waste}(pcf)= 67 $p_{(waste)}$ (psf)= 11704.9
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 12707.4

Evaluation Point 20

Final Cover Elevation (ft-msl)= 512.0 Top of Waste Elevation (ft-msl)= 508.5
Top of Protective Cover Elevation (ft-msl)= 417.1 Top of Liner Elevation (ft-msl)= 415.1

Waste Thickness (ft)= 91.4 γ_{waste}(pcf)= 55 $p_{(waste)}$ (psf)= 5027.0
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 6029.5

Evaluation Point 21

Final Cover Elevation (ft-msl)= 701.0 Top of Waste Elevation (ft-msl)= 697.5
Top of Protective Cover Elevation (ft-msl)= 420.9 Top of Liner Elevation (ft-msl)= 418.9

Waste Thickness (ft)= 276.6 γ_{waste}(pcf)= 78 $p_{(waste)}$ (psf)= 21574.8
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 22577.3

Evaluation Point 22

Final Cover Elevation (ft-msl)= 719.3 Top of Waste Elevation (ft-msl)= 715.8
Top of Protective Cover Elevation (ft-msl)= 423.2 Top of Liner Elevation (ft-msl)= 421.2

Waste Thickness (ft)= 292.6 γ_{waste}(pcf)= 79 $p_{(waste)}$ (psf)= 23115.4
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 24117.9

Evaluation Point 23

Final Cover Elevation (ft-msl)= 722.5 Top of Waste Elevation (ft-msl)= 719
Top of Protective Cover Elevation (ft-msl)= 423.8 Top of Liner Elevation (ft-msl)= 421.8

Waste Thickness (ft)= 295.2 γ_{waste}(pcf)= 79 $p_{(waste)}$ (psf)= 23320.8
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 24323.3

Evaluation Point 24

Final Cover Elevation (ft-msl)= 701.0 Top of Waste Elevation (ft-msl)= 697.5
Top of Protective Cover Elevation (ft-msl)= 430.6 Top of Liner Elevation (ft-msl)= 428.6

Waste Thickness (ft)= 267.0 γ_{waste}(pcf)= 77 $p_{(waste)}$ (psf)= 20555.2
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 21557.7

Evaluation Point 25

Final Cover Elevation (ft-msl)= 664.1 Top of Waste Elevation (ft-msl)= 660.6
Top of Protective Cover Elevation (ft-msl)= 432.1 Top of Liner Elevation (ft-msl)= 430.1

Waste Thickness (ft)= 228.5 γ_{waste}(pcf)= 74 $p_{(waste)}$ (psf)= 16909.0
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 3.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 360
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 17911.5

Evaluation Point 26

Final Cover Elevation (ft-msl)= 716.1 Top of Waste Elevation (ft-msl)= 712.60
Top of Protective Cover Elevation (ft-msl)= 421.9 Top of Liner Elevation (ft-msl)= 419.9

Waste Thickness (ft)= 290.7 γ_{waste}(pcf)= 79 $p_{(waste)}$ (psf)= 22965.3
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 23847.8

Evaluation Point 27

Final Cover Elevation (ft-msl)= 707.2 Top of Waste Elevation (ft-msl)= 703.70
Top of Protective Cover Elevation (ft-msl)= 418.7 Top of Liner Elevation (ft-msl)= 416.7

Waste Thickness (ft)= 285.0 γ_{waste}(pcf)= 78 $p_{(waste)}$ (psf)= 22230.0
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 23112.5

Evaluation Point 28

Final Cover Elevation (ft-msl)= 717.7 Top of Waste Elevation (ft-msl)= 714.20
Top of Protective Cover Elevation (ft-msl)= 422.0 Top of Liner Elevation (ft-msl)= 420.0

Waste Thickness (ft)= 292.2 γ_{waste}(pcf)= 79 $p_{(waste)}$ (psf)= 23083.8
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 23966.3

Evaluation Point 29

Final Cover Elevation (ft-msl)= 706.7 Top of Waste Elevation (ft-msl)= 703.20
Top of Protective Cover Elevation (ft-msl)= 432.0 Top of Liner Elevation (ft-msl)= 430.0

Waste Thickness (ft)= 271.2 γ_{waste}(pcf)= 77 $p_{(waste)}$ (psf)= 20882.4
Protective Cover Thickness (ft)= 2.0 γ_{pc} (pcf)= 120 $p_{(pc)}$ (psf)= 240
Liner Thickness (ft)= 2.0 γ_{liner} (pcf)= 120 $p_{(liner)}$ (psf)= 240
Final Cover Thickness (ft)= 3.5 γ_{fc} (pcf)= 115 $p_{(fc)}$ (psf)= 402.5
Δp (psf)= 21764.9

Prep By: MDM
Date: 3/21/2012

Chkd By: JLG
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CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-B
FOUNDATION SETTLEMENT

Evaluation Point 1:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	410.0	400	10	111.5	0.60	0.063	0.012	6840	557.5	6342.5	0.083	9.917
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	8513	1672.5	6342.5	0.051	9.949
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	9628	2787.5	6342.5	0.039	9.961
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	10743	3902.5	6342.5	0.031	9.969
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	11858	5017.5	6342.5	0.027	9.973
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	12973	6132.5	6342.5	0.023	9.977

Total Settlement (ft) = 0.254

Evaluation Point 2:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	412.8	410	2.80	111.5	0.60	0.063	0.012	6840	156.1	18552.5	0.083	2.717
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	7710	869.7	18552.5	0.229	9.771
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	8825	1984.7	18552.5	0.193	9.807
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	9940	3099.7	18552.5	0.171	9.829
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11055	4214.7	18552.5	0.155	9.845
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12170	5329.7	18552.5	0.142	9.858
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13285	6444.7	18552.5	0.132	9.868

Total Settlement (ft) = 1.105

Evaluation Point 3:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	415.9	410	5.9	111.5	0.60	0.063	0.012	6840	328.9	19624.1	0.166	5.734
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8055	1215.4	19624.1	0.224	9.776
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9170	2330.4	19624.1	0.194	9.806
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10285	3445.4	19624.1	0.174	9.826
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11400	4560.4	19624.1	0.158	9.842
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12515	5675.4	19624.1	0.146	9.854
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13630	6790.4	19624.1	0.136	9.864

Total Settlement (ft) = 1.199

[1] C_c and C_r are the slopes of the e-log p plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

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Evaluation Point 4:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	410.0	400	10	111.5	0.60	0.063	0.012	6840	557.5	6342.5	0.083	9.917
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	8513	1672.5	6342.5	0.051	9.949
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	9628	2787.5	6342.5	0.039	9.961
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	10743	3902.5	6342.5	0.031	9.969
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	11858	5017.5	6342.5	0.027	9.973
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	12973	6132.5	6342.5	0.023	9.977

Total Settlement (ft) = 0.254

Evaluation Point 5:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	413.7	410	3.7	111.5	0.60	0.063	0.012	6840	206.3	22706.9	0.119	3.581
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	7810	970.0	22706.9	0.258	9.742
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	8925	2085.1	22706.9	0.222	9.778
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10040	3200.1	22706.9	0.199	9.801
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11155	4315.1	22706.9	0.182	9.818
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12270	5430.1	22706.9	0.168	9.832
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13385	6545.1	22706.9	0.157	9.843

Total Settlement (ft) = 1.305

Evaluation Point 6:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	415.9	410	5.9	111.5	0.60	0.063	0.012	6840	328.9	23018.9	0.182	5.718
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8055	1215.4	23018.9	0.250	9.750
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9170	2330.4	23018.9	0.218	9.782
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10285	3445.4	23018.9	0.197	9.803
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11400	4560.4	23018.9	0.181	9.819
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12515	5675.4	23018.9	0.168	9.832
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13630	6790.4	23018.9	0.157	9.843

Total Settlement (ft) = 1.353

[1] C_c and C_r are the slopes of the *e* -log *p* plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

Prep By: MDM
Date: 3/21/2012

Chkd By: YG
Date: 3/23/2012

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Evaluation Point 7:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	408.9	400	8.90	111.5	0.60	0.063	0.012	6840	496.2	6468.1	0.079	8.821
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	8390	1549.9	6468.1	0.054	9.946
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	9505	2664.9	6468.1	0.040	9.960
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	10620	3779.9	6468.1	0.032	9.968
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	11735	4894.9	6468.1	0.027	9.973
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	12850	6009.9	6468.1	0.024	9.976

Total Settlement (ft) = 0.256

Evaluation Point 8:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	412.8	410	2.8	111.5	0.60	0.063	0.012	6840	156.1	22819.1	0.092	2.708
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	7710	869.7	22819.1	0.263	9.737
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	8825	1984.7	22819.1	0.225	9.775
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	9940	3099.7	22819.1	0.202	9.798
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11055	4214.7	22819.1	0.184	9.816
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12170	5329.7	22819.1	0.170	9.830
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13285	6444.7	22819.1	0.159	9.841

Total Settlement (ft) = 1.296

Evaluation Point 9:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	416.0	410	6.0	111.5	0.60	0.063	0.012	6840	334.5	23942.6	0.189	5.811
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8067	1226.5	23942.6	0.256	9.744
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9182	2341.5	23942.6	0.224	9.776
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10297	3456.5	23942.6	0.203	9.797
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11412	4571.5	23942.6	0.186	9.814
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12527	5686.5	23942.6	0.173	9.827
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13642	6801.5	23942.6	0.162	9.838

Total Settlement (ft) = 1.393

[1] C_c and C_r are the slopes of the *e* -log *p* plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

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Evaluation Point 10:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o[1]	C_c[1]	C_r[1]	p_c[1] (psf)	p_o (psf)	Δp (psf)	S[2] (ft)	H_f (ft)
Unweathered Shale	414.1	410	4.1	111.5	0.60	0.063	0.012	6840	228.6	22675.7	0.130	3.970
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	7855	1014.7	22675.7	0.255	9.745
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	8970	2129.7	22675.7	0.221	9.779
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10085	3244.7	22675.7	0.198	9.802
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11200	4359.7	22675.7	0.181	9.819
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12315	5474.7	22675.7	0.168	9.832
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13430	6589.7	22675.7	0.156	9.844

Total Settlement (ft) = 1.310

Evaluation Point 11:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o[1]	C_c[1]	C_r[1]	p_c[1] (psf)	p_o (psf)	Δp (psf)	S[2] (ft)	H_f (ft)
Unweathered Shale	416.4	410	6.4	111.5	0.60	0.063	0.012	6840	356.8	22979.9	0.196	6.204
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8111	1271.1	22979.9	0.248	9.752
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9226	2386.1	22979.9	0.217	9.783
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10341	3501.1	22979.9	0.196	9.804
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11456	4616.1	22979.9	0.180	9.820
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12571	5731.1	22979.9	0.167	9.833
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13686	6846.1	22979.9	0.156	9.844

Total Settlement (ft) = 1.359

Evaluation Point 12:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o[1]	C_c[1]	C_r[1]	p_c[1] (psf)	p_o (psf)	Δp (psf)	S[2] (ft)	H_f (ft)
Unweathered Shale	389.4	380	9.4	111.5	0.60	0.063	0.012	6840	524.0	9042.3	0.133	9.267
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	8446	1605.6	9042.3	0.094	9.906
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	9561	2720.6	9042.3	0.076	9.924
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	10676	3835.6	9042.3	0.065	9.935

Total Settlement (ft) = 0.368

[1] C_c and C_r are the slopes of the *e* -log *p* plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

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Evaluation Point 13:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	395.2	390	5.2	111.5	0.60	0.063	0.012	6840	289.9	20010.1	0.150	5.050
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	7977	1137.3	20010.1	0.230	9.770
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	9092	2252.3	20010.1	0.199	9.801
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	10207	3367.3	20010.1	0.178	9.822
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	11322	4482.3	20010.1	0.162	9.838

Total Settlement (ft) = 0.919

Evaluation Point 14:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	398.5	390	8.5	111.5	0.60	0.063	0.012	6840	473.9	18214.9	0.220	8.280
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	8345	1505.3	18214.9	0.203	9.797
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	9460	2620.3	18214.9	0.177	9.823
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	10575	3735.3	18214.9	0.159	9.841
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	11690	4850.3	18214.9	0.145	9.855

Total Settlement (ft) = 0.903

Evaluation Point 15:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	390.3	380	10.3	111.5	0.60	0.063	0.012	6840	574.2	8928.4	0.141	10.159
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	8546	1706.0	8928.4	0.090	9.910
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	9661	2821.0	8928.4	0.074	9.926
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	10776	3936.0	8928.4	0.063	9.937

Total Settlement (ft) = 0.368

[1] C_c and C_r are the slopes of the *e* -log *p* plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

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Evaluation Point 16:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o[1]	C_c[1]	C_r[1]	p_c[1] (psf)	p_o (psf)	Δp (psf)	S[2] (ft)	H_f (ft)
Unweathered Shale	396.9	390	6.9	111.5	0.60	0.063	0.012	6840	384.7	11016.0	0.125	6.775
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	8167	1326.9	11016.0	0.130	9.870
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	9282	2441.9	11016.0	0.107	9.893
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	10397	3556.9	11016.0	0.093	9.907
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	11512	4671.9	11016.0	0.082	9.918

Total Settlement (ft) = 0.537

Evaluation Point 17:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o[1]	C_c[1]	C_r[1]	p_c[1] (psf)	p_o (psf)	Δp (psf)	S[2] (ft)	H_f (ft)
Unweathered Shale	402.3	400	2.3	111.5	0.60	0.063	0.012	6840	128.2	12299.3	0.053	2.247
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	7654	814.0	12299.3	0.165	9.835
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	8769	1929.0	12299.3	0.132	9.868
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	9884	3044.0	12299.3	0.114	9.886
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	10999	4159.0	12299.3	0.101	9.899
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	12114	5274.0	12299.3	0.091	9.909

Total Settlement (ft) = 0.655

Evaluation Point 18:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o[1]	C_c[1]	C_r[1]	p_c[1] (psf)	p_o (psf)	Δp (psf)	S[2] (ft)	H_f (ft)
Unweathered Shale	415.2	410	5.2	111.5	0.60	0.063	0.012	6840	289.9	5064.2	0.049	5.151
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	7977	1137.3	5064.2	0.055	9.945
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9092	2252.3	5064.2	0.038	9.962
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10207	3367.3	5064.2	0.030	9.970
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11322	4482.3	5064.2	0.025	9.975
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12437	5597.3	5064.2	0.021	9.979
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13552	6712.3	5064.2	0.018	9.982

Total Settlement (ft) = 0.237

[1] C_c and C_r are the slopes of the *e* -log *p* plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

Prep By: MDM
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Chkd By: JLG
Date: 3/23/2012

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Evaluation Point 19:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	416.2	410	6.2	111.5	0.60	0.063	0.012	6840	345.6	12707.4	0.129	6.071
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8089	1248.8	12707.4	0.154	9.846
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9204	2363.8	12707.4	0.129	9.871
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10319	3478.8	12707.4	0.112	9.888
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11434	4593.8	12707.4	0.101	9.899
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12549	5708.8	12707.4	0.091	9.909
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13664	6823.8	12707.4	0.084	9.916

Total Settlement (ft) = 0.799

Evaluation Point 20:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	412.1	410	2.1	111.5	0.60	0.063	0.012	6840	117.1	6029.5	0.027	2.073
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	7632	791.7	6029.5	0.070	9.930
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	8747	1906.7	6029.5	0.046	9.954
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	9862	3021.7	6029.5	0.036	9.964
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	10977	4136.7	6029.5	0.029	9.971
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12092	5251.7	6029.5	0.025	9.975
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13207	6366.7	6029.5	0.022	9.978

Total Settlement (ft) = 0.255

Evaluation Point 21:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	415.9	410	5.9	111.5	0.60	0.063	0.012	6840	328.9	22577.3	0.180	5.720
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8055	1215.4	22577.3	0.247	9.753
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9170	2330.4	22577.3	0.215	9.785
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10285	3445.4	22577.3	0.194	9.806
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11400	4560.4	22577.3	0.178	9.822
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12515	5675.4	22577.3	0.165	9.835
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13630	6790.4	22577.3	0.154	9.846

Total Settlement (ft) = 1.334

[1] C_c and C_r are the slopes of the *e* -log *p* plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

Prep By: MDM
Date: 3/21/2012

Chkd By: VG
Date: 3/23/2012

CAMELOT LANDFILL
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Evaluation Point 22:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o[1]	C_c[1]	C_r[1]	p_c[1] (psf)	p_o (psf)	Δp (psf)	S[2] (ft)	H_f (ft)
Unweathered Shale	418.2	410	8.2	111.5	0.60	0.063	0.012	6840	457.1	24117.9	0.252	7.948
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8312	1471.8	24117.9	0.249	9.751
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9427	2586.8	24117.9	0.220	9.780
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10542	3701.8	24117.9	0.200	9.800
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11657	4816.8	24117.9	0.184	9.816
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12772	5931.8	24117.9	0.171	9.829
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13887	7046.8	24117.9	0.160	9.840
										Total Settlement (ft) =	1.436	

Evaluation Point 23:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o[1]	C_c[1]	C_r[1]	p_c[1] (psf)	p_o (psf)	Δp (psf)	S[2] (ft)	H_f (ft)
Unweathered Shale	418.8	410	8.8	111.5	0.60	0.063	0.012	6840	490.6	24323.3	0.269	8.531
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8379	1538.7	24323.3	0.248	9.752
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9494	2653.7	24323.3	0.220	9.780
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10609	3768.7	24323.3	0.200	9.800
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11724	4883.7	24323.3	0.185	9.815
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12839	5998.7	24323.3	0.172	9.828
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13954	7113.7	24323.3	0.161	9.839
										Total Settlement (ft) =	1.455	

Evaluation Point 24:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o[1]	C_c[1]	C_r[1]	p_c[1] (psf)	p_o (psf)	Δp (psf)	S[2] (ft)	H_f (ft)
Unweathered Shale	425.6	420	5.6	111.5	0.60	0.063	0.012	6840	309.4	21557.7	0.166	5.384
Unweathered Shale	420	410	10	111.5	0.60	0.063	0.012	8016	1176.3	21557.7	0.241	9.759
Unweathered Shale	410	405	5	111.5	0.60	0.063	0.012	8853	2012.6	21557.7	0.108	4.892
Unweathered Shale	405	400	5	111.5	0.60	0.063	0.012	9410	2570.1	21557.7	0.102	4.898
Unweathered Shale	400	395	5	111.5	0.60	0.063	0.012	9968	3127.6	21557.7	0.096	4.904
Unweathered Shale	395	390	5	111.5	0.60	0.063	0.012	10525	3685.1	21557.7	0.092	4.908
										Total Settlement (ft) =	0.805	

[1] C_c and C_r are the slopes of the *e*-log *p* plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

Prep By: MDM
Date: 3/21/2012

Chkd By: JLG
Date: 3/23/2012

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Evaluation Point 25:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	427.1	420	7.1	111.5	0.60	0.063	0.012	6840	395.8	17911.5	0.185	6.915
Unweathered Shale	420	410	10	111.5	0.60	0.063	0.012	8189	1349.2	17911.5	0.205	9.795
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	9304	2464.2	17911.5	0.177	9.823
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	10419	3579.2	17911.5	0.159	9.841
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	11534	4694.2	17911.5	0.144	9.856
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	12649	5809.2	17911.5	0.133	9.867
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	13764	6924.2	17911.5	0.123	9.877
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	14879	8039.2	17911.5	0.115	9.885

Total Settlement (ft) = 1.242

Evaluation Point 26:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	417.9	410	7.9	111.5	0.60	0.063	0.012	6840	440.4	23847.8	0.242	7.658
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8278	1438.4	23847.8	0.248	9.752
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9393	2553.4	23847.8	0.219	9.781
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10508	3668.4	23847.8	0.199	9.801
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11623	4783.4	23847.8	0.183	9.817
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12738	5898.4	23847.8	0.170	9.830
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13853	7013.4	23847.8	0.159	9.841

Total Settlement (ft) = 1.420

Evaluation Point 27:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	414.7	410	4.7	111.5	0.60	0.063	0.012	6840	262.0	23112.5	0.149	4.551
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	7922	1081.6	23112.5	0.256	9.744
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9037	2196.6	23112.5	0.222	9.778
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10152	3311.6	23112.5	0.200	9.800
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11267	4426.6	23112.5	0.183	9.817
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12382	5541.6	23112.5	0.170	9.830
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13497	6656.6	23112.5	0.158	9.842

Total Settlement (ft) = 1.338

[1] C_c and C_r are the slopes of the e-log p plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

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CAMELOT LANDFILL
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Evaluation Point 28:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	418.0	410	8	111.5	0.60	0.063	0.012	6840	446.0	23966.3	0.245	7.755
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	8290	1449.5	23966.3	0.248	9.752
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	9405	2564.5	23966.3	0.220	9.780
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	10520	3679.5	23966.3	0.199	9.801
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	11635	4794.5	23966.3	0.184	9.816
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	12750	5909.5	23966.3	0.171	9.829
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	13865	7024.5	23966.3	0.160	9.840

Total Settlement (ft) = 1.427

Evaluation Point 29:

Unit	Top Elevation (ft-msl)	Bottom Elevation (ft-msl)	H_o (ft)	γ_d (pcf)	e_o^1	C_c^1	C_r^1	p_c^1 (psf)	p_o (psf)	Δp (psf)	S^2 (ft)	H_f (ft)
Unweathered Shale	428.0	420	8	111.5	0.60	0.063	0.012	6840	446.0	21764.9	0.232	7.768
Unweathered Shale	420	410	10	111.5	0.60	0.063	0.012	8290	1449.5	21764.9	0.233	9.767
Unweathered Shale	410	400	10	111.5	0.60	0.063	0.012	9405	2564.5	21764.9	0.205	9.795
Unweathered Shale	400	390	10	111.5	0.60	0.063	0.012	10520	3679.5	21764.9	0.185	9.815
Unweathered Shale	390	380	10	111.5	0.60	0.063	0.012	11635	4794.5	21764.9	0.170	9.830
Unweathered Shale	380	370	10	111.5	0.60	0.063	0.012	12750	5909.5	21764.9	0.158	9.842
Unweathered Shale	370	360	10	111.5	0.60	0.063	0.012	13865	7024.5	21764.9	0.147	9.853
Unweathered Shale	360	350	10	111.5	0.60	0.063	0.012	14980	8139.5	21764.9	0.138	9.862

Total Settlement (ft) = 1.468

[1] C_c and C_r are the slopes of the e -log p plot determined using standard laboratory consolidation testing methods. The void ratio and preconsolidation pressure are obtained from the consolidation tests.

[2] Settlement has been estimated from excavation grades.

Prep By: MDM
Date: 3/21/2012

Chkd By: JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-B
SUMMARY OF LINER SLOPES AFTER SETTLEMENT

Slope from Evaluation Point 3 to Evaluation Point 2

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 3 (ft-msl)	Elevation Point 2 (ft-msl)	Slope (Percent)	Evaluation Point 3 (ft)	Evaluation Point 2 (ft)	Length (ft)	Elevation Point 3 (ft-msl)	Elevation Point 2 (ft-msl)	Slope (Percent)
609.9	417.9	414.8	**0.51**	1.199	1.105	609.9	416.70	413.70	**0.49**

Slope from Evaluation Point 2 to Evaluation Point 1

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 2 (ft-msl)	Elevation Point 1 (ft-msl)	Slope (Percent)	Evaluation Point 2 (ft)	Evaluation Point 1 (ft)	Length	Elevation Point 2 (ft-msl)	Elevation Point 1 (ft-msl)	Slope (Percent)
569.6	414.8	412.0	**0.49**	1.105	0.254	569.6	413.70	411.75	**0.34**

Slope from Evaluation Point 6 to Evaluation Point 5

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 6 (ft-msl)	Elevation Point 5 (ft-msl)	Slope (Percent)	Evaluation Point 6 (ft)	Evaluation Point 5 (ft)	Length	Elevation Point 6 (ft-msl)	Elevation Point 5 (ft-msl)	Slope (Percent)
427.2	417.9	415.7	**0.51**	1.353	1.305	427.20	416.55	414.39	**0.50**

Slope from Evaluation Point 5 to Evaluation Point 4

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 5 (ft-msl)	Elevation Point 4 (ft-msl)	Slope (Percent)	Evaluation Point 5 (ft)	Evaluation Point 4 (ft)	Length	Elevation Point 5 (ft-msl)	Elevation Point 4 (ft-msl)	Slope (Percent)
744.6	415.7	412.0	**0.50**	1.305	0.254	744.6	414.39	411.75	**0.36**

Slope from Evaluation Point 9 to Evaluation Point 8

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 9 (ft-msl)	Elevation Point 8 (ft-msl)	Slope (Percent)	Evaluation Point 9 (ft)	Evaluation Point 8 (ft)	Length	Elevation Point 9 (ft-msl)	Elevation Point 8 (ft-msl)	Slope (Percent)
431.9	418.0	415.8	**0.51**	1.393	1.296	431.9	416.61	414.50	**0.49**

Slope from Evaluation Point 8 to Evaluation Point 7

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 8 (ft-msl)	Elevation Point 7 (ft-msl)	Slope (Percent)	Evaluation Point 8 (ft)	Evaluation Point 7 (ft)	Length	Elevation Point 8 (ft-msl)	Elevation Point 7 (ft-msl)	Slope (Percent)
777.3	415.8	411.9	**0.50**	1.296	0.256	777.3	414.50	411.64	**0.37**

Slope from Evaluation Point 11 to Evaluation Point 10

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 11 (ft-msl)	Elevation Point 10 (ft-msl)	Slope (Percent)	Evaluation Point 11 (ft)	Evaluation Point 10 (ft)	Length	Elevation Point 11 (ft-msl)	Elevation Point 10 (ft-msl)	Slope (Percent)
457.7	418.4	416.1	**0.50**	1.359	1.310	457.7	417.04	414.79	**0.49**

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CAMELOT LANDFILL
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SUMMARY OF LINER SLOPES AFTER SETTLEMENT

Slope from Evaluation Point 10 to Evaluation Point 7

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 10 (ft-msl)	Elevation Point 7 (ft-msl)	Slope (Percent)	Evaluation Point 10 (ft)	Evaluation Point 7 (ft)	Length	Elevation Point 10 (ft-msl)	Elevation Point 7 (ft-msl)	Slope (Percent)
845.1	416.1	411.9	**0.50**	1.310	0.256	845.1	414.79	411.64	**0.37**

Slope from Evaluation Point 14 to Evaluation Point 13

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 14 (ft-msl)	Elevation Point 13 (ft-msl)	Slope (Percent)	Evaluation Point 14 (ft)	Evaluation Point 13 (ft)	Length	Elevation Point 14 (ft-msl)	Elevation Point 13 (ft-msl)	Slope (Percent)
330.4	401.5	398.2	**1.00**	0.903	0.919	330.4	400.60	397.28	**1.00**

Slope from Evaluation Point 13 to Evaluation Point 12

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 13 (ft-msl)	Elevation Point 12 (ft-msl)	Slope (Percent)	Evaluation Point 13 (ft)	Evaluation Point 12 (ft)	Length	Elevation Point 13 (ft-msl)	Elevation Point 12 (ft-msl)	Slope (Percent)
581.8	398.2	392.4	**1.00**	0.919	0.368	581.8	397.28	392.03	**0.90**

Slope from Evaluation Point 17 to Evaluation Point 16

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 17 (ft-msl)	Elevation Point 16 (ft-msl)	Slope (Percent)	Evaluation Point 17 (ft)	Evaluation Point 16 (ft)	Length	Elevation Point 17 (ft-msl)	Elevation Point 16 (ft-msl)	Slope (Percent)
532.7	404.3	398.9	**1.01**	0.655	0.537	532.7	403.64	398.36	**0.99**

Slope from Evaluation Point 16 to Evaluation Point 15

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 16 (ft-msl)	Elevation Point 15 (ft-msl)	Slope (Percent)	Evaluation Point 16 (ft)	Evaluation Point 15 (ft)	Length	Elevation Point 16 (ft-msl)	Elevation Point 15 (ft-msl)	Slope (Percent)
662.9	398.9	392.3	**1.00**	0.537	0.368	662.9	398.36	391.93	**0.97**

Slope from Evaluation Point 19 to Evaluation Point 18

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 19 (ft-msl)	Elevation Point 18 (ft-msl)	Slope (Percent)	Evaluation Point 19 (ft)	Evaluation Point 18 (ft)	Length	Elevation Point 19 (ft-msl)	Elevation Point 18 (ft-msl)	Slope (Percent)
397.0	419.2	417.2	**0.50**	0.799	0.237	397.0	418.40	416.96	**0.36**

Slope from Evaluation Point 22 to Evaluation Point 21

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 22 (ft-msl)	Elevation Point 21 (ft-msl)	Slope (Percent)	Evaluation Point 22 (ft)	Evaluation Point 21 (ft)	Length	Elevation Point 22 (ft-msl)	Elevation Point 21 (ft-msl)	Slope (Percent)
463.1	421.2	418.9	**0.50**	1.436	1.334	463.1	419.76	417.57	**0.47**

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-B
SUMMARY OF LINER SLOPES AFTER SETTLEMENT

Slope from Evaluation Point 21 to Evaluation Point 20

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 21 (ft-msl)	Elevation Point 20 (ft-msl)	Slope (Percent)	Evaluation Point 21 (ft)	Evaluation Point 20 (ft)	Length	Elevation Point 21 (ft-msl)	Elevation Point 20 (ft-msl)	Slope (Percent)
761.2	418.9	415.1	**0.50**	1.334	0.255	761.2	417.57	414.84	**0.36**

Slope from Evaluation Point 25 to Evaluation Point 24

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 25 (ft-msl)	Elevation Point 24 (ft-msl)	Slope (Percent)	Evaluation Point 25 (ft)	Evaluation Point 24 (ft)	Length	Elevation Point 25 (ft-msl)	Elevation Point 24 (ft-msl)	Slope (Percent)
153.2	430.1	428.6	**1.01**	1.242	0.805	153.2	428.86	427.75	**0.73**

Slope from Evaluation Point 24 to Evaluation Point 23

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 24 (ft-msl)	Elevation Point 23 (ft-msl)	Slope (Percent)	Evaluation Point 24 (ft)	Evaluation Point 23 (ft)	Length	Elevation Point 24 (ft-msl)	Elevation Point 23 (ft-msl)	Slope (Percent)
658.7	428.6	421.8	**1.02**	0.805	1.455	658.7	427.75	420.35	**1.12**

Slope from Evaluation Point 23 to Evaluation Point 9

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 23 (ft-msl)	Elevation Point 9 (ft-msl)	Slope (Percent)	Evaluation Point 23 (ft)	Evaluation Point 9 (ft)	Length	Elevation Point 23 (ft-msl)	Elevation Point 9 (ft-msl)	Slope (Percent)
325.0	421.8	418.0	**1.17**	1.455	1.393	325.0	420.35	416.61	**1.15**

Slope from Evaluation Point 26 to Evaluation Point 27

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 26 (ft-msl)	Elevation Point 27 (ft-msl)	Slope (Percent)	Evaluation Point 26 (ft)	Evaluation Point 27 (ft)	Length	Elevation Point 26 (ft-msl)	Elevation Point 27 (ft-msl)	Slope (Percent)
347.0	419.9	416.7	**0.92**	1.420	1.338	347.0	418.48	415.36	**0.90**

Slope from Evaluation Point 29 to Evaluation Point 28

Prior to Settlement				Estimated Settlement		After Settlement			
Length	Elevation Point 29 (ft-msl)	Elevation Point 28 (ft-msl)	Slope (Percent)	Evaluation Point 29 (ft)	Evaluation Point 28 (ft)	Length	Elevation Point 29 (ft-msl)	Elevation Point 289 (ft-msl)	Slope (Percent)
855.0	430.0	420.0	**1.17**	1.468	1.427	855.0	428.53	418.57	**1.16**

Conclusion:

The above calculations verify that the slopes and lengths used to design the leachate collection system in Appendix IIIC are valid. As noted in Appendix IIIC-A of Appendix IIIC, the slope between the sector ridgeline and leachate collection line used in the HELP Model analysis was chosen to be 0.9 percent for the undeveloped areas and 1.1 percent for the developed areas, which conservatively represent the lowest post-settlement slope between the sector ridgeline and leachate collection line for the respective areas. The slope used to design the leachate collection line of the leachate collection system in Appendix IIIC was chosen as 0.3 percent to conservatively represent the minimum post-settlement pipe slope calculated above.

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-B
HEAVE ANALYSIS

Required: 1. Estimate the potential heave of the excavation bottom that may occur due to the excavation of overburden soils.

Method: Heave will be calculated using standard consolidation theory.

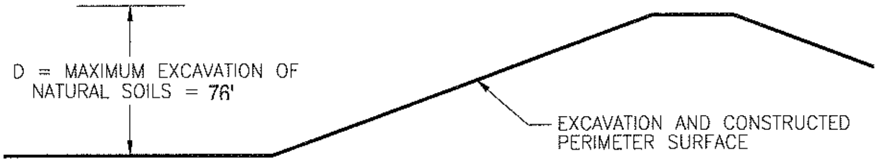
References:

1. Terzaghi, Karl and Peck, Ralph, Soil Mechanics in Engineering Principle, Third Edition, John Wiley and Sons, Inc, New York, 1996.
2. Das, Braja M., Principles of Geotechnical Engineering, Fourth Edition, PWS, Boston, 1998.
3. Day, Robert W., *Geotechnical Engineer's Portable Handbook*, McGraw-Hill, New York, 2000.

Note: 1. Approximate evaluation location for the heave analysis is shown on Sheet IIIJ-B-1-2.

Solution:

Diagram for Heave Analysis:



Definition of Terms/Variables:

C_{ss} = swell index
e_o = initial void ratio
γ = unit weight of soil
ΔP = change in overburden pressure
P_o = present overburden pressure
D = depth of excavation
H_i = depth of shale layer

Prep By: MDM
Date: 3/21/2012

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-B
HEAVE ANALYSIS

Chkd By: JLG
Date: 3/23/2012

Based on the laboratory test results included in Appendix IIIJ-C, the material properties of the soil materials to be excavated at the site are:

Alluvial

$\gamma_{a(DRY)} =$ 104.2 pcf
Natural Moisture Content= 20 %
$\gamma_{a(IN\text{-}SITU)} =$ 116.7 pcf

Shale

$\gamma_{S(DRY)} =$ 111.5 pcf
Natural Moisture Content= 17.4 %
$\gamma_{S(IN\text{-}SITU)} =$ 122.4 pcf

$e_o =$ 0.6
$C_{ss} =$ 0.03
$H_i =$ 37 ft

1) Estimate Potential Heave of the Excavation Bottom

The change in loading is due to the excavation of overburden soils.

The maximum depth of excavation is approximately: 76 ft
through 2 soil layers, therefore:

$$\Delta P = D_a \times \gamma_{a(IN\text{-}SITU)} + D_S \times \gamma_{S(IN\text{-}SITU)}$$

$D_a =$ 21 ft
$D_S =$ 55 ft

$\Delta P =$ 9,180 psf

Using the standard consolidation theory:

$$S = C_{ss} H_i \log((P_o - \Delta P) / P_o)$$ (Reference 1)

$$P_o = (H_i/2) \times \gamma_{S(IN\text{-}SITU)} + \Delta P$$

$P_o =$ 11,444 psf
$S =$ -0.78 ft

Projected Heave = -0.78 ft

CAMELOT LANDFILL
1339-35-11
APPENDIX IIIJ-B
LINER STRAIN

Strain Percentage in Liner System

References:

1. Quian, Xuede, R.M. Koerner, D. H. Gray, Geotechnical Aspects of Landfill Design and Construction, Prentice-Hall, Inc., New Jersey, 2002.
2. Koerner, Robert M., Designing with Geosynthetics, Third Edition. Prentice-Hall, New Jersey, 1994.

Required:

Determine the strain percentage in the Subtitle D liner system based on the total settlement between the evaluation points.

Solution:

Strain Equation:

$$Strain = \frac{L_f - L_o}{L_o} x\ 100$$

(Reference 1, Page 472)

L_f= Final distance between evaluation points after total settlement (ft)
L_o= Initial distance between evaluation points before total settlement (ft)

Note: A negative strain value indicates the component is in compression. A positive strain value indicates the component is in tension.

Example Calculation of Strain between Points 1 and 2:

Initial Distance:

Initial Elev. Point 3 = 414.8 ft-msl
Initial Elev. Point 2 = 417.9 ft-msl
Plan View Distance = 609.9 ft
L_o= 609.9079 ft

Final Distance:

Post-Settlement Elev. Point 3 = 416.70 ft-msl
Post-Settlement Elev. Point 2 = 413.70 ft-msl
Plan View Distance = 609.9 ft
L_f= 609.9074 ft

Strain = -0.0001 %

CAMELOT LANDFILL
1339-35-11
APPENDIX IIIJ-B
LINER STRAIN

Evalution Point[1]		Initial Elevation (ft-msl)		Post-Settlement Elevation (ft-msl)		Plan View Distance (ft)	L_o (ft)	L_f (ft)	Strain (%)
A	B	A	B	A	B				
3	2	417.9	414.8	416.7	413.7	609.9	609.9079	609.9074	-0.0001
2	1	414.8	412.0	413.7	411.7	569.6	569.6069	569.6033	-0.0006
6	5	417.9	415.7	416.5	414.4	427.2	427.2057	427.2054	-0.0001
5	4	415.7	412.0	414.4	411.7	744.6	744.6092	744.6047	-0.0006
9	8	418.0	415.8	416.6	414.5	431.9	431.9056	431.9051	-0.0001
8	7	415.8	411.9	414.5	411.6	777.3	777.3098	777.3053	-0.0006
11	10	418.4	416.1	417.0	414.8	457.7	457.7058	457.7055	-0.0001
10	7	416.1	411.9	414.8	411.6	845.1	845.1104	845.1059	-0.0005
14	13	401.5	398.2	400.6	397.3	330.4	330.4165	330.4166	0.0000
13	12	398.2	392.4	397.3	392.0	581.8	581.8289	581.8237	-0.0009
17	16	404.3	398.9	403.6	398.4	532.7	532.7274	532.7262	-0.0002
16	15	398.9	392.3	398.4	391.9	662.9	662.9329	662.9312	-0.0003
19	18	419.2	417.2	418.4	417.0	397.0	397.0050	397.0026	-0.0006
22	21	421.2	418.9	419.8	417.6	463.1	463.1057	463.1052	-0.0001
21	20	418.9	415.1	417.6	414.8	761.2	761.2095	761.2049	-0.0006
25	24	430.1	428.6	428.9	427.7	153.2	153.2078	153.2040	-0.0025
24	23	428.6	421.8	427.7	420.3	658.7	658.7346	658.7416	0.0011
23	9	421.8	418.0	420.3	416.6	325.0	325.0222	325.0215	-0.0002
26	27	419.9	416.7	418.5	415.4	347.0	347.0148	347.0140	-0.0002
29	28	430.0	420.0	428.5	418.6	855.0	855.0585	855.0580	-0.0001

Conclusion:

Strain is acceptable.

- The allowable tensile strain for an HDPE geomembrane is 25 percent (Reference 1, page 94).
- The allowable tensile strain for a drainage geocomposite is more than 20 percent for the geotextile (reference 2, page 112) and 200 percent for the geonet (reference 2, page 400).

  The allowable tensile strain for compacted clay liner is 0.5 percent (Reference 1, page 469).
- The maximum calculated tensile strain (0.0011%) is below the allowable tensile strain for the components of the liner system; therefore, the system will be stable.

APPENDIX IIIJ-B-2

OVERLINER SYSTEM SETTLEMENT AND STRAIN ANALYSES

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER

3-23-12

Includes pages IIIJ-B-2-1 through IIIJ-B-2-25

Prep By: MDM
Date: 3/21/2012

Chkd By: JCG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11-02
APPENDIX IIIJ-B
OVERLINER SYSTEM SETTLEMENT AND STRAIN

Required: Determine the after settlement slope of the overliner system and verify that the strain induced on the overliner system components due to settlement is within acceptable limits. Calculation of the after settlement slope is also used to support the geocomposite design included in Appendix IIIC.

Method:

A. Estimate primary settlement of waste below the overliner system.
B. Estimate secondary settlement of waste below the overliner system.
C. Estimate total settlement of waste below the overliner system.
D. Verify that strain induced on the overliner system components due to settlement is within acceptable limits.
E. Estimate the after settlement slope of the overliner system.

Description of Contents:

- Sheet IIIJ-B-2-2 shows the excavation and overliner plans.
- Sheets IIIJ-B-2-3 through IIIJ-B-2-9 detail the procedure for the settlement calculations.
- Sheets IIIJ-B-2-10 through IIIJ-B-2-12 provide a summary of the settlement calculations for the overliner.
- Sheets IIIJ-B-2-13 and IIIJ-B-2-14 show the before settlement overliner contours with evaluation points and post-settlement overliner contours, respectively.
- Sheet IIIJ-B-2-15 shows the amount of settlement for the overliner at various points.
- Sheets IIIJ-B-2-16 and IIIJ-B-2-17 provide a summary of the settlement calculations for the overliner trench pipes.
- Sheet IIIJ-B-2-18 shows the evaluation points for the overliner trench pipe settlement calculations.
- Sheets IIIJ-B-2-19 and IIIJ-B-2-20 show the overliner trench pipe before and after settlement profiles.
- Sheet IIIJ-B-2-21 provides a summary of the strain calculations.
- Sheet IIIJ-B-2-22 shows the evaluation points for the strain calculations.
- Sheet IIIJ-B-2-23 and IIIJ-B-2-24 provide a summary of the slope calculations.
- Sheet IIIJ-B-2-25 shows a typical profile of the overliner before and after settlement.

References:

1. Sowers, George F., *Settlement of Solid Waste* , Proceedings of the Eighth International Conference on Soil Mechanics and Foundations Engineering, 1973.

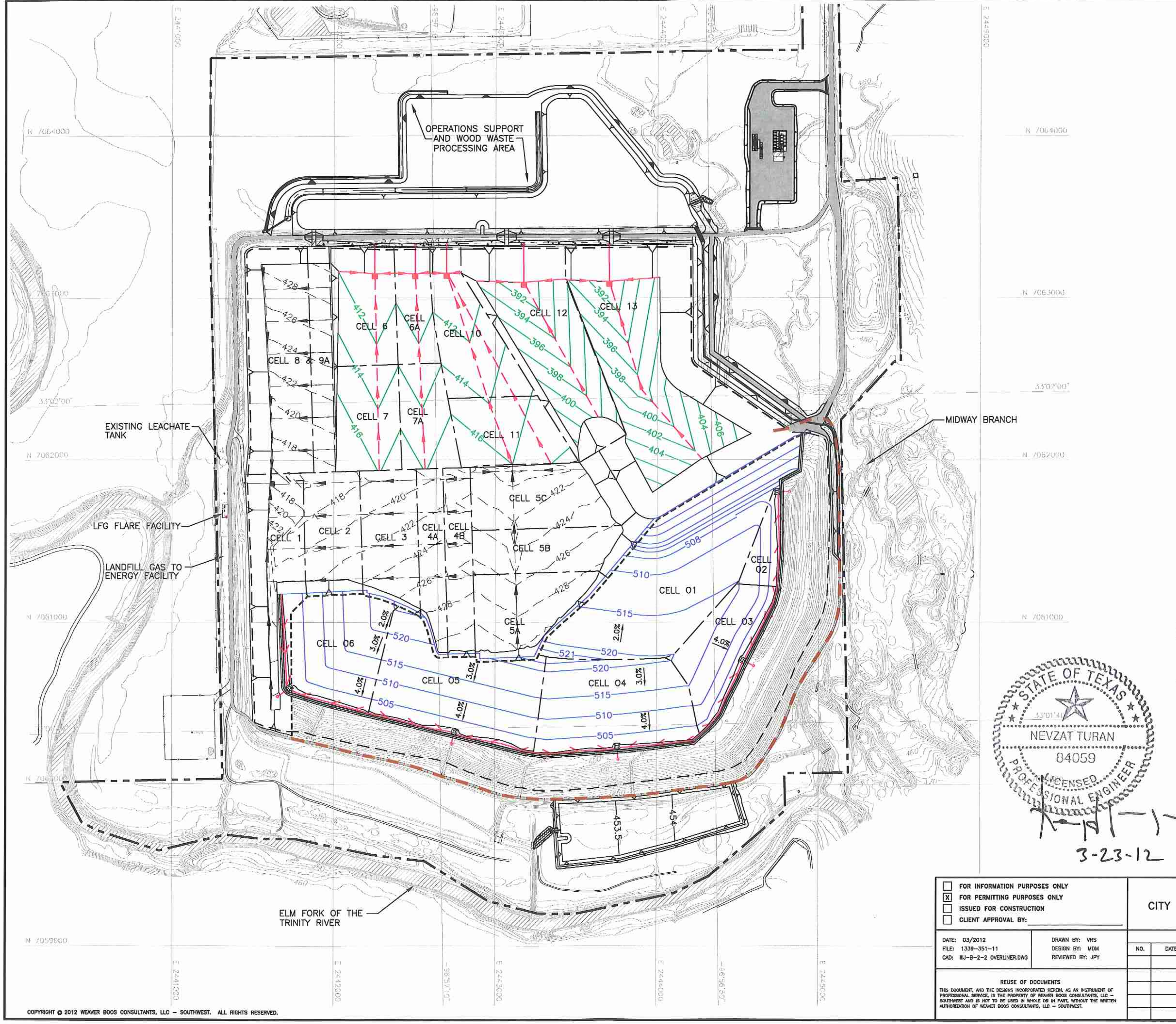
2. Qian, Xuede, R.M. Koerner, D. H. Gray, Geotechnical Aspects of Landfill Design and Construction, Prentice-Hall, Inc., New Jersey, 2002.

3. Koerner, Robert M., Designing with Geosynthetics, Fifth Edition. Prentice-Hall, New Jersey, 2005.

4. Acar, Yalcin B. & Daniel, David E., *Geoenvironment 2000 Characterization, Containment, Remediation, and Performance in Environmental Geotechnics,* Volume 2, American Society of Civil Engineers, 1995.

5. Zornberg, Jorge G., et al., *Retention of Free Liquids in Landfills Undergoing Vertical Expansion,* Journal of Geotechnical and Geoenvironmental Engineering, July 1999.

6. Fassett, Jeffrey B., et al., Geotechnical Properties of Municipal Solid Wastes and Their Use in Landfill Design, Waste Tech, 1994.



0 300 600
SCALE IN FEET

LEGEND

─ ─ · ─ ─	PERMIT BOUNDARY
─ ─ ─ ─	LIMITS OF WASTE
- - - - -	LIMITS OF PRE-SUBTITLE D WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
500	EXISTING CONTOUR
─ ─ ─	CELL BOUNDARY
398	PROPOSED EXCAVATION CONTOUR
─ ◄ ─	PROPOSED LEACHATE LINE
■	PROPOSED LEACHATE COLLECTION SUMP
─●	PROPOSED LEACHATE RISER
422	AS-BUILT TOP OF SUBTITLE D CLAY LINER
─ ◄ ─	EXISTING LEACHATE LINE
■	EXISTING LEACHATE COLLECTION SUMP
─○	EXISTING LEACHATE RISER
515	PROPOSED TOP OF OVERLINER CONTOUR
─►─►	PROPOSED OVERLINER LEACHATE LINE
▣	PROPOSED OVERLINER LEACHATE COLLECTION SUMP
Y Y Y	3H:1V SLOPE (TYPICAL)
─ · ─ · ─	APPROXIMATE LOCATION OF PROPOSED SLURRY WALL

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

NEVZAT TURAN
84059

3-23-12

O:\1339\351\EXPANSION 2009\PART III-SDP\III\III-B\IIIJ-B-2-2 OVERLINER PLAN.dwg, sford, 1:2

☐ FOR INFORMATION PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

DATE: 03/2012
FILE: 1339-351-11
CAD: IIIJ-B-2-2 OVERLINER.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

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PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
TOP OF OVERLINER PLAN

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
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GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

SHEET IIIJ-B-2-2

Solution:

A) Estimate primary settlement of waste below the overliner system.

MSW below the overliner system will undergo primary consolidation due to its own weight, the weight of MSW placed in the pre-Subtitle D area above the overliner system, the overliner and final cover, equipment, etc. Primary consolidation occurs quickly, generally within the first month after loading. Therefore, the weight of the MSW placed above the overliner system, the overliner system, and the final cover system are the main factors that contribute to primary consolidation.

Primary settlement is calculated using the following equation:

$$S_p = \frac{H_o C_c}{1+e_o} \log\left(\frac{\sigma'_o + \Delta\sigma}{\sigma'_o}\right)$$

S_p = primary settlement, ft
H_o = waste thickness below the overliner system, ft
C_c = compression index
e_o = average void ratio of the waste layer below overliner before settlement (i.e., before waste/cover soils are placed above the overliner)
$\Delta\sigma$ = change in loading/increase in overburden pressure, psf
σ'_o = overburden pressure acting at mid-height of refuse below the overliner, psf

For this site assume: $C_c =$ 0.25 x e_o (Ref. 1, p. 210)

The compression index is a function of the void ratio. The compression index can range from C_c=0.15e_o to C_c=0.55e_o for fills that are low and high in organic content, respectively. A value of 0.25 was chosen because it is consistent with the types of waste accepted in the past. It is also representative of the minimal settlement experienced at the site in the pre-Subtitle D area.

The average void ratio of waste below the overliner is estimated by determining the void ratio at the midpoint of the waste column below the overliner. The void ratio is calculated for each settlement evaluation point using the following equation.

$e_o = 1.86 - 0.00102\,\sigma'_o$ (Ref. 5, p. 590)

where: σ'_o = overburden pressure in kPa

$\sigma'_o = 0.5\,\gamma_{mswb}\,H_o$
$\Delta\sigma = \gamma_{cov}\,T_c + \gamma_{mswa}\,T_{waste} + \gamma_{cov}\,T_p + \gamma_{cov}\,T_s$
γ_{mswb} = unit weight of waste below the overliner system, pcf
γ_{mswa} = unit weight of waste above the overliner system, pcf
γ_{cov} = unit weight of cover (for final cover, overliner protective cover, overliner subgrade), pcf
T_{waste} = waste thickness between the final cover system and the overliner system, ft
T_c = thickness of final cover system, ft
T_p = thickness of overliner protective cover, ft
T_s = thickness of soil subgrade for overliner, ft

Parameters:

γ_{cov} = 120 pcf
T_c = 3.5 ft
T_p = 2.0 ft
T_s = 1.0 ft
γ_{mswb} = varies (see note below)
γ_{mswa} = varies (see note below)

Note: γ_{mswb} and γ_{mswa} are selected based on the midpoint of the waste thicknesses lying below and above the overliner system, respectively, using the Unit Weight Profile for Waste/Daily Cover within an MSW Landfill chart from Ref. 4.

The settlement points analyzed are shown on Sheets IIIJ-B-2-13 and IIIJ-B-2-18. An example calculation of the estimated primary settlement is shown below for Evaluation Points 73 and 55 for the overliner. The estimated primary settlement for all evaluation points is shown on Sheets IIIJ-B-2-10 through IIIJ-B-2-12 (overliner), and Sheets IIIJ-B-2-16 and IIIJ-B-2-17 (overliner trench pipes).

At Evaluation Point 73:

Top of Waste Elev. (ft-msl) = 641.4
Top of Overliner Protective Cover Elev. (ft-msl) = 522.4
Top of Waste Below Overliner Elev. (ft-msl) = 519.4
Bottom of Waste Elev. (ft-msl) = 435.8

H_o = Top of Waste Below Overliner Elev. - Bottom of Waste Elev.
= 83.6 ft
γ_{mswb} = 54.2 pcf

T_{waste} = Top of Waste Elev. - Top of Overliner Protective Cover Elev.
= 119.0 ft
γ_{mswa} = 59.1 pcf

$\sigma'_o = 0.5\ \gamma_{mswb}\ H_o$
σ'_o = 2265.5 psf
σ'_o = 108.5 kPa

$e_o = 1.86 - 0.00102\ \sigma'_o$
e_o = 1.75

$C_c = 0.25\ e_o$
C_c = 0.44

$\Delta\sigma$ = 7818.0 psf

$$S_p = \frac{83.6 \times 0.44}{1 + 1.75} \log \frac{2265.5 + 7818.0}{2265.5}$$

S_p = 8.6 ft

At Evaluation Point 55:

Top of Waste Elev. (ft-msl) = 701.1
Top of Overliner Protective Cover Elev. (ft-msl) = 510.6
Top of Waste Below Overliner Elev. (ft-msl) = 507.6
Bottom of Waste Elev. (ft-msl) = 438.7

H_o = Top of Waste Below Overliner Elev. - Bottom of Waste Elev.
= 68.8 ft
γ_{mswb} = 51.8 pcf

T_{waste} = Top of Waste Elev. - Top of Overliner Protective Cover Elev.
= 190.6 ft
γ_{mswa} = 69.5 pcf

$\sigma'_o = 0.5\ \gamma_{mswb}\ H_o$
σ'_o = 1783.6 psf
σ'_o = 85.4 kPa

$e_o = 1.86 - 0.00102\ \sigma'_o$
e_o = 1.77

C_c = 0.25 e_o
C_c = 0.44

$\Delta\sigma$ = 14028.5 psf

$$S_p = \frac{68.8 \times 0.44}{1 + 1.77} \log \frac{1783.6 + 14127.3}{1783.6}$$

S_p = 10.4 ft

B) Estimate secondary settlement of waste below the overliner system.

Secondary consolidation continues at substantial rates for periods of time well beyond primary settlement. It is a combination of mechanical secondary compression, physico-chemical reaction, and bio-chemical decay. Secondary settlement is calculated using the following expression:

$$S_c = \frac{H'_o\ \alpha}{1 + e'_o} \log (t_2/t_1)$$ (Ref. 2, p. 451)

Parameters:

S_c = secondary settlement, ft
α = secondary compression index
e'_o = average void ratio of waste layer below the overliner after primary settlement has occurred
H'_o = waste thickness between the overliner system and the bottom of waste after primary settlement, ft
t_1 = starting time of secondary settlement in years
t_2 = time at which settlement is determined in years

For this site assume: $\alpha =$ 0.06 x e'_o (Ref. 1, p. 210)

As reported by Sowers (Ref. 1), the secondary compression index is used to estimate waste decomposition. The secondary compression index ranges from $\alpha = 0.03e'_o$ to $\alpha = 0.09e'_o$ for conditions that are unfavorable and favorable to decay, respectively. An average secondary compression index value was chosen because it is consistent with the types of waste accepted in the past. It is also representative of the minimal amount of settlement the site has experienced in the pre-Subtitle D area.

The void ratio below the overliner at closure is a function of the overburden pressure caused by waste/cover soil, and the final cover system located above the overliner. The void ratio is calculated for each settlement evaluation point using the following equation.

$$e'_o = 1.86 - 0.00102\,\sigma''_o$$ (Ref. 5, p. 590)

where: σ''_o = overburden pressure in kPa

$\sigma''_o = 0.5\,\gamma'_{mswb}\,H'_o$

γ'_{mswb} = unit weight of waste below the overliner after primary settlement has occurred, pcf

For this site, the void ratio after primary settlement for the waste/cover soils below the overliner varies between 1.8 to 1.9. Therefore, the secondary compression index will range between 0.10 to 0.11. Most literature sources report the secondary compression index in terms of the "modified secondary compression index" (Refs. 2, 6). The modified secondary compression index is defined by the following.

$$C'_\alpha = \frac{\alpha}{1 + e'_o}$$

The secondary compression index calculated for this site translates to a modified secondary compression index of 0.04 (for a void ratio of 1.8 to 1.9). These values are consistent with reported values for the modified secondary compression index which vary from 0.03 to 0.1 (Refs. 2, 6).

Time frame used for this analysis:

$t_1 =$ 0.083 years
$t_2 =$ 60 years (see note below)

The site life calculated in Appendix IIIN is 29.3 years. However, as shown in Parts I/II, Appendix I/IIA, the overliner will be the last portion of the site developed. The waste filling on top of the overliner will likely be around 10 years.However, to provide a conservative approach, the time at which settlement is calculated was chosen to be 60 years. This assumes filling over the overliner for 30 years plus 30 years for the postclosure period.

An example calculation of the estimated secondary settlement using the above secondary settlement period is shown below for Evaluation Points 73 and 55. The estimated secondary settlement for all evaluation points is shown on Sheets IIIJ-B-2-10 through IIIJ-B-2-12 (overliner), and Sheets IIIJ-B-2-16 and IIIJ-B-2-17 (overliner trench pipe).

At Evaluation Point 73:

$H'_o = H_o - S_p$

$H_o' =$ 75.0 ft

$\sigma''_o = 0.5\ \gamma'_{mswb}\ H'_o$

$\gamma'_{mswb} =$ 67.9 pcf

$\sigma''_o =$ 2545.7 psf

$\sigma''_o =$ 121.9 kPa

$e'_o = 1.86 - 0.00102\ \sigma''_o$

$e'_o =$ 1.74

$\alpha = 0.06\ e'_o$

$\alpha =$ 0.10

$$S_c = \frac{H'_o\ \alpha}{1 + e'_o} \log (t_2/t_1)$$

$$S_c = \frac{0 \text{ x } 0.11}{1 + 1.86} \log (60/0.083)$$

$S_c =$ 8.2 ft

At Evaluation Point 55:

$H'_o = H_o - S_p$

$H_o' =$ 58.4 ft

$\sigma''_o = 0.5\ \gamma'_{mswb}\ H'_o$

$\gamma\ '_{mswb} =$ 55.1 pcf

$\sigma''_o =$ 1608.6 psf

$\sigma''_o =$ 77.0 kPa

$e'_o = 1.86 - 0.00102\ \sigma''_o$

$e'_o =$ 1.78

$\alpha = 0.06\ e'_o$

$\alpha =$ 0.11

$$S_c = \frac{H'_o\ \alpha}{1 + e'_o} \log (t_2/t_1)$$

$$S_c = \frac{66.2 \text{ x } 0.11}{1+1.78} \log (60.0/0.083)$$

$S_c =$ 6.4 ft

C) Estimate total settlement of waste below the overliner system.

Total settlement is the combination of primary, and secondary settlement. An example calculation of the estimated total settlement is shown below for Evaluation Points 73 and 55. The estimated total settlement for all evaluation points is shown on pages IIIJ-B-2-10 through IIIJ-B-2-12 (overliner) and Sheets IIIJ-B-2-16 through IIIJ-B-2-17 (overliner trench pipe).

At Evaluation Point 73:			
Thickness of waste column	Primary Settlement =	8.6	ft
below overliner, ft = 83.6	Secondary Settlement =	8.2	ft
	Total Settlement =	16.8	ft
At Evaluation Point 55:			
Thickness of waste column	Primary Settlement =	10.4	ft
below overliner, ft = 68.8	Secondary Settlement =	6.4	ft
	Total Settlement =	16.8	ft

D) Verify that strain induced on the overliner system components due to settlement is within acceptable limits.

Determine the after settlement slope of the overliner system and verify the strain induced on the overliner system components due to settlement is within acceptable limits.

$$\text{Strain} = \frac{L_f - L_o}{L_o} \text{x} 100$$

(Ref. 2, p. 472)

L_f = Final distance between evaluation points after total settlement (ft)

L_o = Initial distance between evaluation points before total settlement (ft)

An example calculation of the estimated strain is shown below for Evaluation Points S1 and S2 for the overliner. The estimated strain for select evaluation points is shown on page IIIJ-B-2-21. The evaluation points are shown on Sheet IIIJ-B-2-22.

Initial Distance:

Evaluation Point S1 Elev. =	522.9	ft-msl
Evaluation Point S2 Elev. =	498.4	ft-msl
Plan View Distance =	696.8	ft
L_o =	697.19	ft

Final Distance (after settlement):

Evaluation Point S1 Elev. =	505.2	ft-msl
Evaluation Point S2 Elev. =	489.4	ft-msl
Plan View Distance =	696.8	ft
L_f =	696.94	ft

$$\text{Strain} = \frac{697.19 - 696.94}{697.19} \times 100$$

Strain = -0.036 %

The allowable tensile strain for the overliner system components are listed below.

- Geotextile - 20 % (Reference 3, page 111)
- Geonet - 200% (Reference 3, page 401)
- GCL - 10% (Reference 3, page 645)

As shown on page IIIJ-B-2-21, the estimated strain between select points ranges from -0.873% to -0.001%. The estimated strain values are acceptable and the system will be stable. Note that a negative strain value indicates that the component is in compression.

E) Estimate the after settlement slope of the overliner.

Determine the after settlement slope of the overliner system.

An example calculation of the estimated after settlement slope is shown below for Evaluation Points S1 and S2 for the overliner. Evaluation points are shown on Sheet IIIJ-B-2-22.

Prior to Settlement:

Evaluation Point S1 Elev. =	522.9	ft-msl
Evaluation Point S2 Elev. =	498.4	ft-msl
Plan View Distance =	696.8	ft
Initial Slope =	3.5	%

After Settlement:

Evaluation Point S1 Elev. =	505.2	ft-msl
Evaluation Point S2 Elev. =	489.4	ft-msl
Plan View Distance =	696.8	ft
After settlement Slope =	2.27	%

Post-settlement slope calculations are provided for select evaluations points, including all trench pipes, on Sheets IIIJ-B-2-23 and IIIJ-B-2-24.

Prep By: MDM
Date: 3/21/2012

Chkd By: JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11-02
APPENDIX IIIJ-B
OVERLINER SYSTEM SETTLEMENT SUMMARY

Evaluation Point	Top of Waste Elevation (ft-msl)	Initial Top of Overliner Elevation (ft-msl)	Initial Top of Waste Below Overliner Elevation (ft-msl)	Bottom of Waste Elevation (ft-msl)	H_o (ft)	T_{waste} (ft)	γ_{mswb} (pcf)	γ_{mswa} (pcf)	σ'_o (psf)	$\Delta\sigma$ (psf)	e_o	C_c	S_p (ft)	H'_o (ft)	γ'_{mswb} (pcf)	σ''_o (psf)	e'_o	α	S_s (ft)	Total Settlement (ft)	Post-Settlement Top of Overliner Elevation (ft-msl)	Post-Settlement Top of Waste Below Overliner Elevation (ft-msl)
1	509.6	498.2	497.2	427.7	69.4	9.5	52.1	43.2	1808.6	1189.0	1.77	0.44	2.4	67.0	54.5	1824.6	1.77	0.11	7.3	9.8	488.4	487.4
2	555.8	507.4	506.4	439.1	67.4	46.3	51.8	48.0	1744.9	3005.7	1.77	0.44	4.7	62.7	64.7	2026.2	1.76	0.11	6.9	11.5	495.9	494.9
3	603.1	515.0	514.0	437.8	76.2	86.1	53.0	54.5	2019.5	5470.5	1.76	0.44	6.9	69.3	75.3	2607.4	1.73	0.10	7.5	14.5	500.5	499.5
4	636.3	519.0	518.0	436.7	81.3	115.3	53.9	58.9	2189.9	7564.8	1.75	0.44	8.4	72.9	79.3	2890.9	1.72	0.10	7.9	16.3	502.7	501.7
5	680.2	522.9	521.9	440.9	81.0	155.3	53.6	64.7	2170.0	10823.7	1.75	0.44	10.0	71.0	80.9	2871.2	1.72	0.10	7.7	17.7	505.2	504.2
6	673.0	523.0	522.0	439.8	82.2	148.0	53.9	63.4	2213.5	10170.1	1.75	0.44	9.8	72.4	80.8	2923.1	1.72	0.10	7.8	17.6	505.3	504.3
7	513.1	498.7	497.7	436.4	61.3	12.4	50.9	43.4	1561.5	1319.0	1.78	0.45	2.6	58.7	54.2	1590.7	1.78	0.11	6.5	9.1	489.6	488.6
8	570.7	509.7	508.7	439.8	68.8	59.1	51.8	50.6	1783.5	3771.6	1.77	0.44	5.4	63.4	68.4	2170.0	1.75	0.11	6.9	12.4	497.3	496.3
9	620.7	517.0	516.0	439.6	76.4	101.7	53.0	56.9	2024.5	6564.4	1.76	0.44	7.6	68.8	77.5	2663.5	1.73	0.10	7.5	15.1	501.9	500.9
10	643.5	520.6	519.6	439.1	80.5	120.9	53.6	59.4	2157.1	7964.4	1.75	0.44	8.6	71.9	79.7	2863.8	1.72	0.10	7.8	16.4	504.2	503.2
11	647.2	520.9	519.9	439.3	80.6	124.3	53.6	60.0	2160.4	8239.0	1.75	0.44	8.8	71.9	79.9	2870.5	1.72	0.10	7.8	16.6	504.3	503.3
12	618.1	517.9	516.9	437.8	79.0	98.3	53.6	56.3	2117.3	6308.1	1.76	0.44	7.6	71.5	77.3	2760.7	1.73	0.10	7.8	15.3	502.6	501.6
13	623.5	518.5	517.5	439.4	78.1	103.0	53.3	56.9	2082.3	6635.1	1.76	0.44	7.7	70.4	77.7	2736.3	1.73	0.10	7.6	15.4	503.1	502.1
14	634.0	519.8	518.8	439.4	79.4	112.2	53.6	58.3	2127.7	7320.7	1.76	0.44	8.2	71.2	79.0	2811.6	1.72	0.10	7.7	15.9	503.8	502.8
15	628.8	519.1	518.1	437.7	80.4	107.6	53.6	57.7	2154.2	6989.5	1.75	0.44	8.0	72.4	78.5	2839.2	1.72	0.10	7.9	15.9	503.3	502.3
16	642.3	520.5	519.5	437.4	82.1	119.8	53.9	59.4	2212.6	7899.6	1.75	0.44	8.6	73.5	79.7	2927.5	1.72	0.10	8.0	16.6	503.9	502.9
17	659.3	521.8	520.8	448.6	72.2	135.5	52.4	61.6	1893.0	9130.8	1.77	0.44	8.8	63.4	80.2	2542.4	1.74	0.10	6.9	15.7	506.1	505.1
18	516.2	499.1	498.1	437.5	60.6	15.1	50.6	44.0	1534.6	1442.0	1.79	0.45	2.8	57.8	54.8	1583.8	1.78	0.11	6.4	9.1	490.0	489.0
19	567.4	509.3	508.3	438.4	69.9	56.1	52.1	49.9	1822.2	3578.9	1.77	0.44	5.3	64.7	67.6	2185.3	1.75	0.11	7.1	12.3	497.0	496.0
20	583.0	513.2	512.2	437.8	74.4	67.8	52.7	51.8	1960.8	4294.7	1.76	0.44	6.0	68.4	71.3	2440.6	1.74	0.10	7.5	13.4	499.8	498.8
21	594.9	515.1	514.1	437.2	76.9	77.8	53.0	53.3	2037.4	4927.0	1.76	0.44	6.5	70.3	73.8	2594.7	1.73	0.10	7.7	14.2	500.9	499.9
22	606.7	516.5	515.5	437.5	78.0	88.2	53.3	54.8	2079.6	5613.4	1.76	0.44	7.1	71.0	75.8	2689.1	1.73	0.10	7.7	14.8	501.7	500.7
23	517.3	500.7	499.7	441.9	57.7	14.6	50.3	43.7	1450.4	1419.2	1.79	0.45	2.7	55.0	54.2	1489.4	1.79	0.11	6.0	8.8	491.9	490.9
24	514.4	499.2	498.2	437.2	61.0	13.2	50.6	43.7	1543.2	1356.9	1.78	0.45	2.7	58.3	54.2	1579.1	1.78	0.11	6.4	9.1	490.1	489.1
25	534.4	505.4	504.4	437.4	67.1	26.9	51.8	45.2	1737.2	1996.6	1.78	0.44	3.6	63.5	59.1	1877.7	1.77	0.11	7.0	10.5	494.9	493.9
26	546.3	507.3	506.3	436.0	70.3	37.0	52.1	46.4	1832.9	2496.5	1.77	0.44	4.2	66.1	62.2	2056.8	1.76	0.11	7.2	11.4	495.9	494.9
27	558.2	509.2	508.2	436.6	71.7	46.9	52.4	48.0	1877.8	3034.5	1.77	0.44	4.8	66.9	65.3	2183.6	1.75	0.11	7.3	12.1	497.1	496.1
28	570.0	511.1	510.1	437.2	72.9	56.9	52.4	49.9	1911.1	3617.9	1.77	0.44	5.4	67.6	68.4	2312.1	1.75	0.10	7.4	12.7	498.4	497.4
29	581.9	513.0	512.0	437.1	74.9	66.8	52.7	51.5	1975.0	4223.3	1.76	0.44	5.9	69.0	71.1	2452.3	1.74	0.10	7.5	13.5	499.6	498.6
30	593.7	514.9	513.9	436.8	77.2	76.8	53.3	53.0	2056.2	4850.8	1.76	0.44	6.5	70.7	73.6	2601.1	1.73	0.10	7.7	14.2	500.8	499.8
31	511.3	498.1	497.1	437.2	59.8	11.2	50.6	43.4	1514.9	1266.0	1.79	0.45	2.5	57.3	53.6	1535.7	1.78	0.11	6.3	8.8	489.3	488.3
32	507.5	495.8	494.8	435.9	58.9	9.7	50.3	43.2	1479.0	1199.2	1.79	0.45	2.4	56.4	53.0	1495.1	1.79	0.11	6.2	8.6	487.2	486.2
33	504.9	493.9	492.9	436.0	56.9	9.0	49.9	43.0	1418.6	1164.7	1.79	0.45	2.4	54.5	52.4	1428.0	1.79	0.11	6.0	8.4	485.5	484.5
34	514.1	498.5	497.5	436.3	61.1	13.6	50.9	43.7	1556.4	1375.9	1.78	0.45	2.7	58.4	54.5	1591.7	1.78	0.11	6.4	9.1	489.3	488.3
35	533.3	505.2	504.2	436.4	67.9	26.0	51.8	45.2	1758.6	1956.3	1.77	0.44	3.5	64.4	58.9	1893.7	1.77	0.11	7.1	10.6	494.7	493.7
36	545.2	507.1	506.1	436.1	70.0	36.0	52.1	46.4	1825.0	2452.8	1.77	0.44	4.1	65.9	61.9	2040.5	1.76	0.11	7.2	11.3	495.8	494.8
37	514.8	500.3	499.3	436.1	63.2	12.5	51.2	43.4	1617.4	1324.1	1.78	0.45	2.6	60.5	54.5	1648.7	1.78	0.11	6.6	9.3	491.0	490.0
38	514.1	502.0	501.0	435.2	65.8	10.1	51.5	43.2	1695.8	1217.5	1.78	0.44	2.5	63.4	54.2	1716.6	1.78	0.11	7.0	9.4	492.6	491.6
39	669.8	520.9	519.9	441.8	78.1	146.8	53.3	63.1	2081.2	10047.7	1.76	0.44	9.5	68.6	80.7	2768.3	1.72	0.10	7.4	17.0	504.0	503.0
40	698.2	518.1	517.1	438.3	78.8	178.1	53.3	67.9	2100.7	12872.1	1.76	0.44	10.7	68.1	81.3	2767.5	1.72	0.10	7.4	18.1	500.0	499.0
41	702.3	515.5	514.5	440.6	73.9	184.8	52.7	68.7	1946.9	13474.1	1.76	0.44	10.6	63.3	81.3	2573.6	1.73	0.10	6.9	17.5	498.0	497.0
42	705.0	513.8	512.8	443.7	69.1	189.2	52.1	69.5	1800.4	13933.9	1.77	0.44	10.4	58.7	81.4	2389.3	1.74	0.10	6.4	16.8	497.0	496.0
43	707.0	510.5	509.5	447.2	62.3	194.5	50.9	70.0	1585.6	14399.5	1.78	0.45	10.0	52.3	81.4	2128.2	1.76	0.11	5.7	15.7	494.8	493.8
44	705.9	508.0	507.0	451.8	55.2	195.9	49.9	70.3	1377.6	14561.8	1.79	0.45	9.4	45.8	81.4	1864.3	1.77	0.11	5.0	14.4	493.6	492.6
45	699.7	470.3	469.3	458.0	11.3	227.4	43.4	74.0	245.5	17598.7	1.85	0.46	3.4	7.9	81.6	322.0	1.84	0.11	0.9	4.3	466.0	465.0
46	692.2	460.0	459.0	456.4	2.6	230.2	42.2	74.2	55.2	17859.1	1.86	0.46	1.1	1.5	81.6	63.2	1.86	0.11	0.2	1.2	458.8	457.8
47	636.5	460.0	459.0	459.0	0.0	174.5	42.0	67.3	0.0	12529.7	1.86	0.47	0.0	0.0	80.5	0.0	1.86	0.11	0.0	0.0	460.0	459.0
48	604.2	460.0	459.0	458.9	0.1	142.2	42.0	62.5	1.3	9664.0	1.86	0.46	0.0	0.0	78.2	0.9	1.86	0.11	0.0	0.0	460.0	459.0
49	550.8	460.0	459.0	459.0	0.0	88.8	42.0	54.8	0.0	5646.4	1.86	0.47	0.0	0.0	67.9	0.0	1.86	0.11	0.0	0.0	460.0	459.0

OVERLINER SYSTEM SETTLEMENT SUMMARY

Evaluation Point	Top of Waste Elevation (ft-msl)	Initial Top of Overliner Elevation (ft-msl)	Initial Top of Waste Below Overliner Elevation (ft-msl)	Bottom of Waste Elevation (ft-msl)	H_o (ft)	T_{waste} (ft)	γ_{mswb} (pcf)	γ_{mswa} (pcf)	σ'_o (psf)	$\Delta\sigma$ (psf)	e_o	C_c	S_p (ft)	H'_o (ft)	γ'_{mswb} (pcf)	σ''_o (psf)	e'_o	α	S_e (ft)	Total Settlement (ft)	Post-Settlement Top of Overliner Elevation (ft-msl)	Post-Settlement Top of Waste Below Overliner Elevation (ft-msl)
50	497.7	460.0	459.0	459.0	0.0	35.7	42.0	46.4	0.0	2437.9	1.86	0.47	0.0	0.0	52.4	0.0	1.86	0.11	0.0	0.0	460.0	459.0
51	469.3	460.0	459.0	459.0	0.0	7.3	42.0	43.0	0.0	1093.7	1.86	0.47	0.0	0.0	43.7	0.0	1.86	0.11	0.0	0.0	460.0	459.0
52	657.5	521.7	520.7	437.2	83.5	133.8	54.2	61.4	2263.3	8992.0	1.75	0.44	9.3	74.3	80.4	2985.1	1.71	0.10	8.0	17.3	504.4	503.4
53	697.8	517.6	516.6	436.8	79.8	178.2	53.6	67.9	2137.0	12880.1	1.76	0.44	10.8	69.0	81.3	2804.5	1.72	0.10	7.5	18.2	499.4	498.4
54	704.4	513.1	512.1	438.0	74.1	189.3	52.7	69.5	1951.8	13942.8	1.76	0.44	10.8	63.3	81.4	2577.8	1.73	0.10	6.9	17.7	495.4	494.4
55	701.1	508.6	507.6	438.7	68.8	190.6	51.8	69.5	1783.6	14028.5	1.77	0.44	10.4	58.4	81.4	2377.8	1.74	0.10	6.4	16.8	491.8	490.8
56	671.5	486.6	485.6	438.9	46.7	182.9	48.0	68.4	1121.0	13300.9	1.81	0.45	8.3	38.3	81.1	1555.0	1.78	0.11	4.2	12.5	474.0	473.0
57	570.7	491.3	490.3	438.2	52.1	77.4	49.1	53.3	1280.9	4904.9	1.80	0.45	5.7	46.4	71.1	1648.9	1.78	0.11	5.1	10.8	480.5	479.5
58	514.3	476.3	475.3	438.1	37.2	36.0	46.7	46.4	867.2	2451.3	1.82	0.45	3.5	33.7	57.4	966.5	1.81	0.11	3.7	7.2	469.1	468.1
59	656.7	521.0	520.0	436.3	83.7	133.7	54.2	61.4	2267.2	8984.5	1.75	0.44	9.3	74.4	80.4	2990.7	1.71	0.10	8.1	17.3	503.7	502.7
60	696.2	517.0	516.0	436.9	79.1	177.2	53.6	67.9	2119.1	12808.7	1.76	0.44	10.7	68.4	81.3	2779.1	1.72	0.10	7.4	18.1	498.9	497.9
61	695.2	512.5	511.5	438.0	73.5	180.7	52.7	68.2	1937.2	13097.9	1.77	0.44	10.4	63.1	81.3	2562.6	1.73	0.10	6.9	17.3	495.2	494.2
62	670.8	509.3	508.3	438.4	69.9	159.5	52.1	65.3	1822.4	11192.8	1.77	0.44	9.5	60.4	80.9	2444.1	1.74	0.10	6.6	16.1	493.2	492.2
63	621.5	506.8	505.8	438.3	67.5	112.7	51.8	58.3	1748.8	7349.5	1.77	0.44	7.7	59.8	78.4	2342.2	1.75	0.10	6.5	14.2	492.6	491.6
64	518.4	502.0	501.0	437.0	64.0	14.4	51.2	43.7	1638.8	1408.1	1.78	0.44	2.8	61.2	55.1	1686.1	1.78	0.11	6.7	9.5	492.5	491.5
65	509.1	500.0	499.0	437.2	61.8	7.1	50.9	43.0	1573.4	1086.3	1.78	0.45	2.3	59.5	52.7	1568.8	1.78	0.11	6.5	8.8	491.2	490.2
66	491.8	489.8	488.8	436.8	52.0	0.0	49.1	42.0	1278.4	780.1	1.80	0.45	1.7	50.3	48.8	1226.6	1.80	0.11	5.5	7.3	482.5	481.5
67	646.3	520.8	519.8	436.2	83.7	123.5	54.2	60.0	2266.4	8190.8	1.75	0.44	8.8	74.8	79.9	2989.9	1.71	0.10	8.1	16.9	503.9	502.9
68	674.5	516.5	515.5	436.9	78.6	155.9	53.3	64.7	2095.5	10863.8	1.76	0.44	9.9	68.7	80.9	2780.7	1.72	0.10	7.5	17.4	499.2	498.2
69	651.3	513.0	512.0	437.7	74.4	136.3	52.7	61.6	1959.6	9178.3	1.76	0.44	9.0	65.4	80.3	2626.0	1.73	0.10	7.1	16.1	497.0	496.0
70	620.8	511.3	510.3	437.8	72.5	107.5	52.4	57.7	1899.0	6985.0	1.77	0.44	7.8	64.7	78.0	2524.0	1.74	0.10	7.0	14.8	496.5	495.5
71	571.5	509.8	508.8	437.3	71.5	59.7	52.4	50.6	1872.5	3802.0	1.77	0.44	5.5	66.0	69.0	2275.8	1.75	0.10	7.2	12.7	497.1	496.1
72	516.3	502.2	501.2	436.1	65.0	12.1	51.5	43.4	1675.6	1306.1	1.78	0.44	2.6	62.4	54.5	1701.0	1.78	0.11	6.9	9.5	492.7	491.7
73	641.4	520.4	519.4	435.8	83.6	119.0	54.2	59.1	2265.5	7818.0	1.75	0.44	8.6	75.0	79.6	2984.6	1.71	0.10	8.1	16.8	503.6	502.6
74	629.0	516.9	515.9	436.5	79.5	110.0	53.6	58.0	2129.7	7162.0	1.76	0.44	8.1	71.4	78.7	2808.9	1.72	0.10	7.7	15.8	501.1	500.1
75	608.9	514.8	513.8	436.9	77.0	92.1	53.0	55.4	2039.6	5879.3	1.76	0.44	7.2	69.7	76.3	2659.1	1.73	0.10	7.6	14.8	500.0	499.0
76	570.9	513.3	512.3	436.6	75.7	55.6	53.0	49.9	2005.5	3552.8	1.76	0.44	5.3	70.3	68.4	2407.1	1.74	0.10	7.7	13.0	500.3	499.3
77	513.4	501.3	500.3	435.2	65.1	10.2	51.5	43.2	1676.2	1219.4	1.78	0.44	2.5	62.6	53.9	1686.7	1.78	0.11	6.9	9.3	491.9	490.9
78	603.2	516.1	515.1	436.3	78.7	85.1	53.3	54.5	2098.3	5418.4	1.76	0.44	7.0	71.8	75.3	2701.3	1.73	0.10	7.8	14.8	501.3	500.3
79	599.8	515.7	514.7	435.9	78.8	82.1	53.3	53.9	2099.7	5205.2	1.76	0.44	6.8	72.0	74.7	2690.5	1.73	0.10	7.8	14.6	501.1	500.1
80	596.4	515.3	514.3	435.2	79.0	79.2	53.6	53.6	2117.6	5023.2	1.76	0.44	6.6	72.4	74.2	2684.8	1.73	0.10	7.9	14.5	500.7	499.7
81	591.6	514.6	513.6	434.6	79.0	75.1	53.3	53.0	2104.4	4758.0	1.76	0.44	6.5	72.5	73.4	2661.4	1.73	0.10	7.9	14.3	500.2	499.2
82	608.2	518.9	517.9	435.2	82.7	87.3	53.9	54.8	2228.8	5564.5	1.75	0.44	7.2	75.6	75.9	2868.5	1.72	0.10	8.2	15.4	503.5	502.5
83	583.5	516.0	515.0	435.8	79.3	65.5	53.6	51.5	2123.8	4155.5	1.76	0.44	5.9	73.3	71.3	2614.9	1.73	0.10	8.0	13.9	502.1	501.1
84	565.1	513.5	512.5	435.7	76.8	49.6	53.0	48.8	2034.1	3198.8	1.76	0.44	5.0	71.7	66.7	2393.9	1.74	0.10	7.8	12.8	500.7	499.7
85	512.3	501.0	500.0	434.4	65.6	9.3	51.5	43.2	1690.5	1181.6	1.78	0.44	2.4	63.2	53.9	1703.2	1.78	0.11	6.9	9.4	491.7	490.7
86	582.1	513.6	512.6	433.9	78.7	66.5	53.3	51.5	2096.3	4206.2	1.76	0.44	6.0	72.7	71.6	2600.0	1.73	0.10	7.9	13.9	499.7	498.7
87	562.7	512.9	511.9	434.4	77.5	47.8	53.3	48.4	2064.8	3095.0	1.76	0.44	4.9	72.6	66.4	2410.9	1.74	0.10	7.9	12.8	500.1	499.1
88	539.8	508.6	507.6	434.6	73.0	29.2	52.4	45.7	1911.9	2115.4	1.77	0.44	3.8	69.2	60.6	2095.1	1.76	0.11	7.6	11.3	497.3	496.3
89	515.2	501.8	500.8	434.0	66.7	11.5	51.5	43.4	1719.3	1277.6	1.78	0.44	2.6	64.2	54.8	1757.5	1.77	0.11	7.0	9.6	492.1	491.1
90	540.6	509.1	508.1	433.0	75.0	29.5	53.0	45.7	1988.6	2129.9	1.76	0.44	3.8	71.3	60.8	2166.7	1.75	0.11	7.8	11.6	497.5	496.5
91	520.0	503.1	502.1	433.5	68.6	14.9	51.8	43.7	1777.0	1430.9	1.77	0.44	2.8	65.8	56.0	1840.6	1.77	0.11	7.2	10.0	493.1	492.1
92	553.3	508.5	507.5	435.4	72.0	42.9	52.4	47.3	1887.7	2808.2	1.77	0.44	4.6	67.5	64.4	2172.1	1.75	0.11	7.4	11.9	496.5	495.5
93	549.9	507.9	506.9	434.8	72.2	40.0	52.4	46.9	1890.7	2656.5	1.77	0.44	4.4	67.8	63.4	2149.6	1.76	0.11	7.4	11.8	496.1	495.1
94	546.5	507.4	506.4	434.1	72.2	37.2	52.4	46.7	1892.4	2515.1	1.77	0.44	4.2	68.0	62.5	2123.9	1.76	0.11	7.4	11.7	495.7	494.7
95	541.9	506.6	505.6	433.4	72.3	33.3	52.4	46.2	1893.4	2317.2	1.77	0.44	4.0	68.3	61.4	2094.4	1.76	0.11	7.5	11.5	495.2	494.2
96	535.9	505.7	504.7	432.5	72.1	28.2	52.4	45.4	1889.9	2063.5	1.77	0.44	3.7	68.4	60.0	2052.9	1.76	0.11	7.5	11.2	494.5	493.5
97	513.4	501.7	500.7	431.8	68.9	9.6	51.8	43.2	1786.0	1195.7	1.77	0.44	2.5	66.5	54.5	1811.1	1.77	0.11	7.3	9.7	492.0	491.0
98	515.3	501.8	500.8	432.1	68.7	11.5	51.8	43.4	1780.9	1279.6	1.77	0.44	2.6	66.2	55.1	1821.8	1.77	0.11	7.3	9.8	492.0	491.0

Prep By: MDM
Date: 3/21/2012

Chkd By: JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11-02
APPENDIX IIIJ-B
OVERLINER SYSTEM SETTLEMENT SUMMARY

Evaluation Point	Top of Waste Elevation (ft-msl)	Initial Top of Overliner Elevation (ft-msl)	Initial Top of Waste Below Overliner Elevation (ft-msl)	Bottom of Waste Elevation (ft-msl)	H_o (ft)	T_{waste} (ft)	γ_{mswb} (pcf)	γ_{mswa} (pcf)	σ'_o (psf)	$\Delta\sigma$ (psf)	e_o	C_c	S_p (ft)	H'_o (ft)	γ'_{mswb} (pcf)	σ''_o (psf)	e'_o	α	S_c (ft)	Total Settlement (ft)	Post-Settlement Top of Overliner Elevation (ft-msl)	Post-Settlement Top of Waste Below Overliner Elevation (ft-msl)
99	516.0	502.1	501.1	432.6	68.6	11.9	51.8	43.4	1776.1	1296.3	1.77	0.44	2.6	65.9	55.1	1816.0	1.77	0.11	7.2	9.8	492.3	491.3
100	511.3	502.1	501.1	434.3	66.8	7.2	51.5	43.0	1721.6	1089.7	1.78	0.44	2.3	64.6	53.3	1720.3	1.78	0.11	7.1	9.4	492.8	491.8
101	513.7	502.6	501.6	433.8	67.8	9.1	51.8	43.2	1756.0	1171.7	1.77	0.44	2.4	65.4	54.2	1771.1	1.77	0.11	7.2	9.6	493.0	492.0
102	515.0	501.5	500.5	433.2	67.3	11.4	51.8	43.4	1744.4	1276.7	1.77	0.44	2.6	64.8	54.8	1773.8	1.77	0.11	7.1	9.7	491.9	490.9
103	514.0	501.2	500.2	432.6	67.6	10.8	51.8	43.2	1752.4	1247.0	1.77	0.44	2.5	65.1	54.5	1773.8	1.77	0.11	7.1	9.7	491.5	490.5
104	512.0	500.8	499.8	431.9	67.9	9.2	51.8	43.2	1758.9	1178.9	1.77	0.44	2.4	65.5	54.2	1773.9	1.77	0.11	7.2	9.6	491.2	490.2
105	510.2	500.5	499.5	431.6	67.9	7.7	51.8	43.0	1759.3	1112.3	1.77	0.44	2.3	65.6	53.9	1767.5	1.77	0.11	7.2	9.5	491.0	490.0
S1	680.2	522.9	521.9	440.9	81.0	155.3	53.6	64.7	2170.0	10823.7	1.75	0.44	10.0	71.0	80.9	2871.2	1.72	0.10	7.7	17.7	505.2	504.2
S2	511.2	498.4	497.4	435.6	61.8	10.8	50.9	43.2	1572.6	1245.5	1.78	0.45	2.5	59.3	53.6	1587.8	1.78	0.11	6.5	9.0	489.4	488.4
S3	673.0	523.0	522.0	439.8	82.2	148.0	53.9	63.4	2213.5	10170.1	1.75	0.44	9.8	72.4	80.8	2923.1	1.72	0.10	7.8	17.6	505.3	504.3
S4	508.3	496.1	495.1	436.7	58.4	10.2	50.3	43.2	1468.1	1220.4	1.79	0.45	2.5	56.0	53.0	1482.9	1.79	0.11	6.2	8.6	487.5	486.5
S5	634.0	519.8	518.8	439.4	79.4	112.2	53.6	58.3	2127.7	7320.7	1.76	0.44	8.2	71.2	79.0	2811.6	1.72	0.10	7.7	15.9	503.8	502.8
S6	512.9	497.2	496.2	437.3	59.0	13.7	50.3	43.7	1481.4	1377.0	1.79	0.45	2.7	56.3	54.2	1524.0	1.79	0.11	6.2	8.9	488.4	487.4
S7	657.5	521.7	520.7	437.2	83.5	133.8	54.2	61.4	2263.3	8992.0	1.75	0.44	9.3	74.3	80.4	2985.1	1.71	0.10	8.0	17.3	504.4	503.4
S8	511.3	502.4	501.4	435.5	65.9	6.9	51.5	42.7	1697.8	1073.8	1.78	0.44	2.2	63.7	53.3	1696.6	1.78	0.11	7.0	9.2	493.1	492.1
S9	641.4	520.4	519.4	435.8	83.6	119.0	54.2	59.1	2265.5	7818.0	1.75	0.44	8.6	75.0	79.6	2984.6	1.71	0.10	8.1	16.8	503.6	502.6
S10	513.4	501.1	500.1	433.4	66.7	10.4	51.5	43.2	1717.9	1227.4	1.78	0.44	2.5	64.2	54.2	1739.1	1.78	0.11	7.0	9.5	491.5	490.5
S11	701.3	508.0	507.0	439.8	67.2	191.3	51.8	69.8	1741.0	14125.7	1.77	0.44	10.3	56.9	81.4	2315.5	1.75	0.10	6.2	16.5	491.5	490.5
S12	583.5	516.0	515.0	435.8	79.3	65.5	53.6	51.5	2123.8	4155.5	1.76	0.44	5.9	73.3	71.3	2614.9	1.73	0.10	8.0	13.9	502.1	501.1
S13	516.8	502.1	501.1	434.7	66.4	12.8	51.5	43.4	1709.1	1334.8	1.78	0.44	2.7	63.7	55.1	1753.8	1.77	0.11	7.0	9.6	492.4	491.4
S14	620.7	508.0	507.0	439.3	67.7	110.7	51.8	58.0	1754.7	7201.8	1.77	0.44	7.7	60.1	78.1	2345.8	1.75	0.10	6.6	14.2	493.8	492.8
S15	638.5	461.8	460.8	455.2	5.7	174.6	42.7	67.3	121.3	12537.7	1.85	0.46	1.9	3.8	80.6	153.8	1.85	0.11	0.4	2.3	459.6	458.6

LEGEND

— - - —	PERMIT BOUNDARY
— — —	LIMITS OF WASTE
- - - -	LIMITS OF PRE-SUBTITLE D WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
500	EXISTING CONTOUR
398	PROPOSED EXCAVATION CONTOUR
— ▸ —	PROPOSED LEACHATE LINE
■	PROPOSED LEACHATE COLLECTION SUMP
—∘	PROPOSED LEACHATE RISER
422	AS-BUILT TOP OF SUBTITLE D CLAY LINER
— ◂ —	EXISTING LEACHATE LINE
■	EXISTING LEACHATE COLLECTION SUMP
—∘	EXISTING LEACHATE RISER
515	PROPOSED TOP OF OVERLINER CONTOUR
→ →	PROPOSED OVERLINER LEACHATE LINE
⊡	PROPOSED OVERLINER LEACHATE COLLECTION SUMP
Y Y Y	3H:1V SLOPE (TYPICAL)
— · —	APPROXIMATE LOCATION OF PROPOSED SLURRY WALL
● 71	SETTLEMENT EVALUATION POINT

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

NEVZAT TURAN
84059

3-23-12

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☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

PREPARED FOR
CITY OF FARMERS BRANCH

MAJOR PERMIT AMENDMENT OVERLINER SETTLEMENT EVALUATION POINTS

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

DATE: 03/2012
FILE: 1339-351-11
CAD: IIIJ-B-2-13 EVAL PTS.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REVISIONS

NO.	DATE	DESCRIPTION

REUSE OF DOCUMENTS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

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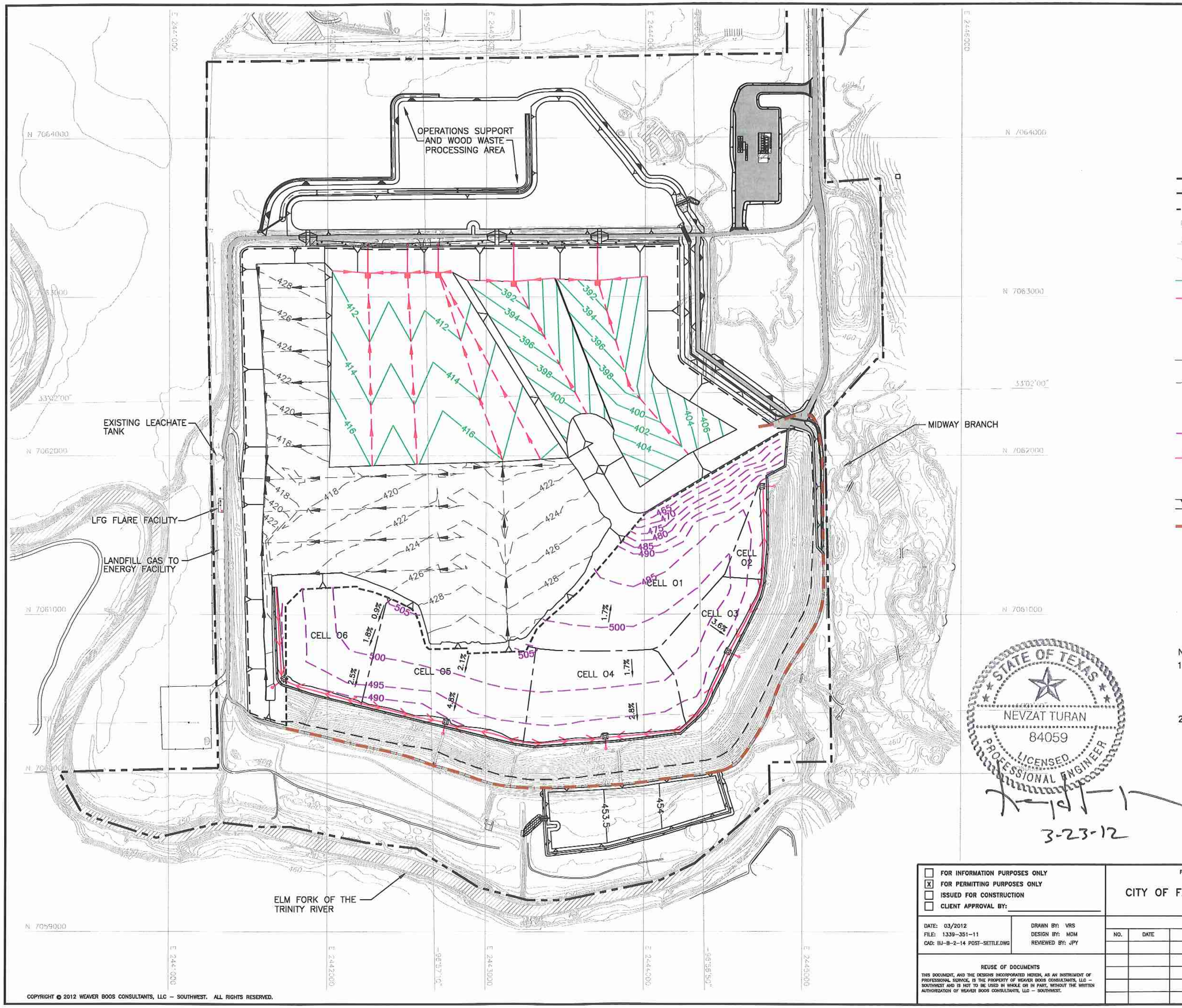
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

SHEET IIIJ-B-2-13

O:\1339\351\EXPANSION 2009\PART III-SDP\III\IIIJ-B\IIIJ-B-2-13 OVERLINER SETT EVAL PTS.dwg, sford, 1:2



LEGEND

— - - —	PERMIT BOUNDARY
— — — —	LIMITS OF WASTE
- - - - - -	LIMITS OF PRE–SUBTITLE D WASTE
N 7064000 ———	STATE PLANE COORDINATE SYSTEM
33°02'00" ———	GEODETIC COORDINATE SYSTEM
~~500~~	EXISTING CONTOUR
——398——	PROPOSED EXCAVATION CONTOUR
– – ◄ – –	PROPOSED LEACHATE LINE
■	PROPOSED LEACHATE COLLECTION SUMP
—●	PROPOSED LEACHATE RISER
— — —422— —	AS–BUILT TOP OF SUBTITLE D CLAY LINER
— — ◄ — —	EXISTING LEACHATE LINE
■	EXISTING LEACHATE COLLECTION SUMP
—○	EXISTING LEACHATE RISER
— — —500— —	OVERLINER POST SETTLEMENT CONTOURS
→→→	PROPOSED OVERLINER LEACHATE LINE
⊡	PROPOSED OVERLINER LEACHATE COLLECTION SUMP
Y Y Y	3H:1V SLOPE (TYPICAL)
▬ · ▬ · ▬	APPROXIMATE LOCATION OF PROPOSED SLURRY WALL

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8–28–2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

NEVZAT TURAN
84059

3-23-12

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☐ CLIENT APPROVAL BY: ____________

DATE: 03/2012
FILE: 1339–351–11
CAD: IIIJ–B–2–14 POST–SETTLE.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

PREPARED FOR
CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
POST–SETTLEMENT OVERLINER MAP

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

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NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

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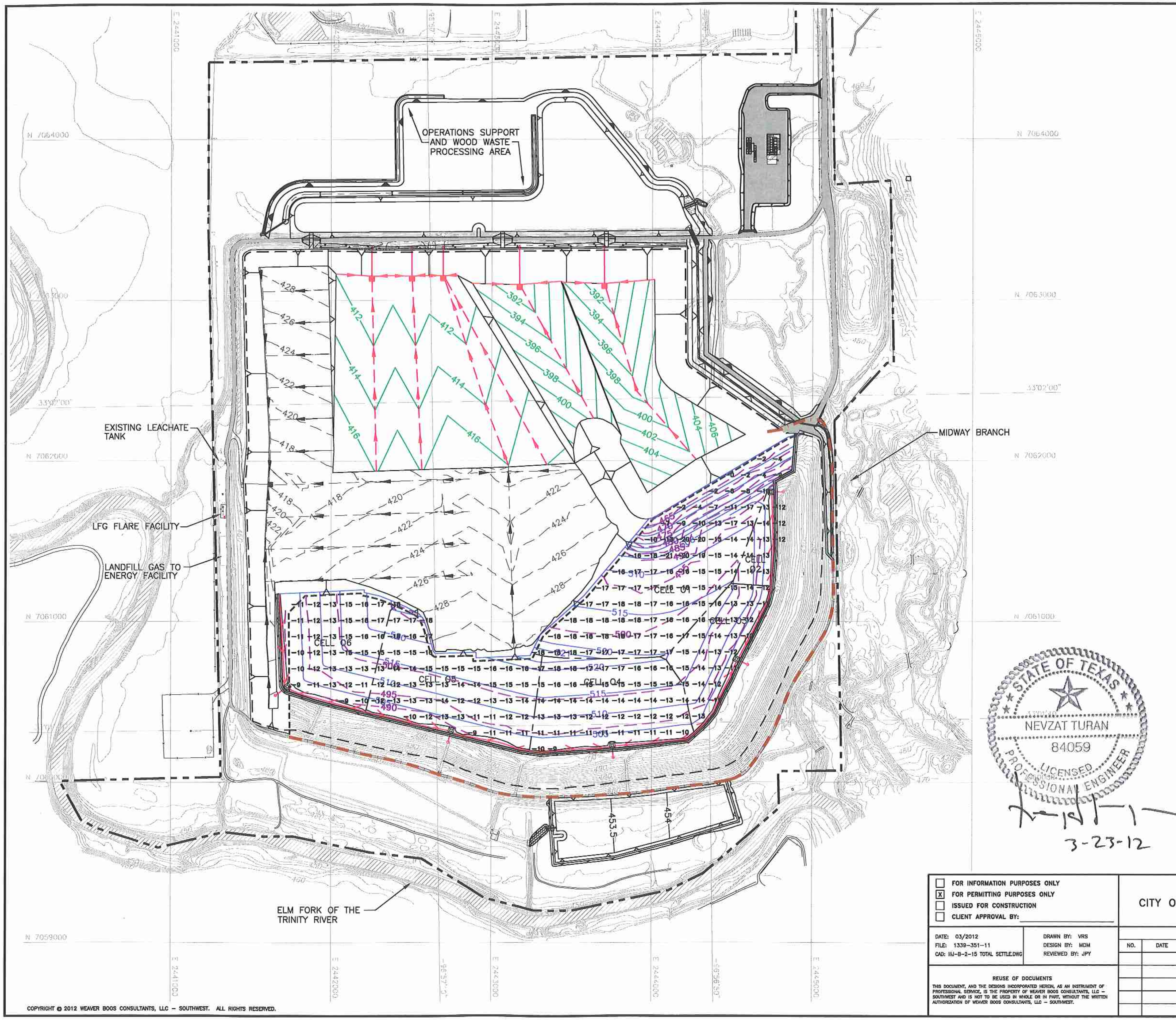
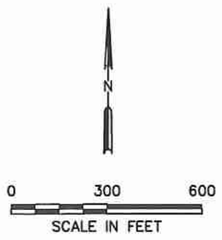
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

SHEET IIIJ–B–2–14

REUSE OF DOCUMENTS

O:\1339\351\EXPANSION 2009\PART III-SDP\IIIJ-B\IIIJ-B-2-14 OVERLINER POST SETTLEMENT.dwg, sford, 1:2





LEGEND

— - —	PERMIT BOUNDARY
— — —	LIMITS OF WASTE
- - - -	LIMITS OF PRE-SUBTITLE D WASTE
N 7064000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
500	EXISTING CONTOUR
398	PROPOSED EXCAVATION CONTOUR
— ◄ —	PROPOSED LEACHATE LINE
■	PROPOSED LEACHATE COLLECTION SUMP
—●	PROPOSED LEACHATE RISER
422	AS-BUILT TOP OF SUBTITLE D CLAY LINER
— ◄ —	EXISTING LEACHATE LINE
■	EXISTING LEACHATE COLLECTION SUMP
—○	EXISTING LEACHATE RISER
500	OVERLINER POST SETTLEMENT CONTOURS
520	PROPOSED TOP OF OVERLINER CONTOUR
→ →	PROPOSED OVERLINER LEACHATE LINE
⊡	PROPOSED OVERLINER LEACHATE COLLECTION SUMP
Y Y Y	3H:1V SLOPE (TYPICAL)
— · —	APPROXIMATE LOCATION OF PROPOSED SLURRY WALL
−10	TOTAL SETTLEMENT (FT)

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

NEVZAT TURAN
84059

3-23-12

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☐ CLIENT APPROVAL BY: ____________

DATE: 03/2012
FILE: 1339-351-11
CAD: IIIJ-B-2-15 TOTAL SETTLE.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

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PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
OVERLINER TOTAL SETTLEMENT

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

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GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

SHEET IIIJ-B-2-15

Prep By: MDM
Date: 3/21/2012

Chkd By : JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11-02
APPENDIX IIIJ-B
OVERLINER SYSTEM TRENCH PIPE SETTLEMENT SUMMARY

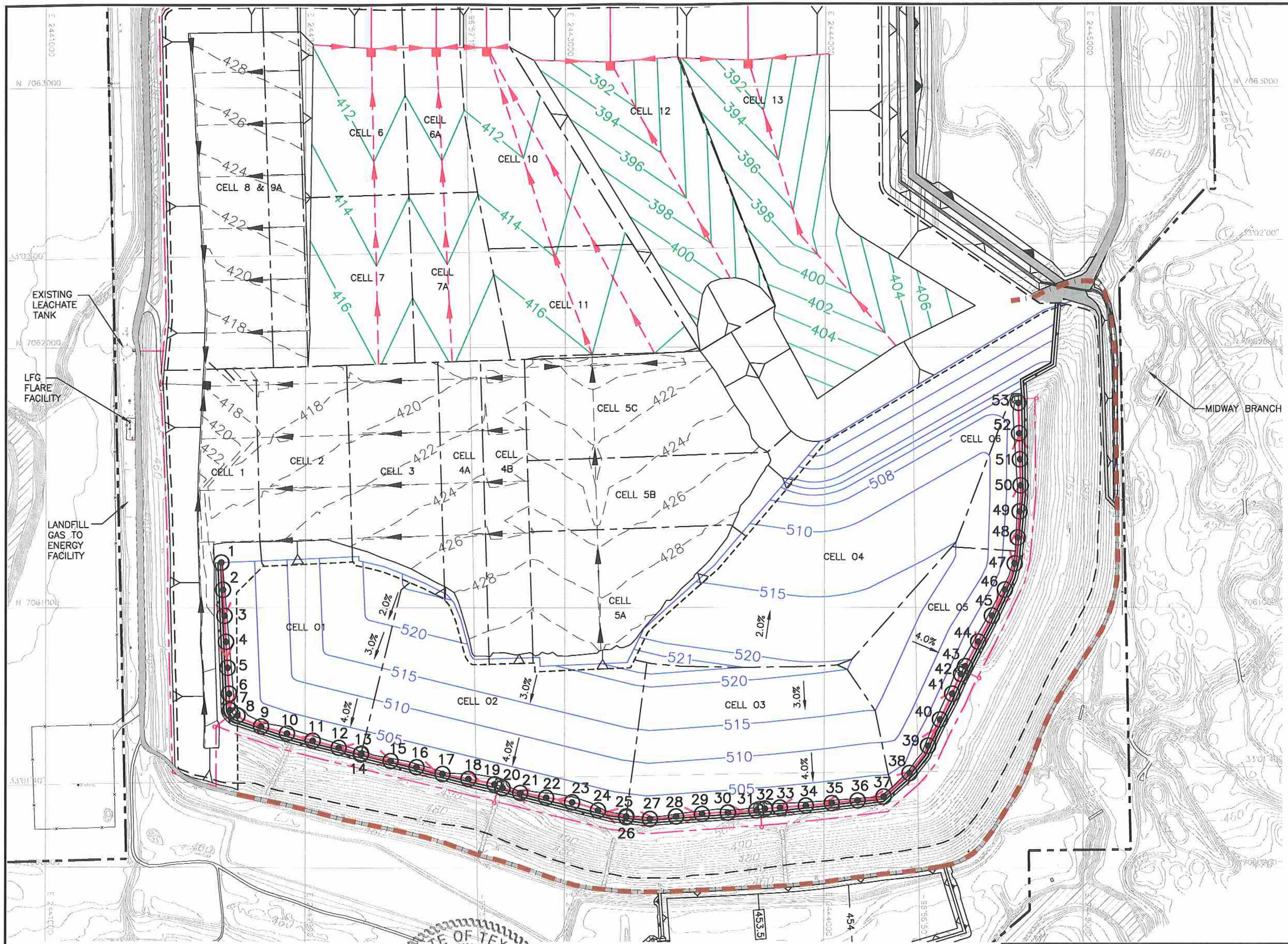
Evaluation Point	Top of Waste Elevation (ft-msl)	Initial Top of Overliner Elevation (in Trench) (ft-msl)	Initial Top of Waste Below Overliner Elevation (in Trench) (ft-msl)	Bottom of Waste Elevation (ft-msl)	H_o (ft)	T_{waste} (ft)	γ_{mswb} (pcf)	γ_{mswa} (pcf)	σ'_o (psf)	$\Delta\sigma$ (psf)	e_o	C_c	S_p (ft)	H'_o (ft)	γ'_{mswb} (pcf)	σ''_o (psf)	e'_o	α	S_c (ft)	Total Settlement (ft)	Post-Settlement Top of Overliner Elevation (in Trench) (ft-msl)	Post-Settlement Top of Waste Below Overliner Elevation (in Trench) (ft-msl)
1	508.6	496.8	495.8	431.9	63.9	8.8	51.2	43.0	1636.0	1158.3	1.8	0.45	2.4	61.5	50.9	1566.0	1.8	0.11	6.8	9.1	487.6	486.6
2	509.5	496.1	495.1	433.1	62.0	10.4	50.9	43.2	1579.3	1230.3	1.8	0.45	2.5	59.5	50.6	1507.1	1.8	0.11	6.5	9.0	487.1	486.1
3	510.5	495.5	494.5	433.9	60.6	12.0	50.6	43.4	1535.1	1301.3	1.8	0.45	2.6	58.0	50.3	1458.8	1.8	0.11	6.4	9.0	486.5	485.5
4	511.5	494.9	493.9	434.5	59.5	13.6	50.6	43.7	1505.1	1373.4	1.8	0.45	2.7	56.8	49.9	1416.1	1.8	0.11	6.2	8.9	486.0	485.0
5	512.5	494.3	493.3	434.8	58.5	15.2	50.3	44.0	1471.3	1446.4	1.8	0.45	2.8	55.8	49.9	1390.8	1.8	0.11	6.1	8.9	485.4	484.4
6	513.5	493.7	492.7	435.1	57.6	16.7	50.3	44.0	1448.1	1515.8	1.8	0.45	2.9	54.8	49.5	1355.6	1.8	0.11	6.0	8.9	484.8	483.8
7	510.7	493.1	492.1	435.9	56.2	14.6	49.9	43.7	1401.9	1418.6	1.8	0.45	2.7	53.5	49.5	1323.7	1.8	0.11	5.9	8.6	484.5	483.5
8	509.5	490.8	489.8	440.5	49.3	15.7	48.8	44.0	1203.6	1470.2	1.8	0.45	2.7	46.6	48.0	1119.2	1.8	0.11	5.1	7.9	482.9	481.9
9	505.2	491.6	490.6	436.8	53.7	10.7	49.5	43.2	1330.7	1240.4	1.8	0.45	2.5	51.3	49.1	1260.1	1.8	0.11	5.7	8.1	483.4	482.4
10	508.4	492.3	491.3	437.1	54.2	13.1	49.5	43.7	1341.0	1354.7	1.8	0.45	2.6	51.5	49.1	1266.2	1.8	0.11	5.7	8.3	483.9	482.9
11	508.2	492.9	491.9	437.7	54.2	12.3	49.5	43.4	1342.7	1315.5	1.8	0.45	2.6	51.6	49.1	1269.2	1.8	0.11	5.7	8.3	484.6	483.6
12	507.3	493.5	492.5	437.2	55.3	10.8	49.9	43.2	1379.1	1245.8	1.8	0.45	2.5	52.8	49.1	1297.7	1.8	0.11	5.8	8.3	485.2	484.2
13	505.0	494.0	493.0	436.6	56.4	8.0	49.9	43.0	1407.1	1122.2	1.8	0.45	2.3	54.1	49.5	1339.6	1.8	0.11	6.0	8.3	485.8	484.8
14	505.9	493.0	492.0	436.6	55.4	9.8	49.9	43.2	1382.2	1205.0	1.8	0.45	2.4	53.0	49.1	1302.2	1.8	0.11	5.8	8.3	484.8	483.8
15	504.6	492.3	491.3	435.9	55.4	9.2	49.9	43.2	1381.8	1178.3	1.8	0.45	2.4	53.0	49.5	1312.6	1.8	0.11	5.8	8.2	484.1	483.1
16	504.2	491.7	490.7	435.7	55.0	9.5	49.5	43.2	1361.4	1188.5	1.8	0.45	2.4	52.6	49.1	1292.1	1.8	0.11	5.8	8.2	483.5	482.5
17	502.4	491.0	490.0	436.0	54.0	8.4	49.5	43.0	1337.2	1141.2	1.8	0.45	2.3	51.7	49.1	1270.1	1.8	0.11	5.7	8.0	483.0	482.0
18	505.4	490.4	489.4	436.2	53.2	12.0	49.5	43.4	1317.9	1301.6	1.8	0.45	2.5	50.7	48.8	1236.0	1.8	0.11	5.6	8.1	482.3	481.3
19	506.7	489.8	488.8	436.2	52.6	13.9	49.1	43.7	1291.8	1386.3	1.8	0.45	2.7	49.9	48.8	1216.9	1.8	0.11	5.5	8.2	481.6	480.6
20	504.9	492.0	491.0	436.2	54.8	9.9	49.5	43.2	1356.8	1206.4	1.8	0.45	2.4	52.4	49.1	1286.9	1.8	0.11	5.8	8.2	483.8	482.8
21	504.5	493.1	492.1	436.1	55.9	8.4	49.9	43.0	1395.6	1139.7	1.8	0.45	2.3	53.6	49.5	1327.6	1.8	0.11	5.9	8.2	484.8	483.8
22	509.9	494.6	493.6	436.0	57.6	12.3	50.3	43.4	1447.3	1314.7	1.8	0.45	2.6	55.0	49.9	1372.0	1.8	0.11	6.1	8.6	486.0	485.0
23	512.4	496.2	495.2	435.6	59.6	13.2	50.6	43.7	1508.3	1357.1	1.8	0.45	2.7	56.9	49.9	1419.9	1.8	0.11	6.3	8.9	487.3	486.3
24	510.7	497.8	496.8	435.1	61.7	9.9	50.9	43.2	1571.2	1207.2	1.8	0.45	2.4	59.3	50.6	1500.1	1.8	0.11	6.5	9.0	488.8	487.8
25	509.9	499.5	498.5	434.6	63.9	7.4	51.2	43.0	1636.9	1097.8	1.8	0.45	2.3	61.6	50.9	1569.4	1.8	0.11	6.8	9.1	490.4	489.4
26	509.1	500.5	499.5	434.5	65.0	5.6	51.2	42.7	1663.6	1020.2	1.8	0.44	2.2	62.8	50.9	1599.0	1.8	0.11	6.9	9.1	491.4	490.4
27	509.7	499.9	498.9	434.2	64.7	6.8	51.2	42.7	1656.9	1068.3	1.8	0.44	2.2	62.5	50.9	1590.4	1.8	0.11	6.9	9.1	490.8	489.8
28	510.1	499.3	498.3	434.0	64.3	7.8	51.2	43.0	1647.3	1115.5	1.8	0.44	2.3	62.0	50.9	1578.9	1.8	0.11	6.8	9.1	490.2	489.2
29	510.5	498.7	497.7	433.7	64.0	8.8	51.2	43.0	1639.4	1158.1	1.8	0.44	2.4	61.6	50.9	1569.3	1.8	0.11	6.8	9.2	489.6	488.6
30	510.3	498.1	497.1	433.4	63.8	9.2	51.2	43.2	1632.7	1176.6	1.8	0.45	2.4	61.3	50.9	1562.1	1.8	0.11	6.7	9.1	489.0	488.0
31	510.4	497.5	496.5	433.0	63.4	9.9	51.2	43.2	1624.8	1208.8	1.8	0.45	2.5	61.0	50.6	1543.9	1.8	0.11	6.7	9.2	488.3	487.3
32	511.6	495.9	494.9	433.0	61.9	12.7	50.9	43.4	1577.0	1330.0	1.8	0.45	2.6	59.3	50.6	1501.2	1.8	0.11	6.5	9.2	486.8	485.8
33	511.3	496.3	495.3	432.8	62.5	12.1	50.9	43.4	1590.2	1304.9	1.8	0.45	2.6	59.8	50.6	1515.1	1.8	0.11	6.6	9.2	487.1	486.1
34	510.7	496.9	495.9	432.5	63.4	10.9	51.2	43.2	1623.8	1249.2	1.8	0.45	2.5	60.9	50.6	1541.3	1.8	0.11	6.7	9.2	487.7	486.7
35	510.5	497.5	496.5	432.1	64.3	10.0	51.2	43.2	1647.6	1211.0	1.8	0.44	2.5	61.9	50.9	1575.3	1.8	0.11	6.8	9.3	488.2	487.2
36	509.9	498.1	497.1	431.8	65.2	8.8	51.5	43.0	1680.5	1157.5	1.8	0.44	2.4	62.9	50.9	1600.7	1.8	0.11	6.9	9.3	488.8	487.8
37	509.9	498.7	497.7	431.6	66.1	8.2	51.5	43.0	1703.2	1132.2	1.8	0.44	2.3	63.8	51.2	1633.5	1.8	0.11	7.0	9.3	489.3	488.3
38	510.5	498.5	497.5	431.7	65.8	9.0	51.5	43.0	1694.0	1165.7	1.8	0.44	2.4	63.4	51.2	1623.0	1.8	0.11	7.0	9.4	489.1	488.1
39	511.1	497.7	496.7	432.0	64.7	10.4	51.2	43.2	1656.4	1229.4	1.8	0.44	2.5	62.2	50.9	1583.3	1.8	0.11	6.8	9.3	488.4	487.4
40	511.7	497.0	496.0	432.5	63.5	11.6	51.2	43.4	1627.4	1285.1	1.8	0.45	2.6	61.0	50.6	1543.5	1.8	0.11	6.7	9.3	487.8	486.8
41	512.2	496.4	495.4	432.9	62.5	12.9	50.9	43.4	1590.9	1338.4	1.8	0.45	2.7	59.8	50.6	1514.5	1.8	0.11	6.6	9.2	487.1	486.1

Prep By: MDM
Date: 3/21/2012

Chkd By : JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11-02
APPENDIX IIIJ-B
OVERLINER SYSTEM TRENCH PIPE SETTLEMENT SUMMARY

Evaluation Point	Top of Waste Elevation (ft-msl)	Initial Top of Overliner Elevation (in Trench) (ft-msl)	Initial Top of Waste Below Overliner Elevation (in Trench) (ft-msl)	Bottom of Waste Elevation (ft-msl)	H_o (ft)	T_{waste} (ft)	γ_{mswb} (pcf)	γ_{mswa} (pcf)	σ'_o (psf)	$\Delta\sigma$ (psf)	e_o	C_c	S_p (ft)	H'_o (ft)	γ'_{mswb} (pcf)	σ''_o (psf)	e'_o	α	S_c (ft)	Total Settlement (ft)	Post-Settlement Top of Overliner Elevation (in Trench) (ft-msl)	Post-Settlement Top of Waste Below Overliner Elevation (in Trench) (ft-msl)
42	512.4	495.9	494.9	433.2	61.6	13.5	50.9	43.7	1569.5	1370.9	1.8	0.45	2.7	58.9	50.3	1481.3	1.8	0.11	6.5	9.2	486.7	485.7
43	512.3	496.1	495.1	433.3	61.7	13.2	50.9	43.7	1571.8	1358.7	1.8	0.45	2.7	59.1	50.6	1494.9	1.8	0.11	6.5	9.2	486.9	485.9
44	511.9	496.7	495.7	433.7	62.0	12.2	50.9	43.4	1579.9	1311.1	1.8	0.45	2.6	59.4	50.6	1504.6	1.8	0.11	6.5	9.1	487.6	486.6
45	511.4	497.4	496.4	433.9	62.5	11.0	50.9	43.2	1590.2	1255.4	1.8	0.45	2.5	59.9	50.6	1517.0	1.8	0.11	6.6	9.1	488.3	487.3
46	510.8	498.1	497.1	434.1	62.9	9.8	50.9	43.2	1601.7	1201.5	1.8	0.45	2.4	60.5	50.6	1530.4	1.8	0.11	6.6	9.1	489.0	488.0
47	510.2	498.7	497.7	434.4	63.3	8.5	51.2	43.0	1621.8	1146.9	1.8	0.45	2.4	61.0	50.6	1543.5	1.8	0.11	6.7	9.1	489.6	488.6
48	510.3	498.7	497.7	434.8	62.9	8.6	50.9	43.0	1602.0	1148.5	1.8	0.45	2.4	60.5	50.6	1532.8	1.8	0.11	6.7	9.0	489.7	488.7
49	510.8	498.1	497.1	435.1	61.9	9.7	50.9	43.2	1577.1	1199.0	1.8	0.45	2.4	59.5	50.6	1506.3	1.8	0.11	6.5	9.0	489.1	488.1
50	511.3	497.5	496.5	435.6	60.9	10.8	50.6	43.2	1541.6	1247.3	1.8	0.45	2.5	58.4	50.3	1467.2	1.8	0.11	6.4	8.9	488.5	487.5
51	511.8	496.9	495.9	436.1	59.8	11.9	50.6	43.4	1514.4	1298.1	1.8	0.45	2.6	57.2	50.3	1438.5	1.8	0.11	6.3	8.9	488.0	487.0
52	512.3	496.3	495.3	436.5	58.8	13.0	50.3	43.7	1477.6	1349.9	1.8	0.45	2.7	56.1	49.9	1400.4	1.8	0.11	6.2	8.8	487.4	486.4
53	512.9	495.6	494.6	437.0	57.5	14.4	50.3	43.7	1445.8	1407.4	1.8	0.45	2.7	54.8	49.5	1357.0	1.8	0.11	6.0	8.8	486.8	485.8
Bottom Cell O2 Sump	514.3	493.3	492.3	437.2	55.1	18.0	49.9	44.2	1375.4	1577.1	1.8	0.45	2.9	52.2	49.1	1282.9	1.8	0.11	5.8	8.7	484.6	483.6
Bottom Cell O3 Sump	515.3	493.6	492.6	433.4	59.2	18.7	50.6	44.2	1499.6	1604.9	1.8	0.45	3.0	56.2	49.9	1402.9	1.8	0.11	6.2	9.2	484.4	483.4
Bottom Cell O4 Sump	513.3	493.6	492.6	433.1	59.5	16.7	50.6	44.0	1506.5	1512.4	1.8	0.45	2.9	56.6	49.9	1412.6	1.8	0.11	6.2	9.1	484.5	483.5
Bottom Cell O5 Sump	508.7	487.6	486.6	436.2	50.4	18.1	48.8	44.2	1228.2	1579.3	1.8	0.45	2.9	47.5	48.4	1148.6	1.8	0.11	5.2	8.1	479.5	478.5
Bottom Cell O6 Sump	512.0	488.5	487.5	438.5	49.0	20.5	48.8	44.4	1195.1	1692.0	1.8	0.45	3.0	46.0	48.0	1104.4	1.8	0.11	5.1	8.1	480.4	479.4



N

0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMITS OF PRE–SUBTITLE D WASTE
- N 7064000 STATE PLANE COORDINATE SYSTEM
- 33°02'00" GEODETIC COORDINATE SYSTEM
- 500 EXISTING CONTOUR
- CELL BOUNDARY
- 398 PROPOSED EXCAVATION CONTOUR
- PROPOSED LEACHATE LINE
- ■ PROPOSED LEACHATE COLLECTION SUMP
- PROPOSED LEACHATE RISER
- 422 AS–BUILT TOP OF SUBTITLE D CLAY LINER
- EXISTING LEACHATE LINE
- ■ EXISTING LEACHATE COLLECTION SUMP
- EXISTING LEACHATE RISER
- 515 PROPOSED TOP OF OVERLINER CONTOUR
- PROPOSED OVERLINER LEACHATE LINE
- ▣ PROPOSED OVERLINER LEACHATE COLLECTION SUMP
- 3H:1V SLOPE (TYPICAL)
- APPROXIMATE LOCATION OF PROPOSED SLURRY WALL
- ⊙ 40 OVERLINER PIPE EVALUATION POINT

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8–28–2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

NEVZAT TURAN
84059

3-23-12

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☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: ____________

PREPARED FOR
CITY OF FARMERS BRANCH

MAJOR PERMIT AMENDMENT OVERLINER PIPE EVALUATION POINTS

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

DATE: 03/2012
FILE: 1339–351–11
CAD: IIIJ–B–2–18 PIPE PTS.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REVISIONS

NO.	DATE	DESCRIPTION

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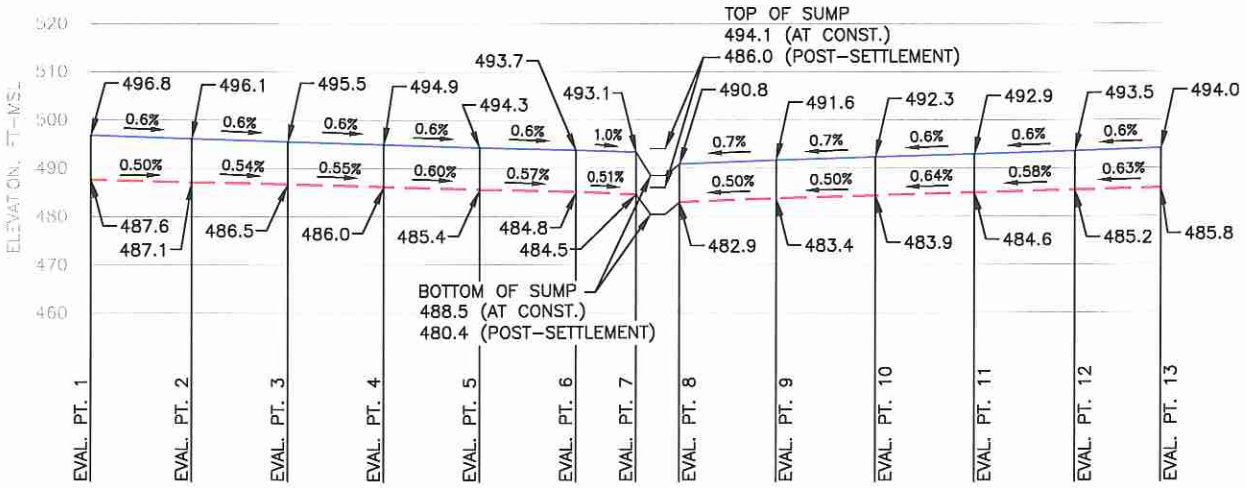
(817) 735–9770

GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

SHEET IIIJ–B–2–18

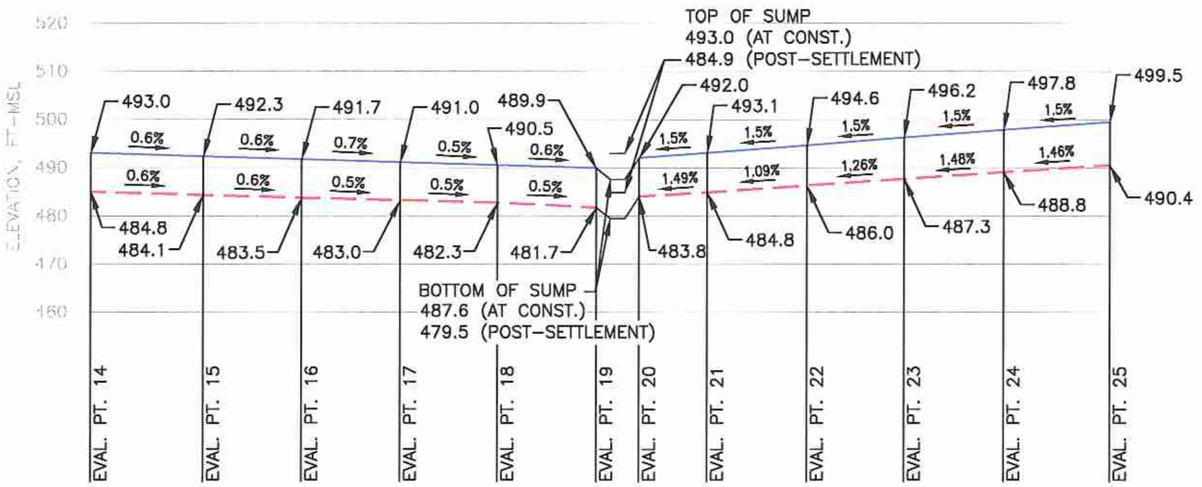
O:\1339\351\EXPANSION 2009\PART III–SDP\IIIJ\IIIJ–B\IIIJ–B–2–18 PIPE EVAL PTS.dwg, sford, 1:2



CELL 1 PIPE PROFILE

0 100 200
SCALE IN FEET
HORIZONTAL

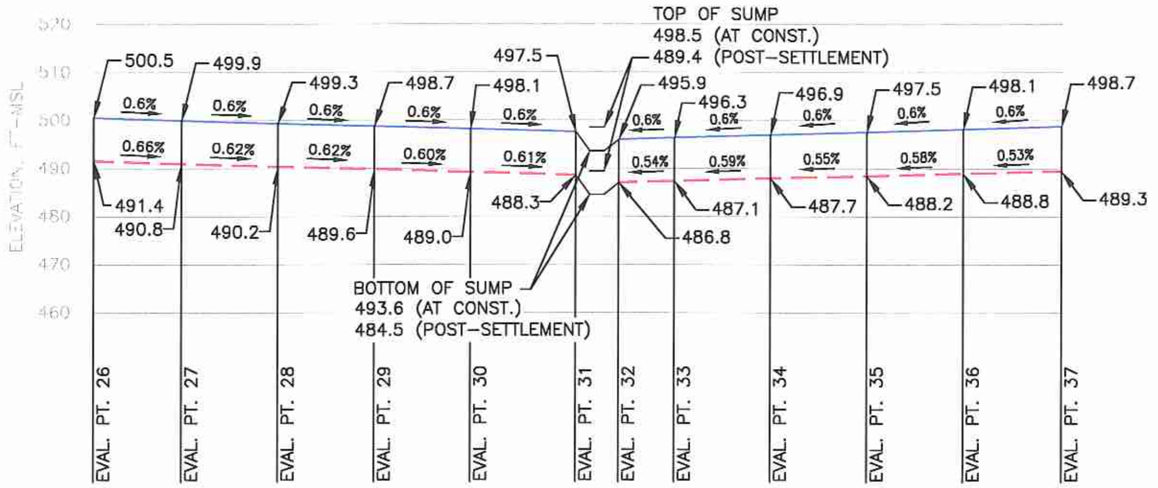
0 20 40
SCALE IN FEET
VERTICAL



CELL 2 PIPE PROFILE

0 100 200
SCALE IN FEET
HORIZONTAL

0 20 40
SCALE IN FEET
VERTICAL



CELL 3 PIPE PROFILE

0 100 200
SCALE IN FEET
HORIZONTAL

0 20 40
SCALE IN FEET
VERTICAL

NEVZAT TURAN
84059
3-23-12

LEGEND

——— AT CONSTRUCTION GRADE

— — — AFTER SETTLEMENT GRADE

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☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY:

DATE: 03/2012
FILE: 1339-351-11
CAD: IIIJ-B-2-19 PIPE PROFILE.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

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PREPARED FOR

CITY OF FARMERS BRANCH

REVISIONS

NO.	DATE	DESCRIPTION

MAJOR PERMIT AMENDMENT
OVERLINER PIPE PROFILE

CAMELOT LANDFILL
DENTON COUNTY, TEXAS

Weaver Boos Consultants

TBPE REGISTRATION NO. F-3727

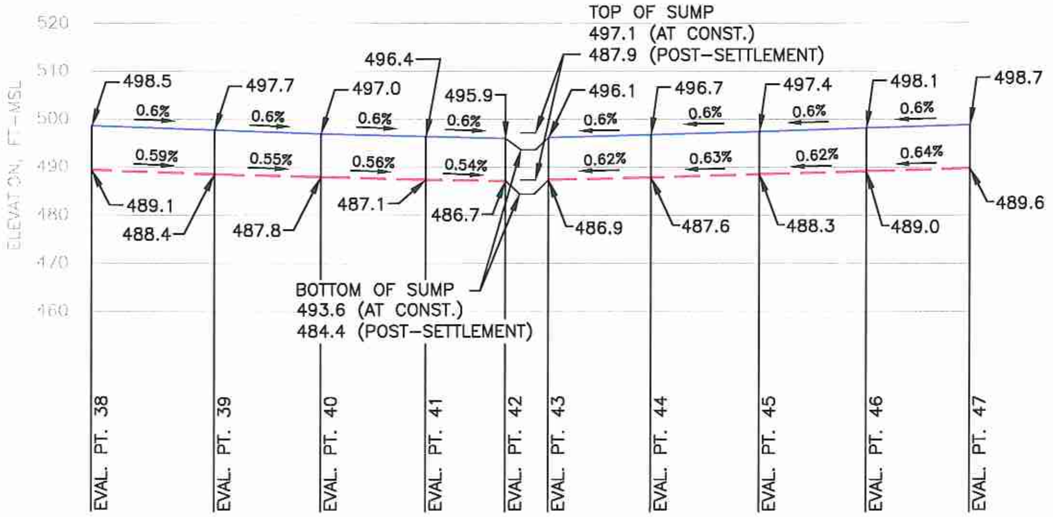
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO

FORT WORTH, TX
(817) 735-9770

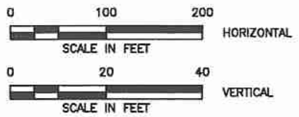
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

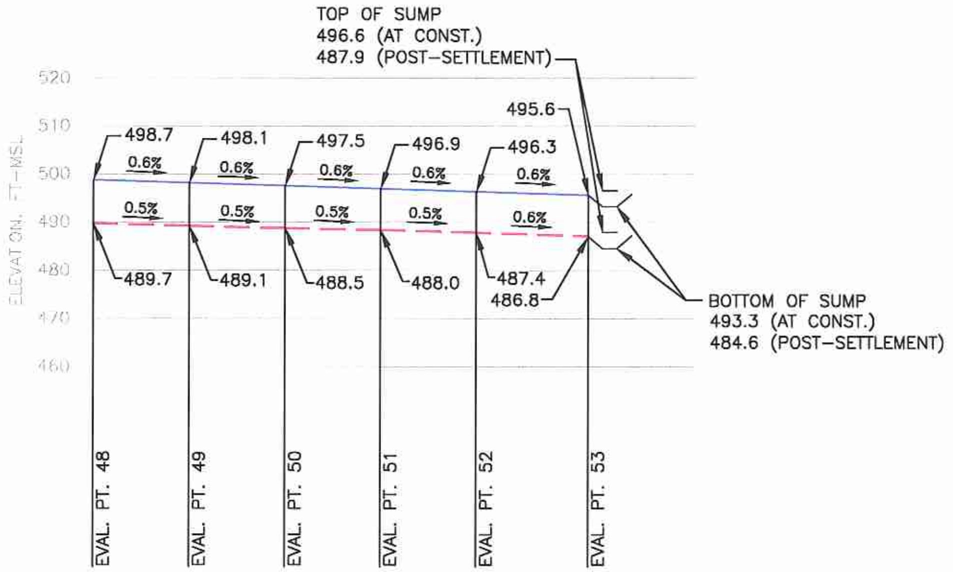
SHEET IIIJ-B-2-19

O:\1339\351\EXPANSION 2009\PART III-SDP\III-B\IIIJ-B-2-19 PIPE PROFILE.dwg, sford, 1:2

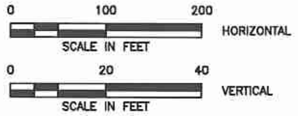


CELL 5 PIPE PROFILE





CELL 6 PIPE PROFILE



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LEGEND

──── AT CONSTRUCTION GRADE

– – – – AFTER SETTLEMENT GRADE

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DATE: 03/2012
FILE: 1339-351-11
CAD: IIIJ-B-2-20 PIPE PROFILE.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

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MAJOR PERMIT AMENDMENT OVERLINER PIPE PROFILE

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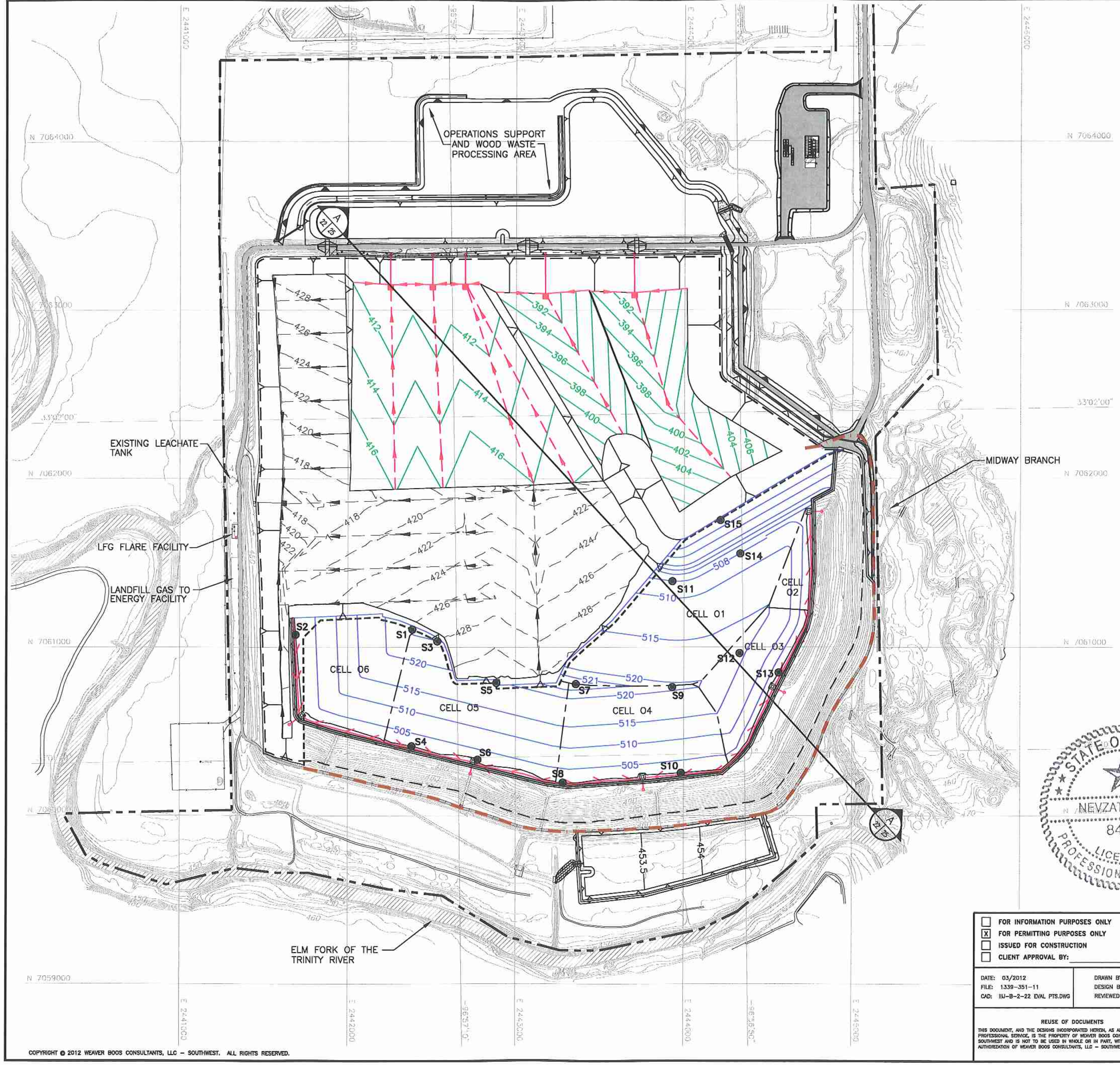
Prep By: MDM
Date: 3/21/2012

Chkd By: JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11-02
APPENDIX IIIJ-B
OVERLINER SYSTEM PERCENT STRAIN SUMMARY

Evalution Point[1]		Initial Top of Overliner Elevation (ft-msl)		Post-Settlement Top of Overliner Elevation (ft-msl)		Plan View Distance (ft)	L_o (ft)	L_f (ft)	Strain (%)
A	B	A	B	A	B				
S1	S2	522.9	498.4	505.2	489.4	696.8	697.19	696.94	-0.036
S3	S4	523.0	496.1	505.3	487.5	640.2	640.77	640.46	-0.049
S5	S6	519.8	497.2	503.8	488.4	468.2	468.70	468.42	-0.061
S7	S8	521.7	502.4	504.4	493.1	589.3	589.57	589.36	-0.036
S9	S10	520.4	501.1	503.6	491.5	511.8	512.16	511.94	-0.043
S9	S11	520.4	508.0	503.6	491.5	627.5	627.59	627.59	-0.001
S12	S13	516.0	502.1	502.1	492.4	259.8	260.16	259.96	-0.075
S14	S15	508.0	461.8	493.8	459.6	230.8	235.36	233.31	-0.869

[1] Refer to Sheet IIIJ-B-2-22 for evaluation point locations.



LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMITS OF PRE-SUBTITLE D WASTE
- N 7064000 STATE PLANE COORDINATE SYSTEM
- 33°02'00" GEODETIC COORDINATE SYSTEM
- 500 EXISTING CONTOUR
- 398 PROPOSED EXCAVATION CONTOUR
- PROPOSED LEACHATE LINE
- ■ PROPOSED LEACHATE COLLECTION SUMP
- PROPOSED LEACHATE RISER
- 422 AS-BUILT TOP OF SUBTITLE D CLAY LINER
- EXISTING LEACHATE LINE
- ■ EXISTING LEACHATE COLLECTION SUMP
- EXISTING LEACHATE RISER
- 515 PROPOSED TOP OF OVERLINER CONTOUR
- PROPOSED OVERLINER LEACHATE LINE
- ⊡ PROPOSED OVERLINER LEACHATE COLLECTION SUMP
- 3H:1V SLOPE (TYPICAL)
- APPROXIMATE LOCATION OF PROPOSED SLURRY WALL
- ● S12 STRAIN/SLOPE EVALUATION POINT

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
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DESIGN BY: MDM
REVIEWED BY: JPY

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O:\1339\351\EXPANSION 2009\PART III-SDP\III\III-B\IIIJ-B-2-22 STRAIN_SLOPE EVAL PTS.dwg, sford, 1:2

Prep By: MDM
Date: 3/21/2012

Chkd By: JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11-02
APPENDIX IIIJ-B
OVERLINER SYSTEM POST-SETTLEMENT SLOPE SUMMARY

OVERLINER

Evalution Point[1]		Initial Top of Overliner Elevation (ft-msl)		Post-Settlement Top of Overliner Elevation (ft-msl)		Plan View Distance (ft)	Initial Slope (%)	Post-Settlement Slope (%)
A	B	A	B	A	B			
S1	S2	522.9	498.4	505.2	489.4	696.8	3.5	2.27
S3	S4	523.0	496.1	505.3	487.5	640.2	4.2	2.78
S5	S6	519.8	497.2	503.8	488.4	468.2	4.8	3.31
S7	S8	521.7	502.4	504.4	493.1	589.3	3.3	1.91
S9	S10	520.4	501.1	503.6	491.5	511.8	3.8	2.36
S9	S11	520.4	508.0	503.6	491.5	627.5	2.0	1.94
S12	S13	516.0	502.1	502.1	492.4	259.8	5.4	3.73
S14	S15	508.0	461.8	493.8	459.6	230.8	20.0	14.83

[1] Refer to Sheet IIIJ-B-2-22 for evaluation point locations.

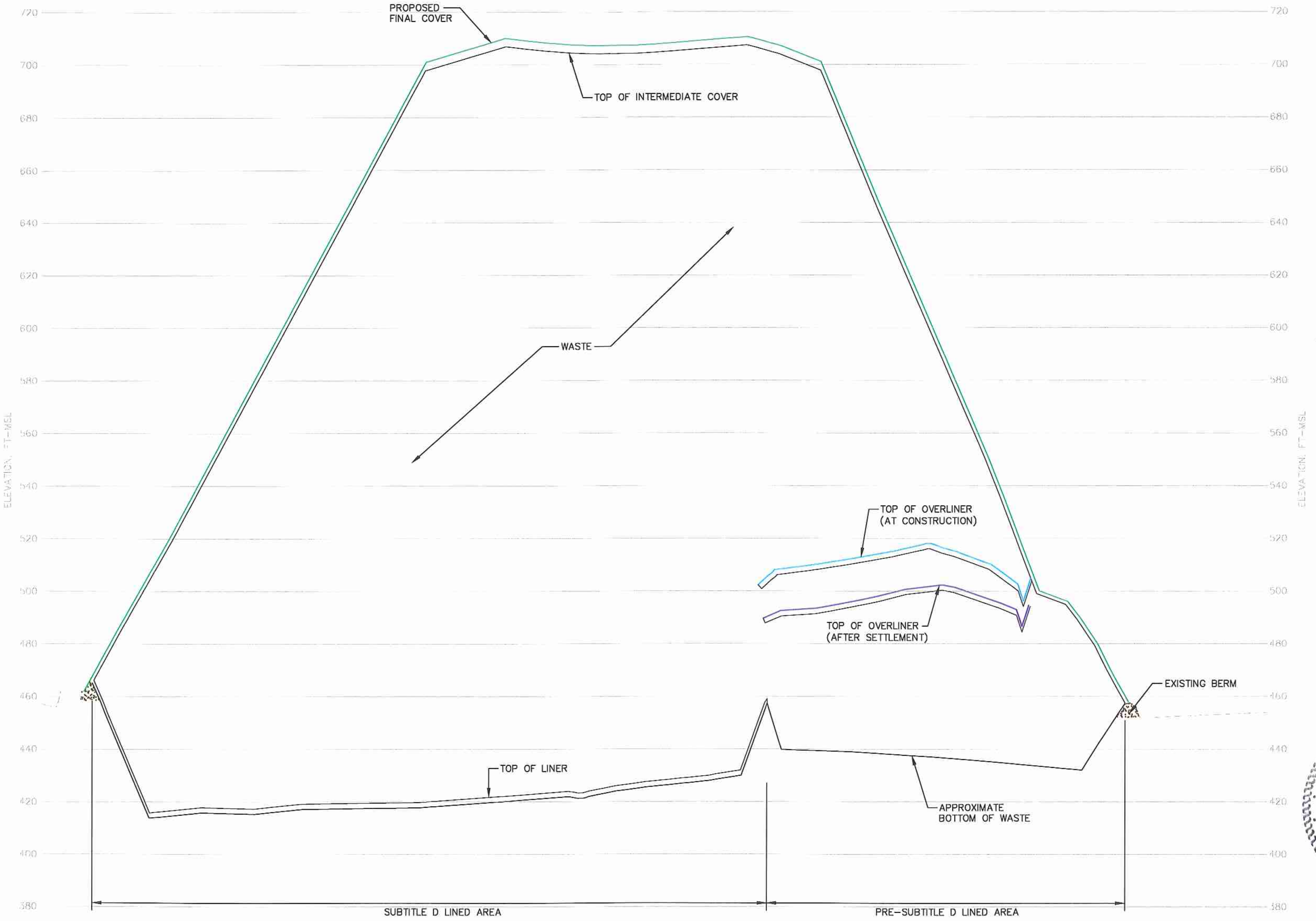
Prep By: MDM
Date: 3/21/2012

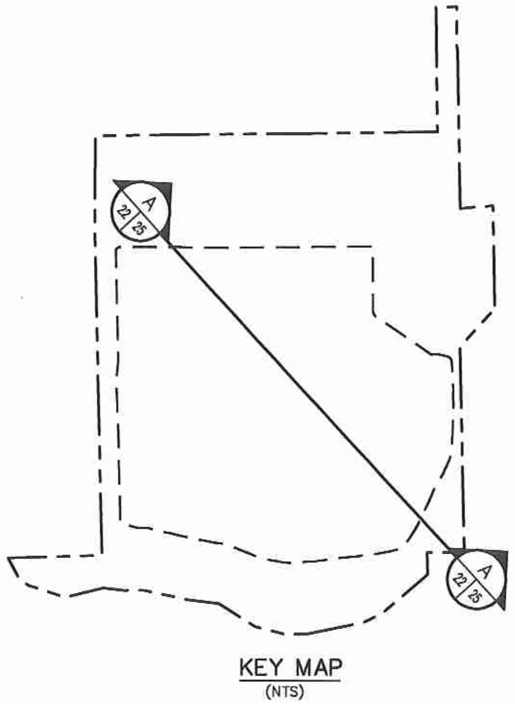
Chkd By: JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11-02
APPENDIX IIIJ-B
OVERLINER SYSTEM POST-SETTLEMENT SLOPE SUMMARY

OVERLINER TRENCH PIPE

Evalution Point[1]		Initial Top of Overliner Elevation (in Trench) (ft-msl)		Post-Settlement Top of Overliner Elevation (in Trench) (ft-msl)		Plan View Distance (ft)	Initial Slope (%)	Post-Settlement Slope (%)
A	B	A	B	A	B			
1	2	496.8	496.1	487.6	487.1	105.0	0.6	0.50
2	3	496.1	495.5	487.1	486.5	100.2	0.6	0.54
3	4	495.5	494.9	486.5	486.0	100.2	0.6	0.55
4	5	494.9	494.3	486.0	485.4	100.2	0.6	0.60
5	6	494.3	493.7	485.4	484.8	100.2	0.6	0.57
6	7	493.7	493.1	484.8	484.5	62.9	1.0	0.51
13	12	494.0	493.5	485.8	485.2	89.2	0.6	0.63
12	11	493.5	492.9	485.2	484.6	104.4	0.6	0.58
11	10	492.9	492.3	484.6	483.9	102.9	0.6	0.64
10	9	492.3	491.6	483.9	483.4	103.5	0.7	0.50
9	8	491.6	490.8	483.4	482.9	100.9	0.7	0.50
14	15	493.0	492.3	484.8	484.1	117.5	0.6	0.56
15	16	492.3	491.7	484.1	483.5	102.9	0.6	0.58
16	17	491.7	491.0	483.5	483.0	103.4	0.7	0.50
17	18	491.0	490.4	483.0	482.3	101.9	0.6	0.71
18	19	490.4	489.8	482.3	481.6	103.2	0.6	0.63
25	24	499.5	497.8	490.4	488.8	111.9	1.5	1.46
24	23	497.8	496.2	488.8	487.3	104.9	1.5	1.48
23	22	496.2	494.6	487.3	486.0	101.6	1.5	1.26
22	21	494.6	493.1	486.0	484.8	103.9	1.5	1.09
21	20	493.1	492.0	484.8	483.8	70.9	1.5	1.49
26	27	500.5	499.9	491.4	490.8	91.7	0.6	0.66
27	28	499.9	499.3	490.8	490.2	100.4	0.6	0.62
28	29	499.3	498.7	490.2	489.6	100.4	0.6	0.62
29	30	498.7	498.1	489.6	489.0	100.2	0.6	0.60
30	31	498.1	497.5	489.0	488.3	109.7	0.6	0.61
37	36	498.7	498.1	489.3	488.8	102.7	0.6	0.53
36	35	498.1	497.5	488.8	488.2	100.6	0.6	0.58
35	34	497.5	496.9	488.2	487.7	100.5	0.6	0.55
34	33	496.9	496.3	487.7	487.1	100.3	0.6	0.59
33	32	496.3	495.9	487.1	486.8	58.2	0.6	0.54
38	39	498.5	497.7	489.1	488.4	127.9	0.6	0.59
39	40	497.7	497.0	488.4	487.8	110.9	0.6	0.55
40	41	497.0	496.4	487.8	487.1	109.5	0.6	0.56
41	42	496.4	495.9	487.1	486.7	82.8	0.6	0.54
47	46	498.7	498.1	489.6	489.0	107.4	0.6	0.64
46	45	498.1	497.4	489.0	488.3	111.7	0.6	0.62
45	44	497.4	496.7	488.3	487.6	113.1	0.6	0.63
44	43	496.7	496.1	487.6	486.9	106.8	0.6	0.62
48	49	498.7	498.1	489.7	489.1	100.3	0.6	0.56
49	50	498.1	497.5	489.1	488.5	100.2	0.6	0.55
50	51	497.5	496.9	488.5	488.0	100.0	0.6	0.54
51	52	496.9	496.3	488.0	487.4	100.0	0.6	0.56
52	53	496.3	495.6	487.4	486.8	116.9	0.6	0.54





KEY MAP
(NTS)

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3-23-12

TYPICAL SECTION A 22 | 25

0 200 400
SCALE IN FEET (HORIZONTAL)

0 20 40
SCALE IN FEET (VERTICAL)

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DATE: 03/2012
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CAD: IIIJ–B–2–25_TYP SEC.DWG

DRAWN BY: VRS
DESIGN BY: TR
REVIEWED BY: JPY

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APPENDIX IIIJ-B-3

FINAL COVER SYSTEM SETTLEMENT AND STRAIN ANALYSES

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER

3-23-12

Includes pages IIIJ-B-3-1 through IIIJ-B-3-11

Prep By: MDM
Date: 3/21/2012

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-B
SOLID WASTE AND FINAL COVER
SETTLEMENT AND STRAIN

Chkd By: YLG
Date: 3/23/2012

Required: Determine the post-settlement slope of the final cover system and verify that the strain induced on the geocomposite due to settlement is within acceptable limits.

Method:

A. Estimate primary settlement of waste below the final cover system.
B. Estimate secondary settlement of waste below the final cover system.
C. Estimate total settlement of waste below the final cover system.
D. Verify that strain induced on the geocomposite due to settlement is within acceptable limits.

Description of Contents:

- Sheet IIIJ-B-3-2 shows the final contour plan and evaluation points.
- Sheets IIIJ-B-3-3 through IIIJ-B-3-9 detail the procedure for the MSW and final cover settlement calculations.
- Sheet IIIJ-B-3-10 provides a summary of the settlement analysis for the final cover.
- Sheet IIIJ-B-3-11 provides a summary of the strain evaluation for the final cover.

References:

1. Sowers, George F., Settlement of Solid Waste, *Proceedings of the Eighth International Conference on Soil Mechanics and Foundations Engineering, 1973*

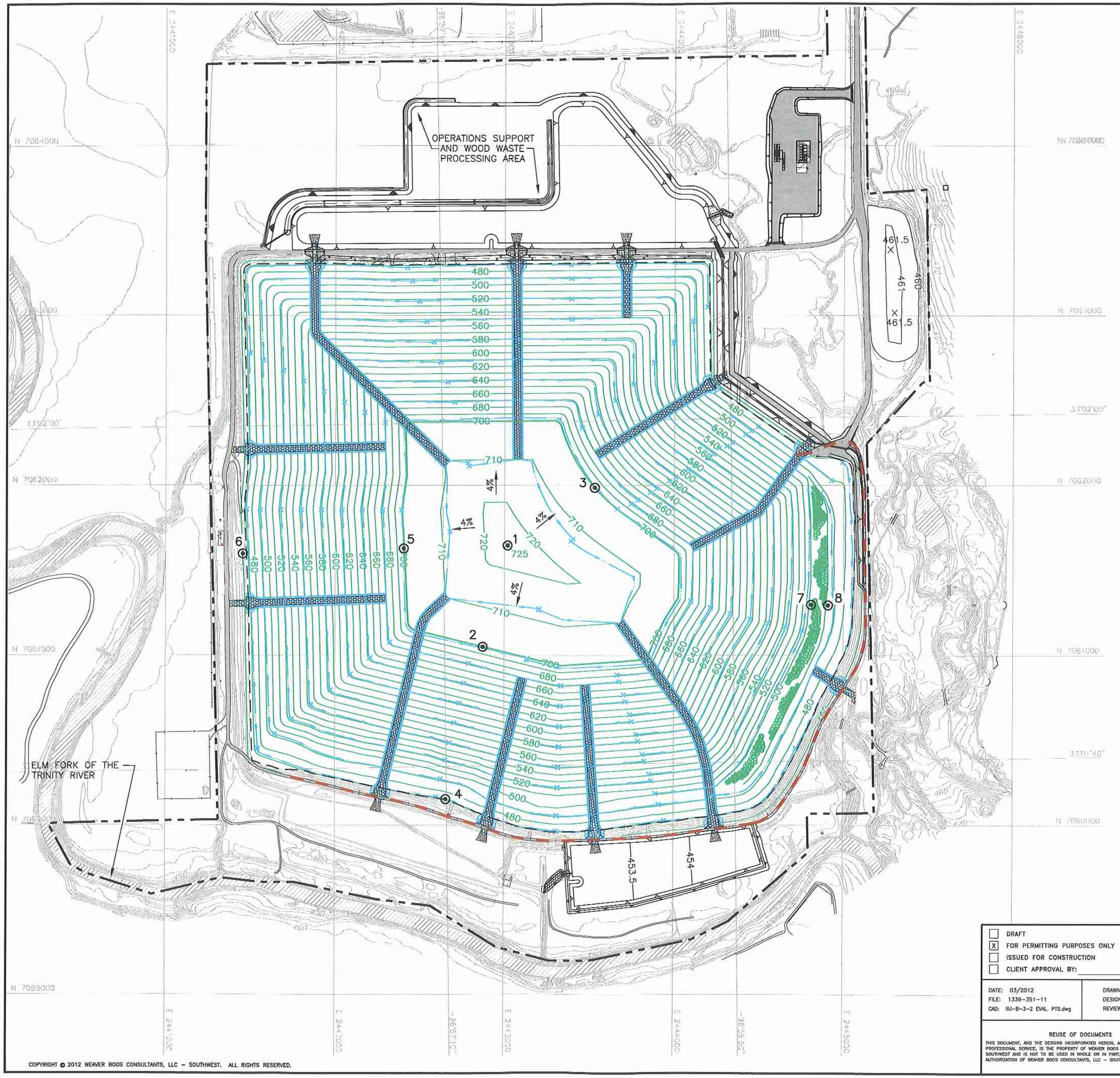
2. Qian, Xuede, R.M. Koerner, D. H. Gray, Geotechnical Aspects of Landfill Design and Construction, Prentice-Hall, Inc., New Jersey, 2002.

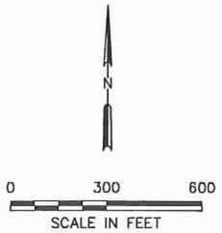
3. Koerner, Robert M., Designing with Geosynthetics, Third Edition. Prentice-Hall, New Jersey, 1994.

4. Acar, Yalcin B. & Daniel, David E., *Geoenvironment 2000 Characterization, Containment, Remediation, and Performance in Environmental Geotechnics,* Volume 2, American Society of Civil Engineers, 1995.

5. Zornberg, Jorge G., et al., *Retention of Free Liquids in Landfills Undergoing* Vertical Expansion, Journal of Geotechnical and Geoenvironmental Engineering, July 1999.

6. Fassett, Jeffrey B., et al., Geotechnical Properties of Municipal Solid Wastes and Their Use in Landfill Design, Waste Tech, 1994.





LEGEND

— - - —	PERMIT BOUNDARY
— — — —	LIMIT OF WASTE
N 7063000	STATE PLANE COORDINATE SYSTEM
33°02'00"	GEODETIC COORDINATE SYSTEM
500	EXISTING CONTOUR
720	PROPOSED FINAL COVER CONTOUR
600	REGRADED BUFFER ZONE AREA
▨	PROPOSED LETDOWN STRUCTURE
—×—	DRAINAGE SWALE
— · —	APPROXIMATE LOCATION OF PROPOSED SLURRY WALL
⊙4	SETTLEMENT EVALUATION POINT

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS COMPILED FROM AERIAL PHOTOGRAPHY FLOWN 8-28-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 83. ELEVATIONS ARE BASED ON NAVD 88.
2. PERMIT BOUNDARY WAS REPRODUCED FROM LEGAL DESCRIPTION PROVIDED BY PEISER SURVEYING CO. DATED NOVEMBER 2010.

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Solution:

A) Estimate primary settlement of waste below the final cover system.

MSW will undergo primary consolidation due to its own weight, final cover, equipment, etc. Primary consolidation occurs quickly, generally within the first month after loading. Therefore, the weight of the final cover system is the only remaining factor that contributes to primary consolidation. In addition, by the time the construction of the final cover is complete, settlement of the waste due to the weight of the final cover will be complete.

Primary settlement is calculated using the following equation:

$$S_p = \frac{H_o C_c}{1+e_o} \log\left(\frac{\sigma'_o + \Delta\sigma}{\sigma'_o}\right)$$

S_p = primary settlement, ft
H_o = waste thickness below the final cover system, ft
C_c = compression index
e_o = void ratio of the waste layer below final cover before settlement (i.e., before final cover placement)
$\Delta\sigma$ = change in loading/increase in overburden pressure, psf
σ'_o = overburden pressure acting at mid-height of refuse below the final cover, psf

For this site assume: $C_c =$ $0.35 \text{ x } e_o$ (Ref. 1, p. 210)

The compression index is a function of the void ratio. The compression index can range from C_c=0.15e_o to C_c=0.55e_o for fills that are low and high in organic content, respectively. An average compression index value was chosen because it is consistent with the types of waste accepted in the past. It is also representative of the minimal amount of settlement the site has experienced.

The average void ratio of waste below the final cover is estimated by determining the void ratio at the midpoint of the waste column below the final cover system. The void ratio is calculated for each settlement evaluation point using the following equation.

$$e_o = 1.86 - 0.00102\ \sigma'_o \qquad \text{(Ref. 5, p. 590)}$$

where: σ'_o = overburden pressure in kPa

$\sigma'_o = 0.5\ \gamma_{msw}\ H_o$
$\Delta\sigma = \gamma_{cov}\ T_c$
γ_{msw} = unit weight of waste below the final cover system, pcf
γ_{cov} = unit weight of cover, pcf
T_c = thickness of final cover system, ft

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-B
SOLID WASTE AND FINAL COVER
SETTLEMENT AND STRAIN

Parameters:

γ_{cov} = 120 pcf
T_c = 3.5 feet
γ_{msw} = varies (see note below)

Note: γ_{msw} is selected based on the waste thicknesses below the final cover system using the Unit Weight Profile for Waste/Daily Cover within an MSW Landfill chart from Ref. 4.

The settlement points analyzed are shown on Sheet IIIJ-B-3-2. An example calculation of the estimated primary settlement is shown below for Evaluation Points 1 and 2. The estimated primary settlement for all evaluation points is shown on Sheets IIIJ-B-3-10.

At Evaluation Point 1

Top of Waste Elevation (ft-msl)= 721.5
Bottom of Waste Elevation (ft-msl)= 426.5
H_o = 295.0 ft
γ_{msw} = 79 pcf

$\sigma'_o = 0.5\ \gamma_{msw}\ H_o$
σ'_o = 11652.5 psf
σ'_o = 557.9 kPa

$e_o = 1.86 - 0.00102\ \sigma'_o$
e_o = 1.3

$C_c = 0.35\ e_o$
C_c = 0.45

$\Delta\sigma$ = 420.0 psf

$$S_p = \frac{295.0 \times 0.45}{1 + 1.3} \quad \log \quad \frac{11652.5 + 420.0}{11652.5}$$

S_p = 0.9 ft

At Evaluation Point 2

Top of Waste Elevation (ft-msl)= 697.5
Bottom of Waste Elevation (ft-msl)= 433.5
$H_o =$ 264.0 ft
$\gamma_{msw} =$ 77 pcf

$\sigma'_o = 0.5\, \gamma_{msw}\, H_o$
$\sigma'_o =$ 10164.0 psf
$\sigma'_o =$ 486.7 kPa

$e_o = 1.86 - 0.00102\, \sigma'_o$
$e_o =$ 1.4

$C_c =$ 0.35 e_o
$C_c =$ 0.48

$\Delta\sigma =$ 420.0 psf

$$S_p = \frac{263.0 \times 0.48}{1 + 1.3} \quad \log \quad \frac{10125.5 + 420.0}{10125.5}$$

$S_p =$ 0.9 ft

B) Estimate secondary settlement of waste below the final cover system.

Secondary consolidation continues at substantial rates for periods of time well beyond primary settlement. It is a combination of mechanical secondary compression, physico-chemical reaction, and bio-chemical decay. The settlement-log time relationship is similar to secondary compression of soils and can be expressed by:

$$S_c = \frac{H'_o \alpha}{1 + e'_o} \log (t_2/t_1)$$ (Ref. 2, p. 451)

Parameters:

S_c = secondary settlement, ft
α = secondary compression index
e'_o = void ratio of the waste layer below the final cover after primary settlement has occurred due to the final cover
H'_o = waste thickness below the final cover system after settlement, ft
t_1 = starting time of secondary settlement in years
t_2 = time at which settlement is determined in years

For this site assume: $\alpha = 0.06 \times e'_o$ (Ref. 1, p. 210)

As reported by Sowers (Ref. 1), the secondary compression index is used to estimate waste decomposition. The secondary compression index ranges from $\alpha = 0.03e'_o$ to $\alpha = 0.09e'_o$ for conditions that are unfavorable and favorable to decay, respectively. An average secondary compression index value was chosen because it is consistent with the types of waste accepted in the past. It is also representative of the minimal amount of settlement the site has experienced.

The void ratio of the waste below the final cover at closure is a function of the overburden pressure caused by placement of the final cover system. The void ratio is calculated for each settlement evaluation point using the following equation.

$$e'_o = 1.86 - 0.00102\, \sigma''_o$$ (Ref. 5, p. 590)

where: σ''_o = overburden pressure in kPa

$\sigma''_o = 0.5\, \gamma'_{msw} H'_o$
γ'_{msw} = unit weight of waste below the final cover after primary settlement has occurred, pcf

For this site, the void ratio after primary settlement for the waste/cover soils below the final cover system varies between 1.3 to 1.9. Therefore, the secondary compression index will range between 0.08 to 0.11. Most literature sources report the secondary compression index in terms of the "modified secondary compression index" (Refs. 2, 6). The modified secondary compression index is defined by the following.

$$C'_\alpha = \frac{\alpha}{1 + e'_o}$$

The secondary compression index calculated for this site translates to a modified secondary compression index of 0.03 to 0.04 (for a void ratio of 1.3 to 1.9). These values are consistent with reported values for the modified secondary compression index which vary from 0.03 to 0.1 (Refs. 2, 6).

Time frame used for this analysis:

$t_1 =$ 0.083 years
$t_2 =$ 30.0 years (postclosure period)

An example calculation of the estimated secondary settlement using the above secondary settlement period is shown below for Evaluation Points 1 and 2. The estimated secondary settlement for all evaluation points is shown on Sheet IIIJ-B-3-10.

At Evaluation Point 1:

$H'_o = H_o - S_p$
$H_o' =$ 294.1 ft

$\sigma''_o = 0.5\, \gamma'_{msw}\, H'_o$
$\gamma'_{msw} =$ 79.0 pcf
$\sigma''_o =$ 11617.2 psf
$\sigma''_o =$ 556.2 kPa

$e'_o = 1.86 - 0.00102\, \sigma''_o$
$e'_o =$ 1.3

$\alpha = 0.06\, e'_o$
$\alpha =$ 0.08

$$S_c = \frac{H'_o\, \alpha}{1 + e'_o} \log (t_2/t_1)$$

$$S_c = \frac{294.1 \times 0.08}{1 + 1.3} \log (30/0.083)$$

$S_c =$ 25.5 ft

At Evaluation Point 2:

$H'_o = H_o - S_p$
$H_o' =$ 263.1 ft

$\sigma''_o = 0.5\, \gamma'_{msw}\, H'_o$
$\gamma'_{msw} =$ 77.0 pcf
$\sigma''_o =$ 10127.9 psf
$\sigma''_o =$ 484.9 kPa

$e'_o = 1.86 - 0.00102\, \sigma''_o$
$e'_o =$ 1.4

$\alpha =$ 0.06 e'_o
$\alpha =$ 0.08

$$S_c = \frac{H'_o\, \alpha}{1 + e'_o} \log (t_2/t_1)$$

$$S_c = \frac{262.1 \text{ x } 0.08}{1+1.4} \log (30.0/0.083)$$

$S_c =$ 23.3 ft

C) Estimate total settlement of waste below the final cover system.

Total settlement is the combination of primary and secondary settlement. An example calculation of the estimated total settlement is shown below for Evaluation Points 1 and 2. The estimated total settlement for all evaluation points is shown on page IIIJ-B-3-10.

At Evaluation Point 1:				
Thickness of waste column, ft =	295.0	Primary Settlement =	0.9	ft
		Secondary Settlement =	25.5	ft
		Total Settlement =	26.3	ft
At Evaluation Point 2:				
Thickness of waste column, ft=	264.0	Primary Settlement =	0.9	ft
		Secondary Settlement =	23.3	ft
		Total Settlement =	24.2	ft

D) Verify that strain induced on the geocomposite due to settlement is within acceptable limits.

Determine the post-settlement slope of the final cover system and verify the strain induced on the geocomposite due to settlement is within acceptable limits.

$$\text{Strain} = \frac{L_f - L_o}{L_o} x100$$

(Reference 2, Page 472)

L_f= Final distance between evaluation points after total settlement (ft)
L_o= Initial distance between evaluation points before total settlement (ft)

An example calculation of the estimated strain is shown below for Evaluation Points 1 and 2. The estimated strain for all evaluation points is shown on page IIIJ-B-3-11.

Evaluation Point 1. to Evaluation Point 2:

Initial Distance:

Evaluation Point 1 Elev. =	725.0 ft-msl
Evaluation Point 2 Elev. =	701.0 ft-msl
Plan View Distance=	612.8 ft
L_o=	613.3 ft

Total Settlement:

Total Settlement Point 1=	26.3 ft
Total Settlement Point 2=	24.2 ft

Final Distance (after settlement):

Evaluation Point 1 Elev. =	698.7 ft-msl
Evaluation Point 2 Elev. =	676.8 ft-msl
Plan View Distance=	612.8 ft
L_f=	613.2 ft

Strain= -0.013%

Conclusion:

Strain is acceptable.

- Compacted clay component of final cover has the smallest average allowable tensile strain value which is 0.5 percent (Reference 2, Page 469).
- The allowable tensile strain for an HDPE geomembrane is 25 percent (Reference 2, page 94).
- The allowable tensile strain for a drainage geocomposite is more than 20 percent for the geotextile (reference 3, page 112) and 200 percent for the geonet (reference 3, page 400).
- The calculated strain values are all less than zero; therefore the system will be stable.

Prep By: MDM
Date: 3/21/2012

Chkd By: JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-B
FINAL COVER SETTLEMENT SUMMARY

FINAL COVER EVALUATION

Evaluation Point[1]	Initial Top of Final Cover Elevation (ft-msl)	Initial Top of Waste Elevation (ft-msl)	Bottom of Waste Elevation (ft-msl)	H_o (ft)	γ_{msw} (pcf)	σ'_o (psf)	$\Delta\sigma$ (psf)	e_o	C_c	S_p (ft)	H'_o (ft)	γ'_{msw} (pcf)	σ''_o (psf)	e'_o	α	S_c (ft)	Total Settlement (ft)	Post-Settlement Top of Final Cover Elevation (ft-msl)
1	725.0	721.5	426.5	295.0	79	11653	420.0	1.3	0.45	0.9	294.1	79	11617	1.3	0.08	25.5	26.3	698.7
2	701.0	697.5	433.5	264.0	77	10164	420.0	1.4	0.48	0.9	263.1	77	10128	1.4	0.08	23.3	24.2	676.8
3	701.0	697.5	423.0	274.5	78	10706	420.0	1.3	0.47	0.9	273.6	78	10670	1.3	0.08	24.0	25.0	676.0
4	470.0	466.5	466.5	0.0	42	0	420.0	1.9	0.65	0.0	0.0	42	0	1.9	0.11	0.0	0.0	470.0
5	701.0	697.5	425.5	272.0	78	10608	420.0	1.3	0.47	0.9	271.1	77	10437	1.4	0.08	23.9	24.8	676.2
6	462.6	459.1	459.1	0.0	42	0	420.0	1.9	0.65	0.0	0.0	42.0	0	1.9	0.11	0.0	0.0	462.6
7	504.0	500.5	437.0	63.5	51	1619	420.0	1.8	0.62	1.4	62.1	51	1583	1.8	0.11	6.1	7.5	496.5
8	500.0	496.5	436.0	60.5	51	1543	420.0	1.8	0.62	1.4	59.1	51	1507	1.8	0.11	5.8	7.2	492.8

[1] Refer to Sheet IIIJ-B-3-2 for Evaluation Point locations.

Prep By: MDM
Date: 3/21/2012

Chkd By: JLG
Date: 3/23/2012

CAMELOT LANDFILL
1339-351-11
APPENDIX IIIJ-B
FINAL COVER SYSTEM STRAIN SUMMARY

FINAL COVER EVALUATION

Evalution Point[1]		Initial Top of Final Cover Elevation (ft-msl)		Post-Settlement Top of Final Cover Elevation (ft-msl)		Plan View Distance (ft)	L_o (ft)	L_f (ft)	Initial Slope (ft/ft)	Post-Settlement Slope (ft/ft)	Strain (%)
A	B	A	B	A	B						
1	2	725.0	701.0	698.7	676.8	612.8	613.3	613.2	0.04	0.036	-0.013
1	3	725.0	701.0	698.7	676.0	613.6	614.1	614.0	0.04	0.037	-0.009
1	5	725.0	701.0	698.7	676.2	609.5	610.0	609.9	0.04	0.037	-0.010
2	4	701.0	470.0	676.8	470.0	930.7	958.9	953.4	0.25	0.222	-0.579
5	6	701.0	462.6	676.2	462.6	951.7	981.1	975.4	0.25	0.224	-0.585
7	8	504.0	500.0	496.5	492.8	100.0	100.1	100.1	0.04	0.037	-0.011

[1] Refer to Sheet IIIJ-B-3-2 for Evaluation Point locations.

APPENDIX IIIJ-C

LABORATORY TEST RESULTS

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER

3-23-12

Includes pages IIIJ-C-1 through IIIJ-C-91

INTRODUCTION

Subsurface characterization at the site was based on field exploration and geotechnical testing conducted by Rone Engineers (1979 and 1980), Reed Engineering Group (1994 and 1995), and WBC (2010). A total of 59 borings were drilled at the site for geotechnical purposes that included laboratory testing. Additional subsurface characterization was provided by other subsurface exploratory drilling and installation of monitoring wells. However, these investigations did not yield any geotechnical laboratory testing.

A summary of the laboratory test results is presented in the following tables:

- Table IIIJ-C-1 – Summary of all geotechnical testing for the alluvial stratum (includes earthen fill, alluvial clay, and alluvial sand) and shale stratum (includes weathered shale and unweathered shale).
- Table IIIJ-C-2 – Summary of geotechnical testing on earthen fill material (includes earthen fill and perimeter berm material).
- Table IIIJ-C-3 – Summary of geotechnical testing on alluvial clay.
- Table IIIJ-C-4 – Summary of geotechnical testing on alluvial sand (includes sand and gravel).
- Table IIIJ-C-5 – Summary of geotechnical testing on weathered shale.
- Table IIIJ-C-6 – Summary of geotechnical testing on unweathered shale.

Available laboratory test results are also included in this appendix.

TABLE IIIJ-C-1
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
TESTING ON ALLUVIAL STRATA SOILS											
1979 Borings by Rone Engineers											
B-1	0	61	25	36		21					
	2					15					
	5					12					
	10	64	25	39		17		1E-09	1E-09		
	15					17					
	20	87	33	54		26					
	25	54	26	28		28			1E-09		
B-2	0					34					
	2	74	33	41		34	86		1E-09		
	5					23					
	10	75	31	44		27	96		1E-09		
	15					33					
	20	92	29	63		34					
B-3	0					22					
	2	42	19	23		16					
	5					21					
B-4	0					19					
	2	26	18	8	29.4	25			3.2E-06		
	5					18					
	9					16					
B-5	0					22					
	2	42	20	22	51.3	19	109				
	5					19					
	10	52	22	30		29					
B-6	0					20					
	2	29	15	14		26					
	5					18					
	9	63	26	37		13					
B-7	0					16					
	2					17					
	5	51	20	31		20					
	10					27					
	15					20					
B-8	0					35					
	2					23					
	5	58	24	34	79.7	22					
	10					20					
	15	25	17	8		14					
B-9	0					22					
	2					36					
	5					18					
	10					17					
	15	22	13	9		12			1.0E-05		
	20					20					
B-10	0					21					
	2					17					
	5					23					
	10					21					
	15					13					
1980 Borings by Rone Engineers											
B-11	0					20					
	2					25					
	5					20					
	10					18					
	15	51	21	30		22		6.7E-08			
	20					26					
	25	60	23	37		24					
	30					25					
	35				80	22					
B-12	0					23					
	2	67	29	38	96	23					
	5					23					
	10	64	27	37		23		4.5E-08			
	15					15					

TABLE IIJ-C-1
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
	20					20					
	25	56	22	34		17					
B-13	0					19					
	2					25					
	5	63	30	33		21	103				
	10					24					
	15					26					
	20					22					
	25	45	20	25	87	17			2.0E-08		
	30					8					
	35					15					
	40					21					
	46				49	21					
B-14	0					23					
	2					25					
	5					20					
	10					23					
	15	67	27	40		27					
	20					27					
	25					26					
	30	47	22	25	81	26			4.3E-08		
	40				19	20			8.0E-06		
B-15	0					34					
	2	73	29	44		28					
	5					19					
	10					21					
	15	51	26	25		20		8.0E-07			
	20					11					
	25	40	15	25	75	13			3.3E-08		
	30					11					
	35				40	20					
	40					17					
	45				15	14					
B-16	0					21					
	2	58	23	35	91	23					
	5					18					
	10					17		6.0E-08			
	15					21					
	20				37	15					
B-17	0					16					
	2					28					
	5					18					
	10					13					
	15					8		6.8E-07			
B-18	0					28					
	2	67	29	38	98	28					
	5					21					
	10				78	15					
	15					8					
B-19	0					24					
	2					23					
	5					22					
	10	65	26	39		25					
	15					26					
	20	66	27	39	97	24					
	25					23					
	30					21					
	35					16					
	40				64	23					
B-20	0					35					
	2					34					
	5	65	30	35		22			1.2E-08		
	10					25					
	15					24					
	20				95	21					
	25					22					

TABLE IIIJ-C-1
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
	30					17		3.9E-07			
	35					17					
	40					23					
	45				66	23					
B-21	0					27					
	2	65	30	35		20		3.5E-09			
	5					18					
	10	33	13	20	35	16					
	15				29	23					
B-22	0					13					
	2					21					
	5	29	16	13		8		8.4E-07			
	10				26	8					
B-23	0					25					
	2					30					
	5					21					
	10	31	17	14	36	9					
B-24	0					5					
	2					11					
	5					20					
	10				21	10					
	15				28	7					
B-25	0					26					
	2					25					
	5					19					
	10	24	17	7		8					
	15					7					
B-26	0					6					
	2					23					
	5					16					
	7					15					
	10	24	18	6	27	11					
	15					3					
B-27	0					9					
	2					16					
	5					21					
	10					9					
	15	23	17	6	27	8					
	18					4					
B-28	0					27					
	2	60	28	32	90	32					
	5					19					
	10					10					
	12					4					
	15				29	7					
B-29	0					26					
	2					27					
	5					17					
	8	51	21	30	76	16					
	10					15					
	15					3					
2010 Borings by Weaver Boos Consultants											
WB-1	6	64	27	37	90	26.6	102.0	7.7E-08			2.5
	12	63	24	39	95	26.7	96.1	6.6E-08			3
	19	53	20	33	73	25.2	94.7				2
	23	26	17	9	13	10.7					
WB-2	5	50	19	31	64	22.1	103.5				2
	10					29.6	88.6				1
	12	21	14	7	12	8.7	134.3	1.2E-06			
WB-3	5	60	21	39	79	23.1	101.3				4.5
	9	37	15	22	36	15.3	113.6	2.6E-07			2
	11					15.1	112.5				1
	13	24	15	9	17	14.9					
WB-7	5	29	12	17	44	14.2	121.1				
	9	40	18	22	20	13.1	131.6				
	11	23	15	8	15	13.4		5.0E-04	4.6E-04		

TABLE IIIJ-C-1
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
WB-10	4	48	18	30	72	18.0	115.9	9.4E-08			4.5
	7	29	13	16	35	13.3	124.1	1.3E-07			2
	11	18	14	4	11	9.9					
	13	15	11	4	11	12.0					
WB-13	4	68	25	43	93	27.6	97.7				3
	15					25.8	96.4				2
	19	50	17	33	73	27.1	99.5	5.7E-08	8.1E-08		0.5
	22	47	19	28	64	23.9	103.6				
WB-14	7					17.8	108.7		5.5E-08		
	10	55	21	34	91	33.3	97.0		5.4E-08		1
	13	56	20	36	84	29.7	94.2		4.5E-08		
WB-15	6					28.3	88.9	8.9E-08			
	10					27.1	95.3				2
	14	70	23	47	91	25.1	97.4				4.5
	24	31	13	18	47	21.4	112.0	8.5E-07			1.5
WB-16	4	67	21	46	88	19.4	112.2				4.5
	8					27.5	96.1				3.5
	11	60	22	38	87	27.7	98.2				2
TESTING ON SHALE STRATA SOILS											
1979 Borings by Rone Engineers											
B-1	30					18					
B-3	10					22					
	15					18					
B-4	14					17					
	19					16					
B-5	15					20					
	19					16					
B-6	14					17					
B-7	20					17					
B-8	20					10					
	24					19					
B-9	25					17					
B-10	20					12					
1980 Borings by Rone Engineers											
B-12	30					24					
	35					17					
B-13	47					22					
B-14	45					25					
	50					27					
	55					26					
B-19	45					22					
	50					20					
B-20	50					23					
B-22	16					18					
B-23	15					18					
B-24	20					25					
B-25	20					20					
	22					15					
B-26	19					15					
B-27	24					26					
B-28	18					15					
B-29	22					15					
1995 Borings by Reed Engineering Group											
DB-1	7					16.7					
	12					15.3					
	17					13.7					
	21	51	27	24	97.8				1.17E-08		
	22					15.2					
	23	48	24	24	92.1			1.25E-08			

TABLE IIIJ-C-1
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
	24					14.8					
	25					15.3					
	26					13.5					
	27					14.9					
	28					14.2					
	29					14.7					
	30					15.3					
	31					15.8					
	32					9					
	33					17.4					
	34					18.4					
	39					17					
	44					17					
	46	93	68	25	99.8				7.74E-09		
	47	88	63	25	100			1.62E-09			
	49					12.8					
	52					16.7					
	60					17.2					
	65					15.9					
2010 Borings by Weaver Boos Consultants											
WB-3	14.7					20.1	113.7		3.9E-08		
	15					21.6					
WB-4	60					15.6	113.1		2.8E-08		4.5
WB-5	60					17.2	112.6			29,200	
	62					18.4	114.7				
WB-6	65					16.3	112.3				
	66					16.3	125.8		3.6E-08		4.5
WB-8	51.5					12.8	117.9				
	56					16.8	102.3		2.9E-08		4.5
	94					14.8	117.8				4.5
WB-9	60					17.9	111.2		2.3E-08		
	73					15.9	116.3				4.5
WB-10	45					17.0	97.1	3.2E-08			4.5
	83					17.9	107.5				
WB-11	58					13.6	125.5		3.7E-08		4.5
	60					20.3	104.5				4.5
	65					16.6	119.8				4.5
WB-12	59					12.9	99.1				4.5
	60					20.2	95.7		2.5E-08		
WB-13	23	54	19	35	56						

TABLE IIIJ-C-1
ITASCA LANDFILL
SUMMARY OF GEOTECHNICAL TESTING

	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
SUMMARY OF TESTS FOR ALLUVIAL STRATA SOILS										
Average	50	21	28	56.4	20.0	104.2	2.7E-05	3.0E-05	--	2.5
Minimum	15	11	4	11.0	3.0	86.0	1.0E-09	1.0E-09	--	0.5
Maximum	92	33	63	98.0	36.0	134.3	5.0E-04	4.6E-04	--	4.5
Standard Deviation	18	6	13	29.7	6.9	12.0	1.1E-04	1.1E-04	--	1.3
Number of Tests	68	68	68	56	212	31	19	16	0	20
SUMMARY OF TESTS FOR SHALE STRATA SOILS										
Average	67	40	27	89.1	17.4	111.5	1.5E-08	2.6E-08	29,200	4.5
Minimum	48	19	24	56.0	9.0	95.7	1.6E-09	7.7E-09	29,200	4.5
Maximum	93	68	35	100.0	27.0	125.8	3.2E-08	3.9E-08	29,200	4.5
Standard Deviation	22	23	5	18.8	3.6	8.9	1.5E-08	1.1E-08	--	0.0
Number of Tests	5	5	5	5	71	18	3	9	1	10

SUMMARY OF TRIAXIAL SHEAR TESTS

Boring	Depth (ft)	Material	% Moisture	Dry Unit Weight (pcf)	Angle of Shear (deg)	Cohesion (psf)	Comments
WB-2	10	Clay	29.6	88.6	11.5	788	Total
			29.6	88.6	11.0	854	Effective
WB-3	11	Sandy Clay	15.1	112.5	28.4	262	Total
			15.1	112.5	32.0	384	Effective
WB-13	15	Clayey Sand	25.8	96.4	8.3	470	Total
			25.8	96.4	16.4	488	Effective
WB-15	10	Perimeter Berm	27.1	95.3	16.0	834	Total
			27.1	95.3	13.1	1074	Effective
WB-16	8	Perimeter Berm	27.5	96.1	15.8	992	Total
			27.5	96.1	15.0	1076	Effective

SUMMARY OF PROCTOR TESTS

Boring	Material	LL	PL	PI	Dry Unit Weight	O.M.C. (%)
B-14 & B-16 (2.0' to 10.0')	Alluvial Soil	56	24	32	100.3	22.6
B-19 & B-20 (2.0' to 10.0')	Alluvial Soil	59	26	33	97.2	22.5

SUMMARY OF REMOLDED PERMEABILITY TESTS

Boring	Material	LL	PL	PI	Moisture Content (%)	Permeability (cm/s)	Orientation
B-14 & B-16 (5', 10', & 15' ea.)	Alluvial Soil	NP	NP	NP	23	3.3E-08	Horizontal
B-14 & B-16 (5', 10', & 15' ea.)	Alluvial Soil	NP	NP	NP	21	6.6E-08	Vertical
B-19 & B-20 (10', 15' &20' ea.)	Alluvial Soil	56	24	32	22	6.1E-08	Horizontal
B-19 & B-20 (10', 15' &20' ea.)	Alluvial Soil	NP	NP	NP	24	3.2E-08	Vertical

NP = Not performed

TABLE IIIJ-C-2
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING FOR CLAY FILL AND PERIMETER BERM MATERIAL

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
TESTING ON CLAY FILL											
1979 Borings by Rone Engineers											
B-4	0					19					
B-6	0					20					
2010 Borings by Weaver Boos Consultants											
WB-1	6	64	27	37	90	26.6	102.0	7.7E-08			2.5
WB-2	5	50	19	31	64	22.1	103.5				2
WB-14	7					17.8	108.7		5.5E-08		1
TESTING ON PERIMETER BERM											
2010 Borings by Weaver Boos Consultants											
WB-15	6					28.3	88.9	8.9E-08			
	10					27.1	95.3				2
	14	70	23	47	91	25.1	97.4				4.5
WB-16	4	67	21	46	88	19.4	112.2				4.5
	8					27.5	96.1				3.5
SUMMARY OF TESTS FOR CLAY FILL											
Average		57	23	34	77.0	21.1	104.7	7.7E-08	5.5E-08	N/A	1.8
Minimum		50	19	31	64.0	17.8	102.0	7.7E-08	5.5E-08	N/A	1.0
Maximum		64	27	37	90.0	26.6	108.7	7.7E-08	5.5E-08	N/A	2.5
Standard Deviation		10	6	4	18.4	3.5	3.5	--	--	N/A	0.8
Number of Tests		2	2	2	2	5	3	1	1	0	3
SUMMARY OF TESTS FOR PERIMETER BERM											
Average		69	22	47	89.5	25.5	98.0	8.9E-08	N/A	N/A	3.6
Minimum		67	21	46	88.0	19.4	88.9	8.9E-08	N/A	N/A	2.0
Maximum		70	23	47	91.0	28.3	112.2	8.9E-08	N/A	N/A	4.5
Standard Deviation		2	1	1	2	3.6	8.6	--	N/A	N/A	1.2
Number of Tests		2	2	2	2	5	5	1	0	0	4

TABLE IIIJ-C-3
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING FOR ALLUVIAL CLAY

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
TESTING ON ALLUVIAL CLAY											
1979 Borings by Rone Engineers											
B-1	0	61	25	36		21					
	2					15					
	5					12					
	10	64	25	39		17		1E-09	1E-09		
	15					17					
	20	87	33	54		26					
	25	54	26	28		28			1E-09		
B-2	0					34					
	2	74	33	41		34	86		1E-09		
	5					23					
	10	75	31	44		27	96		1E-09		
	15					33					
	20	92	29	63		34					
B-3	0					22					
	2	42	19	23		16					
	5					21					
B-4	9					16					
B-5	0					22					
	2	42	20	22	51.3	19	109				
	5					19					
	10	52	22	30		29					
B-6	2	29	15	14		26					
	5					18					
	9	63	26	37		13					
B-7	0					16					
	2					17					
	5	51	20	31		20					
	10					27					
B-8	0					35					
	2					23					
	5	58	24	34	79.7	22					
	10					20					
B-9	0					22					
	2					36					
	5					18					
	10					17					
B-10	0					21					
	2					17					
	5					23					
	10					21					
1980 Borings by Rone Engineers											
B-11	0					20					
	2					25					
	5					20					
	10					18					
	15	51	21	30		22		6.7E-08			
	20					26					
	25	60	23	37		24					
	30					25					
	35				80	22					
B-12	0					23					
	2	67	29	38	96	23					
	5					23					
	10	64	27	37		23		4.5E-08			
	15					15					
	20					20					
	25	56	22	34		17					
B-13	0					19					
	2					25					
	5	63	30	33		21	103				
	10					24					
	15					26					
	20					22					
	25	45	20	25	87	17			2.0E-08		
B-14	0					23					
	2					25					
	5					20					
	10					23					

TABLE IIIJ-C-3
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING FOR ALLUVIAL CLAY

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
	15	67	27	40		27					
	20					27					
	25					27					
	30	47	22	25	81	26			4.3E-08		
B-15	0					34					
	2	73	29	44		28					
	5					19					
	10					21					
	15	51	26	25		20		8.0E-07			
	20					11					
	25	40	15	25	75	13			3.3E-08		
	30					11					
B-16	0					21					
	2	58	23	35	91	23					
	5					18					
	10					17		6.0E-08			
	15					21					
B-17	0					16					
	2					28					
	5					18					
	10					13					
	15					8		6.8E-07			
B-18	0					28					
	2	67	29	38	98	28					
	5					21					
	10				78	15					
	15					8					
B-19	0					24					
	2					23					
	5					22					
	10	65	26	39		25					
	15					26					
	20	66	27	39	97	24					
	25					23					
	30					21					
	35					16					
B-20	0					35					
	2					34					
	5	65	30	35		22			1.2E-08		
	10					25					
	15					24					
	20				95	21					
	25					22					
	30					17		3.9E-07			
	35					17					
	40					23					
B-21	0					27					
	2	65	30	35		20		3.5E-09			
	5					18					
B-22	0					13					
B-23	0					25					
	2					30					
	5					21					
B-24	0					5					
	2					11					
	5					20					
B-25	0					26					
	2					25					
	5					19					
B-26	0					6					
	2					23					
	5					16					
B-27	0					9					
	2					16					
	5					21					
B-28	0					27					
	2	60	28	32	90	32					
	5					19					
	10					10					
B-29	0					26					

TABLE IIIJ-C-3
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING FOR ALLUVIAL CLAY

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
	2					27					
	5					17					
	8	51	21	30	76	16					
	10					15					
2010 Borings by Weaver Boos Consultants											
WB-1	12	63	24	39	95	26.7	96.1	6.6E-08			3
	19	53	20	33	73	25.2	94.7				2
WB-3	5	60	21	39	79	23.1	101.3				4.5
WB-7	5	29	12	17	44	14.2	121.1				2.5
WB-10	4	48	18	30	72	18.0	115.9	9.4E-08			4.5
	7	29	13	16	35	13.3	124.1	1.3E-07			2
WB-13	4	68	25	43	93	27.6	97.7				3
	19	50	17	33	73	27.1	99.5	5.7E-08	8.1E-08		0.5
	22	47	19	28	64	23.9	103.6				
WB-14	10	55	21	34	91	33.3	97.0		5.4E-08		1
	13	56	20	36	84	29.7	94.2		4.5E-08		1
WB-15	24	31	13	18	47	21.4	112.0	8.5E-07			1.5
WB-16	11	60	22	38	87	27.7	98.2				2
SUMMARY OF TESTS FOR ALLUVIAL CLAY											
Average		57	23	34	78.2	21.6	102.9	2.5E-07	2.7E-08	N/A	2.3
Minimum		29	12	14	35.0	5.0	86.0	1.0E-09	1.0E-09	N/A	0.5
Maximum		92	33	63	98.0	36.0	124.1	8.5E-07	8.1E-08	N/A	4.5
Standard Deviation		14	5	9	17.0	6.1	10.3	3.2E-07	2.7E-08	N/A	1.3
Number of Tests		47	47	47	27	154	17	13	11	0	12

TABLE IIIJ-C-4
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING FOR ALLUVIAL SAND AND GRAVEL

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Pocket Penetrometer Reading (tsf)	Blows/ft
TESTING ON ALLUVIAL SAND & GRAVEL											
1979 Borings by Rone Engineers											
B-4	2	26	18	8	29.4	25			3.2E-06		
	5					18					
B-7	15					20					
B-8	15	25	17	8		14					
B-9	15	22	13	9		12			1.0E-05		
	20					20					
B-10	15					13					
1980 Borings by Rone Engineers											
B-13	30					8					
	35					15					
	40					21					
	46				49	21					
B-14	40				19	20			8.0E-06		
B-15	35				40	20					
	40					17					
	45				15	14					
B-16	20				37	15					
B-19	40				64	23					
B-20	45				66	23					
B-21	10	33	13	20	35	16					
	15				29	23					
B-22	2					21					
	5	29	16	13		8		8.4E-07			
	10				26	8					
B-23	10	31	17	14	36	9					
B-24	10				21	10					
	15				28	7					
B-25	10	24	17	7		8					
	15					7					
B-26	7					15					
	10	24	18	6	27	11					
	15					3					
B-27	10					9					
	15	23	17	6	27	8					
	18					4					
B-28	12					4					
	15				29	7					
B-29	15					3					
2010 Borings by Weaver Boos Consultants											
WB-1	23	26	17	9	13	10.7				1.5	26
WB-2	10					29.6	88.6			1	
	12	21	14	7	12	8.7	134.3	1.2E-06		1	25
WB-3	9	37	15	22	36	15.3	113.6	2.6E-07		2	6
	11					15.1	112.5			1	15
	13	24	15	9	17	14.9				0	18
WB-7	9	40	18	22	20	13.1	131.6			0.5	
	11	23	15	8	15	13.4		5.0E-04	4.6E-04	0	
WB-10	11	18	14	4	11	9.9					36
	13	15	11	4	11	12.0					73
WB-13	15					25.8	96.4			2	
SUMMARY OF TESTS FOR ALLUVIAL SAND & GRAVEL											
Average		26	16	10	28.5	13.9	112.8	1.3E-04	1.2E-04	1.0	28.4
Minimum		15	11	4	11.0	3.0	88.6	2.6E-07	3.2E-06	0.0	6.0
Maximum		40	18	22	66.0	29.6	134.3	5.0E-04	4.6E-04	2.0	73.0
Standard Deviation		6	2	6	14.9	6.5	18.3	2.5E-04	2.3E-04	0.8	21.8
Number of Tests		17	17	17	25	48	6	4	4	9	7

TABLE IIJ-C-5
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING FOR WEATHERED SHALE

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
TESTING ON WEATHERED SHALE											
1980 Borings by Rone Engineers											
B-12	30					24					
B-13	47					22					
B-14	45					25					
	50					27					
B-23	15					18					
2010 Borings by Weaver Boos Consultants											
WB-3	14.7					20.1	113.7		3.9E-08		
	15					21.6					
WB-13	23	54	19	35	56						
SUMMARY OF TESTS FOR WEATHERED SHALE											
Average		54	19	35	56	22.5	113.7	N/A	3.9E-08	N/A	N/A
Minimum		54	19	35	56	18.0	113.7	N/A	3.9E-08	N/A	N/A
Maximum		54	19	35	56	27.0	113.7	N/A	3.9E-08	N/A	N/A
Standard Deviation		--	--	--	--	3.0	--	N/A	--	N/A	N/A
Number of Tests		1	1	1	1	7	1	0	1	0	0

TABLE IIIJ-C-6
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING FOR UNWEATHERED SHALE

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
TESTING ON UNWEATHERED SHALE											
1979 Borings by Rone Engineers.											
B-1	30					18					
B-3	10					22					
	15					18					
B-4	14					17					
	19					16					
B-5	15					20					
	19					16					
B-6	14					17					
B-7	20					17					
B-8	20					10					
	24					19					
B-9	25					17					
B-10	20					12					
1980 Borings by Rone Engineers											
B-12	35					17					
B-14	55					26					
B-19	45					22					
	50					20					
B-20	50					23					
B-22	16					18					
B-24	20					25					
B-25	20					20					
	22					15					
B-26	19					15					
B-27	24					26					
B-28	18					15					
B-29	22					15					
1995 Borings by Reed Engineering Group											
DB-1	7					16.7					
	12					15.3					
	17					13.7					
	21	51	27	24	97.8				1.17E-08		
	22					15.2					
	23	48	24	24	92.1			1.25E-08			
	24					14.8					
	25					15.3					
	26					13.5					
	27					14.9					
	28					14.2					
	29					14.7					
	30					15.3					
	31					15.8					
	32					9					
	33					17.4					
	34					18.4					
	39					17					
	44					17					
	46	93	68	25	99.8				7.74E-09		
	47	88	63	25	100			1.62E-09			
	49					12.8					
	52					16.7					
	60					17.2					
	65					15.9					
2010 Borings by Weaver Boos Consultants											
WB-4	60					15.6	113.1		2.8E-08		4.5
WB-5	60					17.2	112.6			29,200	
	62					18.4	114.7				
WB-6	65					16.3	112.3				
	66					16.3	125.8		3.6E-08		4.5
WB-8	51.5					12.8	117.9				
	56					16.8	102.3		2.9E-08		4.5
	94					14.8	117.8				4.5
WB-9	60					17.9	111.2		2.3E-08		
	73					15.9	116.3				4.5
WB-10	45					17.0	97.1	3.2E-08			4.5
	83					17.9	107.5				
WB-11	58					13.6	125.5		3.7E-08		4.5
	60					20.3	104.5				4.5

TABLE IIIJ-C-6
CAMELOT LANDFILL
SUMMARY OF GEOTECHNICAL TESTING FOR UNWEATHERED SHALE

Boring	Depth	LL	PL	PI	% Passing 200 Sieve	% Moisture	Dry Unit Weight (pcf)	Horizontal Permeability (cm/s)	Vertical Permeability (cm/s)	Unconfined Compression (psf)	Pocket Penetrometer Reading (tsf)
WB-12	65					16.6	119.8				4.5
	59					12.9	99.1				4.5
	60					20.2	95.7		2.5E-08		
SUMMARY OF TESTS FOR UNWEATHERED SHALE											
Average		70	46	25	97.4	16.8	111.4	1.5E-08	2.5E-08	29200	4.5
Minimum		48	24	24	92.1	9.0	95.7	1.6E-09	7.7E-09	29200	4.5
Maximum		93	68	25	100.0	26.0	125.8	3.2E-08	3.7E-08	29200	4.5
Standard Deviation		24	23	1	3.7	3.2	9.2	1.5E-08	1.0E-08	--	0.0
Number of Tests		4	4	4	4	64	17	3	8	1	10

SUBSURFACE LABORATORY TESTING RESULTS

1979 RONE ENGINEERS, INC.
GEOTECHNICAL TESTING

SUMMARY OF PERMEABILITY TESTS

Boring No.	Depth (ft.)	Material	Permeability, k,	cm/sec
			Horizontal	Vertical
B-1	10	Dark brown clay	1×10^{-9} *	1×10^{-9} *
B-1	25	Brownish-gray clay	-	1×10^{-9} *
B-2	2	Dark brown clay	-	1×10^{-9} *
B-2	10	Olive-brown clay	-	1×10^{-9} *
B-4	2	Tan & gray clayey sand	-	3.2×10^{-6}
B-9	15	Tan clayey sand	-	1.0×10^{-5}

* Estimated values; testing indicated samples impermeable.

1980 RONE ENGINEERS, INC.
GEOTECHNICAL TESTING

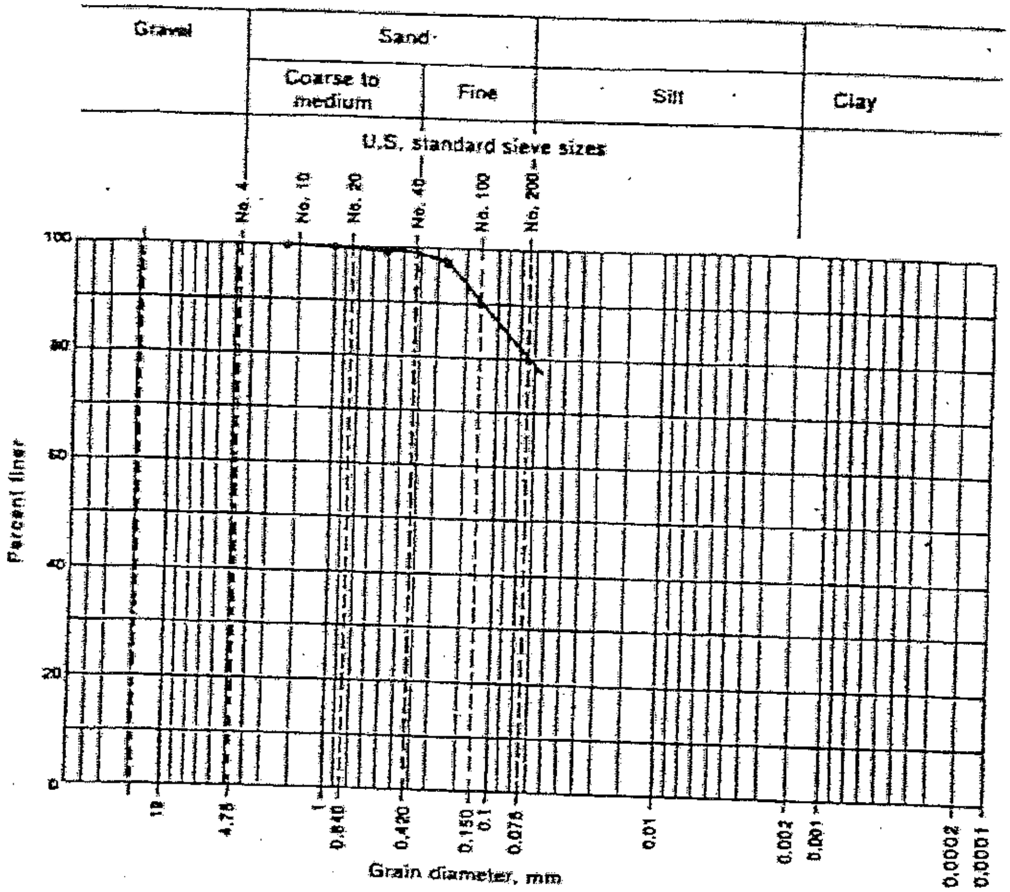
PERMEABILITY TEST RESULTS

Boring No.	Depth (ft)	Material Description	Atterberg Limits			% Linear Shrinkage	% Passing #200 sieve	Permeability (cm/sec)	
			LL	PL	PI			Horizontal	Vertical
B-11	15	Tan & reddish-tan clay	51	21	30	18	-	6.7×10^{-8}	
B-12	10	Brown to light brown clay	64	27	37	20	-	4.5×10^{-8}	
B-13	25	Brown & gray clay w/fine sand	45	20	25	16	87		2.0×10^{-8}
B-14	30	Light brown to tan clay w/ fine sand	47	22	25	16	81		4.3×10^{-8}
B-14	40	Light brown to tan sand	-	-	-	-	19		8.0×10^{-6}
B-15	15	Brown sandy clay	51	26	25	17	-	8.0×10^{-7}	
B-15	25	Brown sandy clay	40	15	25	14	75		3.3×10^{-8}
B-16	10	Tan sandy clay	-	-	-	-	-	6.0×10^{-8}	
B-17	15	Brown sandy clay	-	-	-	-	-	6.8×10^{-7}	
B-19	20	Brown & tan clay	66	27	39	21	97	*	
B-20	5	Dark brown clay	65	30	35	19	-		1.2×10^{-8}
B-20	30	Brown to tan sandy clay	-	-	-	-	-	3.9×10^{-7}	
B-21	2	Dark brown clay	65	30	35	19	-	3.5×10^{-9}	
B-22	5	Reddish-tan & brown clayey sand	29	16	13	8	-	8.4×10^{-7}	
B-24	10	Reddish-tan sand w/clay	-	-	-	-	21	*	

* Invalid test.

PERMEABILITY TEST RESULTS (Cont'd.)

Boring NO.	Depth (ft)	Material Description	Atterberg Limits			% Linear Shrinkage	% Passing #200 sieve	Permeability (cm/sec)	
			LL	PL	PI			Horizontal	Vertical
Composite Proctor Borings B-19/20 samples @ 10,15, & 20' each boring.		99% Std.Proctor @ 22% moisture	-	-	-	-	-	$6.1x10^{-8}$	
		99% Std.Proctor @ 24% moisture	-	-	-	-	-		$3.2x10^{-8}$
Composite Proctor Borings B-14/16 samples @ 5, 7, & 15' each boring.		99% Std.Proctor @ 23% moisture	56	24	32	18	-	$3.3x10^{-8}$	
		99% Std.Proctor @ 21% moisture	-	-	-	-	-		$6.6x10^{-8}$

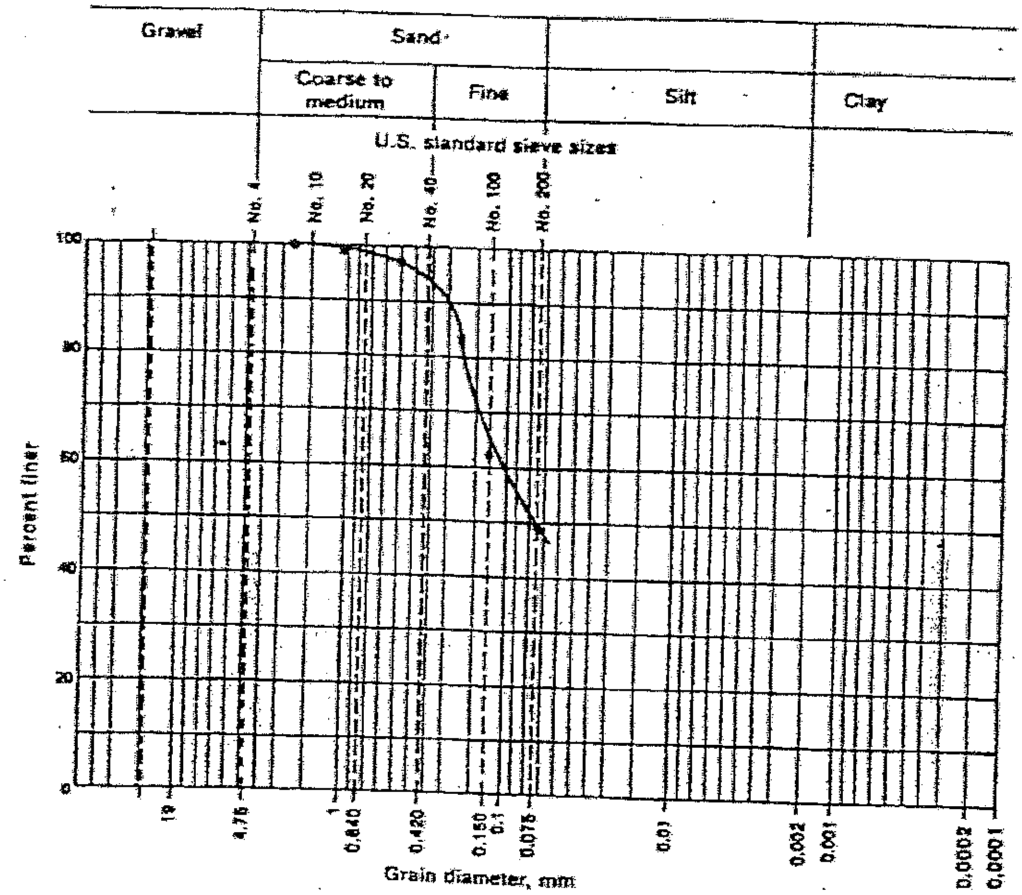


Visual soil description Tan & gray sandy clay

Grain Size Distribution

Project
Landfill - Hebron

Boring No. B-11	Sample Depth 35.0'	Drawn By RR	Date 5-23-80	Rone Engineers

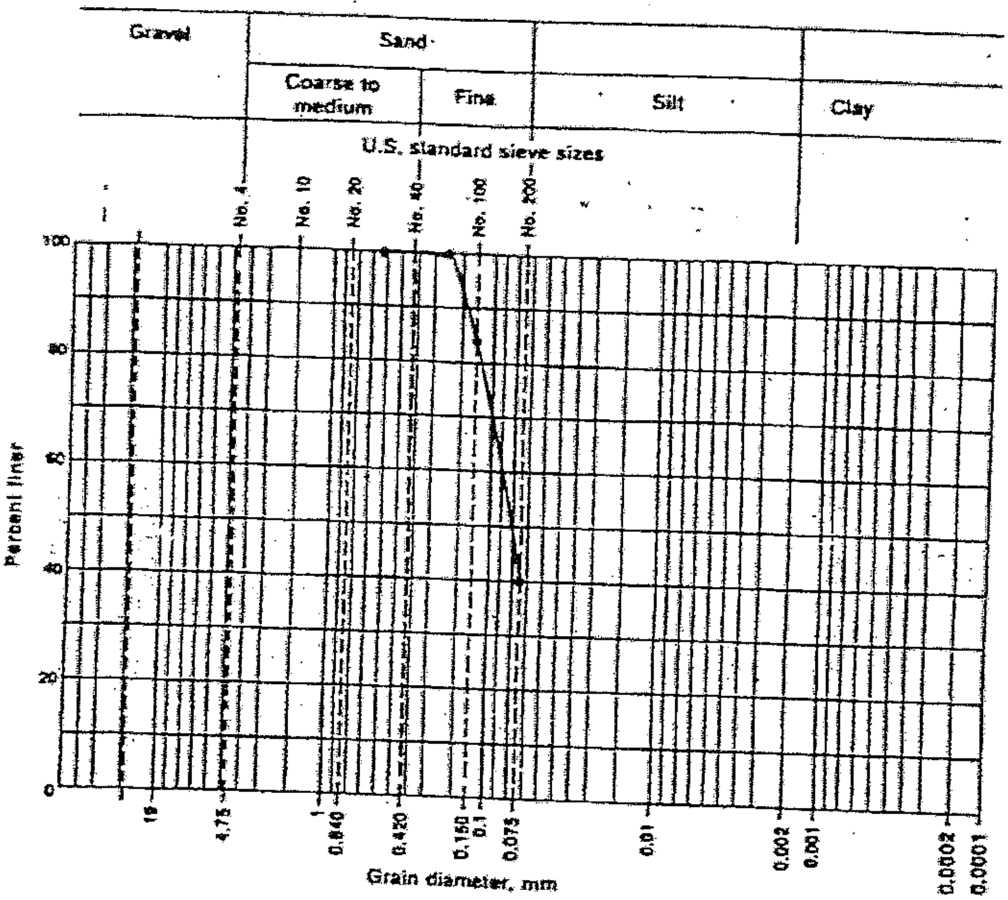


Visual soil description Brown and tan sand

Grain Size Distribution

Project Landfill - Hebron

Boring No.	**Sample Depth**	**Drawn By**	**Date**	
B-13	45.0'	RR	5-23-80	Rone Engineers

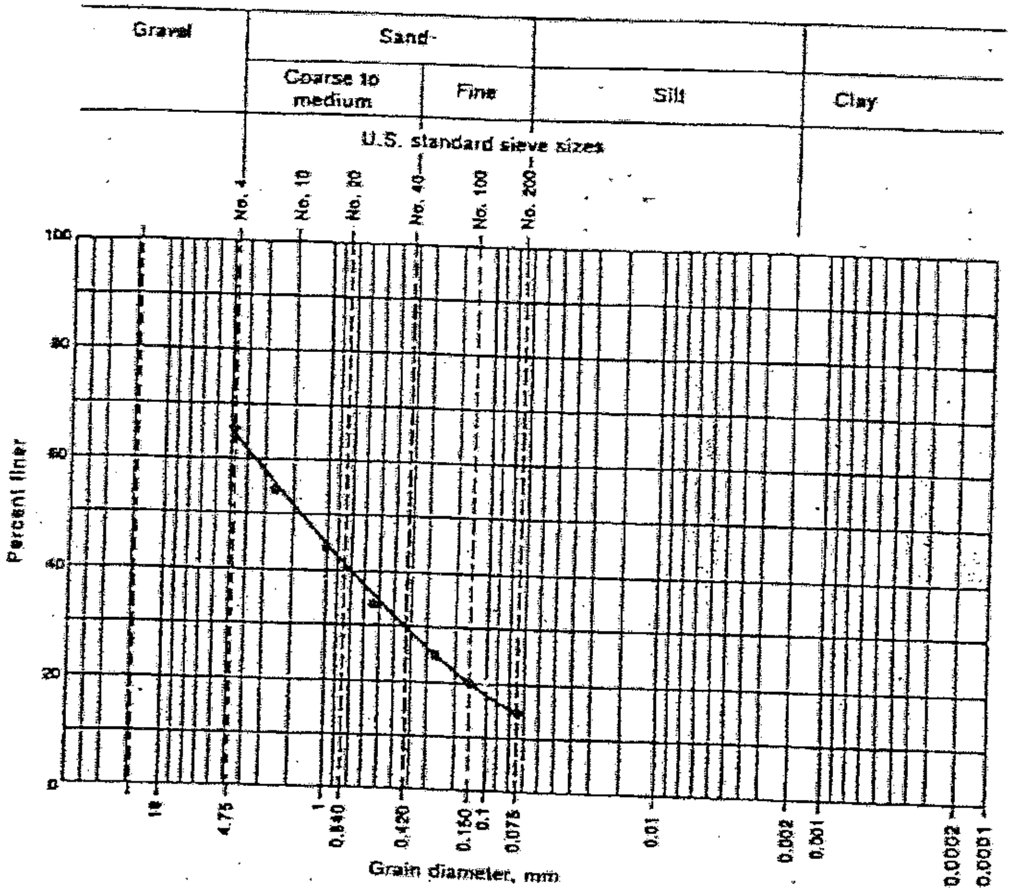


Visual soil description Tan to reddish-tan clayey sand

Grain Size Distribution

Project
Landfill - Hebron

Boring No. B-15	**Sample Depth** 35.0'	**Drawn By** RR	**Date** 5-23-80	Rone Engineers

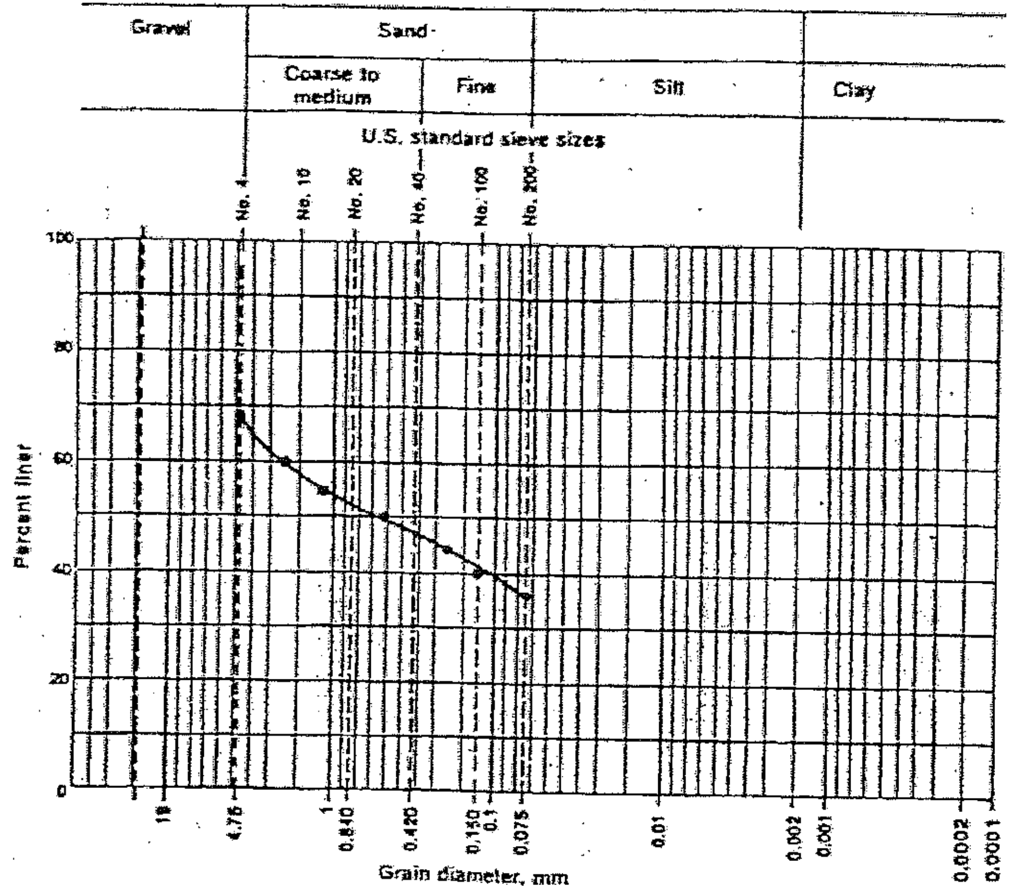


Visual soil description Brown sand

Grain Size Distribution

Project
Landfill - Hebron

Boring No.	Sample Depth	Drawn By	Date	
B-15	50.0'			

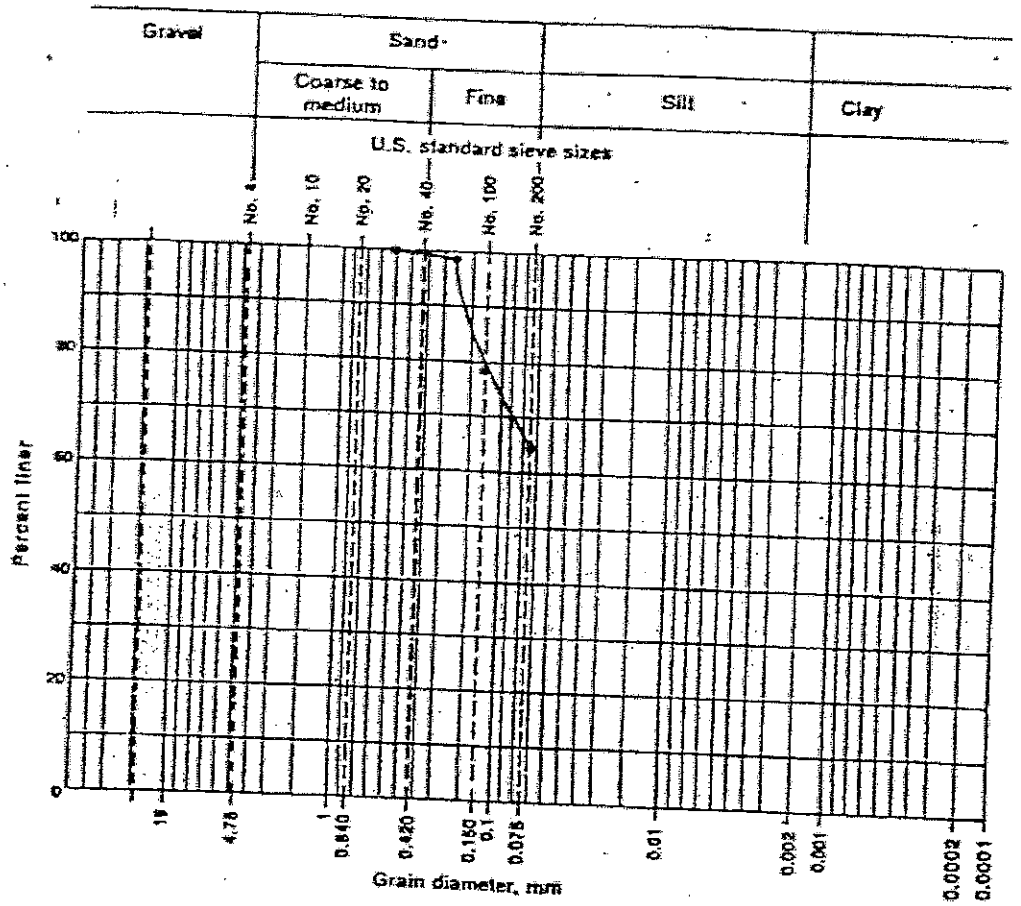


Visual soil description Tan sand

Grain Size Distribution

Project
Landfill - Hebron

Boring No. B-16	Sample Depth 20.0'	Drawn By RR	Date 5-23-80	Rone Engineers



Visual soil description Tan & gray clayey sand

Grain Size Distribution

Project
Landfill - Hebron

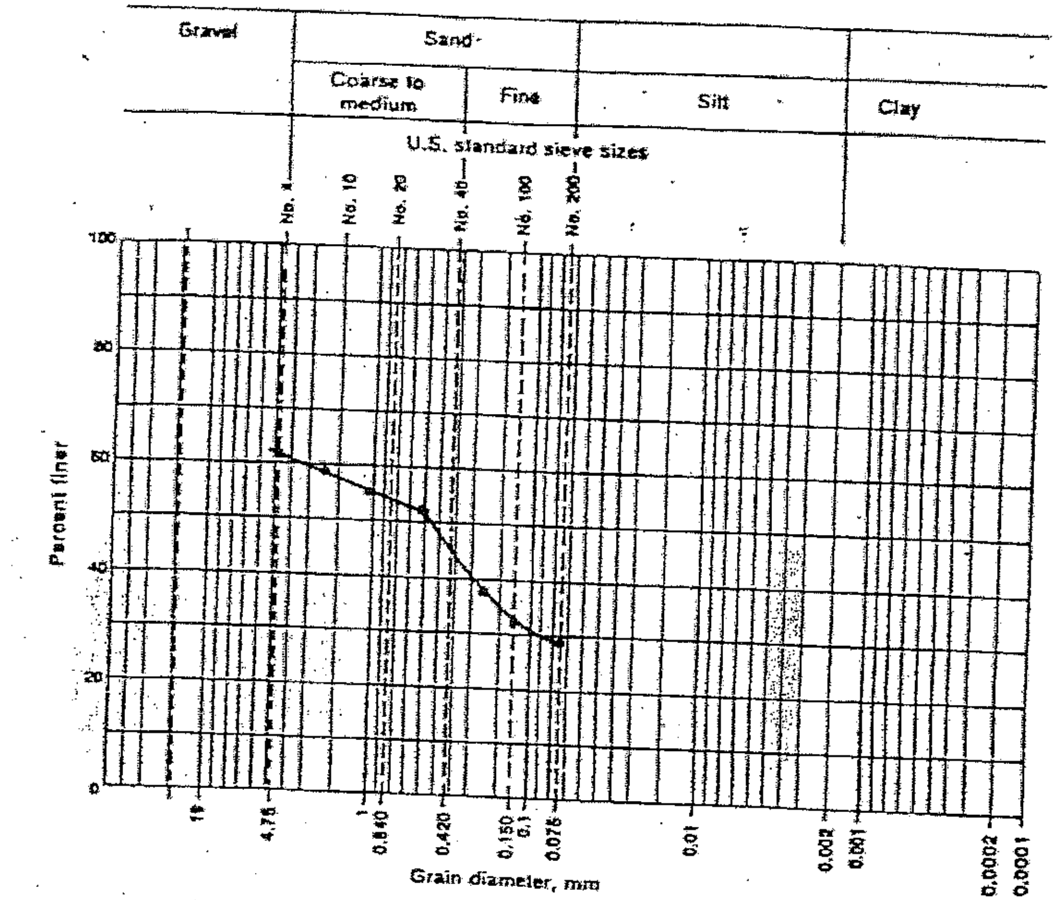
Boring No. B-19

Sample Depth 40.0'

Drawn By RR

Date 5-23-80

Rone Engineers

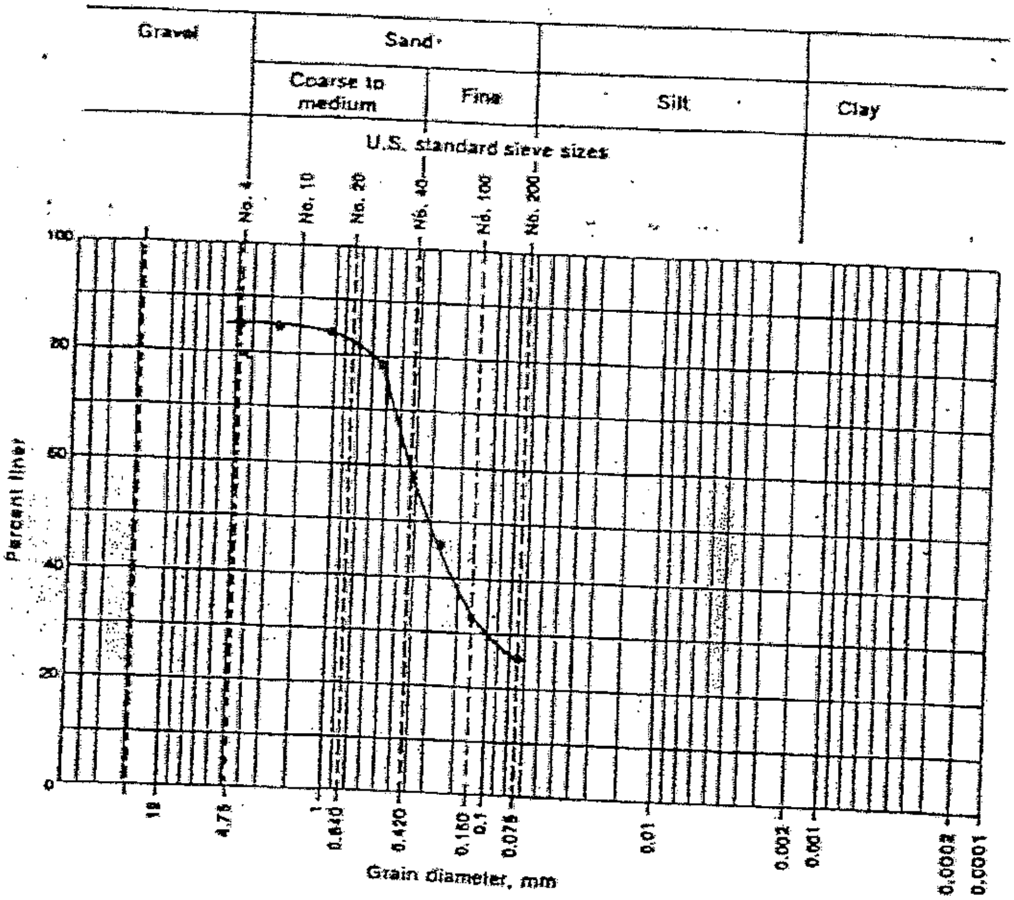


Visual soil description Tan sand

Grain Size Distribution

Project
Landfill - Hebron

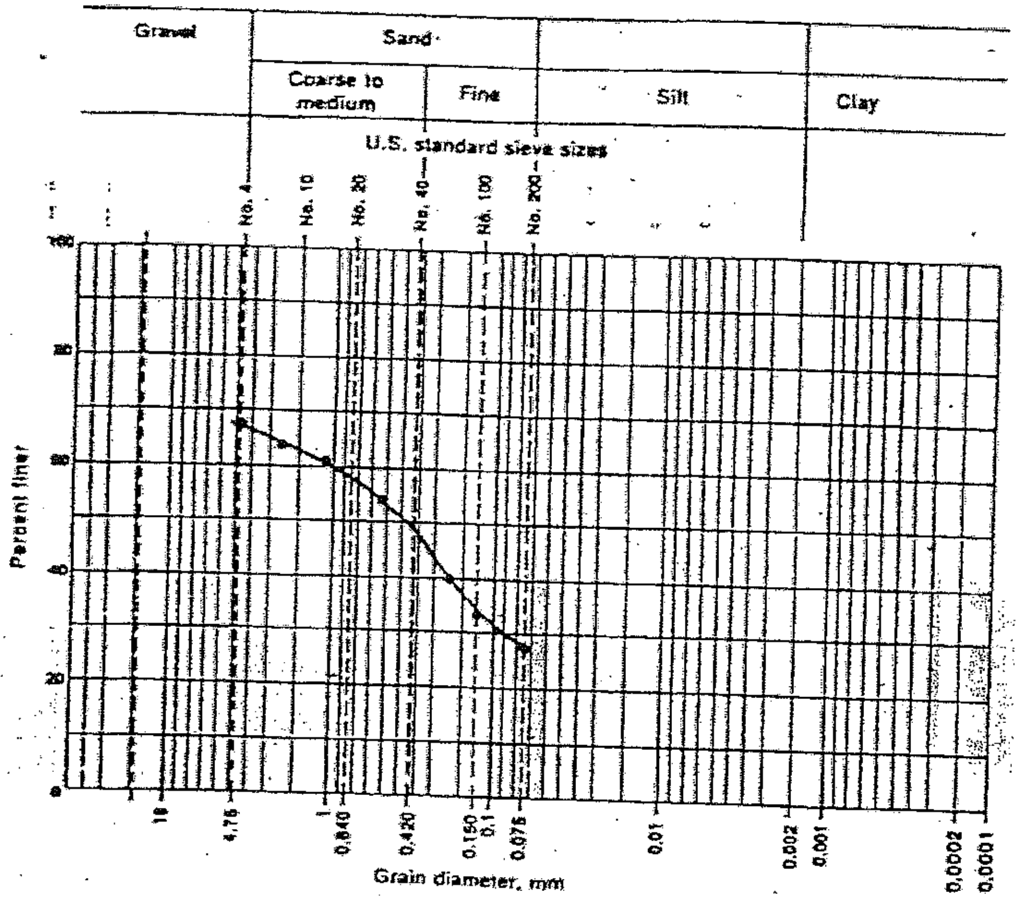
Boring No. B-21	Sample Depth 15.0'	Drawn By RR	Date 5-23-80	Rone Engineers



Visual soil description Tan sand

Grain Size Distribution

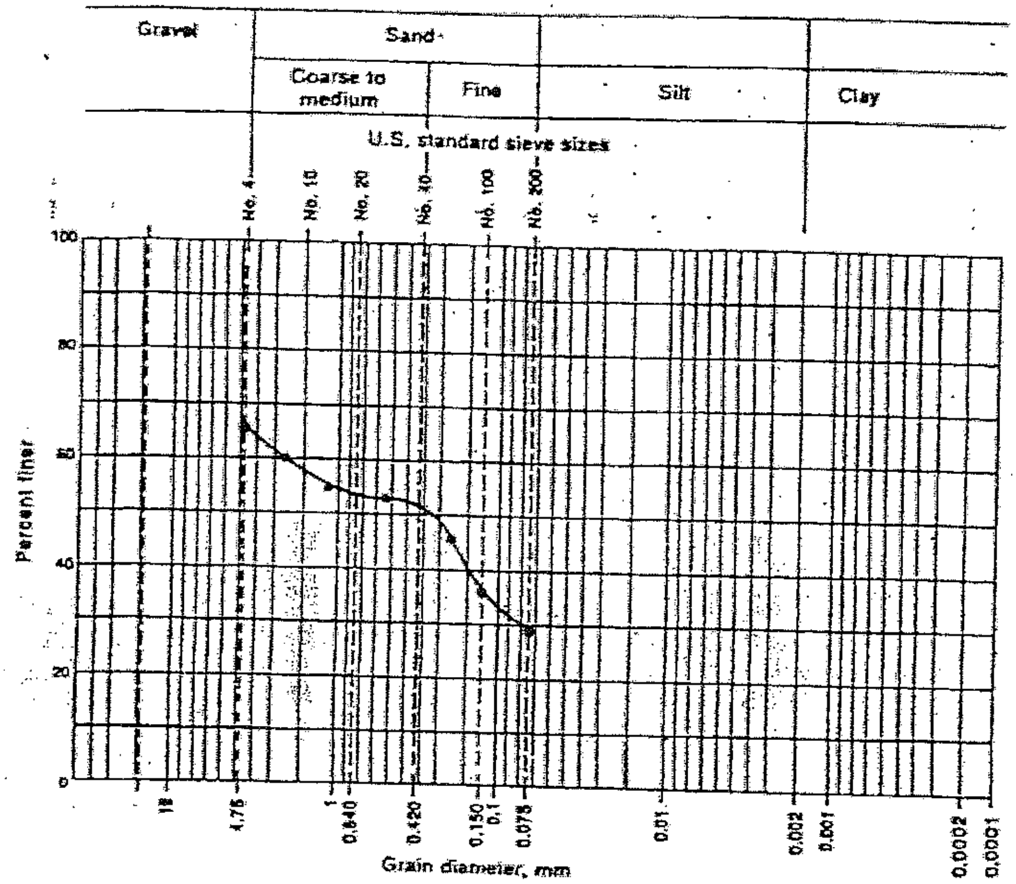
Project Landfill - Hebron				
Boring No. B-22	Sample Depth 10.0'	Drawn By RR	Date 5-23-80	Rone Engineers



Visual soil description Reddish-tan sand

Grain Size Distribution

Project Landfill - Hebron				
Boring No. B-24	Sample Depth 15.0'	Drawn By RR	Date 5-23-80	Rone Engineers



Visual soil description Tan sand

Grain Size Distribution

Project
Landfill - Hebron

Boring No.	Sample Depth	Drawn By	Date	
B-28	15'	RR	5-23-80	Rone Engineers

20

BORING NO: B-14 & B-16

DEPTH: 2.0' to 10.0'

MATERIAL: Composite sample

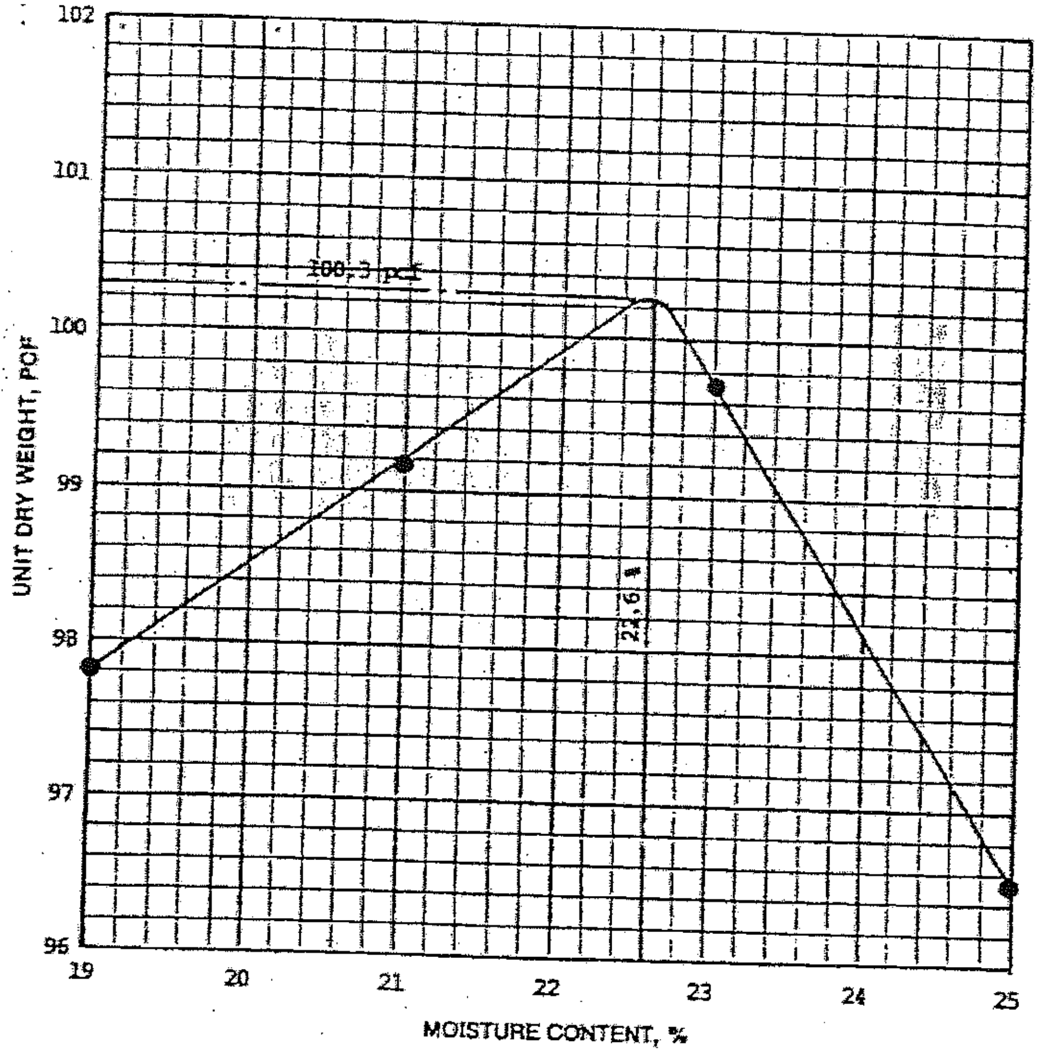
TEST METHOD: ASTMD-698

LIQUID LIMIT: 56

PLASTICITY INDEX: 32

OPTIMUM MOISTURE: 22.6 %

MAX. UNIT DRY WGT: 100.3 pcf



RONE ENGINEERS, INC.

COMPACTION TEST RESULTS

21

BORING NO: B-19 & B-20

DEPTH: 2.0' to 10.0'

MATERIAL: Composite sample

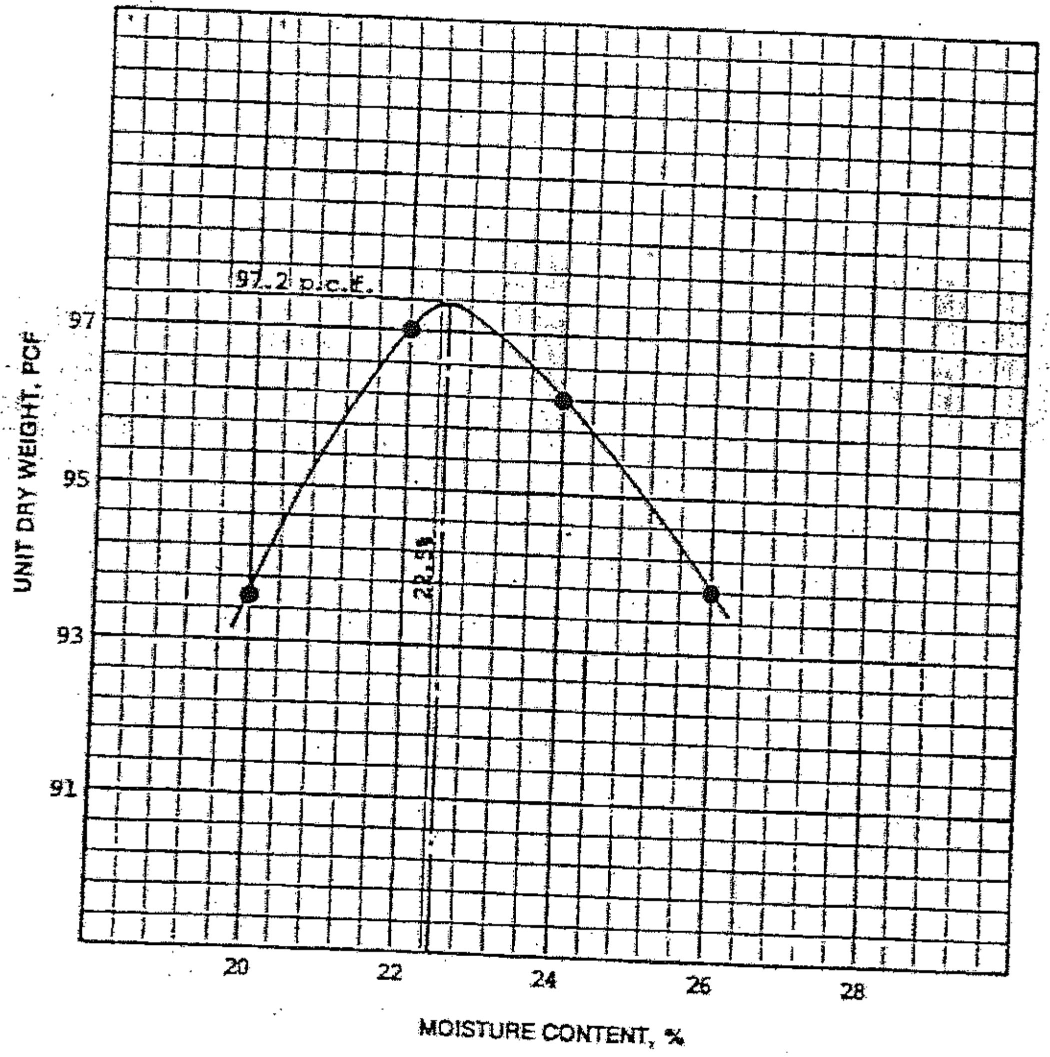
TEST METHOD: ASTM D-698

LIQUID LIMIT: 59

PLASTICITY INDEX: 33

OPTIMUM MOISTURE: 22.5 %

MAX. UNIT DRY WGT: 97.2 pcf



RONE ENGINEERS, INC.

COMPACTION TEST RESULTS

1995 REED ENGINEERING GROUP GEOTECHNICAL TESTING

TABLE 1
SUMMARY OF GEOTECHNICAL LABORATORY RESULTS

Sample			Moisture Content (%)	Soil Suction (psf)	Liquid Limit	Plastic Limit	-200 Gradation	Vertical Permeability (cm/sec)	Horizontal Permeability (cm/sec)
Boring	Interval (feet)	Depth (feet)							
DB-1a	7.25 -7.75	7	16.7	11,670					
DB-1a	12 - 12.7	12	15.3	10,660					
DB-1a	17 - 18.15	17	13.7	16,820					
DB-1a	21 -23	22	15.2	28,160					
DB-1a	24.45 - 25	24	14.8	24,120					
DB-1a	25.4 - 26.1	25	15.3	20,880					
DB-1a	26.4 - 26.9	26	13.5	25,640					
DB-1c	27 - 28	27	14.9	16,730					
DB-1c	28 - 28.75	28	14.2	15,350					
DB-1c	29 - 29.75	29	14.7	14,330					
DB-1c	29.75 - 31	30	15.3	18,580					
DB-1c	31 - 32	31	15.8	32,210					
DB-1c	31 - 32	32	9	2890*					
DB-1a	33 - 35	33	17.4	11,370					
DB-1a	33 - 36	34	18.4	14,680					
DB-1a	39 - 39.8	39	17	18,380					
DB-1a	43 - 44.4	44	17	20,440					
DB-1b	49.3 - 50.3	49	12.8	22,420					
DB-1b	53.75 - 54.7	54	16.7	25,390					
DB-1b	60.5 - 61	60	17.2	19,530					
DB-1b	64 - 65	65	15.9	17,400					
DB-1a	45 - 46	46			93	68	99.8	7.74E-09	
DB-1a	46 - 47	47			88	63	100		1.62E-09
DB-1a	21 - 23	21			51	27	97.8	1.17E-08	
DB-1a	21 - 23	23			48	24	92.1		1.25E-08
Average Values			15.69	19,238	70	46	97	9.7E-09	7.1E-09

* Absorbed moisture from lid

SUMMARY OF HYDRAULIC CONDUCTIVITY CALCULATIONS

Fluid: Tap Water

The Reed Engineering Group
Job Number : 136.16

Boring DB-1a
File: DAL-95167

Sample I.D.	Length, cm	Area, m²	Viscosity, cp	Differential Pressure, m H2O	Quantity of Flow, m³	Incremental Time, sec	Hydraulic Conductivity,	
							cm/sec	m/year
46-47'	2.81E+00	4.99E-04	9.70E-01	3.39E+01	3.50E-08	3.60E+03	1.62E-09	5.10E-02
23'	2.87E+00	4.99E-04	9.70E-01	3.39E+01	2.65E-07	3.60E+03	1.25E-08	3.94E-01

2010 WBC GEOTECHNICAL TESTING

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Percent Passing #40	Unconfined Compressive Strength (tsf)
WB-01	6.0	64	27	37	0.075	90	CH	26.6	102.0		
WB-01	12.0	63	24	39	0.075	95	CH	26.7	96.1		
WB-01	19.0	53	20	33	0.075	73	CH	25.2	94.7		
WB-01	23.0	26	17	9	0.075	13	SC	10.7			
WB-02	5.0	50	19	31	0.075	64	CH	22.1	103.5		
WB-02	12.0	21	14	7	0.075	12		8.7	134.3		
WB-03	5.0	60	21	39	0.075	79	CH	23.1	101.3		
WB-03	9.0	37	15	22	0.075	36	SC	15.3	113.6		
WB-03	13.0	24	15	9	0.075	17	SC	14.9			
WB-03	15.0							21.6			
WB-04	60.0							15.6	113.1		
WB-05	60.0							17.2	112.6		14.6
WB-05	62.0							18.4	114.7		
WB-06	65.0							16.3	112.3		
WB-06	66.0							16.3	125.8		
WB-07	5.0	29	12	17	0.075	44	SC	14.2	121.1		
WB-07	9.0	40	18	22	0.075	20	SC	13.1	131.6		
WB-07	11.0	23	15	8	0.075	15	SC	13.4			
WB-08	56.0							16.8	102.3		
WB-08	94.0							14.8	117.8		
WB-09	60.0							17.9	111.2		
WB-09	73.0							15.9	116.3		
WB-10	4.0	48	18	30	0.075	72	CL	18.0	115.9		
WB-10	7.0	29	13	16	0.075	35	SC	13.3	124.1		
WB-10	11.0	18	14	4	0.075	11		9.9			
WB-10	13.0	15	11	4	0.075	11		12.0			
WB-10	83.0							17.9	107.5		
WB-11	58.0							13.6	125.5		
WB-11	65.0							16.6	119.8		
WB-12	59.0							12.9	99.1		
WB-12	60.0							20.2	95.7		
WB-13	4.0	68	25	43	0.075	93	CH	27.6	97.7		
WB-13	19.0	50	17	33	0.075	73	CH	27.1	99.5		
WB-13	22.0	47	19	28	0.075	64	CL	23.9	103.6		
WB-13	23.0	54	19	35	0.075	56	CH				
WB-14	7.0							17.8	108.7		
WB-14	10.0	55	21	34	0.075	91	CH	33.3	97.0		
WB-14	13.0	56	20	36	0.075	84	CH	29.7	94.2		
WB-15	14.0	70	23	47	0.075	91	CH	25.1	97.4		
WB-15	24.0	31	13	18	0.075	47	SC	21.4	112.0		
WB-16	4.0	67	21	46	0.075	88	CH	19.4	112.2		
WB-16	11.0	60	22	38	0.075	87	CH	27.7	98.2		

Telephone:
Fax:

Summary of Laboratory Results

Project: Camelot Landfill

Number: 1339-351-11-2-6B.9

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Shaley clay, gray
BORING/SAMPLE: WB-1
PROCTOR #:
SAMPLE ORIENTATION: H ✓ V _____
Remold _____

LAB START DATE: 12/27/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 6.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 125.0 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 681.9 gms
f. Wet Weight Soil + Tare: 253.1 gms
g. Dry Weight Soil + Tare: 224.6 gms
h. Tare Weight: 92.0 gms
i. Moisture Content [(f-g)/(g-h)]*100: 21.5 %
j. Unit Dry Weight [d/(1+(i/100))]: 102.9 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 260.0 gms
l. Dry Weight Soil + Tare: 224.6 gms
m. Tare Weight: 92.0 gms
n. Moisture Content [(k-l)/(l-m)]*100: 26.7 %
o. Unit Dry Weight [d/(1+(n/100))]: 98.7 pcf
p. Ring Weight: 520.8 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
27-Dec	08:15		42.5	35.5					
27-Dec	19:45	41400			37.7	30.7	22	0.953	2.3E-07
27-Dec	19:45		37.7	30.7					
28-Dec	07:51	43560			35.9	28.9	22	0.953	9.2E-08
28-Dec	07:51		35.9	28.9					
28-Dec	15:00	25740			35.0	28.0	22	0.953	8.1E-08
28-Dec	15:00		35.0	28.0					
28-Dec	22:16	26160			34.2	27.2	22	0.953	7.3E-08
28-Dec	22:16		34.2	27.2					
29-Dec	07:51	34500			33.4	26.4	22	0.953	5.7E-08
27-Dec	19:45		37.7	30.7					
29-Dec	07:51	129960			33.4	26.4	22	0.953	7.7E-08

Height of Top of Specimen From Top of Table: 7.00 cm

Standpipe Diameter 1.05 cm

Standpipe Area 0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET

Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Sdy Cly Gr
BORING/SAMPLE NO: WB-1
SAMPLE ORIENTATION [✓ H] V R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 12/27/10
TECHNICIAN: MLT
DEPTH/LIFT: 6'
PERM FLUID USED: Tap Water
b. AVERAGE DIAMETER: 2.5 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 520.8 gms
f. Ring Wt + Wet Soil: 681.9 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 260.0 gms
m. Dry Wt. Soil + tare: 224.6 gms
n. Tare Wt: WU1 92.0 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/27/10	8:15		42.5			
12/27/10	19:45			37.7		
12/27/10	19:45		37.7			
12/28/10	7:51			35.9		
12/28/10	7:51		35.9			
12/28/10	15:00			35.0		
12/28/10	15:00		35.0			
12/28/10	22:16			34.02		
12/28/10	22:16		34.02			
12/29/10	7:51			33.4		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.0 *cm*
Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$k = \{[(a * L)/(A * t)] * \ln(ho/hf)\}$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* (1)
hf = *final height in cm* (1)
ln = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Clay, brown
BORING/SAMPLE: WB-1
PROCTOR #:
SAMPLE ORIENTATION: H ✓ V _____
Remold _____

LAB START DATE: 12/31/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 12.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume
(π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight:
[((f-h)*3.8095)/c)]: 119.9 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 695.0 gms
f. Wet Weight Soil + Tare: 249.2 gms
g. Dry Weight Soil + Tare: 215.8 gms
h. Tare Weight: 94.7 gms
i. Moisture Content
[(f-g)/(g-h)]*100: 27.6 %
j. Unit Dry Weight
[d/(1+(i/100))]: 94.0 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 250.8 gms
l. Dry Weight Soil + Tare: 215.8 gms
m. Tare Weight: 94.7 gms
n. Moisture Content
[(k-l)/(l-m)]*100: 28.9 %
o. Unit Dry Weight
[d/(1+(n/100))]: 93.0 pcf
p. Ring Weight: 540.5 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
31-Dec	10:05		37.7	30.2					
31-Dec	18:30	30300			35.2	27.7	22	0.953	1.9E-07
31-Dec	18:30		35.2	27.7					
01-Jan	07:53	48180			33.8	26.3	22	0.953	7.1E-08
01-Jan	07:53		33.8	26.3					
01-Jan	12:00	14820			33.4	25.9	22	0.953	6.8E-08
01-Jan	12:00		33.4	25.9					
01-Jan	16:30	16200			33.0	25.5	22	0.953	6.4E-08
01-Jan	16:30		33.0	25.5					
01-Jan	22:07	20220			32.6	25.1	22	0.953	5.2E-08
31-Dec	18:30		35.2	27.7					
01-Jan	22:07	99420			32.6	25.1	22	0.953	6.6E-08

Height of Top of Specimen
From Top of Table: 7.50 cm

Standpipe Diameter
1.05 cm

Standpipe Area
0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF

LOCATION:

MATERIAL: Cly Br

BORING/SAMPLE NO: WB-1

SAMPLE ORIENTATION [✓ H] V R (Circle One)

a. HEIGHT: 1.0 in

c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-60.9

DATE: 12/31/10

TECHNICIAN: MLT

DEPTH/LIFT: 12'

PERM FLUID USED: Tap Water

b. AVERAGE DIAMETER: 2.5 in

d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 540.5 gms

f. Ring Wt + Wet Soil: 695.0 gms

g. Wet Wt Soil + tare [f-e+i]: gms

h. Dry Wt Soil + tare: gms

i. Tare Wt: gms

j. Moisture Content [(g-h)/(h-i)]*100 %

k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 250.8 gms

m. Dry Wt. Soil + tare: 215.8 gms

n. Tare Wt: C-5 94.7 gms

o. Moisture Content [(l-m)/(m-n)]*100 %

p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/31/10	10:05		37.7			
12/31/10	18:30			35.2		
12/31/10	18:30		35.2			
1/1/11	7:53			33.8		
1/1/11	7:53		33.8			
1/1/11	12:00			33.4		
1/1/11	12:00		33.4			
1/1/11	16:30			33.0		
1/1/11	16:30		33.0			
1/1/11	22:07			32.6		

PROCTOR NO:

MDD:

OMC:

PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.5 *cm*

Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$

Where k = *permeability in cm/sec*

a = *area of standpipe in sq cm*

L = *length of specimen in cm*

A = *area of specimen in sq cm*

t = *elapsed time in seconds*

ho = *initial height in cm* (1)

hf = *final height in cm* (1)

ln = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Clayey gravel, brown
BORING/SAMPLE: WB-2
PROCTOR # :
SAMPLE ORIENTATION: H ✓ V ____
Remold ____

LAB START DATE: 12/31/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 12.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume ($\pi b^2 / 4 * a$): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 130.9 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 683.2 gms
f. Wet Weight Soil + Tare: 264.0 gms
g. Dry Weight Soil + Tare: 243.7 gms
h. Tare Weight: 95.3 gms
i. Moisture Content [(f-g)/(g-h)]*100: 13.7 %
j. Unit Dry Weight [d/(1+(i/100))]: 115.2 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 270.3 gms
l. Dry Weight Soil + Tare: 243.7 gms
m. Tare Weight: 95.3 gms
n. Moisture Content [(k-l)/(l-m)]*100: 17.9 %
o. Unit Dry Weight [d/(1+(n/100))]: 111.0 pcf
p. Ring Weight: 514.5 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
31-Dec	10:17		38.0	30.5					
31-Dec	18:30	29580			25.9	18.4	22	0.953	1.1E-06
31-Dec	18:30		25.9	18.4					
01-Jan	07:53	48180			16.5	9.0	22	0.953	9.6E-07
01-Jan	07:53		16.5	9.0					
01-Jan	12:00	14820			14.3	6.8	22	0.953	1.2E-06
01-Jan	12:00		14.3	6.8					
01-Jan	16:30	16200			12.0	4.5	22	0.953	1.6E-06
01-Jan	16:30		12.0	4.5					
01-Jan	22:07	20220			10.4	2.9	22	0.953	1.4E-06
31-Dec	18:30		25.9	18.4					
01-Jan	22:07	99420			10.4	2.9	22	0.953	1.2E-06

Height of Top of Specimen From Top of Table: 7.48 cm

Standpipe Diameter 1.04 cm

Standpipe Area 0.849 sq cm

MLT Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Cl, Gvl Br
BORING/SAMPLE NO: LWB-2
SAMPLE ORIENTATION [✓ H] V R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 12/31/10
TECHNICIAN: MLT
DEPTH/LIFT: 12'
PERM FLUID USED: Tap Water
b. AVERAGE DIAMETER: 2.5 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 514.5 gms
f. Ring Wt + Wet Soil: 683.2 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 270.3 gms
m. Dry Wt. Soil + tare: 243.7 gms
n. Tare Wt: B-19 95.3 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/31/10	10:17		38.0			
12/31/10	18:30			25.9		
12/31/10	18:30		25.9			
1/1/11	7:53			16.5		
1/1/11	7:53		16.5			
1/1/11	12:00			14.3		
1/1/11	12:00		14.3			
1/1/11	16:30			12.0		
1/1/11	16:30		12.0			
1/1/11	22:07			10.4		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.48 *cm*
Stand Pipe Diameter: 1.04 *cm*

SAMPLE CALCULATIONS

$$k = \{[(a * L)/(A * t)] * \ln(ho/hf)\}$$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* [1]
hf = *final height in cm* [1]
ln = *natural logarithm*

[1] *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET

FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Sandy clay/clayey sand brown
BORING/SAMPLE: WB-3
PROCTOR #:
SAMPLE ORIENTATION: H ✓ V ____ Remold ____

LAB START DATE: 12/31/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 9.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 130.5 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 694.8 gms
f. Wet Weight Soil + Tare: 265.0 gms
g. Dry Weight Soil + Tare: 242.8 gms
h. Tare Weight: 96.9 gms
i. Moisture Content [(f-g)/(g-h)]*100: 15.2 %
j. Unit Dry Weight [d/(1+(i/100))]: 113.2 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 266.7 gms
l. Dry Weight Soil + Tare: 242.8 gms
m. Tare Weight: 96.9 gms
n. Moisture Content [(k-l)/(l-m)]*100: 16.4 %
o. Unit Dry Weight [d/(1+(n/100))]: 112.1 pcf
p. Ring Weight: 526.7 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
31-Dec	10:25		35.6	28.1					
31-Dec	18:30	29100			25.9	18.4	22	0.953	1.0E-06
31-Dec	18:30		25.9	18.4					
01-Jan	07:53	48180			22.5	15.0	22	0.953	3.0E-07
01-Jan	07:53		22.5	15.0					
01-Jan	12:00	14820			21.6	14.1	22	0.953	3.0E-07
01-Jan	12:00		21.6	14.1					
01-Jan	16:30	16200			21.0	13.5	22	0.953	1.9E-07
01-Jan	16:30		21.0	13.5					
01-Jan	22:07	20220			20.3	12.8	22	0.953	1.9E-07
31-Dec	18:30		25.9	18.4					
01-Jan	22:07	99420			20.3	12.8	22	0.953	2.6E-07

Height of Top of Specimen From Top of Table: 7.47 cm

Standpipe Diameter 1.09 cm

Standpipe Area 0.933 sq cm

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Sa Cl / C4 Sand Bl
BORING/SAMPLE NO: WB-7
SAMPLE ORIENTATION [✓ H] V R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6A.9
DATE: 12/31/10
TECHNICIAN: MLT
DEPTH/LIFT: 9'
PERM FLUID USED: Tap Water
b. AVERAGE DIAMETER: 2.5 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 526.7 gms
f. Ring Wt + Wet Soil: 694.8 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 266.7 gms
m. Dry Wt. Soil + tare: 242.8 gms
n. Tare Wt: Ph 96.9 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/31/10	10:25		35.6			
12/31/10	18:30			25.9		
12/31/10	18:30		25.9			
1/1/11	7:53			22.5		
1/1/11	7:53		22.5			
1/1/11	12:00			21.6		
1/1/11	12:00		21.6			
1/1/11	16:30			21.0		
1/1/11	16:30		21.0			
1/1/11	22:07			20.3		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.47 *cm*
Stand Pipe Diameter: 1.09 *cm*

SAMPLE CALCULATIONS

*k = {[(a * L)/(A * t)] * ln[ho/hf]}*

Where k = permeability in cm/sec
a = area of standpipe in sq cm
L = length of specimen in cm
A = area of specimen in sq cm
t = elapsed time in seconds
ho = initial height in cm [1]
hf = final height in cm [1]
ln = natural logarithm

[1] *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver-Boos Engineers

REPORT DATE: 1/12/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: WB-3
PROCTOR #:
SAMPLE ORIENTATION: H ____ V ✓
Remold ____

LAB START DATE: 1/8/2011
LAB RPT. DATE: 1/12/2011
TECHNICIAN: MLT
DEPTH/LIFT: 16.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 3.142 cu in

b. Avg. Diameter of Specimen: 2.0 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 136.7 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 325.9 gms
f. Wet Weight Soil + Tare: 208.2 gms
g. Dry Weight Soil + Tare: 189.3 gms
h. Tare Weight: 95.5 gms
i. Moisture Content [(f-g)/(g-h)]*100: 20.1 %
j. Unit Dry Weight [d/(1+(i/100))]: 113.7 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 209.9 gms
l. Dry Weight Soil + Tare: 189.3 gms
m. Tare Weight: 95.5 gms
n. Moisture Content [(k-l)/(l-m)]*100: 22.0 %
o. Unit Dry Weight [d/(1+(n/100))]: 112.1 pcf
p. Ring Weight: 213.2 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
08-Jan	07:15		41.5	34.0					
08-Jan	18:22	40020			40.3	32.8	22	0.953	9.3E-08
08-Jan	18:22		40.3	32.8					
09-Jan	06:30	43680			39.4	31.9	22	0.953	6.6E-08
09-Jan	06:30		39.4	31.9					
09-Jan	14:00	27000			39.1	31.6	22	0.953	3.6E-08
09-Jan	14:00		39.1	31.6					
09-Jan	21:36	27360			38.9	31.4	22	0.953	2.4E-08
09-Jan	21:36		38.9	31.4					
10-Jan	07:20	35040			38.7	31.2	22	0.953	1.9E-08
08-Jan	18:22		40.3	32.8					
10-Jan	07:20	133080			38.7	31.2	22	0.953	3.9E-08

Height of Top of Specimen From Top of Table: 7.50 cm

Standpipe Diameter 1.05 cm

Standpipe Area 0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Shale DK Gr
BORING/SAMPLE NO: WB-3
SAMPLE ORIENTATION H [✓ V] R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 1/8/11
TECHNICIAN: MLT
DEPTH/LIFT: 16'
PERM FLUID USED: Tap Water
b. AVERAGE DIAMETER: 2.0 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: ~~[illegible]~~ 213.2 gms
f. Ring Wt + Wet Soil: 325.9 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 209.9 gms
m. Dry Wt. Soil + tare: 189.3 gms
n. Tare Wt: 0 95.5 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/8/11	7:15		41.5			
1/8/11	18:22			40.3		
1/8/11	18:22		40.3			
1/9/11	6:30			39.4		
1/9/11	6:30		39.4			
1/9/11	14:00			39.1		
1/9/11	14:00		39.1			
1/9/11	21:36			38.9		
1/9/11	21:36		38.9			
1/10/11	7:20			38.7		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.5 *cm*
Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

*k = {[(a * L)/(A * t)] * ln[ho/hf]}*

Where k = permeability in cm/sec
a = area of standpipe in sq cm
L = length of specimen in cm
A = area of specimen in sq cm
t = elapsed time in seconds
ho = initial height in cm [1]
hf = final height in cm [1]
ln = natural logarithm

[1] *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, gray
BORING/SAMPLE: WB-4
PROCTOR # :
SAMPLE ORIENTATION: H _____ V ✓
Remold _____

LAB START DATE: 1/6/2011
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 60.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume ($\pi b^2 / 4 * a$): 2.835 cu in

b. Avg. Diameter of Specimen: 1.9 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 128.2 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 409.0 gms
f. Wet Weight Soil + Tare: 187.4 gms
g. Dry Weight Soil + Tare: 175.6 gms
h. Tare Weight: 92.0 gms
i. Moisture Content [(f-g)/(g-h)]*100: 14.1 %
j. Unit Dry Weight [d/(1+(i/100))]: 112.3 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 190.4 gms
l. Dry Weight Soil + Tare: 175.6 gms
m. Tare Weight: 92.0 gms
n. Moisture Content [(k-l)/(l-m)]*100: 17.7 %
o. Unit Dry Weight [d/(1+(n/100))]: 108.9 pcf
p. Ring Weight: 313.6 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
06-Jan	15:03		43.7	36.2					
06-Jan	22:10	25620			42.6	35.1	22	0.953	1.4E-07
06-Jan	22:10		42.6	35.1					
07-Jan	06:30	30000			42.1	34.6	22	0.953	5.5E-08
07-Jan	06:30		42.1	34.6					
07-Jan	12:00	19800			41.9	34.4	22	0.953	3.4E-08
07-Jan	12:00		41.9	34.4					
07-Jan	19:37	27420			41.8	34.3	22	0.953	1.2E-08
07-Jan	19:37		41.8	34.3					
08-Jan	06:42	39900			41.6	34.1	22	0.953	1.7E-08
06-Jan	22:10		42.6	35.1					
08-Jan	06:42	117120			41.6	34.1	22	0.953	2.8E-08

Height of Top of Specimen From Top of Table: 7.50 cm

Standpipe Diameter 1.05 cm

Standpipe Area 0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Shale Gr
BORING/SAMPLE NO: WB-4
SAMPLE ORIENTATION H [✓ V] R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 1/6/11
TECHNICIAN: MLT
DEPTH/LIFT: 6.0'
PERM FLUID USED: Tap water
b. AVERAGE DIAMETER: 1.9 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 313.6 gms
f. Ring Wt + Wet Soil: 409.0 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 190.4 gms
m. Dry Wt. Soil + tare: 175.6 gms
n. Tare Wt: ws ws 92.0 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/6/11	15:03		43.9			
1/6/11	22:10			42.6		
6/6/11	22:10		42.6			
1/7/11	6:30			42.1		
1/7/11	6:30		42.1			
1/7/11	12:00			41.9		
1/7/11	12:00		41.9			
1/7/11	19:37			41.8		
1/7/11	19:37		41.8			
1/8/11	6:42			41.6		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.5 *cm*
Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* (1)
hf = *final height in cm* (1)
$\ln$ = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: WB-6
PROCTOR # :
SAMPLE ORIENTATION: H ______ V ✓
Remold ______

LAB START DATE: 1/6/2011
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 66.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 3.142 cu in

b. Avg. Diameter of Specimen: 2.0 in
d. Wet Unit Weight [((f-h)*3.8095)/c)]: 127.0 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 318.0 gms
f. Wet Weight Soil + Tare: 205.5 gms
g. Dry Weight Soil + Tare: 190.7 gms
h. Tare Weight: 100.8 gms
i. Moisture Content [(f-g)/(g-h)]*100: 16.5 %
j. Unit Dry Weight [d/(1+(i/100))]: 109.0 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 206.7 gms
l. Dry Weight Soil + Tare: 190.7 gms
m. Tare Weight: 100.8 gms
n. Moisture Content [(k-l)/(l-m)]*100: 17.8 %
o. Unit Dry Weight [d/(1+(n/100))]: 107.8 pcf
p. Ring Weight: 213.3 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
06-Jan	14:45		41.2	33.7					
06-Jan	22:10	26700			40.4	32.9	22	0.953	9.3E-08
06-Jan	22:10		40.4	32.9					
07-Jan	06:30	30000			39.7	32.2	22	0.953	7.4E-08
07-Jan	06:30		39.7	32.2					
07-Jan	12:00	19800			39.5	32.0	22	0.953	3.3E-08
07-Jan	12:00		39.5	32.0					
07-Jan	19:37	27420			39.3	31.8	22	0.953	2.4E-08
07-Jan	19:37		39.3	31.8					
08-Jan	06:42	39900			39.1	31.6	22	0.953	1.6E-08
06-Jan	22:10		40.4	32.9					
08-Jan	06:42	117120			39.1	31.6	22	0.953	3.6E-08

Height of Top of Specimen From Top of Table: 7.50 cm

Standpipe Diameter 1.05 cm

Standpipe Area 0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF

LOCATION:

MATERIAL: Shale DK Gr

BORING/SAMPLE NO: WB-26

SAMPLE ORIENTATION H [✓ V] R (Circle One)

a. HEIGHT: 1.0 in

c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B:9

DATE: 1/6/11

TECHNICIAN: MLT

DEPTH/LIFT: 66'

PERM FLUID USED: Tap Water

b. AVERAGE DIAMETER: 2.0 in

d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: ~~[illegible]~~ 213.3 gms

f. Ring Wt + Wet Soil: 318.0 gms

g. Wet Wt Soil + tare [f-e+i]: gms

h. Dry Wt Soil + tare: gms

i. Tare Wt: gms

j. Moisture Content [(g-h)/(h-i)]*100 %

k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: gms

m. Dry Wt. Soil + tare: 190.7 gms

n. Tare Wt: GL 100.8 gms

o. Moisture Content [(l-m)/(m-n)]*100 %

p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/6/11	14:45		41.2			
1/6/11	22:10			40.4		
1/6/11	22:10		40.4			
1/7/11	6:30			39.7		
1/7/11	6:30		39.7			
1/7/11	12:00			39.5		
1/7/11	12:00		39.5			
1/7/11	19:37			39.3		
1/7/11	19:37		39.3			
1/8/11	6:42			39.1		

PROCTOR NO:

MDD:

OMC:

PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.5 *cm*

Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$

Where k = *permeability in cm/sec*

a = *area of standpipe in sq cm*

L = *length of specimen in cm*

A = *area of specimen in sq cm*

t = *elapsed time in seconds*

ho = *initial height in cm* (1)

hf = *final height in cm* (1)

ln = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver-Boos Engineers

REPORT DATE: 1/12/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Clayey gravel, brown
BORING/SAMPLE: WB-7
PROCTOR # :
SAMPLE ORIENTATION: H ____ V _✓_
Remold ____

LAB START DATE: 1/8/2011
LAB RPT. DATE: 1/12/2011
TECHNICIAN: MLT
DEPTH/LIFT: 11.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 154.1 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 739.4 gms
f. Wet Weight Soil + Tare: 294.8 gms
g. Dry Weight Soil + Tare: 270.5 gms
h. Tare Weight: 96.2 gms
i. Moisture Content [(f-g)/(g-h)]*100: 13.9 %
j. Unit Dry Weight [d/(1+(i/100))]: 135.3 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 304.1 gms
l. Dry Weight Soil + Tare: 270.5 gms
m. Tare Weight: 96.2 gms
n. Moisture Content [(k-l)/(l-m)]*100: 19.3 %
o. Unit Dry Weight [d/(1+(n/100))]: 129.2 pcf
p. Ring Weight: 540.8 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
08-Jan	7:05:00		39.4	32.4					
08-Jan	7:05:10	10			36.2	29.2	22	0.953	6.9E-04
08-Jan	7:05:20		36.2	29.2					
08-Jan	7:05:30	10			32.9	25.9	22	0.953	7.9E-04
08-Jan	7:05:40		32.9	25.9					
08-Jan	7:05:50	10			30.1	23.1	22	0.953	7.6E-04
08-Jan	7:06:00		30.1	23.1					
08-Jan	7:06:10	10			27.5	20.5	22	0.953	7.9E-04
08-Jan	7:06:20		27.5	20.5					
08-Jan	7:06:30	10			25.0	18.0	22	0.953	8.6E-04
08-Jan	7:05:20		36.2	29.2					
08-Jan	7:06:30	70			25.0	18.0	22	0.953	4.6E-04

Height of Top of Specimen From Top of Table: 7.00 cm

Standpipe Diameter: 1.05 cm

Standpipe Area: 0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Cly Gvl. Br
BORING/SAMPLE NO: WB-7
SAMPLE ORIENTATION H [✓ V] R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 1/8/11
TECHNICIAN: MLT
DEPTH/LIFT: 11'
PERM FLUID USED: Tap water
b. AVERAGE DIAMETER: 2.5 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 540.8 gms
f. Ring Wt + Wet Soil: 739.4 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 304.1 gms
m. Dry Wt. Soil + tare: 270.5 gms
n. Tare Wt: B 96.2 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/8/11	7:05:00		39.4			
1/8/11	7:05:10			36.2		
1/8/11	7:05:20		36.2			
1/8/11	7:05:30			32.9		
1/8/11	7:05:40		32.9			
1/8/11	7:05:50			30.1		
1/8/11	7:06:00		30.1			
1/8/11	7:06:10			27.5		
1/8/11	7:06:20		27.5			
1/8/11	7:06:30			25.0		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 71.0 *cm*
Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$$k = \{[(a * L)/(A * t)] * \ln(ho/hf)\}$$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* (1)
hf = *final height in cm* (1)
$\ln$ = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver-Boos Engineers

REPORT DATE: 1/12/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Clayey gravel, brown
BORING/SAMPLE: WB-7
PROCTOR # :
SAMPLE ORIENTATION: H ✓ V ____
Remold ____

LAB START DATE: 1/8/2011
LAB RPT. DATE: 1/12/2011
TECHNICIAN: MLT
DEPTH/LIFT: 11.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 152.0 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 710.2 gms
f. Wet Weight Soil + Tare: 289.6 gms
g. Dry Weight Soil + Tare: 266.3 gms
h. Tare Weight: 93.7 gms
i. Moisture Content [(f-g)/(g-h)]*100: 13.5 %
j. Unit Dry Weight [d/(1+(i/100))]: 133.9 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 292.4 gms
l. Dry Weight Soil + Tare: 266.3 gms
m. Tare Weight: 93.7 gms
n. Moisture Content [(k-l)/(l-m)]*100: 15.1 %
o. Unit Dry Weight [d/(1+(n/100))]: 132.1 pcf
p. Ring Weight: 514.3 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
08-Jan	7:00:00		43.3	35.8					
08-Jan	7:00:10	10			40.7	33.2	22	0.953	5.4E-04
08-Jan	7:00:20		40.7	33.2					
08-Jan	7:00:30	10			37.6	30.1	22	0.953	7.0E-04
08-Jan	7:00:40		37.6	30.1					
08-Jan	7:00:50	10			34.1	26.6	22	0.953	8.8E-04
08-Jan	7:01:00		34.1	26.6					
08-Jan	7:01:10	10			30.9	23.4	22	0.953	9.1E-04
08-Jan	7:01:20		30.9	23.4					
08-Jan	7:01:30	10			27.8	20.3	22	0.953	1.0E-03
08-Jan	7:00:20		40.7	33.2					
08-Jan	7:01:30	70			27.8	20.3	22	0.953	5.0E-04

Height of Top of Specimen From Top of Table: 7.47 cm

Standpipe Diameter 1.09 cm

Standpipe Area 0.933 sq cm

MLT Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF

LOCATION:

MATERIAL: Cly Gvl Br

BORING/SAMPLE NO: WB-7

SAMPLE ORIENTATION [✓ H] V R (Circle One)

a. HEIGHT: 1.0 in

c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-CB9

DATE: 1/8/11

TECHNICIAN: MLT

DEPTH/LIFT: 11'

PERM FLUID USED: Tap water

b. AVERAGE DIAMETER: 2.5 in

d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 514.3 gms

f. Ring Wt + Wet Soil: 710.2 gms

g. Wet Wt Soil + tare [f-e+i]: gms

h. Dry Wt Soil + tare: gms

i. Tare Wt: gms

j. Moisture Content [(g-h)/(h-i)]*100 %

k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: gms

m. Dry Wt. Soil + tare: gms

n. Tare Wt: AA 93.7 gms

o. Moisture Content [(l-m)/(m-n)]*100 %

p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/8/11	7:00		43.3			
1/8/11	7:00:10			40.7		
1/8/11	7:00:20		40.7			
1/8/11	7:00:30			37.6		
1/8/11	7:00:40		37.6			
1/8/11	7:00:50			34.1		
1/8/11	7:01:00		34.1			
1/8/11	7:01:10			30.9		
1/8/11	7:01:20		30.9			
1/8/11	7:01:30			27.8		

PROCTOR NO:

MDD:

OMC:

PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.47 *cm*

Stand Pipe Diameter: 1.07 *cm*

SAMPLE CALCULATIONS

$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$

Where k = *permeability in cm/sec*

a = *area of standpipe in sq cm*

L = *length of specimen in cm*

A = *area of specimen in sq cm*

t = *elapsed time in seconds*

ho = *initial height in cm* [1]

hf = *final height in cm* [1]

$\ln$ = *natural logarithm*

[1] *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver-Boos Engineers

REPORT DATE: 1/12/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: WB-8
PROCTOR # :
SAMPLE ORIENTATION: H ______ V ✓
Remold ______

LAB START DATE: 1/8/2011
LAB RPT. DATE: 1/12/2011
TECHNICIAN: MLT
DEPTH/LIFT: 56.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 3.142 cu in

b. Avg. Diameter of Specimen: 2.0 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 133.3 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 322.9 gms
f. Wet Weight Soil + Tare: 201.1 gms
g. Dry Weight Soil + Tare: 185.6 gms
h. Tare Weight: 91.2 gms
i. Moisture Content [(f-g)/(g-h)]*100: 16.4 %
j. Unit Dry Weight [d/(1+(i/100))]: 114.5 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 204.5 gms
l. Dry Weight Soil + Tare: 185.6 gms
m. Tare Weight: 91.2 gms
n. Moisture Content [(k-l)/(l-m)]*100: 20.0 %
o. Unit Dry Weight [d/(1+(n/100))]: 111.0 pcf
p. Ring Weight: 213.0 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
08-Jan	07:23		36.6	29.1					
08-Jan	18:22	39540			35.2	27.7	22	0.953	1.3E-07
08-Jan	18:22		35.2	27.7					
09-Jan	06:30	43680			34.8	27.3	22	0.953	3.4E-08
09-Jan	06:30		34.8	27.3					
09-Jan	14:00	27000			34.6	27.1	22	0.953	2.8E-08
09-Jan	14:00		34.6	27.1					
09-Jan	21:36	27360			34.4	26.9	22	0.953	2.8E-08
09-Jan	21:36		34.4	26.9					
10-Jan	07:20	35040			34.2	26.7	22	0.953	2.2E-08
08-Jan	18:22		35.2	27.7					
10-Jan	07:20	133080			34.2	26.7	22	0.953	2.9E-08

Height of Top of Specimen From Top of Table: 7.50 cm

Standpipe Diameter 1.05 cm

Standpipe Area 0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Shale DK Gr
BORING/SAMPLE NO: WB-8
SAMPLE ORIENTATION H [✓ V] R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 1/8/11
TECHNICIAN: MT
DEPTH/LIFT: 56'
PERM FLUID USED: Tap water
b. AVERAGE DIAMETER: 2.0 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 213.0 gms
f. Ring Wt + Wet Soil: 322.9 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 204.5 gms
m. Dry Wt. Soil + tare: 185.6 gms
n. Tare Wt: KI 91.2 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/8/11	7:23		36.6			
1/8/11	18:22			35.2		
1/8/11	18:22		35.2			
1/9/11	6:30			34.8		
1/9/11	6:30		34.8			
1/9/11	14:00			34.6		
1/9/11	14:00		34.6			
1/9/11	21:36			34.4		
1/9/11	21:36		34.4			
1/10/11	7:20			34.2		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.5 *cm*
Stand Pipe Diameter: 1.35 *cm*

SAMPLE CALCULATIONS

$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* (1)
hf = *final height in cm* (1)
ln = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:		LAB START DATE:	1/6/2011
MATERIAL:	Shale, dark gray	LAB RPT. DATE:	1/11/2011
BORING/SAMPLE:	WB-9	TECHNICIAN:	MLT
PROCTOR # :		DEPTH/LIFT:	60.0'
SAMPLE ORIENTATION:	H ____ V ✓ Remold ____	PERM FLUID USED:	De-aired Tap Water

a. Length of Specimen, L:	1.0 in	b. Avg. Diameter of Specimen:	2.0 in
c. Sample Volume $(\pi b^2 / 4 * a)$:	3.142 cu in	d. Wet Unit Weight: [((f-h)*3.8095)/c)]:	130.5 pcf

INITIAL CONDITIONS		FINAL CONDITIONS	
e. Ring + Wet Weight Soil:	320.8 gms	k. Wet Weight Soil + Tare:	201.2 gms
f. Wet Weight Soil + Tare:	199.5 gms	l. Dry Weight Soil + Tare:	182.7 gms
g. Dry Weight Soil + Tare:	182.7 gms	m. Tare Weight:	91.9 gms
h. Tare Weight:	91.9 gms	n. Moisture Content [(k-l)/(l-m)]*100:	20.4 %
i. Moisture Content [(f-g)/(g-h)]*100:	18.5 %	o. Unit Dry Weight [d/(1+(n/100))]:	108.4 pcf
j. Unit Dry Weight [d/(1+(i/100))]:	110.1 pcf	p. Ring Weight:	213.2 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
06-Jan	14:54		46.5	39.0					
06-Jan	22:10	26160			45.3	37.8	22	0.953	1.2E-07
06-Jan	22:10		45.3	37.8					
07-Jan	06:30	30000			45.0	37.5	22	0.953	2.7E-08
07-Jan	06:30		45.0	37.5					
07-Jan	12:00	19800			44.8	37.3	22	0.953	2.7E-08
07-Jan	12:00		44.8	37.3					
07-Jan	19:37	27420			44.6	37.1	22	0.953	2.0E-08
07-Jan	19:37		44.6	37.1					
08-Jan	06:42	39900			44.3	36.8	22	0.953	2.1E-08
06-Jan	22:10		45.3	37.8					
08-Jan	06:42	117120			44.3	36.8	22	0.953	2.3E-08

Height of Top of Specimen From Top of Table:	7.48 cm	Standpipe Diameter 1.04 cm	Standpipe Area 0.849 sq cm

MLT Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Candlot LF

LOCATION:

MATERIAL: Shale DK Gr

BORING/SAMPLE NO: WB-9

SAMPLE ORIENTATION H [✓ V] R (Circle One)

a. HEIGHT: 1.0 in

c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9

DATE: 1/6/11

TECHNICIAN: MLT

DEPTH/LIFT: 60'

PERM FLUID USED: Tap water

b. AVERAGE DIAMETER: 2.0 in

d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 213.2 gms

f. Ring Wt + Wet Soil: 320.8 gms

g. Wet Wt Soil + tare [f-e+i]: gms

h. Dry Wt Soil + tare: gms

i. Tare Wt: gms

j. Moisture Content [(g-h)/(h-i)]*100 %

k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 201.2 gms

m. Dry Wt. Soil + tare: 182.7 gms

n. Tare Wt: C-1 91.9 gms

o. Moisture Content [(l-m)/(m-n)]*100 %

p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/6/11	14:54		46.5			
1/6/11	22:10			45.3		
1/6/11	22:10		45.3			
1/7/11	6:30			45.0		
1/7/11	6:30		45.0			
1/7/11	12:00			44.8		
1/7/11	12:00		44.8			
1/7/11	19:37			44.6		
1/7/11	19:37		44.6			
1/8/11	6:42			44.3		

PROCTOR NO:

MDD:

OMC:

PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.48 *cm*

Stand Pipe Diameter: 1.04 *cm*

SAMPLE CALCULATIONS

$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$

Where k = *permeability in cm/sec*

a = *area of standpipe in sq cm*

L = *length of specimen in cm*

A = *area of specimen in sq cm*

t = *elapsed time in seconds*

ho = *initial height in cm* (1)

hf = *final height in cm* (1)

ln = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Clay, brown
BORING/SAMPLE: WB-10
PROCTOR # :
SAMPLE ORIENTATION: H ✓ V ____
Remold ____

LAB START DATE: 12/31/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 4.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
b. Avg. Diameter of Specimen: 2.5 in
c. Sample Volume (π b^2 / 4 * a): 4.909 cu in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 126.0 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 677.9 gms
f. Wet Weight Soil + Tare: 254.5 gms
g. Dry Weight Soil + Tare: 230.3 gms
h. Tare Weight: 92.1 gms
i. Moisture Content [(f-g)/(g-h)]*100: 17.5 %
j. Unit Dry Weight [d/(1+(i/100))]: 107.3 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 259.4 gms
l. Dry Weight Soil + Tare: 230.3 gms
m. Tare Weight: 92.1 gms
n. Moisture Content [(k-l)/(l-m)]*100: 21.1 %
o. Unit Dry Weight [d/(1+(n/100))]: 104.1 pcf
p. Ring Weight: 515.5 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
31-Dec	09:53		36.0	28.5					
31-Dec	18:30	31020			33.3	25.8	22	0.953	2.1E-07
31-Dec	18:30		33.3	25.8					
01-Jan	07:53	48180			31.5	24.0	22	0.953	9.9E-08
01-Jan	07:53		31.5	24.0					
01-Jan	12:00	14820			31.0	23.5	22	0.953	9.4E-08
01-Jan	12:00		31.0	23.5					
01-Jan	16:30	16200			30.5	23.0	22	0.953	8.8E-08
01-Jan	16:30		30.5	23.0					
01-Jan	22:07	20220			29.9	22.4	22	0.953	8.7E-08
31-Dec	18:30		33.3	25.8					
01-Jan	22:07	99420			29.9	22.4	22	0.953	9.4E-08

Height of Top of Specimen From Top of Table: 7.50 cm

Standpipe Diameter: 1.05 cm

Standpipe Area: 0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Cl-y Br
BORING/SAMPLE NO: WB-10
SAMPLE ORIENTATION [✓ H] [✓ V] R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 12/31/10
TECHNICIAN: MLT
DEPTH/LIFT: 4'
PERM FLUID USED: Tap water
b. AVERAGE DIAMETER: 2.5 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 515.5 gms
f. Ring Wt + Wet Soil: 677.9 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 259.4 gms
m. Dry Wt. Soil + tare: 230.3 gms
n. Tare Wt: WW 92.1 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/31/10	9:53		36.0			
12/31/10	18:30			33.3		
12/31/10	18:30		33.3			
1/1/11	7:53			31.5		
1/1/11	7:53		31.5			
1/1/11	12:00			31.0		
1/1/11	12:00		31.0			
1/1/11	16:30			30.5		
1/1/11	16:30		30.5			
1/1/11	22:07			29.9		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.5 *cm*
Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* (1)
hf = *final height in cm* (1)
$\ln$ = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Sandy clay, tan & brown
BORING/SAMPLE: WB-10
PROCTOR # :
SAMPLE ORIENTATION: H ✓ V ____
Remold ____

LAB START DATE: 1/3/2011
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 7.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 132.5 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 697.5 gms
f. Wet Weight Soil + Tare: 267.0 gms
g. Dry Weight Soil + Tare: 245.7 gms
h. Tare Weight: 96.3 gms
i. Moisture Content [(f-g)/(g-h)]*100: 14.3 %
j. Unit Dry Weight [d/(1+(i/100))]: 115.9 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 269.9 gms
l. Dry Weight Soil + Tare: 245.7 gms
m. Tare Weight: 96.3 gms
n. Moisture Content [(k-l)/(l-m)]*100: 16.2 %
o. Unit Dry Weight [d/(1+(n/100))]: 114.0 pcf
p. Ring Weight: 526.8 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
04-Jan	07:21		42.0	35.0					
04-Jan	11:30	14940			40.3	33.3	22	0.953	2.2E-07
04-Jan	11:30		40.3	33.3					
04-Jan	14:30	10800			39.5	32.5	22	0.953	1.5E-07
04-Jan	14:30		39.5	32.5					
05-Jan	07:20	60600			36.2	29.2	22	0.953	1.2E-07
05-Jan	07:20		36.2	29.2					
05-Jan	12:00	16800			35.2	28.2	22	0.953	1.4E-07
05-Jan	12:00		35.2	28.2					
05-Jan	16:15	15300			34.2	27.2	22	0.953	1.6E-07
04-Jan	11:30		40.3	33.3					
05-Jan	16:15	103500			34.2	27.2	22	0.953	1.3E-07

Height of Top of Specimen From Top of Table: 7.00 cm

Standpipe Diameter 1.05 cm

Standpipe Area 0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF

LOCATION:

MATERIAL: Sa Cly Trace Br

BORING/SAMPLE NO: WB-10

SAMPLE ORIENTATION [✓ H] V R (Circle One)

a. HEIGHT: 1.0 in

c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9

DATE: 1/3/11

TECHNICIAN: MLT

DEPTH/LIFT: 7'

PERM FLUID USED: Tap water

b. AVERAGE DIAMETER: 2.5 in

d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 526.8 gms

f. Ring Wt + Wet Soil: 697.5 gms

g. Wet Wt Soil + tare [f-e+i]: gms

h. Dry Wt Soil + tare: gms

i. Tare Wt: gms

j. Moisture Content [(g-h)/(h-i)]*100 %

k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 269.9 gms

m. Dry Wt. Soil + tare: 245.7 gms

n. Tare Wt: F-2 96.3 gms

o. Moisture Content [(l-m)/(m-n)]*100 %

p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/3/11	14:54		44.3			
1/4/11	7:21		42.0			
1/4/11	11:30			40.3		
1/4/11	11:30		40.3			
1/4/11	14:30			39.5		
1/4/11	14:30		39.5			
1/5/11	7:20			36.2		
1/5/11	7:20		36.2			
1/5/11	12:00			35.2		
1/5/11	12:00		35.2			
1/5/11	16:15			34.2		

PROCTOR NO:

MDD:

OMC:

PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.0 *cm*

Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$$k = \{[(a * L)/(A * t)] * \ln(ho/hf)\}$$

Where k = *permeability in cm/sec*

a = *area of standpipe in sq cm*

L = *length of specimen in cm*

A = *area of specimen in sq cm*

t = *elapsed time in seconds*

ho = *initial height in cm* [1]

hf = *final height in cm* [1]

$\ln$ = *natural logarithm*

[1] *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: WB-10
PROCTOR # :
SAMPLE ORIENTATION: H ✓ V _____
Remold _____

LAB START DATE: 1/6/2011
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 45.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume
(π b^2 / 4 * a): 2.835 cu in

b. Avg. Diameter of Specimen: 1.9 in
d. Wet Unit Weight:
[((f-h)*3.8095)/c)]: 113.7 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 362.7 gms
f. Wet Weight Soil + Tare: 179.2 gms
g. Dry Weight Soil + Tare: 166.9 gms
h. Tare Weight: 94.6 gms
i. Moisture Content
[(f-g)/(g-h)]*100: 17.0 %
j. Unit Dry Weight
[d/(1+(i/100))]: 97.1 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 181.3 gms
l. Dry Weight Soil + Tare: 166.9 gms
m. Tare Weight: 94.6 gms
n. Moisture Content
[(k-l)/(l-m)]*100: 19.9 %
o. Unit Dry Weight
[d/(1+(n/100))]: 94.8 pcf
p. Ring Weight: 278.1 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
06-Jan	15:15		33.9	26.4					
06-Jan	22:10	24900			32.5	25.0	22	0.953	2.5E-07
06-Jan	22:10		32.5	25.0					
07-Jan	06:30	30000			32.1	24.6	22	0.953	6.2E-08
07-Jan	06:30		32.1	24.6					
07-Jan	12:00	19800			31.9	24.4	22	0.953	4.7E-08
07-Jan	12:00		31.9	24.4					
07-Jan	19:37	27420			31.8	24.3	22	0.953	1.7E-08
07-Jan	19:37		31.8	24.3					
08-Jan	06:42	39900			31.7	24.2	22	0.953	1.2E-08
06-Jan	22:10		32.5	25.0					
08-Jan	06:42	117120			31.7	24.2	22	0.953	3.2E-08

Height of Top of Specimen
From Top of Table: 7.50 cm

Standpipe Diameter
1.05 cm

Standpipe Area
0.866 sq cm

MLT Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET

Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Shale DK Gr
BORING/SAMPLE NO: WB-10
SAMPLE ORIENTATION [✓ H] V R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 1/6/11
TECHNICIAN: MLT
DEPTH/LIFT: 45'
PERM FLUID USED: Tap water
b. AVERAGE DIAMETER: 1.8 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 278.1 gms
f. Ring Wt + Wet Soil: 362.7 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 181.3 gms
m. Dry Wt. Soil + tare: 166.9 gms
n. Tare Wt: C-5 94.6 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/6/11	15:15		33.9			
1/6/11	22:10			32.5		
1/6/11	22:10		32.5			
1/7/11	6:30			32.1		
1/7/11	6:30		32.1			
1/7/11	12:00			31.9		
1/7/11	12:00		31.9			
1/7/11	19:37			31.8		
1/7/11	19:37		31.8			
1/8/11	6:42			31.7		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.5 *cm*
Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* (1)
hf = *final height in cm* (1)
$\ln$ = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, gray hard
BORING/SAMPLE: WB-11
PROCTOR # :
SAMPLE ORIENTATION: H _____ V ✓
Remold _____

LAB START DATE: 1/3/2011
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 58.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 3.142 cu in

b. Avg. Diameter of Specimen: 2.0 in
d. Wet Unit Weight [((f-h)*3.8095)/c)]: 148.4 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 335.5 gms
f. Wet Weight Soil + Tare: 215.0 gms
g. Dry Weight Soil + Tare: 200.3 gms
h. Tare Weight: 92.6 gms
i. Moisture Content [(f-g)/(g-h)]*100: 13.6 %
j. Unit Dry Weight [d/(1+(i/100))]: 130.6 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 218.7 gms
l. Dry Weight Soil + Tare: 200.3 gms
m. Tare Weight: 92.6 gms
n. Moisture Content [(k-l)/(l-m)]*100: 17.1 %
o. Unit Dry Weight [d/(1+(n/100))]: 126.8 pcf
p. Ring Weight: 213.1 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
04-Jan	07:00		34.7	27.2					
04-Jan	11:30	16200			34.0	26.5	22	0.953	1.8E-07
04-Jan	11:30		34.0	26.5					
04-Jan	14:30	10800			33.8	26.3	22	0.953	7.8E-08
04-Jan	14:30		33.8	26.3					
05-Jan	07:20	60600			33.3	25.8	22	0.953	3.5E-08
05-Jan	07:20		33.3	25.8					
05-Jan	12:00	16800			33.2	25.7	22	0.953	2.6E-08
05-Jan	12:00		33.2	25.7					
05-Jan	16:15	15300			33.1	25.6	22	0.953	2.8E-08
04-Jan	11:30		34.0	26.5					
05-Jan	16:15	103500			33.1	25.6	22	0.953	3.7E-08

Height of Top of Specimen From Top of Table: 7.47 cm

Standpipe Diameter: 1.09 cm

Standpipe Area: 0.933 sq cm

MLT Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF

LOCATION:

MATERIAL: Shale Cor Hd

BORING/SAMPLE NO: 1WB-11

SAMPLE ORIENTATION H [✓ V] R (Circle One)

a. HEIGHT: 1.0 in

c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6 13.9

DATE: 1/3/11

TECHNICIAN: MLT

DEPTH/LIFT: 58'

PERM FLUID USED: Tap Water

b. AVERAGE DIAMETER: 2.0 in

d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 213.1 gms

f. Ring Wt + Wet Soil: 335.5 gms

g. Wet Wt Soil + tare [f-e+i]: gms

h. Dry Wt Soil + tare: gms

i. Tare Wt: gms

j. Moisture Content [(g-h)/(h-i)]*100 %

k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 218.7 gms

m. Dry Wt. Soil + tare: 200.3 gms

n. Tare Wt: AA 92.6 gms

o. Moisture Content [(l-m)/(m-n)]*100 %

p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/4/11	7:00		34.7			
1/4/11	11:30			34.0		
1/4/11	11:30		34.0			
1/4/11	14:30			33.8		
1/4/11	14:30		33.8			
1/5/11	7:20			33.3		
1/5/11	7:20		33.3			
1/5/11	12:00			33.2		
1/5/11	12:00		33.2			
1/5/11	16:15			33.1		

PROCTOR NO:

MDD:

OMC:

PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.47 *cm*

Stand Pipe Diameter: 1.09 *cm*

SAMPLE CALCULATIONS

*k = {[(a * L)/(A * t)] * ln[ho/hf]}*

Where k = permeability in cm/sec

a = area of standpipe in sq cm

L = length of specimen in cm

A = area of specimen in sq cm

t = elapsed time in seconds

ho = initial height in cm (1)

hf = final height in cm (1)

ln = natural logarithm

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Shale, dark gray
BORING/SAMPLE: WB-12
PROCTOR # :
SAMPLE ORIENTATION: H ____ V ✓
Remold ____

LAB START DATE: 1/6/2011
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 60.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume
(π b^2 / 4 * a): 2.835 cu in

b. Avg. Diameter of Specimen: 1.9 in
d. Wet Unit Weight:
[((f-h)*3.8095)/c)]: 105.5 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 392.0 gms
f. Wet Weight Soil + Tare: 173.6 gms
g. Dry Weight Soil + Tare: 155.2 gms
h. Tare Weight: 95.1 gms
i. Moisture Content
[(f-g)/(g-h)]*100: 30.6 %
j. Unit Dry Weight
[d/(1+(i/100))]: 80.8 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 174.9 gms
l. Dry Weight Soil + Tare: 155.2 gms
m. Tare Weight: 95.1 gms
n. Moisture Content
[(k-l)/(l-m)]*100: 32.8 %
o. Unit Dry Weight
[d/(1+(n/100))]: 79.4 pcf
p. Ring Weight: 313.5 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
06-Jan	15:24		38.5	31.5					
06-Jan	22:10	24360			38.1	31.1	22	0.953	6.0E-08
06-Jan	22:10		38.1	31.1					
07-Jan	06:30	30000			37.8	30.8	22	0.953	3.7E-08
07-Jan	06:30		37.8	30.8					
07-Jan	12:00	19800			37.6	30.6	22	0.953	3.8E-08
07-Jan	12:00		37.6	30.6					
07-Jan	19:37	27420			37.5	30.5	22	0.953	1.4E-08
07-Jan	19:37		37.5	30.5					
08-Jan	06:42	39900			37.3	30.3	22	0.953	1.9E-08
06-Jan	22:10		38.1	31.1					
08-Jan	06:42	117120			37.3	30.3	22	0.953	2.5E-08

Height of Top of Specimen
From Top of Table: 7.00 cm

Standpipe Diameter
1.05 cm

Standpipe Area
0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Shale DK Gr
BORING/SAMPLE NO: WB-12
SAMPLE ORIENTATION H [✓ V] R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 1/6/11
TECHNICIAN: MLT
DEPTH/LIFT: 60'
PERM FLUID USED: Tap Water
b. AVERAGE DIAMETER: 1.9 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 313.5 gms
f. Ring Wt + Wet Soil: 392.0 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 174.9 gms
m. Dry Wt. Soil + tare: 155.2 gms
n. Tare Wt: B-19 95.1 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/6/11	15:24		38.5			
1/6/11	22:10			38.1		
1/6/11	22:10		38.1			
1/7/11	6:30			37.8		
1/7/11	6:30		37.8			
1/7/11	12:00			37.6		
1/7/11	12:00		37.6			
1/7/11	19:37			37.5		
1/7/11	19:37		37.5			
1/8/11	6:42			37.3		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.0 *cm*
Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$$k = \{[(a * L)/(A * t)] * \ln(ho/hf)\}$$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* [1]
hf = *final height in cm* [1]
ln = *natural logarithm*

[1] *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Sandy clay, brown
BORING/SAMPLE: WB-13
PROCTOR #:
SAMPLE ORIENTATION: H ✓ V ____
Remold ____

LAB START DATE: 12/27/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 19.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume ($\pi b^2 / 4 * a$): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 121.4 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 696.8 gms
f. Wet Weight Soil + Tare: 251.1 gms
g. Dry Weight Soil + Tare: 221.2 gms
h. Tare Weight: 94.7 gms
i. Moisture Content [(f-g)/(g-h)]*100: 23.6 %
j. Unit Dry Weight [d/(1+(i/100))]: 98.2 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 252.9 gms
l. Dry Weight Soil + Tare: 221.2 gms
m. Tare Weight: 94.7 gms
n. Moisture Content [(k-l)/(l-m)]*100: 25.1 %
o. Unit Dry Weight [d/(1+(n/100))]: 97.1 pcf
p. Ring Weight: 540.4 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
27-Dec	08:38		43.9	36.4					
27-Dec	19:45	40020			40.3	32.8	22	0.953	1.7E-07
27-Dec	19:45		40.3	32.8					
28-Dec	07:51	43560			38.7	31.2	22	0.953	7.6E-08
28-Dec	07:51		38.7	31.2					
28-Dec	15:00	25740			38.1	30.6	22	0.953	5.0E-08
28-Dec	15:00		38.1	30.6					
28-Dec	22:16	26160			37.5	30.0	22	0.953	5.0E-08
28-Dec	22:16		37.5	30.0					
29-Dec	07:51	34500			36.8	29.3	22	0.953	4.5E-08
27-Dec	19:45		40.3	32.8					
29-Dec	07:51	129960			36.8	29.3	22	0.953	5.7E-08

Height of Top of Specimen From Top of Table: 7.50 cm

Standpipe Diameter 1.05 cm

Standpipe Area 0.866 sq cm

MLT Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
JOB NO: 1339-351-11-02-613.9
LOCATION:
DATE: 12/27/10
MATERIAL: Cly, Sandy Cly Br w/Rock
TECHNICIAN: MLT
BORING/SAMPLE NO: WB-19
DEPTH/LIFT: 19'
SAMPLE ORIENTATION [✓ H] V R (Circle One)
PERM FLUID USED: Tap Water
a. HEIGHT: 1.0 in
b. AVERAGE DIAMETER: 2.5 in
c. VOLUME: (0.7854 * b ^ 2) cu in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 540.4 gms
f. Ring Wt + Wet Soil: 696.8 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 252.9 gms
m. Dry Wt. Soil + tare: 221.1 gms
n. Tare Wt: C-5 94.7 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/27/10	8:38		43.9			
12/27/10	19:45			40.3		
12/27/10	19:45		40.3			
12/28/10	7:51			38.7		
12/28/10	7:51		38.7			
12/28/10	15:00			38.1		
12/28/10	15:00		38.1			
12/28/10	22:16			37.5		
12/28/10	22:16		37.5			
12/29/10	7:51			36.8		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.5 *cm*
Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

*k = {[(a * L)/(A * t)] * ln[ho/hf]}*

Where k = permeability in cm/sec
a = area of standpipe in sq cm
L = length of specimen in cm
A = area of specimen in sq cm
t = elapsed time in seconds
ho = initial height in cm (1)
hf = final height in cm (1)
ln = natural logarithm

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Sandy clay, brown
BORING/SAMPLE: WB-13
PROCTOR #:
SAMPLE ORIENTATION: H ____ V ✓
Remold ____

LAB START DATE: 12/27/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 19.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume
(π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight:
[((f-h)*3.8095)/c)]: 122.5 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 673.2 gms
f. Wet Weight Soil + Tare: 249.7 gms
g. Dry Weight Soil + Tare: 218.6 gms
h. Tare Weight: 91.9 gms
i. Moisture Content
[(f-g)/(g-h)]*100: 24.5 %
j. Unit Dry Weight
[d/(1+(i/100))]: 98.3 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 252.2 gms
l. Dry Weight Soil + Tare: 218.6 gms
m. Tare Weight: 91.9 gms
n. Moisture Content
[(k-l)/(l-m)]*100: 26.5 %
o. Unit Dry Weight
[d/(1+(n/100))]: 96.8 pcf
p. Ring Weight: 515.4 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
27-Dec	08:25		40.7	33.2					
27-Dec	19:45	40800			38.0	30.5	22	0.953	1.4E-07
27-Dec	19:45		38.0	30.5					
28-Dec	07:51	43560			36.1	28.6	22	0.953	9.8E-08
28-Dec	07:51		36.1	28.6					
28-Dec	15:00	25740			35.3	27.8	22	0.953	7.3E-08
28-Dec	15:00		35.3	27.8					
28-Dec	22:16	26160			34.3	26.8	22	0.953	9.3E-08
28-Dec	22:16		34.3	26.8					
29-Dec	07:51	34500			33.5	26.0	22	0.953	5.8E-08
27-Dec	19:45		38.0	30.5					
29-Dec	07:51	129960			33.5	26.0	22	0.953	8.1E-08

Height of Top of Specimen
From Top of Table: 7.50 cm

Standpipe Diameter
1.05 cm

Standpipe Area
0.866 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Gy Sandy Clay (Br
BORING/SAMPLE NO: W 13-13
SAMPLE ORIENTATION H [✓ V] R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) ______ cu in

JOB NO: 1339-351-11-02-613.9
DATE: 12/27/10
TECHNICIAN: MLT
DEPTH/LIFT: 19'
PERM FLUID USED: Tap Water
b. AVERAGE DIAMETER: 2.5 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] ______ pcf

INITIAL CONDITIONS

e. Ring Wt: 515.4 gms
f. Ring Wt + Wet Soil: 673.2 gms
g. Wet Wt Soil + tare [f-e+i]: ______ gms
h. Dry Wt Soil + tare: ______ gms
i. Tare Wt: ______ gms
j. Moisture Content [(g-h)/(h-i)]*100 ______ %
k. Unit Dry Wt [d/(1 + (j/100))] ______ pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 252.2 gms
m. Dry Wt. Soil + tare: 218.6 gms
n. Tare Wt: C-1 91.9 gms
o. Moisture Content [(l-m)/(m-n)]*100 ______ %
p. Unit Dry Wt. [d/(1 + (o/100))] ______ pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/27/10	8:25		40.7			
12/27/10	19:45			38.0		
12/27/10	19:45		38.0			
12/28/10	7:51			36.1		
12/28/10	7:51		36.1			
12/28/10	15:00			35.3		
12/28/10	15:00		35.3			
12/28/10	22:16			34.3		
12/28/10	22:16		34.3			
12/29/10	7:51			33.5		

PROCTOR NO: ______
MDD: ______
OMC: ______
PERCENT COMPACTION: ______

Height of Top of Specimen from Top of Table: 7.5 *cm*
Stand Pipe Diameter: 1.05 *cm*

SAMPLE CALCULATIONS

$$k = \{[(a * L)/(A * t)] * \ln(ho/hf)\}$$

Where k = permeability in cm/sec
a = area of standpipe in sq cm
L = length of specimen in cm
A = area of specimen in sq cm
t = elapsed time in seconds
ho = initial height in cm [1]
hf = final height in cm [1]
ln = natural logarithm

[1] Corrected for height of specimen from top of table during computations

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Sandy clay, brown
BORING/SAMPLE: WB-14
PROCTOR # :
SAMPLE ORIENTATION: H ____ V ✓
Remold ____

LAB START DATE: 12/27/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 7.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume
(π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight:
[((f-h)*3.8095)/c)]: 121.0 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 670.4 gms
f. Wet Weight Soil + Tare: 247.1 gms
g. Dry Weight Soil + Tare: 215.3 gms
h. Tare Weight: 91.2 gms
i. Moisture Content
[(f-g)/(g-h)]*100: 25.6 %
j. Unit Dry Weight
[d/(1+(i/100))]: 96.3 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 248.2 gms
l. Dry Weight Soil + Tare: 215.3 gms
m. Tare Weight: 91.2 gms
n. Moisture Content
[(k-l)/(l-m)]*100: 26.5 %
o. Unit Dry Weight
[d/(1+(n/100))]: 95.6 pcf
p. Ring Weight: 514.5 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
27-Dec	08:51		42.6	35.1					
27-Dec	19:45	39240			41.0	33.5	22	0.953	7.7E-08
27-Dec	19:45		41.0	33.5					
28-Dec	07:51	43560			39.5	32.0	22	0.953	6.8E-08
28-Dec	07:51		39.5	32.0					
28-Dec	15:00	25740			39.0	31.5	22	0.953	4.0E-08
28-Dec	15:00		39.0	31.5					
28-Dec	22:16	26160			38.2	30.7	22	0.953	6.4E-08
28-Dec	22:16		38.2	30.7					
29-Dec	07:51	34500			37.5	30.0	22	0.953	4.3E-08
27-Dec	19:45		41.0	33.5					
29-Dec	07:51	129960			37.5	30.0	22	0.953	5.5E-08

Height of Top of Specimen
From Top of Table: 7.48 cm

Standpipe Diameter
1.04 cm

Standpipe Area
0.849 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Sand, Cl Br
BORING/SAMPLE NO: U1B-14
SAMPLE ORIENTATION H [✓ V] R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B,9
DATE: 12/27/10
TECHNICIAN: MLT
DEPTH/LIFT: 7'
PERM FLUID USED: Tap water
b. AVERAGE DIAMETER: 2.5 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 514.5 gms
f. Ring Wt + Wet Soil: 670.4 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 248.2 gms
m. Dry Wt. Soil + tare: 215.3 gms
n. Tare Wt: 606 91.2 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/27/10	8:51		42.6			
12/27/10	19:45			41.0		
12/27/10	19:45		41.0			
12/28/10	7:51			39.5		
12/28/10	7:51		39.5			
12/28/10	15:00			39.0		
12/28/10	15:00		39.0			
12/28/10	22:16			38.2		
12/28/10	22:16		38.2			
12/29/10	7:51			37.5		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.48 *cm*
Stand Pipe Diameter: 1.04 *cm*

SAMPLE CALCULATIONS

$k = \{[a * L]/[A * t]\} * \ln[ho/hf]\}$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* [1]
hf = *final height in cm* [1]
ln = *natural logarithm*

[1] *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION: -
MATERIAL: Sandy clay, brown
BORING/SAMPLE: WB-14
PROCTOR #:
SAMPLE ORIENTATION: H _____ V ✓
Remold _____

LAB START DATE: 12/27/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 10.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume (π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 122.8 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 684.9 gms
f. Wet Weight Soil + Tare: 259.1 gms
g. Dry Weight Soil + Tare: 225.8 gms
h. Tare Weight: 100.9 gms
i. Moisture Content [(f-g)/(g-h)]*100: 26.7 %
j. Unit Dry Weight [d/(1+(i/100))]: 96.9 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 259.5 gms
l. Dry Weight Soil + Tare: 225.8 gms
m. Tare Weight: 100.9 gms
n. Moisture Content [(k-l)/(l-m)]*100: 27.0 %
o. Unit Dry Weight [d/(1+(n/100))]: 96.7 pcf
p. Ring Weight: 526.7 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
27-Dec	08:51		43.8	36.3					
27-Dec	19:45	39240			42.8	35.3	22	0.953	5.1E-08
27-Dec	19:45		42.8	35.3					
28-Dec	07:51	43560			41.9	34.4	22	0.953	4.2E-08
28-Dec	07:51		41.9	34.4					
28-Dec	15:00	25740			41.1	33.6	22	0.953	6.5E-08
28-Dec	15:00		41.1	33.6					
28-Dec	22:16	26160			40.4	32.9	22	0.953	5.7E-08
28-Dec	22:16		40.4	32.9					
29-Dec	07:51	34500			39.5	32.0	22	0.953	5.7E-08
27-Dec	19:45		42.8	35.3					
29-Dec	07:51	129960			39.5	32.0	22	0.953	5.4E-08

Height of Top of Specimen From Top of Table: 7.47 cm

Standpipe Diameter 1.09 cm

Standpipe Area 0.933 sq cm

MLT Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Clay Br
BORING/SAMPLE NO: WB-14
SAMPLE ORIENTATION H [✓ V] R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6139
DATE: 12/27/10
TECHNICIAN: MLT
DEPTH/LIFT: 10'
PERM FLUID USED: Tap Water
b. AVERAGE DIAMETER: 2.5 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 526.7 gms
f. Ring Wt + Wet Soil: 684.9 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 259.5 gms
m. Dry Wt. Soil + tare: 225.8 gms
n. Tare Wt: GL 100.9 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/27/10	9:02		43.8			
12/27/10	19:45			42.8		
12/27/10	19:45		42.8			
12/28/10	7:51			41.9		
12/28/10	7:51		41.9			
12/28/10	15:00			41.1		
12/28/10	15:00		41.1			
12/28/10	22:16			40.4		
12/28/10	22:16		40.4			
12/29/10	7:51			39.5		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.47 *cm*
Stand Pipe Diameter: 1.09 *cm*

SAMPLE CALCULATIONS

$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* [1]
hf = *final height in cm* [1]
$\ln$ = *natural logarithm*

[1] *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Clay, brown
BORING/SAMPLE: WB-14
PROCTOR # :
SAMPLE ORIENTATION: H ____ V ✓
Remold ____

LAB START DATE: 12/31/2010
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 13.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume ($\pi b^2 / 4 * a$): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight: [((f-h)*3.8095)/c)]: 119.7 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 675.1 gms
f. Wet Weight Soil + Tare: 246.3 gms
g. Dry Weight Soil + Tare: 213.5 gms
h. Tare Weight: 92.0 gms
i. Moisture Content [(f-g)/(g-h)]*100: 27.0 %
j. Unit Dry Weight [d/(1+(i/100))]: 94.3 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 247.7 gms
l. Dry Weight Soil + Tare: 213.5 gms
m. Tare Weight: 92.0 gms
n. Moisture Content [(k-l)/(l-m)]*100: 28.1 %
o. Unit Dry Weight [d/(1+(n/100))]: 93.4 pcf
p. Ring Weight: 520.8 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
31-Dec	09:42		45.2	38.2					
31-Dec	18:30	31680			43.6	36.6	22	0.953	8.9E-08
31-Dec	18:30		43.6	36.6					
01-Jan	07:53	48180			42.4	35.4	22	0.953	4.6E-08
01-Jan	07:53		42.4	35.4					
01-Jan	12:00	14820			42.1	35.1	22	0.953	3.8E-08
01-Jan	12:00		42.1	35.1					
01-Jan	16:30	16200			41.6	34.6	22	0.953	5.9E-08
01-Jan	16:30		41.6	34.6					
01-Jan	22:07	20220			41.2	34.2	22	0.953	3.8E-08
31-Dec	18:30		43.6	36.6					
01-Jan	22:07	99420			41.2	34.2	22	0.953	4.5E-08

Height of Top of Specimen From Top of Table: 7.00 cm

Standpipe Diameter 1.05 cm

Standpipe Area 0.866 sq cm

MLT Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Carlat LF

LOCATION:

MATERIAL: Cly Br

BORING/SAMPLE NO: WB-14

SAMPLE ORIENTATION H [✓ V] R (Circle One)

a. HEIGHT: 1.0 in

c. VOLUME: (0.7854 * b ^ 2) cu.in

JOB NO: 1339-351-11-02-6B.9

DATE: 12/31/10

TECHNICIAN: MLT

DEPTH/LIFT: 13'

PERM FLUID USED: Tap Water

b. AVERAGE DIAMETER: 2.5 in

d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 520.8 gms

f. Ring Wt + Wet Soil: 675.1 gms

g. Wet Wt Soil + tare [f-e+i]: gms

h. Dry Wt Soil + tare: gms

i. Tare Wt: gms

j. Moisture Content [(g-h)/(h-i)]*100 %

k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 247.7 gms

m. Dry Wt. Soil + tare: 213.5 gms

n. Tare Wt: C-1 92.0 gms

o. Moisture Content [(l-m)/(m-n)]*100 %

p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
12/31/10	9:42		45.2			
12/31/10	18:30			43.6		
12/31/10	18:30		43.6			
1/1/11	7:53			42.4		
1/1/11	7:53		42.4			
1/1/11	12:00			42.1		
1/1/11	12:00		42.1			
1/1/11	16:30			41.6		
1/1/11	16:30		41.6			
1/1/11	22:07			41.2		

PROCTOR NO:

MDD:

OMC:

PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.0 *cm*

Stand Pipe Diameter: 1.05 *cm*

IIIJ-C-80

SAMPLE CALCULATIONS

$$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$$

Where *k* = *permeability in cm/sec*

a = *area of standpipe in sq cm*

L = *length of specimen in cm*

A = *area of specimen in sq cm*

t = *elapsed time in seconds*

ho = *initial height in cm* (1)

hf = *final height in cm* (1)

ln = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CLIENT: Weaver Boos Engineers

REPORT DATE: 1/11/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Clayey sand, brown
BORING/SAMPLE: WB-15
PROCTOR # :
SAMPLE ORIENTATION: H ✓ V _____
Remold _____

LAB START DATE: 1/3/2011
LAB RPT. DATE: 1/11/2011
TECHNICIAN: MLT
DEPTH/LIFT: 24.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume
(π b^2 / 4 * a): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight:
[((f-h)*3.8095)/c)]: 131.2 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 709.8 gms
f. Wet Weight Soil + Tare: 260.2 gms
g. Dry Weight Soil + Tare: 235.1 gms
h. Tare Weight: 91.2 gms
i. Moisture Content
[(f-g)/(g-h)]*100: 17.4 %
j. Unit Dry Weight
[d/(1+(i/100))]: 111.7 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 261.0 gms
l. Dry Weight Soil + Tare: 235.1 gms
m. Tare Weight: 91.2 gms
n. Moisture Content
[(k-l)/(l-m)]*100: 18.0 %
o. Unit Dry Weight
[d/(1+(n/100))]: 111.1 pcf
p. Ring Weight: 540.8 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
04-Jan	07:21		36.3	28.8					
04-Jan	11:30	14940			29.1	21.6	22	0.953	1.3E-06
04-Jan	11:30		29.1	21.6					
04-Jan	14:30	10800			25.4	17.9	22	0.953	1.2E-06
04-Jan	14:30		25.4	17.9					
05-Jan	07:20	60600			19.9	12.4	22	0.953	4.0E-07
05-Jan	07:20		19.9	12.4					
05-Jan	12:00	16800			16.5	9.0	22	0.953	1.3E-06
05-Jan	12:00		16.5	9.0					
05-Jan	16:15	15300			13.2	5.7	22	0.953	2.0E-06
04-Jan	11:30		29.1	21.6					
05-Jan	16:15	103500			13.2	5.7	22	0.953	8.5E-07

Height of Top of Specimen From Top of Table:	Standpipe Diameter	Standpipe Area
7.50 cm	1.05 cm	0.866 sq cm

MLT Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF
LOCATION:
MATERIAL: Cly Sand Br
BORING/SAMPLE NO: WB-15
SAMPLE ORIENTATION [✓ H] V R (Circle One)
a. HEIGHT: 1.0 in
c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9
DATE: 1/3/11
TECHNICIAN: MLT
DEPTH/LIFT: 24'
PERM FLUID USED: Tap water
b. AVERAGE DIAMETER: 2.5 in
d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 540.8 gms
f. Ring Wt + Wet Soil: 709.8 gms
g. Wet Wt Soil + tare [f-e+i]: gms
h. Dry Wt Soil + tare: gms
i. Tare Wt: gms
j. Moisture Content [(g-h)/(h-i)]*100 %
k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 261.0 gms
m. Dry Wt. Soil + tare: 235.1 gms
n. Tare Wt: Bo6 91.2 gms
o. Moisture Content [(l-m)/(m-n)]*100 %
p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME, SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
1/3/11	15:02		33.5			
1/4/11	7:21		36.3			
1/4/11	11:30			29.1		
1/4/11	11:30		29.1			
1/4/11	14:30			25.4		
1/4/11	14:30		25.4			
1/5/11	7:20			19.9		
1/5/11	7:20		19.9			
1/5/11	12:00			16.5		
1/5/11	12:00		16.5			
1/5/11	16:15			13.2		

PROCTOR NO:
MDD:
OMC:
PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.5 *cm*
Stand Pipe Diameter: 1.05 *cm*

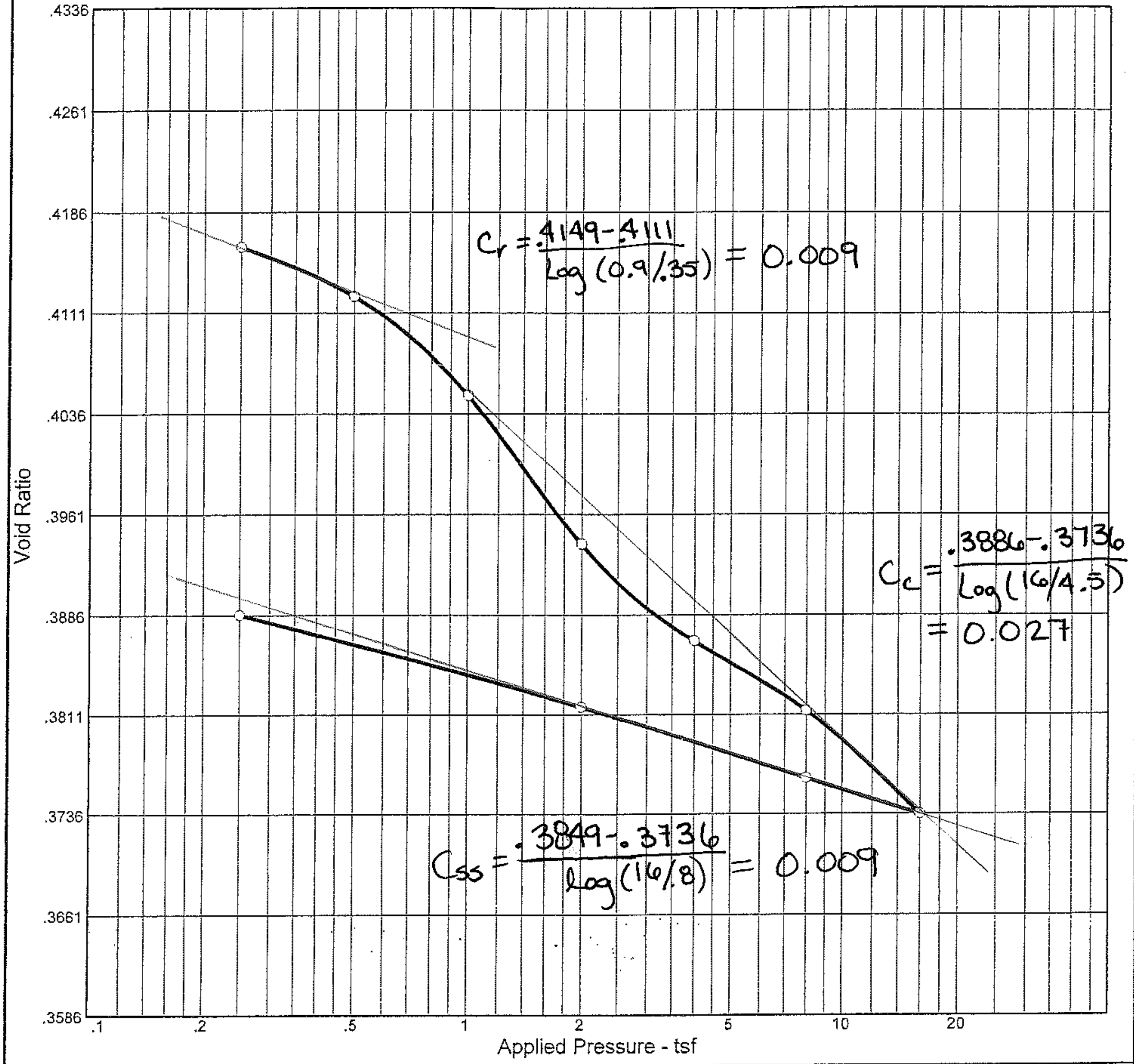
SAMPLE CALCULATIONS

$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$

Where k = *permeability in cm/sec*
a = *area of standpipe in sq cm*
L = *length of specimen in cm*
A = *area of specimen in sq cm*
t = *elapsed time in seconds*
ho = *initial height in cm* (1)
hf = *final height in cm* (1)
$\ln$ = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*

CONSOLIDATION TEST REPORT



$$C_r = \frac{.4149 - .4111}{\text{Log}(0.9/.35)} = 0.009$$

$$C_c = \frac{.3886 - .3736}{\text{Log}(16/4.5)} = 0.027$$

$$C_{ss} = \frac{.3849 - .3736}{\text{log}(16/8)} = 0.009$$

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	Initial Void Ratio
Saturation	Moisture							
81.5 %	12.8 %	117.9			2.68		4.84	0.419

MATERIAL DESCRIPTION	USCS	AASHTO
Shale, gray hard		

Project No. 1339-351- **Client:** Weaver Boos Engineers

Project: Camelot Landfill

Source: **Sample No.:** WB-8 **Elev./Depth:** 51.5'

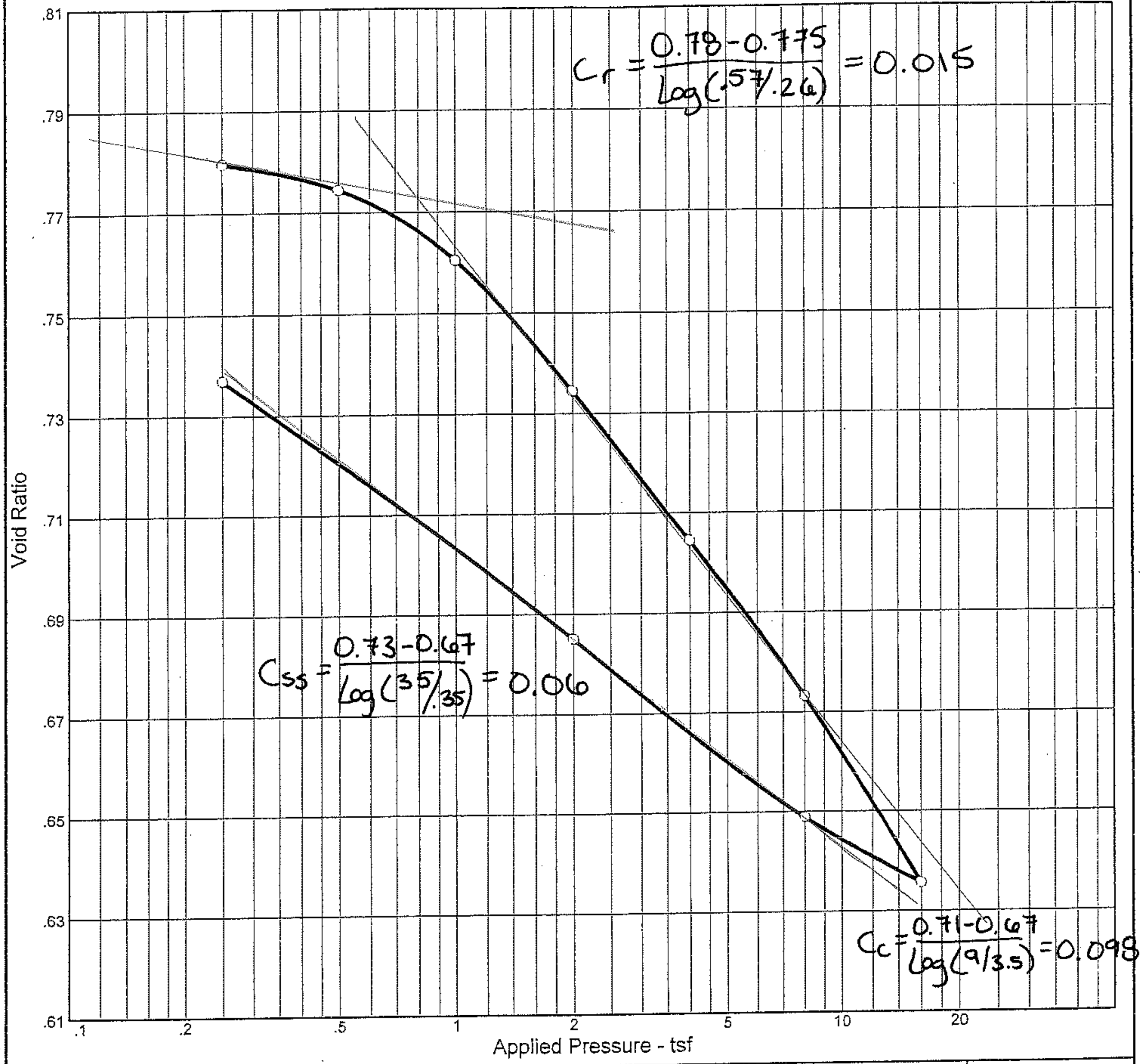
Remarks:

M L Testing, LLC

Bluff Dale, TX IIIJ-C-83

Figure

CONSOLIDATION TEST REPORT



$C_r = \frac{0.78-0.775}{Log(.57/.26)} = 0.015$

$C_{ss} = \frac{0.73-0.67}{Log(35/.35)} = 0.06$

$C_c = \frac{0.71-0.67}{Log(9/3.5)} = 0.098$

Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	Initial Void Ratio
Saturation	Moisture							
76.9 %	20.3 %	104.5			3.00		2.00	0.792

MATERIAL DESCRIPTION	USCS	AASHTO
Shale, gray		

Project No. 1339-351- **Client:** Weaver Boos Engineers

Project: Camelot Landfill

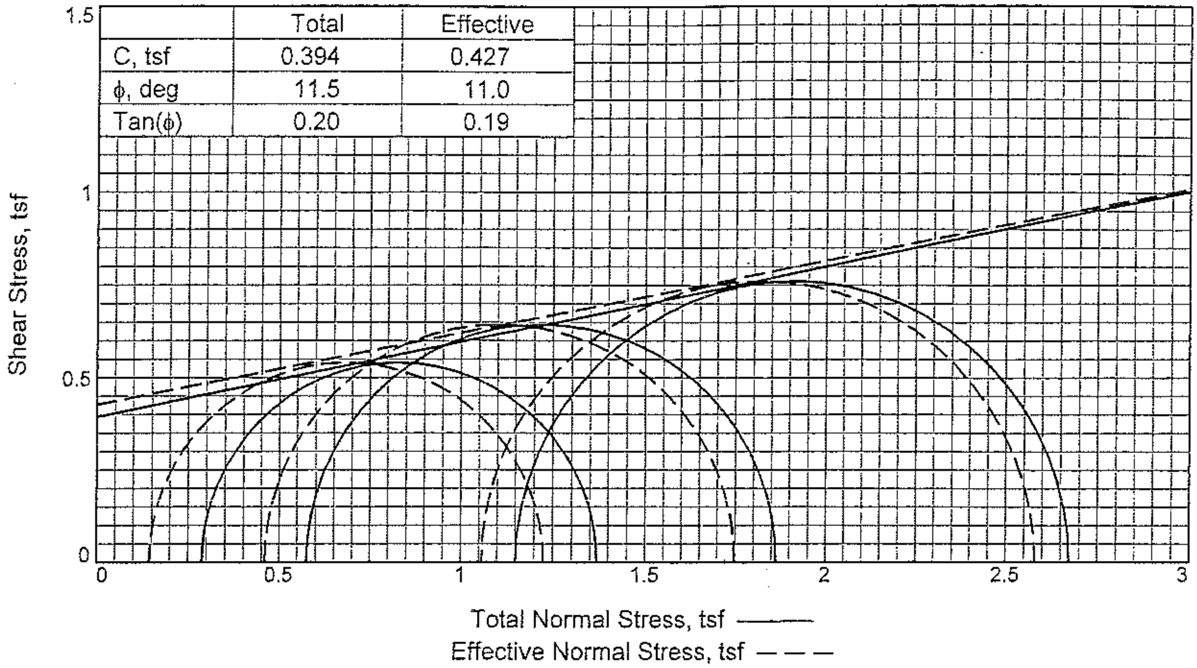
Source: **Sample No.:** WB-11 **Elev./Depth:** 60.0'

Remarks:

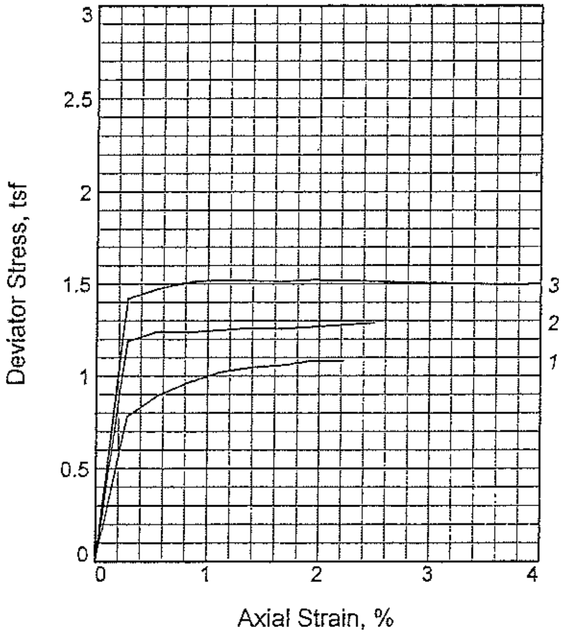
M L Testing, LLC

Bluff Dale, TX IIIJ-C-84

Figure



	Total	Effective
C, tsf	0.394	0.427
ϕ, deg	11.5	11.0
Tan(ϕ)	0.20	0.19



	Sample No.	1	2	3
Initial	Water Content, %	29.6	29.6	29.6
	Dry Density, pcf	88.6	88.6	88.6
	Saturation, %	89.2	89.2	89.2
	Void Ratio	0.8891	0.8891	0.8891
	Diameter, in.	1.45	1.45	1.45
	Height, in.	3.60	3.60	3.60
At Test	Water Content, %	33.2	33.2	33.2
	Dry Density, pcf	88.6	88.6	88.6
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.8891	0.8891	0.8891
	Diameter, in.	1.45	1.45	1.45
	Height, in.	3.60	3.60	3.60
	Strain rate, in./min.	1.00	1.00	1.00
	Back Pressure, psi	20.00	20.00	20.00
	Cell Pressure, psi	24.00	28.00	36.00
	Fail. Stress, tsf	1.08	1.29	1.52
	Total Pore Pr., tsf	1.58	1.56	1.53
	Ult. Stress, tsf			
	Total Pore Pr., tsf			
	$\bar{\sigma}_1$ Failure, tsf	1.23	1.75	2.58
	$\bar{\sigma}_3$ Failure, tsf	0.14	0.46	1.06

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed

Description: Clay, brown & lt. brown

Assumed Specific Gravity= 2.68

Remarks:

Figure ________

Client: Weaver Boos Engineers

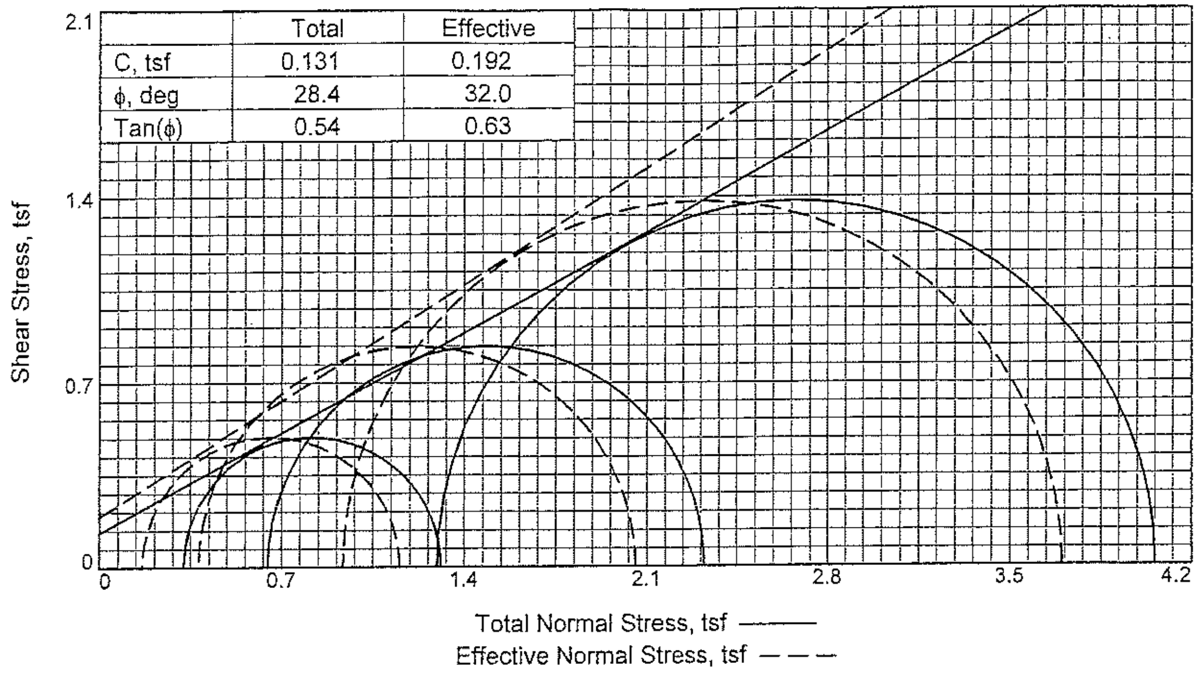
Project: Camelot Landfill

Sample Number: WB-2 **Depth:** 10.0'

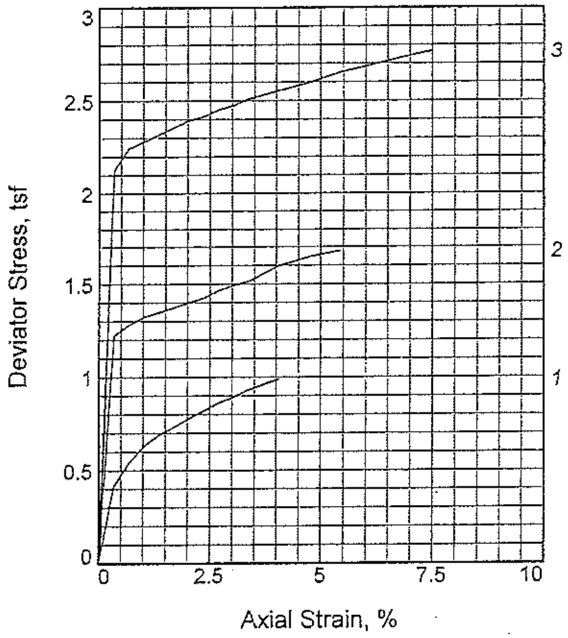
Proj. No.: 1339-351-11-02-6B.9 **Date Sampled:** 1/4/2011

TRIAXIAL SHEAR TEST REPORT
M L Testing, LLC
Bluff Dale, TX

IIIJ-C-85



	Total	Effective
C, tsf	0.131	0.192
ϕ, deg	28.4	32.0
Tan(ϕ)	0.54	0.63



Sample No.		1	2	3
Initial	Water Content, %	15.1	15.1	15.1
	Dry Density, pcf	112.5	112.5	112.5
	Saturation, %	83.3	83.3	83.3
	Void Ratio	0.4872	0.4872	0.4872
	Diameter, in.	1.40	1.40	1.40
	Height, in.	2.95	2.95	2.95
At Test	Water Content, %	18.2	18.2	18.2
	Dry Density, pcf	112.5	112.5	112.5
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.4872	0.4872	0.4872
	Diameter, in.	1.40	1.40	1.40
	Height, in.	2.95	2.95	2.95
Strain rate, in./min.		1.00	1.00	1.00
Back Pressure, psi		20.00	20.00	20.00
Cell Pressure, psi		24.50	29.00	38.00
Fail. Stress, tsf		0.99	1.68	2.77
Total Pore Pr., tsf		1.60	1.71	1.80
Ult. Stress, tsf				
Total Pore Pr., tsf				
$\bar{\sigma}_1$ Failure, tsf		1.15	2.06	3.70
$\bar{\sigma}_3$ Failure, tsf		0.17	0.38	0.94

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed

Description: Sandy clay, tan & brown

Assumed Specific Gravity= 2.68

Remarks:

Client: Weaver Boos Engineers

Project: Camelot Landfill

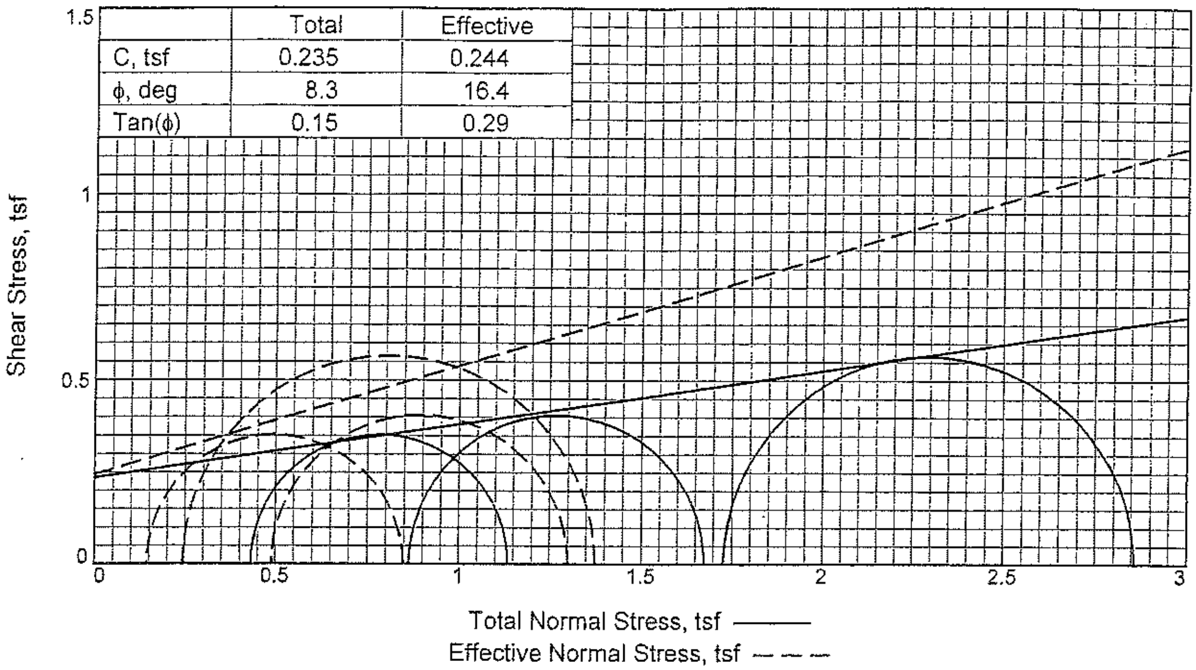
Sample Number: WB-3 **Depth:** 11.0'

Proj. No.: 1339-351-11-02-6B.9 **Date Sampled:** 1/4/2011

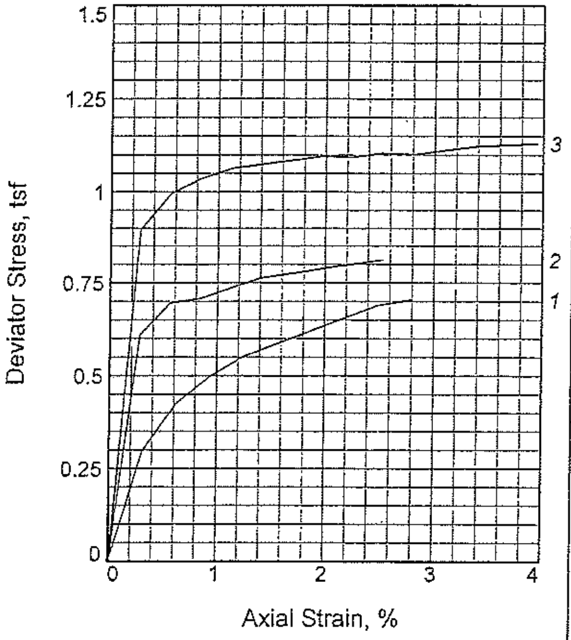
TRIAXIAL SHEAR TEST REPORT
M L Testing, LLC
Bluff Dale, TX

IIIJ-C-86

Figure _______



	Total	Effective
C, tsf	0.235	0.244
ϕ, deg	8.3	16.4
Tan(ϕ)	0.15	0.29



	Sample No.	1	2	3
Initial	Water Content, %	25.8	25.8	25.8
	Dry Density, pcf	96.4	96.4	96.4
	Saturation, %	94.1	94.1	94.1
	Void Ratio	0.7348	0.7348	0.7348
	Diameter, in.	1.45	1.45	1.45
	Height, in.	3.55	3.55	3.55
At Test	Water Content, %	9.8	27.4	27.4
	Dry Density, pcf	132.4	96.4	96.4
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.2637	0.7348	0.7348
	Diameter, in.	1.30	1.45	1.45
	Height, in.	3.21	3.55	3.55
	Strain rate, in./min.	1.00	1.00	1.00
	Back Pressure, psi	20.00	20.00	20.00
	Cell Pressure, psi	26.00	32.00	44.00
	Fail. Stress, tsf	0.70	0.81	1.13
	Total Pore Pr., tsf	1.73	1.81	2.92
	Ult. Stress, tsf			
	Total Pore Pr., tsf			
	$\bar{\sigma}_1$ Failure, tsf	0.85	1.30	1.38
	$\bar{\sigma}_3$ Failure, tsf	0.14	0.49	0.24

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed

Description: Clay, brown

Assumed Specific Gravity= 2.68

Remarks:

Client: Weaver Boos Engineers

Project: Camelot Landfill

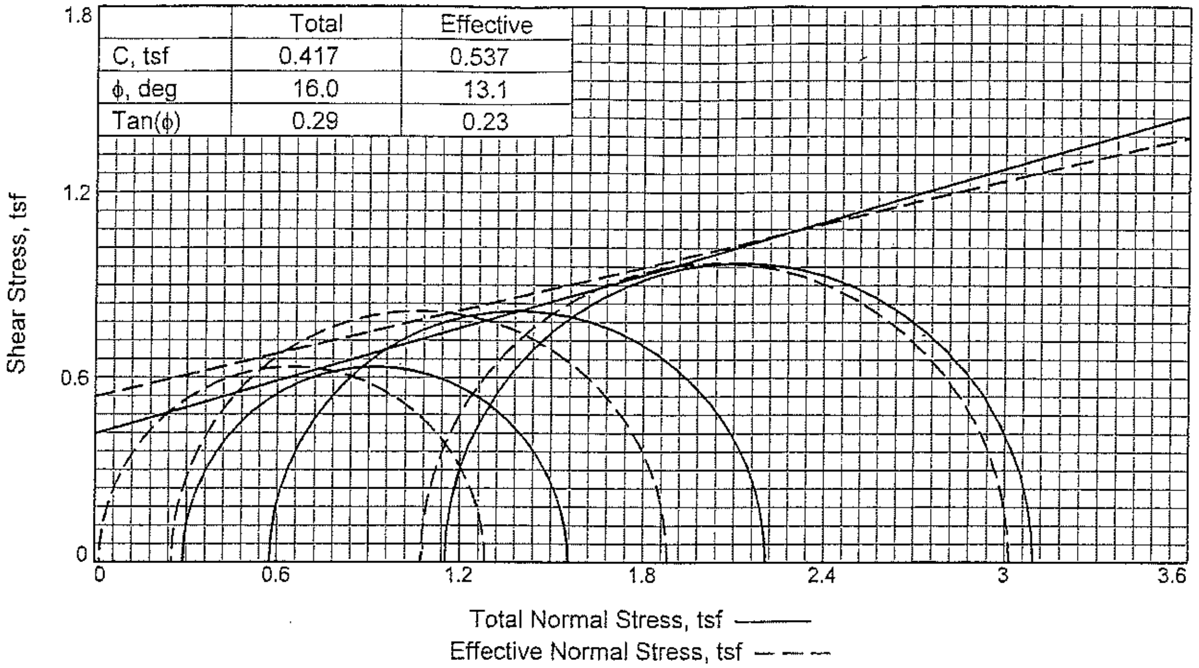
Sample Number: WB-13 **Depth:** 15.0'

Proj. No.: 1339-351-11-02-6B.9 **Date Sampled:** 1/4/2011

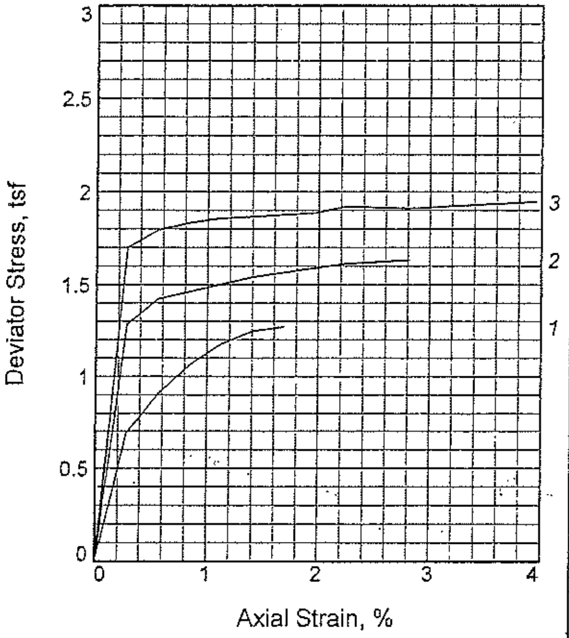
TRIAXIAL SHEAR TEST REPORT
M L Testing, LLC
Bluff Dale, TX

IIIJ-C-87

Figure _______



	Total	Effective
C, tsf	0.417	0.537
ϕ, deg	16.0	13.1
Tan(ϕ)	0.29	0.23



	Sample No.	1	2	3
Initial	Water Content, %	27.1	27.1	27.1
	Dry Density, pcf	95.3	95.3	95.3
	Saturation, %	96.1	96.1	96.1
	Void Ratio	0.7549	0.7549	0.7549
	Diameter, in.	1.45	1.45	1.45
	Height, in.	3.55	3.55	3.55
At Test	Water Content, %	28.2	28.2	28.2
	Dry Density, pcf	95.3	95.3	95.3
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.7549	0.7549	0.7549
	Diameter, in.	1.45	1.45	1.45
	Height, in.	3.55	3.55	3.55
	Strain rate, in./min.	1.00	1.00	1.00
	Back Pressure, psi	20.00	20.00	20.00
	Cell Pressure, psi	24.00	28.00	36.00
	Fail. Stress, tsf	1.27	1.63	1.94
	Total Pore Pr., tsf	1.71	1.76	1.52
	Ult. Stress, tsf			
	Total Pore Pr., tsf			
	$\bar{\sigma}_1$ Failure, tsf	1.28	1.88	3.02
	$\bar{\sigma}_3$ Failure, tsf	0.01	0.25	1.07

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed

Description: Clay, brown

Assumed Specific Gravity= 2.68

Remarks:

Client: Weaver Boos Engineers

Project: Camelot Landfill

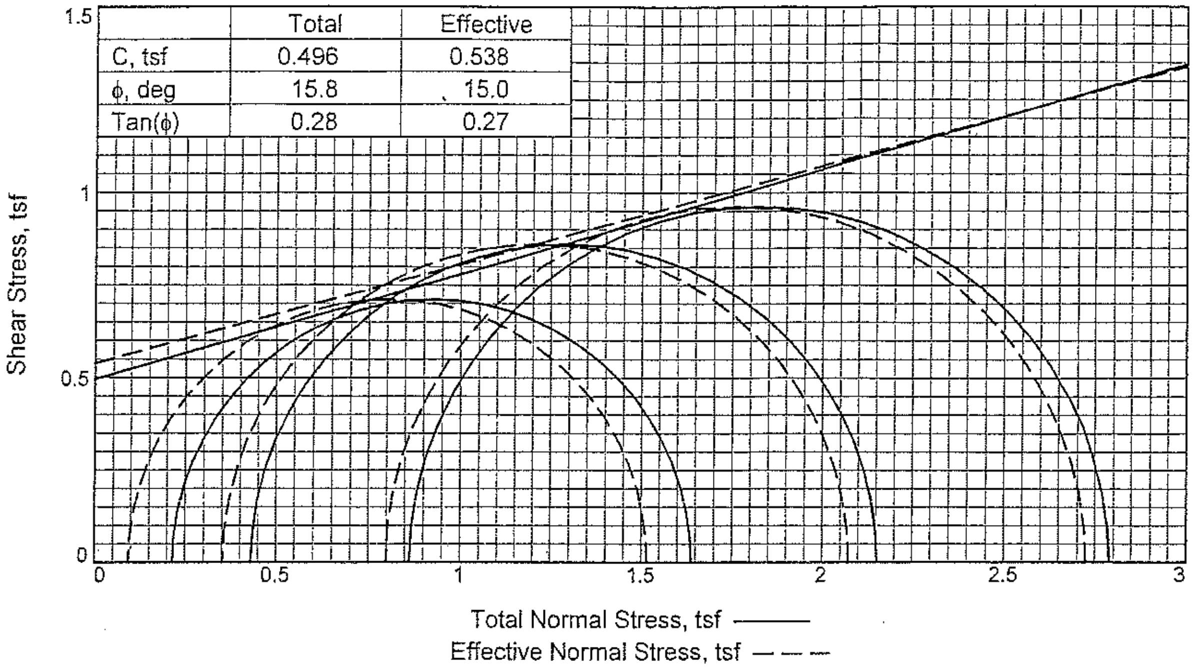
Sample Number: WB-15 **Depth:** 10.0'

Proj. No.: 1339-351-11-02-6B.9 **Date Sampled:** 1/4/2011

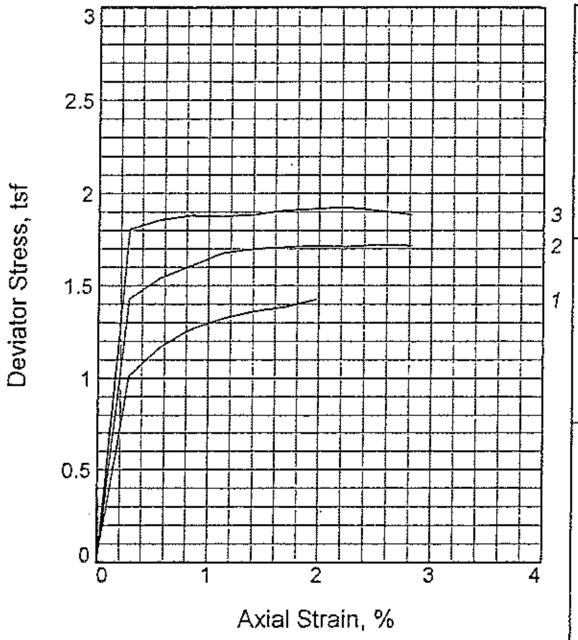
TRIAXIAL SHEAR TEST REPORT
M L Testing, LLC
Bluff Dale, TX

Figure ______

IIIJ-C-88



	Total	Effective
C, tsf	0.496	0.538
ϕ, deg	15.8	15.0
Tan(ϕ)	0.28	0.27



	Sample No.	1	2	3
Initial	Water Content, %	27.5	27.5	27.5
	Dry Density, pcf	96.1	96.1	96.1
	Saturation, %	99.3	99.3	99.3
	Void Ratio	0.7407	0.7407	0.7407
	Diameter, in.	1.45	1.45	1.45
	Height, in.	3.55	3.55	3.55
At Test	Water Content, %	27.6	27.6	27.6
	Dry Density, pcf	96.1	96.1	96.1
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.7407	0.7407	0.7407
	Diameter, in.	1.45	1.45	1.45
	Height, in.	3.55	3.55	3.55
	Strain rate, in./min.	1.00	1.00	1.00
	Back Pressure, psi	20.00	20.00	20.00
	Cell Pressure, psi	23.00	26.00	32.00
	Fail. Stress, tsf	1.42	1.72	1.93
	Total Pore Pr., tsf	1.56	1.52	1.50
	Ult. Stress, tsf			
	Total Pore Pr., tsf			
	$\bar{\sigma}_1$ Failure, tsf	1.52	2.07	2.72
	$\bar{\sigma}_3$ Failure, tsf	0.09	0.35	0.80

Type of Test:
CU with Pore Pressures

Sample Type: Undisturbed

Description: Clay, brown

Assumed Specific Gravity= 2.68

Remarks:

Figure ______

Client: Weaver Boos Engineers

Project: Camelot Landfill

Sample Number: WB-16 **Depth:** 8.0'

Proj. No.: 1339-351-11-02-6B.9 **Date Sampled:** 1/4/2011

TRIAXIAL SHEAR TEST REPORT
M L Testing, LLC
Bluff Dale, TX

IIIJ-C-89

CLIENT: Weaver-Boos Engineers

REPORT DATE: 8/18/2011

PROJECT NO.: 1339-351-11-02-6B.9

PROJECT: Camelot Landfill

HYDRAULIC CONDUCTIVITY WORKSHEET
FALLING HEAD - FIXED WALL PERMEAMETER

LOCATION:
MATERIAL: Clay, dark brown
BORING/SAMPLE: WB-15
PROCTOR #:
SAMPLE ORIENTATION: H_X_ V ____
Remold ____

LAB START DATE: 8/15/2011
LAB RPT. DATE: 8/18/2011
TECHNICIAN: MLT
DEPTH/LIFT: 6.0'-8.0'
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in
c. Sample Volume
$(\pi b^2 / 4 * a)$: 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in
d. Wet Unit Weight:
[((f-h)*3.8095)/c)]: 114.1 pcf

INITIAL CONDITIONS

e. Ring + Wet Weight Soil: 667.9 gms
f. Wet Weight Soil + Tare: 238.8 gms
g. Dry Weight Soil + Tare: 206.4 gms
h. Tare Weight: 91.8 gms
i. Moisture Content
[(f-g)/(g-h)]*100: 28.3 %
j. Unit Dry Weight
[d/(1+(i/100))]: 88.9 pcf

FINAL CONDITIONS

k. Wet Weight Soil + Tare: 242.7 gms
l. Dry Weight Soil + Tare: 206.4 gms
m. Tare Weight: 91.8 gms
n. Moisture Content
[(k-l)/(l-m)]*100: 31.7 %
o. Unit Dry Weight
[d/(1+(n/100))]: 86.6 pcf
p. Ring Weight: 520.9 gms

Date	Time	t sec	Initial Height, ho	Corrected ho - C	Final Height, hf	Corrected hf - C	Temp C	Rt	k @ 20C cm/sec
15-Aug	18:44		42.0	34.5					
16-Aug	08:55	51060			38.4	30.9	22	0.953	1.4E-07
16-Aug	08:55		38.4	30.9					
16-Aug	14:28	19980			37.6	30.1	22	0.953	8.5E-08
16-Aug	14:28		37.6	30.1					
17-Aug	07:17	60540			35.0	27.5	22	0.953	9.7E-08
17-Aug	07:17		35.0	27.5					
17-Aug	12:00	16980			34.4	26.9	22	0.953	8.4E-08
17-Aug	12:00		34.4	26.9					
17-Aug	17:30	19800			33.8	26.3	22	0.953	7.4E-08
16-Aug	08:55		38.4	30.9					
17-Aug	17:30	117300			33.8	26.3	22	0.953	8.9E-08

Height of Top of Specimen
From Top of Table: 7.48 cm

Standpipe Diameter
1.04 cm

Standpipe Area
0.849 sq cm

MLT

Test Method: Corps of Engineers EM 1110-2-1906, Appendix VII

Hx-C = Hx-Ht

HYDRAULIC CONDUCTIVITY WORKSHEET
Falling Head - Fixed Wall Permeameter

PROJECT: Camelot LF

LOCATION:

MATERIAL: Clay DK Br

BORING/SAMPLE NO: WB-15

SAMPLE ORIENTATION [✓ H] V R (Circle One)

a. HEIGHT: 1.0 in

c. VOLUME: (0.7854 * b ^ 2) cu in

JOB NO: 1339-351-11-02-6B.9

DATE: 8/15/11

TECHNICIAN: MLT

DEPTH/LIFT: 6-8'

PERM FLUID USED: Tap Water

b. AVERAGE DIAMETER: 2.5 in

d. WET UNIT WEIGHT: [(g-i * 3.8095)/c] pcf

INITIAL CONDITIONS

e. Ring Wt: 520.9 gms

f. Ring Wt + Wet Soil: 667.9 gms

g. Wet Wt Soil + tare [f-e+i]: gms

h. Dry Wt Soil + tare: gms

i. Tare Wt: gms

j. Moisture Content [(g-h)/(h-i)]*100 %

k. Unit Dry Wt [d/(1 + (j/100))] pcf

FINAL CONDITIONS

l. Wet Wt. Soil + tare: 242.7 gms

m. Dry Wt. Soil + tare: 206.4 gms

n. Tare Wt: WW 91.8 gms

o. Moisture Content [(l-m)/(m-n)]*100 %

p. Unit Dry Wt. [d/(1 + (o/100))] pcf

DATE	CLOCK TIME	TIME SECONDS	INITIAL HEIGHT, ho	FINAL HEIGHT, hf	TEMP °C	PERMEABILITY k, cm/sec
8/15/11	18:44		42.0			
8/16/11	8:55			38.4		
8/16/11	8:55		38.4			
8/16/11	14:28			37.6		
8/16/11	14:28		37.6			
8/17/11	7:17			35.0		
8/17/11	7:17		35.0			
8/17/11	12:00			34.4		
8/17/11	12:00		34.4			
8/17/11	17:30			33.8		

PROCTOR NO:

MDD:

OMC:

PERCENT COMPACTION:

Height of Top of Specimen from Top of Table: 7.48 *cm*

Stand Pipe Diameter: 1.04 *cm*

IIIJ-C-91

SAMPLE CALCULATIONS

$k = \{[(a * L)/(A * t)] * \ln[ho/hf]\}$

Where k = *permeability in cm/sec*

a = *area of standpipe in sq cm*

L = *length of specimen in cm*

A = *area of specimen in sq cm*

t = *elapsed time in seconds*

ho = *initial height in cm* (1)

hf = *final height in cm* (1)

$\ln$ = *natural logarithm*

(1) *Corrected for height of specimen from top of table during computations*