PRELIMINARY GEOTECHNICAL INVESTIGATION

GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO

PREPARED FOR:
GOLD HILL MESA JV, LLC
D&M JOB NO. 38057-003-035

MAY 17, 1999

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DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

9665 Chesapeake Drive, Suite 201
San Diego, California 92123
(619) 541-0833 Tel
(619) 541-0890 Fax

May 17, 1999

Mr. Robert E. Willard
Gold Hill Mesa JV, LLC
1040 South Eighth Street, Suite 101
Colorado Springs, Colorado 80906

Re: Preliminary Geotechnical Investigation
Gold Hill Mesa Property
Colorado Springs, Colorado
Gold Hill Mesa JV, LLC
Dames & Moore Job No. 38057-003-035

Dear Mr. Willard:

Dames & Moore is pleased to submit our preliminary report on the geotechnical assessment for the feasibility of developing the Gold Hill Mesa Property for residential and commercial development. This report documents our findings, and presents general conclusions and recommendations concerning geotechnical aspects of the subject property.

Based on our findings, the site appears to be suitable for proposed development; however, specific earthwork and soil improvements may be necessary. The most significant geotechnical issues at the site appear to be the potential differential settlement of the mine tailings and the ground modification steps that may be necessary to limit this settlement, the presence of some potentially corrosive soils, and the expansive native clays and shales located below the tailings around portions of the site perimeter.

We trust this report meets your present needs. If you have any questions or need more information please contact us at your convenience.

Very truly yours,

DAMES & MOORE

Steven E. McCullough
Project Engineer

Ronald J. Tanenbaum, Ph.D., P.E., G.E.
Associate

SDO 001 - H62.DOC

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1

Introduction

This report presents the results of Dames & Moore's preliminary geotechnical and geologic hazard investigation for the proposed feasibility for site development at the project site. The general location of the site is shown on Figure 1.

Our investigation was performed in general accordance with our proposal dated December 7, 1998. The scope of our services reported herein consists of a field investigation, laboratory testing, preliminary engineering analyses, and preparation of this report.

The purpose of our assessment was to evaluate subsurface soil conditions, and outline the potential geotechnical considerations pertinent to the ability to develop the proposed site for residential and commercial use. This report presents our findings, conclusions and recommendations regarding typical site preparation, earthwork, foundations, retaining walls, and other geotechnical engineering characteristics related to future development criteria.

2

Project Description

A potential development of approximately 217-acre vacant parcel of land is being contemplated which will feature low-rise, lightly loaded office buildings and residential structures. Associated with this development will be infrastructure in the form of roads, parking, utilities, and landscaping. No precise information on the proposed development was available at the time this report was prepared. Once a development plan is finalized for the site, a structure-specific geotechnical engineering investigation will be required.

The Gold Hill Mesa property is located south of U.S. Highway 24 and east of 21st Street in Colorado Springs, El Paso County, Colorado. The property comprised a portion of the east ½ of Section 13 and the west ½ of Section 14, Township 14 South, Range 67 West of the 6th Principal Meridian. Existing site zoning includes: PBC-Planned Business Center development, located in the northwest portion of the site, and PUD-Planned Unit Development zoning for the remainder of the subject property (CSP, 1997). The proposed zoning and land use is assumed to be similar to, or in accordance with, the existing zoning and land use.

The property includes approximately 170 acres of mine tailings exceeding 100 feet in thickness with side slopes reaching heights of 200 feet. The side slopes currently range from 2 horizontal to 1 vertical to 2.5 horizontal to 1 vertical, and have experienced severe erosion problems. Most of the slope erosion is located on the north and northeast sides of the mesa in the downstream face of the tailings dam.

3

Field Investigation and Laboratory Testing

A field investigation was performed from February 9 through March 3, 1999, and consisted of advancing 21 8-inch diameter hollow stem auger borings and 2 hand auger borings at the project site to depths ranging between 6 and 133.5 feet below ground surface (bgs).

Drilling services were provided by Site Service Inc. of Golden, Colorado using a Central Mine Equipment (CME) 75 hollow stem auger drill rig. The locations of these borings were surveyed by J.R. Engineering, Ltd. of Colorado Springs and the locations and elevations are provided on Figure 3. In addition to the borings, 2 hand augers were advanced at the project site. The boring numeration began with B-5 since 4 borings had been advanced during prior investigations. Borings B-12 and B-18 were not completed, but their locations were surveyed prior to deletion from the investigation, and thus are shown on the boring location plan.

The borings and hand augers were logged continuously by a representative of Dames & Moore in general accordance with the Unified Soil Classification System (USCS). Relatively undisturbed and disturbed soil samples were collected at 5-foot intervals or recognized changes in lithology. Soil samples were collected by using a Dames & Moore U-type sampler or Shelby tube sampler to the depths explored.

The samples collected were sent to Dames & Moore's geotechnical engineering laboratory to estimate their relevant engineering properties. Further details of the laboratory testing program and test results are presented in Appendix B. Some of the results of the laboratory tests are presented on the boring logs in Appendix A, for convenient reference to the soil profile.

4

Site Topography

Topographic expression of the surrounding lands includes high, rolling hillslopes. Processed ore materials (mine tailings) that have been hydraulically deposited onto the majority of the site, created an elevated flat area to the south with steep north-facing slopes situated on the northern portions of the site. The mine tailings exceed 100 feet in thickness in some locations with side slopes reaching heights of 200 feet. The side slopes currently range from 2 horizontal to 1 vertical to 2.5 horizontal to 1 vertical or flatter, and have experienced severe erosion problems. Most of the slope erosion is located on the north and northeast sides of the mesa in the downstream face of the tailings dam.

The land surface in the northwest corner of the site is moderately flat, with benched areas of soils present in that area. The site surface elevation ranges from approximately 6,000 to 6,280 feet above mean sea level (J. R. Engineering, Ltd. Site Survey, 1999).

Current and historical aerial photographs included in this study were selected from fly-overs of the Colorado Springs area for the years 1949 and 1998. Their scales reflect one inch to 600 feet and are attached for reference in Appendix C. These photographs were useful in identifying the past site features and their relationship to the surrounding properties, and the site as it exists today.

5

Geologic Conditions

5.1 Regional Geologic Setting

The subject property is situated in the foothills of the Rocky Mountain Front Range, which is part of the Colorado Piedmont section. Bedrock under the site is represented by the Pierre Formation (Upper Cretaceous) and is generally composed of shale and claystone units. Bentonite-bearing units within the Pierre Formation can have significant swelling properties. A geologic site vicinity map has been provided for reference as Figure 2.

5.2 Site Geology

5.2.1 Surficial Deposits

The majority of the site is overlain by man-made milled sands and silt fines produced by the Golden Cycle Mill operations. The deposits form a flat area over the southern portion of the site with a steep, eroded hillslope facing north and east along the northern and northeastern portions of the property. The steep hill slope represents primarily the tailings dam constructed to contain the hydraulically placed tailings. The United States Department of Agriculture (USDA) classifies the mill tailings soils as Badland soils formed in gold ore mill tailings. Runoff is rapid; the erosion hazard is high. Gullying is high on Badland soils, as is exhibited by the severe erosion located in the northern and northeastern portions of the site.

Native soils located along the west and southwest property boundaries belong to the Razor-Midway complex. These clay loam soils form gentle to moderately steep slopes and are developed in residuum derived from calcareous shale on uplands. Permeability is slow and the available water capacity is moderate. Surface runoff and the hazard of erosion are moderate for Razor-Midway soils. The shrink-swell potential is moderate to high for these soils.

Soils situated in the Fountain Creek alluvial plain (northern boundary and northwest corner of the site) are classified as loamy Ustic Torrifluvents. The USDA describes the texture as variable; the onsite subsurface investigation characterizes the soil profile in Fountain Creek Alluvium as 60 inches of silty sandy loam overlying interbedded silty clay, sand, and gravels. These fine- to coarse-grained clastics extend to a depth of approximately 20 feet below ground surface.

5.2.2 Bedrock Units

Bedrock under the site is represented by the Upper Cretaceous Pierre Formation. It generally is composed of shale and claystone units. Although the actual thickness of the Pierre Formation under the site is not known, literature indicates the Pierre Formation thickness ranges from 3150 to 4800 feet. It outcrops within the foothills along the Rocky Mountain Front Range beginning from the U.S. Air Force Academy to the north and extends to the south of Colorado Springs.

From subsurface investigations, the upper portions of the Pierre Formation is described as an olive-gray shale displaying varying degrees of weathering. The thickness of the weathered zone ranges from approximately two feet to greater than ten feet under the site. Weathering decreases with depth, consequently, formation stiffness and competency increases with depth. Iron staining and calcium carbonate mineralization was encountered in samples.

5.2.3 Geomorphic Features

Dames & Moore investigated the site for the presence of these features and the only geomorphic feature of concern for the subject property is slope erosion caused by periodic rainfall events on the steep north- to east-facing hillslopes locate in the northern and northeastern portions of the site. Mass wasting features such as slow flowage, rapid flowage, landslides, and subsidence were not identified on the site.

5.2.4 Surface Hydrology

The subject property is located in an uplands area of the Rocky Mountain Front Range. Overland sheet flow caused by brief periods of seasonal rainfall appears to have contributed to gully erosion on the northern and northeastern portions of the site. Otherwise, no other surface features, perennial and ephemeral streams, or rivulets are known to exist on the majority of the property. Fountain Creek is a perennial stream channel describing the northern property boundary. No other surface water features are known to exist on the site. The Fountain Creek drainage basin includes areas immediately to the west in the Rocky Mountain Front Range. The creek flows to the southeast in the site vicinity and it confluences with Monument Creek a distance of approximately one mile to the east of the subject property. Areas immediately adjacent

to Fountain Creek are located in Zone 'AE', an area where the base flood elevations have been determined within the 100-year flood plain. Limited areas adjacent to Zone AE are designated Zone 'X', within the 500-year flood hazard area (FEMA, 1997).

Bear Creek is a smaller stream located approximately 1,800 feet offsite and to the south. It flows to the east-southeast in the site vicinity. No springs or seeps were observed on the subject property.

5.2.5 Groundwater: Confined and Unconfined

Based upon the site geotechnical investigation and other investigations performed at the site, shallow groundwater is present at the site. An unconfined shallow water table was encountered at the interface between the native soil profile and below the milled materials pile at a depth ranging from 20 to 129 feet below ground surface (bgs). Unconfined shallow groundwater was encountered in native soils at a depth of 15 to 37 feet bgs at locations situated along the western site boundary and to the south of the site. The shallow unconfined water table adjacent to Fountain Creek was encountered at 10 feet bgs. No groundwater was encountered in the shale underlying the site. The hydraulic gradient is assumed to flow to the north-northeast under the site.

Artesian conditions were observed at a groundwater monitor well located southeast of the subject property. Review of the 1988 driller's logs indicates the well was completed to a total depth of 30 feet bgs, with slotted screen installed across a grayish-brown 'clayey sand' from 20 to 30 feet bgs. It is not known whether the artesian condition represents hydraulic conditions in the shallow water table or the hydrology of a localized bedrock sandstone lens underlying the shallow soils.

With the exception of the areas adjacent to Fountain Creek, the shallow water table appears to be a finite system dependent on precipitation events. In the case of Fountain Creek soils, the coarse clastic nature of the soils may be prone to seasonal streamflow recharge.

6

Seismicity

6.1 Structural Features

Structural features include joints, faults, shear zones, folds, schistocity, and foliation. With the exception of near-horizontal bedding displayed in samples collected from the underlying Pierre Formation sedimentary bedrock, no structural features were identified on the subject property.

6.2 Tectonics and Seismicity

Colorado has long been considered an area of low seismicity with only a minor potential for future earthquakes. Recent geological and geophysical investigations, however, have discovered several active faults that are capable of generating future damaging earthquakes and numerous other faults that are suspected of being potentially active. These investigations suggest Colorado is a moderately active earthquake area and in time larger earthquakes than yet have been experienced can occur (Kirkham and Rogers 1981).

Colorado can be divided into six distinct seismotectonic provinces based on the distribution and characteristics of Neogene faults, historic earthquakes, major structural and physiographic regions, and interpretation of earthquake potential (Kirkham and Rogers 1981). Designated provinces include the Rio Grande rift, eastern mountain, plains, western mountain, Uinta-Elkhead, and Colorado Plateau provinces. Many of the potentially active faults in these seismotectonic zones have moved during the Quaternary and several show evidence of late Quaternary and Holocene activity.

The subject site is located in the eastern mountain province, which lies between the Rio Grande rift and the plains provinces. It includes the Front and Medicine Bow Ranges, Middle and South Parks, Wet Mountains, Wet Mountain Valley, and the east flanks of the Mosquito and Sangre de Cristo Ranges. Most of the faults in this province have Laramide, late Paleozoic, or even Precambrian ancestry (Tweto, 1979). Several of the

faults, particularly those in the southern and central parts of this province show considerable Neogene movement. A few of these faults have moved during the Quaternary.

Ute Pass Fault (Eastern Mountains Province)

Faulting of sedimentary rocks within the foothills to the west of the subject property and in the crystalline rock to the west of Colorado Springs is well documented. The Ute Pass Fault extends from the Front Range to the northwest and terminates in the foothills near Fort Carson to the south of the Colorado Springs metropolitan area and the site. The southern end of the fault is characterized as a low-angle reverse fault with dips as low as 30 degrees. Northward, the fault steepens in dip and at Woodland Park the fault zone consists of several near-vertical faults which form a graben complex.

Total displacement along the Ute Pass fault is reported to be a few thousand meters. The most recent mapping indicates Quaternary movement which displaced a block of Verdos Alluvium (Pleistocene) in a road cut located in the E/2 SE/4 sec. 25, Township 15 South, Range 67 West, approximately seven miles to the south of the subject property.

Rampart Range Fault (Eastern Mountain Province)

The Rampart Range Fault is a high-angle reverse fault that extends 50 kilometers north to south from Perry Park to Colorado Springs. Inferred mapping of the fault places its southern terminus in an area located approximately 0.60 miles to the northwest of the subject property (Trimble, et. al., 1979). A minimum throw of 3,000 meters during the Cenozoic is indicated by juxtaposed strata along the well defined fault scrap. Quaternary movement on the Rampart Range fault has been described at a location approximately 12 miles north-northwest of the subject property in the N/2 sec. 33, Township 12 South, Range 67 West. The fault trends N25W and a displacement of 7.6 meters in the Kansas or Yarmouth age gravels is described at that location.

6.3 Ground Motion

Ground motion refers to the shaking of the ground in response to an earthquake where the amplitude and duration of shaking are sufficient to damage engineered structures. Ground motion is usually described mathematically in terms of acceleration, which is commonly expressed as a percent or fraction of the acceleration due to gravity (g). The faults and fault zones described above are considered to have the potential to generate ground motion at the site.

A seismic risk map of the United States based on the expected ground shaking has been prepared by Algermissen and Perkins, 1976. This map has often been used as a guide for the design of low-risk structures such as single-family dwellings. Algermissen's map is widely used in a somewhat modified form by many building codes. On this map Colorado is entirely within seismic zone 1, a zone of low seismic risk in which earthquakes of intensity VI and smaller may occur. Several earthquakes of intensity VII have been recorded historically in Colorado and geological evidence suggests large earthquakes have happened in the recent past and are likely to recur in the future. The existing data indicates a need to design in accordance with seismic zone 2 in the U.B.C. scheme of seismic zonation for much of Colorado. Only the northeastern part of the state appears to be totally acceptable for zone 1.

Algermissen and Perkins (1976) presented a probabilistic map showing maximum expected rock accelerations in the contiguous United States for the next 50 years. The highest acceleration value assigned in Colorado was 0.07 g in the southwestern portion of the state. Unfortunately, very little information on Quaternary faulting was available to Algermissen and Perkins during report preparation and, their map, therefore, is primarily based on the historic earthquake record. Brazee (1976) constructed several maps using historical intensity data. These maps are valuable as general guides to historical intensities and could be used to crudely approximate expected earthquake intensities for designing low-risk structures. A minimum of 0.1 g horizontal acceleration should be used in design and safety analyses.

Table 1 lists the seismotectonic provinces of Colorado that are considered potential seismogenic sources within a 60-mile radius of the site, their closest distance, and the highest maximum credible earthquake (MCE) anticipated for each of these provinces. An MCE is defined as the maximum earthquake that appears capable of occurring under the present seismotectonic conditions, and is based on empirical relationships between fault rupture length and magnitude, and historical seismicity. The MCE is used to estimate the potential for damage due to earthquake shaking. Calculated peak ground accelerations resulting from MCEs on the fault segments were calculated using the composite attenuation relationships of Joyner and Boore (1988) and Donovan and Becker (1986) as updated by Dames & Moore's Dr. Neville Donovan. This relationship is the arithmetic mean of five commonly used, published, and unpublished attenuation relationships. The source to site distance (Table 1) used for the Donovan and Becker (1986) relationship is the closest distance between the mapped or inferred surface trace of the source fault and the site.

The Eastern Mountain Fault Zone, a splay of which is located at the site, has an MCE estimated to be a magnitude 6.0 to 6.75. This magnitude estimation was from published data by Kirkham and Rogers (1981). A magnitude 6.75 earthquake would be expected to generate a peak ground acceleration of approximately 0.6 at the site (Joyner and Boore, 1988). The fault documentation reviewed did not specify which fault sections were capable of generating the above listed magnitudes. Therefore, as suggested by Brazee (1976), a minimum of 0.1g horizontal should be used in design and safety analysis. The site is currently classified as located in UBC seismic zone 1. It is up to the structural engineer to design to UBC seismic zone 1 specifications, or seismic zone 2 as suggested above.

7

Laboratory Analysis

The laboratory testing program was conducted to estimate the relevant engineering properties of the existing soil. Bulk, ring and tube soil samples collected during the geotechnical field exploration were labeled and transported to a Dames & Moore geotechnical engineering laboratory for testing. Due to the large amount of geotechnical laboratory data results, only the type of laboratory test conducted have been listed below. Results of the laboratory analyses are presented in Appendix B. Summary of the testing results have been prepared and are provided in Tables 2 through 5.

The following laboratory tests were conducted on selected soil samples:

- Moisture/density
- Gradation analysis
- Hydrometer analysis
- Atterberg limits
- Standard Proctor compaction
- Modified Proctor compaction
- Direct shear (unconsolidated undrained & consolidated drained)
- Specific gravity
- Consolidation
- Hydrocollapse
- Percent swell
- Pinhole dispersion
- Corrosion analysis (pH, resistivity, soluble sulfate)

8

Engineering Analysis

8.1 Mine Tailings Condition

The mine tailings typically consisted of a yellowish brown to reddish brown silty sand and silt. These mine tailings varied in depth from 50 to 120 feet where measured in the borings. The mine tailings had various degrees of moisture content and densities. Moisture contents ranged from a low of 3 percent in some of the clean sand mine tailings to a high of 73 percent in the mine tailings composed of silt-sized particles. The degree of saturation also varied greatly within the mine tailing deposits from 8 to 100 percent. The average degree of saturation was 48 percent. Most of the silt-sized mine tailings developed a high degree of saturation.

In-situ dry densities were considered to be low. The unit weights of the mine tailings ranged from a low of 60 pounds per cubic foot (pcf) to a high of 100 pcf with the majority of the densities around the 80 pcf. One modified Proctor and one standard Proctor density tests were conducted on a composite sample of the mine tailings. The modified and standard Proctor values were then used as a generalized baseline for estimating the relative maximum density that the mine tailings could obtain. A percent compaction was then obtained by comparing the existing mine tailing densities to the modified and standard Proctor densities. The results show the mine tailings to be approximately 76 to 80 percent of the modified Proctor density, and 83 to 88 percent of the standard Proctor density.

Based on the above analysis, the mine tailings appear to be loosely compacted and have high moisture contents. Table 2 lists the relative density information for soil samples collected and tested.

8.2 Expansive Soils

Expansive clay soils were observed in borings B-7, B-15, B-20, B-24, B-25, and HA-1, at or near the surface. These clay soils are the result of the weathering and decomposition of the Pierre Formation and Razor-Midway Soils. The olive gray to reddish brown clay had a plasticity index range of 36 to 48. Load to prevent swell testing was conducted on select soil samples which required a load of 100 to 200 pounds per square foot (psf) to prevent swelling at the existing native moisture content at the time of sampling. Moisture contents of the clay soils when sampled for this testing ranged between 25 to 54 percent. Due to the high moisture content of the soils only limited expansion pressures were encountered. Large moisture content variations in this clay will most-likely result in large volumetric changes. Precautions should be taken to minimize their impact. These precautions are discussed in Section 9.4.2.

8.3 Bearing Capacity

Bearing capacity values for the mine tailing deposits were evaluated based on a cohesion ("c") value of 0 psf, and an average angle of internal friction ("ϕ") value of 32 degrees for the mine tailings with a bulk soil unit weight value of 104.8 pcf. A range of footing types, sizes and depths of embedment were analyzed. For a typical 3 foot by 3 foot spread footing, the existing soils will have a minimum allowable bearing capacity of 3,300 psf. Typical continuous footings founded on the mine tailing deposits should have a minimum width of 24 inches. The exterior footings will require a minimum embedment depth of 36 inches beneath the surface to protect the structure from the actions of frost heave associated with ground freezing during the winter months.

If foundation loading requirements exceed the bearing capacity of the surficial soils then drilled piers may be used. Drilled pier foundations analyzed for this study only considered the end bearing capacities; skin friction was neglected. Drilled piers with a minimum diameter of 24 inches and drilled a minimum of 15 feet bgs should develop allowable bearing capacities on the order of 19 tons per square foot.

The above allowable bearing capacities assume that site settlement potential has been mitigated. The above analysis may need to be reduced to limit soil stresses to weaker soil strata that may produce potential settlements due to the increased soil stress.

8.4 Lateral Earth Pressures

The active and passive earth pressures using mine tailings as backfill material and assuming horizontal backfill on a smooth wall, were evaluated using Rankine's earth pressure theory. A "ϕ" value of 32 degrees and a bulk unit weight of 112.3 pcf from the laboratory compaction results (ASTM D 1557) were used in the analysis. The equivalent

fluid active earth pressure was computed equal to 35 pcf and the equivalent fluid passive earth pressure was computed equal to 365 pcf. An at-rest equivalent fluid pressure of 53 pcf was calculated. For the lateral resistance against sliding, a recommended coefficient of frictional resistance at the bottom of the footing is 0.3. The passive pressure component and frictional resistance may be increased by one-third when considering loads of a transient nature, such as wind or seismic loads. However, for both continuous and transient loading conditions, when considering combined resistance due to passive pressures and frictional resistance, the passive component should not be greater than 2/3 of the combined resistance. No factors of safety were considered in these calculations.

8.5 Settlement

8.5.1 Settlement of Partially Saturated Soils

The analysis performed on the samples recovered from the site were typical of the standard settlement analysis for geotechnical projects which is based on Terzaghi's one-dimensional theory of consolidation. This theory, and the tests run in the laboratory to develop the analytical parameters, is based on a saturated soil mass. Assuming various types of loading conditions that we might anticipate for the site, we estimated settlements on the order less than one inch and up to seven inches in the deeper sections of the mine tailings.

Some of the soils at the site, however, are not saturated, but rather are partially saturated containing both water and air in the pore spaces. Thus, Terzaghi's theory does not apply. The theoretical basis for assessing partially saturated soils is extremely complex involving parameters that are rarely if ever measured as part of a standard geotechnical engineering investigation. The process required to gather the needed data and perform the engineering analyses, that might lead to an approximation of the volume change of the soils under load, is difficult, time consuming and very expensive, bordering on performing a "research" project. The level of study for this project does not warrant such an investigation.

It is recognized that the settlement of partially saturated soil is not as time-dependent as it is in saturated soils. The application of load to partially saturated soil generally creates larger instantaneous settlements but significantly smaller time-dependent settlements than one would experience with the same soil if it were saturated. Thus, for the Gold Hill Mesa site, where the soils are fine-grained, free-draining sands and fine silts, we anticipate that settlement under load would be fairly rapid occurring primarily while construction is underway. Settlement following construction would likely be fairly low and may be within tolerable limits of the types of structures planned.

Recognizing the potential pattern of settlement at Gold Hill Mesa, the most prudent way to assess the amount of volume change for a particular project is to perform full-scale field tests and measure the settlement in place. This approach by-passes the theoretical complexities and rigors of trying to analyze the behavior of a partially saturated soil mass, and provides more meaningful and realistic information on soil performance under load.

There are two cost-effective methods for evaluating settlement at the site. The first is the Plate Load Test (PLT). The PLT applies load to the soil through a hydraulic jack system. The load is transferred to a steel plate or series of plates, and the settlement as a function of load is measured. From this data, the total potential settlement can be evaluated.

The second approach is to install settlement platforms at the base of an earthen surcharge load. Using standard survey equipment, the settlement of the platforms is measured during construction of the surcharge and over time in order to evaluate the potential future settlement under similar loading conditions. Either or both of these evaluation techniques are recommended for the next geotechnical engineering investigation phase of the project.

8.5.2 Hydrocollapse

Hydrocollapse is settlement that occurs when a partially saturated soil is subjected to an increase in moisture content while subjected to significant overburden loads. Several hydrocollapse tests were run in the laboratory on selected silty soils loaded to existing overburden pressures and inundated with water. The test results indicate that the current soils do not appear to be prone to hydrocollapse. The laboratory testing showed only very small percentages ranging from .08 to .27 percent collapse.

8.6 Slope Stability

Slope stability analyses were conducted using a generalized profile of the mine tailings dam overlying the Pierre Formation. The analysis was conducted using soil strength parameters of a soil unit weight of 95 pcf, "c" of 0 psf and "ϕ" 33 degrees. A slope of 2 horizontal (H) to 1 vertical (V) and 2-1/2H:1V were analyzed. Shallow and deep-seated rotational failures were analyzed for the slopes.

The analyses of the existing slope were conducted through the use of a limit-equilibrium slope stability program (PCSTABLE5M). The analyses conducted showed the slope to be stable for static and pseudostatic conditions for 2-1/2:1 slope, with the factors of safety provided in the table below. Pseudostatic (earthquake) loading conditions assumed a horizontal ground acceleration of 0.1g.

Slope Stability Analysis	
Description	**Factor of Safety Against Failure**
2:1 Slope	1.31
2:1 Slope with 3,300 psf surcharge load 100 feet in length applied to slope 20 feet from the crest	1.31
2:1 slope under seismic loading conditions	1.04
2:1 slope under seismic loading condition with 3,300 psf surcharge load 100 feet in length applied to the slope 20 feet from the crest	1.04
2:5 to 1 slope	1.63
2.5 to 1 slope with 3,300 psf surcharge load 100 feet in length applied to the slope 20 feet from the crest	1.63
2.5 to 1 slope under seismic conditions	1.25
2.5 to 1 slope under seismic loading conditions with 3,300 psf surcharge load 100 feet in length applied to the slope 20 feet from the crest	1.25

A factor of safety of 1.5 is recommended for all permanent slopes and a factor of safety of 1.0 indicates that the slope is on the verge of potential movement.

The above analysis suggests that construction on or influenced by slopes steeper than 2.5 to 1 (H:V) will require slope stability enhancement such as removal and recompaction of fill slopes to form a buttress fill, the use of mechanically stabilized earth (MSE) walls or geotextiles, the construction of retaining walls, or other accepted techniques.

The results assume subsurface conditions are as discussed in this report and that grading and earthwork procedures, if performed, provide the minimum soil strength parameters as stated above. Site specific slope stability analyses will be necessary once the types, locations, and loads of the proposed building structures are outlined.

Any proposed buildings and settlement sensitive structures should be set back a minimum of 20 feet from the crest of the slope. Slope creep and lateral extension in fills are naturally occurring processes. Therefore, by not building near the crest of slopes, the effects are greatly reduced. However, recent studies on lateral extension of fill slopes have shown that downslope movements and related vertical displacement can extend back, at a declining magnitude, as far as the height of the fill slope. Thus, the construction of new large fill slopes is not recommended.

8.7 Soil Erosion and Dispersion

Soil erosion is visibly evident on the mine tailings dam slope face. Laboratory testing was conducted to evaluate the extent of the soils ability to resist dispersion which relates to how well a soil will be susceptible to erosion from water runoff. The laboratory procedures used included ASTM D 4221 and ASTM D 4647. The test data show the soil from the pinhole test to be classified as D1 soil and the dispersions test gave dispersion

values ranging from 14 to 87 percent. These results indicate that the soil, when subjected to water runoff, will erode severely. Runoff and erosion should be controlled with properly engineered drainage and landscaping.

8.8 Utilities

The existing soil condition (mine tailings) will be suitable for the support of utilities across the site. Utility construction on areas that have received ground modifications should be installed in accordance with the local standards and specifications required by the City of Colorado Springs. Utilities supported on unimproved soils should have the backfill soils and the utilities designed so that there is minimal increase in soil stresses (balancing the soil stress). This can be obtained through the use of recompacted backfill that is not significantly dense when compacted than the existing soils surrounding the utility. Due to the potential for differential settlement, utilities should be designed to have a degree of flexibility between the pipe sections and between any rigid structures.

8.9 Fugitive Dust

Due to the soils dispersive nature and easy erodability, typical grading procedure to control fugitive dust will need to be employed. This may include the use of water spraying construction equipment to moisten the exposed excavations and temporary construction roads to control construction generated dust. Keeping exposed excavation areas to a minimum would be beneficial. Following construction, fugitive dust problems can be minimized with proper groundcovers including landscaping, roofs, asphalt and concrete. Drainage control is also important since, by eliminating erosion, the fugitive dust is minimized.

8.10 Corrosivity

A useful factor in determining soil corrosivity is electrical resistivity, soluble sulfate content, and soil pH. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from the metal into the soil. A low electrical resistivity (0 to 1,000 ohm-centimeter) is caused by high moisture content and chemical content and indicates a corrosive soil. Dames & Moore's laboratory testing of the soil resistivity showed the soil resistivity to range from a high of 5,276 to a low of 78 ohm-cm. The average resistivity was 1,977 ohm-cm, which would indicate the soil is borderline corrosive to severely corrosive.

Soil pH values ranges from 7.96 to 7.53 which indicate the soils are mildly alkaline.

Qualitative tests for sulfates showed soil water-soluble sulfate contents ranging from 1,160 parts per million (ppm) to 62,400 ppm. These test results would indicate a soil that is a severe to very severe corrosive environment.

The information contained in this section is not intended to replace the professional opinion of an experienced corrosion engineering specialist. A corrosion engineer should be consulted to further evaluate the soils corrosion potential for each specific structure.

8.11 Modulus of Subgrade Reaction

The modulus of subgrade reaction is a relationship between soil pressure and deflection that is widely used in the structural analysis of foundation members. Based on an allowable bearing capacity of 3,300 psf, the modulus of subgrade reaction was evaluated to be 118 kcf (1,000 pounds per cubic foot) based on a settlement of 1 inch.

8.12 Liquefaction

Due to the absence of groundwater near the surface and the low potential ground accelerations estimated by Brazee (1976) for the area, it is Dames & Moore's opinion that the potential for significant structural distress due to liquefaction occurring during a seismic event is low. This translates to a low probability of volume reduction under the ground accelerations generated by local earthquakes.

9

Discussion, Conclusions, And Recommendations

9.1 General

It is our opinion that the site is suitable for future development if consideration is given to the on-site geotechnical conditions discussed in this report and the subsequent investigations to quantifiably analyze the potential settlement of the mine tailings.

9.2 Subsurface Conditions

Our understanding of the subsurface conditions at the site is based on the findings of our field investigation and laboratory testing, and our understanding of the general geology of the area.

Subsurface conditions were investigated by drilling 21 borings labeled B-5 to B-26, to depths ranging from 6 to 133.5 feet bgs. The results of this investigation indicate that hydraulically placed mine tailings were deposited over the majority of the project site. The fill soils vary in depth with the greatest amount of fill being located along the eastern portion of the property. These fill soils overlay native formational deposits consisting of the Pierre Formation, an olive gray silty clay. The existing soil conditions would be classified as an S_4 soil by the Uniform Building Code (UBC) 1997 edition.

The soils have been classified in accordance with the Unified Soil Classification System. An index table with its major divisions, graphic and letter symbols, and typical descriptions has been provided in Appendix A. Field classifications, as well as other pertinent data for specific boring locations, are provided on the attached boring logs.

9.3 Usable Area

The site is suitable for building; however, attention to the potential settlements of the mine tailings must be addressed. Most of the Gold Hill Mesa property is acceptable for normal construction practices and building methods commonly used over soft or loose soils, and that are currently anticipated for the site. Two areas were noticed that most likely will require additional ground modification or deep foundations. These areas overlay what once were water entrapment ponds during previous mining process applications. For reference we have attached an aerial photograph with these locations outlined. The subsurface silty sands and silts in these areas were extremely loose and soft with the silt showing a high dilatancy, which is common with mine tailings (rock flour). Since the mine tailings in the two pond areas are very soft, these soils may undergo a decrease in volume during loading as the water is forced out of the soil matrix.

9.4 Ground Modification

9.4.1 Site Preparation

Site preparation will need to be performed on a site to site basis depending on the type of structure proposed. The majority of the site that lies on mine tailings may need some ground modification to limit the potential settlements at the site. Several forms of ground modifications are applicable to the site and are described below. No cost comparison data is provided due to the limited scope of this report and lack of information pertaining to type, size, loading requirements, and location of proposed structures.

9.4.2 Soil Stress Balancing

Settlements are generally caused by building foundation systems which increase the soil stress past the soils maximum historical stress level. Balancing the soil stress and foundation loading is accomplished by excavating a calculated amount of soil overburden (such as a basement or removing 10 feet of overburden) and subtracting the weight of the soil from the foundation pressure to reduce the net increase in foundation pressure to within the maximum historical stresses the soil has been subjected.

The proposed site will require the site specific geotechnical investigation to evaluate the depth of removal required and the settlement potential at the proposed site.

9.4.3 Surcharge Loading

Surcharge loading would require imposing load onto the existing mine tailings equal to or greater than the anticipated structures load or as needed to eliminate detrimental settlement, usually by stockpiling soil to a specified depth over the area of concern.

Settlements are then monitored by surveying to evaluate the magnitude and rate of movement. Surcharging accelerates the settlement of mine tailings, reducing future settlement under the applied loads of the structure to tolerable levels. Typically, the induced settlement can be accelerated by the installation of vertical sand or wick drains. This is accomplished by drilling holes in the mine tailings and installing the drain system prior to placing the soil surcharge load. This drainage system helps relieve the pore water stresses that build up in the soil due to the surcharge loading. This in turn allows the stress to dissipate more readily causing the site to settle more rapidly. This method usually is very cost-effective solution, but sufficient time needs to be set aside to achieve the desired results. However, with the soils that we encountered at the site, the time required to achieve the desired results are anticipated to be of relatively short duration.

9.4.4 Vibrodensification

Vibrodensification is a patented process in which a vibrating probe is sunk with the aid of water or air jets through the mine tailings to be densified. As the equipment is being withdrawn gravel is being added at the surface to occupy the volume of the depression resulting from the densification. Prior to conducting the work, the engineer provides the contractor with the desired ground densification targets and works with the contractor to develop a spacing pattern. After conduction of the work, the site is allowed to sit for a desired period of time to allow soil stresses to dissipate before testing is performed to verify that the desired results were obtained. This method is relatively quick and can be performed fairly inexpensively if only those areas beneath structures that require densification are modified.

9.4.5 Deep Dynamic Compaction

Deep Dynamic Compaction (DDC) is the process of densifying soil deposits that are loose or soft through the use of a crane which lifts a large weight to a specified height and then releases the weight. The weight falls to the earth densifying the subsurface soils. The process is relatively fast compared to surcharge loading but will most likely be more expensive. Like the other methods discussed, test sections will need to be conducted to determine the spacing of the weight drops and height. Before and after geotechnical evaluations will need to be conducted to validate the results.

9.4.6 Removal and Recompaction of Expansive Soils

If construction is planned directly on the Pierre Formation, then the potential effects of expansion must be addressed. A minimum of 3 feet of the weathered Pierre Formation clays under the entire building pad to a minimum lateral distance of 5 feet out from the edge of the pads will need to be removed and replaced with granular non-expansive fill. After removal of the top 3 feet, the bottom of the excavation should be moisture conditioned to a minimum of 2 to 4 percent over the optimum moisture content and

recompacted to 95 percent of the moisture density curve for the clay as determined by ASTM D-1557. If the existing moisture content of the clay is found to have seasonal fluctuations greater than 3 feet below the ground surface, than deeper over-excavations may be required to minimize their expansive nature.

9.4.7 Chemical Treatment of Expansive Soils

Depending on the cost of removal of the expansive soils and importing granular fill replacement, chemical stabilization of clay soils may be cost effective. Two generally accepted methods of chemical stabilization of expansive clays are cement or lime treatment. Both methods act on the physical chemistry of the soil-water system, which reduces the amount of soil expansion. Site-specific geotechnical investigations that evaluate the expansive soil conditions impact on the type of structure will be required to determine what the most beneficial options are to deal with the near surface expansive soils located along the perimeter of the property.

9.5 Typical Grading Procedures

After evaluating and implementing any needed ground modification efforts, site clearing and grabbing should extend either 5 feet laterally beyond the envelope of the proposed structure or a lateral distance to include the zone of influence of the footings, which is defined as a 1:1 plane extending down and away from the base of the proposed footing or to the base of the excavation, whichever is greater. Locally deeper removals may be necessary if unsuitable materials are exposed during grading.

Mine tailing soils as observed in the boring logs should be easily excavated. No large cobbles or boulders were encountered in the mine tailings and, thus, standard excavating equipment should be able to accomplish the needed earth moving.

Minor surficial grading, consisting of over-excavating and recompacting the on-site soils to 95 percent of the modified Proctor density at near-optimum moisture content in accordance with ASTM D 1557 will most-likely be necessary for structural backfill and 90 percent for non-structural backfill. The depth of over-excavation and recompaction will need to be determined by the requirements of the proposed structure.

To increase the stability of temporary excavations and reduce the potential for damage or failure within such an excavation, it is recommended that the excavation of any trench be such that temporary vertical excavations exposing fill or native formational deposits are constructed to a maximum of 5 feet in height and laid back at a 1:1 gradient for slopes greater than 5 feet in height. Construction equipment or excavation spoils should not be stored or placed adjacent to the excavation above a 1:1 projection from the bottom of the excavation.

We recommend that temporary excavations for the construction of structures be suitably supported in accordance with local building code requirements. The responsibility for temporary excavation support and safety should rest with the contractor.

9.6 Building Foundations

A combination of spread footings or drilled piers may be used to carry all structural loads. Shallow foundations may be used to support proposed structures that do not exceed the bearing capacity of the soils and are within tolerable settlement limits. Since ground modifications will change the density and affect the soil strength parameters, the data for footings is only preliminary. Sizing and reinforcing recommendations for footings should be provided by a structural engineer. Under no conditions should concrete be placed on loose and/or frozen soil or other deleterious materials. All footing excavations and drilled piers should be observed by a geotechnical engineer.

If the building footprint or any other structure should encounter a cut-fill transition line, special grading procedures may be necessary. Typical recommendations include the over-excavation of the fill soils and recompaction to form a more uniform soil condition beneath the footings and concrete slabs-on-grade, or extending footings down to the same bearing stratum.

The bearing value may be increased by one-third when considering loads of short duration including wind and seismic forces. Foundation design and construction should conform to the criteria presented in the latest edition of the Uniform Building Code.

9.7 Retaining Walls

9.7.1 Foundations

Foundations for retaining walls founded in compacted engineered fill or in the underlying mine tailings will most likely be governed by the overturning moment. The bearing capacity of the soil beneath the retaining wall will be as stated in section 8.3. The bearing value may be increased by one-third when considering loads of short duration including wind and seismic forces. Foundation design and construction should conform to the criteria presented in the latest edition of the Uniform Building Code.

9.7.2 Passive Pressure and Frictional Resistance

A foundation system may be designed for passive lateral earth pressures of 365 psf per foot of depth. A coefficient of friction against sliding between concrete and soil of 0.3 may be used. When combining passive pressure and frictional resistance, the passive pressure component should not exceed 2/3 of the total resistance.

9.7.3 Wall Pressures and Drainage

The equivalent fluid pressure parameters presented herein assume that nonexpansive, free-draining, granular backfill will be used behind retaining walls. This granular backfill should be at a 0.5:1 projection up and out from the heel of the wall.

Building walls extending to below grade should be either waterproofed or damp-proofed, depending on the degree of moisture protection desired, as provided by the project architect. Site grading should be such that surface water drains away from buildings and behind retaining walls in a controlled manner to an approved point of discharge.

9.7.4 Cantilever Walls

Active earth pressures may be used for cantilever retaining walls up to 12 feet high provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. A design equivalent fluid pressure of 35 pcf can be used for walls with level surface slopes. These pressures assume that granular, non-expansive materials will be used behind the wall, but do not include other superimposed loading conditions such as traffic, structures, seismic events or adverse geologic conditions.

9.7.5 Wall Backfill Drainage

All retaining walls should be provided with an adequate pipe and gravel backdrain system, having at least two outlets, to prevent a buildup of hydrostatic pressures. Gravel in the backdrain systems should be a minimum of one square foot per lineal foot of wall and should consist of 3/8- to 1-inch diameter clean crushed rock wrapped in Mirafi 140N, non-woven filter fabric, or equivalent. Either the surface of the backfill should be sealed by pavement, or the top 24 inches should be compacted with native soil. Proper surface drainage should also be provided.

Retaining wall backfill should be compacted to 90% of its maximum dry density as determined by ASTM D1557.

9.7.6 Restrained Walls

Retaining walls that will be restrained prior to placing and compacting backfill, and walls that have male or reentrant corners, should be designed for an at-rest equivalent fluid pressure of 53 pcf plus any applicable surcharge loading. For areas of male of reentrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall laterally from the corner.

9.7.7 Factors of Safety

The values presented above, with the exception of the allowable bearing pressure, do not include a factor of safety. Appropriate factors of safety should be incorporated into the structural design to prevent walls from overturning and sliding.

9.7.8 Highly Expansive Soils

The design parameters provided above assume that non-expansive soils are used to backfill any retaining walls. If expansive soils are used to backfill behind retaining walls, increased active and at-rest earth pressures will be required for design.

9.8 Slabs-on-Grade

It is our opinion that reinforced concrete slab-on-grade floors can be used for the proposed construction. Specific grading requirements will need to be prepared prior to construction and are not provided herein. Post-tensional slabs may be advisable in areas where soil expansion or differential settlement is anticipated.

Slabs should rest on a capillary break blanket of clean, coarse sand at least 4 inches thick. This blanket material should have 100 percent of its particles passing the ¼-inch screen, no more than 10 percent passing the No. 16 sieve, and no more than 5 percent passing the No. 200 sieve.

A moisture barrier, such as polyethylene sheeting, should be placed on top of the capillary break wherever moisture-sensitive floor covering is planned. An additional 2-inch thick layer of clean sand should be placed over the polyethylene sheeting to allow the concrete to properly cure and protect the plastic sheeting.

Due to the potential fill settlement, the use of more closer spaced control joints and additional steel reinforcing should be considered to minimize and help control cracking or floor slab displacements due to the various depth of undocumented fill at the project site.

9.9 Frost Penetration

Foundation systems and utilities to be constructed at the project site will need to be located below the frost penetration zone, which currently requires a minimum embedment below the ground surface of 36 inches. This does not apply to interior footings in heated spaces which can be located directly beneath the slab. The embedment depth and freeze protection for utilities should be conducted in accordance with the local building codes.

9.10 Sulfate Attack and Corrosion Potential

To evaluate the sulfate attack and corrosion potential of the existing soil at the project site, water-soluble sulfate, resistivity, and pH tests were performed on representative samples of the mine tailings that may be in direct contact with utilities and foundations. The results of these laboratory tests show the existing soil to have low resistivity and high soluble sulfate content and may be classified as severe to very severe corrosive to concrete and steel. The laboratory tests results indicate that special corrosion requirements will most likely be necessary. A corrosion engineer should be consulted to further analyze what protective measures will be required.

9.11 Pavement Sections

No preliminary pavement analysis was conducted for the site. Pavement sections will need to be designed based on the traffic volumes and types of vehicles that each particular area will have to accommodate. The site should be acceptable for the construction of rigid and flexible pavement structures. In areas where ground modification to limit settlements is not cost efficient, flexible pavements should be used to minimize the impact of localized differential settlements.

9.12 Drainage Considerations

Adequate surface drainage provisions should be made to drain water away from excavations. Site grading should be performed in a manner that rain or surface water is directed away from structures. Positive site drainage should be maintained at all times. Water should not be allowed to pond or seep into the ground near pavement sections or building foundations. If planters or landscaping are located adjacent to paved areas, measures should be taken to minimize the potential for water to enter the pavement section.

Drainage provisions that will limit sheet flow over the face of the mine tailing slopes should be provided as well as landscaping to minimize soil erosion.

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General Conditions

Dames & Moore's services are performed, within the limitations imposed by the firm's clients, using the degree of care and skill ordinarily exercised under similar circumstances by reputable engineers and geologists practicing in this locality. No other warranty or representation, either express or implied, is made as to the findings and professional advice in this report.

The findings in this report are believed to describe site conditions to the extent practical given the scope of the investigation. However, this investigation, like all such investigations, can directly explore subsurface conditions at only a few isolated locations within the site. Soil and geologic conditions can vary greatly from place to place, and different conditions may be found during subsequent investigations or project construction. Any such changed conditions should be brought promptly to Dames & Moore's attention for evaluation. Changes to the conclusions and recommendations, and to any designs based on them, may be needed if changed conditions are discovered.

The conclusions and recommendations presented in this report were developed specifically for this project and do not necessarily apply to any other site or project. If the nature of the project changes significantly from that described in this report, Dames & Moore should be contacted to confirm the validity of these conclusions and recommendations.

The condition of a site can change with the passage of time, either due to natural processes or to the works of man on this or adjacent properties. In addition, changes to the applicable laws, regulations, codes and standards of practice may occur because of governmental action and the broadening of knowledge. The findings of this report may be invalidated wholly or in part by such changes, over which Dames & Moore has no control. If more than two years have passed since the date of issue for this report, the report should be reviewed by Dames & Moore to check the validity of the conclusions in light of possible changes.

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Summary

Several geotechnical conditions were found that will need to be addressed prior to the construction of any proposed development at the subject site as it is currently envisaged. This report was prepared as a geotechnical feasibility study and is not intended to be used for design of potential development. The recommendations presented in this report are for the purpose of estimating if the present site is developable.

Based on our finding the existing site soils may still be experiencing some settling under the existing overburden pressure or will settle under any reasonable foundation loading which will increase the soil stresses. Future development may require the removal and recompaction of site soils or ground improvement measures to limit the potential site settlements. Ground modification such as surcharge loading, vibrofloatation or other ground stabilizing measures may be necessary. Ground stabilizing techniques have been employed for many years and are becoming more widely used, as land becomes less available and more expensive.

The project site, after any required ground modification, should prove suitable for the proposed development. Minor grading will be required with localized over-excavation and recompaction, as needed. The slope stability of the existing soil slopes is stable against deep and shallow seated slope failures for the 2.5 H to 1V slopes. The slope stability also indicates that if steeper slopes are planned, slope stabilizing mechanisms will be necessary. Tests conducted on the mine tailing deposits show that the soil will be very erodible and corrosive to concrete and steel.

Site utilities, once any needed ground modification has been completed, will be easy to excavate and install in the mine tailings. Grading activities should be able to use standard construction equipment to excavate and recompact the mine tailings. Soil corrosion potential will require special attention by a corrosion engineer for any ferrous metals and concrete placed in direct contact with the soil.

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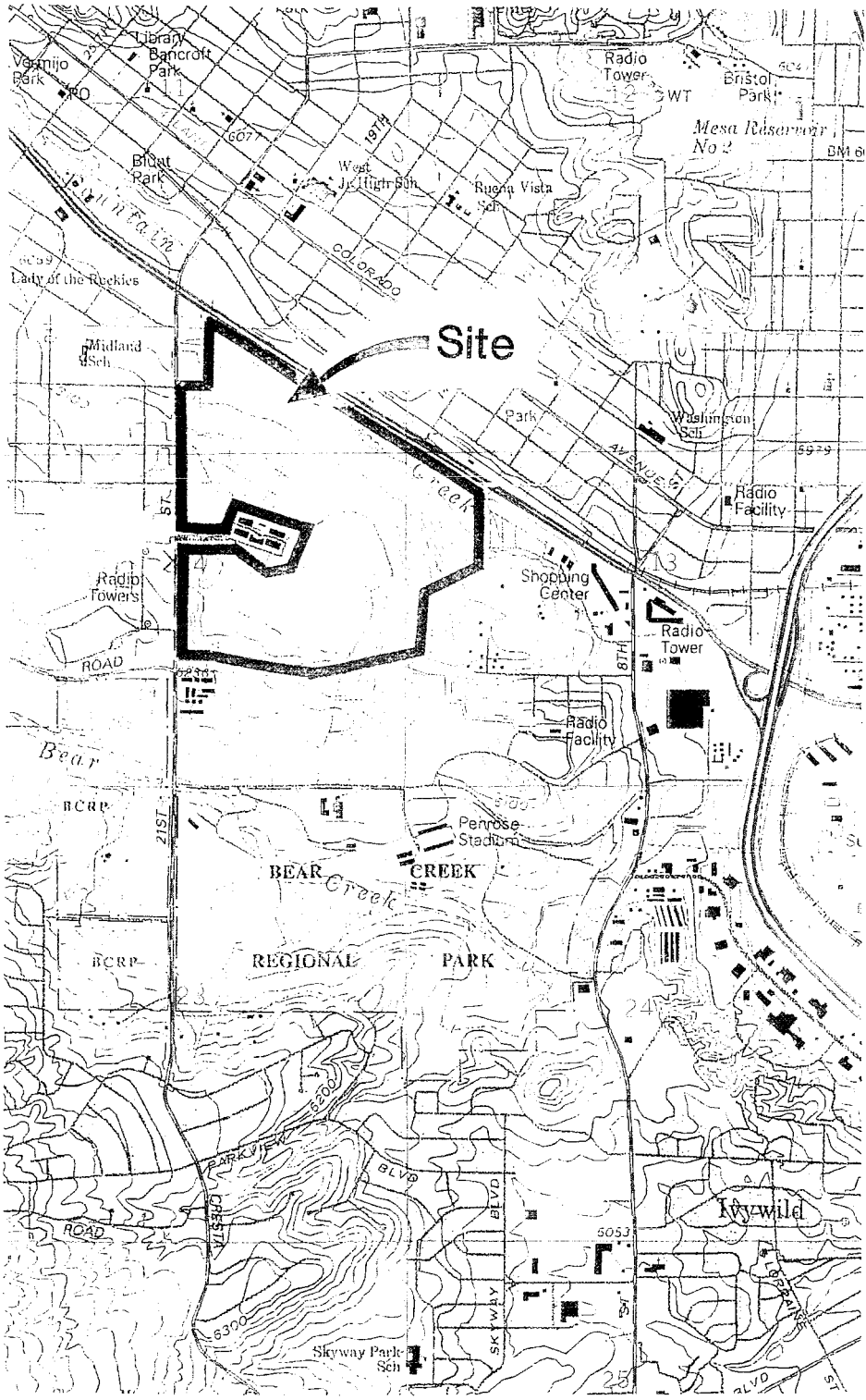
Figures

FIGURES

SITE BOUNDARY LINE



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Scale in Feet

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Site Vicinity Map

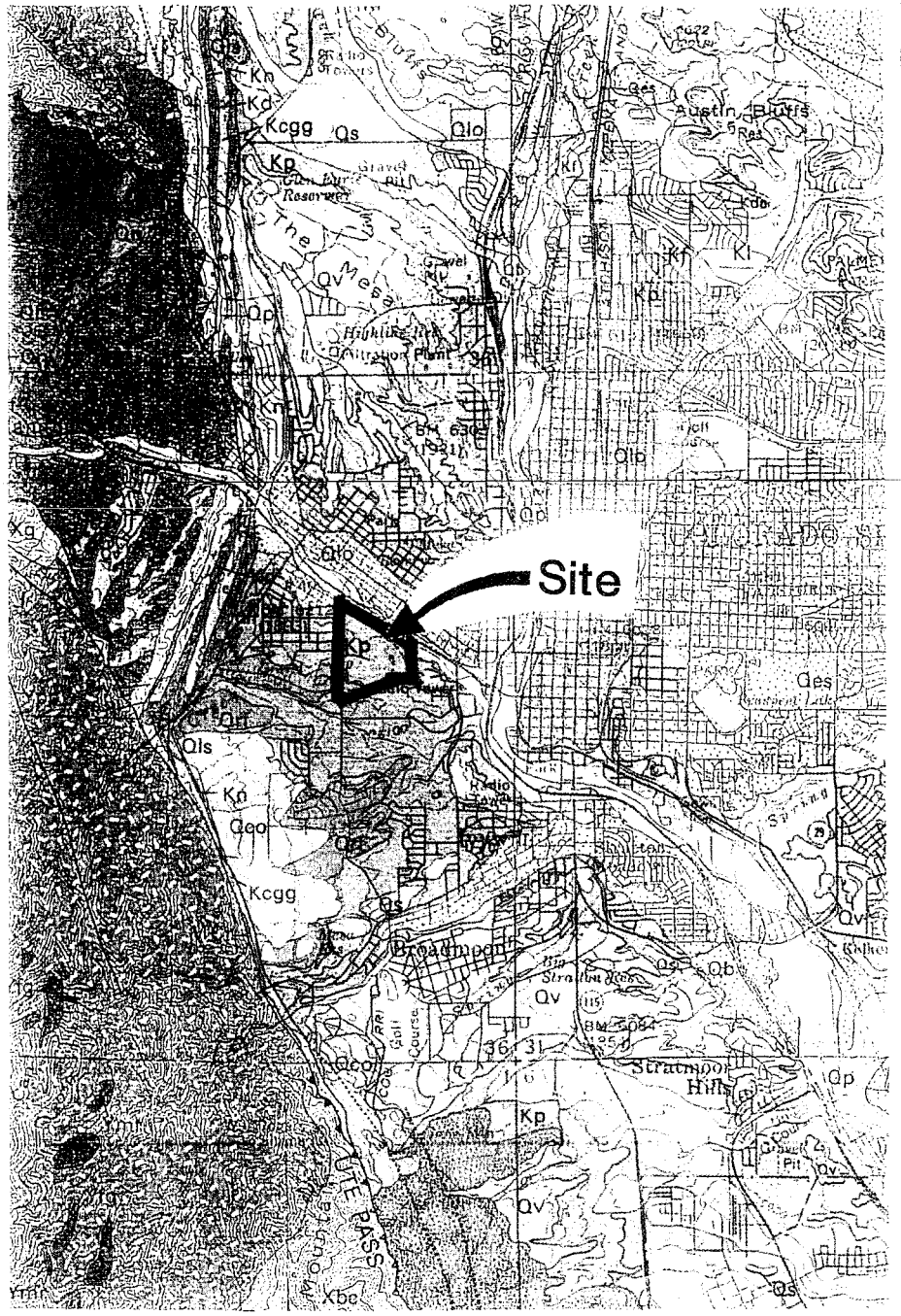
Gold Hill Mesa Property
Colorado Springs, Colorado
Gold Hill Mesa JV, LLC
D&M Job No. 38057-003-035

REFERENCE: GEOLOGIC MAP OF THE COLORADO SPRINGS–CASTLE ROCK AREA, FRONT RANGE URBAN CORRIDOR, COLORADO DEPARTMENT OF THE INTERIOR UNITED STATES GEOLOGIC SURVEY, 1969.

FIGURE 1

S:\CAD_Projects\38057\003\003Fig03.dwg

Qp	POST-PINEY CREEK AND PINEY CREEK ALLUVIUM (UPPER HOLOCENE)
Qco	COLLUVIUM (UPPER HOLOCENE)
Qls	LANDSLIDE DEPOSITS (HOLOCENE TO MIDDLE PLEISTOCENE)
Qlo	LOUVIERS ALLUVIUM (UPPER PLEISTOCENE)
Qv	VERDOS ALLUVIUM (PLEISTOCENE)
Qrf	ROCKY FLATS ALLUVIUM (PLEISTOCENE)
Kp	PIERRE SHALE (UPPER CRETACEOUS)
PPf	FOUNTAIN FORMATION (LOWER PERMIAN TO MIDDLE PENNSYLVANIAN)
Ypp	PIKES PEAK GRANITE (PRECAMBRIAN Y)



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Geologic Site Vicinity Map

Gold Hill Mesa Property
Colorado Springs, Colorado
Gold Hill Mesa JV, LLC
D&M Job No. 38057-003-035

DAMES & MOORE
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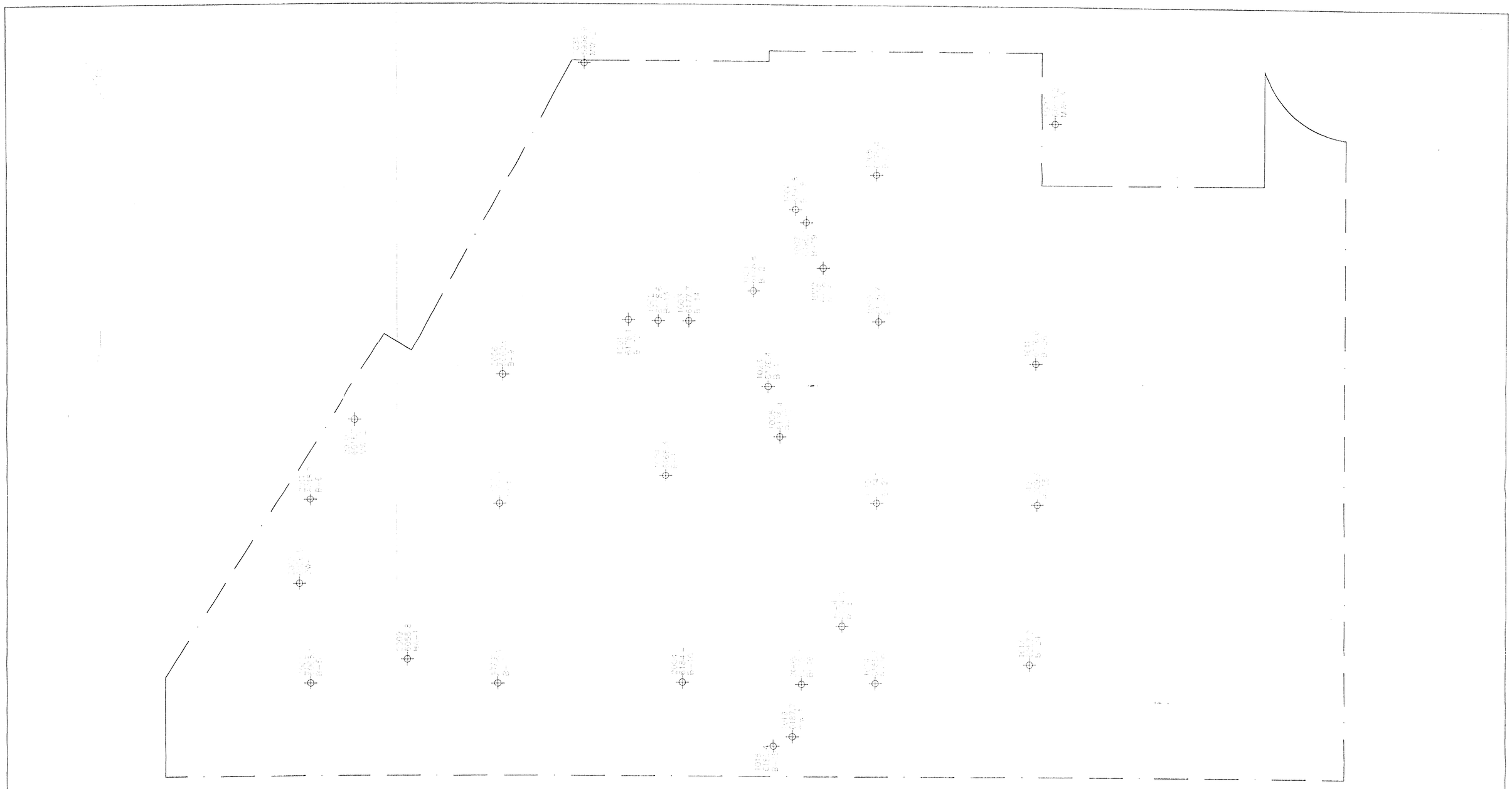
REFERENCE: GEOLOGIC MAP OF THE COLORADO SPRINGS-CASTLE ROCK AREA, FRONT RANGE URBAN CORRIDOR, COLORADO DEPARTMENT OF THE INTERIOR UNITED STATES GEOLOGIC SURVEY, 1969.

FIGURE 2

S:\CAD_Projects\38057\003\003Fig02.dwg



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Gold Hill Mesa

Colorado Springs, Colorado
D&M Job No. 38057-003-035

BORING LOCATION
PLOT PLAN

FIGURE 3

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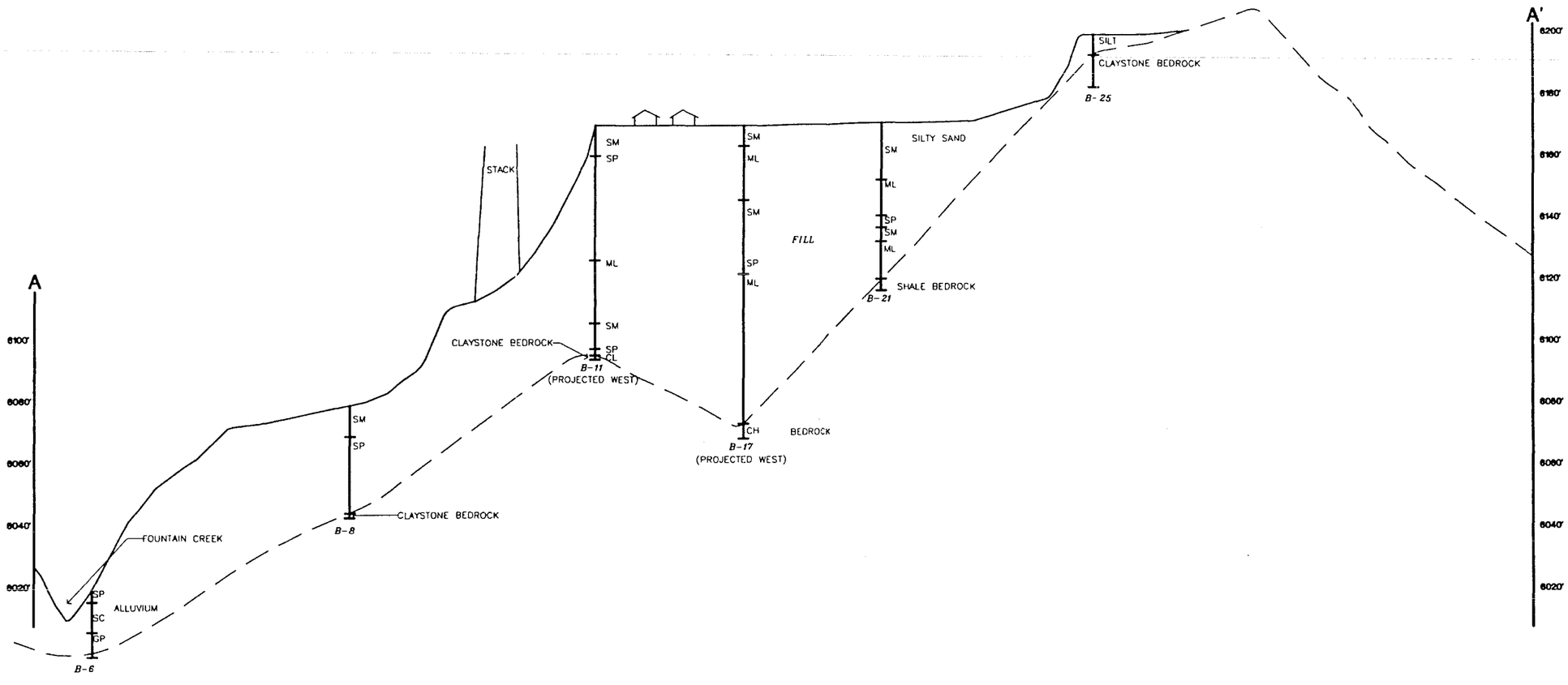

HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 40'

Gold Hill Mesa

Colorado Springs, Colorado
D&M Job No. 35775-003-035

Geologic Cross Section
Figure 4
A-A'

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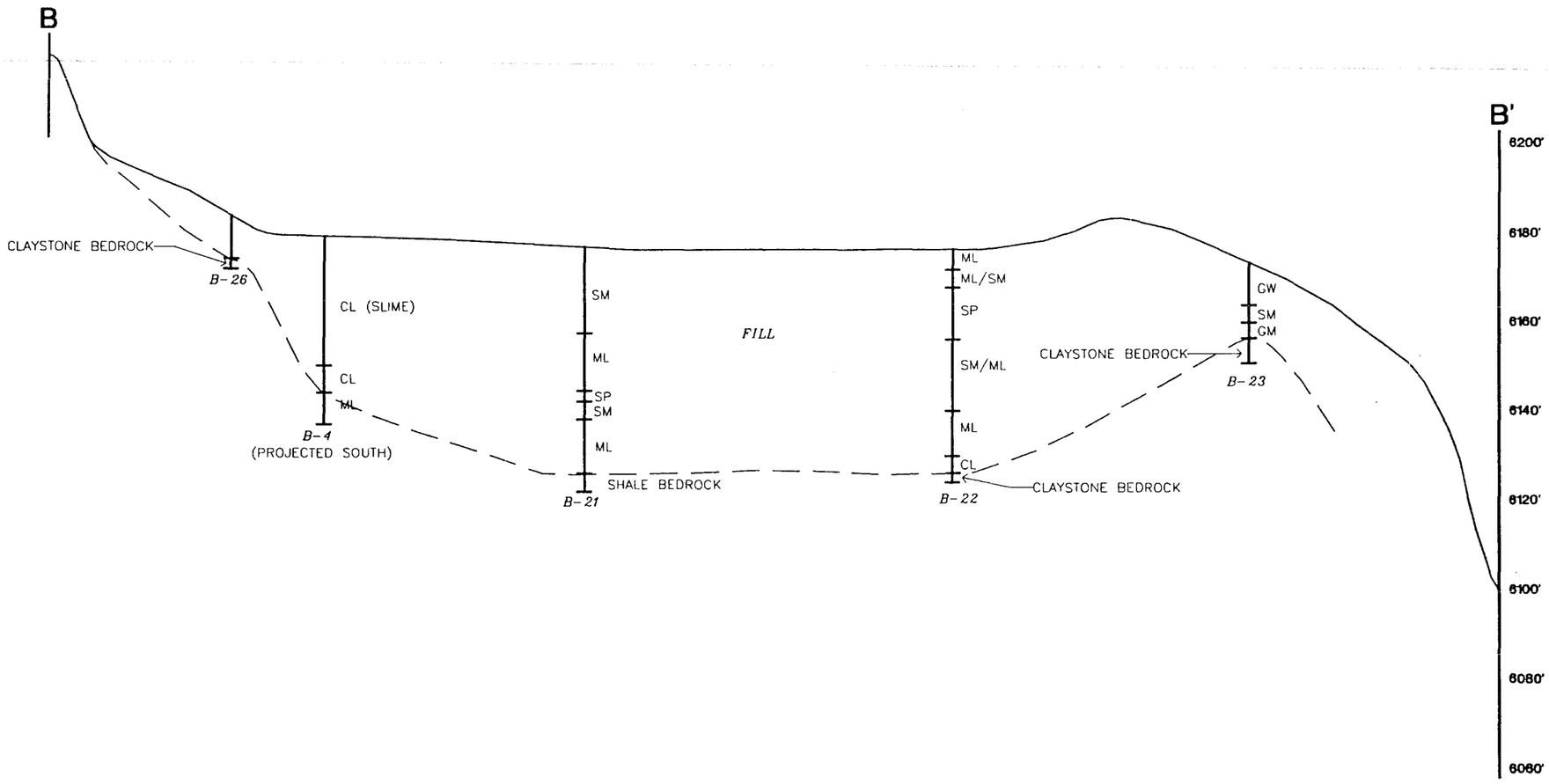

HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 40'

Gold Hill Mesa

Colorado Springs, Colorado
D&M Job No. 35775-003-035

Geologic Cross Section
Figure 5
B-B'

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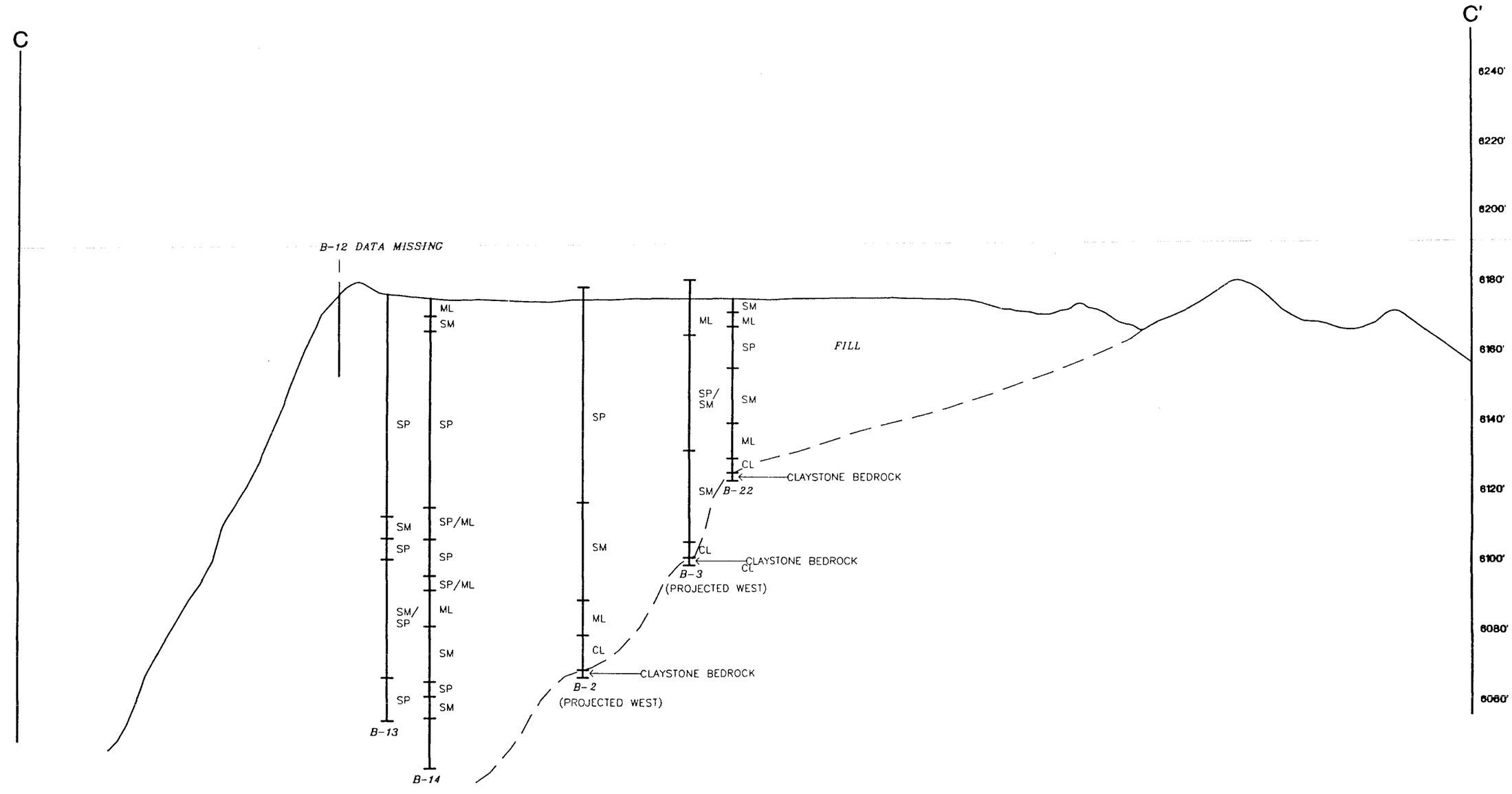

HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 40'

Gold Hill Mesa

Colorado Springs, Colorado
D&M Job No. 35775-003-035

Geologic Cross Section
Figure 6
C-C'

DAMES & MOORE
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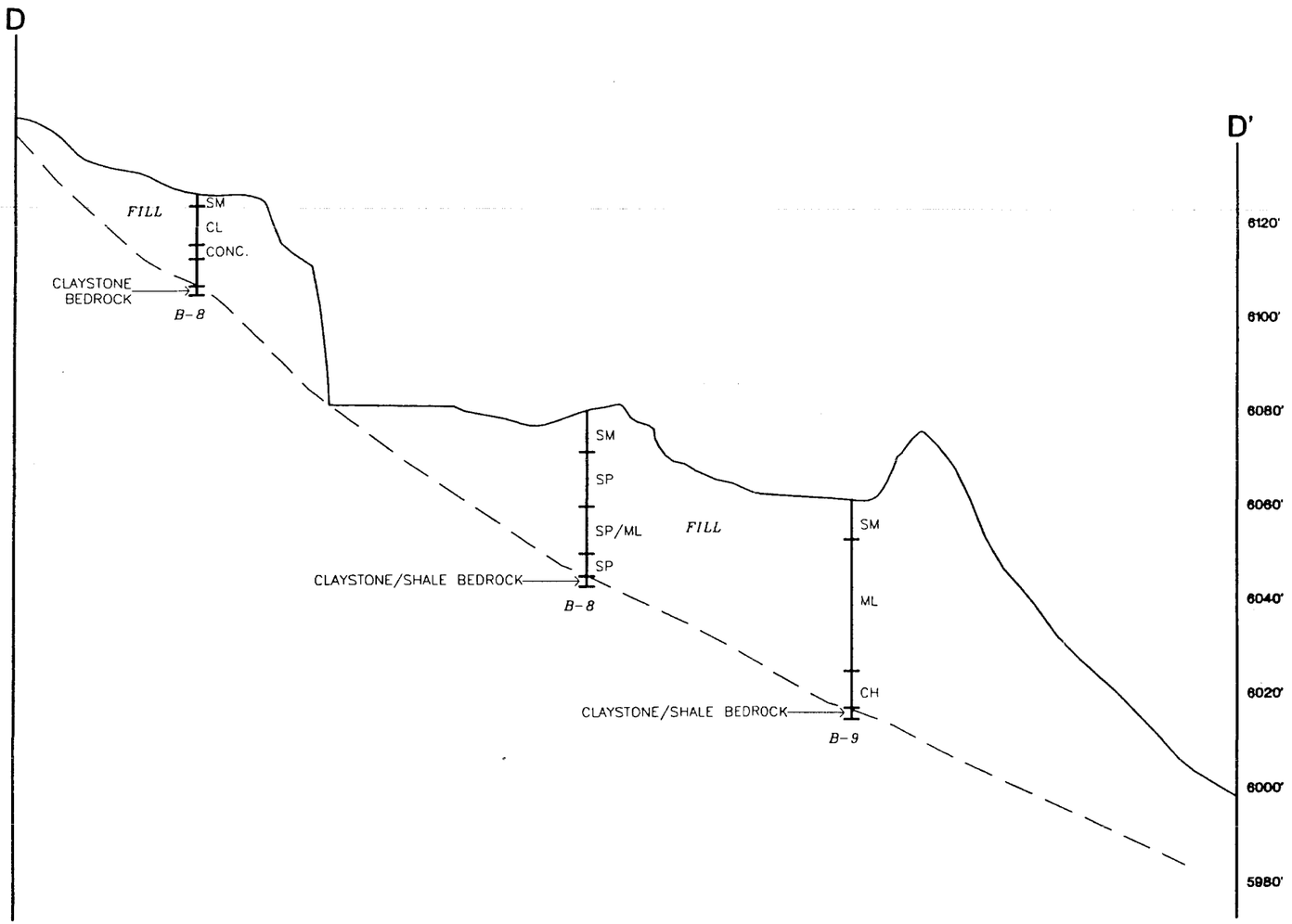

HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 40'

Gold Hill Mesa

Colorado Springs, Colorado
D&M Job No. 35775-003-035

Geologic Cross Section
Figure 7
D-D'

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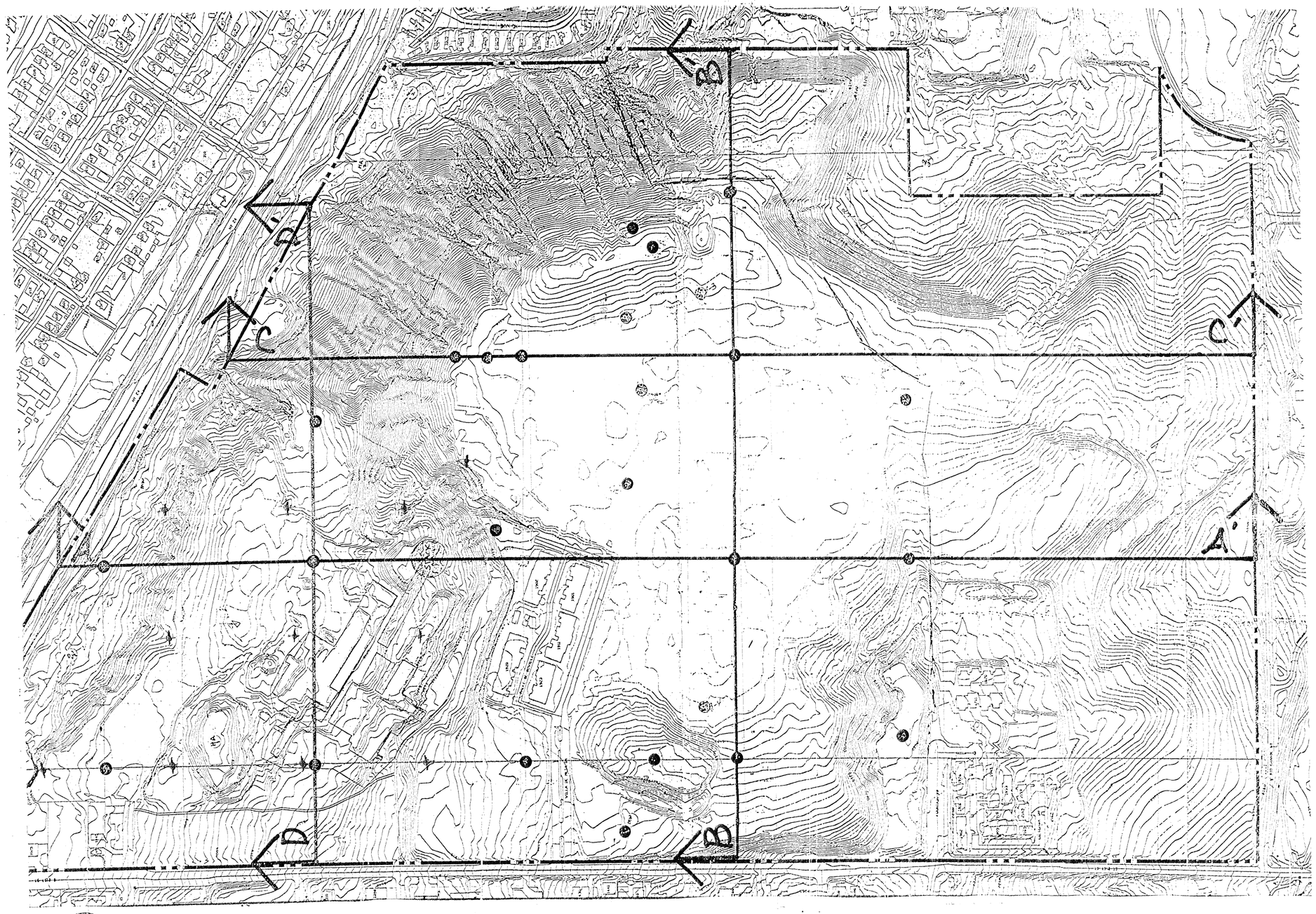

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Gold Hill Mesa

Colorado Springs, Colorado
D&M Job No. 38057-003-035

GEOLOGIC CROSS-SECTION LOCATIONS

FIGURE 8

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REFERENCE: Drawing from M.E.S. Inc.
1040 S. Eighth St. Colorado Springs, Co. 80906

Tables

TABLES

TABLE 1

ESTIMATED EARTHQUAKE MAGNITUDES AND ASSOCIATED PEAK GROUND ACCELERATIONS

Seismic Source[1]	MCE[2]		Length (miles)	Distance to Site (miles)[3]
	Mag[4]	PGA[5]		
Southern Rio Grande Rift Subprovince	6.5 to 7.5	0.023 – 0.16	150	60
Eastern Mountain Province (Rampart Range Ute Pass Faults)	6 to 6.75	0.466- 0.21	300	0.1
Plains Province	5.5 to 6	0.105 – 0.08	300	10

Notes:

*

1 Modified from Anderson, et al., 1989
2 Magnitude-Maximum Credible Earthquake
3 Distances from Kirkham and Rogers 1981.
4 Richter Magnitudes from Kirkham and Rogers, 1981
5 Peak Ground Acceleration - Based on the Dames & Moore Program ACCEL

TABLE 2

GOLD HILL MESA Soil Condition									
Boring	Sample	Sample Depth	Wet Density	Moisture Content	Dry Density	Generalized			Saturation
						% Compaction		Avg. Compaction	
	No.	(Ft.)	(pcf)	(%)	(pcf)	ASTM D 1557	ASTM D 698	(%) for Tailings	(%)
B14	1	5.5	106.0	21.21%	87.5	83.6	90.7		58%
B08	1	5.5	106.2	30.34%	81.5	77.9	84.5		73%
B09	1	5.5	102.8	10.05%	93.4	89.3	96.9		32%
B21	1	5.5	90.8	24.43%	73.0	69.8	75.7		48%
B22	1	5.5	120.4	36.73%	88.1	84.2	91.3	78.6/85.3	103%
B19	1	5.5	102.6	16.28%	88.2	84.4	91.5		46%
B10	1	5.5	102.1	69.54%	60.2	57.6	62.5		101%
B26	1	5.5	105.5	37.28%	76.9	73.5	79.7		81%
B24	1	5.5	116.7	31.14%	89.0	85.1	92.3		89%
B13	1	5.5	89.8	6.55%	84.3	80.6	87.4		17%
B08	2	10.5	92.1	6.96%	86.1	82.3	89.3		19%
B06	3	10.5	129.0	12.07%	115.1	n/a	n/a		63%
B09	2	10.5	101.0	30.13%	77.6	74.2	80.5		66%
B17	2	10.5	94.2	6.86%	88.2	84.3	91.4		19%
B23	2	10.5	119.0	8.87%	109.3	n/a	n/a		40%
B22	2	10.5	95.4	36.04%	70.1	67.0	72.7	78.9/85.6	67%
B11	2	10.5	100.0	35.81%	73.6	70.4	76.4		72%
B26	2	10.5	103.5	24.09%	83.4	79.7	86.5		61%
B24	2	10.5	120.1	19.03%	100.9	96.5	104.7		71%
B13	2	10.5	97.8	22.01%	80.2	76.6	83.2		51%
B14	2	16.5	100.7	34.20%	75.0	71.7	77.8		71%
B09	3	15.5	91.4	16.77%	78.3	74.8	81.2		38%
B17	3	15.5	99.0	14.93%	86.1	82.4	89.4		40%
B22	3	15.5	91.1	3.80%	87.8	83.9	91.0		11%
B07	3	15.5	127.0	19.45%	106.3	n/a	n/a	78.2/84.8	82%
B19	3	15.5	86.4	7.80%	80.1	76.6	83.1		18%
B08	3	15.5	91.1	2.92%	88.5	84.6	91.8		8%
B13	3	15.5	104.0	35.71%	76.6	73.3	79.5		77%
B24	3	15.5	125.8	27.00%	99.1	n/a	n/a		97%
B14	4	20.5	93.1	6.81%	87.2	83.3	90.4		19%
B22	4	20.5	102.4	15.07%	89.0	85.1	92.3		43%
B07	4	20.5	128.7	21.95%	105.5	n/a	n/a		91%
B11	4	20.5	100.2	49.64%	67.0	64.0	69.5	76.8/83.4	85%
B19	4	20.5	89.6	7.98%	83.0	79.3	86.1		20%
B13	4	20.5	95.6	8.21%	88.3	84.5	91.6		23%
B08	4	20.5	102.0	50.00%	68.0	65.0	70.5		88%
B14	5	25.5	94.9	6.49%	89.1	85.2	92.4		19%
B05	5	25.5	118.2	31.80%	89.7	85.7	93.0		92%
B17	5	25.5	90.3	14.59%	78.8	75.3	81.7		33%
B22	5	25.5	100.4	35.57%	74.1	70.8	76.8		72%
B10	5	25.5	102.8	53.79%	66.8	63.9	69.3	79.8/86.5	92%
B11	5	25.5	96.3	7.28%	89.8	85.8	93.1		21%
B19	5	25.5	92.7	5.67%	87.7	83.9	91.0		16%
B13	5	25.5	94.4	3.11%	91.6	87.5	95.0		9%

TABLE 2

GOLD HILL MESA
Soil Condition

Boring	Sample No.	Sample Depth (Ft.)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Generalized % Compaction ASTM D 1557	Generalized % Compaction ASTM D 698	Avg. Compaction (%) for Tailings	Saturation (%)
B14	6	30.5	93.6	7.57%	87.0	83.2	90.3		21%
B21	6	30.5	95.6	32.80%	72.0	68.8	74.7		64%
B22	6	30.5	104.1	40.13%	74.3	71.0	77.1	78.4/85.1	82%
B11	6	30.5	93.8	8.00%	86.9	83.0	90.1		22%
B19	6	30.5	84.9	5.53%	80.5	76.9	83.5		13%
B13	6	30.5	100.5	9.88%	91.5	87.4	94.9		30%
B14	7	35.5	98.0	9.92%	89.2	85.2	92.5		28%
B17	7	35.5	95.7	21.71%	78.6	75.2	81.6		49%
B22	7	35.5	103.6	14.30%	90.6	86.7	94.0	82.6/89.6	42%
B11	7	35.5	90.7	5.94%	85.6	81.8	88.8		16%
B08	7	35.5	119.6	26.72%	94.4	n/a	n/a		86%
B13	7	35.5	94.8	7.96%	87.8	83.9	91.1		22%
B14	8	40.5	98.0	8.89%	90.0	86.0	93.4		26%
B22	8	40.5	104.1	46.73%	70.9	67.8	73.6		88%
B11	8	40.5	94.2	6.93%	88.1	84.2	91.4	81.8/88.8	19%
B19	8	40.5	93.1	4.01%	89.5	85.6	92.9		12%
B13	8	40.5	94.5	5.93%	89.2	85.3	92.5		17%
B14	9	45.5	96.8	10.29%	87.8	83.9	91.0		29%
B22	9	45.5	106.3	58.81%	66.9	64.0	69.4		101%
B10	9	45.5	127.5	22.37%	104.2	n/a	n/a	81/87.8	90%
B11	9	45.5	117.2	30.85%	89.6	85.6	92.9		89%
B19	9	45.5	91.6	5.23%	87.0	83.2	90.3		14%
B13	9	45.5	97.9	6.29%	92.1	88.1	95.5		19%
B17	10	50.5	107.4	34.70%	79.7	76.2	82.7		80%
B22	10	50.5	114.1	23.04%	92.7	n/a	n/a	82.8/89.9	72%
B13	10	50.5	97.9	4.64%	93.6	89.4	97.1		15%
B14	11	55.5	94.7	5.27%	90.0	86.0	93.3		15%
B17	11	55.5	100.7	52.65%	66.0	63.1	68.4	77.3/83.8	88%
B13	11	55.5	97.1	6.57%	91.1	87.1	94.5		20%
B11	11	55.5	103.8	36.08%	76.3	72.9	79.1		77%
B14	12	60.5	98.3	7.11%	91.8	87.7	95.2		22%
B17	12	60.5	100.6	32.10%	76.2	72.8	79.0		68%
B11	12	60.5	102.6	34.55%	76.3	72.9	79.1	81.5/88.5	74%
B13	12	60.5	97.5	6.85%	91.2	87.2	94.7		21%
B19	12	60.5	95.2	4.73%	90.9	86.9	94.3		14%
B14	13	65.5	95.9	12.32%	85.4	81.6	88.6		32%
B17	13	65.5	98.0	12.94%	86.8	83.0	90.0		35%
B11	13	65.5	108.4	44.38%	75.1	71.8	77.9	81.9/88.8	92%
B13	13	65.5	100.7	7.10%	94.0	89.9	97.5		23%
B19	13	65.5	92.9	6.64%	87.1	83.3	90.4		18%
B14	14	70.5	97.2	6.18%	91.5	87.5	95.0		19%
B17	14	70.5	104.1	25.08%	83.2	79.6	86.3		63%
B11	14	70.5	90.6	49.57%	60.6	57.9	62.8	76.9/83.5	73%
B19	14	70.5	127.6	22.71%	104.0	n/a	n/a		91%
B13	14	70.5	93.3	7.76%	86.6	82.8	89.8		21%

TABLE 2

GOLD HILL MESA
Soil Condition

Boring	Sample No.	Sample Depth (Ft.)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Generalized % Compaction ASTM D 1557	Generalized % Compaction ASTM D 698	Avg. Compaction (%) for Tailings	Saturation (%)
B14	15	75.5	96.0	8.46%	88.5	84.6	91.8	83.8/90.9	24%
B17	15	75.5	108.3	31.65%	82.3	78.6	85.3		78%
B11	15	75.5	119.0	24.30%	95.7	n/a	n/a		81%
B13	15	75.5	97.5	5.74%	92.2	88.2	95.7		18%
B14	16	80.5	87.7	7.63%	81.5	77.9	84.5	81.5/88.4	18%
B17	16	80.5	114.1	34.05%	85.1	81.4	88.3		89%
B13	16	80.5	96.3	8.09%	89.1	85.2	92.4		23%
B14	17	85.5	99.4	73.15%	57.4	54.9	59.6	60.2/65.3	99%
B17	17	85.5	109.4	57.89%	69.3	66.2	71.9		105%
B13	17	85.5	87.1	40.17%	62.1	59.4	64.5		61%
B13	18	90.5	103.4	22.16%	84.6	80.9	87.8	80.9/87.8	57%
B17	19	95.5	114.1	45.31%	78.5	75.1	81.5	73/79.2	102%
B13	19	95.5	108.8	46.70%	74.2	70.9	76.9		95%
B14	20	100.5	107.8	41.44%	76.2	72.9	79.1	72.9/79.1	89%
B17	20	100.5	122.2	27.67%	95.7	n/a	n/a		92%
B14	21	105.5	103.8	46.74%	70.7	67.6	73.4	73.5/79.8	88%
B13	21	105.5	108.0	30.02%	83.1	79.4	86.2		75%
B14	22	110.5	98.8	16.93%	84.5	80.8	87.7	82.1/89.1	44%
B13	22	110.5	93.1	6.73%	87.2	83.4	90.5		18%
B14	23	115.5	106.3	17.26%	90.7	86.7	94.0	95.3/103.4	51%
B13	23	115.5	121.0	11.36%	108.7	103.9	112.7		51%
B14	24	120.5	98.8	8.19%	91.3	87.3	94.7	82.6/89.6	25%
B13	24	120.5	86.5	6.24%	81.4	77.8	84.5		15%
B14	25	125.5	98.8	16.95%	84.5	80.8	87.6	80.8/87.6	44%

TABLE 3

Gold Hill Mesa Shear Strength Data							
Boring	Sample No.	Test	Depth (Ft.)	Internal angle of friction ϕ	Cohesion (Psf)	Wet Density (i) (Pcf)	Wet Density (f) (Pcf)
B05	1	cu	5.5	14	480	97.6	121.2
B05	2	cu	10.5	36	0	96.2	111.8
B05	6	cd	30.0	25	100	115.7	118.3
B05	6	cu	30.0	27	500	110.9	112.4
B08	5	cd	25.0	37.5	0	101.7	118.8
B08	5	cu	25.0	35	100	101.3	109.7
B09	4	cd	20.5	34	100	103.5	108.3
B09	7	cd	40.5	20	550	121.9	127.7
B10	2	cd	10.0	32	0	89.6	110.0
B10	2	cu	10.0	34	0	111.9	119.8
B10	7	cd	35.5	35	0	108.2	115.8
B11	1	cd	5.5	59	0	103.1	115.9
B11	3	cd	15.5	28	0	85.9	109.9
B11	10	cd	50.0	34	0	95.9	114.5
B11	10	cu	50.0	32	740	93.9	115.2
B11	20	cd	100.0	35	0	85.1	109.2
B13	20	cu	100.0	29	0	91.5	117.4
B14	3	cd	15.5	30	0	90.1	113.8
B14	10	cd	50.5	36	0	95.4	121.0
B19	2	cd	10.5	28	600	95.5	112.3
B19	7	cd	35.5	34	0	89.4	115.6
B19	11	cd	55.5	35	0	94.2	121.8
B21	10	cd	62.5	18	1900	124.6	128.8

Lengend:

cd - Consolidated drained

cu - Consolidated undrained

i - initial

f - final

TABLE 4

Specific Gravity ASTM D 854			
Boring	Sample No.	Depth (Ft.)	Specific Gravity
B05	2	5.5	2.86
B05	3	15.5	2.97
B05	6	30.0	2.84
B08	5	25.0	2.71
B09	4	20.5	2.91
B09	7	40.5	2.78
B10	2	10.0	2.75
B11	10	50.0	2.84
B13	19	100.5	2.82
B14	18	90.5	3.00
B14	19	95.5	2.87
B21	4	20.5	2.83
B21	10	62.5	2.89

Average Specific Gravity **2.85**

TABLE 5

Dispersion and Pin Hole Test Results ASTM D 4221 and 4647				
Boring	Sample	Depth	Dispersion (%)	Classification Pin Hole Test
B05	1	5.5	14	D1
B05	3	15.5	14	D1
B09	4	20.5	16	D1
B10	2	10	40	Non-Plastic
B17	1	5.5	87	D1

Legend:

D-1 to D-2 Dispersive

ND4 to ND3 Itermediate

ND2 to ND1 Nondispersive

TABLE 6

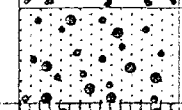
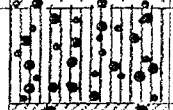
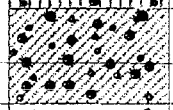
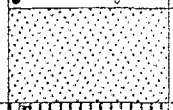
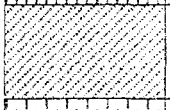
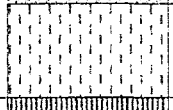
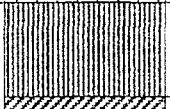
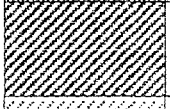
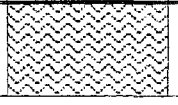
Soil Analytical Testing					
Boring	Sample	Depth	Resistivity (ohm-cm)	Sulfate (ppm)	pH
B05	1	5.5	2,413	1,160	7.96
B05	3	15.5	5,276	5,730	7.94
B09	4	20.5	1,248	6,640	--
B10	2	10	870	7,270	7.53
B17	1	5.5	78	62,400	--

Soil Resistivity Corrolation		Soluble Sulfate Corrolation	
Soil Resistivity (ohms-centimeter)	Corrosivity Category	Sulfate In Water (ppm)	
0 - 1000	Severely Corrosive	over 10000	(Very Severe)
1000 - 2000	Corrosive	1500 - 10000	(Severe)
2000 -10000	Moderately Corrosive	150 - 1500	(Moderate)
over 10000	Mildly Corrosive	0 - 150	(Negligible)

Appendix A

APPENDIX A

FIELD INVESTIGATIONS

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS (MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE)	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES.
				GC	CLAYEY GRAVELS, GRAVEL-SAND CLAY MIXTURES.
	SAND AND SANDY SOILS (MORE THAN 50% OF COARSE FRACTION PASSING NO.4 SIEVE)	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES.
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES.
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50 %		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.
		LIQUID LIMIT GREATER THAN 50 %		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS.
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS.

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

UNIFIED SOIL CLASSIFICATION SYSTEM

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-5**
FEBRUARY 25, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 2
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		33 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,068.2 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Weeds and grasses		
									ML		Sandy SILT, light yellowish red, poorly graded, very fine grain, soft, loose, slightly moist.		
U	18	18	1	5.5	2 4 4 [8]	1 2 2 [4]	6	5					
U	18	18	2	10.5	3 4 6 [10]	2 2 3 [5]	6	10	SM		Silty SAND, light yellowish red, poorly graded, very fine to fine grain, soft moderately loose, slightly moist.	79.3	16.1
U	18	15	3	15.5	2 2 6 [8]	1 1 3 [4]	6	15	ML		Sandy SILT, reddish brown, poorly graded, alternating ~2" stratified layers, very fine grain, moist/wet in silt layers.		
ST	30	0	4	20	—	—	—	20			No recovery, wet silt.		

[ ] = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-6**
FEBRUARY 9, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 1
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
12.5 FEET		23.1 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
MICHELLE FLINT/BILL POLIVKA	STEVE MCCULLOUGH	6,018.3 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Sparse vegetation (weeds)		
U	18	17	1	0.5	6 9 9 [18]		6 (DIST)		SP		Reddish brown, fine to medium grained SAND, loose, slightly moist with trace of interbedded grayish-yellow clay.		
								5	SM		Brown to dark brown silty fine SAND, medium dense, slightly moist with some black mottling and organics.		
U	18	10	2	5.5	10 25 28 [53]		4 (DIST)						
									SP/ SC		Yellowish red gravelly medium to coarse SAND, with clay, medium dense, moist; gravel is fine to coarse.		
U	18	15	3	10.5	11 53 22 [75]		6	10			Grades dense, moist to wet, with embedded thin layer (6" thick) of brown sandy clay with fine gravel, mica. Grades wet.	115.1	12.1
								15	GP		Yellowish red sandy GRAVEL with cobbles, very dense, wet. Encountered cobbles (17 feet).		
								20					
U	7	6	4	22.5	29 21/1" [21/1"]		3		CH		Pierre Formation: Shale, greenish-gray to olive gray high plasticity, slightly moist, moderately strong, slightly weathered.		
											The boring was completed at 23.1 feet.		

[ ] = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-7**
MARCH 3, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 1
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	

HAMMER DATA:	D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP	38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:	**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED	21.4 FEET

PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,106.6 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
											Surface conditions: Sparse vegetation		
								0					
									CH		Silty SAND.		
U	18	15	1	5.5	7 10 18 [28]	3.5 5 9 [14]	6	5			CLAY (fill), olive gray, low plasticity, medium stiff, with 3/4" angular gravel, slightly moist.		
U	4	3	2	10.5	45/4"			10			No recovery: Concrete fill – stuck in shoe, no sample. Concrete 10 – 13.5 feet.		
U	18	13	3	15.5	10 22 30 [52]	5 11 15 [26]	5	15			Claystone fill – olive gray, stiff, slightly moist, appears fairly unweathered but bedding in shale is vertical.	106.3	19.5
											Stiffer augering – possible native bedrock.		
U	16	10	4	20.5	16 43 50/4" [93+]	—	—	20			Pierre Formation: Claystone bedrock – olive gray, very stiff, slightly moist to dry, thin 1 mm carbonaceous black slt iron tri stain, horizontal bedding.	105.5	21.9
											The boring was at 21.4 feet.		

[ ] = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-8**
FEBRUARY 25, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 2
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		33057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		36.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,076.9 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
											Surface conditions: Cxxxxxx, silts, weeds, concrete rubble		
								0	ML		SILT with sand, light yellow brown, poorly graded, very fine to fine grain, slightly moist, soft, loose.		
U	18	18	1	5.5	3 4 5 (9)	2 2 3 (5)	6	5				81.4	30.3
U	18	17	2	10.5	2 5 7 12	1 3 4 7	6	10	SP		SAND, yellowish red/red brown, poor grading, fine to coarse grain, angular to subround, very soft, loose, slightly moist.	86.1	6.9
U	18	16	3	15.5	5 6 6 12	3 3 3 (6)	6	15			SAND, as above, grading down to fine-medium grain, slightly moist.	88.5	2.92
U	18	17	4	20.5	3 2 4 (6)	2 1 2 (3)	6	20	ML		SILT, light reddish brown, alternating stratified sand layers, very fine to fine grain, subround to subangular on coarser material, moist/wet in silt layers.	68	50

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GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-8**
FEBRUARY 25, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 2 OF 2
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		36.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,076.9 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
ST	30	26	5	25	—	—	—	25	ML		SILT, pushed soft, moist on top and bottom (received 26" in sample, missing 2" on top and bottom).	81.2	25.6
U	18	15	6	30.5	4 8 10 [18]	2 4 5 [9]	4 (DIST)	30	SP		SAND, yellowish red, poorly graded, very fine to fine grain, subangular to angular, moist, soft.		
U	18	12	7	35	5 16 26 [42]	3 8 13 [21]	6	35	CH		Pierre Formation: Bedrock claystone/shale, olive gray, soft to stiff, slight plasticity in upper sample, moist grading to dry.	94.4	26.7
											Boring completed at 36.5 feet.		
								40					
								45					

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ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-9**
FEBRUARY 9, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 2
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		46 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
MICHELLE FLINT/BILL POLIVKA	STEVE MCCULLOUGH	8,060.7 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
								0			Surface conditions: No vegetation, silty fine to coarse sand with trace fine gravel		
									SM		Brown, silty fine SAND, loose, slightly moist, with interbedded nodules of yellowish gray clay.		
U	18	16	1	5.5	9 10 9 [19]		6	5				93.4	10.1
									ML		Yellowish red SILT with trace fine sand, medium stiff, wet, low plasticity.		
U	18	16	2	10.5	2 2 7 [9]		6	10				77.6	30.1
U	18	18	3	15.5	4 7 9 [16]		4	15			Grades moist.	78.3	16.8
U	18	18	4	20.5	2 3 2 [5]		6	20			Grades wet, soft.	70.9	50.7

□ = BLOWS PER FOOT OF DRIVEN SAMPLER
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ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-9**
FEBRUARY 9, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 2 OF 2
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		46 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
MICHELLE FLINT/BILL POLIVKA	STEVE MCCULLOUGH	6,060.7 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
ST	30	0	---	---	---	---	---	25	ML		No Recovery.		
U	18	10	5	30.5	4 2 4 6		3 (DIST)	30			Sample disturbed.		
U	18	18	6	35.5	6 12 16 28		6	35	CH		Olive gray (fat) clay, stiff, moist, high plasticity with calcereous deposits and small, fine roots.		
U	18	12	7	40.5	8 12 17 30		6	40			Slight iron oxide staining.	94.4	26.0
U	18	12	8	45.5	12 22 31 53		6	45			Pierre Formation: Shale, very stiff, olive gray, high plasticity, slightly moist, highly weathered, weak, blocky.		
											Boring completed at 46 feet.		

□ = BLOWS PER FOOT OF DRIVER SAMPLER
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ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 091 - 1462

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-10**
MARCH 2, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 2
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		46.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,184.5 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Grasses		
									ML		Silt, yellowish red, poorly graded, soft, wet, with trace: fine laminated sand, low plasticity.		
U	18	18	1	5.5	1 2 1 [3]	.5 1 .5 [1.5]	6	5				60.2	69.4
ST	30	28	2	10	—	—	—	10			Grades, SILT with silty sand lenses.		23.9
U	18	18	3	15.5	2 2 6 [8]	1 1 3 [4]	5 (DIST)	15					
U	18	0	4	20.5	2 2 2 [4]	1 1 1 [2]	—	20					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-10**
MARCH 2, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	SHEET 2 OF 2
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		46.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,184.5 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
								25	ML		Rapid dilatancy, wet.		
U	18	18	5	25.5	2 4 4 [8]	1 2 2 [4]	6					66.9	53.8
								30					
U	18	18	6	30.5	0 1 1 [2]	0 .5 .5 [1]	6				Slow dilatancy, wet.		
								35					
U	18	18	7	35.5	1 1 1 [2]	.5 .5 .5 [1]	6				Slow dilatancy.		
								40					
U	18	18	8	40.5	4 8 12 [20]	2 4 6 [10]	3 (DIST)		OL		Organic silt, black, poorly graded, soft, wet grading downward into olive gray claystone, trace: roots.		
									CH		Pierre Formation: Claystone, olive gray, moderately stiff, moist to slightly moist, moderate plasticity, highly weathered.		
								45					
U	18	18	9	45.5	8 12 18 [30]	4 6 9 [15]	6					104.2	22.4
											Boring completed at 46.5 feet.		

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-11**
MARCH 2, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	SHEET 1 OF 4
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		76.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	5,168.3 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
											Surface conditions: Grasses		
								0	SM		Silty SAND, yellowish red, poorly graded, 1/4" alternating layers of light yellow red/yellow red, loose, slightly moist, very fine to fine grained.		
U	18	18	1	5.5	4 6 8 [14]	2 3 4 [7]	6	5					
U	18	17	2	10.5	2 4 4 [8]	1 2 2 [3]	6	10	SP		SAND, light reddish brown, poorly graded, fine grained, angular to subround, loose, slightly moist.	73.5	35.8
U	18	18	3	15.5	3 2 5 [7]	1.5 1 2.5 [3.5]	6	15			SAND, alternating light reddish brown/reddish brown, fine grained, as above.		
U	18	18	4	20.5	3 4 5 [9]	1.5 2 2.5 [4.5]	6	20			SAND, reddish brown, poorly graded, fine grained, loose, slightly moist.	67	49.6

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U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-11**
MARCH 2, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 2 OF 4
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		76.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,163.3 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
U	18	18	5	25.5	7 12 14 [26]	3,5 6 7 [13]	6	25	SP		SAND, as above, grading into medium to coarse grained, subangular to angular, slightly moist, loose.	89.8	7.3
U	18	18	6	30.5	8 10 14 [24]	4 5 7 [12]	6	30			SAND, as above, slightly moist, loose.	86.8	8.0
U	18	16	7	35.5	8 12 14 [26]	4 6 7 [13]	6	35			SAND, as above, grading to fine – medium grained.	85.6	6.0
U	18	18	8	40.5	6 12 14 [26]	3 6 7 [13]	6	40			SAND, reddish brown, poorly graded, fine to medium grained, angular to subround, loose, unconsolidated as is sand above, slightly moist, trace pyrite.	88.1	6.9
U	18	12	9	45.5	4 3 4 [7]	2 1,5 2 [3.5]	2 (DIST)	45	ML		SILT with sand layers, reddish brown, very fine to medium grained, wet in fines, silts exhibit slow dilatancy, soft/loose.	89.6	30.9

[ ] = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-11**
MARCH 2, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	SHEET 3 OF 4
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		76.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,168.3 FEET

SAMPLE												
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
ST	30	27	10	50	—	—	—	50	ML		SILT with sand layers.		22.9
U	18	15	11	55.5	5 8 8 [16]	2.5 4 4 [8]	6	55			SAND, thin layer reddish brown, poorly graded, fine grained with subangular to subround, moist.	76.3	36.1
U	18	15	12	60.5	7 10 12 [22]	3.5 5 6 [11]	5	60			Grades interbedded SILTS/SAND, light to medium reddish brown, poorly graded, very fine to fine grained, soft, loose, moist.	76.2	34.6
U	18	18	13	65.5	14 12 12 [24]	7 6 6 [12]	5	65	SM		SILTY SAND, reddish brown, poorly graded, very fine to fine grained, medium stiff, slightly moist.	75.1	44.4
U	18	16	14	70.5	12 14 16 [30]	6 7 8 [15]	6	70				60.6	49.6

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1862

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-11**
MARCH 2, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 4 OF 4
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		76.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,183.3 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								75	SP		SAND, reddish brown, poorly graded, fine grain, loose, slightly moist.		
U	18	14	15	75.5	12 18 48 [66]	6 9 24 [33]	6		CH		Pierre Formation: claystone, olive gray, very stiff, weathered, iron stain, ca min., slightly moist.	95.7	24.3
											Boring completed at 76.5 feet.		
								80					
								85					
								90					
								95					

[ ] = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1/82

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-13**
FEBRUARY 25 - 26, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		121.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,178.6 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Grasses		
									SP		SAND, yellowish red, poorly graded, fine to medium grained, angular to subround, soft, slightly moist.		
U	18	18	1	5.5	11 10 12 [22]	6 5 6 [11]	5 (DIST)	5				84.2	6.6
U	18	15	2	10.5	4 5 7 [12]	2 2 4 [6]	6	10			SAND, yellowish red to reddish brown, very fine to fine grained, angular to subround, soft, slightly moist.	80.2	22
U	18	16	3	15.5	1 2 10 [12]	.5 1 5 [6]	6	15	SM		Silty SAND, yellowish red, very fine grain, wet.	76.7	35.7
									SP		SAND, yellowish red, reddish brown, fine to medium grain, angular to round, soft, slightly moist.		
U	18	17	4	20.5	8 13 16 [29]	4 7 8 [15]	6	20			SAND, yellowish red/reddish brown, poorly graded, fine to medium grain, angular to subround, soft/moderately firm, slightly moist.	88.3	8.2

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-13**
FEBRUARY 25 – 26, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 2 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		121.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,178.6 FEET

SAMPLE												
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
U	18	16	5	25.5	10 16 24 [40]	5 8 12 [20]	6	25	SP		SAND, yellowish red, reddish brown, poorly graded, fine to medium coarse grain, loose to medium dense, slightly moist.	91.6	3.11
U	18	15	6	30.5	14 18 20 [38]	7 9 10 [19]	6	30			SAND, as above, loose, slightly moist.	91.5	9.9
U	18	16	7	35.5	14 23 24 [47]	7 12 12 [24]	5	35			SAND, reddish brown, poorly graded, fine to coarse grain, angular to subround, medium dense, slightly moist.	87.8	7.9
U	18	15	8	40.5	15 21 15 [36]	8 11 8 [19]	6	40			SAND, reddish brown, poorly graded, fine to medium grained, angular to subangular, loose, slightly moist.	89.2	5.9
U	18	17	9	45.5	8 20 20 [40]	4 10 10 [20]	6	45			SAND, as above.	92.1	6.3

[ ] = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-13**
FEBRUARY 25 – 26, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 3 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		121.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,178.6 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
	18	18	10	50.5	17 17 20 [37]	9 9 10 [19]	6 (DIST)	50	SP		SAND, reddish brown, poorly graded, fine to medium grained, angular to subangular, loose, slightly moist.	93.6	4.6
U	18	18	11	55.5	10 16 18 [34]	5 8 9 [17]	6	55			SAND, as above.	91.1	6.6
U	18	18	12	60.5	12 24 28 [52]	6 12 14 [26]	6	60	SM		SAND/SILT (interbedded) SAND, reddish brown, poorly graded, fine to coarse grained, angular to subround, slightly moist SILT: light reddish brown, poorly graded with fine sand, soft, powdery, dry to moist.	91.3	6.9
U	18	17	13	65.5	10 30 35 [65]	5 15 18 [33]	6	65			Grades silty SAND, reddish brown, moderately graded, very fine to coarse grained, slightly moist, medium dense.	94	7.1
U	18	16	14	70.5	2 22 26 [48]	6 11 13 [24]	6	70	SP		SAND, reddish brown, poorly graded, fine to medium grained, slightly moist, medium dense.	86.6	7.8

[ ] = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-13**
FEBRUARY 25 – 26, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 4 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		121.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,178.6 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
U	18	18	15	75.5	10 24 32 [56]	5 12 16 [28]	6	75	SM		SAND, as above, slightly moist with interbedded silt, dry, silt may not have made it into can.	92.2	5.7
U	18	18	16	80.5	15 26 44 [70]	8 13 22 [35]	5	80	ML		Interbedded sandy SILT and SAND layers, Silt - reddish brown, moderately graded with medium coarse sand, loose, slightly moist. Sand - reddish brown, fine to coarse grained, angular to subangular, medium dense, poorly consolidated, slightly moist.	89.1	8.1
U	18	17	17	85.5	18 24 34 [58]	9 12 17 [29]	6	85			Grades sandy SILT, light reddish brown, stratified with fine sand (~1/4"), poorly graded, medium dense, slightly moist.	62.1	40.2
U	18	18	18	90.5	7 10 26 [36]	4 5 13 [18]	6	90	SM		Silty SAND, light reddish brown, poorly graded, very fine to fine grained, medium dense, not as stratified as above, subangular to subround, moist to very moist.	84.6	22.2
U	18	17	19	95.5	8 8 9 [17]	4 4 4.5 [8.5]	6	95			SILTY SAND/SANDY SILT, as above, moist to wet.	74.2	46.7

[ ] = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-13**
FEBRUARY 25 – 26, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 5 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		121.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,178.5 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
ST	28	28	20	100	—	—	—	100	SM		Silty SAND, reddish brown, poorly graded, very fine to fine grained, soft at first then stiffened, moist. (drove shelby tube 28" – became very stiff, lifted rig).	75.3	19.4
U	18	18	21	105.5	19 19 22 [41]	10 10 11 [21]	6	105			Silty SAND, reddish brown, poorly graded, very fine to fine grained, soft at first then stiffened, moist.	83.1	30
U	18	16	22	110.5	32 34 34 [68]	16 17 17 [34]	6	110	SP		SAND, reddish brown, poorly graded, very fine to fine grained, subround to subangular, medium dense, moist to slightly moist.	87.2	6.7
U	11	11	23	115.5	25 50/5" —	13 25+ —	5	115	SM		SILTS/SAND, reddish brown, poorly graded, very fine to medium grained, subangular to subround, dense, slightly moist.	108.7	11.4
U	18	—	24	120.5	16 30 34 [64]	8 15 17 [32]	—	120			SAND, reddish brown, poorly graded, very fine to fine grainded, angular to subround, medium dense, slightly moist.	81.4	6.2
											Boring completed at 121.5 feet due to drill rig limitations.		

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-14**
FEBRUARY 16 – 19, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 1 OF 6
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER; 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		133.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,177.7 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Sand		
									ML		Yellowish red silts, poorly graded, low plasticity, moist		
U	18	18	1	5.5	7 5 7 [12]	3 2 4 [6]	6	5	SM		Silty SAND, yellowish red, very fine to fine grain, poorly graded, slightly moist, soft.	87.4	21.2
U	18	16	2	10.5	5 4 6 [10]	3 2 3 [5]	6 (DIST)	10	SP		SAND, light yellowish red, very fine to fine grain, poorly graded, slightly moist, very soft, loose, very loose.		
U	18	16	3	15.5	5 4 14 [18]	3 2 2 [4]	6	15			SAND, light yellowish red, fine grain, poorly graded, slightly moist, very soft, very loose.	75.1	34.2
U	18	14	4	20.5	8 10 16 [26]	4 5 8 [13]	6	20			SAND, yellowish red, fine grain, slightly coarser than above, poorly graded, slightly moist, very soft, loose to very loose.	87.2	6.8

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-14**
FEBRUARY 16 – 19, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 2 OF 6
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		133.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,177.7 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
U	18	16	5	25.5	24 16 18 [34]	12 8 9 [17]	6	25	SP		SAND, yellowish red/brown, fine to medium grain, subangular to angular, poorly graded, slightly moist, soft, loose.	89.2	6.5
U	18	16	6	30.5	28 16 18 [34]	12 8 9 [17]	6	30			SAND, as above, note silter content in upper part of sampler, silt not in grab sample, slightly moist.	87.0	7.6
U	18	18	7	35.5	30 25 28 [53]	15 13 14 [27]	6	35			SAND, as above, yellowish red/brown, fine to medium grain, subangular to subround, poorly graded, slightly moist, soft, loose, well compacted.	89.2	9.9
U	18	16	8	40.5	22 22 24 [46]	11 11 12 [23]	6	40			SAND, yellowish red, intererbedded, fine to medium grain, angular to subround, poorly graded, moist, soft, loose, well compacted, like sand above.	90.0	8.9
U	18	16	9	45.5	21 20 22 [42]	11 10 11 [21]	6	45			SAND, yellowish red, as above.	87.8	10.3

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-14**
FEBRUARY 16 – 19, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 3 OF 6
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		133.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,177.7 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
U	18	15	10	50.5	16 20 26 [46]	8 10 13 [23]	6	50	SP		SAND, yellowish red, fine to medium grained, angular to subangular, as above.		5.9
U	18	16	11	55.5	20 18 28 [46]	10 9 14 [23]	6	55			SAND, as above, but coarser grained fractions are becoming more evident. Trace: coarse grain sand interbeds (1/2").	89.9	5.3
U	18	17	12	60.5	20 25 30 [55]	10 12 15 [37]	6	60			Grades, SAND with interbedded silt layers, yellowish red, fine to medium grained, poorly graded, subround in fines to sugangular in coarser sand, moist, medium dense, compacted. SILT: light reddish brown, very fine grain, poorly graded, soft, powdery, dry to slightly moist.	91.3	7.1
U	18	16	13	65.5	20 27 17 [44]	10 14 9 [23]	6	65			SAND/SILT, as above.	85.4	12.3
U	18	16	14	70.5	36 36 38 [74]	18 18 19 [37]	6	70			SAND, yellowish red/gray, fine to medium grain. poorly graded, well compacted, fairly dense.	91.5	6.2

[ ] = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-14**
FEBRUARY 16 – 19, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 4 OF 6
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		133.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,177.7 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
U	18	16	15	75.5	46 39 37 [76]	23 20 19 [39]	6	75	SP		SAND, as above, grading slightly finer with discrete coarse sand laminae, well compacted, dense.	88.5	8.5
U	18	16	16	80.5	38 40 42 [82]	19 20 21 [41]	6	80	ML		SILT with interbed SAND. Silt: light reddish brown, very fine, fine grain, powdery, slightly moist. Sand: reddish brown to brown, fine to coarse grain, subangular to subround, medium dense, very stiff, slightly moist	43.3	7.6
U	18	18	17	85.5	16 19 24 [43]	8 10 12 [22]	6	85			Grades SILT, light reddish brown, very fine grain, moist soft to medium stiff, poorly graded, moist.	57.4	73.2
U	18	16	18	90.5	12 16 20 [36]	6 8 10 [18]	6	90			SILT, light reddish brown as above, slightly moist.		
U	18	17	19	95.5	10 12 15 [23]	5 6 8 [14]	6	95			Grade sandy SILT, yellowish red, poorly graded, very fine to fine grain, stratified, 1" to 2' bedding, soft, moist to wet.		

[ ] = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-14**
FEBRUARY 16 – 19, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	SHEET 5 OF 6
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		133.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,177.7 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
U	18	15	20	100.5	14 16 26 [42]	7 8 13 [21]	6	100	ML		SILT/SILTY SAND, yellowish red, poorly graded, stratified 1" to 1/2" beds, very fine to fine grained, soft to firm, moist.	76.2	41.4
U	18	16	21	105.5	28 34 40 [74]	14 17 20 [27]	6	105			SILT/Silty SAND, as above, thin 1/4" strata of fine sand, moist.	70.7	46.7
U	18	15	22	110.5	30 26 40 [66]	15 13 20 [33]	6	110					
									SM		SILT grading into SAND, yellowish red, poorly graded, fine grained, slightly moist.	84.5	16.9
U	18	15	23	115.5	40 44 46 [90]	20 22 23 [45]	6	115	ML		Sandy SILT, yellowish red, poorly graded, silty sand, medium dense, slightly moist.	90.7	17.3
U	18	16	24	120.5	26 38 44 [82]	13 19 22 [41]	6	120					
									SM		Silty SAND, grading to sand, yellowish red, poorly graded, very fine to fine grain, medium dense, well compacted, slightly moist.	91.4	8.2

[ ] = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-14**
FEBRUARY 16 – 19, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 6 OF 6
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		133.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,177.7 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
U	18	15	24	125.5	20 39 30 60	10 15 15 15	6	125	SP		SAND, light reddish brown, poorly graded, fine grained, medium dense, well compacted, slightly moist, no silt fines.	84.5	16.9
								130					
								135			Boring completed at 133.5 feet.		
								140					
								145					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

STDO 001 - 1692

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-15**
FEBRUARY 10, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 1 OF 1
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		21.1 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
MICHELLE FLINT	STEVE MCCULLOUGH	5,185.5 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
											Surface conditions: Sparse vegetation (weeds)		
								0	CH		Mottled gray/dark brown, brown silty CLAY with occasional fine gravel and trace fine sand, soft to medium stiff, moist, medium plasticity.		
											Obstruction: large cobble likely (2.5 to 4 feet)		
U	18	15	1	5.5	9 13 21 [34]		6	5			Grades very stiff	96	24.6
U	18	12	2	10.5	10 21 28 [49]		5	10			Grades without sand or gravel, mottled gray/brown/ brownish yellow with abundant calcereous deposits.		
U	8	14	3	15.5	6 17 24 [41]		2	15			Pierre Formation: Shale, mottled brown/gray, very stiff, high plasticity, slightly moist, highly weathered, weak.		
U	13	13	4	20.3	24 40 30/1" [30/11"]		6	20			Grades olive gray, hard, slightly weathered, moderately weak to moderately strong, slickensided, somewhat laminated.		
											The boring was completed at 21.1 feet.		

□ = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 – 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-16A**
FEBRUARY 10, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 1
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		6.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
MICHELLE FLINT	STEVE MCCULLOUGH	6,210.7 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Sparse vegetation (weeds)		
									CH		Olive gray silty CLAY with trace gravel, stiff to very stiff, slightly moist, medium plasticity. Obstruction: Gneiss bedrock with silt, sand and mica, very light reddish brown, slightly moist (dry), fissured, weathered, weak. Note: Sample is "granitic" in appearance (dark speckling), sand/silt/mica. Based on previous borings and classification of overlying material (clay), this bedrock formation varies significantly from other types at the site.		
U	10	4	1	5.5	45 50/4"		3	5					
											Very slow advance from 5 to 6.5 feet, practical auger refusal. The boring was completed at 6.5 feet. Note: The boring was relocated approximately 50 feet south to confirm observations (see B-16B).		
								10					
								15					
								20					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-16B**
FEBRUARY 10, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 1
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		6.3 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
MICHELLE FLINT	STEVE MCCULLOUGH	6,210.7 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Sparse vegetation (weeds)		
									CH		Olive gray silty CLAY, very stiff to hard slightly moist, medium plasticity, somewhat blocky structure.		
U	16	10	1	5.4	46 43 50/4" 50/4"		5	5			Pierre Formation: Shale, mottled brown/gray/olive gray, hard high plasticity, slightly moist, slightly weathered, moderately weak to moderately strong, with iron oxide staining.		
											Practical auger refusal at 6.3 feet.		
								10					
								15					
								20					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1502

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-17**
FEBRUARY 11 – 12, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
87.5 FEET		101.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
MICHELLE FLINT	STEVE MCCULLOUGH	6,176.5 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
											Surface conditions: 1" snow, sparse weeds		
								0	SM		Brown silty fine SAND, loose, moist to yellowish-red. Lenses, thin layers of silt are likely.		
U	18	18	1	5.5	9 6 9 [15]		6	5			Grades brown to yellowish red silty fine SAND with interbeds (estimated 1" to 24" thickness) of yellowish-red silt with fine sand, sand is loose, silt is medium stiff, primarily moist with some interbeds of wet silt, silt has low plasticity (primarily silty with sand interbeds)		
U	18	18	2	10.5	17 9 8 [17]		6	10			Fine silty sand with interbeds, 1" to 2" thick of silt, moist.	88.2	6.9
U	18	18	3	15.5	5 4 5 [9]		6	15			Same as above, top is fine sand, bottom is silt, moist.	86.1	14.9
U	18	18	4	20.5	2 3 5 [8]		6	20			Sandy silt, moist, grades soft.		

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-17**
FEBRUARY 11 – 12, 1999	SITE SERVICES, INC.	
RILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 2 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
87.5 FEET		101.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
MICHELLE FLINT	STEVE MCCULLOUGH	6,176.5 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
U	18	18	5	25.5	3 4 5 [9]		6	25	SM		Brown to yellowish red fine silty SAND, loose, moist.	78.8	14.6
U	18	18	6	30.5	5 6 8 [14]		6	30			Fine silty SAND.		
U	18	18	7	35.5	6 12 12 [24]		6	35			Grades medium dense, brown SAND with silt and silty fine sand. Silt at tip of sampler.	78.6	21.7
U	18	18	8	40.5	3 4 8 [12]		6	40			Grades moist to wet, loose. Brown to yellowish red silty fine SAND, observed 1" to 3" thick lenses of silt in sampler.		
									SP		Brown fine to medium grain SAND with trace of silt, medium dense, slightly moist.		
U	18	16	9	45.5	12 15 18 [33]		6	45				89	4.6
									ML		Yellowish red SILT with trace fine sand, stiff, moist to wet.		

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 091 – 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-17**
FEBRUARY 11 – 12, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 3 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
87.5 FEET		101.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
MICHELLE FLINT	STEVE MCCULLOUGH	6,176.5 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
U	18	18	10	50.5	18 13 12 [25]		6	50	ML		Yellowish red silt with trace fine sand, stiff, moist on top, wet on location.	79.8	34.7
U	18	18	11	55.5	3 5 8 [13]		6	55			Grades medium stiff, wet.	66	52.7
U	18	18	12	60.5	8 27 21 [48]		6	60			Grades, very stiff, moist, to wet.	76.1	32.1
U	18	18	13	65.5	~~6~~ 9 15 [29]		3	65			Grades stiff, moist, with fine sand.	86.8	12.9
U	18	18	14	70.5	6 13 19 [32]		6	70				83.2	25.1

[ ] = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-17**
FEBRUARY 11 – 12, 1999	SITE SERVICES, INC.	
RILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 4 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
87.5 FEET		101.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
MICHELLE FLINT	STEVE MCCULLOUGH	6,176.5 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
U	18	18	15	75.3	4 10 12 [22]		6	75	ML		Grades wet.	82.2	31.7
U	18	18	16	80.5	17 6 14 [20]		6 (DIST)	80			Very wet, disturbed sample	85.1	34.1
U	18	18	17	85.5	6 5 6 [11]		6	85			Grades medium stiff, very wet.	69.3	57.9
U	18	15	18	90.5	3 5 8 [13]		3 (DIST)	90			Disturbed sample.		
U	18	12	19	95.5	6 12 14 [26]		5	95			Grades stiff, observed water flowing off of, out of sampler. Estimated depth to water, 87-1/2', based on water mark observed on drilling rods.	78.6	45.3
									CH		Greenish gray to olive gray clay (fat), very stiff, moist to wet, with roots and trace calcereous deposits (clay is a product of shale weathering).		

[ ] = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1162

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING HA-2**
FEBRUARY 23, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 1
HAND AUGER	HAND AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
NONE	HAND AUGER	
HAMMER DATA:		**D&M JOB NO:**
N/A		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		9 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	5,194 FEET*

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
											Surface conditions: Sand		
								0					
HA	—	—	1	2.0	—	—	—		SP/SW		SAND, medium yellowish brown, fine to coarse grain, moderately poorly graded, soft, slightly moist.		
HA	—	—	2	4.0	—	—	—		GP		Gravelly sand, reddish brown, moderately well graded fine sand through coarse 2" gravel, tougher augering, moist to slightly moist.		
HA	—	—	3	6.0	—	—	—	5			Gravelly sand, as above yellowish red to reddish brown.		
HA	—	—	4	8.0	—	—	—				Gravel/cobbles/sand, yellowish red to reddish brown, cobbles are subround, slightly moist.		
								10			The boring was completed at 9 feet.		
								15					
								20					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE
* ALL ELEVATIONS ESTIMATED FROM TOPO MAP

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-17**
FEBRUARY 11 – 12, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 5 OF 5
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
87.5 FEET		101.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
MICHELLE FLINT	STEVE MCCULLOUGH	6,176.5 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
U	18	14	20	100.5	16 17 29 46		4	100	CH		CLAY, same as above.	95.7	27.7
											Boring completed at 101.5 feet.		
								105					
								110					
								115					
								120					

□ = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-19**
MARCH 3, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 1 OF 3
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE 'U' OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		71.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,195.2 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
											Surface conditions: Sparse vegetation		
								0	SM		Silty SAND, yellowish brown, poorly graded, very fine to medium drained, subangular to subround, very loose, slightly moist.		
U	18	15	1	5.5	4 4 4 [8]	2 2 2 [4]	5	5				88.3	16.3
U	18	16	2	10.5	7 10 10 [20]	3.5 5 5 [10]	6	10	SP		SAND, reddish brown, poorly graded, fine to coarse grained, subangular, loose, moist.		
U	18	16	3	15.5	6 7 12 [19]	3 3.5 6 [9.5]	5	15			SAND, as above, less coarser grained fractions noted.	80.2	7.8
U	18	18	4	20.5	6 6 12 [18]	3 3 6 [9]	5	20			SAND, reddish brown, poorly graded, medium to coarse grained, angular to subround loose, slightly moist.	82.9	8.0

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-19**
MARCH 3, 1999	SITE SERVICES, INC.	
RILLING METHOD:	**DRILL BIT SIZE/TYPE:**	
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	SHEET 2 OF 3
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		71.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,195.2 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
U	18	18	5	25.5	7 8 12 [20]	3 4 6 [10]	6	25	SP		SAND, reddish brown, as above with 1/8" seams of coarse sand, loose, slightly moist.	87.7	5.7
U	18	16	6	30.5	7 8 12 [20]	3.5 4 6 [10]	5	30			SAND with silt layers, reddish brown, poorly graded, fine to medium grained, trace: red silt, loose, slightly moist.	80.4	5.5
U	18	16	7	35.5	4 8 8 [16]	2 4 4 [8]	5	35	SP/ SW		SAND, as above, grading coarser, moderately graded, slightly moist.		
U	18	17	8	40.5	12 14 18 [32]	6 7 9 [16]	6	40	SP		SAND with silty sand layers, medium brown, layered, moderately sorted/graded in each bed, SAND – fine to medium grained, subangular to subround, SILT, very fine to fine grained, slightly moist to dry.	89.5	4.0
U	18	16	9	45.5	8 12 11 [23]	4 6 5.5 [11.5]	5	45			Grades SAND, medium brown, poorly graded, fine to medium grained, subangular to subround, loose, slightly moist, trace: gold.	87	5.2

[ ] = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1/93

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-19**
MARCH 3, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 3 OF 3
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		71.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,195.2 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
U	18	16	10	50.5	7 8 14 [22]	3.5 4 7 [11]	6	50	SP		SAND, medium brown, poorly graded, fine to medium grained, subangular to subround, loose, slightly moist; no note of gold.	124	4.6
U	18	18	11	55.5	10 14 18 [32]	5 7 9 [16]	5	55			SAND, reddish brown, moderately graded, fine to medium grained with 1/2" coarse grained strata. angular to subround, slightly moist.		
U	18	16	12	60.5	12 25 28 [51]	6 12.5 14 [26.5]	5	60			SAND, reddish brown, moderately poor graded fine to medium grained, subangular to subround, medium dense, slightly moist.	90.9	4.7
U	18	15	13	65.5	10 14 16 [30]	5 7 8 [15]	6	65			SAND, as above, with poorly graded coarse sand interbeds, subround to angular loose, slightly moist.	87.2	6.6
									CH		Pierre Formation: Claystone in bottom 1", olive gray, highly weathered, slightly moist.		
U	15	12	14	70.5	10 30 50/3"	5 15	4	70			Shale, olive gray, dense, fresh/unweathered, limonite stain, CA mins in fractures, dry.	104	22.7
											Boring completed at 71.5 feet.		

[ ] = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-20**
FEBRUARY 10, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 1 OF 1
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		11.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
MICHELLE FLINT	STEVE MCCULLOUGH	6,185.8 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: No vegetation		
									CH		Brown silty CLAY, very stiff to hard, slightly moist to moist, calceious deposits.		
											Pierre Formation: Yellowish red to olive gray shale, very stiff to hard, high plasticity slightly to moderately weathered, moderately weak, blocky, slickensided, with "veins" of calcereous deposits (similar to fine sand with mica).		
U	17	15	1	5.5	18 27 50/5" 50/5"		6	5					
U	18	14	2	10.5	6 24 38 62		5	10					
											The boring was completed at 11.5 feet		
								15					
								20					

☐ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1552

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-21**
FEBRUARY 10 – 11, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 3
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
46 FEET		54.8 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
MICHELLE FLINT	STEVE MCCULLOUGH	6,174.6 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
											Surface conditions: Sparse weeds		
								0	SM				
U	18	18	1	5.5	5 10 13 [23]	—	6	5			Brownish, yellow silty fine SAND, loose to medium dense, slightly moist.	73	24.4
U	18	18	2	10.5	11 7 12 [19]	—	6	10			Grades brown.	91	8.5
ST	30	27	3	15-17.5	—	—	—	15			Topped sample off with fine light gray sand.		
U	18	14	4	20.5	2 3 7 [10]	—	6	20	ML		Yellowish red SILT with trace fine sand, soft to medium stiff, moist to wet, low plasticity.		

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-21**
FEBRUARY 10 – 11, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 2 OF 3
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
46 FEET		54.8 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
MICHELLE FLINT	STEVE MCCULLOUGH	6,174.6 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
U	18	18	5	25.5	2 4 3 [7]		6	25	ML		Grades to sandy silt.	65	48.7
U	18	18	6	30.5	5 8 8 [16]		6	30				72	32.8
									SP		Brown fine SAND with trace silt, loose, moist.		
U	18	15	7	35.5	3 4 5 [9]		6	35	SM		Brown silty fine SAND and interbedded seams (1/4" – 1" thick) of yellowish red silt, loose sand/soft to medium stiff silt, wet.		33.9
U	18	18	8	40.5	1 3 6 [9]		6	40	ML		Yellowish red SILT with interbedded fine sand seams/layers (estimated thickness = 1" to 24") soft to medium stiff silt/loose sand, wet.		
U	18	18	9	45.5	6 7 9 [16]		4	45			Grades with thin layer dark gray fine SAND, loose, wet from 45.0 – 45.5 feet.		

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-21**
FEBRUARY 10 – 11, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 3 OF 3
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
46 FEET		54.8 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
MICHELLE FLINT	STEVE MCCULLOUGH	6,174.6 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
ST	30	26	10	50-52.5	—	—	—	50	CH		Pierre Formation: Shale, olive gray, hard, high plasticity, slightly moist, highly to moderately weathered, weak, blocky, with striations of fine sand, calcereous deposits (similar to white fine sand) and iron oxide staining.		
U	16	12	11	54	12 50 50/4" 50/4"		6	55			Boring completed at 54.8 feet.		
								60					
								65					
								70					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE

SDO 001 - H62

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-22**
FEBRUARY 15, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 3
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
45 FEET		51.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,175.7 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Grasses		
									SM		Silty SAND, light red brown, loose, dry to moist.		
U	18	18	1	5.5	5 6 5 [11]	5 6 5 [5]	6	5	ML		Grades SILT with sand layers, yellowish red, interbedded, very fine to fine grain, silt has low plasticity, loose to very loose, moist.	88.1	36.7
									SP				
U	18	18	2	10.5	4 5 8 [13]	2 2 4 [6]	6	10			SAND, yellowish red, very fine grain, very loose to loose, moist.	70.1	36
U	18	18	3	15.5	4 8 10 [18]	2 4 5 [9]	6	15			SAND, light yellowish red/brown, fine to very fine grain, very loose, unconsolidated, dry to moist.	87.8	3.8
U	18	18	4	20.5	5 6 10 [16]	2 3 5 [8]	6	20	ML		Sandy SILT, light yellowish red, very fine to fine, loose, slightly moist.	89	15.1

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-22**
FEBRUARY 15, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 2 OF 3
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
45 FEET		51.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,175.7 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								25	ML				
U	18	18	5	25.5	4 4 4 [8]	2 2 2 [4]	6				Grades silty SAND layers, light yellowish red, interbedded, very fine to fine grain, soft, moist.	74.1	35.6
								30					
U	18	18	6	30.5	1 3 5 [8]	2 2 2 [4]	6				Grades sandy SILT layers, yellowish red, fine to very fine grain, soft, moist.	74.3	40.1
								35					
U	18	18	7	35.5	2 4 6 [10]	1 2 3 [5]	6				Grades silty SAND layer, yellowish red/brown, very fine to fine grain, soft, grading down to silt, moist.	90.6	14.3
								40					
U	18	18	8	40.5	1 3 6 [9]	2 3 [5]	6				SILT with interbedded silty sand layers yellowish red to red brown sand, very fine to fine grain, moderately graded, low plasticity in interbedded silts, moist.	7.1	46.7
											Grades SILT, yellowish red to dark brown, very fine grain, wet trace roots on bottom cone.		
								45					
U	18	18	9	45.5	2 2 3 [5]	1 1 2 [3]	6					66.9	58.8
									OL		Organic SILT, black, soft, moist.		
											Started getting stiff.		

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-22**
FEBRUARY 15, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 3 OF 3
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
45 FEET		51.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,175.7 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
U	18	12	10	50.5	15 37 49 [83]	7 19 25 [44]	6	50	CH		Pierre Formation: Claystone bedrock, olive gray, stiff, very fine grain, dry trace: calcium min.	92.7	23
											Boring completed at 51.5 feet.		
								55					
								60					
								65					
								70					

[ ] = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-23**
FEBRUARY 15, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 1 OF 1
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		21.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,175 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Sandy gravel and weeds		
									SW/ GW		Light brown to brownish yellow SAND with up to 1-inch gravel.		
U	18	14	4	5.5	5 6 6 [12]	2 3 3 [6]	6	5			Gravely SAND, brownish yellow, medium to very coarse grained, moderately well graded, 1/2-inch gravels, moist, very loose.		
U	18	15	2	10.5	4 5 6 [11]	2 2 3 [5]	6	10	SM		SILTY SAND – brownish yellow, very fine to very coarse grain, moderately graded, less gravels, loose, dry.	109.3	8.9
									GM		Heavy gravel, possible cobbles, granitic/gneissic.		
U	18	14	3	15.5	6 15 45 [60]	3 7 23 [30]	6	15	CH		Pierre Formation: CLAY – olive gray, stiff, heavy iron mineralization, slightly moist, bedrock.		
U	18	11	4	20.5	12 35 43 [78]	6 17 22 [39]	6	20			Becoming more stiff, less weathered.		
											The boring was completed at 21.5 feet.		

□ = BLOWS PER FOOT OF DRIVEN SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1102

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-24**
FEBRUARY 25, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 1
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		**D&M JOB NO:**
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		16.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,253.3 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
								0			Surface conditions: Grasses		
									CL		CLAY, olive gray, soft, low plasticity, iron staining, slightly moist.		
U	18	15	1	5.5	5 12 18	3 6 9	5	5				89.0	31.1
									SM		SILTY SAND, light brown, moderately graded, very fine to coarse grained, subangular to subround, slightly moist, iron stained.		
U	18	12	2	10.5	8 10 12 22	4 5 6 11	6	10	SC		CLAY/SAND, olive gray, low to moderate plasticity in fines, iron staining, very fine to coarse grained, dry.	100.9	19.0
U	18	11	3	15.5	8 18 30 48	4 9 15 24	5	15	CH		Pierre Formation: Claystone, olive gray, less weathered with depth, slightly friable, slightly moist.	99	27
											The boring was completed at 16.5 feet.		
								20					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-25**
FEBRUARY 15, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	SHEET 1 OF 1
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		16.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,209.4 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
								0			Surface conditions: Grasses and dirt.		
									ML		Silts, brownish yellow, dry to slightly moist.		
									CH		Pierre Formation: Claystone – yellowish brown/olive gray, mottled weathered CLAY, bedrock iron min. moist.		
U	18	16	1	5.5	8 11 12 [23]	4 5 6 [11]	6	5					
U	18	14	2	10.5	7 26 40 [66]	4 13 20 [33]	6	10			Sandy claystone – light brownish yellow, very fine to medium grain, stiff weathered (less), dry to moist.		
U	18	11	3	15.5	18 33 38 [71]	9 16 19 [35]	6	15			Silty claystone – olive gray, stiff, slightly moist to dry, less weathered, iron and ca mins.		
											The boring was completed at 16.5 feet.		
								20					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MOORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 031 - 1152

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING B-26**
FEBRUARY 25, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	DRILL BIT SIZE/TYPE:	SHEET 1 OF 1
HOLLOW STEM AUGER	8" DIAMETER HOLLOW STEM AUGER	
DRILL RIG TYPE:	SAMPLING METHODS:	
CME 75	D&M TYPE "U" OR SHELBY TUBE	
HAMMER DATA:		D&M JOB NO:
140 POUND AUTOMATIC HAMMER, 30 INCH DROP		38057 - 003 - 035
APPROXIMATE GROUNDWATER DEPTH:		TOTAL DEPTH DRILLED:
GROUNDWATER NOT ENCOUNTERED		11.5 FEET
PREPARED BY:	CHECKED BY:	GROUND SURFACE ELEVATION:
BILL POLIVKA	STEVE MCCULLOUGH	6,176.1 FEET

SAMPLE								DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS						
											Surface conditions: Olive gray, light gray silt and some gravel		
								0	SM				
U	18	18	1	5.5	3 4 4 [8]	2 2 2 [4]	6	5			SILTY SAND, yellowish red, poorly graded, very fine grain, soft, slightly moist silt interbeds (1/2").	76.9	37.3
U	18	10	2	10.5	7 20 32 [52]	4 10 16 [26]	5	10	CH		Pierre Formation: Shale bedrock, olive gray, stiff, dry ca mins iron stain and nodules.	83.4	24.1
											The boring was completed at 11.5 feet.		
								15					
								20					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SDO 001 - 1152

DATE(S) DRILLED:	DRILLING CONTRACTOR:	**BORING HA-1**
FEBRUARY 23, 1999	SITE SERVICES, INC.	
DRILLING METHOD:	**DRILL BIT SIZE/TYPE:**	SHEET 1 OF 1
HAND AUGER	HAND AUGER	
DRILL RIG TYPE:	**SAMPLING METHODS:**	
NONE	HAND AUGER	
HAMMER DATA:		**D&M JOB NO:**
N/A		38057 – 003 – 035
APPROXIMATE GROUNDWATER DEPTH:		**TOTAL DEPTH DRILLED:**
GROUNDWATER NOT ENCOUNTERED		12.5 FEET
PREPARED BY:	**CHECKED BY:**	**GROUND SURFACE ELEVATION:**
BILL POLIVKA	STEVE MCCULLOUGH	6,055.9 FEET

SAMPLE													
SAMPLER TYPE	INCHES DRIVEN	INCHES RECOVERED	SAMPLE NUMBER	SAMPLE DEPTH (FT)	BLOWS PER 6 INCHES SAMPLER	CALCULATED EQUIVALENT SPT BLOWS	NUMBER OF RINGS	DEPTH (FT)	USCS	SOIL GRAPH	DESCRIPTION	DRY DENSITY (PCE)	MOISTURE CONTENT %
								0			Surface conditions: Grasses		
									ML		Sandy SILT, medium brown, dry to slightly moist, poor grading, very fine to fine grain.		
HA	—	—	1	2.0	—	—	—				Grades silt, medium yellow brown, poor grading, very fine grain, slightly moist.		
HA	—	—	2	4.0	—	—	—		CH		CLAY, reddish brown, low plasticity, moist.		
								5			Becoming moist at 4.5 feet.		
HA	—	—	3	6.0	—	—	—				Silty clay, reddish brown, low to moderate, plasticity, becoming stiff, very moist.		
HA	—	—	4	8.0	—	—	—				Silty clay, as above.		
HA	—	—	5	10.0	—	—	—	10			Silty clay, reddish brown, olive green, low to moderate plasticity, slightly moist to moist.		
											Silt/sand/clay, reddish brown, olive gray grading to brown silty sand, stiff, dry to moist.		
											The boring was completed at 12.5 feet.		
								15					
								20					

□ = BLOWS PER FOOT OF DRIVER SAMPLER
U = DAMES & MORE TYPE U SAMPLER
ST = SHELBY TUBE

GEOTECHNICAL INVESTIGATION
GOLD HILL MESA PROPERTY
COLORADO SPRINGS, COLORADO
FOR GOLD HILL MESA JOINT VENTURES

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Appendix B

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APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Selected samples obtained from the field investigation were tested in the laboratory to evaluate classification indices and estimate relevant engineering properties. A summary of the tests to be performed is provided below.

ASTM D 2216 – 92 Standard test Method for Laboratory determination of Water (Moisture) Content of Soil and Rock

This test method covers the laboratory determination of the water (moisture) content of soil, rock, and similar materials by mass. Moisture content is expressed as a ratio of the weight of water to the weight of solids in a given soil mass

ASTM D 1557 – 91 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort

This test method covers laboratory compaction procedures used to determine the relationship between water content and dry unit weight of soils compacted in a 4- or 6-inch diameter mold with a 10-lbf rammer dropped from a height of 18 inches producing a compactive effort of 56,000 ft-lbf/cu. ft. This test method applies only to soils that have 30% or less by weight of their particles retained on the ¾-inch sieve.

ASTM D 4318 – 84 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

This test method covers the determination of the liquid limit, plastic limit, and plasticity index of soils. These tests are often collectively referred to as Atterberg limits. Liquid limit is the water content in percent of the soil at the arbitrary defined boundary between the liquid and plastic states. This water content is defined as the water content at which a pat of soil placed in a standard cup and cut by a groove of standard dimensions will flow together at the base of the groove for a distance of 13 mm. When subjected to 25 shocks from the cup being dropped 10 mm in a standard liquid limit apparatus at a rate of two shocks per second.

Plastic limit is the water content in percent of a soil at the boundary between the plastic and brittle states. The water content at this boundary is the water content at which soil can no longer be deformed by rolling into 3.2 mm diameter threads without crumbling.

Plasticity index is the range of water content over which a soil behaves plastically. Numerically it is the difference between the liquid limit and the plastic limit.

ASTM D 2435 – 90 Standard test Method for One–Dimensional Consolidation Properties of Soil (Consolidation)

This test method covers the procedures for determining the magnitude and rate of consolidation of soil when it is restrained laterally and drained axially while subjected to incrementally applied controlled stress loading. Each stress increment is maintained until excess pore water pressures are dissipated. During the consolidation process, measurements are made of change in the specimen height. This data is used to determine the relationship between the effective stress and void ratio or strain, and the rate at which consolidation can occur by evaluating the coefficient of consolidation.

ASTM D 4546 – 90 Standard test Method for One–Dimensional Swell or Settlement Potential of Cohesive of Soil

This test method determines the magnitude of swell or settlement of relatively undisturbed or compacted cohesive soil. This test method can be used to determine the magnitude of swell or settlement under known vertical (axial) pressures, or the magnitude of vertical pressure required to maintain no volume change of laterally constrained, axially loaded specimens.

ASTM D 5333 – 92 Standard test Method for Measurement of Collapse Potential of Soils

This method covers the determination of the magnitude of one-dimensional collapse that occurs when unsaturated soils are inundated with water. This method is used to determine the magnitude of potential collapse that may occur given vertical (axial) stress and an index for rating the potential for collapse.

ASTM D 422 –90 Standard test Method for Particle-Size Analysis of Soils

This test method covers the quantitative determination of the distribution of particle sizes in soil. The distribution of particle sizes larger than the 75 m is determined by sieving while the distribution of particle size smaller than 75 m is determined by a sedimentation process, using a hydrometer to gather the necessary data.

ASTM D 3080 –90 Standard test Method for Direst Shear Test of Soils Under Consolidated Drained Conditions

This test method covers the determination of the consolidated drained shear strength of a soil material in a direct shear. The test is performed by deforming a specimen at a controlled strain rate on or near a single shear plane. Generally three of more specimens are tested, each under a different normal load, to determine the effects upon shear resistance and displacement.

ASTM D 854–92 Standard test Method for Specific Gravity of Soils

This test method covers the determination of the specific gravity of soils that pass the 4.75-mm (No. 4) sieve, by means of a pycnometer. The specific gravity is the ratio of the mass of a unit volume of a material at a stated temperature to the mass of the same volume of gas-free distilled water at a stated temperature.

ASTM D 4647–87 Standard test Method for Identification and Classification of Dispersive Clay Soils by the Pinhole Test

This test method presents a direct, qualitative measurement of the dispersibility or deflocculation and consequent colloidal erodibility of clay soils by causing water to flow through a small pinhole punched in a specimen. This test method and the criteria for evaluating the test data are based upon results of several hundred tests on samples collected from embankments, channels, and other areas where clay soils have eroded and or resisted erosion in nature.

ASTM G 57–84 Standard test Method for Field Measurement of Soil Resistivity Using the Wenner four Electrode Method.

This method covers the equipment and procedures for the field in-situ, and for samples removed from the ground for testing in the laboratory. The resistivity measurements indicate the relative ability of a medium to carry electrical current. A voltage is impressed between the electrodes , causing current to flow, and the voltage drop between the electrodes is measured with a voltmeter. The resistivity is then calculated.

ASTM G 51–84 Standard test Method for pH of Soil for use in Corrosion Testing

This test method covers the determination of soil pH. The principal use of the test is to supplement soil-resistivity measurements and thereby identify conditions under which the corrosion of metals in soil may be sharply accentuated.

EPA 375.4 Standard test Method for Soluble Sulfates

Chemical analysis test were performed on the existing fill soils for soluble sulfates. The data obtained is used in conjunction with pH, and resistivity to analyze a soils potential corrosivity. These tests were sent out to Dames & Moore's subconsultant CHEMTEC-FORD for analysis.

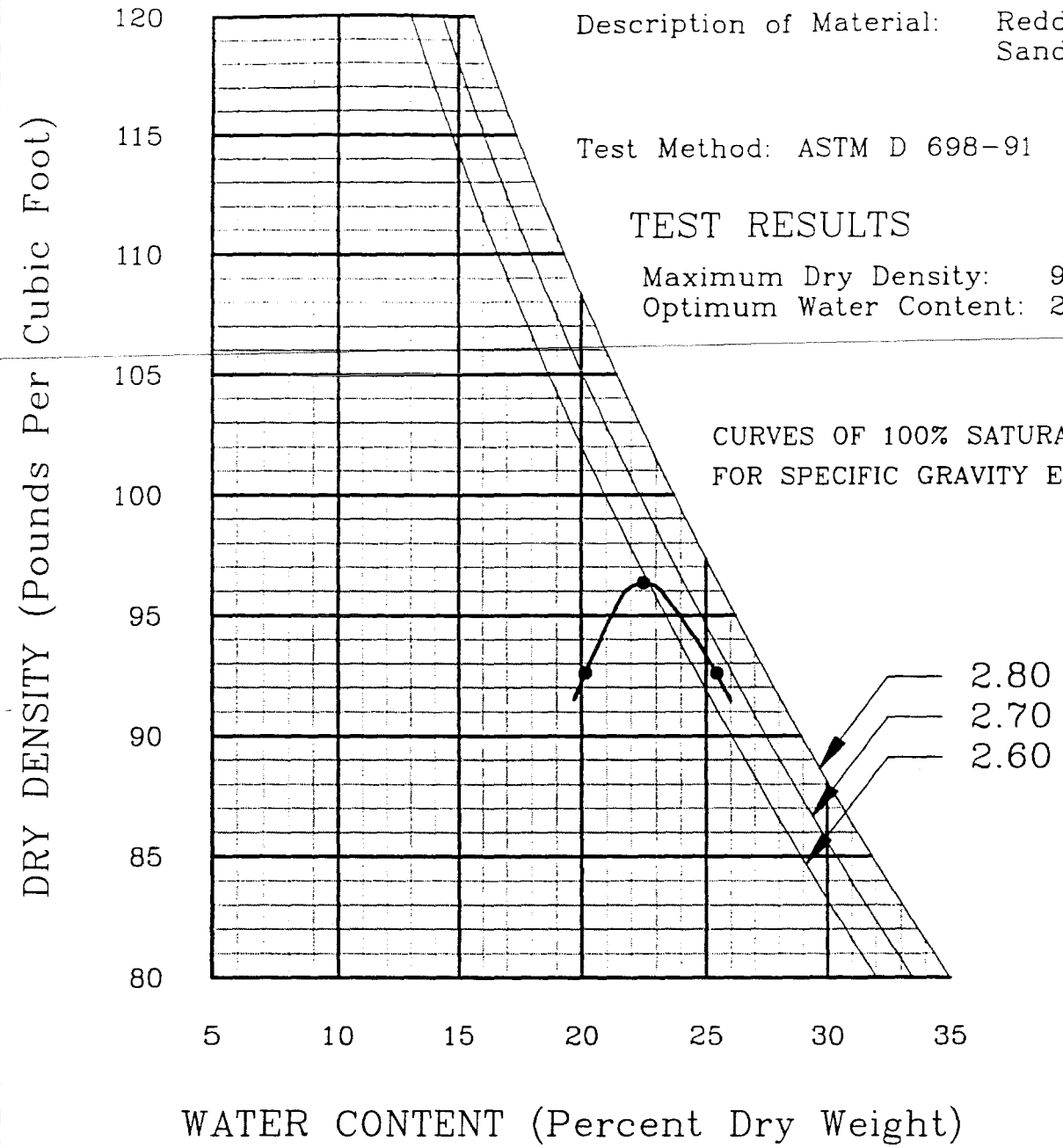
Source of Material: Mine Tailings

Description of Material: Reddish Brown Sandy Silt

Test Method: ASTM D 698-91

TEST RESULTS

Maximum Dry Density: 96.4 PCF
Optimum Water Content: 22.6 %



PROJECT Gold Hill Mesa **JOB NO.** 38057-003-035 **DATE** 4/22/99

MOISTURE-DENSITY RELATIONSHIP

Dames & Moore
San Diego, California

S:\CAD_Projects\3 103\003M002.dwg

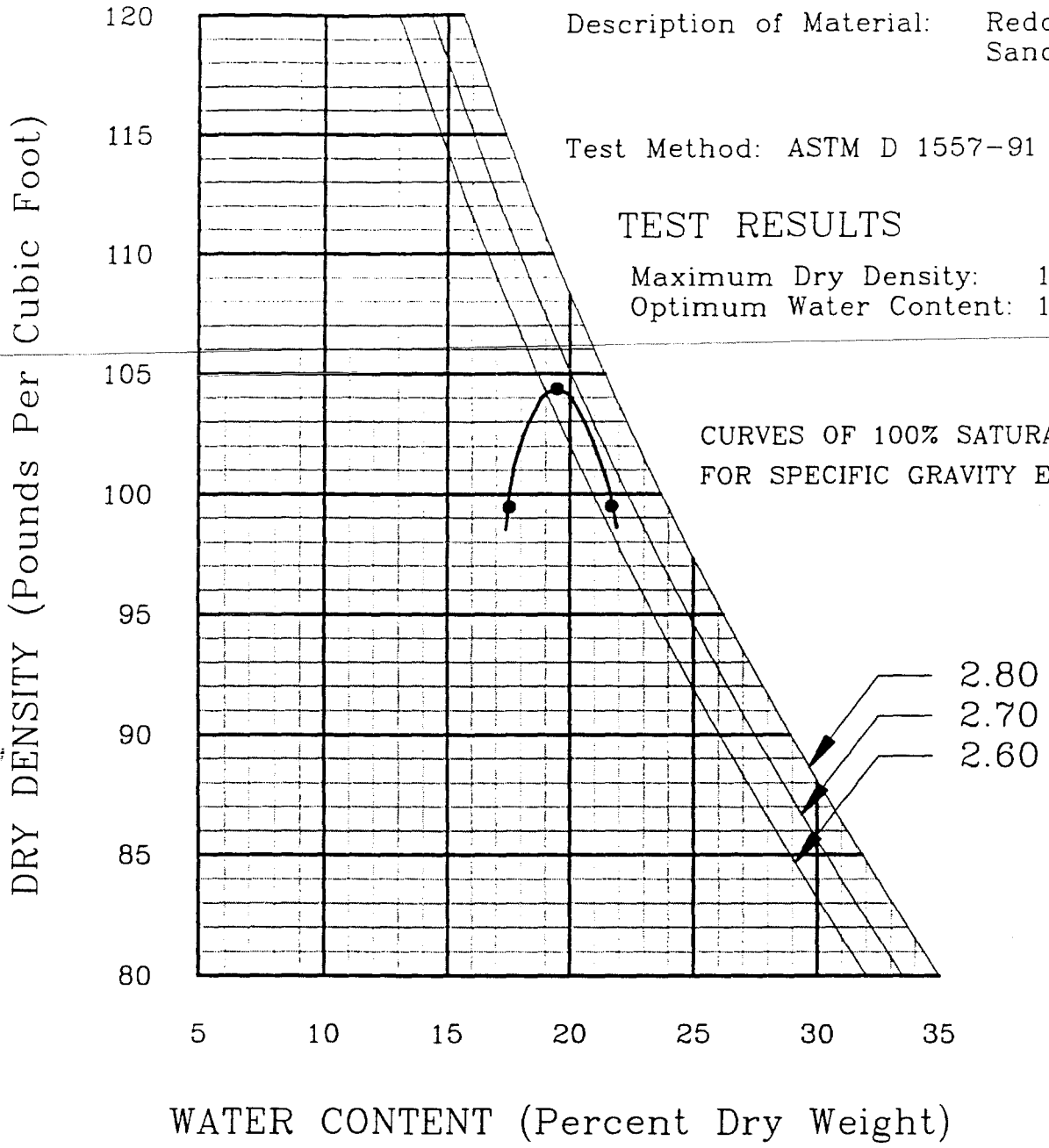
Source of Material: Mine Tailings

Description of Material: Reddish Brown Sandy Silt

Test Method: ASTM D 1557-91

TEST RESULTS

Maximum Dry Density: 104.6 PCF
Optimum Water Content: 19.3 %

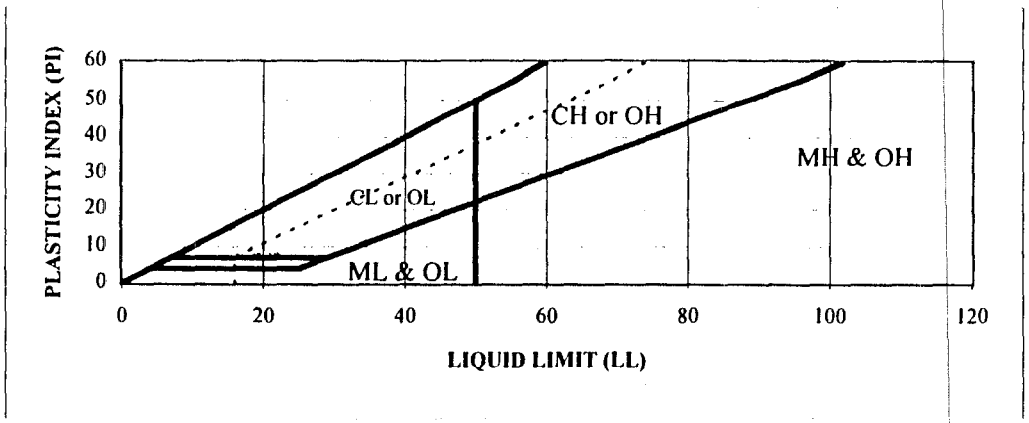


PROJECT Gold Hill Mesa **JOB NO.** 38057-003-035 **DATE** 4/22/99

MOISTURE-DENSITY RELATIONSHIP

Dames & Moore
San Diego, California

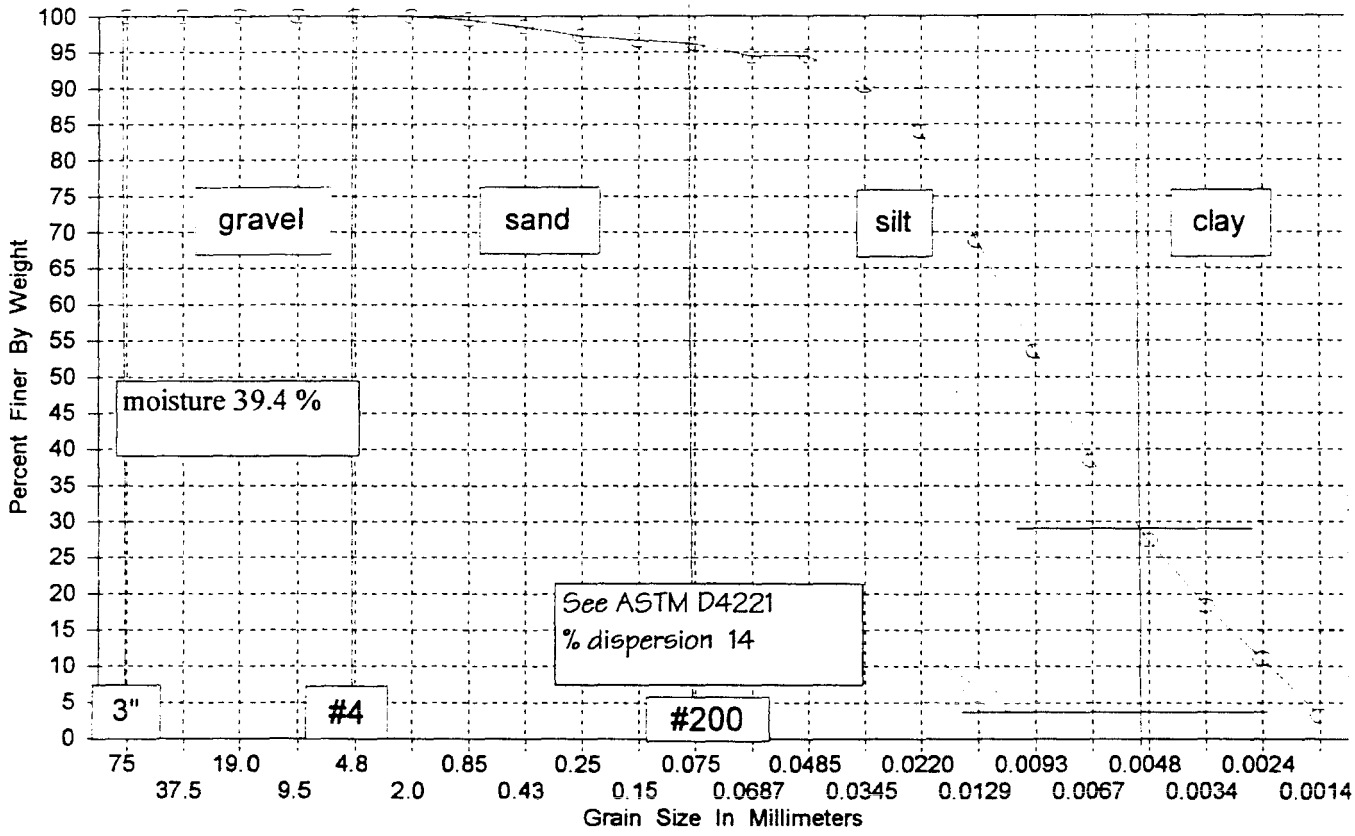
ATTERBERG TEST DATA RESULTS



Boring No.	Depth (ft.)	Native soil moisture content (%)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Identification	Soil Description
5	30	48.7	37	25	12	ML	Reddish brown sandy SILT
7	1		59	23	36	CH	Olive gray CLAY
8	25	25.6	NP	NP	NP	---	Reddish brown sandy SILT
8	35.5	26.7	60	22	38	CH	Olive gray CLAYSTONE/SHALE
9	20.5		NP	NP	NP	---	Yellowish red Silt with sand
9	40.5	26	63	22	41	CH	Olive Gray CLAY
10	10	23.9	NP	NP	NP	---	Yellowish red silty SAND
10	35.5		NP	NP	NP	---	Reddish brown sandy SILT
11	5.5		NP	NP	NP	---	Yellowish red silty SAND
13	100.5	19.4	NP	NP	NP	---	Reddish brown silty SAND
15	5.5	24.6	73	25	48	CH	Brown silty CLAY
17	45.5	4.6	NP	NP	NP	---	Brown SAND
21	10.5	8.5	NP	NP	NP	---	Brownish yellow silty SAND
21	25.5	48.7	44	34	10	ML	Yellowish red SILT
26	10.5	24.1	56	24	32	CH	Olive gray CLAY

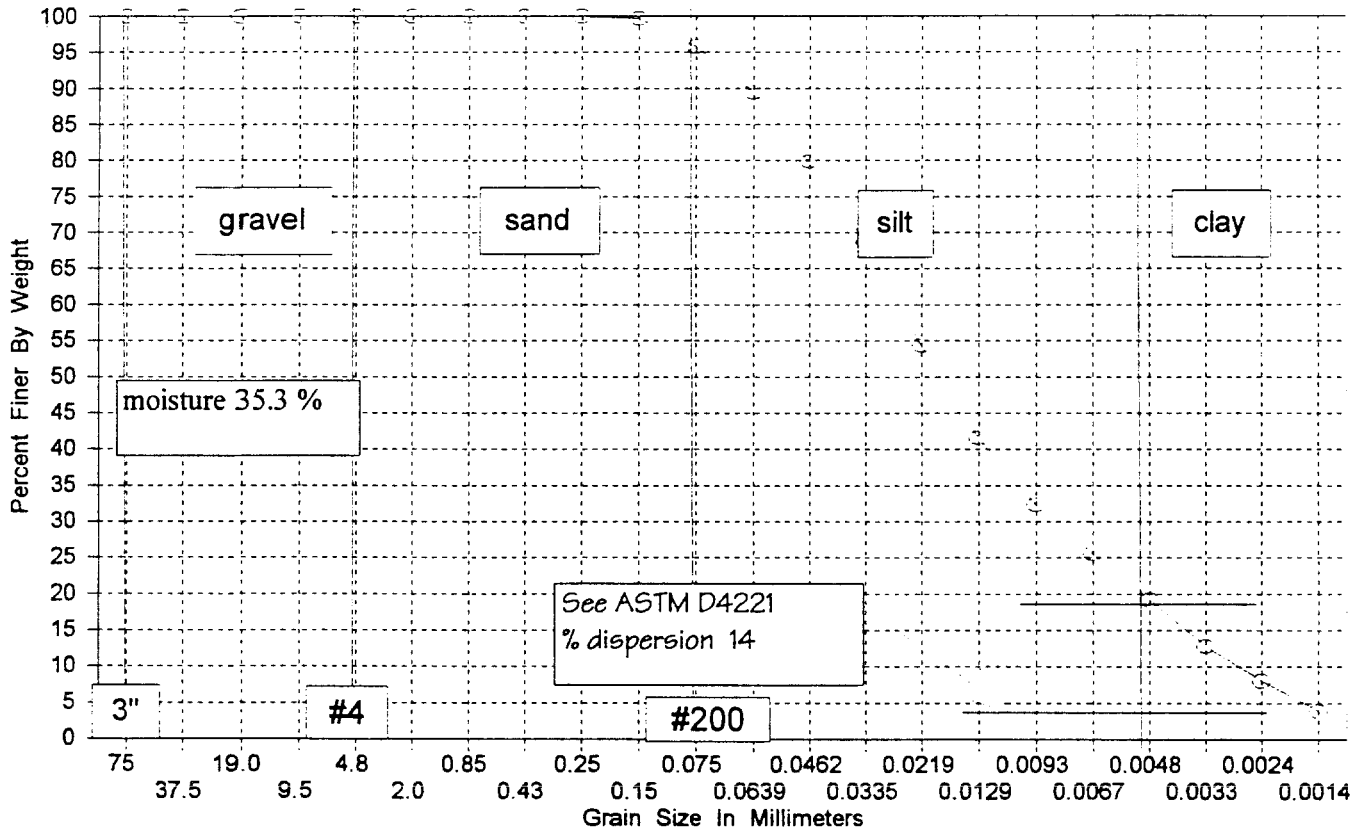
GRADATION CURVE

Boring B-5, sample 1 at 5.5 feet



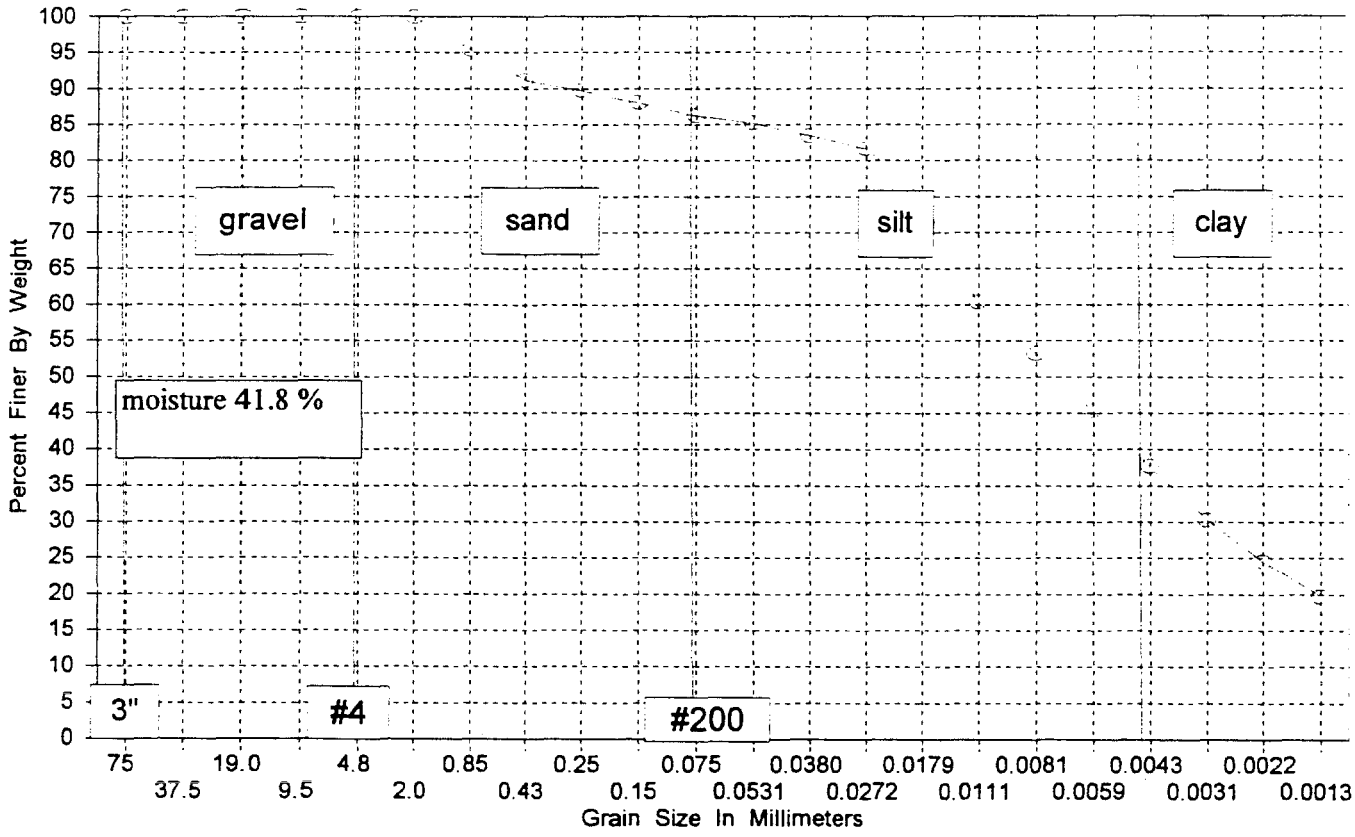
GRADATION CURVE

Boring B-5, sample 3 at 15.5 feet



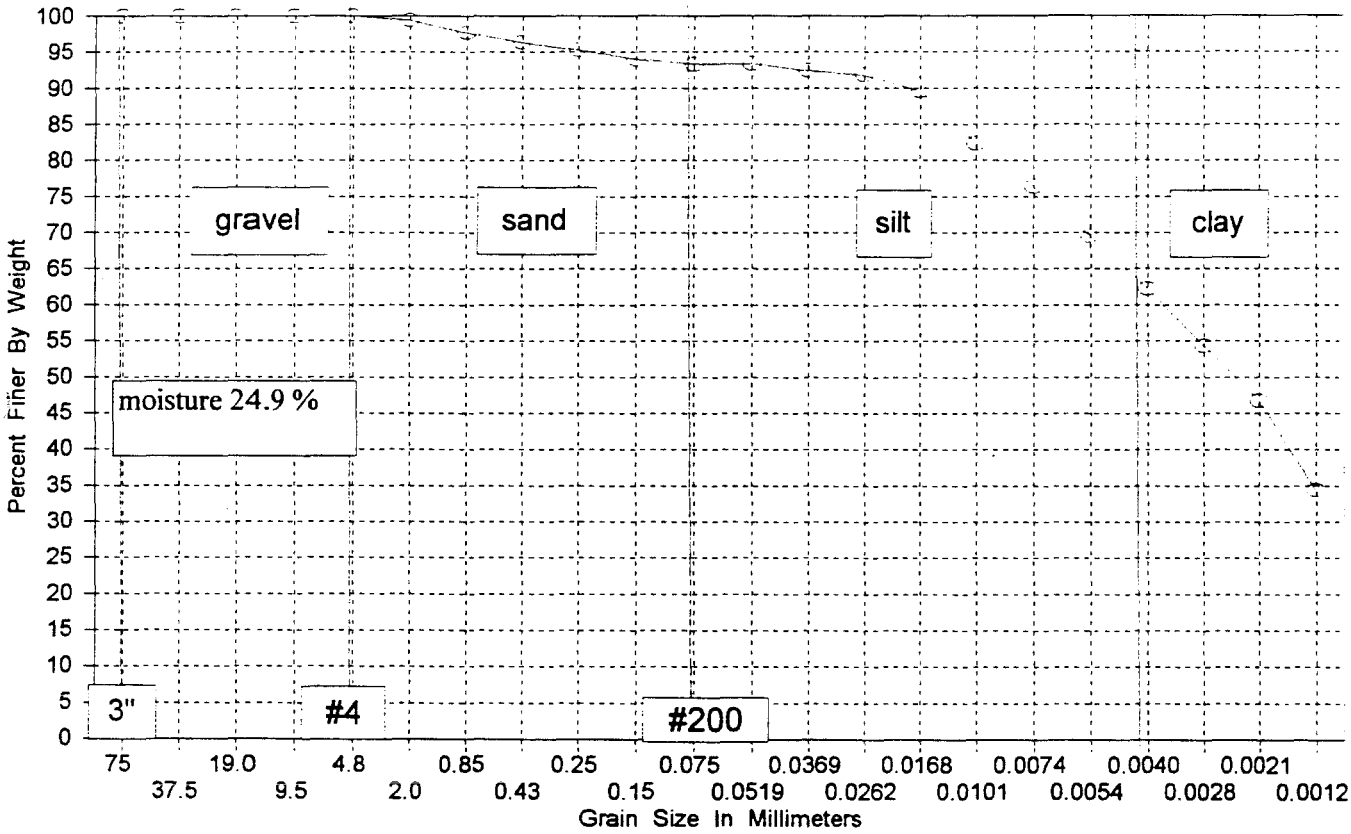
GRADATION CURVE

Boring B-5 sample 6 at 30 feet



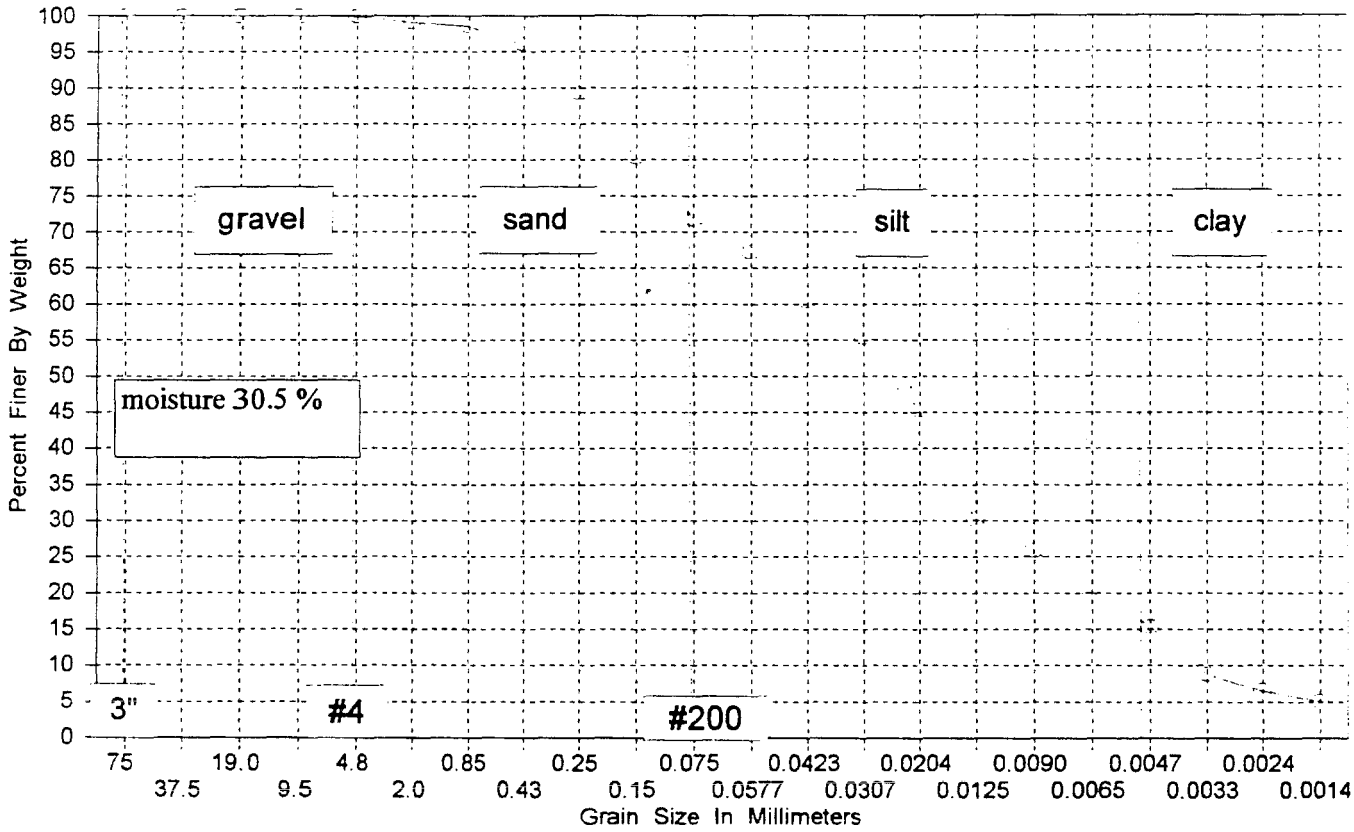
GRADATION CURVE

Boring B-7, sample 1 at 5.5 feet



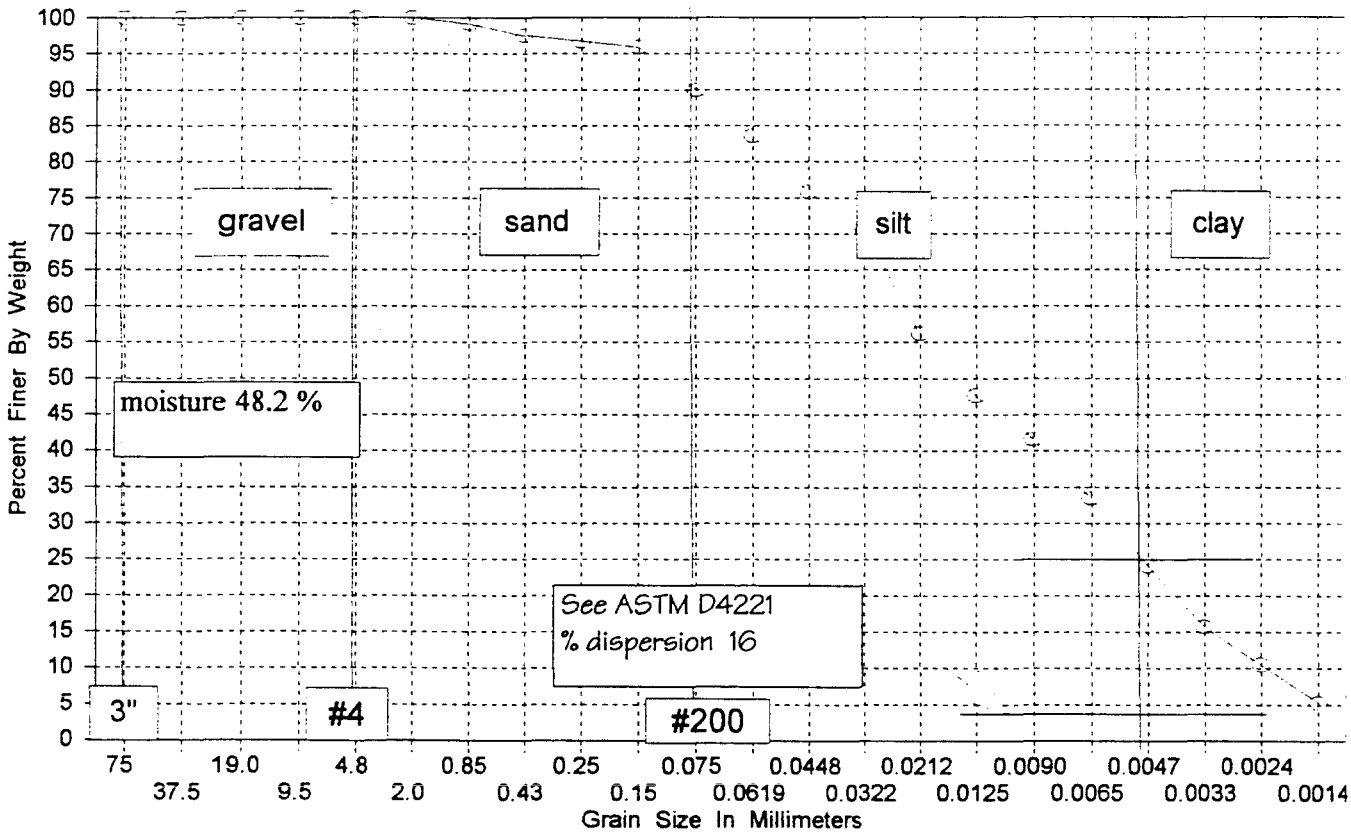
GRADATION CURVE

Boring B-8 sample 5 at 25 feet



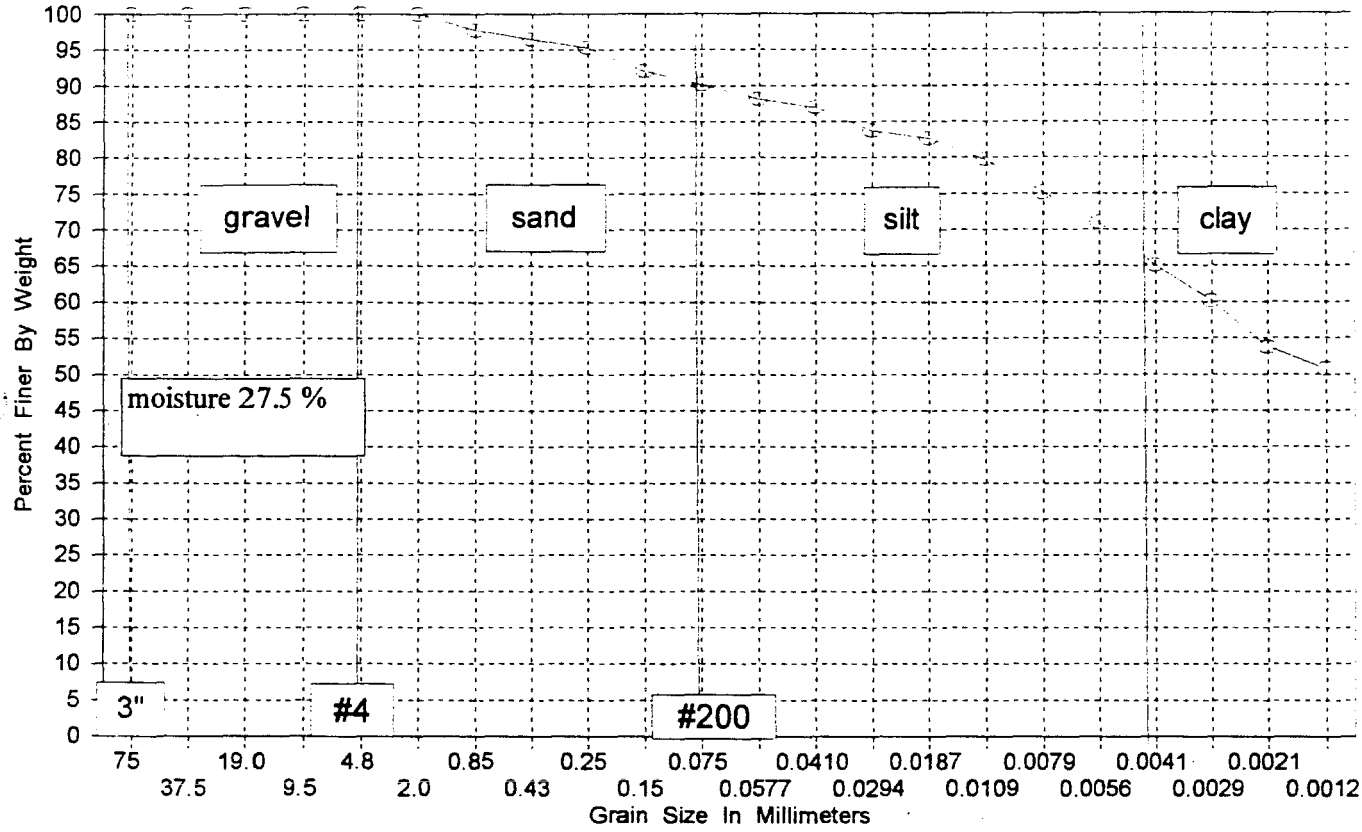
GRADATION CURVE

Boring B-9, sample 4 at 20.5 feet



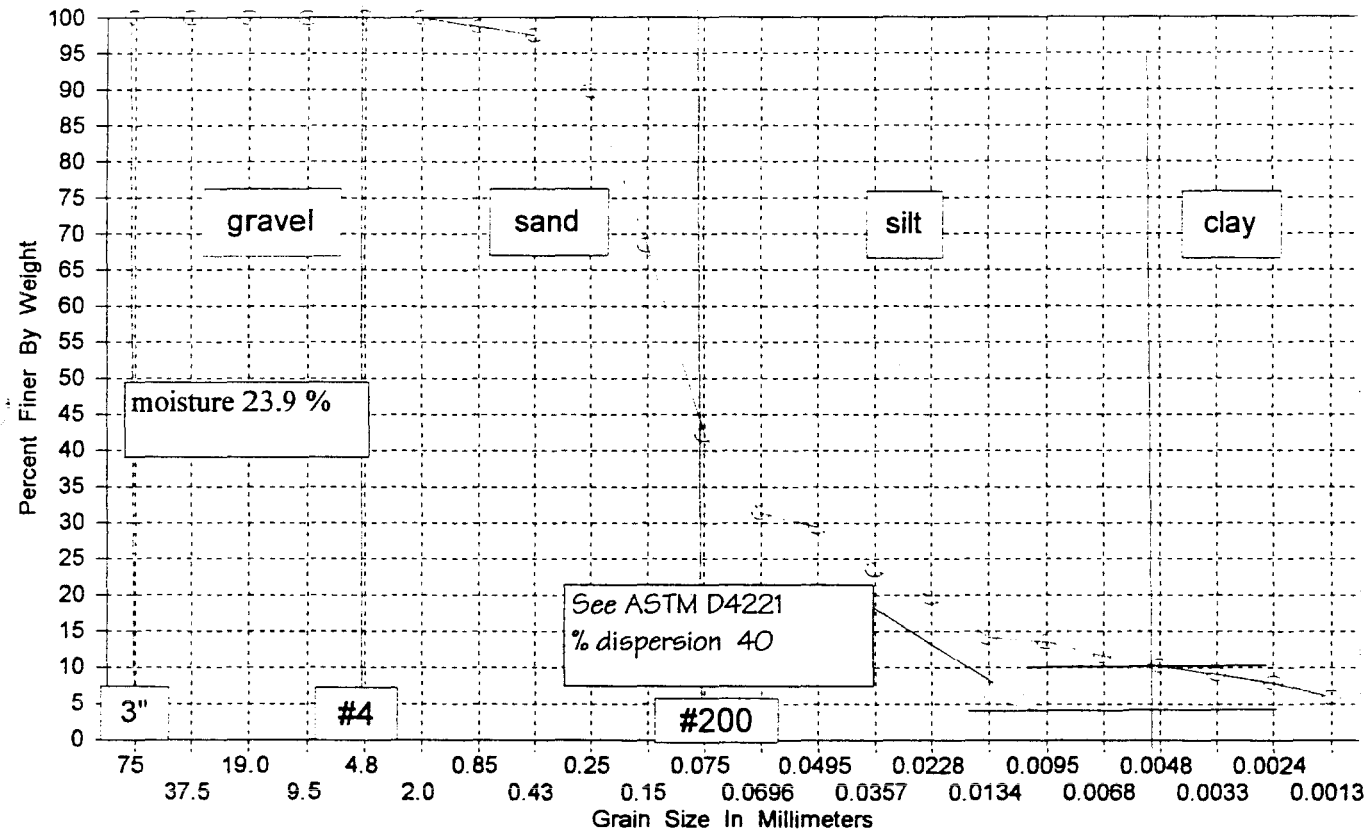
GRADATION CURVE

Boring B-9 sample 7 at 40.5 feet



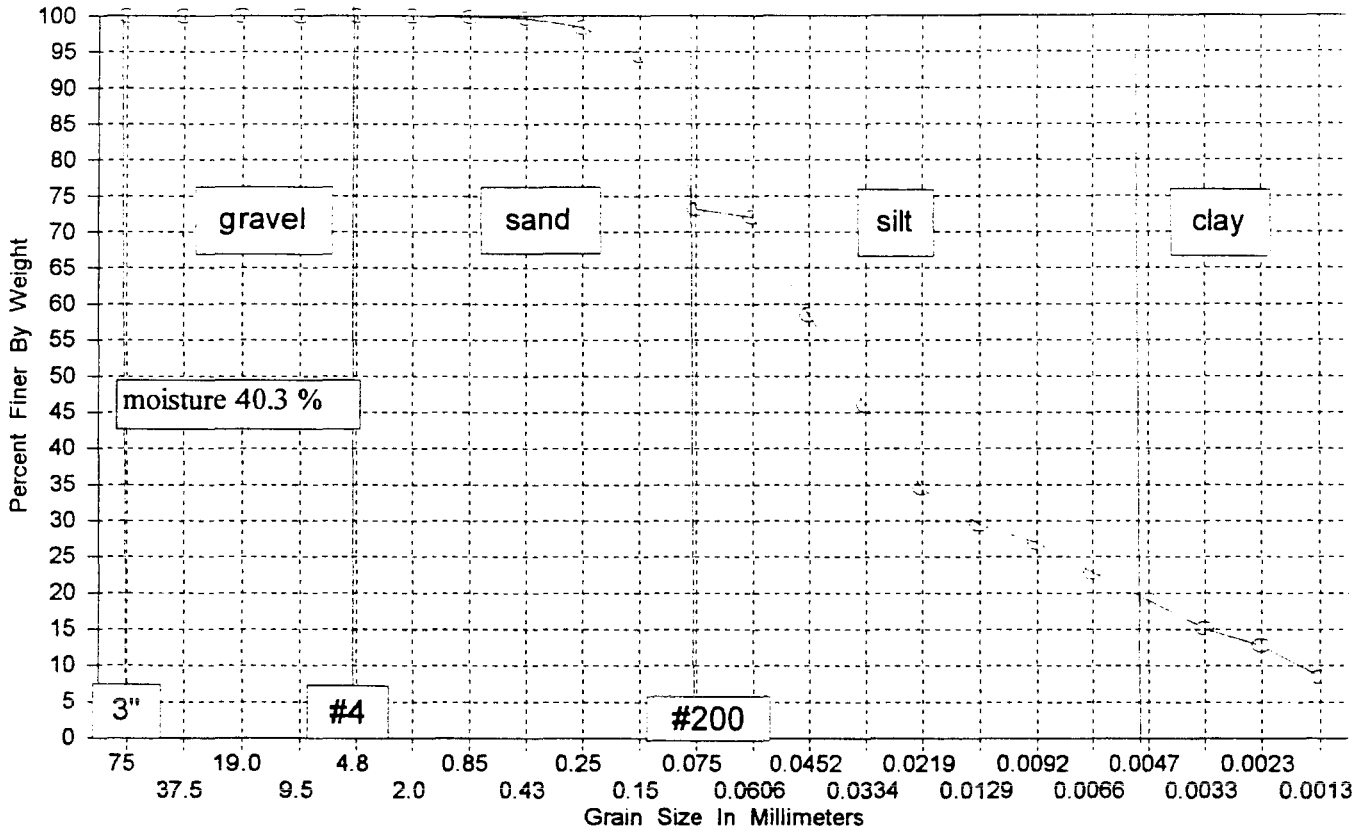
GRADATION CURVE

Boring B-10, sample 2 at 10 feet



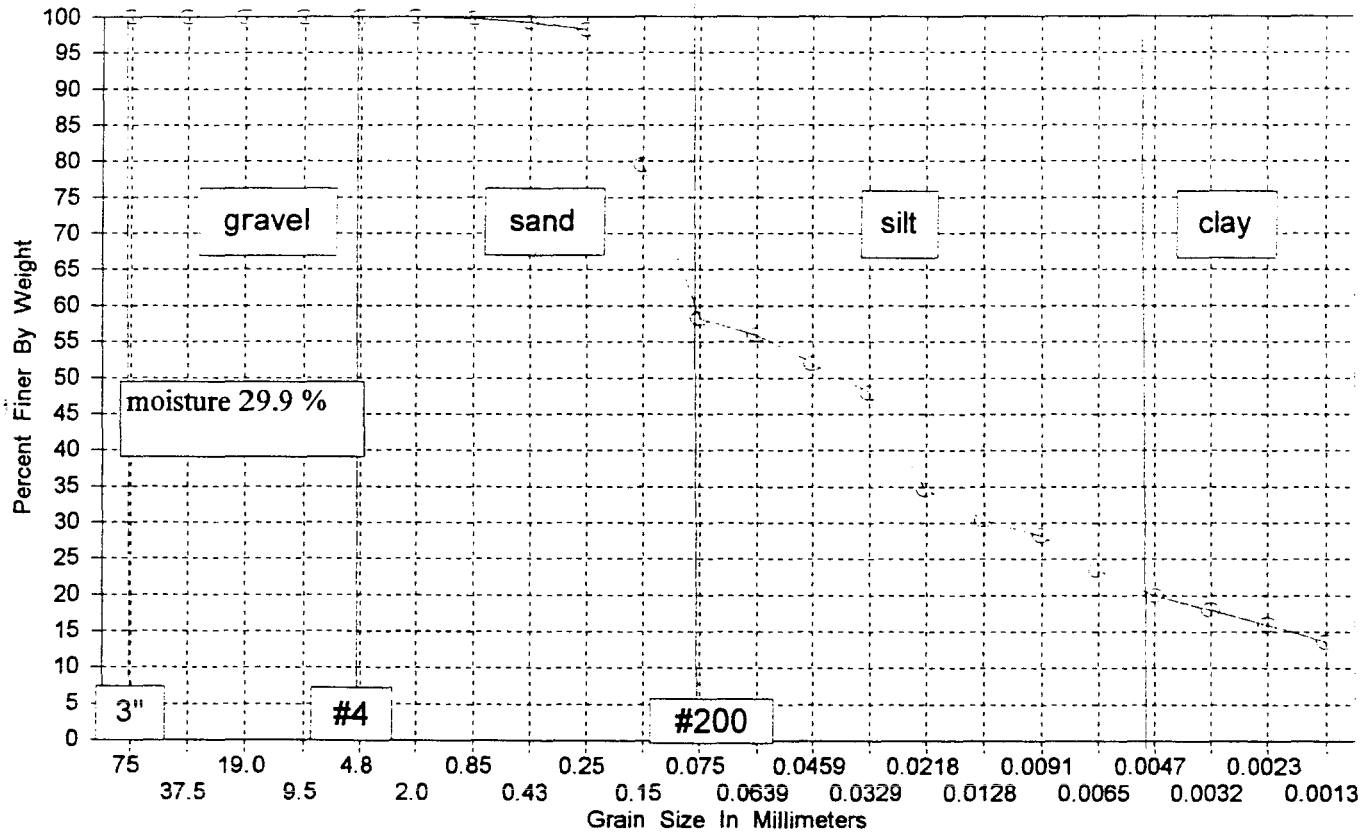
GRADATION CURVE

Boring B-10, sample 7 at 35.5 feet



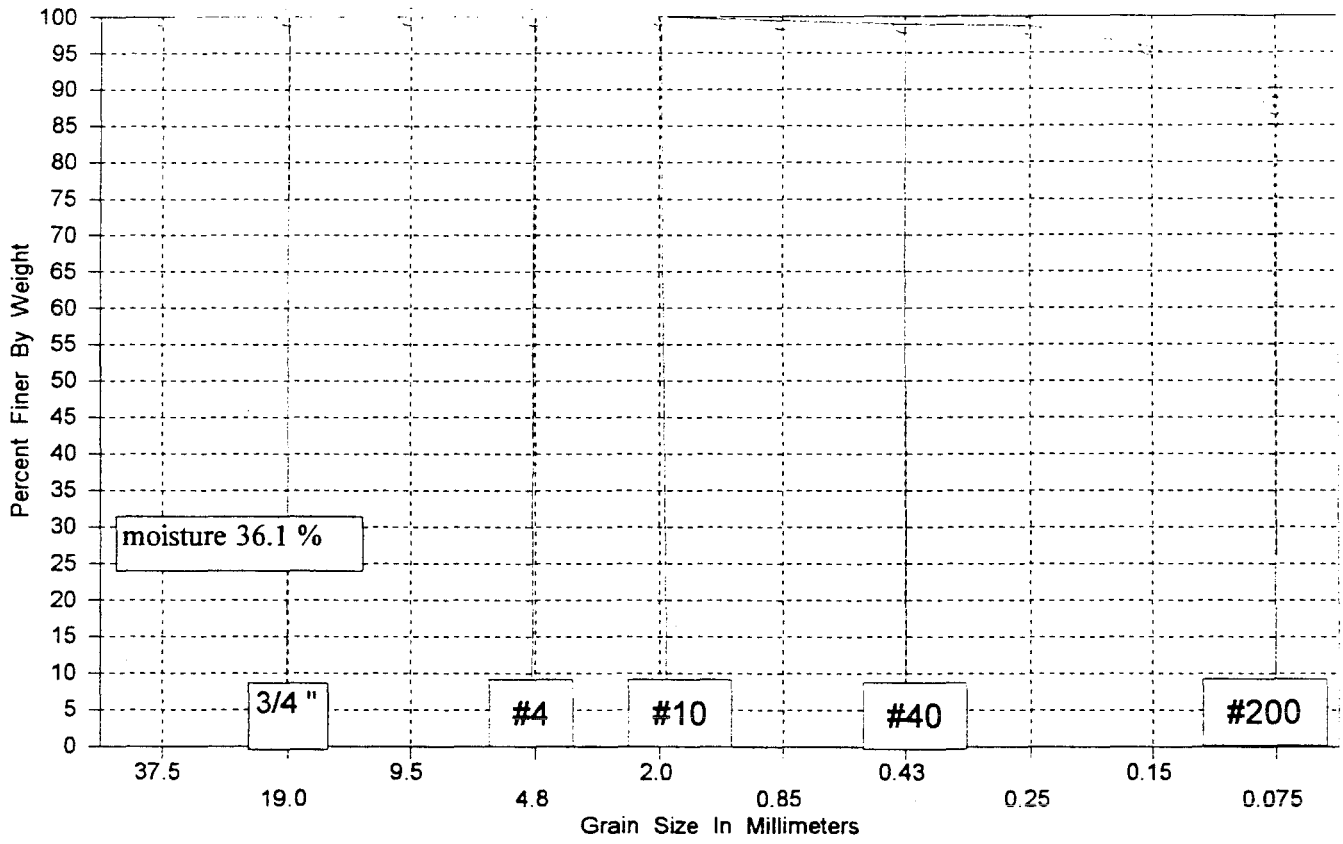
GRADATION CURVE

Boring B-11, sample 1 at 5.5 feet



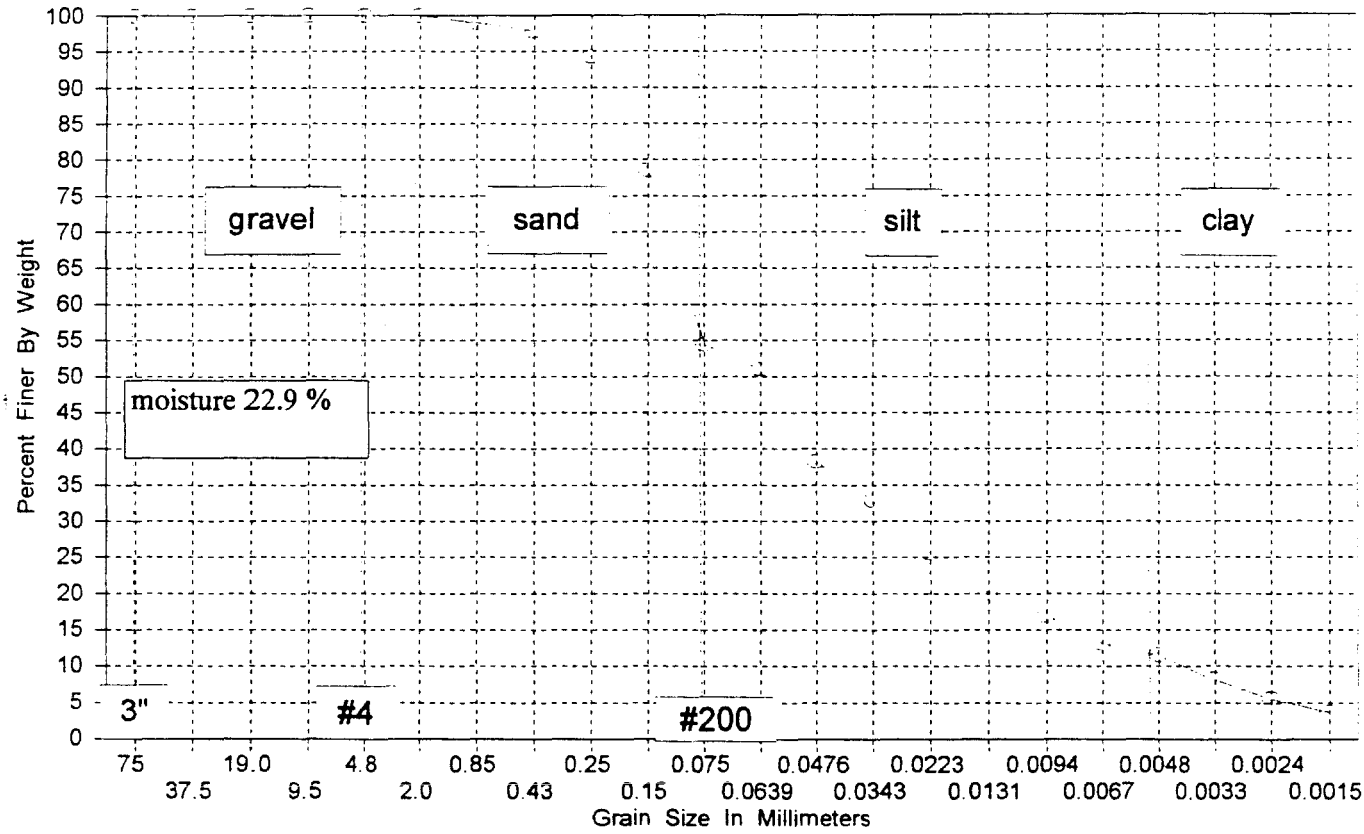
GRADATION CURVE

Boring B-11, sample 3 at 15.5 feet



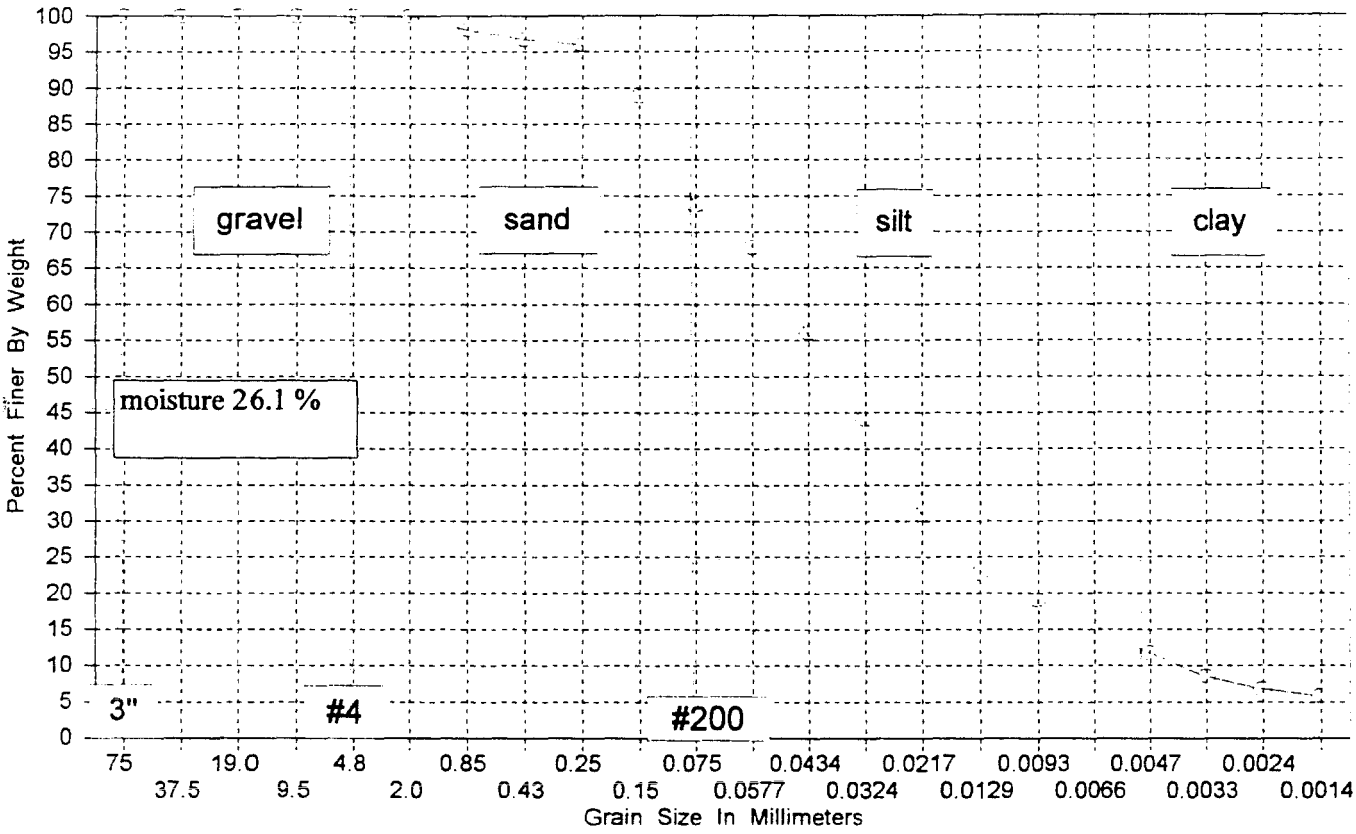
GRADATION CURVE

Boring B-11. sample 10 at 50 feet



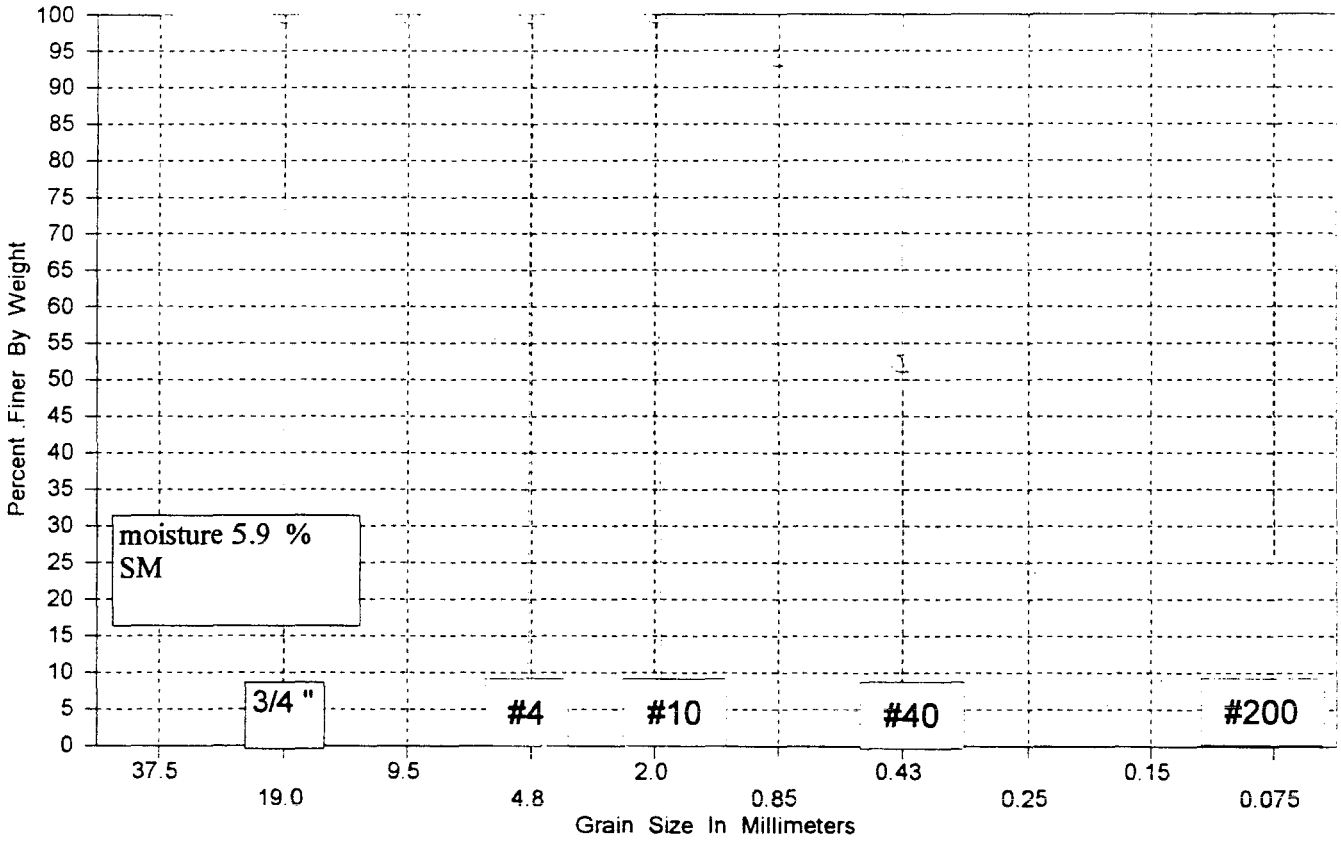
GRADATION CURVE

Boring B-13 sample 20 at 100.5 feet



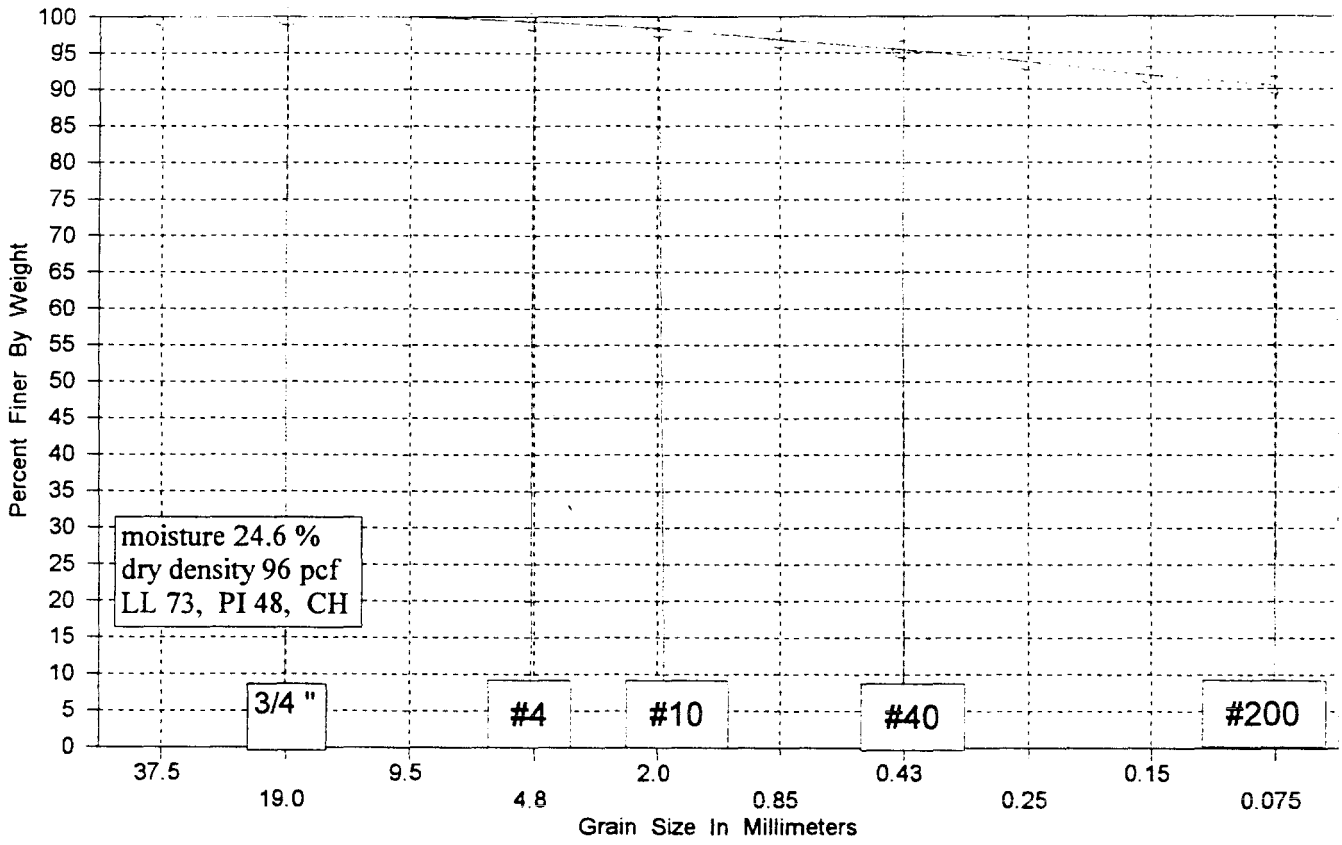
GRADATION CURVE

Boring B-14, sample 10 at 50.5 feet



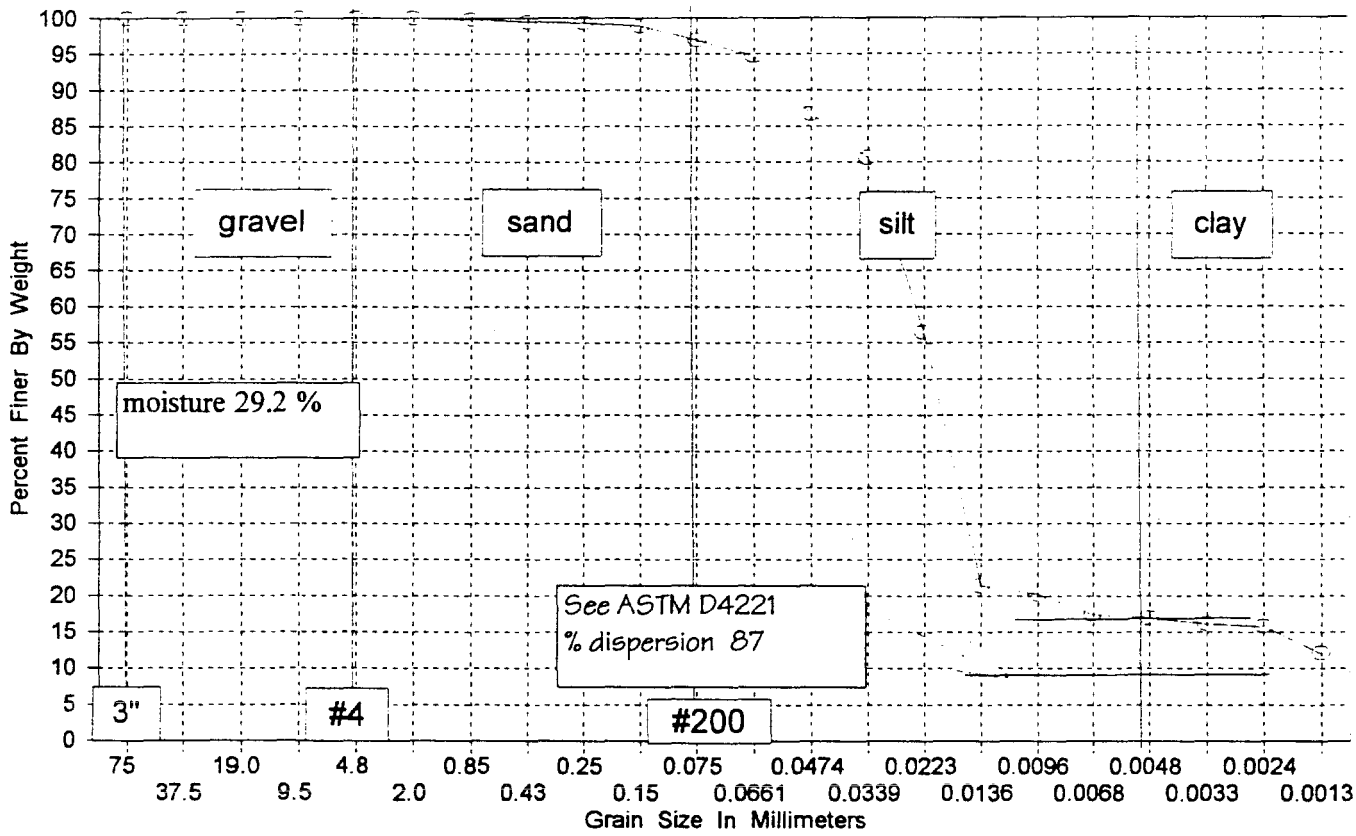
GRADATION CURVE

Boring B-15, sample 1 at 5.5 feet



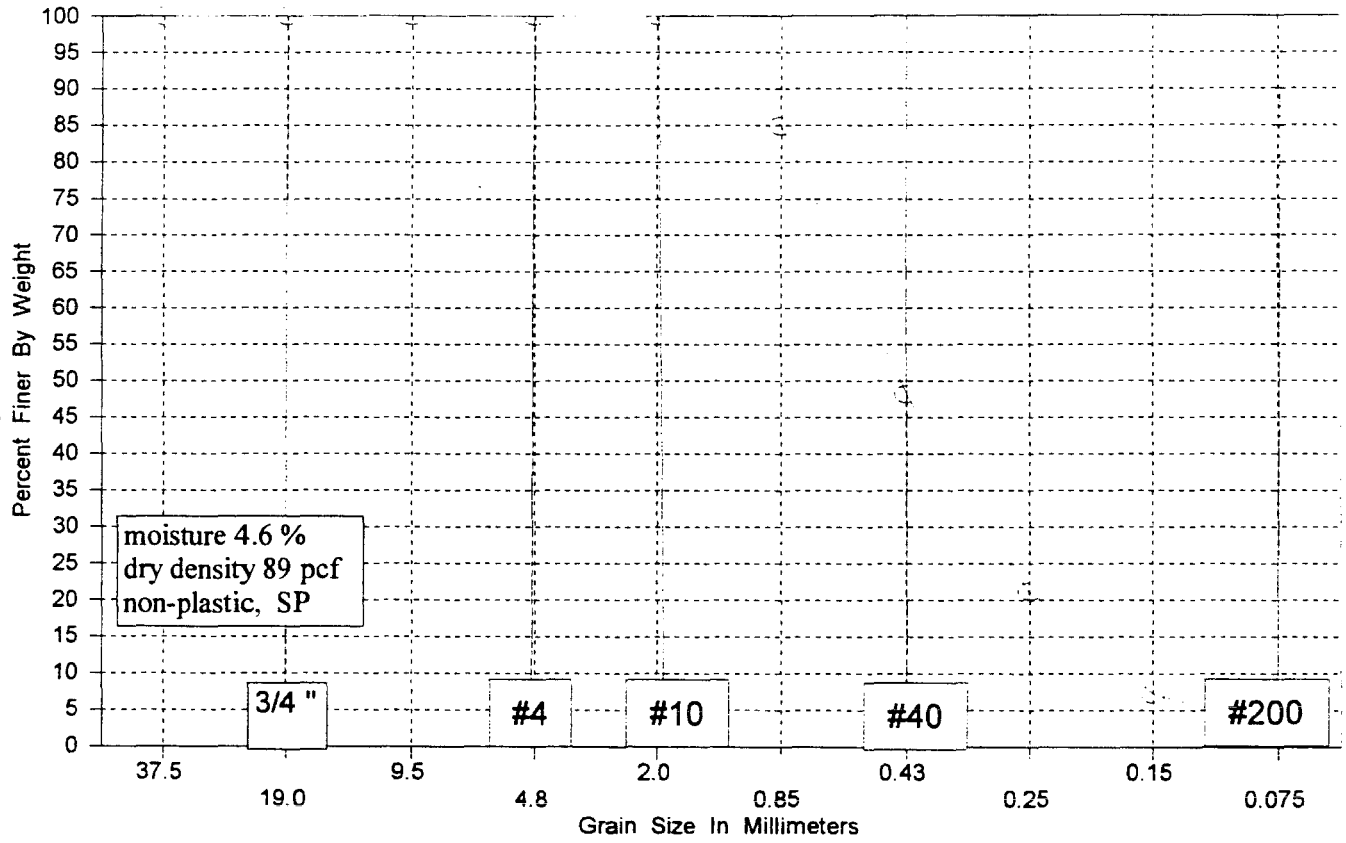
GRADATION CURVE

Boring B-17, sample 1 at 5.5 feet



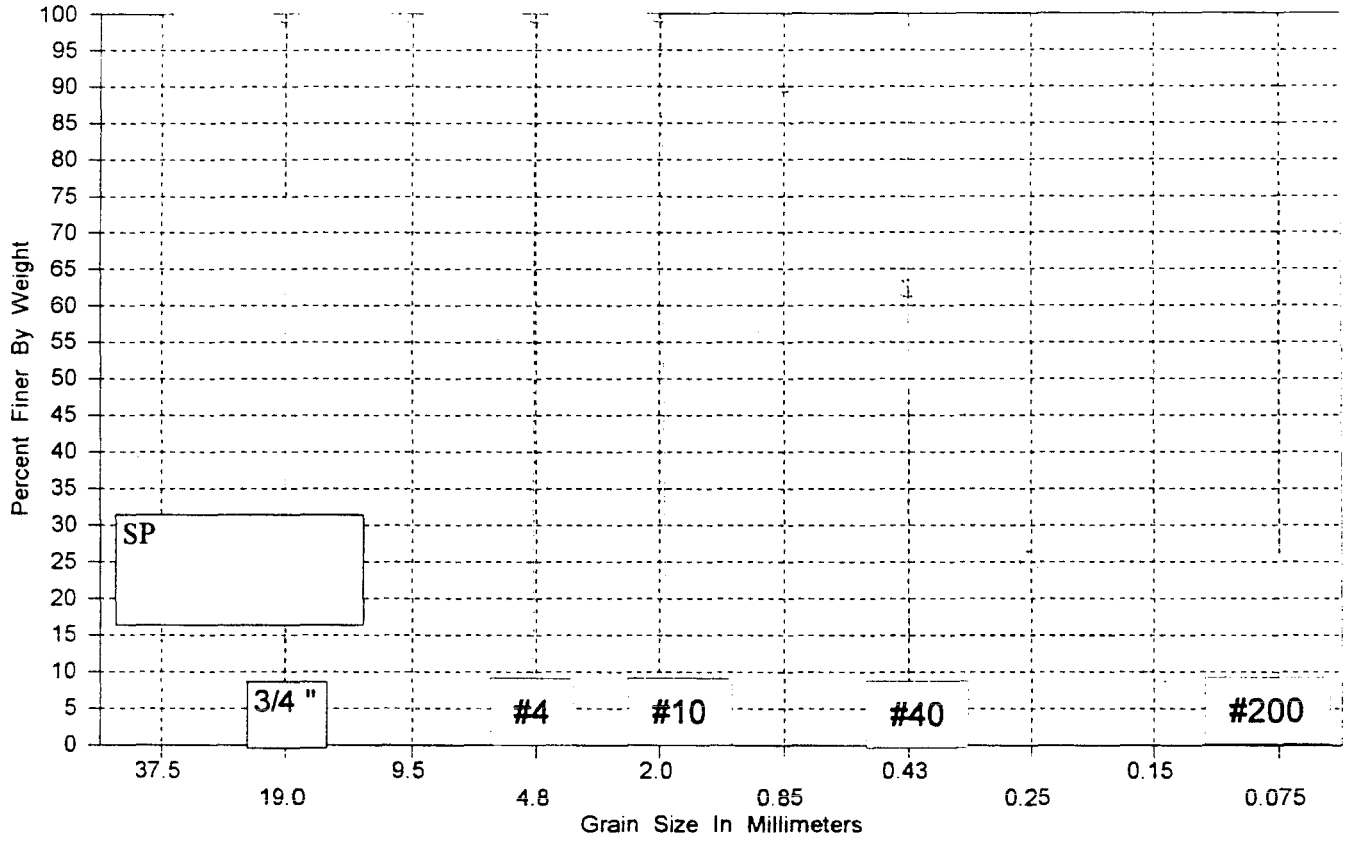
GRADATION CURVE

Boring B-17, sample 9 at 45.5 feet



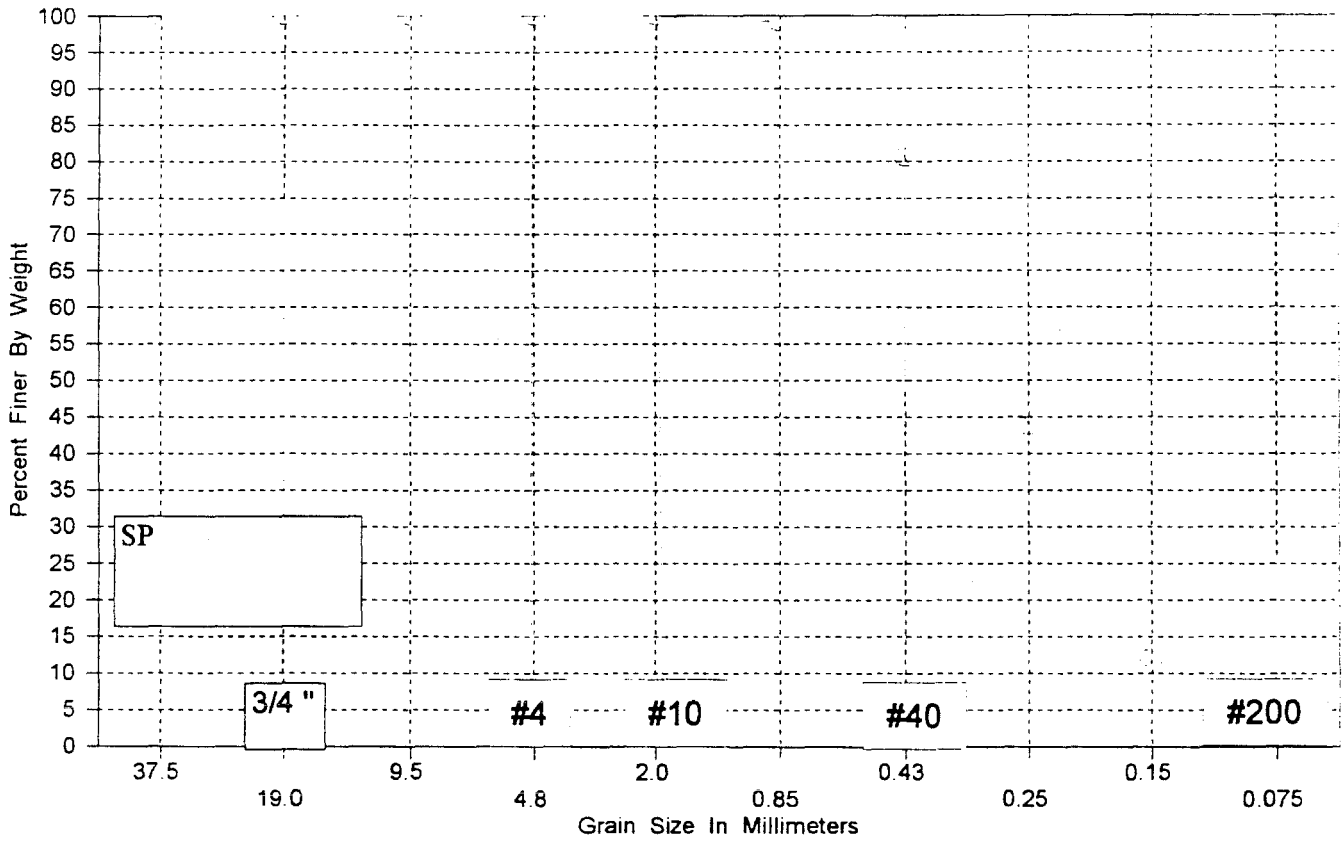
GRADATION CURVE

Boring B-19, sample 2 at 10.5 feet



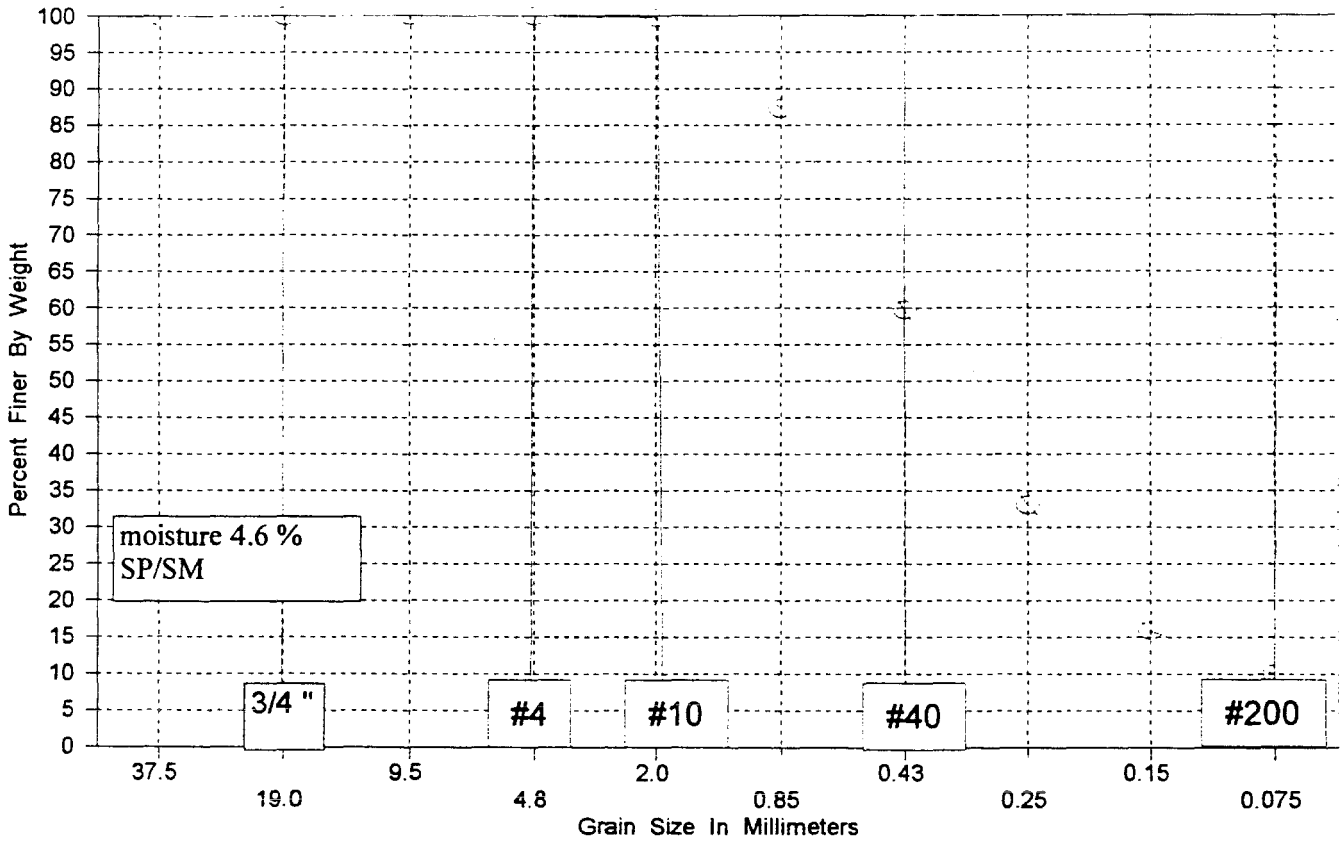
GRADATION CURVE

Boring B-19, sample 7 at 35.5 feet



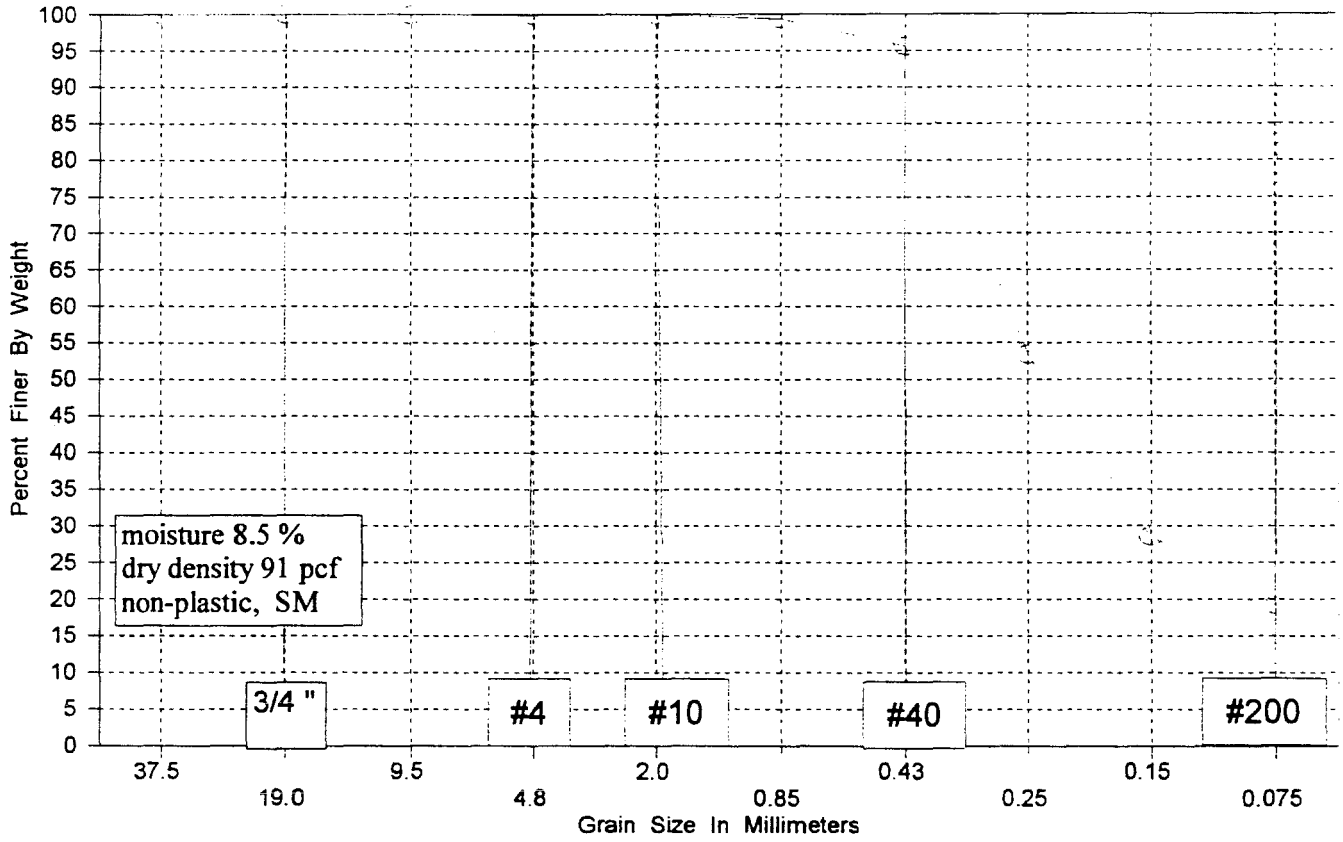
GRADATION CURVE

Boring B-19 sample 10 at 50.5 feet



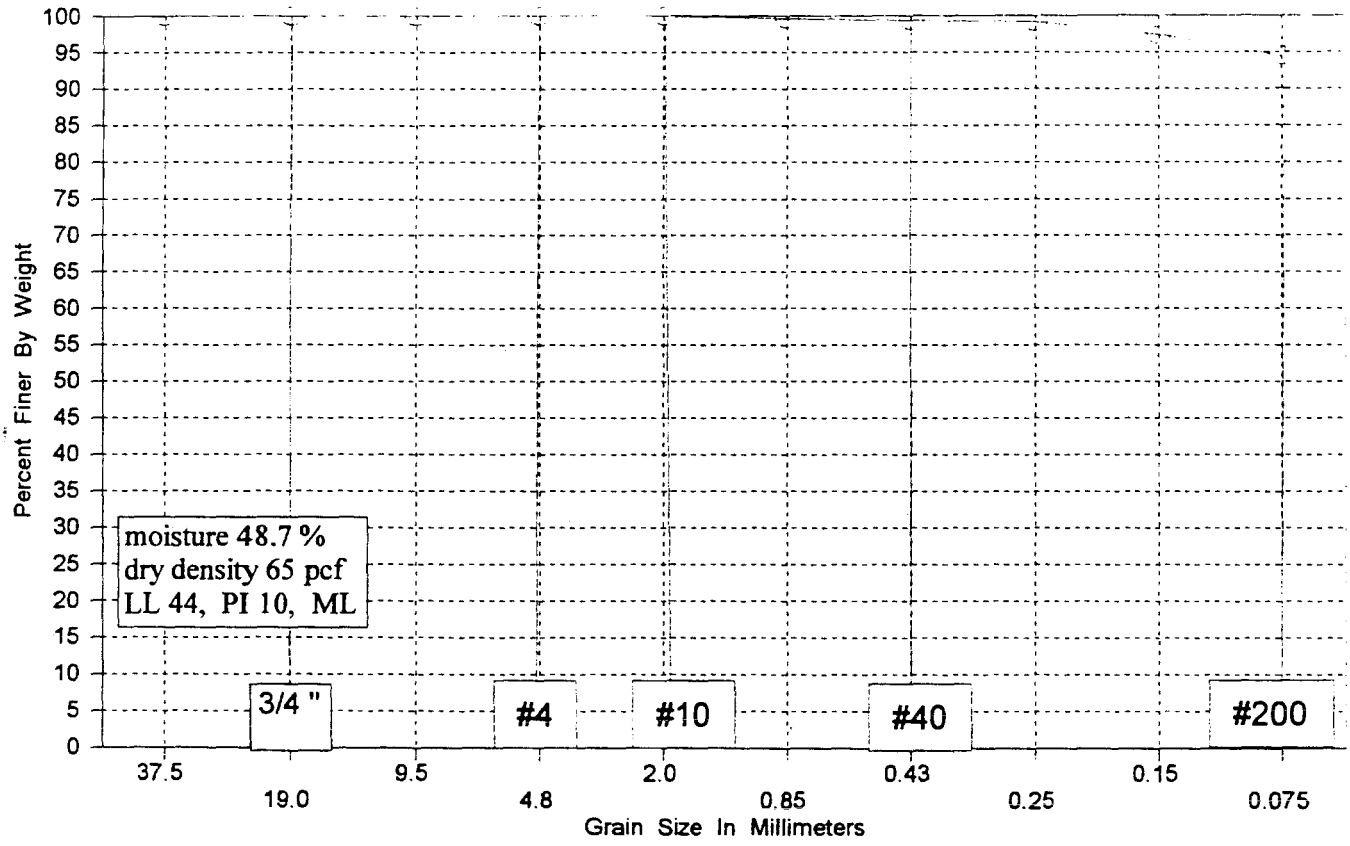
GRADATION CURVE

Boring B-21, sample 2 at 10.5 feet



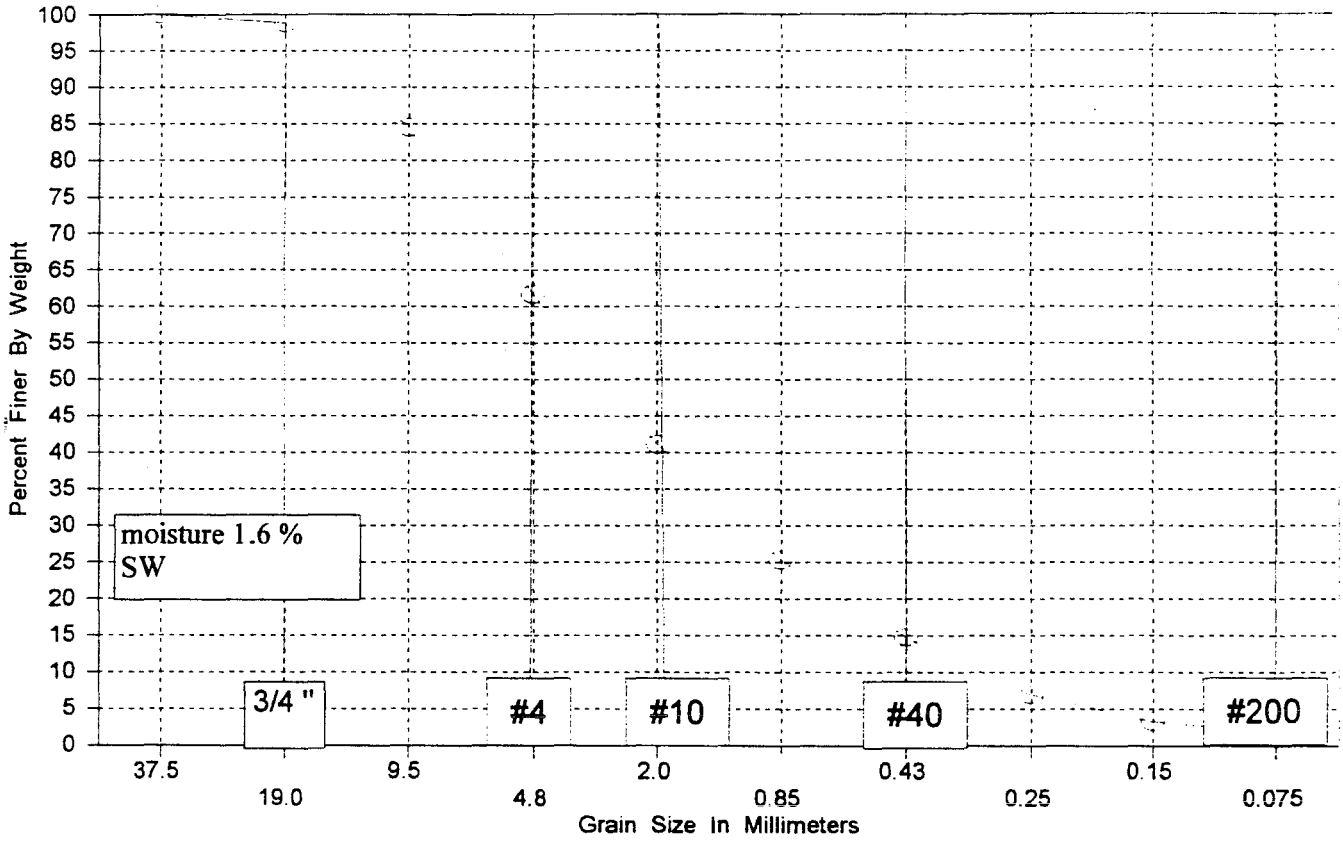
GRADATION CURVE

Boring B-21, sample 5 at 25.5 feet



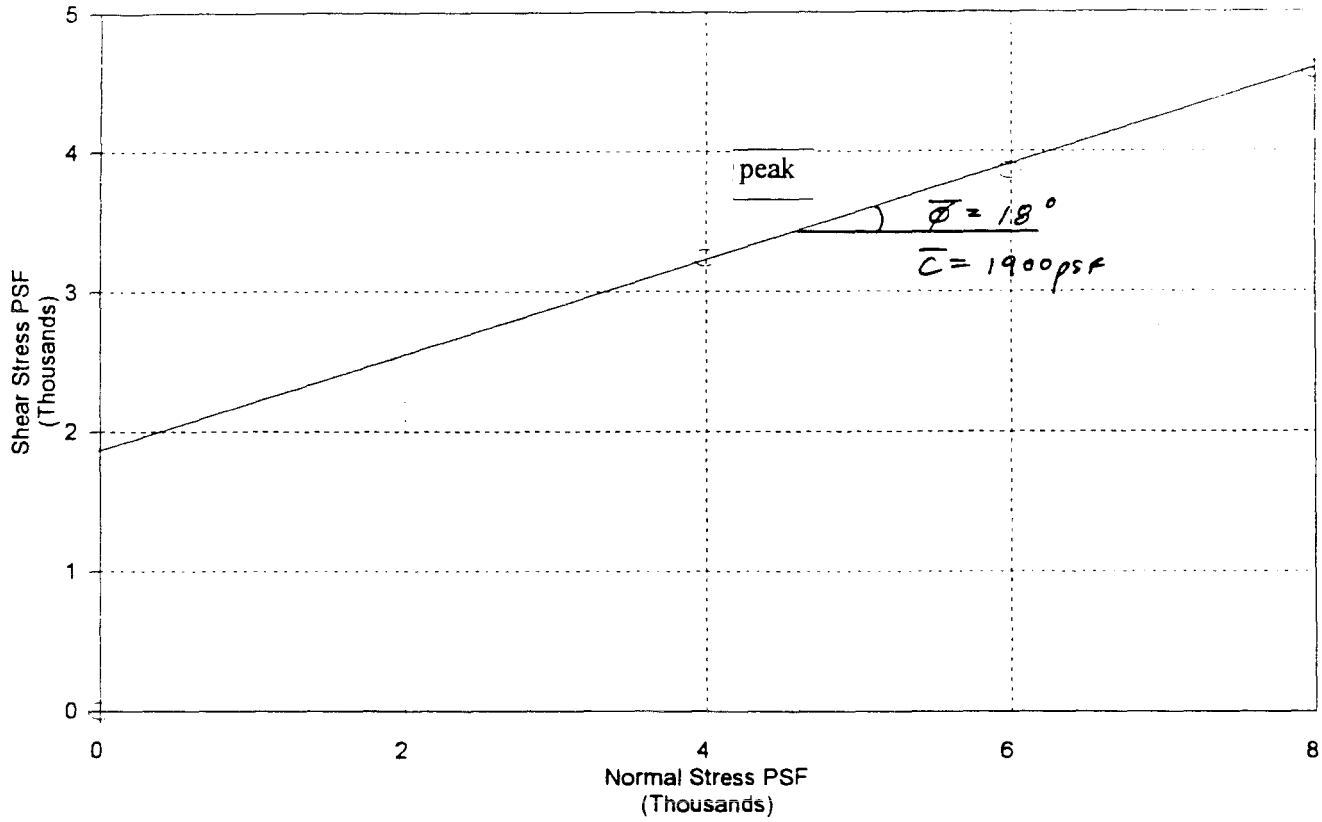
GRADATION CURVE

Boring B-23. sample 1 at 5.5 feet



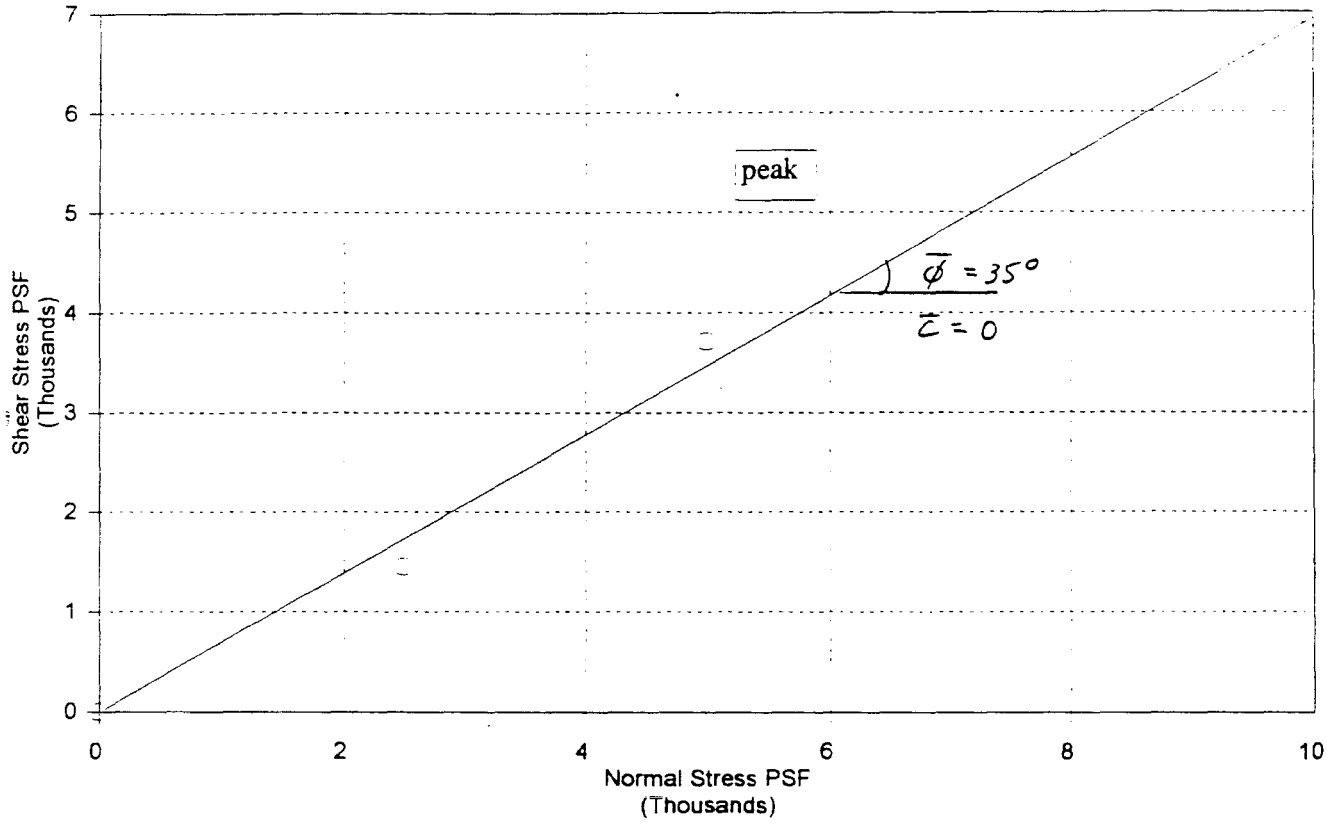
DIRECT SHEAR - Consolidated Drained

Boring B-21, Sample 10 at 62.5 feet



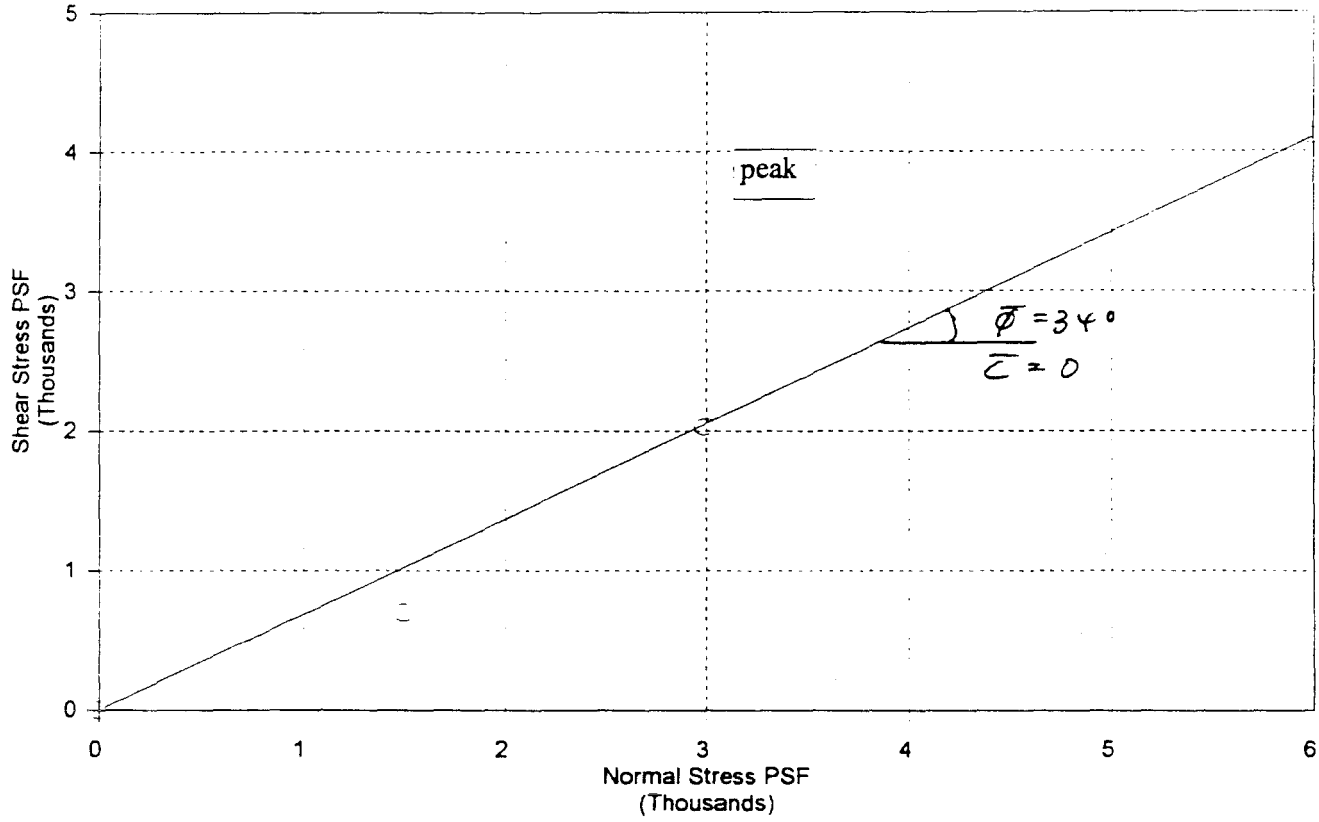
DIRECT SHEAR - Consolidated Drained

Boring B-19, sample 11 at 55.5 feet



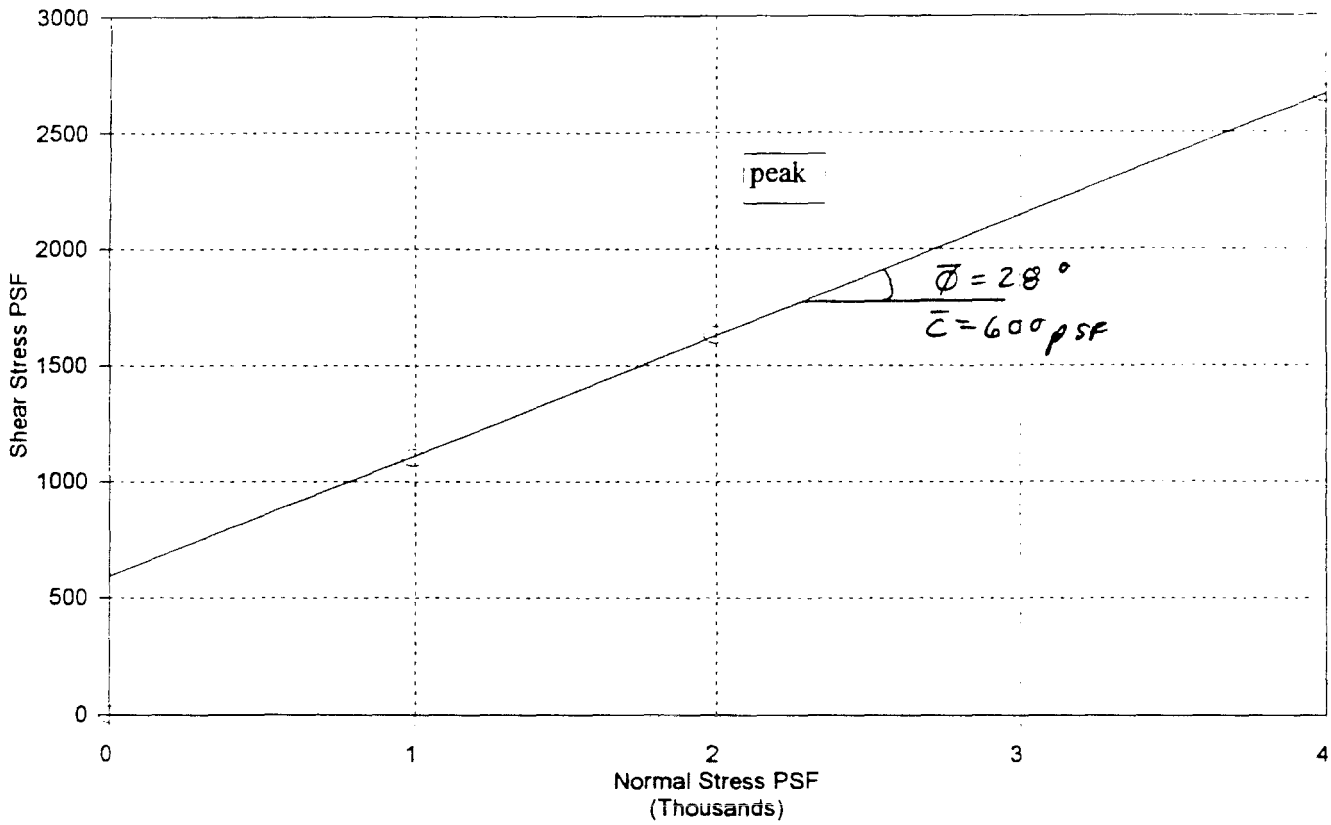
DIRECT SHEAR - Consolidated Drained

Boring B-19, sample 7 at 35.5 feet



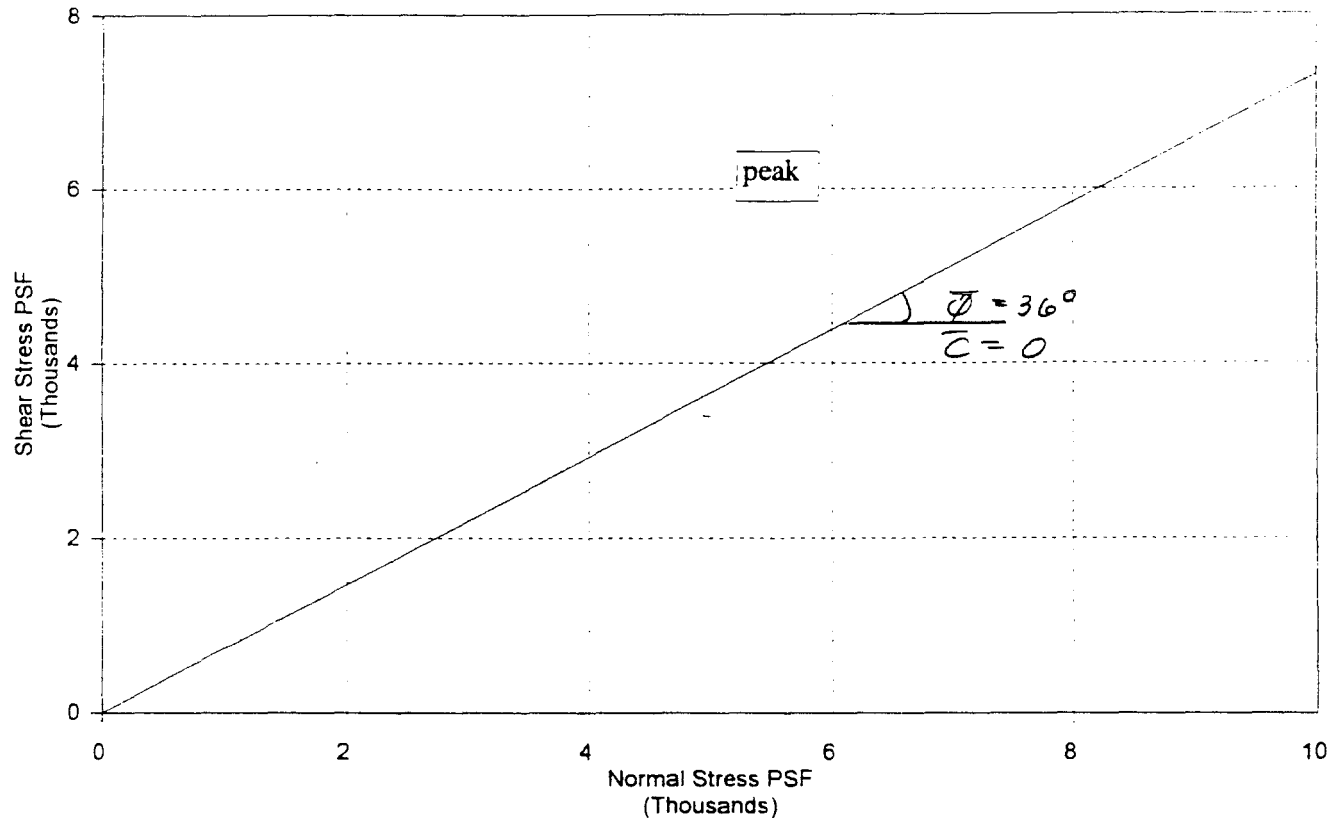
DIRECT SHEAR - Consolidated Drained

Boring B-19, sample 2 at 10.5 feet



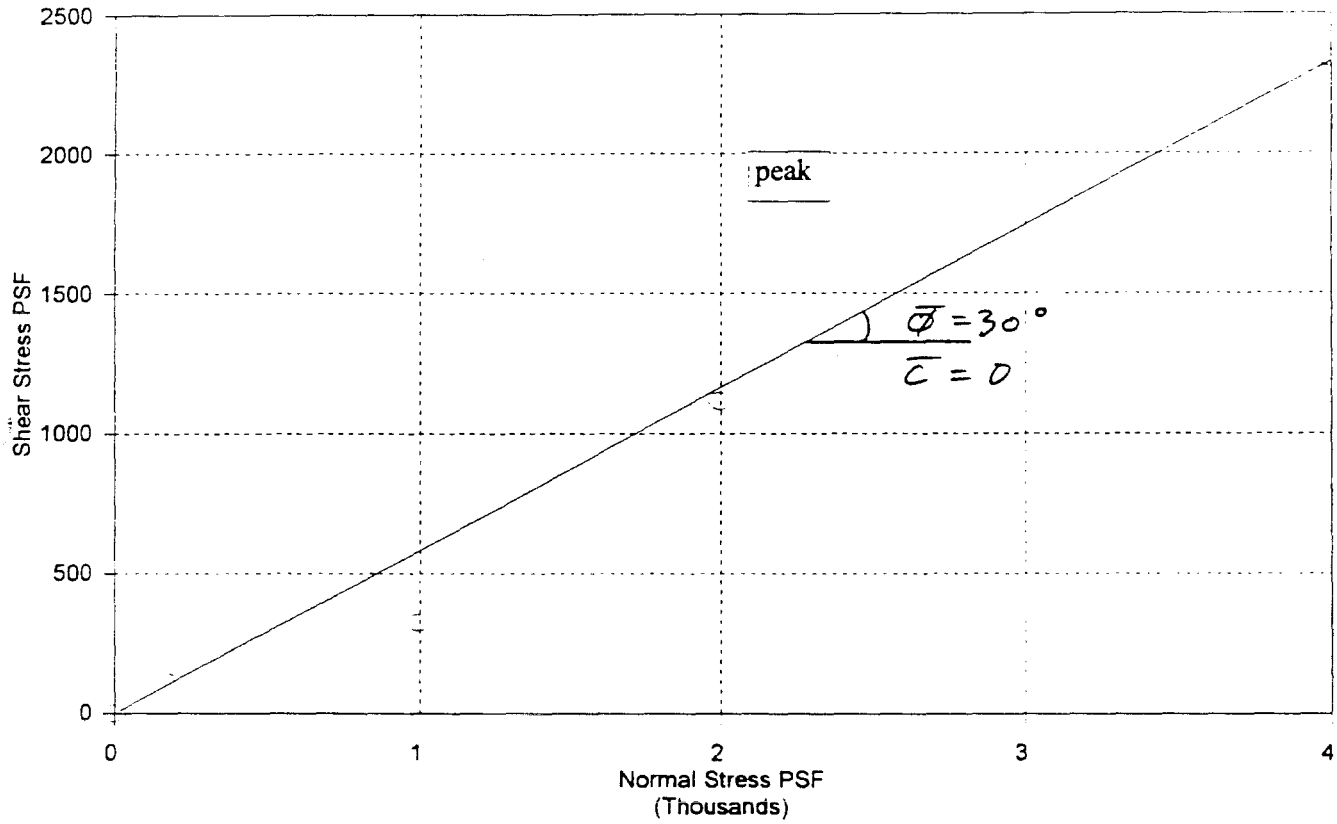
DIRECT SHEAR - Consolidated Drained

Boring B-14, sample 10 at 50.5 feet



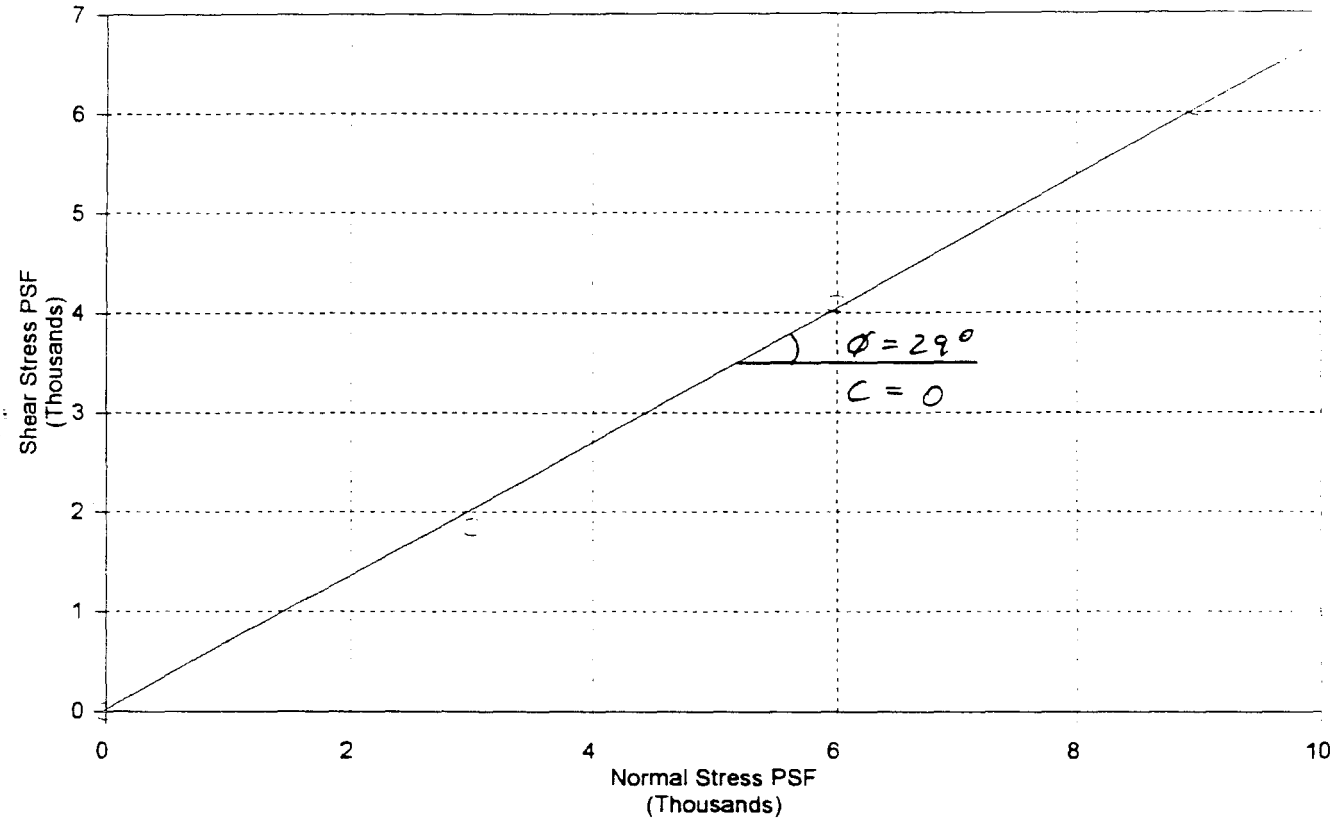
DIRECT SHEAR - Consolidated Drained

Boring B-14, sample 3 at 15.5 feet



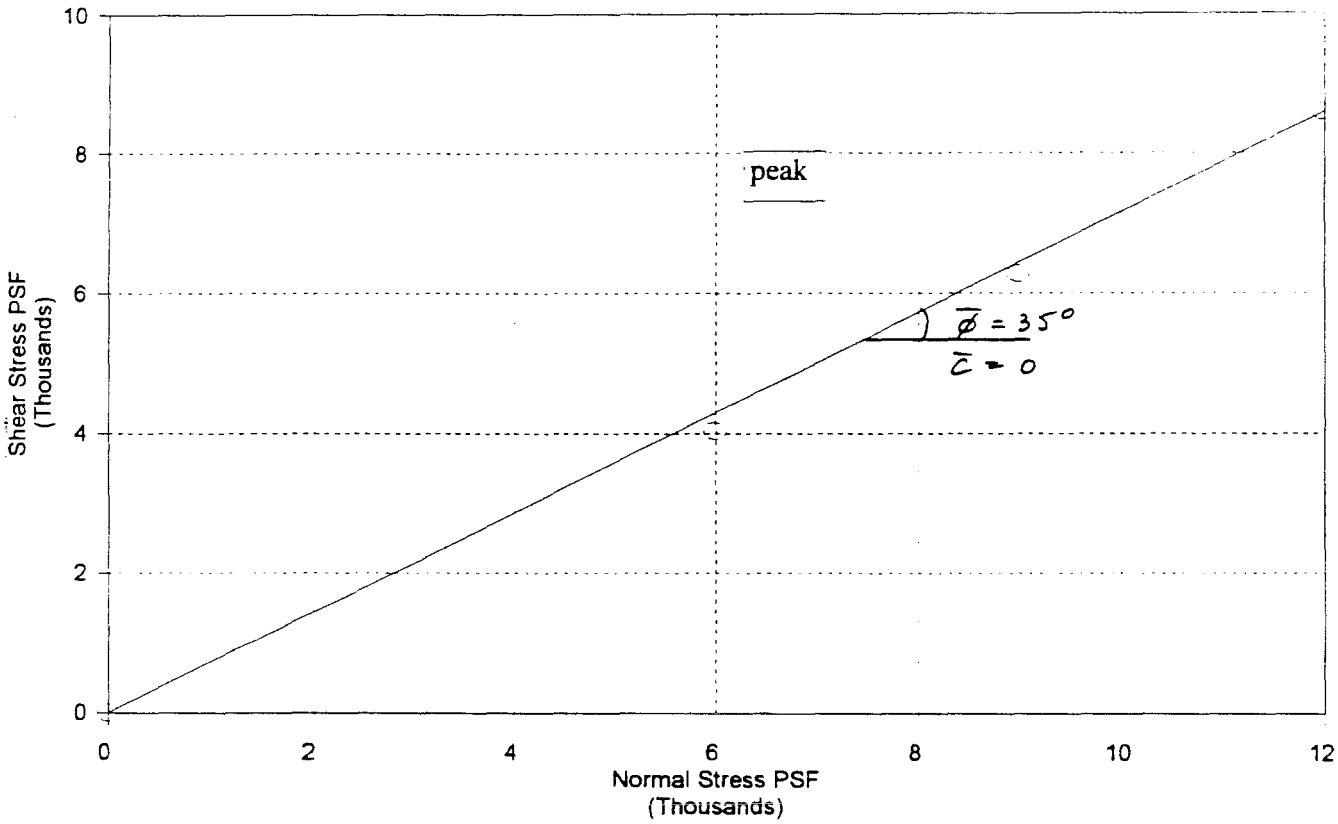
DIRECT SHEAR - Consolidated Undrained

Boring B-13, sample 20 at 100 feet



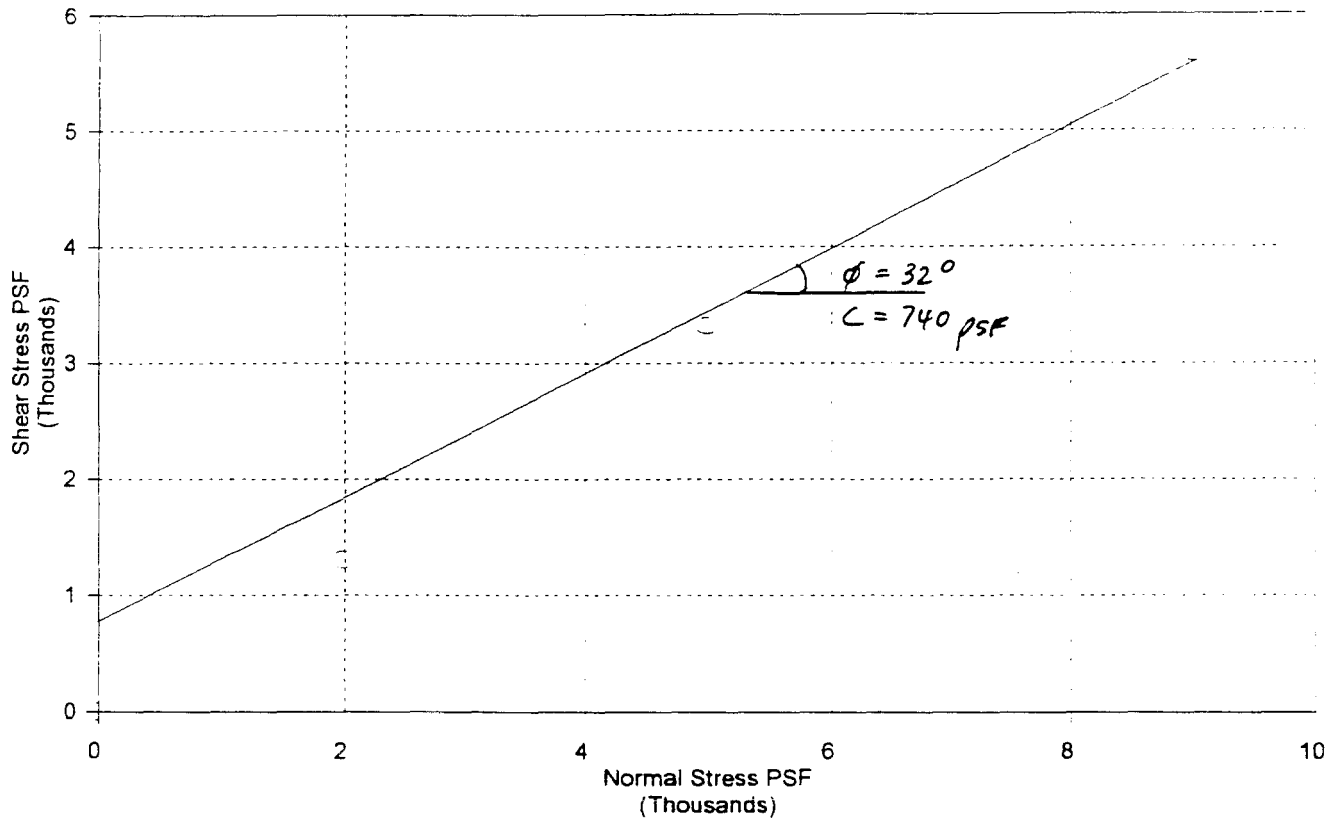
DIRECT SHEAR - Consolidated Drained

Boring B-13, Sample 20 at 100 feet



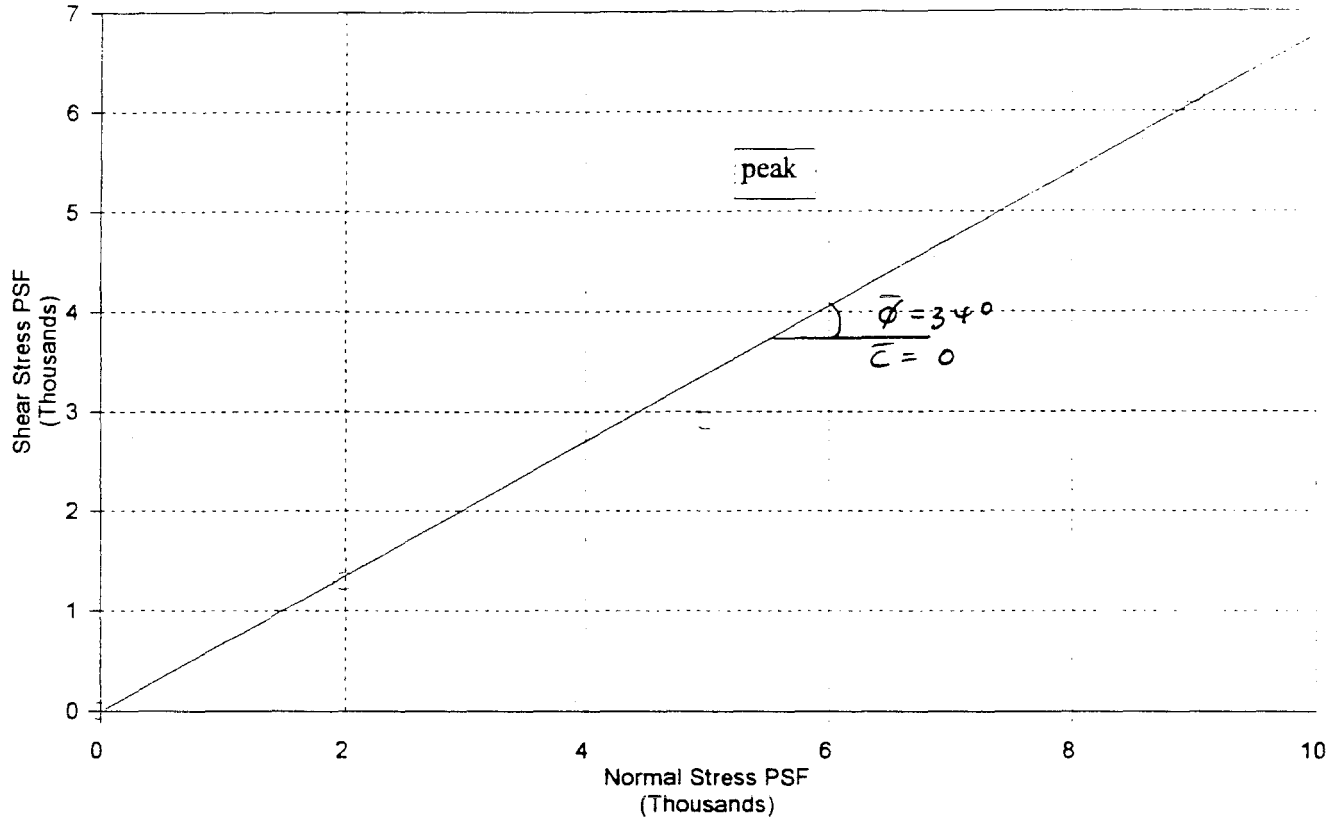
DIRECT SHEAR - Consolidated Undrained

Boring B-11. sample 10 at 50 feet



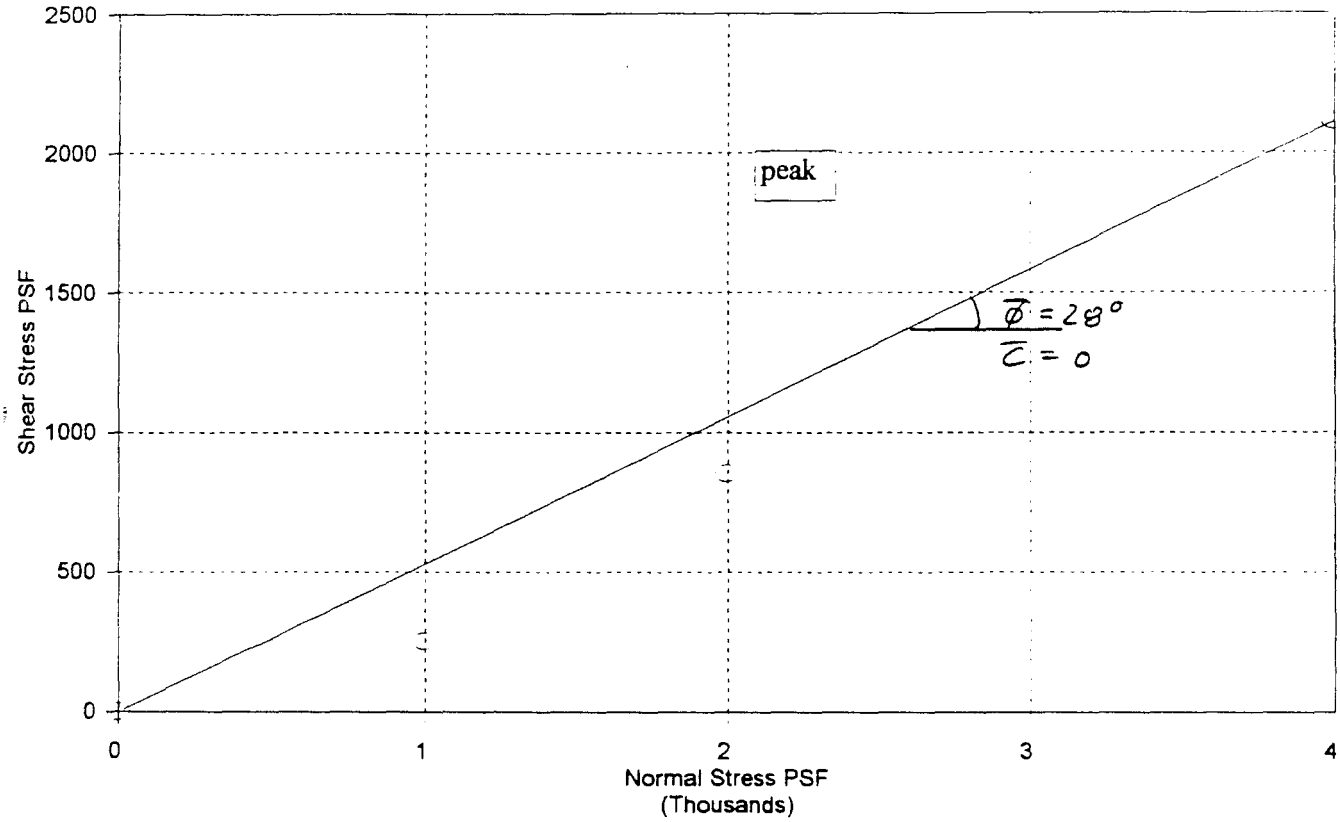
DIRECT SHEAR - Consolidated Drained

Boring B-11, sample 10 at 50 feet



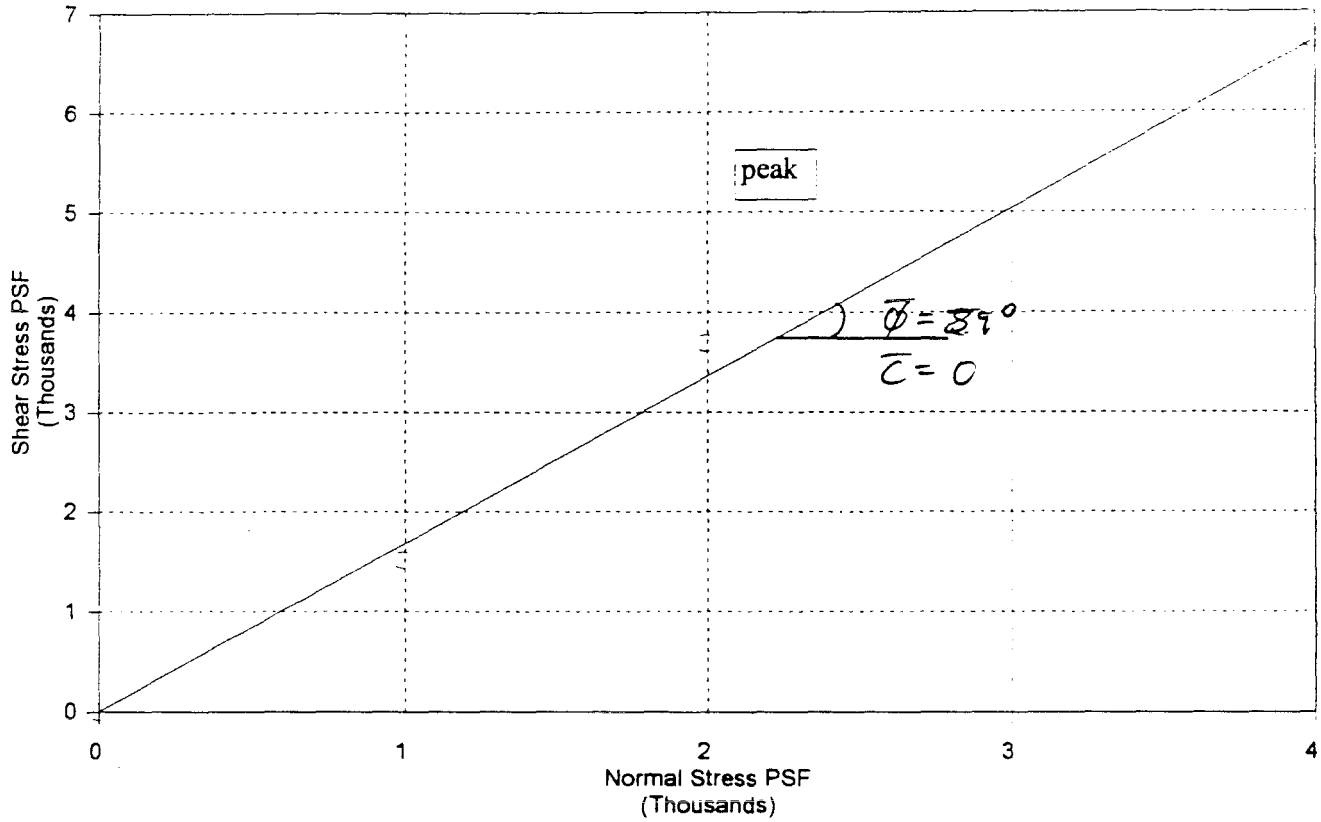
DIRECT SHEAR - Consolidated Drained

Boring B-11, sample 3 at 15.5 feet



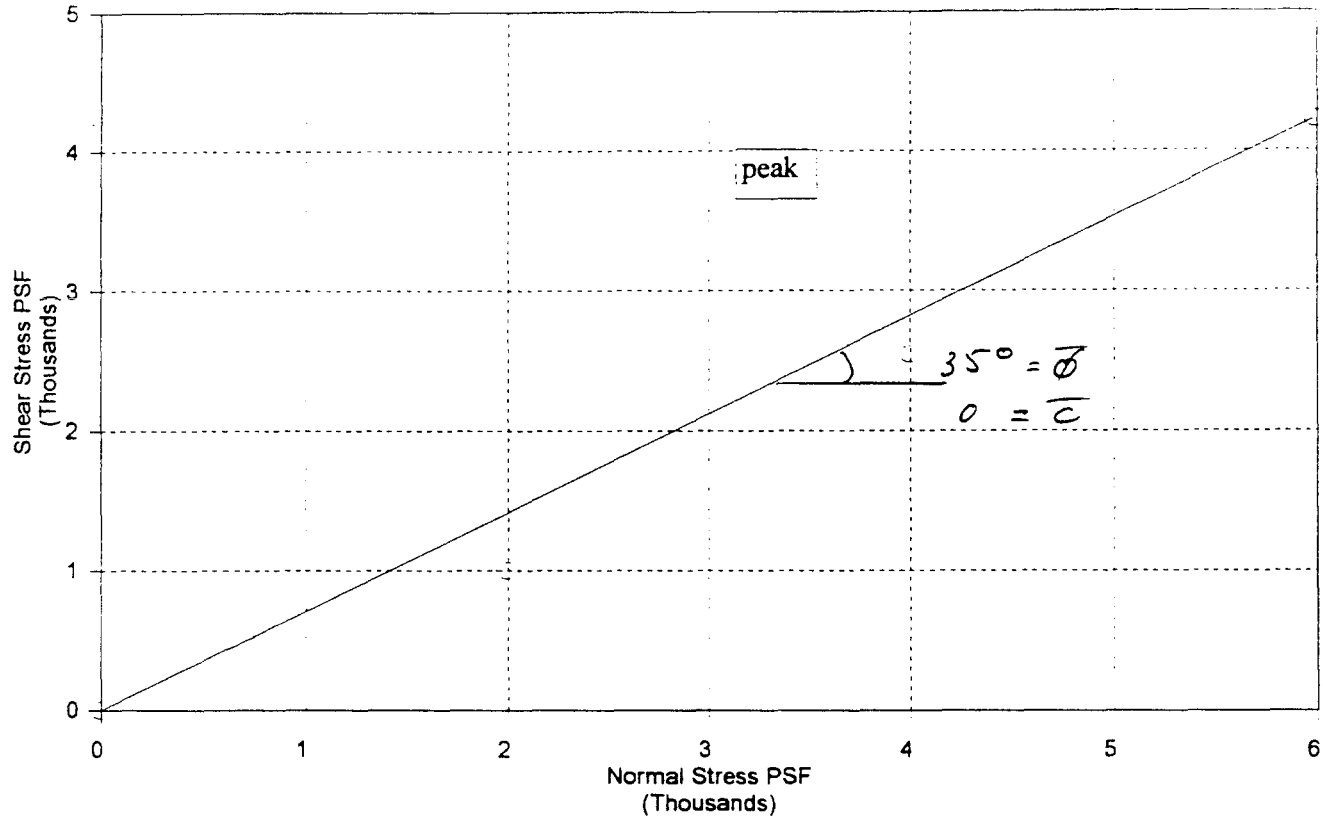
DIRECT SHEAR - Consolidated Drained

Boring B-11, sample 1 at 5.5 feet



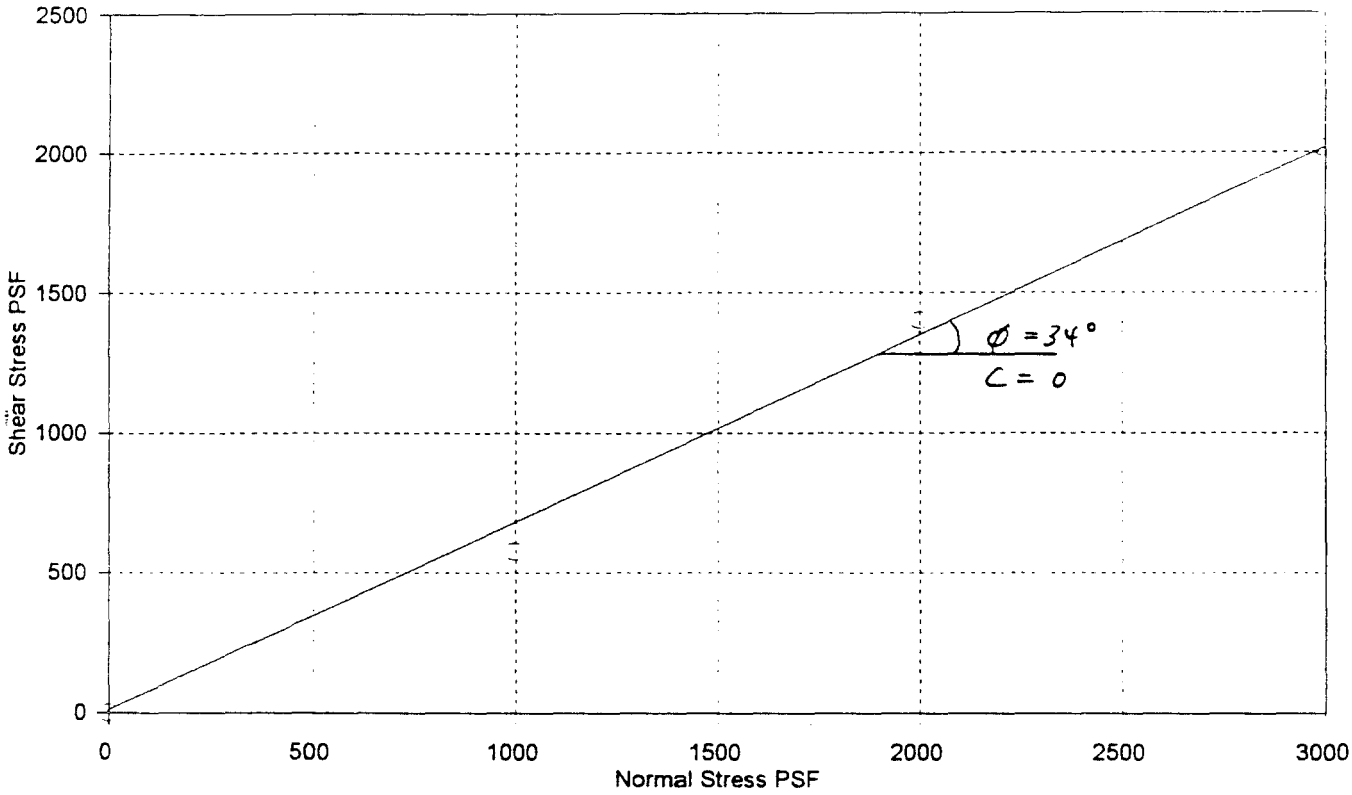
DIRECT SHEAR - Consolidated Drained

Boring B-10, sample 7 at 35.5 feet



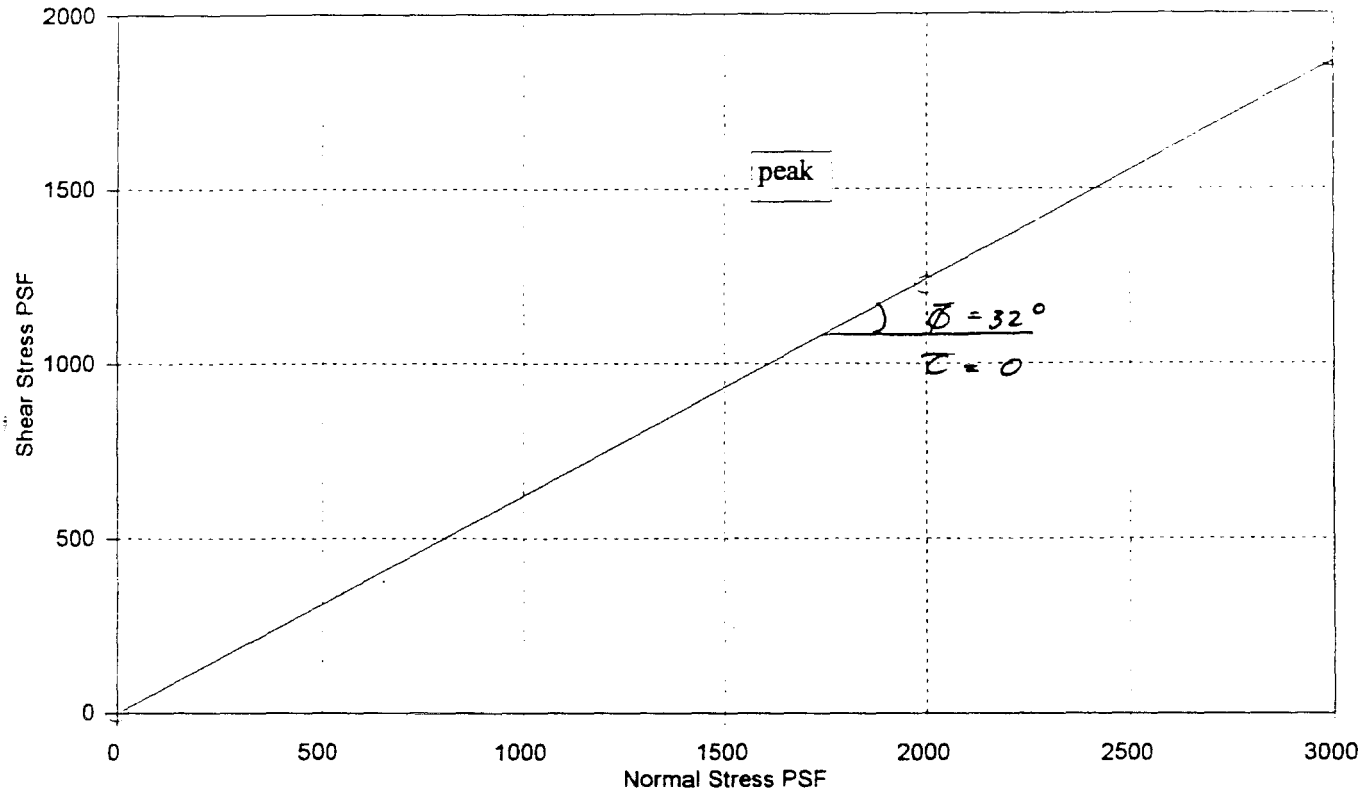
DIRECT SHEAR - Consolidated Undrained

Boring B-10, sample 2 at 10 feet



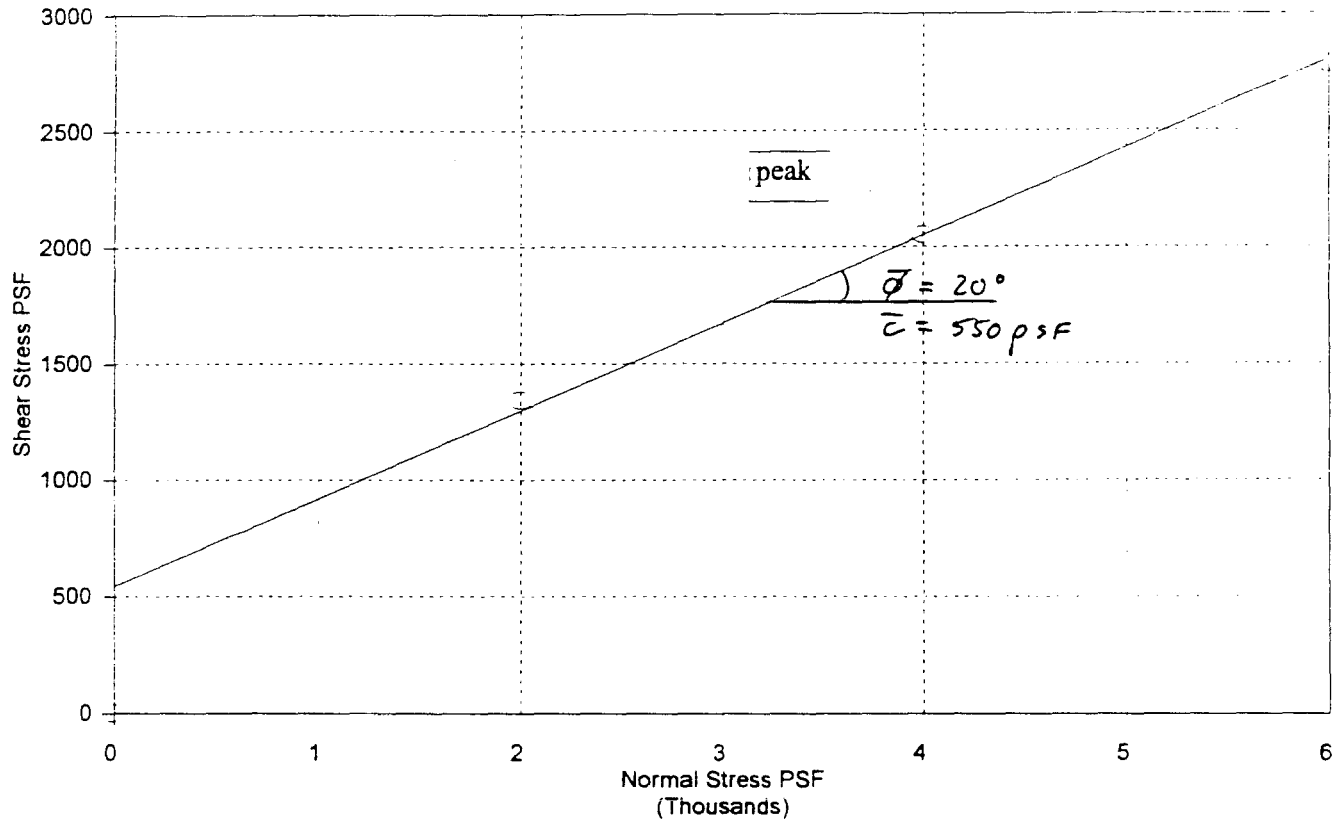
DIRECT SHEAR - Consolidated Drained

Boring B-10, sample 2 at 10 feet



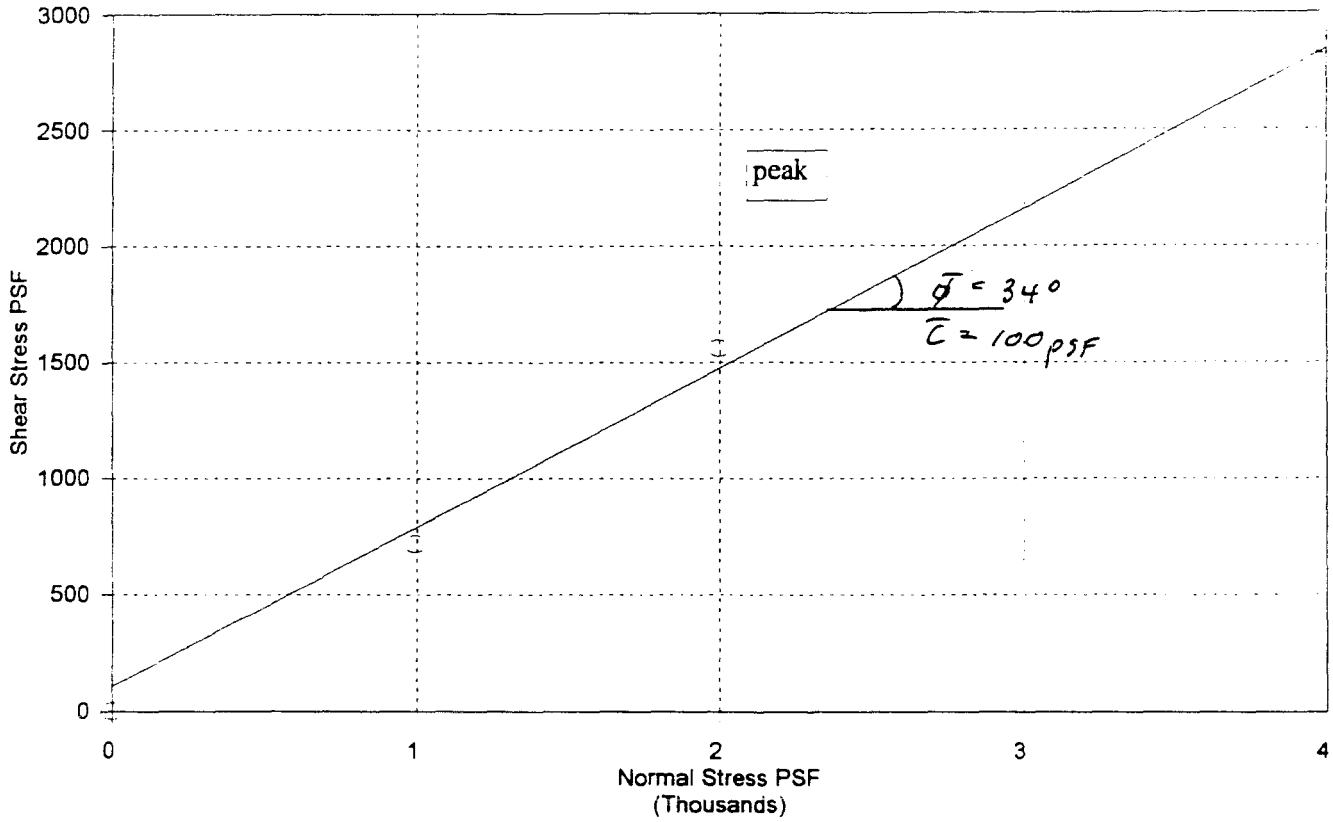
DIRECT SHEAR - Consolidated Drained

Boring B-9, Sample 7 at 40.5 feet



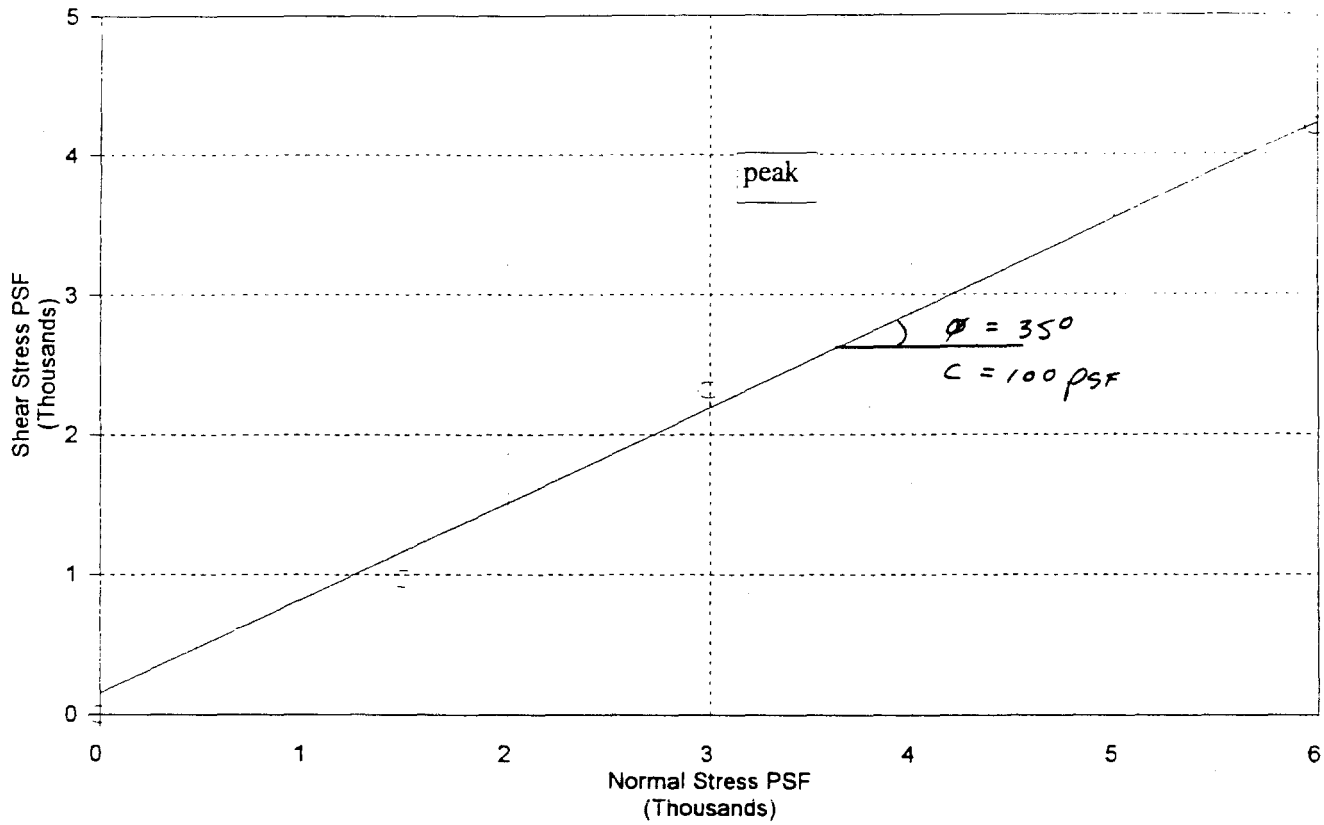
DIRECT SHEAR - Consolidated Drained

Boring B-9, Sample 4 at 20.5 feet



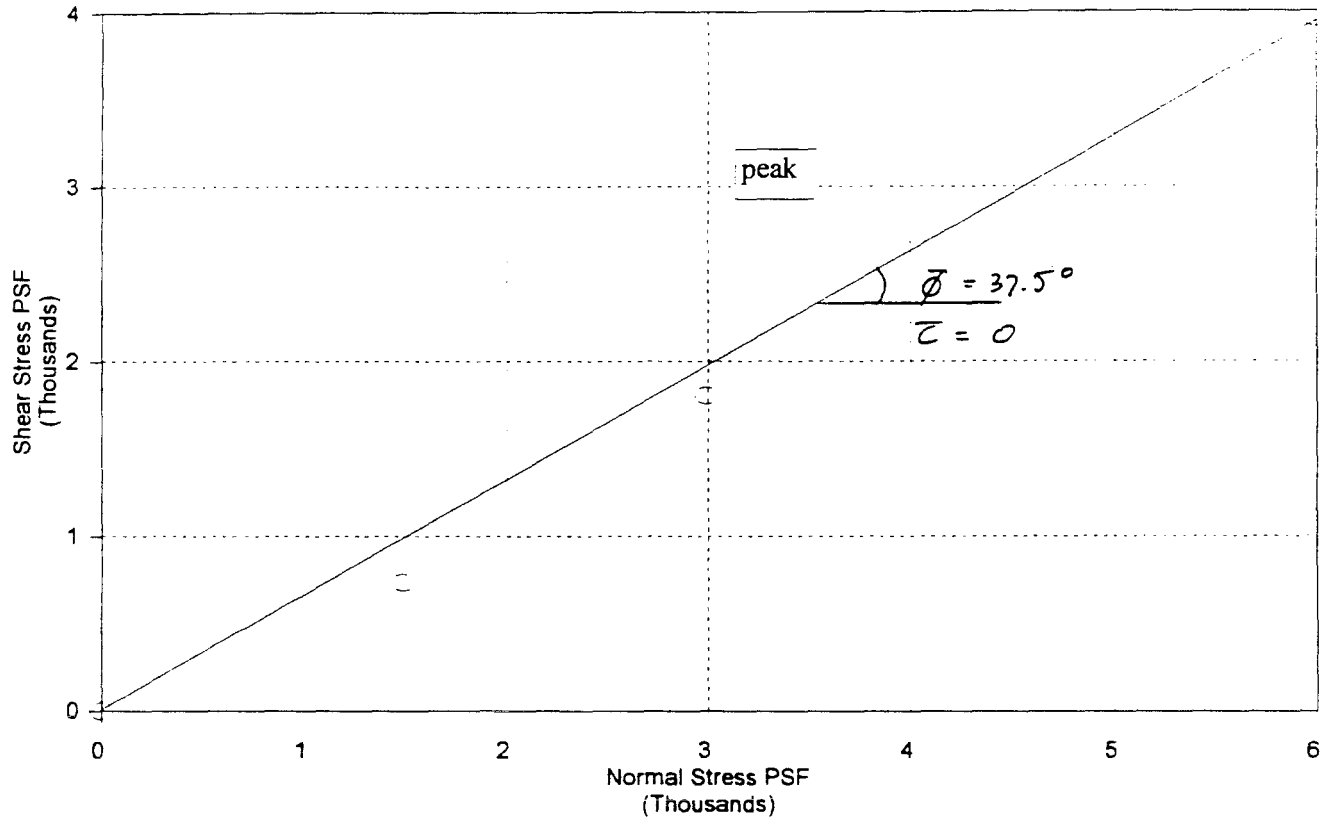
DIRECT SHEAR - Consolidated Undrained

Boring B-8, Sample 5 at 25 feet



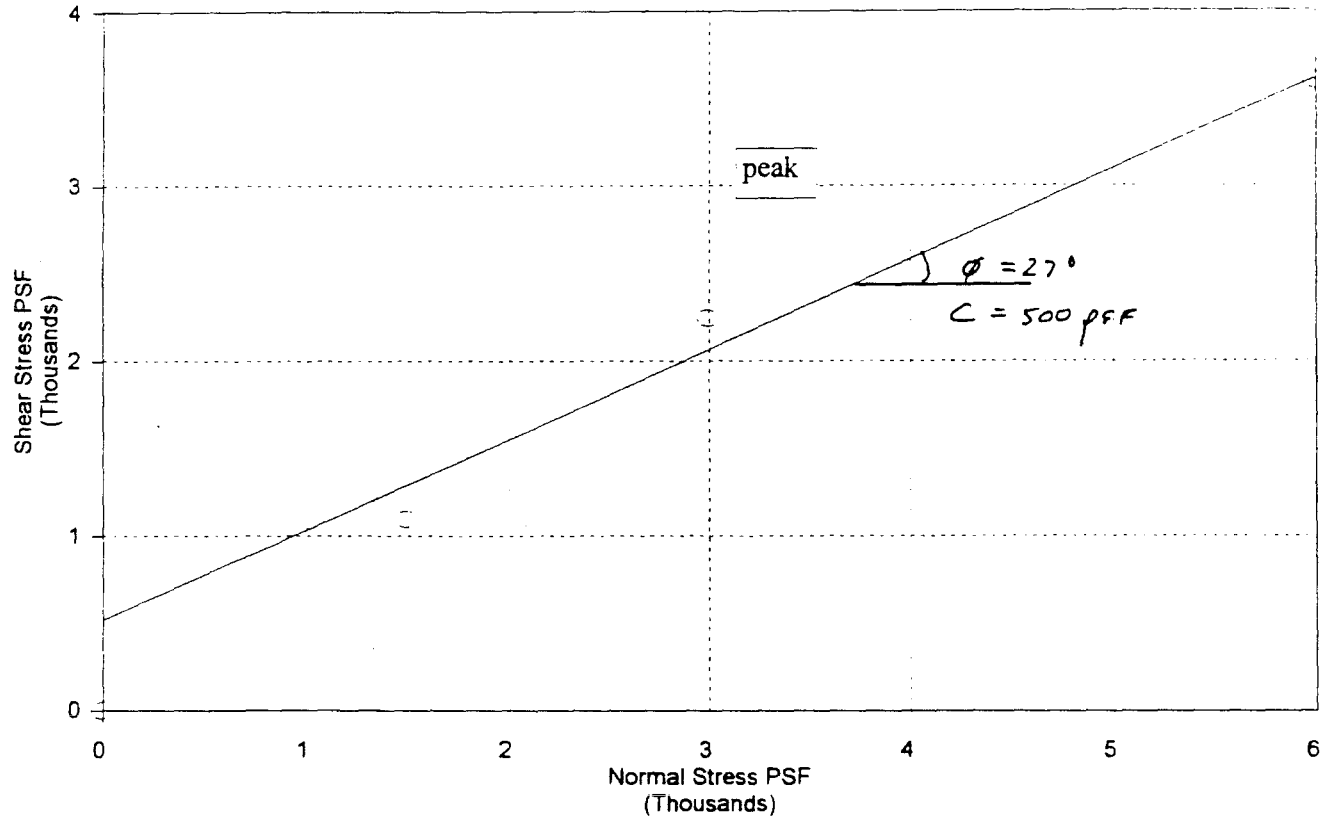
DIRECT SHEAR - Consolidated Drained

Boring B-8, Sample 5 at 25 feet



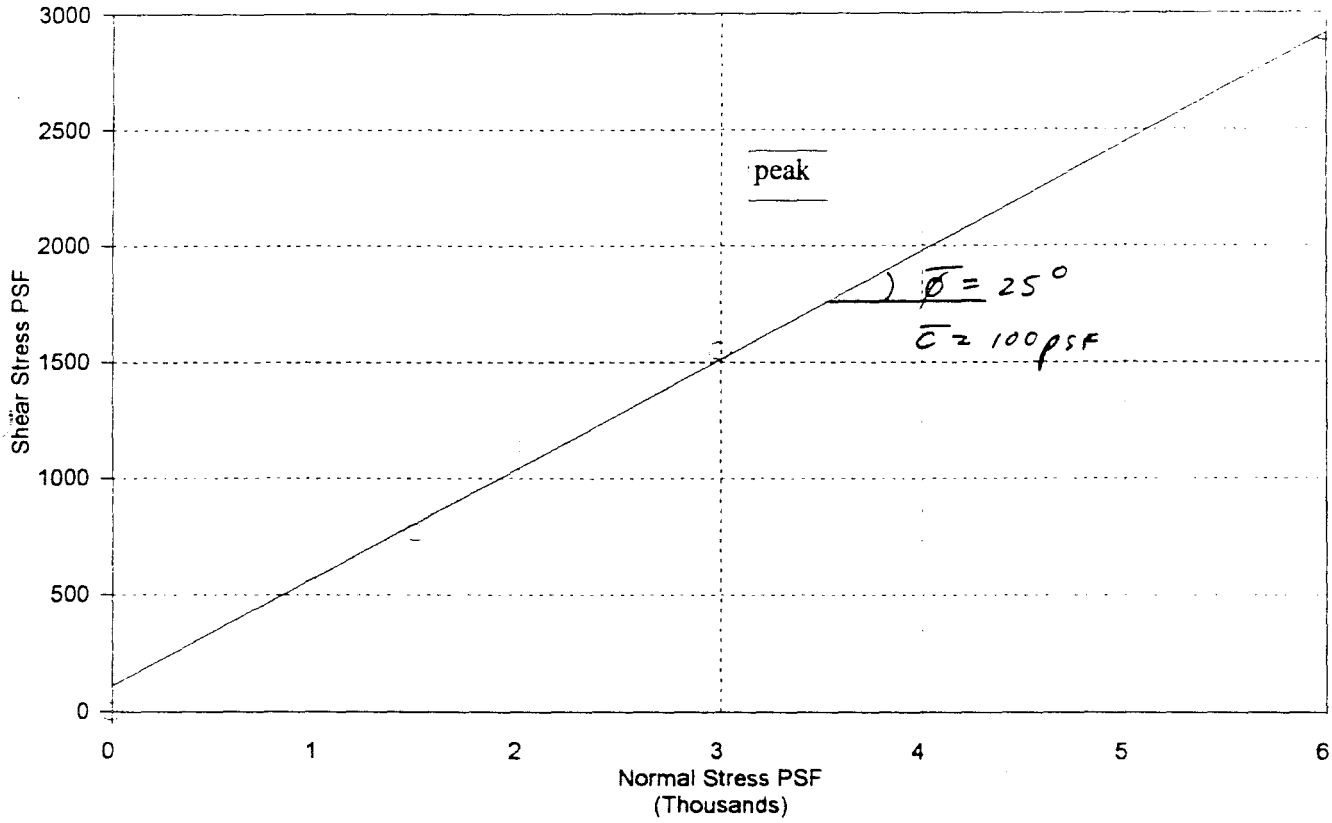
DIRECT SHEAR - Consolidated Undrained

Boring B-5, Sample 6 at 30 feet



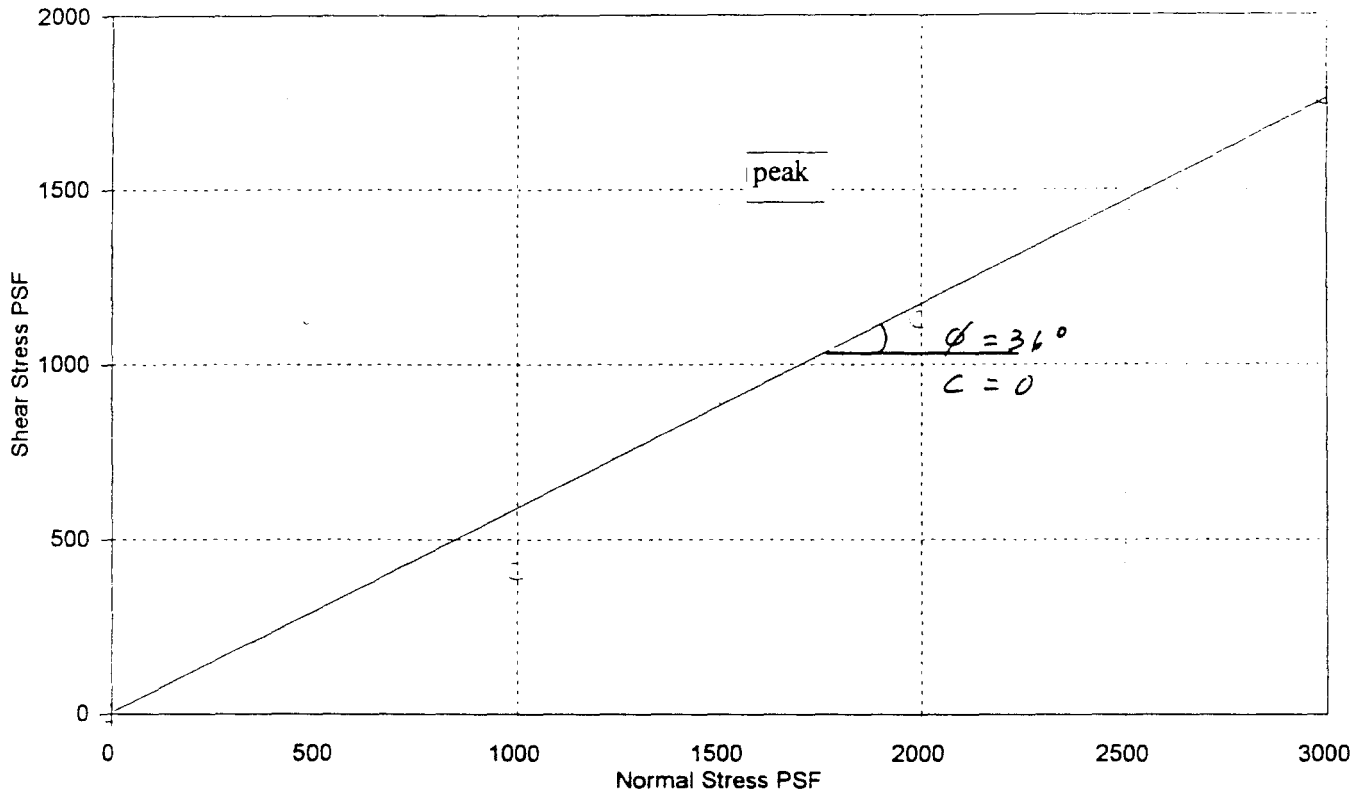
DIRECT SHEAR - Consolidated Drained

Boring B-5, Sample 6 at 30 feet



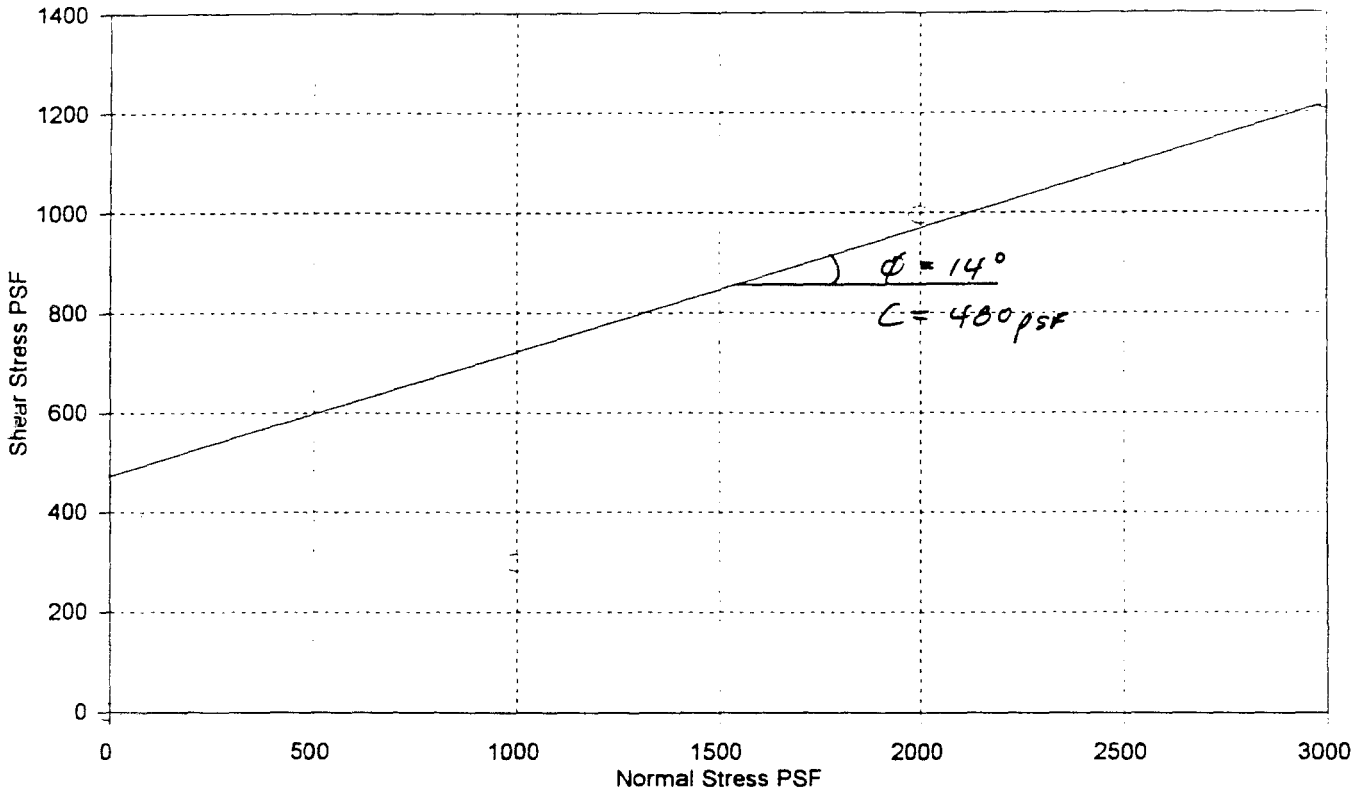
DIRECT SHEAR - Consolidated Undrained

Boring B-5, Sample 2 at 10.5 feet



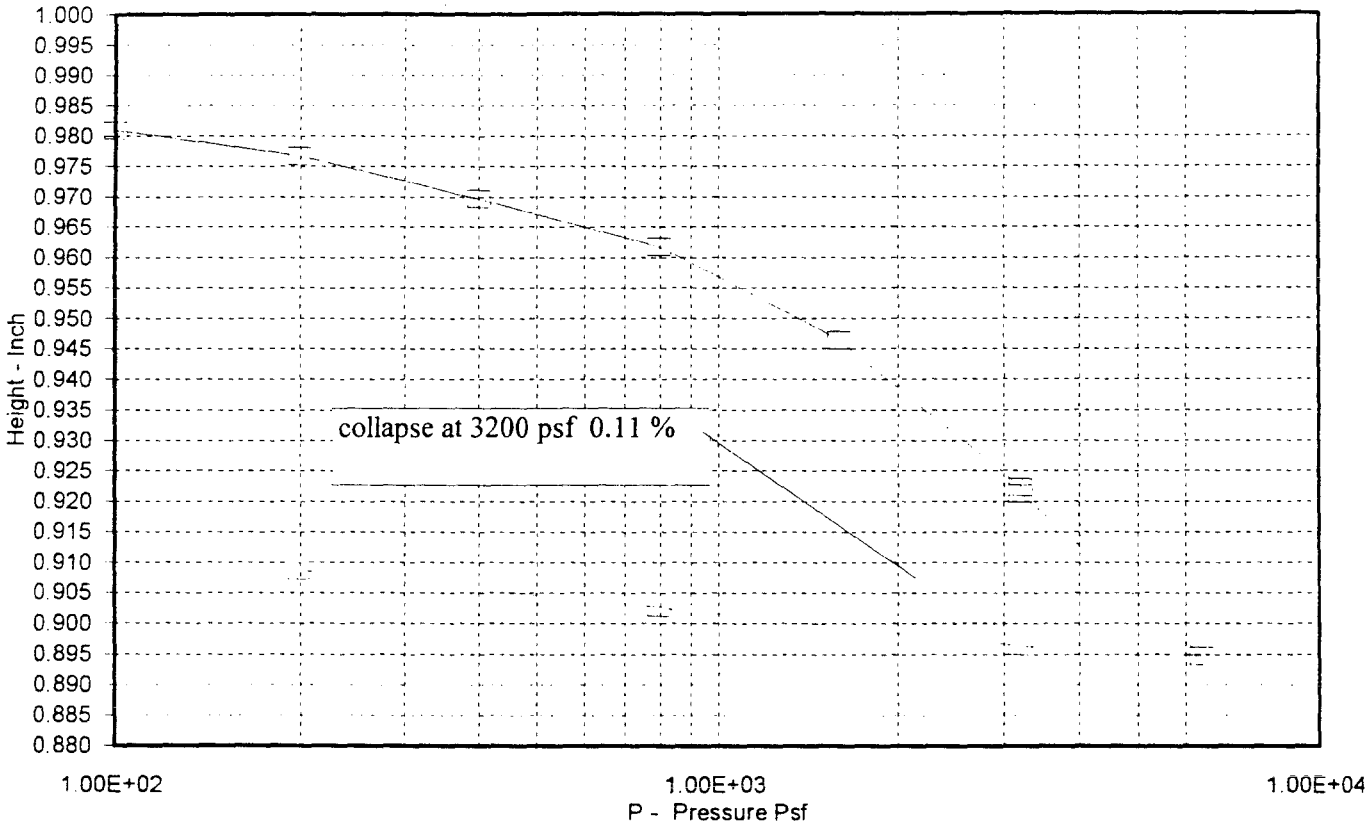
DIRECT SHEAR - Consolidated Undrained

Boring B-5, sample 1 at 5.5 feet



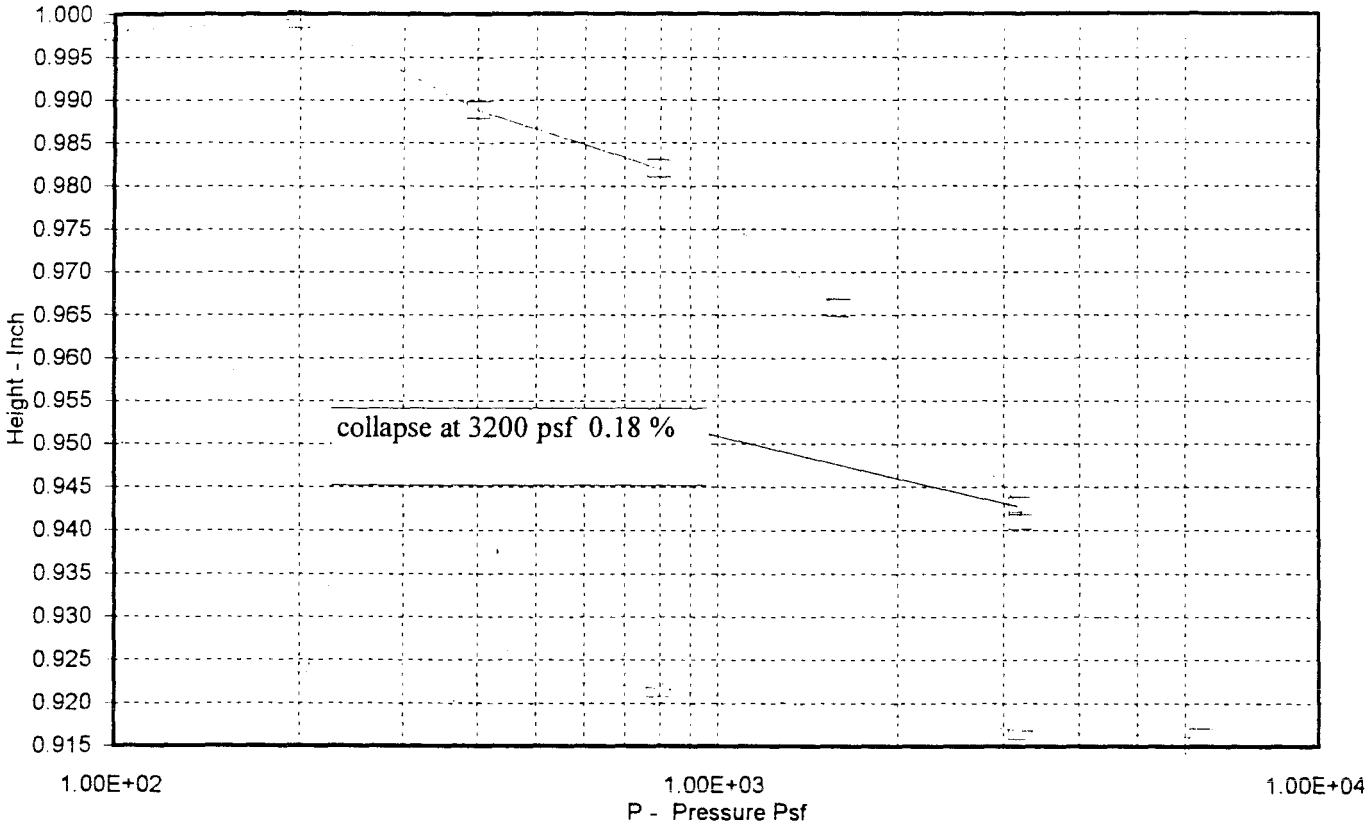
Consolidation

Boring B-5. Sample 6 at 30 feet



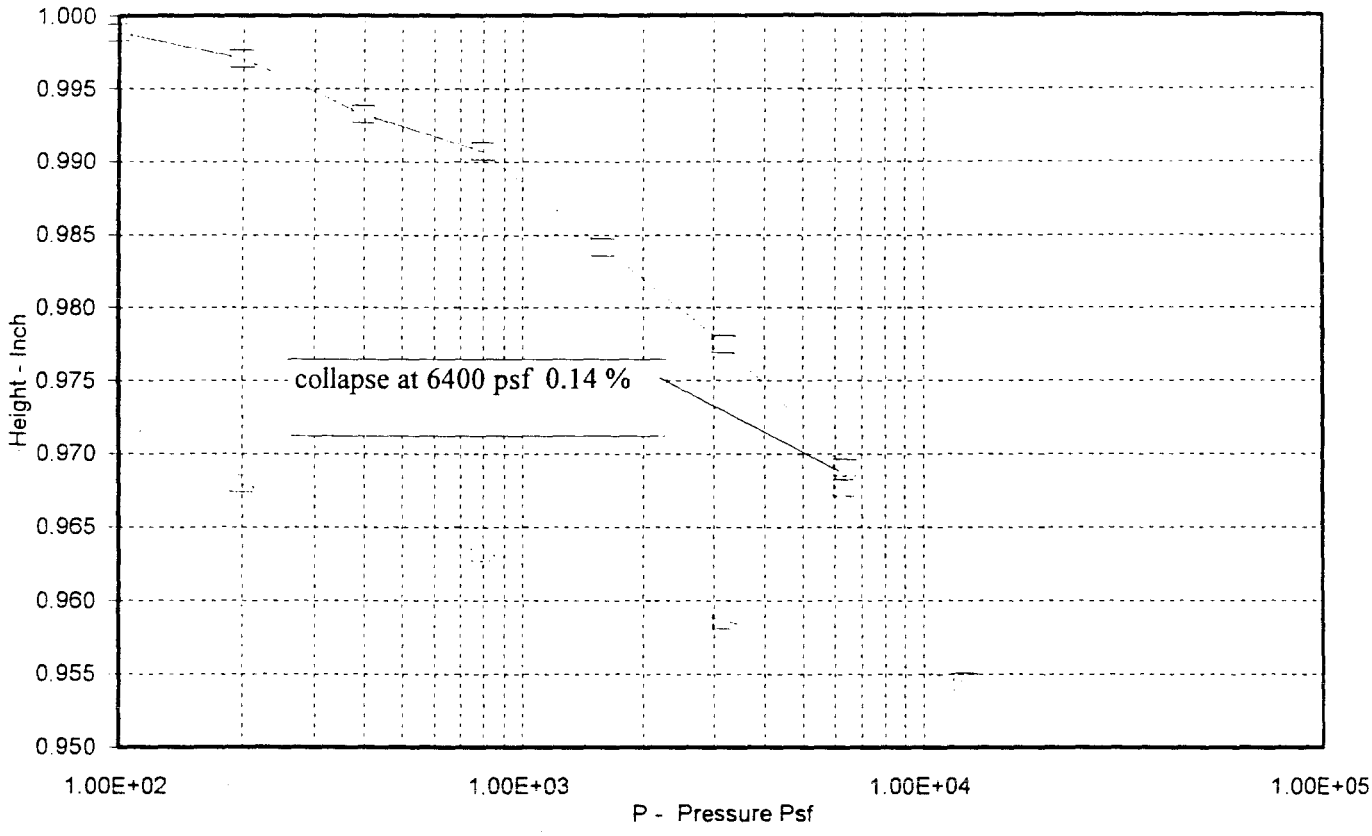
Consolidation

Boring B-8, Sample 5 at 25 feet



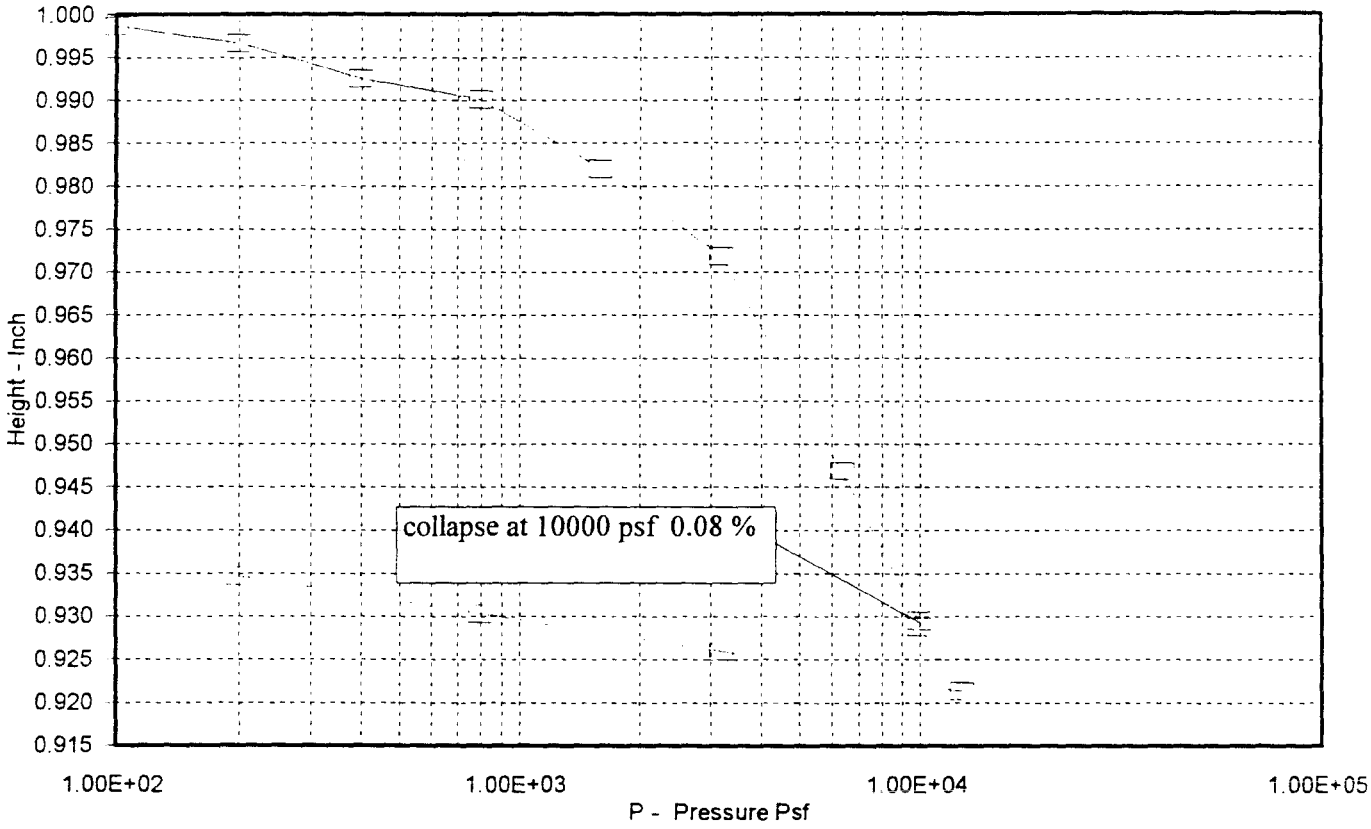
Consolidation

Boring B-11, Sample 10 at 50 feet



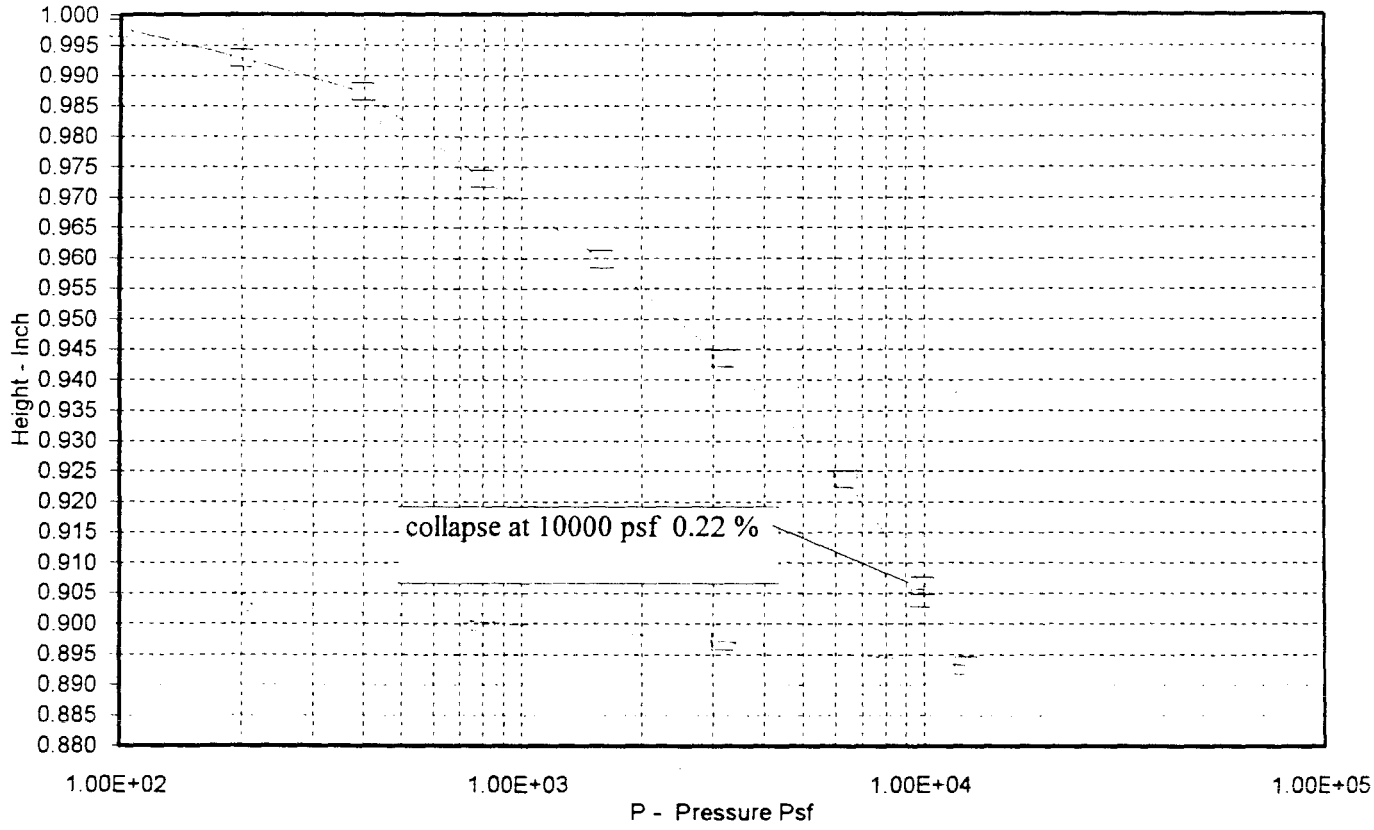
Consolidation

Boring B-13, Sample 20 at 100 feet



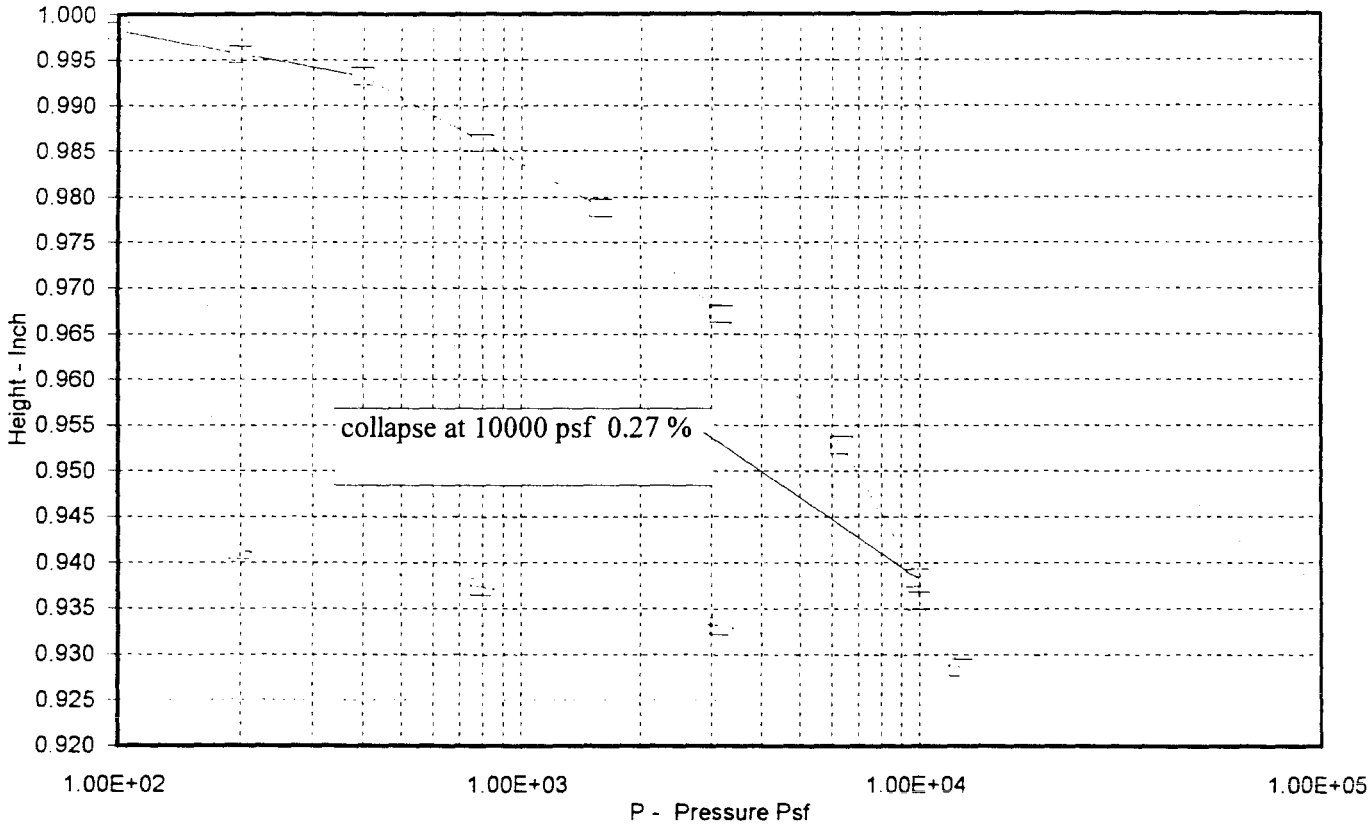
Consolidation

Boring B-14. Sample 18 at 90.5 feet



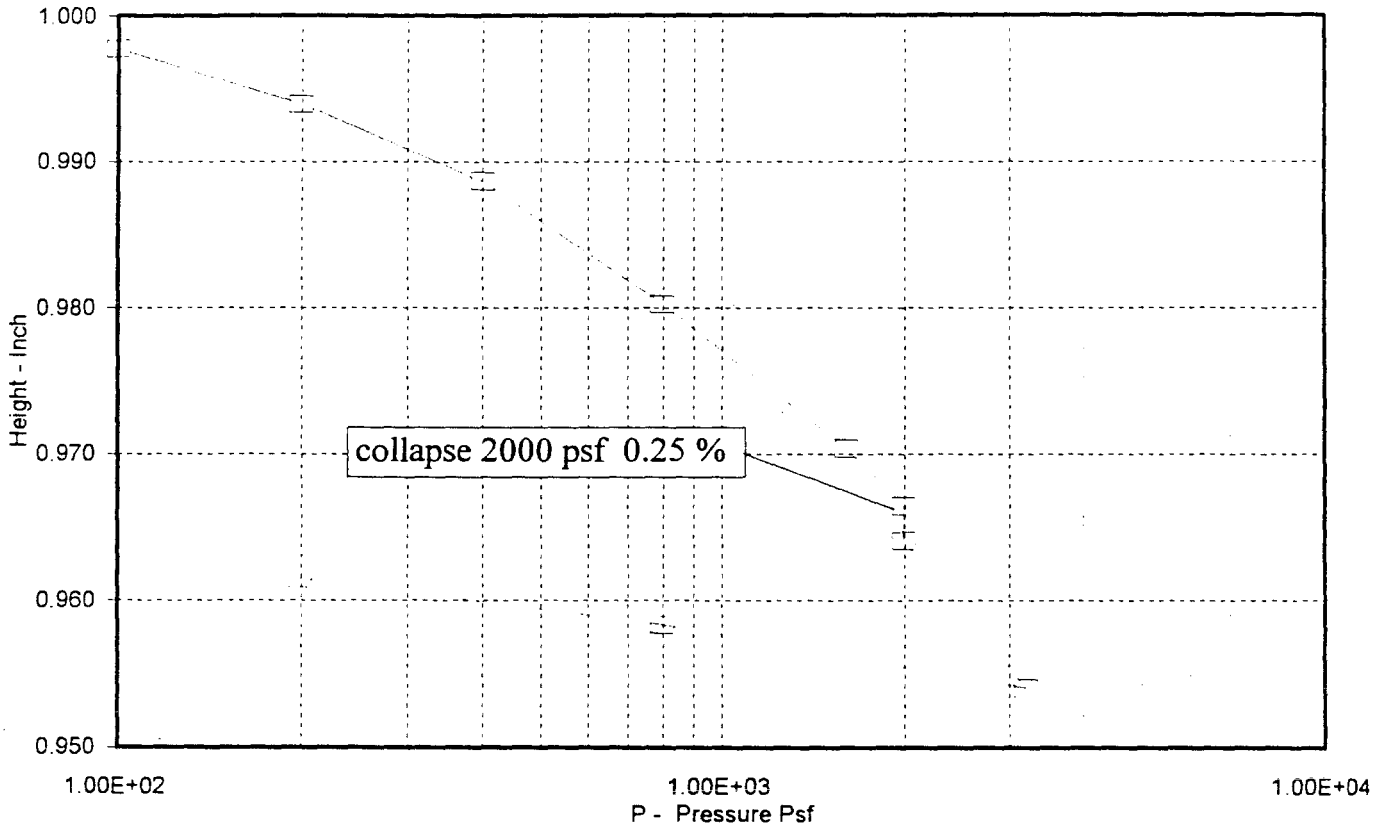
Consolidation

Boring B-14, Sample 19 at 95.5 feet



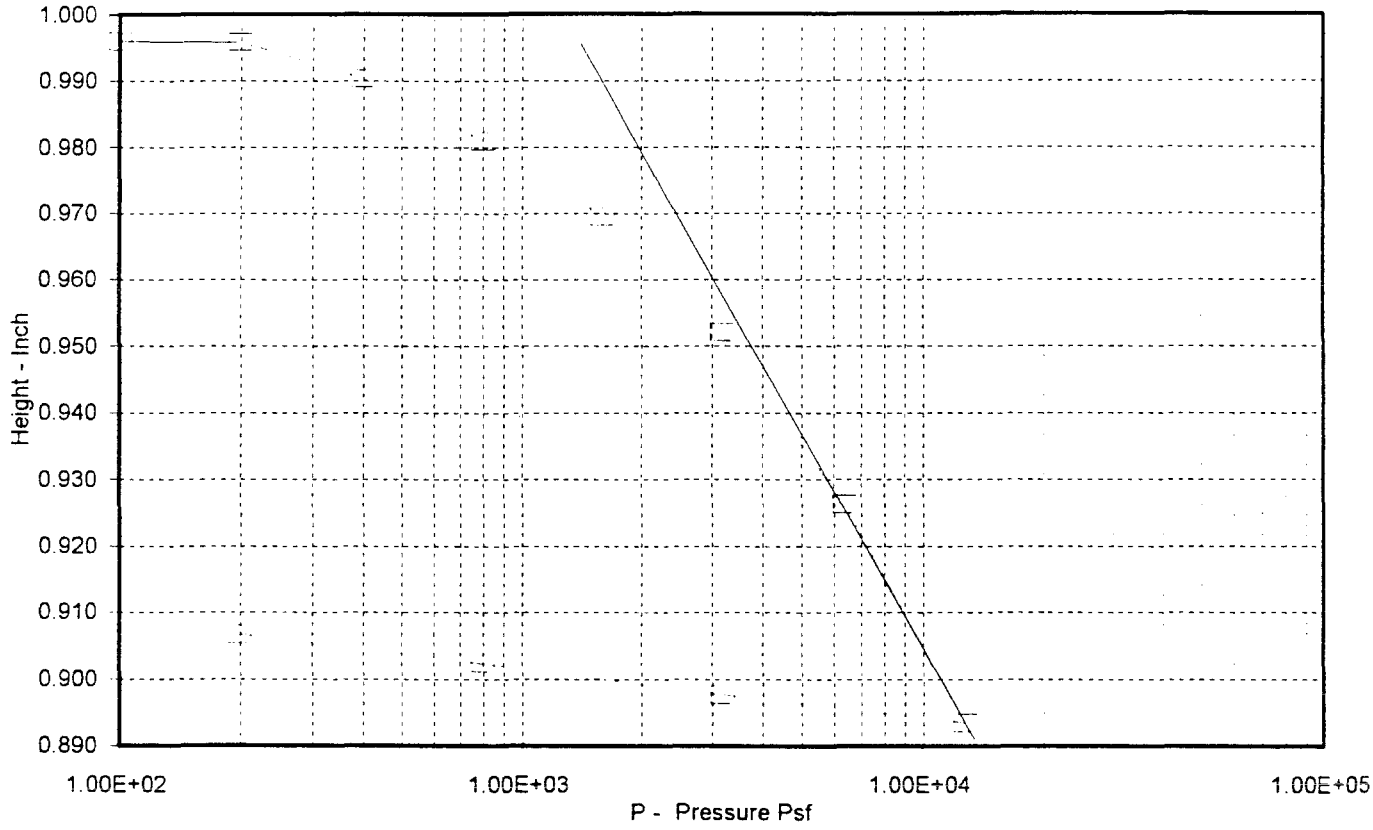
Consolidation

Boring B-21, Sample 4 at 20.5 feet



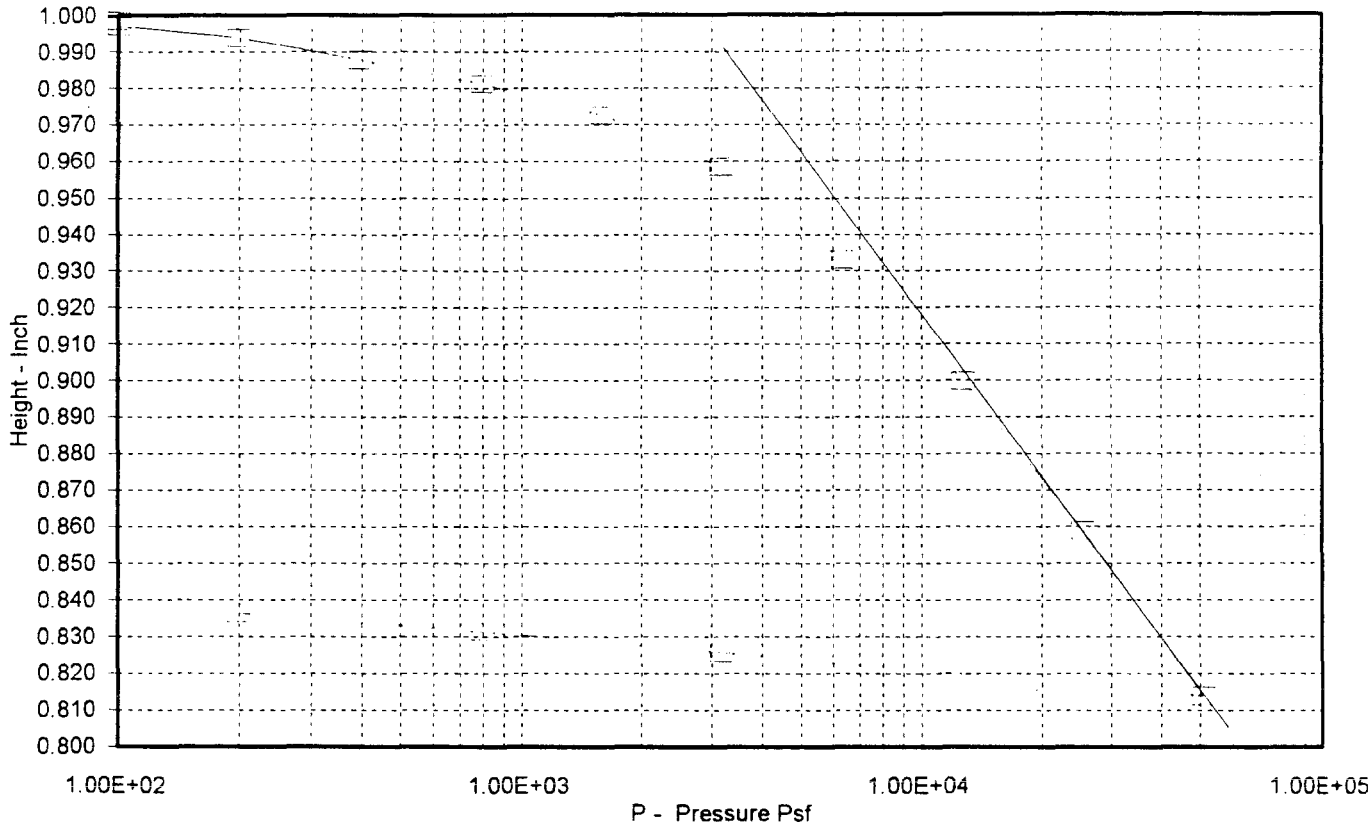
Consolidation

Boring B-5, Sample 1 at 5.5 feet



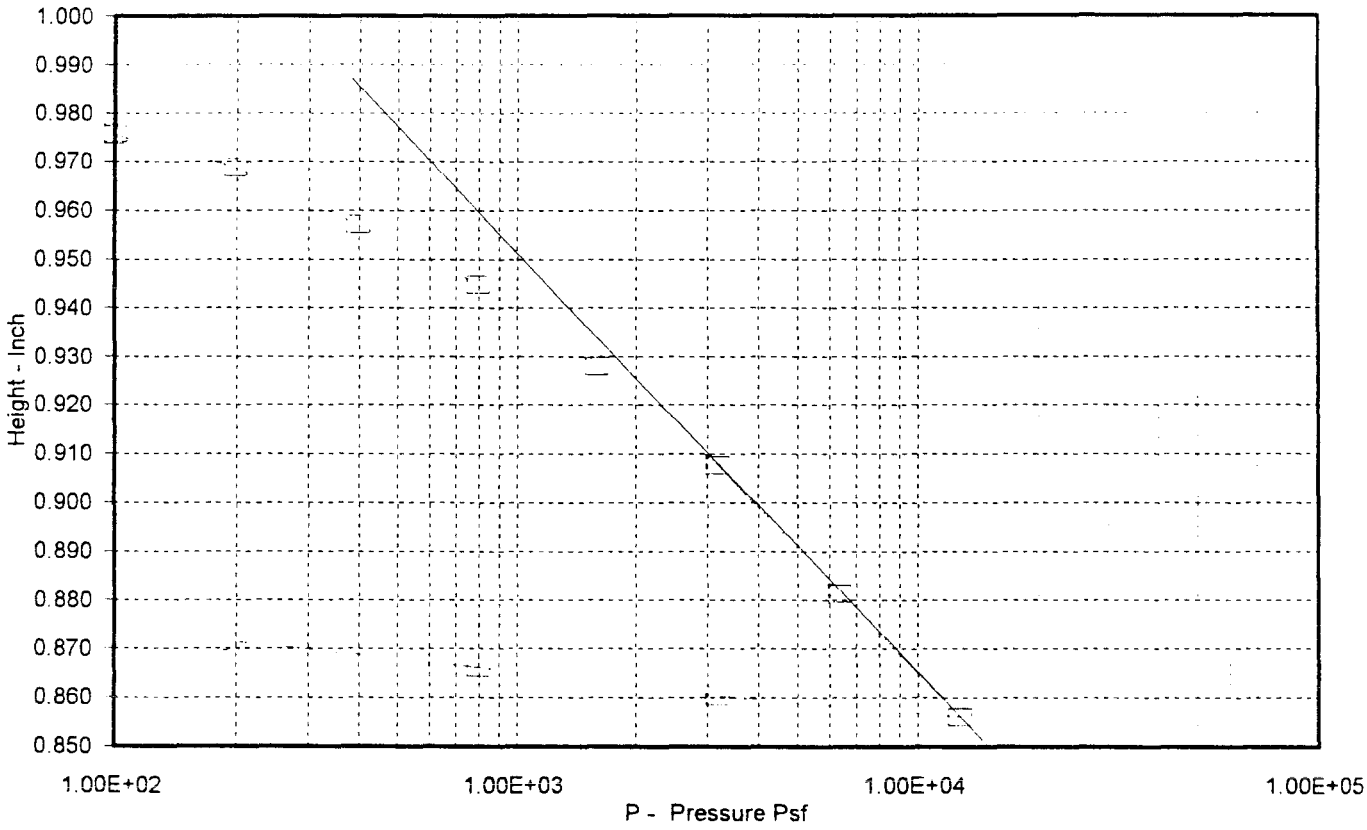
Consolidation

Boring B-5, Sample 3 at 15.5 feet



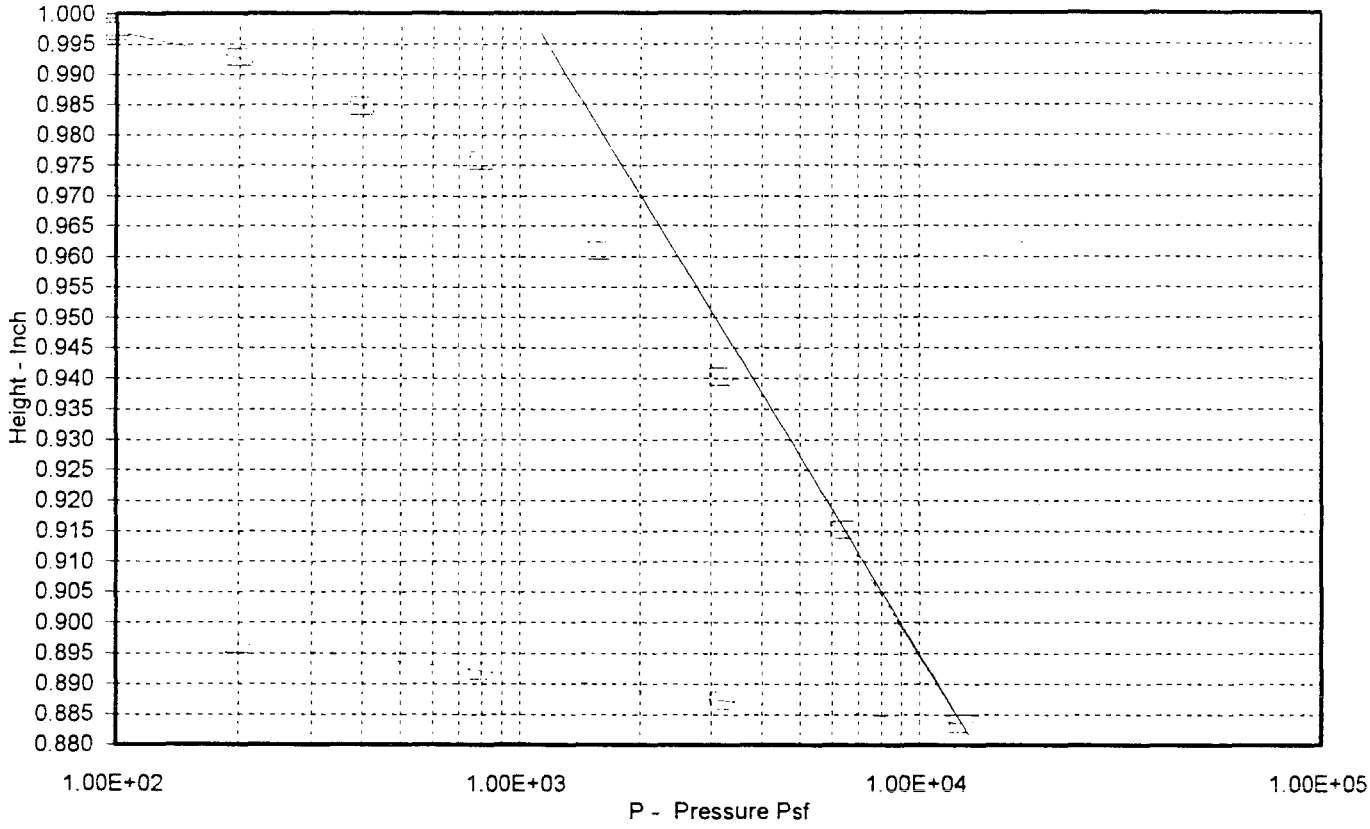
Consolidation

Boring B-5: Sample 6 at 30 feet



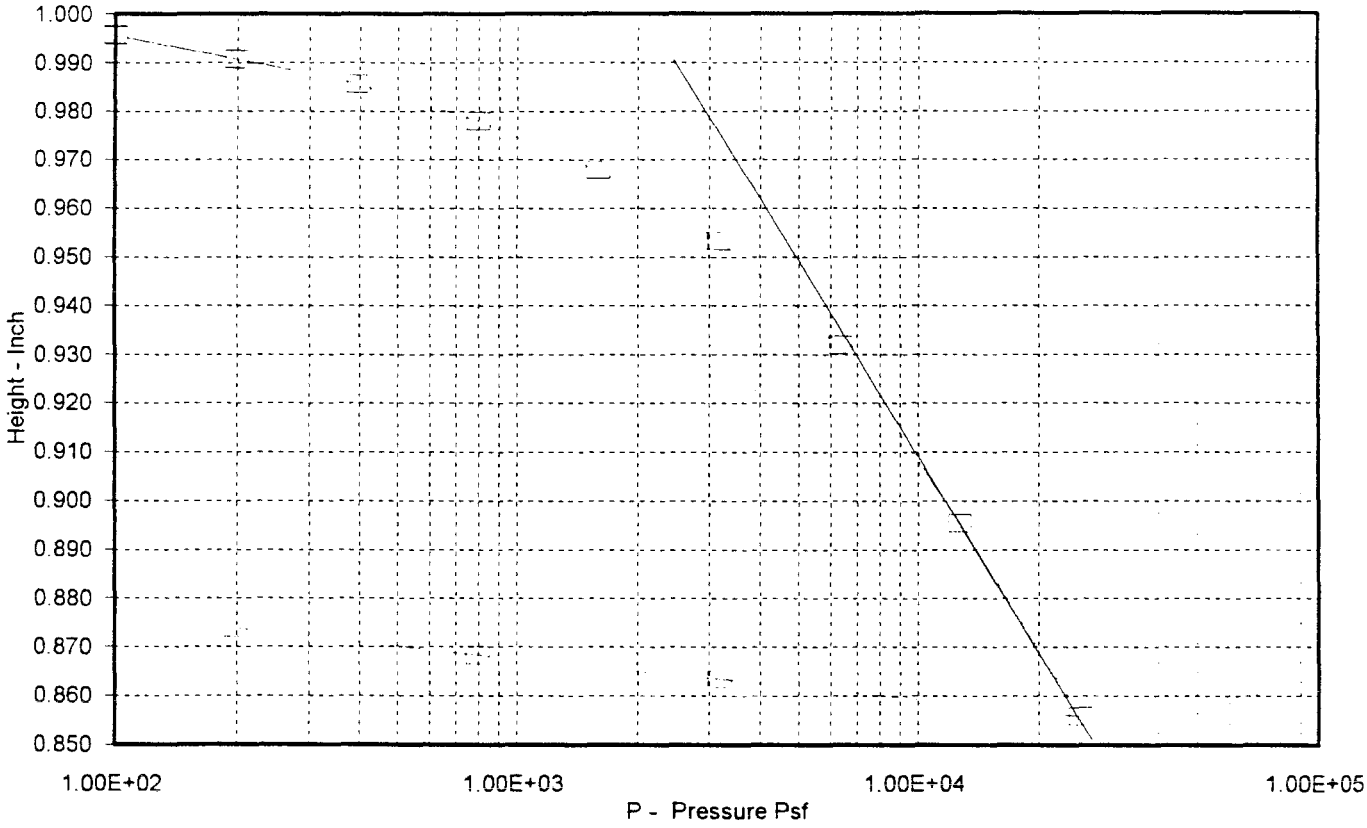
Consolidation

Boring B-8, Sample 5 at 25 feet



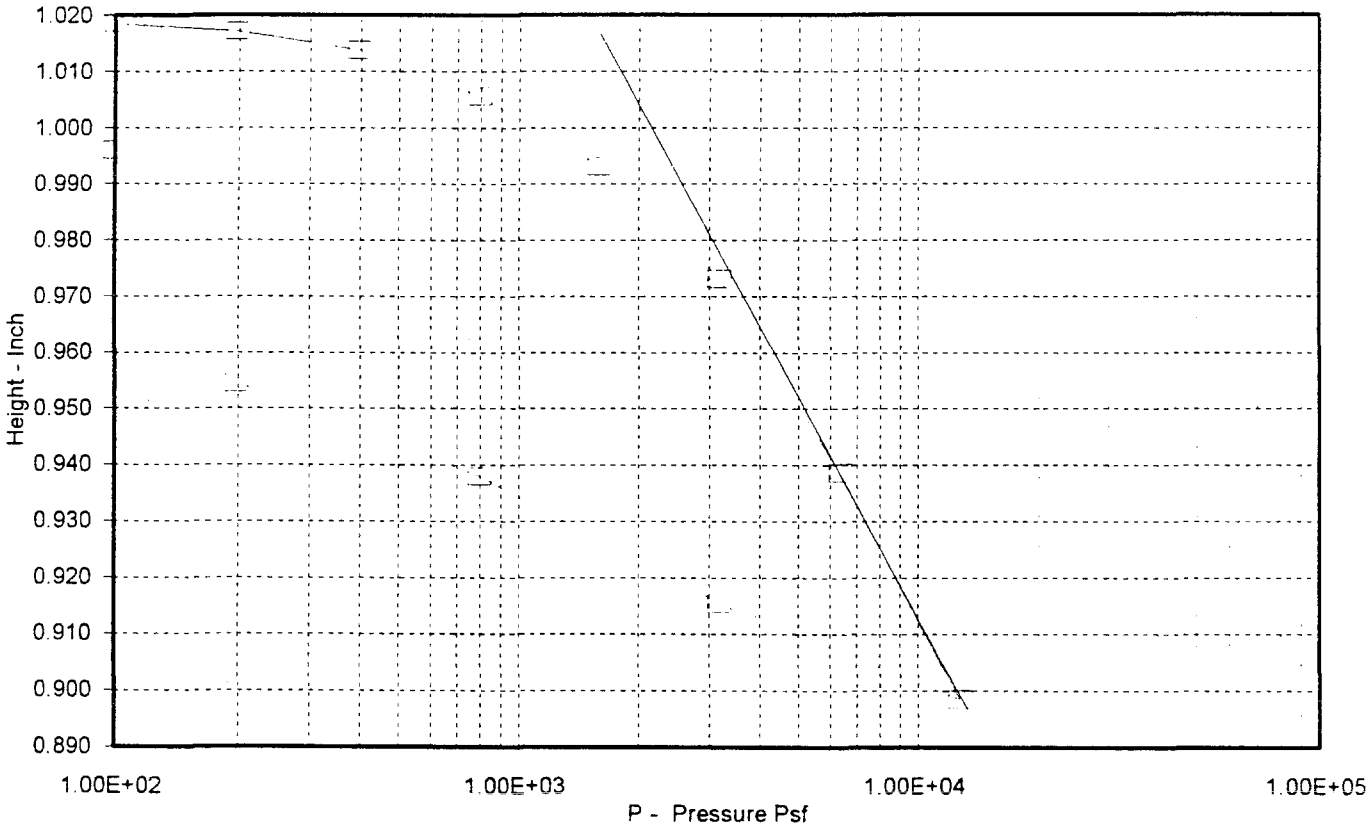
Consolidation

Boring B-9, Sample 4 at 20.5 feet



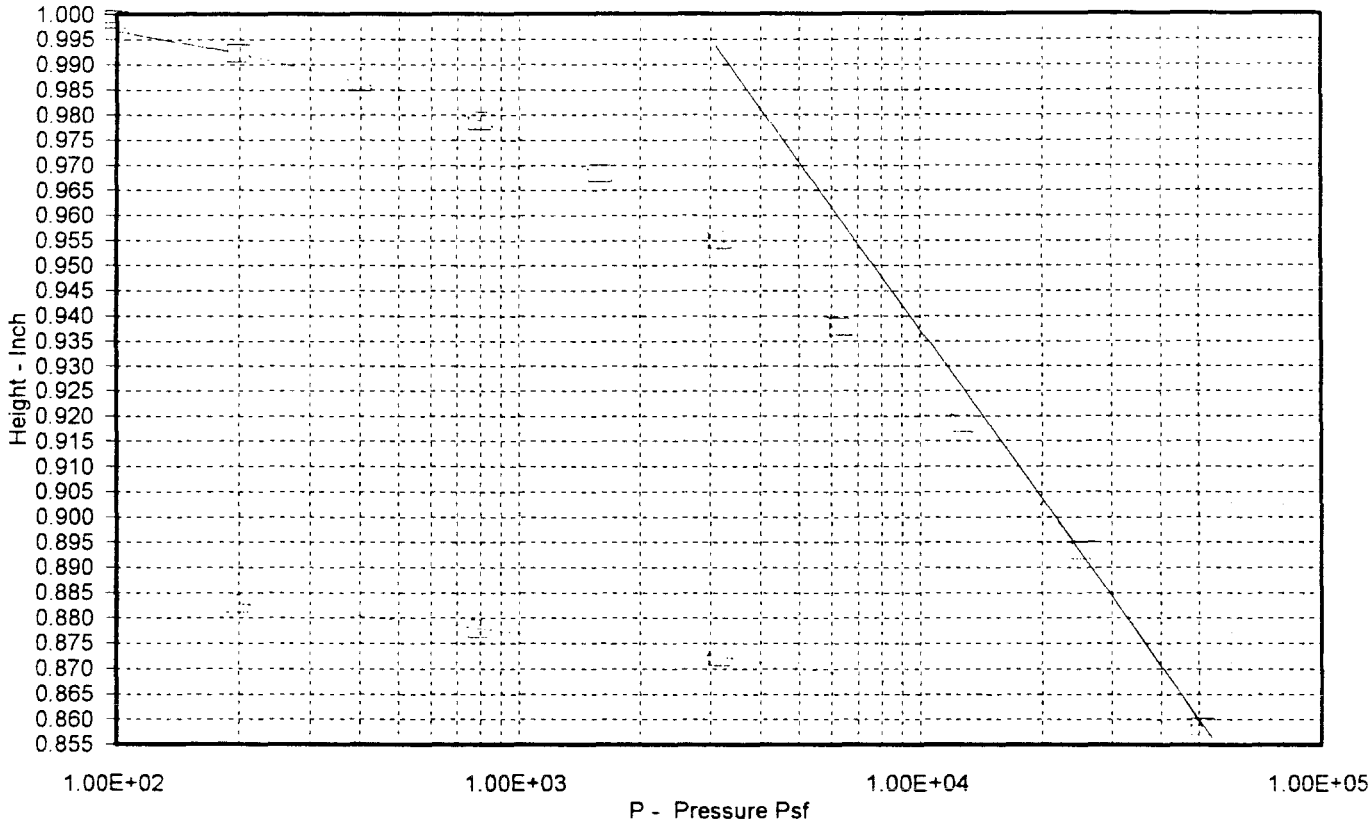
Consolidation

Boring B-9, Sample 7 at 40.5 feet



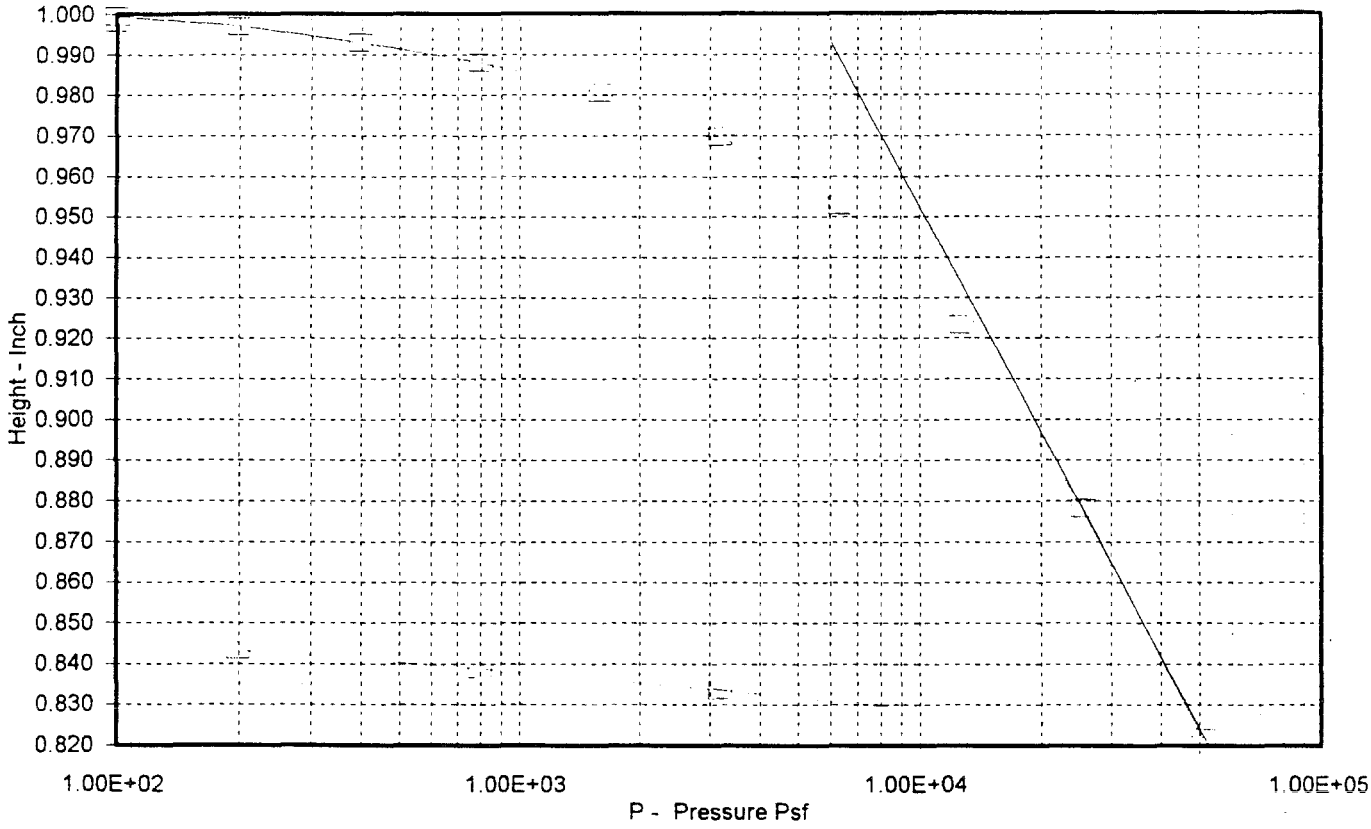
Consolidation

Boring B-10, Sample 2 at 10.0 feet



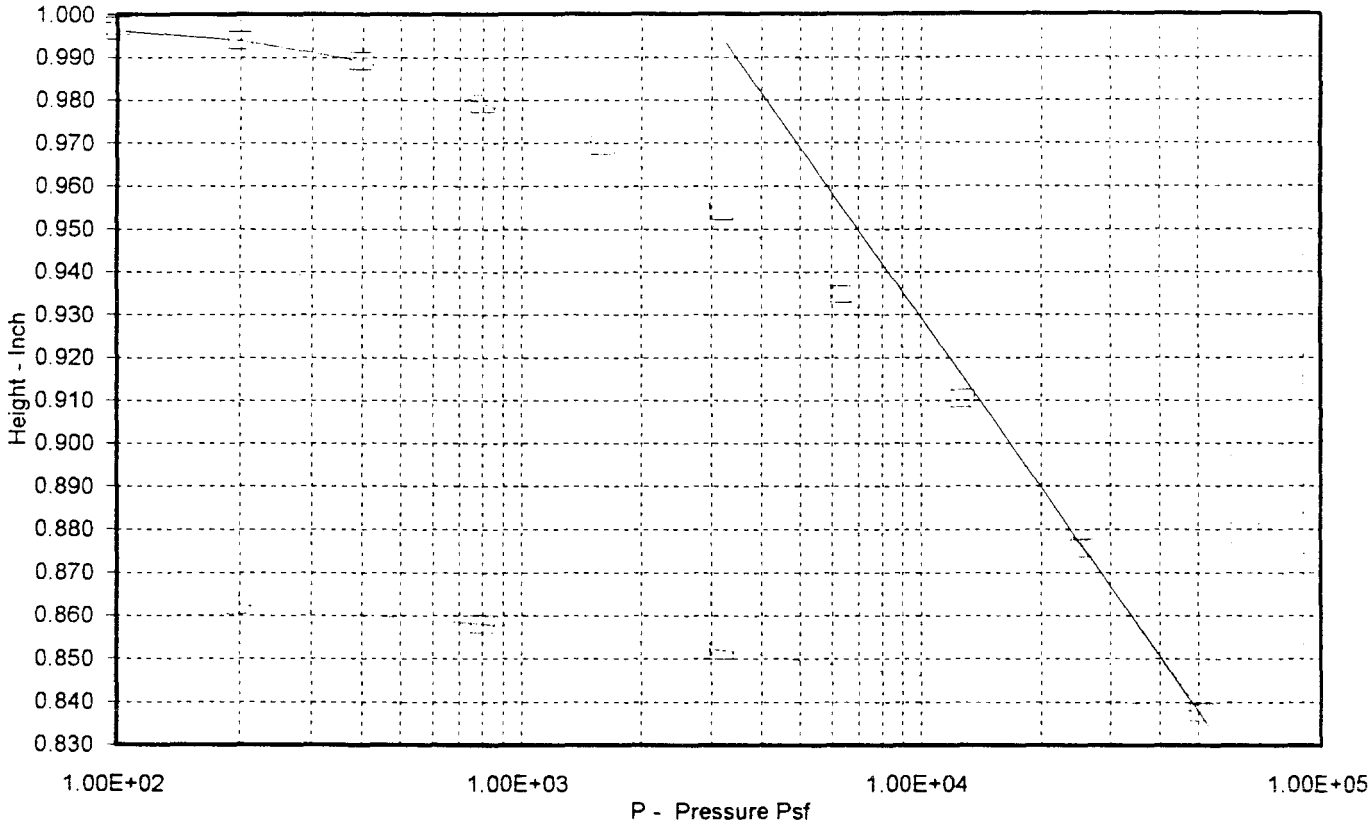
Consolidation

Boring B-11, Sample 10 at 50.0 feet



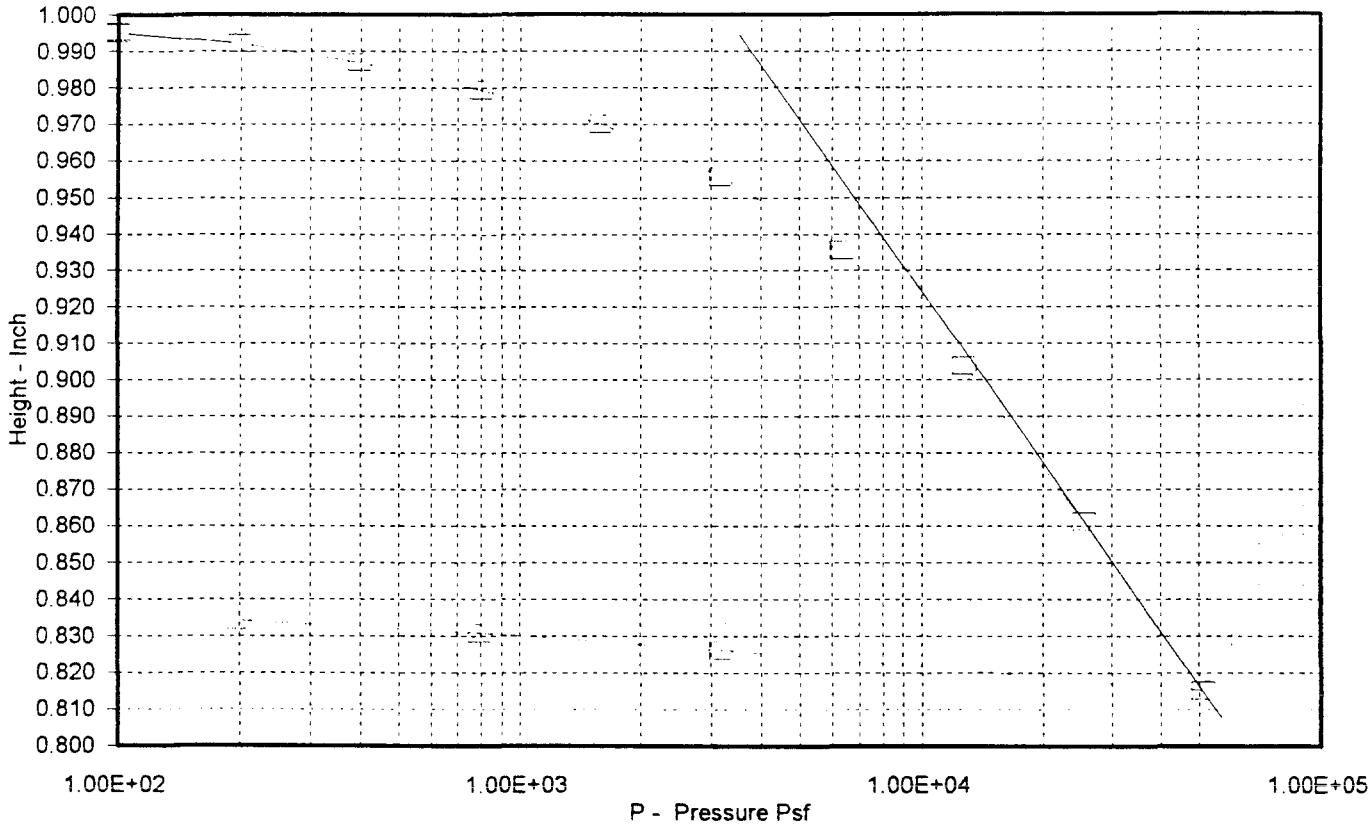
Consolidation

Boring B-13, Sample 20 at 100 feet



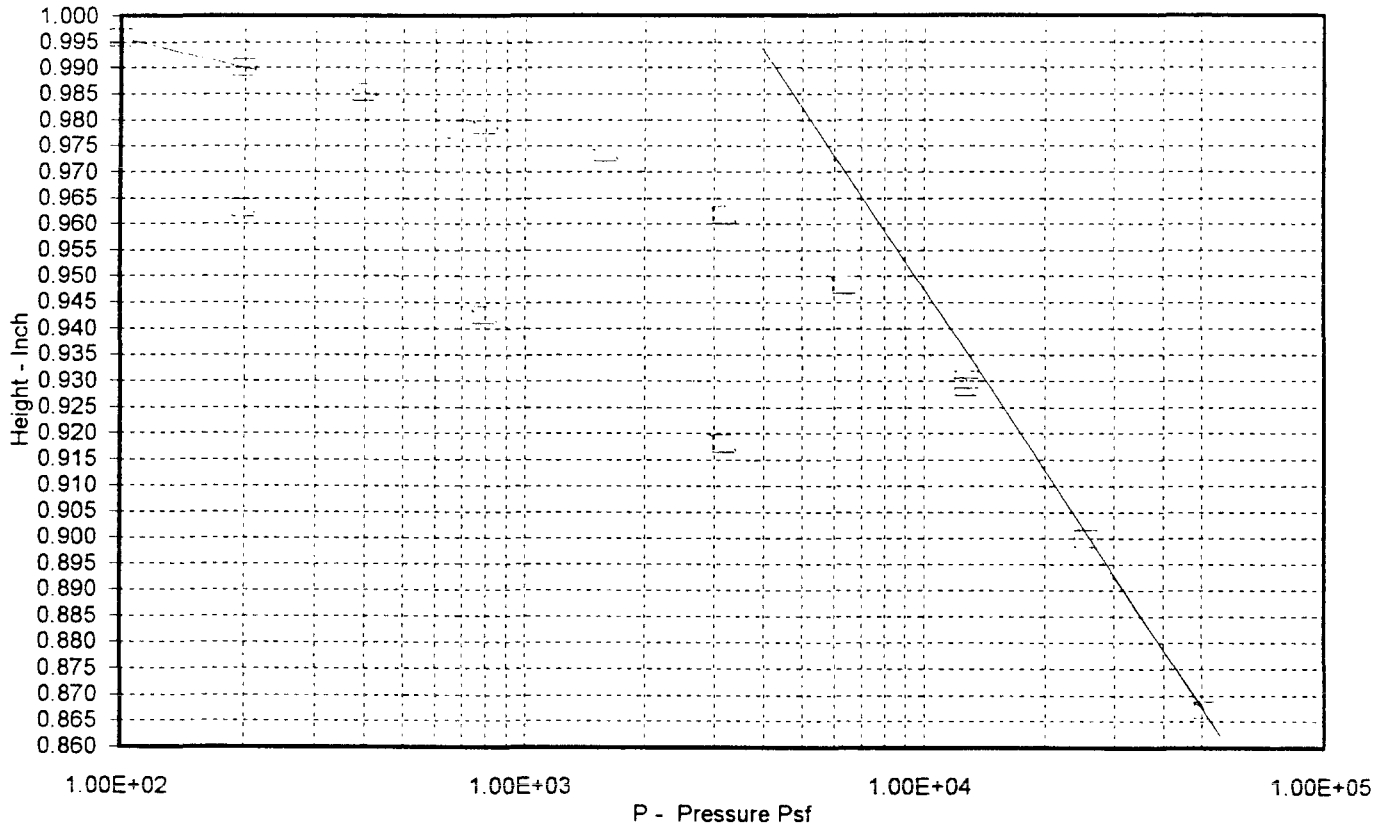
Consolidation

Boring B-14, Sample 18 at 90.5 feet



Consolidation

Boring B-21, Sample 10 at 52.5 feet



Appendix C

DAMES & MOORE

A DAMES & MOORE GROUP COMPANY

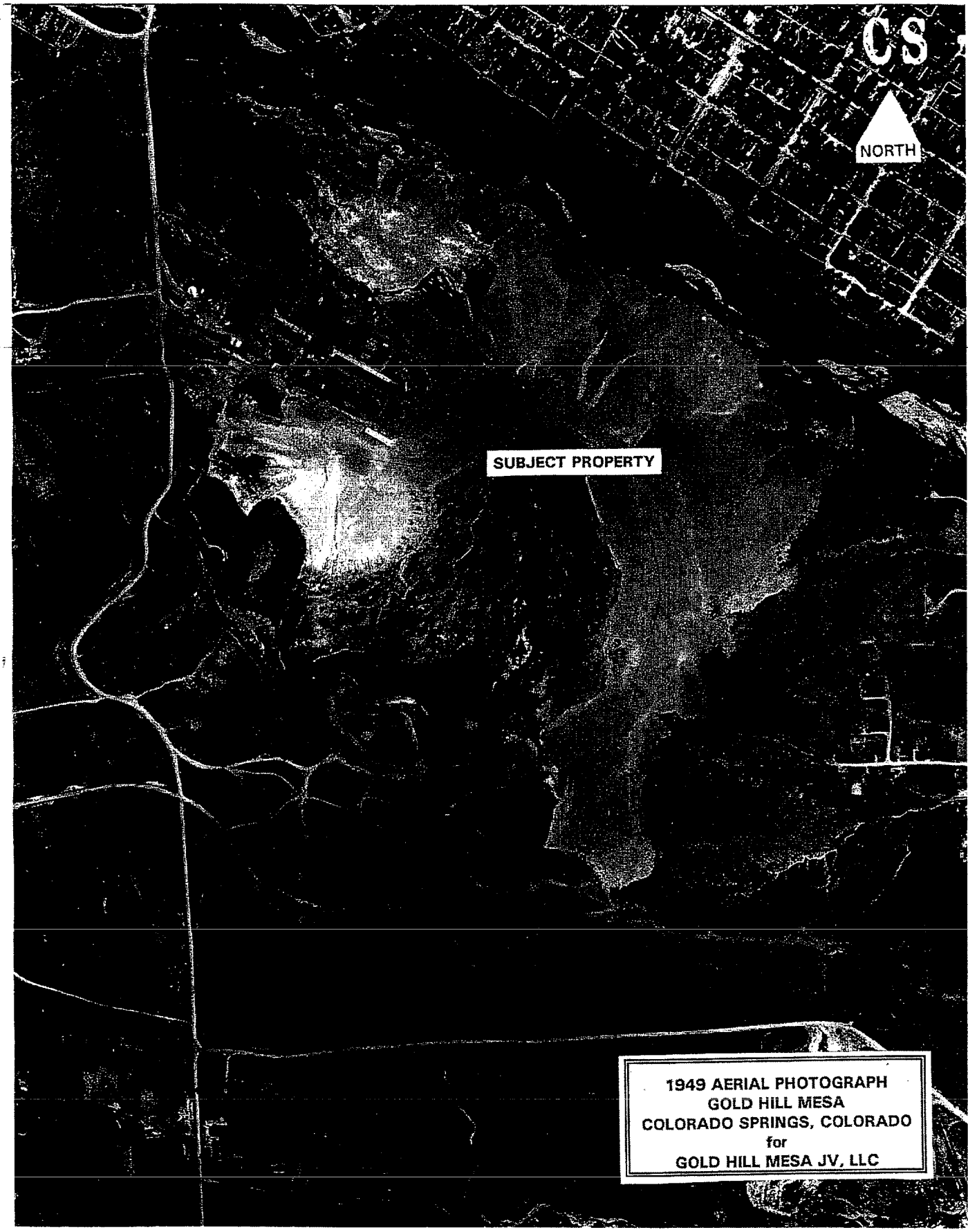
APPENDIX C

HISTORICAL SITE PHOTOGRAPHS

1998 AERIAL PHOTOGRAPH
GOLD HILL MESA
COLORADO SPRINGS, COLORADO
for
GOLD HILL MESA JV, LLC

S:\CAD_Proje 0057-GoldhillMesa\003\003Image-98.doc

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY



1949 AERIAL PHOTOGRAPH
GOLD HILL MESA
COLORADO SPRINGS, COLORADO
for
GOLD HILL MESA JV, LLC

DCM GROUP
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

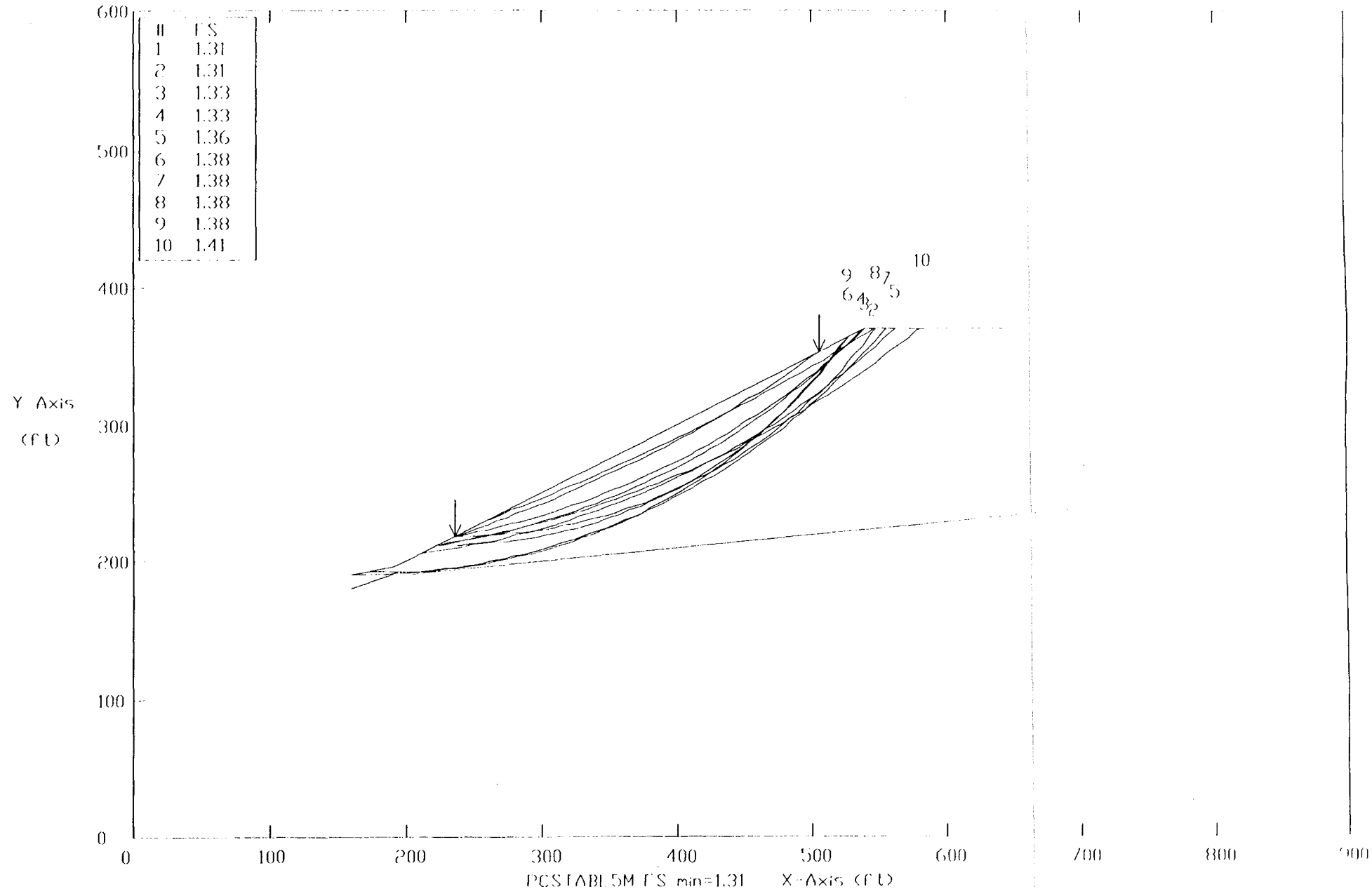
Appendix D

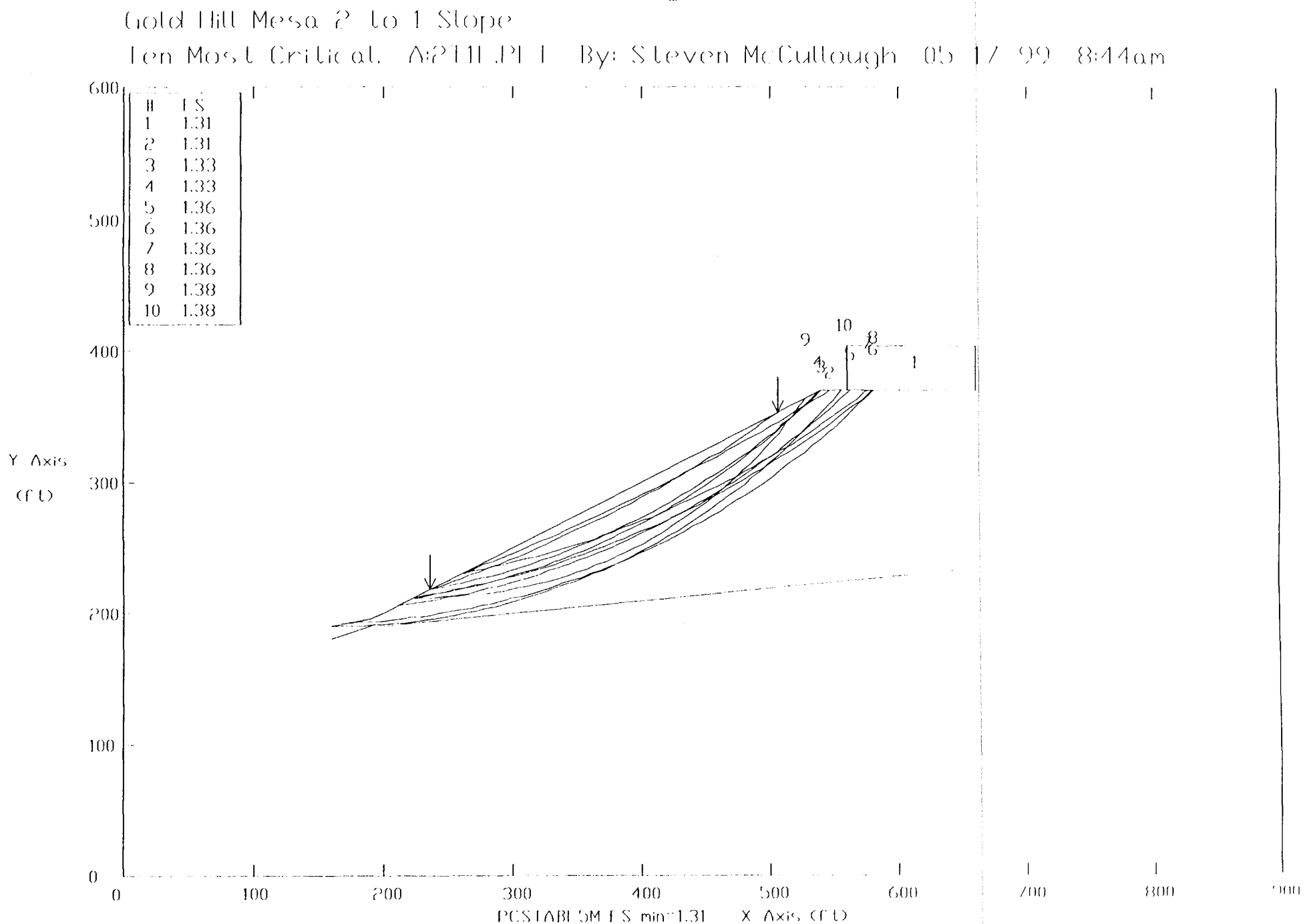
APPENDIX D

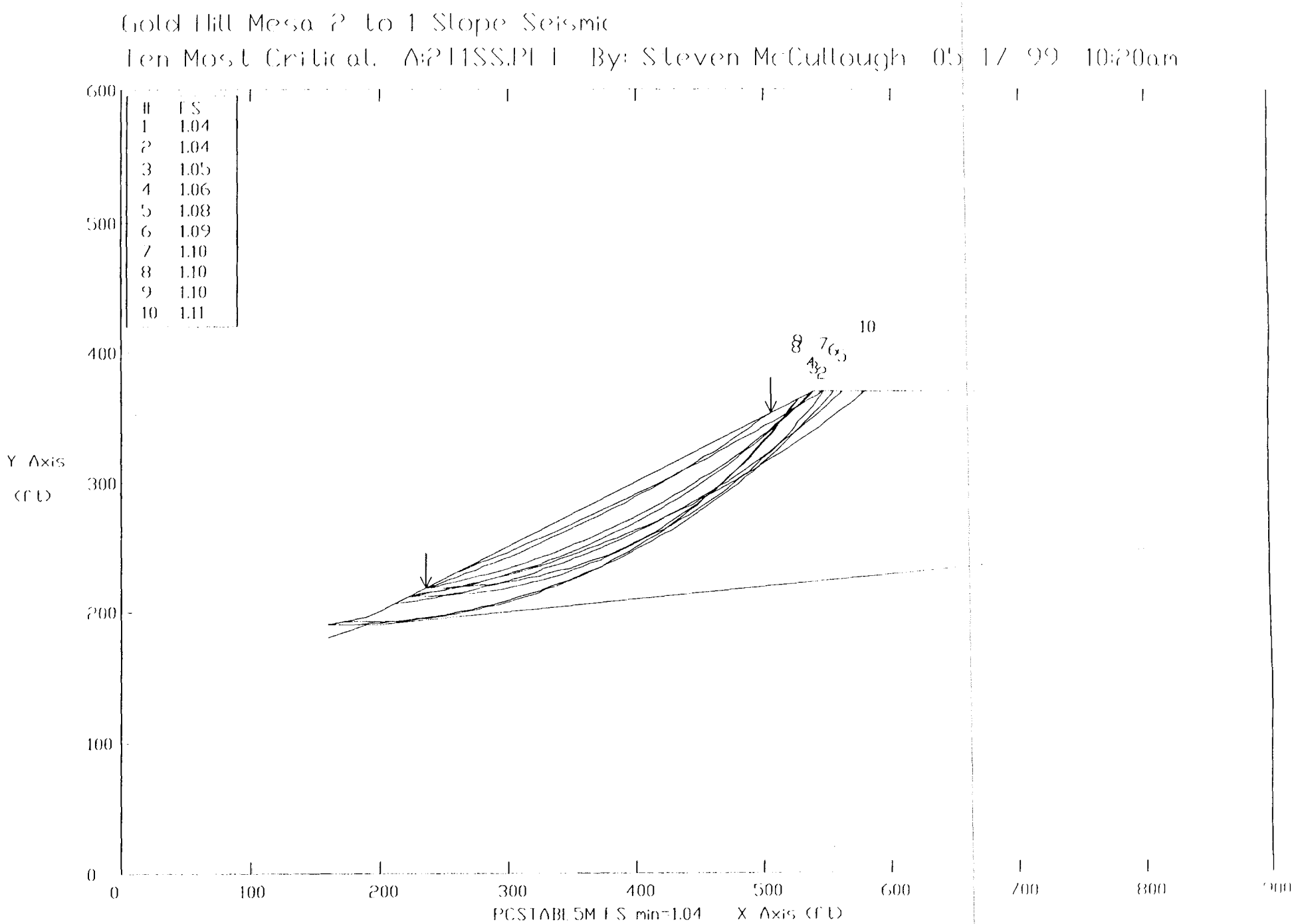
SLOPE STABILITY

Gold Hill Mesa 2 to 1 Slope

Ten Most Critical. A:2111PLT By: Steven McCullough 05 17 99 8:38am

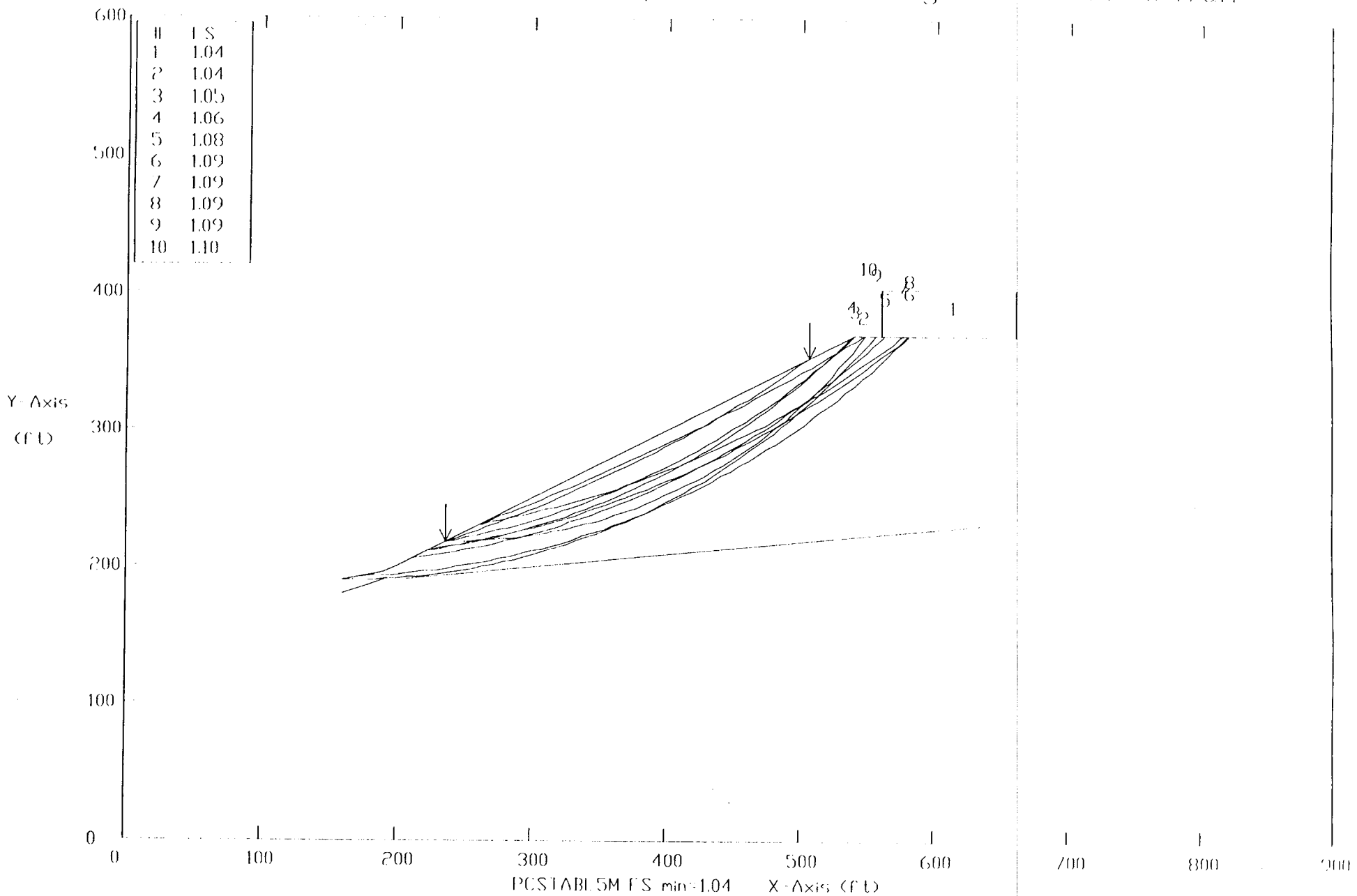


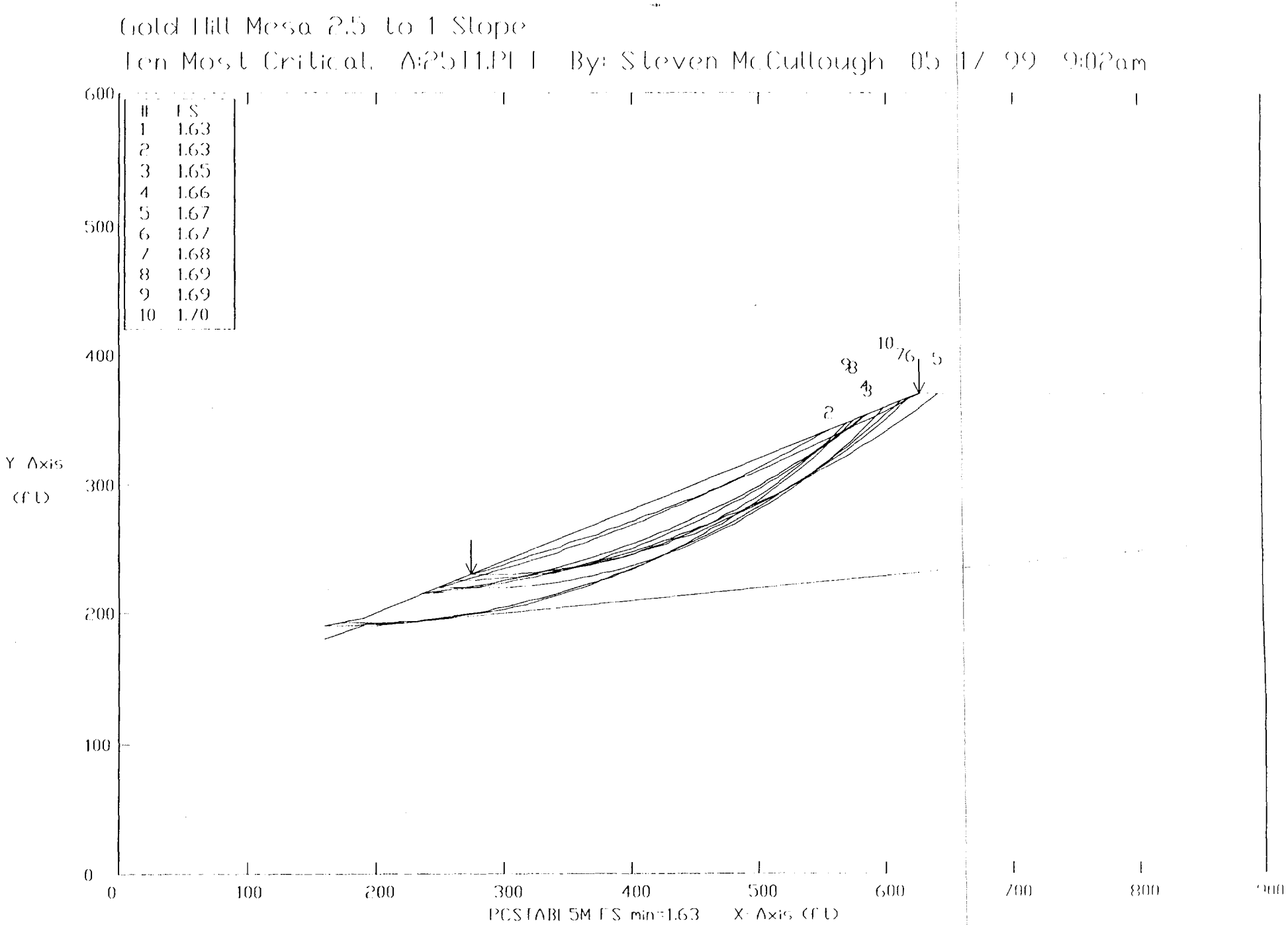

Gold Hill Mesa 2 to 1 Slope
Ten Most Critical. A:2HILPLT By: Steven McCullough 05/17/99 8:44am
FS
1 1.31
2 1.31
3 1.33
4 1.33
5 1.36
6 1.36
7 1.36
8 1.36
9 1.38
10 1.38
Y Axis (ft)
X Axis (ft)
PCSTABL5M FS min=1.31
0
100
200
300
400
500
600
700
800
900


Gold Hill Mesa 2 to 1 Slope Seismic
Ten Most Critical A:2115S.PLT By: Steven McCullough 05 17 99 10:20am
FS
1 1.04
2 1.04
3 1.05
4 1.06
5 1.08
6 1.09
7 1.10
8 1.10
9 1.10
10 1.11
10
Y Axis (ft)
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700
800
900
PCSTABL5M FS min=1.04
X Axis (ft)

Gold Hill Mesa 2 to 1 Slope Seismic

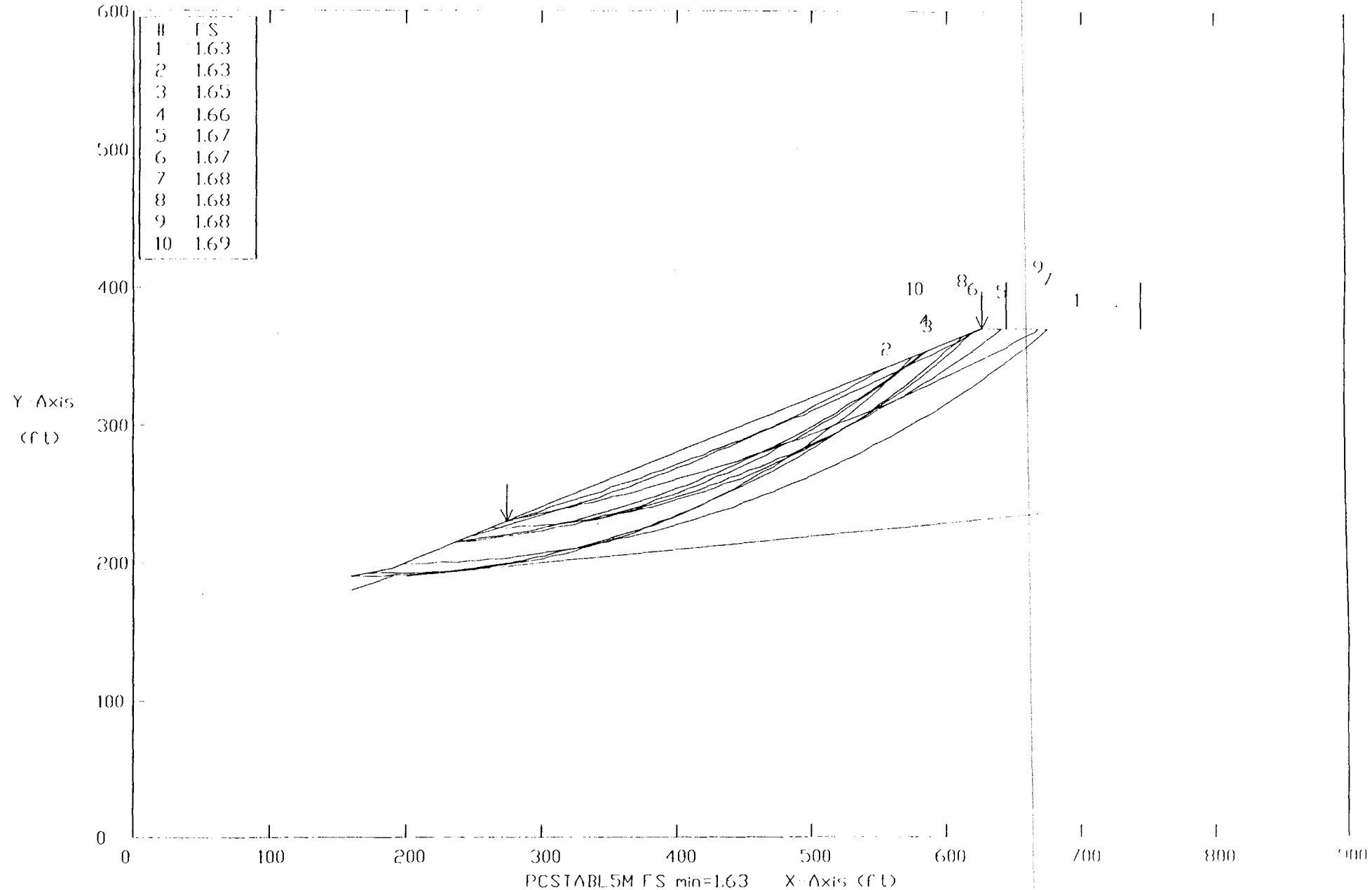
Ten Most Critical. A:PHI S.PHI By: Steven McCullough 05/17/99 8:47am




Gold Hill Mesa 2.5 to 1 Slope
Ten Most Critical A:2511.PLT By: Steven McCullough 05/17/99 9:02am
FS
1 1.63
2 1.63
3 1.65
4 1.66
5 1.67
6 1.67
7 1.68
8 1.69
9 1.69
10 1.70
Y Axis (ft)
X Axis (ft)
PCSTABL5M FS min=1.63
0
100
200
300
400
500
600
700
800
900

Gold Hill Mesa 2.5 to 1 Slope

Ten Most Critical. A25TH.PLT By: Steven McCullough 05 17 99 9:04am



Gold Hill Mesa 2.5 to 1 Slope Seismic

Ten Most Critical. A:2511SS.PLT By: Steven McCullough 05 17 99 9:08am