



Converse Consultants

Over 50 Years of Dedication in Geotechnical Engineering and Environmental Sciences

PRELIMINARY GEOTECHNICAL AND GEOLOGIC INVESTIGATION

**INDUSTRIAL NON-HAZARDOUS
DISPOSAL FACILITY
BASIC MANAGEMENT INCORPORATED
CLARK COUNTY, NEVADA**

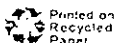
Prepared for:

Parsons Engineering Science, Inc.
100 West Walnut Street
Pasadena, CA 91124

Converse Project No. 99-33437-01

October 27, 1999

18/69BG



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October 27, 1999

99-33437-01

Parsons Engineering Science, Inc.
100 West Walnut Street
Pasadena, CA 91124

Attention: Mr. Jim Goepel

Subject: **Preliminary Geotechnical and Geologic Investigation**
Industrial Non-Hazardous Disposal Facility
Basic Management Incorporated
Clark County, Nevada

Gentlemen:

We are pleased to submit the results of our preliminary geotechnical and geologic investigation conducted for an industrial non-hazardous disposal facility at property owned by Basic Management Incorporated (BMI). The site is located immediately south and west of the operating BMI facility off Lake Mead Drive in Clark County, Nevada and is approximately 20 acres in size. The study was performed in general accordance with our proposal dated August 30, 1999, and your Notice-to-Proceed dated September 1, 1999.

The on-site soils are suitable for use as materials for structural and embankment fills for support of a disposal facility. There do not appear to be adverse geologic or engineering considerations that would severely restrict the development of the proposed facility.

Soils generally consisted of medium dense to very dense granular soils with occasional zones of moderately hard to hard cemented sand and gravel overlying very stiff clay and silts. Groundwater encountered in the borings explored for this project and ranged from 30 to 58 feet be-

low the ground surface. Cemented soils were encountered at 9 out of 12 boring locations beginning at depths ranging from 7 to 49½ feet below ground surface. Rock excavation techniques may be required for deep cuts.

If you have questions concerning information contained in this report, please contact us at your convenience.

Respectfully submitted,

CONVERSE CONSULTANTS



Algirdas G. Leskys, P.E.
Principal

AGL:MKK:gm
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Preliminary Geotechnical and Geologic Investigation

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Preliminary Geotechnical and Geologic Investigation

1.0 Introduction

This report presents the results of our preliminary geotechnical and geologic investigation performed for development of an industrial non-hazardous disposal facility at property owned by Basic Management Incorporated (BMI). The site is located immediately south and west of the operating BMI facility off Lake Mead Drive in Clark County, Nevada and is approximately 20 acres in size. We understand that BMI desires to excavate the existing near-surface soils at the site to approximate depths of the proposed disposal facility, which will be constructed some time in the future. Ideally, the excavated soils will be suitable as commercial aggregate materials that may be sold.

A vicinity map showing the location of the project within the Las Vegas Valley area is provided on Drawing No. 1. This scope of work included performing geologic mapping, field exploration, and laboratory testing and engineering analyses to provide preliminary geotechnical design criteria for the site. In conjunction with this scope of work, an environmental evaluation was performed to assess the existing residual chemical concentrations of the soils at the site. Results from this work have been submitted under separate cover.

The purposes of this investigation were to: (1) determine the geologic conditions and presence of any hazards or controlling features at the proposed site; (2) define general subsurface conditions at the sites, and delineate or determine, if possible, the presence of any features that might impact location of the project features; and (3) provide preliminary geotechnical design recommendations.

Designs are in the conceptual stage at this time. The specific type of disposal facility, related structures and other details have not been determined. Future studies will be necessary to address liner designs, slope stability, earthwork recommendations and foundation design.

2.0 Scope of Services

The following tasks were included in our scope of services:

1. A geologic and geotechnical reference search was conducted to confirm the geology and soil conditions in the area.
2. A field reconnaissance of the site was performed by our field geologist to determine the presence of geologic features that could have an impact on the project.
3. A field exploration program was conducted which consisted of drilling, logging, and sampling of twelve (12) exploratory borings to depths ranging from 33 to 60 feet. The approximate location of the borings is shown on Drawing No. 2. The location of the borings was determined in the field by PBS&J surveyors at locations requested by Parsons Engineering Science, Inc. Coordinates and elevations of the individual soil boring locations were not available at the time this report was prepared. Summaries of the subsurface conditions encountered are presented on the boring summary sheets, Drawing Nos. A-1 through A-34 presented in Appendix A. Field drilling and investigation procedures are further described in Appendix A. Samples of the subsurface soils were obtained from the borings and were taken to our laboratory for further evaluation and testing.
4. Laboratory tests were conducted on selected soil samples. Tests included solubility, Atterberg limits, grain size analysis, direct shear, moisture/density relationship, chemical analyses, solubility and permeability. Descriptions and results of the laboratory tests are presented in Appendix A.

5. Results of the field exploration and laboratory testing were evaluated and engineering analyses were performed develop appropriate preliminary recommendations for the design and construction of the proposed project.
6. This geotechnical report was prepared to present the findings, conclusions, and preliminary recommendations. Based on the soil boring logs, geologic cross sections were developed which show interpolated subsurface conditions and are presented on Drawing No. 3

3.0 Existing Site Conditions

3.1 Site Description

The site is located on the northwest portion of the Black Mountain Industrial Complex near Lake Mead Drive and Interstate 515. Two potential areas were investigated at the project site and evaluated for the proposed disposal facility. Six borings were drilled in each area.

Area 1 was located north and west of several evaporation ponds and north of the Pioneer Chlor Alkali Plant. The area was rough-graded and relatively level. A drainage ditch was located adjacent and north of Area 1. Several dirt roads crossed this area. Numerous groundwater wells were observed in this area during our site visit; however, they did not appear to be pumping. Access to this area was either through the BMI plant or by a gate accessed from Warm Springs Road. Soil borings B-1, B-4, B-5, B-8, B-10, and B12 were drilled to investigate this area and cross section A-A' developed from this information.

Area 2 was located north and west of Area 1 and nearly paralleled the west and north fence of the BMI property. Area 2 was less disturbed except near dirt roadways. Undeveloped areas generally were covered with desert vegetation and scattered debris at the time of our field investigation. Soil borings B-101 through B-106 were drilled to investigate this area and cross section B-B' shown on Drawing No. 3 was de-

veloped from this information. Only one of the borings (B-102) in Area 2 was located inside the fence of the BMI property.

Based on our investigation, no major subsurface variations were observed at either of the above areas at the site. The soil materials encountered in both areas were found to be of the same type and have the same engineering properties. The following sections present information applicable for both areas.

3.2 Subsurface

Based on results of our subsurface explorations and subsurface explorations performed by others, the subsurface is characterized by alluvial granular soils overlying fine-grained soils, the top of which generally coincides with the groundwater table. The depth of the contact between the granular soil top and the fine-grained soils was encountered from approximately 34 feet to 55 feet below ground surface. The location of this material contact is shown on geologic cross sections A-A' and B-B' on Drawing No. 3.

The granular subsoils generally consisted of medium dense to very dense granular fill and native soils overlying localized zones of moderately hard to hard cemented sand and gravel. The fine-grained soils consisted high plasticity silts and lean clays. Granular fill soils 2 to 14 feet deep were encountered in 10 of the borings. Small boulders and large cobbles were encountered in several of the borings. Cemented soils were not encountered in Boring Nos. 1, 5 and 8 for this investigation. The depths to the cemented soils for the other borings are provided below in Table No. 1.

Table 1 - Depth to and Thickness of Cemented Soils

Boring Location	Depth To Cemented Soils (ft)	Thickness of Cemented Soils (ft)	Cemented Soil Description
B-4	39	1	Hard
B-4	48	6	Moderately Hard to Hard

Boring Location	Depth To Cemented Soils (ft)	Thickness of Cemented Soils (ft)	Cemented Soil Description
B-10	14	16	Moderately Hard
B-12	21	2	Hard
B-101	49.5	0.5	Moderately Hard
B-102	7	10.5	Moderately Hard
B-102	38	2	Moderately Hard
B-103	37	5	Moderately Hard
B-104	25	4	Moderately Hard
B-104	40	3.5	Hard
B-105	17	3	Moderately Hard
B-105	38	>2	Hard
B-106	31	>2	Hard

Field and laboratory test results indicate that the native granular soils at the site have a low compressibility, moderate to high internal angles of friction, low potential for gypsum solubility, a low chemical (salt) heave potential, and contain sulfate salts in concentrations considered harmful to normal strength concrete. The fine-grained soils encountered at depth at the site generally were found to be moderately compressible, have a high expansion potential, and have relatively low permeabilities. Ranges of laboratory test results for the soils are summarized in Table No. 2 and the individual test results and procedures are presented in detail in Appendix A.

Table No. 2 - Summary of Laboratory Test Results

*Properties	Range of Results
Solubility	0.0 to 0.6 percent
Laboratory Max Density (ASTM D1557)	129.7 to 132.1 pcf
Optimum Moisture Content D 1557	7.5 to 8.7 percent
Angle of Internal Friction	26 to 43 degrees
Percent Passing the No. 200 Sieve	8 to 20 percent
Permeability (cm/s)	1.2×10^{-3} to 1.7×10^{-7}
Plasticity Index	Nonplastic to 34

*The laboratory tests are described in detail in Appendix A.

Free groundwater was encountered at depths between 30 and 58 feet below ground surface. Groundwater was measured in the borings immediately following drilling and levels may not have stabilized in the boreholes. A summary of the groundwater elevations encountered in the borings, which extended to groundwater is summarized in the following table:

Table 3 - Depth to Groundwater at Time of Drilling

Boring Location	Depth to Groundwater (ft)
B-1	53
B-4	54.5
B-5	52.5
B-8	58
B-10	46.5
B-12	37.5
B-101	42
B-102	43
B-103	42.5
B-104	43.5
B-105	30
B-106	30

4.0 Site Conditions

4.1 Topography and Vegetation

The native topography of the site is characterized by moderately sloping alluvial fans that lie at the base of the McCullough Range. These piedmont surfaces (areas geologically formed at the base of mountains) slope to the north and northeast, and coalesce in several areas near the proposed disposal facility. The relatively flat surfaces of the alluvial fans in the area are sparsely vegetated with creosote bushes, weeds, and other native plants typical of the Mojave Desert. The eastern two-thirds of Area 1 had been rough graded and was relatively level. Vegetation was very sparse in this area.

Several small north to northeast-trending washes cross the fans and the western portion of the site providing drainage for natural storm-water runoff from the uplands to the south. Most of these washes vary in size from about 10 to 20 feet across. The terrain within the washes consist of gentle to moderate bar-and-swale topography with numerous bar deposits of cobbles and gravel.

4.2 Geologic Soil Units

Our mapping has been based upon review of aerial photographs, published geologic and soils maps, site reconnaissance, and field exploration program. Within the general project area, two different geologic soil units were identified for the purposes of this work. The approximate boundary between the two units is the BMI property fence. Geologic descriptions of the units are based on the *Soil Conservation Service* (SCS) of soil classification and are given below:

Caliza Soil

This soil corresponds to *SCS Soil Map Unit 187* and is described as a very deep, well drained, cobbly fine sandy loam with 2 to 8 percent slopes. This soil is formed in alluvium derived from various types of rock and found on inset fan remnants. The subsurface is predominantly very gravelly coarse sand to a depth of 5 feet or more. Permeability is moderately rapid, available water capacity is low, and runoff is medium. The hazard of water erosion is slight, and the hazard of soil blowing is moderate if the surface is disturbed. Intermittent streams form the drainages in this unit. These drainages are subject to rare or occasional periods of high-velocity flooding.

Urban Land

This unit corresponds to *SCS Soil Map Unit 615* and consists of areas covered by asphalt, concrete, and buildings or other urban structures. The entire BMI complex including the undeveloped areas within the fenced property is mapped in this unit.

5.0 Geologic Conditions

5.1 Geologic Setting

The project area is located in the southeastern portion of the Las Vegas Valley, a structural basin of late Mesozoic and Tertiary block faulting origin. The valley is physiographically characteristic of the Basin and Range province. Valley deposits are Tertiary and Quaternary Age unconsolidated sediments derived from the surrounding mountains; the local sources of deposition are the McCullough Range to the south and the River Mountains to the east. Alluvial deposits consisting of gravel, sand, silt, and clay are overlain by lacustrine deposits of sand, silt, and clay in some portions of the valley. The alluvial and lacustrine sediments can be up to 4,000 feet thick in some parts of the valley. Coarse-grained alluvial fan deposits are located near the base of the mountains and grade into and interfinger with fine-grained sand, silt, and clay deposits in the central portion of the valley.

5.2 Drainage

Primary drainage for the valley is toward the southeast along four major wash systems: Las Vegas Wash, Flamingo Wash, Tropicana Wash, and Duck Creek Wash. These four systems consist of a series of channels of varying lengths and depths that originate along alluvial fans at the base of the Spring Mountains. The channels drain the valley to the southeast where they all coalesce into Las Vegas Wash. Several drainages near the proposed disposal facility divert stormwater runoff from the area to Las Vegas Wash and its tributaries.

5.3 Geologic and Environmental Hazards Review

Existing geologic data, including past Converse project files and references from the U.S. Soil Conservation Service, U.S. Geological Survey, Nevada Bureau of Mines and Geology, aerial photographs, and information through the State Universities were reviewed as part of this in-

vestigation. According to our review, two north-trending fault scarps are located approximately ½ mile northwest and southwest of the proposed site. The first is located along the fringe of the McCullough Mountains. The northern terminus of this fault scarp is located approximately 690 feet south of Lake Mead Drive and 1,050 feet west of Interstate 515. The second scarp is located near the vicinity of Gibson Road and American Pacific Drive. No evidence for faulting was observed within the proposed disposal facility site.

The *Subsidence-Related Faults and Fissures of the Las Vegas Valley Map*, published by the Nevada Bureau of Mines and Geology, *Subsidence in Las Vegas Valley 1980-91 Final Project Report*, John W. Bell and Jonathan G. Price, 1991, did not indicate topographic lineations regarded as a subsidence-related (compaction) fault were located near the proposed site. It is generally agreed that subsidence-related faults are not bedrock faults, although their displacement may have been at least partly induced by a seismic event. Others have dated the age of one of these escarpments in the southern part of the valley at about 14,000 to 35,000 years old. Fissures, surface expressions of differential stress resulting from regional and local subsidence due to withdrawal of groundwater, have been localized near subsidence-related faults. The nearest subsidence related faults and fissures are located approximately 2.3 miles northwest of the proposed disposal facility near Whitney Mesa.

The potential for landslides is believed to be low due to the nature and proximity of the topographic highlands to the project area and low precipitation in the region.

5.4 Estimated Ground Accelerations

Las Vegas Valley is located in Seismic Zone 2B as categorized in the Uniform Building Code. Zone 2B represents a low to moderately active seismic area. A regional map published by Algermissen and Perkins (1976) presents the expected peak horizontal ground acceleration for the Las Vegas Valley as approximately 0.1g. This value has a 10 per-

cent chance of being exceeded in a 50-year period. Site specific seismicity model analyses have been performed by Converse on other projects in the Las Vegas Valley. This analysis has typically found the peak horizontal ground acceleration of an event having a 10 percent chance of exceedance during a 100-year design life to range between 0.2g and 0.3g. For an event having a 10 percent chance of exceedance during a 50-year design life, the peak horizontal ground acceleration has ranged between 0.1g and 0.2g. The peak horizontal ground acceleration recommended for the design of the project is 0.15g. Based on our subsurface explorations and well drillers' logs in the area, a soil profile type of Sp per Table 16-J of the 1997 Uniform Building Code should be used for the site.

6.0 Site Evaluation and Preliminary Recommendations

6.1 General

Based on (1) our review of published geologic maps; (2) our geologic site reconnaissance, (3) the results of the preliminary field and laboratory investigations ; and (4) and assuming that the proposed facilities will not be developed to within 8 feet or closer of the fine-grained soils encountered at depth, it is our opinion that from a geotechnical engineering perspective, the site is suitable for support of the proposed disposal facility. We did not identify geologic hazards that would severely restrict development of the proposed disposal facility. Granular native site soils will provide support of the facility with some reworking. Cemented soils were found at shallow to moderate depths in 9 of the 12 borings drilled for this investigation. Based on observed excavation activities performed on other nearby projects, the majority of the soils should be rippable with conventional earthwork equipment, however, deep cuts into fully cemented soil deposits could require rock excavation techniques.

One design consideration will be requirements pertaining to liner permeability as related to the availability of near-surface, low-permeability native soils. As previously mentioned, the subsurface soils are char-

acterized by alluvial granular soils overlying fine-grained soils, the top of which coincides with the groundwater table. The granular soils above the fine-grained soils and groundwater table were tested to have relatively high permeabilities (greater than 1×10^{-5} cm/sec) and are not suitable as potential liner material. Due to regulatory requirements and the subsurface site conditions, development of the site as a disposal facility will probably require placement of either synthetic or non-synthetic (clay) liners. Synthetic liners could include membranes manufactured of high density polyethylene or a similar material. If a clay liner is used, a borrow source containing materials which meet regulatory permeability criteria would need to be identified and investigated. Another possible alternative, which is a combination of the above, is a geosynthetic clay liner which is constructed both of geotextile and/or geomembrane and bentonite. The appropriate regulatory agencies should be contacted during the design process to establish a dialogue as to which liner systems are allowed for the given waste stream and site conditions.

In order to provide geotechnical design recommendations for the proposed project, additional field explorations, laboratory testing, and engineering analyses should be performed. Additional field investigations related to excavatability of the on-site cemented soils may be desirable to perform and could include additional borings at cut areas and seismic refraction tests. After details of the project are finalized and design information is available, specific design recommendations should be developed in the design-level investigation.

The following sections present an engineering evaluation and preliminary considerations for the proposed site and facilities. The preliminary recommendations are for planning and should be confirmed with a final design-level investigation.

6.2 Foundations

Disturbed soils and undocumented fill soils are not considered suitable for the support of structures or retaining walls in their present condition. It is our opinion that structures may be supported on spread footings founded on a zone of properly placed and compacted structural fill, undisturbed medium dense to very dense granular native soils or on moderately hard to hard cemented soils. Individual footings should not bear on both cemented soils and uncemented soils. Actual bearing materials can be determined after foundation loads and elevations have been determined.

Depending on the type of construction, the proposed structural loads, and the depths of footings, we estimate that the maximum allowable bearing pressures for conventional spread footings will range from 4,000 to 6,000 psf on cemented or non-cemented native granular soils or granular structural fill. Concrete floor slabs may be supported by a 4 to 6 inch layer of processed and compacted granular fill material underlain by structural fill or undisturbed, dense native soils.

6.3 Cut Slopes and Fill Embankments

Cut slopes into medium dense to very dense native granular soils or cemented soils should provide stable slopes on which waste disposal liners may be placed. For any proposed embankments, medium dense to very dense native granular soils or a zone of properly placed and compacted structural fill or cemented soils should provide adequate support for the embankments and disposal facilities after the surface vegetation and organics have been removed and the foundation preparation has been conducted. For embankments, we recommend a homogeneous embankment section consisting of either on-site or import soils. The on-site soils are suitable for use as materials for embankment fill or other structural fills. Fill soils and disturbed native granular soil beneath the embankment sections or any areas which will support liner systems will require scarification, moisture conditioning, and recompaction.

Surfaces of the cut or embankment slopes will need to be adequately protected from erosion due to rainfall and runoff. The stability of the cut or embankment slopes should be analyzed during the final design-level investigation after locations, geometry and heights have been determined. The ranges of cut and embankment slopes given in Table No. 4 may be used for preliminary planning.

Table No. 4 - Slopes for Preliminary Planning

Cut Slope or Embankment Soil Type	Approximate Slope (Horizontal:Vertical)
Sands and Gravels	1½:1 to 2:1

It should be noted that typical slopes on which liners will be constructed are usually not recommended to be steeper than 3:1 (horizontal to vertical). Slopes would need to be analyzed on an individual basis with proposed liner types and expected loads for the appropriate maximum steepness in the design-level investigation.

6.4 Retaining Walls

We anticipate that conventional concrete retaining walls may be used for the project. The appropriateness of concrete walls will depend on the height, length, and configuration of the walls. After wall details have been determined, information on different options and approximate costs can be provided in the design-level investigation. Ranges of lateral earth pressures for restrained and unrestrained walls are given in Table 5 below:

Table No. 5 - Lateral Earth Pressures

Wall Type	Lateral Earth Pressures psf/ft
Restrained	38-45
Unrestrained	30-40

The site soils generally contain too high a percentage of fines to be free draining. On-site material may be processed to reduce the silt and clay content and to remove oversize material, to obtain a free draining backfill material. If free draining material is not used, a drainage system will need to be provided or the wall designed to resist hydrostatic forces.

7.0 Construction Considerations

7.1 Site Grading

It is anticipated that site grading will be a large component of development of the site. Site grading should consist of: (1) the removal of existing vegetation, pavements, debris, surface trash and possibly some underground utilities that may be relocated from the site; (2) the undocumented fill, loose or disturbed native soils should be processed and stockpiled for later use as engineered fill; (3) excavating down to medium dense to very dense granular soils or down to expose the underlying cemented soils for support of any foundations; (4) overexcavation and recompaction of the natural soils will be required for the support of any structures; and (5) the exposed native soils will require scarification, moisture conditioning and recompaction prior to placing structural fill in fill areas. Scarification and recompaction can be terminated where cemented soils are exposed. The existing on-site soils should be suitable for use as compacted structural fill. All fill at the site should be considered undocumented unless records of proper placement were prepared and are obtained. All undocumented fill at the site will be unsuitable for support of structures and settlement-sensitive facilities at the site will need to be reworked as structural fill. Rubble and debris resulting from excavating cemented soil deposits should be considered undocumented fill. Contingency plans should be considered for removing small boulders, cobbles, and broken cemented material resulting from excavations of cemented soil from the project site. Boulders, cobbles, and cemented material between 4 and 24 inches in diameter may possibly be used in deep fill where potential

settlement may be tolerated areas if special compaction procedures are used and full-time observation during placement is provided.

There will be shrinkage when excavating and compacting or scarifying and recompact the non-cemented on-site soils, and swell when excavating and compacting cemented soils. The shrinkage and swell factors provided in Table No. 6 may be used for preliminary planning.

Table No. 6 - Shrinkage and Swell Factors for Preliminary Planning

Soil Type	Estimated Shrinkage (-) or Swell (+) Factor (percent)
Sands and Gravels	5 to 15 (-)
Cemented Soils	0 to 10 (+)

A shrinkage factor of 5 to 15 percent may be used for preliminary planning in areas where the exposed native soils will be compacted to a depth of 6 inches. For final design, the anticipated shrinkage and swell factors for the on-site soils should be determined in the design-level investigation.

7.2 Excavations

Based on observations made during our field explorations, the majority of non-cemented soils should be readily excavatable with conventional earthwork equipment. Partially to fully cemented (moderately hard to hard) soils were encountered during this investigation at depths of 7 to 49½ feet below the existing ground surface. Heavy-duty ripping, heavy-duty backhoe, headache ball, rocksaw, blasting, or Ho-ram should be anticipated for any deep excavations. The Contractor should be aware of the potential for vibrational damage to adjacent or nearby structures when using blasting or heavy impact equipment during removal of the hard cemented materials.

7.3 Soil Corrosivity

Laboratory test results indicate that according to Clark County Building Department standards, soils should be considered moderately to severely corrosive to buried metal and have sulfate levels above that considered harmful to normal strength concrete and soil cement. Consideration should be given to corrosion protection systems for buried metal. The concrete mixture recommendations to accommodate severely corrosive soils should be based on the design-level investigation.

7.4 Final Design Recommendations

Additional design-level investigations will be required, when final facility and structure layouts and dimensions have been determined. Borings should be located within the foot-print of the facilities or structures and laboratory testing should be performed to evaluate the nature and engineering properties of the native subsoils at those locations and, if possible, any potential import materials. It may also be desirable to evaluate the extent and rippability of cemented soils.

8.0 Closure

Our assumptions, conclusions, recommendations, and opinions presented herein are: (1) based upon the geologic site reconnaissance, (2) based upon our evaluation and interpretation of the findings of the preliminary field exploration and laboratory programs, (3) based upon an interpolation of soil conditions between and extrapolation beyond the boring locations, (4) based on our geotechnical experience in the locale, (5) not based on environmental regulatory requirements for disposal facility design and construction and are only based on standard geotechnical engineering considerations (6) subject to confirmation of the conditions encountered during a design-level investigation, and (7) prepared in accordance with generally accepted professional geotechnical engineering principles and practice. We make no other warranty, either express or implied.

It has been our pleasure to serve you on this project. If you have any questions, please contact this office.

Respectfully submitted,

CONVERSE CONSULTANTS



Lorraine Linnert Dunford
Project Geologist



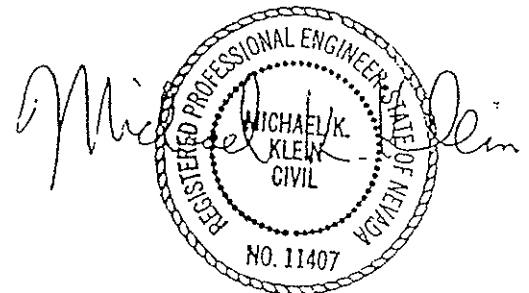
Mike Klein, P.E.
Senior Engineer

Reviewed by:



James L. Werle, P.G.
Principal Geologist

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Encl: Drawing Nos. 1 through 3
Appendix A

Dist: 3/Addressee

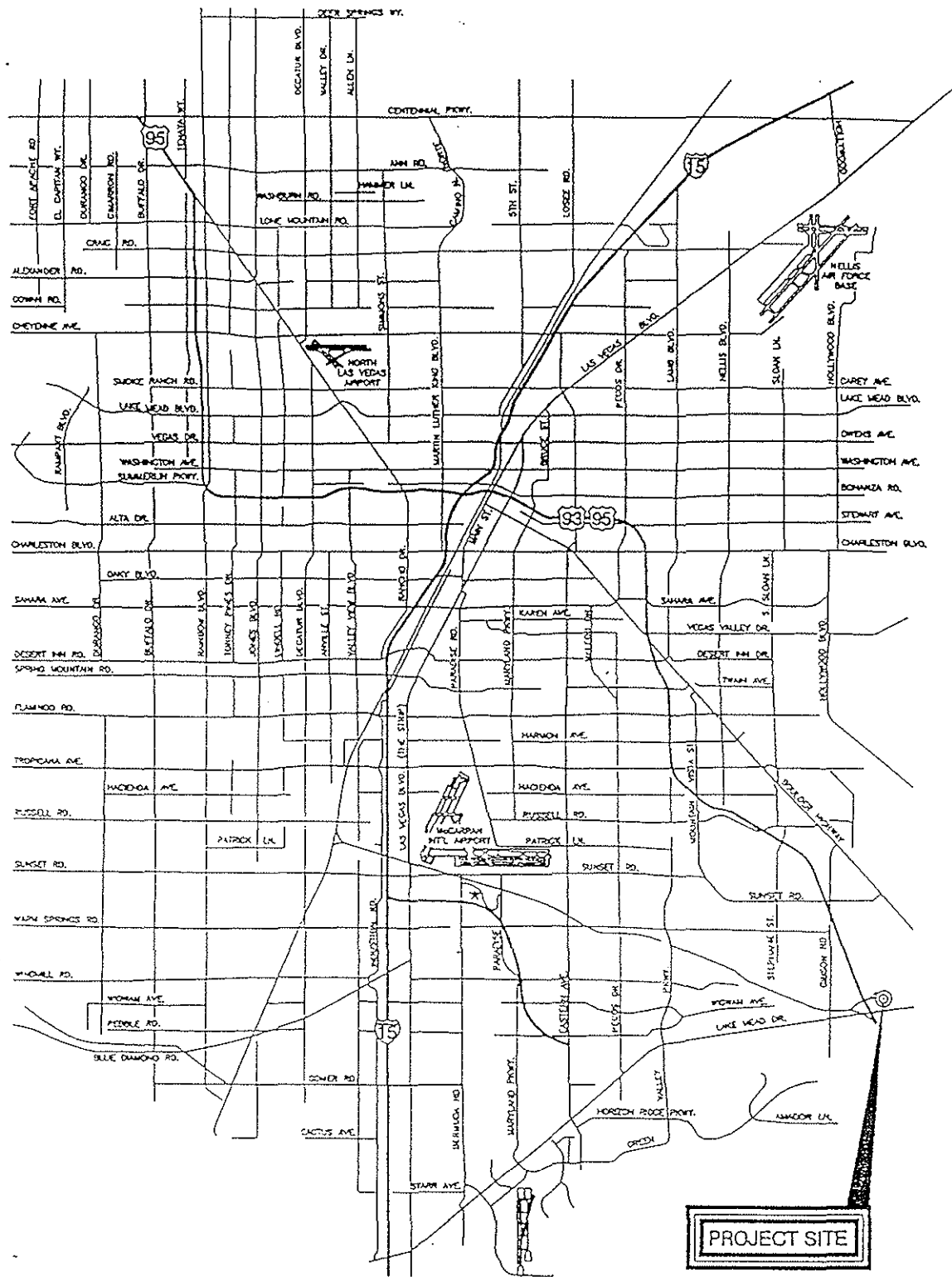


Preliminary Geotechnical and Geologic Investigation

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LAS VEGAS VICINITY

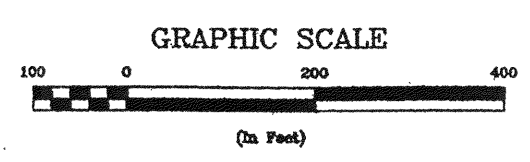
PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
 Basic Management Incorporated
 Clark County, Nevada

Scola	N.T.S.	File No.
Date	10/21/99	Project No.
Drafted By	GLE	99-33437-01
Checked By	MKK	Drawing No.
Approved By	[Signature]	



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Over 50 Years of Dedication
 in Engineering and
 Environmental Sciences

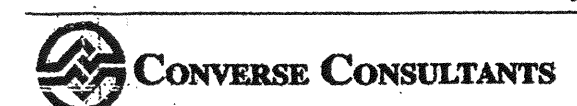


- EXPLANATION**
- APPROXIMATE SOIL BORING LOCATION
 - APPROXIMATE LOCATION OF GEOLOGIC SECTION
(See Drawing No. 3)

REF: AutoCAD drawing file "site.dwg", supplied by client

LOCATION OF SUBSURFACE EXPLORATIONS

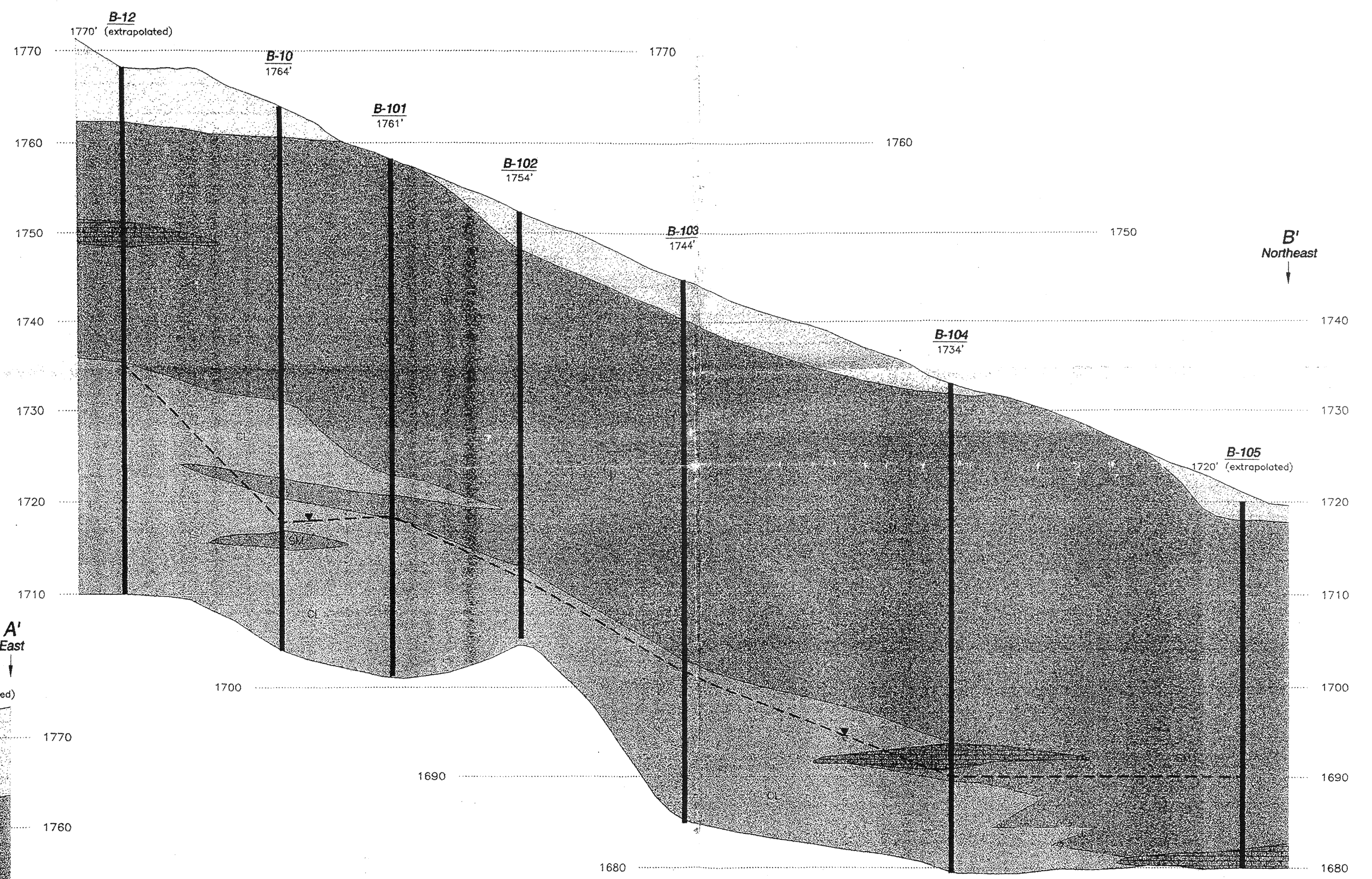
PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada



Over 50 Years of Dedication
 in Engineering and
 Environmental Sciences

Scale	1" = 200'	File No.	43701002
Date	10/21/99	Project No.	99-33437-01
Drafted By	GLE	Drawing No.	
Checked By	MKK		
Approved By			

B
Southwest

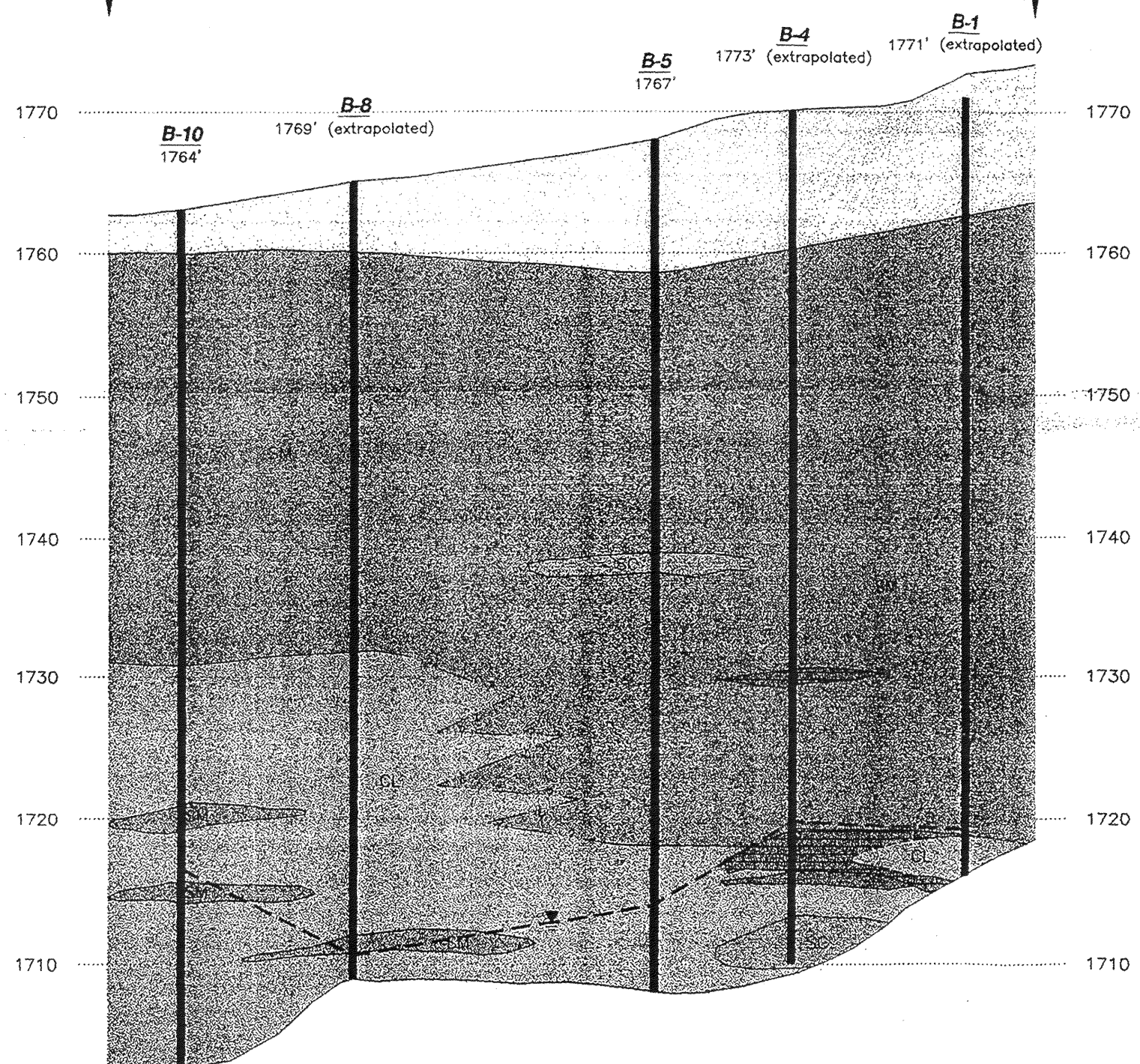


B'
Northeast

SECTION A-A'
SCALE: 1" = 10' (VERTICAL)
1" = 250' (HORIZONTAL)
VERTICAL EXAGGERATION = 25X

A
West

A'
East



SECTION B-B'
SCALE: 1" = 10' (VERTICAL)
1" = 250' (HORIZONTAL)
VERTICAL EXAGGERATION = 25X

- LEGEND**
- FILL
 - CLAY
 - CLAYEY SAND
 - SILTY SAND
 - SAND
 - CEMENTED SAND AND GRAVEL
 - APPROXIMATE GROUNDWATER LEVEL MEASURED IMMEDIATELY AFTER DRILLING

NOTE: Ground surface elevations were extrapolated from a topographic map provided by the client. Locations and elevations of the soil borings are approximate. Data concerning subsurface conditions has been obtained at exploration locations only. Actual conditions between explorations may differ from the generalized profiles shown here.

GEOLOGIC SECTIONS		Scale 1" = 300'	File No. 43701003
PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION		Date 10/28/99	Project No. 99-33437-01
Basic Management Incorporated Clark County, Nevada		Drafted By GLE	Drawing No.
CONVERSE CONSULTANTS		Checked By LLD	3
Over 50 Years of Dedication in Engineering and Environmental Sciences		Approved By	



Field and Laboratory Investigations

Field Investigation

The subsurface soil conditions were explored by drilling 6 borings in each of the two areas (total of 12 for the site) to depths ranging from 33 to 60 feet below ground surface. The approximate locations of the explorations are shown on Drawing No. 2, Locations of Subsurface Explorations. Boring locations were located, surveyed, and staked by PBS&J surveyors, however, at the time this report was prepared this information was not available. Continuous logs of the subsurface conditions as encountered in the explorations were recorded at the time of drilling by a field geologist. The subsurface conditions encountered were visually classified in accordance with the Unified Soil Classification System. Summaries of the subsurface conditions encountered are presented on the boring summary sheets, Drawing Nos. A-1 through A-34. A key to soil symbols and terms is found on Drawing No. A-35. The soil classification system for engineering purposes is further explained on Drawing No. A-36.

Drilling was accomplished with a BK-81 hollow-stem auger drill rig equipped for soil sampling. Relatively undisturbed soil samples were obtained using a 2.42-inch inside diameter Converse sampler driven with a 140-pound hammer free-falling through a distance of 30 inches. Sampler driving resistance, expressed as blows per 12 inches of penetration, is presented on the boring logs at the respective sampling depths. The sampled soil is retained in brass rings 1-inch in height which line the sampler. A representative portion of each sample was retained and carefully sealed in waterproof plastic containers for transport to the geotechnical laboratory. Additional samples were collected in 6-inch high stainless steel sleeves for environmental laboratory analysis. Soils with stains and orders due to potential chemical contamination are noted on the soil boring logs. It should be noted that given the coarse grained materials encountered at the site, undisturbed sample recovery was low. Also, the encountered materials



in the borings classified as boulders could have also been cobble size as well as boulder size particles.

Pocket Penetrometer

At the time of drilling, pocket penetrometer tests (pp) were conducted in the ends of selected brass ring samples of fine-grained soils as they were received from the borings. The purpose of the tests was to give an indication of the unconfined compressive strength in tons per square foot (tsf) or unconfined shear strength in kips per square foot (ksf) of the soil. A Brainard-Kilman S-170 pocket penetrometer was used. The results of the tests are presented in the Field or Laboratory Tests column of the boring logs, Drawing Nos. A-1 through A-34.

Laboratory Investigation

Laboratory tests were conducted on representative soil samples for the purpose of classification, and determination of their physical properties and engineering characteristics. The amount and selection of the types of testing for a given study are based on the geotechnical conditions of the project. Test results are presented in the summary boring logs and in this appendix. A summary of the various laboratory tests conducted by our office for engineering purposes is presented as follows.

The soil samples presently stored in our laboratory will be discarded 30 days after the date of this report, unless this office receives a specific request to retain the samples for a longer period.

Moisture Content and Dry Density

Data obtained from these tests, performed on relatively undisturbed samples obtained from the field and in accordance with ASTM D2435, were used in the classification and correlation of the soils and to provide qualitative information regarding soils strength and compressibility. Test results are presented on the boring logs on Drawing Nos. A-1 through A-34.

Grain Size Distribution

Grain size distribution for soil samples were determined by sieve analysis in accordance with ASTM C136. A sieve analysis is conducted by passing the soil through a number of different sized sieves and measuring the amount of soils retained on each sieve. The test results and grain size distribution curves are presented on Drawing Nos. A-37 through A-48.

Atterberg Limits

The liquid limit, plastic limit and plasticity index of a representative sample of the fine-grained soils were determined to aid in the classification of the soils and in the evaluation of other engineering parameters. The test was performed in general accordance with ASTM test method D4318. The results of the tests are tabulated in the following table:

Exploration Location	Sample Depth, ft.	Liquid Limit, %	Plastic Limit, %	Plasticity Index	Unified Soils Classification
B-1	30-35	NP	NP	NP	SM
B-5	20-25	NP	NP	NP	SM
B-10	30-35	NP	NP	NP	SM
B-12	10-15	NP	NP	NP	SM
B-101	39-40	105	71	34	MH
B-101	54-55	54	44	10	ML
B-102	20-25	NP	NP	NP	SM
B-102	49-50	88	58	30	MH
B-103	30-35	NP	NP	NP	SM
B-104	10-15	NP	NP	NP	SM
B-105	20-25	NP	NP	NP	SW-SM
B-106	0-5	NP	NP	NP	SM

NP = Nonplastic

Solubility

Solubility tests were performed to determine the amount of water-soluble materials (principally gypsum) present in the soil. After drying a soil specimen weighing approximately 150 grams in a 60-degree centigrade oven, about 2 liters of tap water are passed through the specimen. The soil is then oven-dried and the amount of soluble materials lost is calculated based on the original dry weight of the soil. The results of the solubility test are presented in the following table:

Exploration Location	Sample Depth (Feet)	Soil Description	Solubility (% by Unit Weight)
B-4	2-2.5	Fill - Poorly graded sand	0.2
B-5	10-15	Silty sand with gravel	0.6
B-8	19-20	Silty sand with gravel	0.2
B-101	5-10	Silty sand with gravel	0.0
B-102	0-5	Fill - Silty sand with gravel	0.6
B-104	0-5	Silty sand with gravel and cobbles	0.4
B-106	0-5	Silty sand with gravel	0.0

Consolidation

The apparatus used for the consolidation tests is designed to receive a one-inch high brass ring containing an undisturbed soil sample as it comes from the field. Tests were performed in general accordance with ASTM D2435 test method. Loads are applied to the test specimen in several increments, while resulting deformations are recorded at selected time intervals. Porous stones are placed in contact with both ends of the specimen to permit the ready addition or release of water. Samples are initially tested at their field moisture content. After consolidating at the field moisture content with a 2 ksf surcharge load, the specimens are inundated with water. Additional consolidation that occurs with a 2 ksf load after the specimens are inundated with water (hydrocollapse) is measured. Subsequent consolidation with additional loads is measured at the increased moisture content to determine soil behavior under saturated conditions. Results of the tests are

shown on Drawing Nos. A-49 through A-56, entitled *Consolidation Test* and are summarized on the following table:

Exploration Location	Depth (feet)	Soil Description	Dry Unit Weight, pcf	Moisture Content, %	Hydrocollapse (percent)*
B-1	29-30	Silty sand with gravel	105	6	3.2
B-8	39-40	Sandy lean clay	57.4	64	0.4
B-8	49-50	Sandy lean clay	69.5	51.1	-0.6
B-10	54-54.5	Sandy lean clay	60.7	67.7	-0.6
B-101	39-40	Sandy lean clay	65.8	45	-0.2
B-101	59-60	Sandy lean clay	73.2	38.3	-0.6
B-102	49-50	Sandy lean clay	67.3	48.7	-0.5
B-105	34-35	Well graded sand with silt and gravel	101	5	0.1

NA: Not available

* A negative sign indicates swell occurred upon inundation with water instead of collapse.

Laboratory Maximum Density

Laboratory maximum density tests were performed on selected samples of the granular soils. The purpose of the test was to define the compaction characteristics of these soils, and to aid in estimating soil shrinkage. The laboratory maximum density test was performed in general accordance with the ASTM D1557 test method. This test procedure uses 25 blow of a 10-pound hammer falling a height of 18 inches on each of five layers of soil in a 1/30 or 1/13 cubic foot cylinder. The test results are presented on Drawing Nos. A-57 through A-61 and in the following table:

Exploration Location	Depth (Feet)	Soil Description	Maximum Dry Unit Weight (pcf)	Optimum Moisture Content (percent) - of dry weight
B-1	20-25	Silty sand with gravel	129.4	8.2
B-5	20-25	Silty sand with gravel	132.1	8.2
B-12	10-15	Silty sand with gravel	129.7	7.9
B-101	5-10	Silty sand with gravel	130.6	8.7
B-105	20-25	Well graded sand with silt and gravel	131.8	7.5

Direct Shear Strength

A progressive direct shear test was performed on selected undisturbed samples using a constant strain rate direct shear machine in general accordance with ASTM D3080. The test specimen was trimmed and placed in the shear machine, a specified normal load was applied, and the specimen was sheared until maximum shear strength was developed. After the soil specimen had developed maximum shear resistance under the first normal load, the normal load was removed and the specimen was pushed back to its original undeformed configuration. Another normal load was then applied, and the specimen was sheared a second time. This process was repeated for three different normal loads. Results of the direct shear test are presented on Figures A-62 through A-69 and in the following table:

Exploration Location	Depth (feet)	Soil Description	Angle of Internal Friction (deg)	Coulomb Cohesion (ksf)
B-4	14-14.5	Silty sand with gravel	31	0.7
B-5	14-15	Silty sand with gravel	43	0.3
B-10	54-54.5	Sandy lean clay	26	0.85
B-12	14-15	Silty sand with gravel	40	0.3
B-101	39-40	Sandy lean clay	26	0.9
B-102	20-25	Silty sand with gravel	37	0.2
B-103	49-50	Sandy lean clay	37	1.0
B-104	10-15	Silty sand with gravel	43	0.1

Chemical Analysis

Chemical tests were performed on a representative soil samples to investigate the potential for soil corrosivity and chemical heave. Atlas Chemical Testing Laboratories, Inc. in Las Vegas performed the chemical analysis for water-soluble sulfates and sodium in general accordance with ASTM D516. The results of the chemical tests are presented on Drawing No. A-70.

Exploration Location	Depth (feet)	Soil Description	Percent Sodium	Percent Sulfate	Total Available Water Soluble sodium Sulfate (%)
B-5	10-15	Silty sand with gravel	0.07	0.13	0.20
B-8	19-20	Silty sand with gravel	0.07	0.06	0.08
B-101	5-10	Silty sand with gravel	0.17	0.06	0.08
B-102	0-5	Fill - Silty sand with gravel	0.17	0.03	0.05
B-106	0-5	Silty sand with gravel	0.15	0.08	0.12
B-106	29-30	Silty sand with gravel	0.15	0.06	0.08

Permeability

Falling head permeability tests were conducted on remolded samples in general accordance with modified ASTM procedure D2434. The soil was compacted in a mold 4.6 inches long and 4.0 inches in diameter to 85 or 90 percent of maximum dry density and at optimum moisture content. A falling head was applied to the sample and the flow of water through the sample was monitored. The permeability was calculated after the flow rate had stabilized. The result of the falling head permeability test is presented in the following table:

Exploration Location	Sample Depth (Feet)	Soil Description	k (cm/s)
B-5	20-25	Silty sand with gravel	5.3×10^{-4}
B-12	10-15	Silty sand with gravel	4.0×10^{-4}
B-102	20-25	Silty sand with gravel	1.0×10^{-4}
B-105	20-25	Well graded sand with silt and gravel	1.2×10^{-3}

Flexible wall permeameter tests were performed on selected samples by AP Engineering and Testing, Inc according to ASTM D5084. With the exception of one sample (B-105), all tested samples were undisturbed ring samples. The samples were placed in a triaxial machine with a constant confining pressure at the approximate in-place effective stress pressures. Results were generally consistent with the fal-

ling head permeability test results for the granular materials. Laboratory results are presented on Drawing Nos. A-71 through A-76 and summarized below:

Exploration Location	Sample Depth (Feet)	Soil Description	k (cm/s)
B-1	14-15	Silty sand with gravel	1.57×10^{-4}
B-4	24-25	Silty sand with gravel	1.47×10^{-4}
B-8	44-45	Sandy silt	2.90×10^{-5}
B-12	39-39.5	Silty clay	1.76×10^{-7}
B-103	44-45	Silty clay	3.83×10^{-7}
B-105*	30-35	Silty sand	3.05×10^{-4}

* Sample remolded to 85% relative compaction at optimum moisture.

Log No. B- 1

Date of Drilling: 9/23/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 53.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			<u>FILL: SILTY SAND With Gravel; light brown, dry</u>	▲		21				
	2									
	4		---moist	▲		26				
	6			▲		42				
	8									
	10			▲		26		4		
	12		<u>SILTY SAND With Gravel (SM); dense, light brown, slightly moist</u>	▲		33				
	14			▲						
	16			▲		44				
	18		---very dense	⊗		35/5"				
	20									
	22									
	24									
	26									
	28									
	30									
	32									
	34									
	36									
	38									
	40									
	42									
	44									
	46									
	48									
	50									
	52									
	54									
	56									
	58									
	60									
	62									
	64									
	66									
	68									
	70									
	72									
	74									
	76									
	78									
	80									
	82									
	84									
	86									
	88									
	90									
	92									
	94									
	96									
	98									
	100									

End of Exploration at 53.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-1

Converse Consultants

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Environmental Sciences

LV-51 92343701 GP



Log No. B- 1

Date of Drilling: 9/23/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 53.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
			SILTY SAND With Gravel (SM); dense, light brown, slightly moist			35				
	22									G ₂ F
	24					35		7	108	
	26									
	28		---grayish brown							
	30		---very dense			35/6"				
	32					53				A
	34									G
	36									
	38		---dense			35/3"				
						35/6"				
End of Exploration at 53.0'										

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01



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Environmental Sciences

Drawing No.

A-2

Log No. B- 1

Date of Drilling: 9/23/99

Driller: T. High

Logged By: M. Stacy

Location: See Drawing No. 2

Borehole Diameter: 8"

Groundwater Depth (ft): 53.0

Ground Surface Elevation (ft): Not Available

Equipment: BK-81 Hollow Stem Auger

Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
	42		SILTY SAND With Gravel (SM); dense, grayish brown, slightly moist	X		42				
	44		—very dense	X		58/7"				
	46									
	48									
	50					35/4"				
	52									
	54		—wet							
	54		SANDY LEAN CLAY (CL); very stiff, dark brown, moist	X		35/6"				
	56									
	58									
ON	End of Exploration at 55.0'									

X Converse Sampler (white symbol=no recovery)

▣ SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-3

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Log No. B- 4

Date of Drilling: 9/13/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 54.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			<u>FILL</u> ; SILTY SAND With Gravel; brown, dry			17				
	2		---POORLY GRADED GRAVELLY SAND			45				Sol
	4					66/7"		3		
	6					35/4"				
	8									
	10		---SILTY SAND With Gravel			35/5"				
	12					36				
	14		SILTY SAND With Gravel (SM); very dense, brown, dry			35/8"		5		DS
	16									
	18		---dense			43				
	20									
End of Exploration at 60.0'										
Converse Sampler (white symbol=no recovery) SPT Sampler (white symbol=no recovery)										

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01



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Environmental Services

Drawing No.

01 93343701 GPJ

Log No. B- 4

Date of Drilling: 9/13/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 54.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			SILTY SAND With Gravel (SM); very dense, brown, dry			35/2"				
	22									
	24		--dense			49				K
	26									
	28									
	30		---few gravel			35		7	107	
	32					42				
	34		---with gravel, very dense			35/8"		4		
	36									
	38		---with boulders							
			CEMENTED SAND AND GRAVEL: hard, brown, dry			20/0"				
End of Exploration at 60.0'										

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

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99-33437-01



Log No. B- 4

Date of Drilling: 9/13/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 54.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			SILTY SAND With Gravel (SM); very dense, brown, dry			35/1"				
	42									
	44		—with boulders			35/0"				
	46									
	48		---partially cemented, moderately hard							
	50					35/0"				
	52		CEMENTED SAND AND GRAVEL; hard, gray, dry							
	54		POORLY GRADED SAND (SP); dense, black, moist, very strong odor, heavy staining			44				
	56		LEAN CLAY (CL); stiff, grayish brown, dry							pp=2.0
	58		CLAYEY SAND (SC); medium dense, brown, wet							
			---strong odor			23				
APPROVED BY			End of Exploration at 60.0'							

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01



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Drawing No.

A 6

Log No. B- 5

Date of Drilling: 9/15/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 52.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
			<u>FILL: SILTY SAND With Gravel; tan, dry</u>			9				
	2									
	4		---slightly moist			35/5"				
	6					58				
	8		---with cobbles							
	10		SILTY SAND With Gravel (SM); dense, tan, slightly moist			31		5	115	
	12					29				K:Sol; Ch
	14					43		4	111	DS
	16									
	18		---very dense			57/8"				
	20		End of Exploration at 60.0'							

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

Converse Consultants

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99-33437-01

Log No. B- 5

Date of Drilling: 9/15/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 52.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
	22		SILTY SAND With Gravel (SM); dense, tan, slightly moist	▲		32				A
	24			▲		58/8"				G;P,C
	26		---very dense							
	28		---brown							
	30		CLAYEY SAND With Gravel (SC); dense, dark brown, slightly moist	▲		35/5"		6	112	
	32		SILTY SAND With Gravel (SM); dense, black, slightly moist	▲		35/6"				
	34		---dark brown							
	36		---very dense	▲		50/3"				
	38		---with cobbles	▲		50/6"				
End of Exploration at 60.0'										

▲ Converse Sampler (white symbol=no recovery)

▲ SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

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31 93343701 GPJ

Log No. B- 5

Date of Drilling: 9/15/99
 Driller: T. High
 Logged By: M. Stacy

Location: See Drawing No. 2
 Borehole Diameter: 8"
 Groundwater Depth (ft): 52.5

Ground Surface Elevation (ft): Not Available
 Equipment: BK-81 Hollow Stem Auger
 Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			SILTY SAND With Gravel (SM); dense, black, slightly moist	✕		35/6"				
	42									
	44					35/0"				
	46									
	48									
	50		SANDY LEAN CLAY With Gravel (CL); very stiff, dark brown, slightly moist	▽		36				
	52									
	54		--moist	▽		32				pp=3.0
	56									
	58									
				▽		18				
APPROVED BY ON			End of Exploration at 60.0'							
			✕ Converse Sampler (white symbol=no recovery) ▽ SPT Sampler (white symbol=no recovery)							

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99-33437-01

Log No. B- 8

Date of Drilling: 9/14/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 58.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			FILL: SILTY SAND With Gravel; tan, dry			8				
	2									
	4					28				
	6					16				
	8									
	10		SILTY SAND With Gravel (SM); very dense, tan, dry			35/8"		2		
	12					32				
	14					33/6"				
	16									
	18									
	20									
	22									
	24									
	26									
	28									
	30									
	32									
	34									
	36									
	38					38		4		Ch Sol
	40									
	42									
	44									
	46									
	48									
	50									
	52									
	54									
	56									
	58									
	60		End of Exploration at 60.0'							

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
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Clark County, Nevada

Project No.
99-33437-01

Drawing No.

A-10

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99-33437-01 CPU

Log No. B- 8

Date of Drilling: 9/14/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 58.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			SILTY SAND With Gravel (SM); very dense, tan, dry	▲	▲	60/9"				
	22									
	24			▲	▲	54/9"		4		
	26									
	28									
	30			▲	▲	35/8"		4		
	32			▲	▲	45				
	34			▲	▲	55				
	36									
	38		SANDY LEAN CLAY (CL); very stiff, dark brown, slightly moist	▲	▲	30		46	69	
		---with gravel								
End of Exploration at 60.0'										

▲ Converse Sampler (white symbol=no recovery)

▲ SPT Sampler (white symbol=no recovery)

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Project No.

99-33437-01

Drawing No.

1 60343701 C/PJ



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Log No. B- 8

Date of Drilling: 9/14/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 58.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
			Drive	Bulk	Blow Count				
		SANDY LEAN CLAY With Gravel (CL); very stiff, dark brown, slightly moist	▲		49				
42									
44		—dry	▲		35/8"				K
46									
48									
		---partially cemented, moderately hard, white, dry							
		SANDY LEAN CLAY (CL); very stiff, dark brown, moist	▲		35/10"				pp=3.
50									
52									
54			▲		16		52	71	pp=2.0
56									
58		SILTY SAND (SM); dense, brown, wet	▲						
		SANDY LEAN CLAY (CL); stiff, dark brown, wet	▲		13		51	70	pp=3.0
		End of Exploration at 60.0'	▲						

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

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Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01



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Drawing No.

A 12

Log No. B-10

Date of Drilling: 9/13/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 46.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			<u>FILL</u> : SILTY SAND With Gravel; tan. dry	▲		26				
	2			▲						
	4		SILTY SAND With Gravel (SM); medium dense, tan, slightly moist	▲		25		5		
	6			▲		20				
	8									
	10		---very dense	▲		39				
	12			▲		60/8"				
	14		---cobble							
	16									
	18		---partially cemented, moderately hard			35/1"				
	20									
	22									
	24									
	26									
	28									
	30									
	32									
	34									
	36									
	38									
	40									
	42									
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	416									
	418									
	420									
	422									
	424									
	426									
	428									
	430									
	432									

Log No. B- 10

Date of Drilling: 9/13/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 46.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
	22		SILTY SAND With Gravel (SM); partially cemented, moderately hard, tan, slightly moist			35/0"				
	24		---with cobbles			35/1"				
	26									
	28									
	30		SILTY SAND With Gravel and Cobbles (SM); very dense, brown, slightly moist			35/0"				
	32					35/3"				
	34		---cobbles and boulders							
	36		LEAN CLAY With Gravel (CL); very stiff, light brown, dry			35/3"				
	38									
						35/6"				
End of Exploration at 60.0'										

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-1.1

B1 93343701 GPJ



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Log No. B-10

Date of Drilling: 9/13/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 46.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
	42		LEAN CLAY (CL); very stiff, light brown, dry	▲		35				
	44		SILTY SAND With Boulders (SM); very dense, brown, dry							
	46		LEAN CLAY With Gravel (CL); stiff, dark brown, moist	▲		13				pp=1.2
	48		SILTY SAND With Gravel and Caliche Nodules (SM); medium dense, dark brown, moist							
	50		SANDY LEAN CLAY (CL); very stiff, dark grayish brown, wet	▲		30		17	106	
	54			▲		26		68	60	DS pp=1.5
	58			▲		16				
End of Exploration at 60.0'										

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-15

1-V-01 93343701 GLE



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Log No. B-12

Date of Drilling: 9/14/99
 Driller: T. High
 Logged By: M. Stacy

Location: See Drawing No. 2
 Borehole Diameter: 8"
 Groundwater Depth (ft): 37.5

Ground Surface Elevation (ft): Not Available
 Equipment: BK-81 Hollow Stem Auger
 Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			<u>FILL: SILTY SAND With Gravel; tan, dry</u>							
	2			✕		16				
	4			✕		25				
	6			✕		35/4"				
	8									
	10					35/2"				
	12		SILTY SAND With Gravel (SM); very dense, tan, dry	✕		35/7"				
	14	---cobble								
	16									
	18	---cobble								
			SILTY SAND With Gravel (SM); very dense, light brown, dry	✕		35/6"				
End of Exploration at 60.0'										

✕ Converse Sampler (white symbol=no recovery)

✕ SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
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Project No.

99-33437-01



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Drawing No.

A-16

Log No. B-12

Date of Drilling: 9/14/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 37.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
			SILTY SAND With Gravel (SM); very dense, light brown, dry	▲		35/6"				
			CEMENTED SAND AND GRAVEL; hard, grayish brown, dry							
	22									
			SILTY SAND With Gravel (SM); very dense, tan, dry	▲		35/5"		2		
	24									
	26									
	28									
			---with gypsum, dense	▼		35		3		
	30		---with clay	▼		35				
				▼						
	32									
	34			▼		28		5		
				▼						
	36									
			SANDY LEAN CLAY (CL); very stiff, dark brown, moist							
	38		---slight odor	▼		21				
				▼						
			End of Exploration at 60.0'	▼						

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
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Clark County, Nevada

Project No.

99-33437-01



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Drawing No.

A-17

LV-B1 93343701.GPJ

Log No. B-12

Date of Drilling: 9/14/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 37.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			SANDY LEAN CLAY (CL); very stiff, dark brown, moist			44				
	42									
	44									
	46		—wet, stiff			15		80	53	pp=1.1
	48									
	50					11				
	52									
	54		---with gravel, very stiff			16		31	87	pp=1.1
	56									
	58					18				pp=1.1
	60		End of Exploration at 60.0'							

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01



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Drawing No.

A-18

Log No. B-101

Date of Drilling: 9/20/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 42.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLJE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk					
			SILTY SAND With Gravel (SM); occasional cobbles, medium dense, tan, slightly moist			11				
	2									
	4		—dense			35				
	6					21				
	8									
	10					42		4		
	12					39				
	14									
	16					42				
	18		---very dense			35/1"				
	20									
	22									
	24									
	26									
	28									
	30									
	32									
	34									
	36									
	38									
	40									
	42									
	44									
	46									
	48									
	50									
	52									
	54									
	56									
	58									
	60		End of Exploration at 60.0'							

APPROVED BY: ON

End of Exploration at 60.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
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Project No.

99-33437-01

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Drawing No.

A-19

Log No. B-101

Date of Drilling: 9/20/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 42.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			SILTY SAND With Gravel (SM); occasional cobbles, very dense, tan, slightly moist			55				
	22									
	24					35/7"		4		
	26									
	28									
	30		---dense			35/8"		4		
	32					35				
	34					35/9"				
	36									
	38		SANDY LEAN CLAY (CL); very stiff, dark brown, slightly moist			21		52	64	A:DS
APPROVED BY	ON									

End of Exploration at 60.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-20

99-33437-01 CPJ



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Log No. B-101

Date of Drilling: 9/20/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 42.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
	42		SILTY SAND With Gravel (SM); medium dense, grayish brown, dry			10				
	44		SANDY LEAN CLAY (CL); stiff, dark brown, moist			11		45	67	
	50		---partially cemented lens, moderately hard, brownish white, wet			25				pp=1.5
	54		---with gravel			11		42	75	A
	58					14		42	74	
End of Exploration at 60.0'										

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-21

51 93343701 GPJ



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Environmental Science

Log No. B-102

Date of Drilling: 9/23/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 43.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
	22		SILTY SAND With Gravel (SM); very dense, light brown, slightly moist	✕		35/5"				A; G; K; DS
	24			✕		35/8"				
	26		---with cobbles							
	28									
	30					35/4"				
	32					35/10"				
	34		---dense	✕		35/5"		5		
	36									
	38		---partially cemented, moderately hard							
	40					35/0"				

End of Exploration at 50'

✕ Converse Sampler (white symbol=no recovery)

✕ SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A. 22

99-33437-01 GLE



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Over 50 Years of Dedication
in Engineering and
Environmental Science

Log No. B-102

Date of Drilling: 9/23/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): -43.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
			Drive	Bulk	Blow Count				
42		SILTY SAND With Gravel (SM); trace clay, very dense, light brown, slightly moist ---with cobbles			35/9"				
44		SANDY LEAN CLAY (CL); very stiff, dark brown, moist			28				
46									
48									
50		---stiff			13		48	68	A
52									
54									
56									
58									
End of Exploration at 50.0'									

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-2.4

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4-81 93543701 GPJ



Log No. B-103

Date of Drilling: 9/21/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 42.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			<u>FILL: SILTY SAND With Clay; tan, dry</u>			14				
	2									
	4					14				
	6		<u>SILTY SAND With Gravel (SM); dense, tan, dry</u> ---with cobbles			26				
	8									
	10					35		4		
	12					25				
	14					42				
	16									
	18					26		3		
	20									
	22									
	24									
	26									
	28									
	30									
	32									
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	42									
	44									
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	54									
	56									
	58									
	60									

End of Exploration at 60.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-25

V-B1 93343701 GPJ



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Environmental Sciences

Log No. B-103

Date of Drilling: 9/21/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 42.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			SILTY SAND With Gravel (SM); medium dense, tan, dry			24				
	22									
	24		--with cobbles, very dense			35/5"		3		
	26									
	28									
	30					35/0"				
	32					59/8"				
	34									
	36					62/8"				
	38		--partially cemented, moderately hard							
						35/0"				
			End of Exploration at 60.0'							

End of Exploration at 60.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

Converse Consultants

Over 50 Years of Dedication
in Engineering and



Log No. B-103

Date of Drilling: 9/21/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 42.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			SILTY SAND With Gravel (SM); partially cemented, moderately hard, tan, dry							
	42		SANDY LEAN CLAY (CL); very stiff, dark brown, slightly moist							
	44		---stiff	▲		21				K _{pp} =2.5
	46			▲		13				
	48									
	50			▲		12		88	51	DS
	52									
	54			▲		10				
	56									
	58			▲		12				
	60		End of Exploration at 60.0'	▲						

▲ Converse Sampler (white symbol=no recovery)

▲ SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

Converse Consultants

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A 27



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Log No. B-104

Date of Drilling: 9/21/99
Driller: D. Wilson
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 43.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk				
			FILL: SILTY SAND With Gravel; tan, dry			9			
	2		SILTY SAND With Gravel and Cobbles (SM); dense, tan, slightly moist						Sol
	4		—very dense			35/7"	3		
	6					35/3"			
	8								
	10					45			
	12					35/6"			
	14								A.G.D.S
	16					53/7"	1		
	18					35/2"			
End of Exploration at 34.0'									
 Converse Sampler (white symbol=no recovery)  SPT Sampler (white symbol=no recovery)									

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-28



Log No. B-104

Date of Drilling: 9/21/99
Driller: D. Wilson
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 43.5

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			CEMENTED SAND AND GRAVEL; hard, tan, dry							
	42									
	44		SILTY SAND (SM); medium dense, gray, wet							
	44		SANDY LEAN CLAY (CL); very stiff, dark brown, slightly moist	☒		18				pp=1..
	46									
	48									
	50			☒		16				
	52									
	54									
	56									
	58									
APPROVED BY	ON									

End of Exploration at 54.0'

☒ Converse Sampler (white symbol=no recovery)

☒ SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION

Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

Converse Consultants

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A 20

BT 9343701 GLE



Log No. B-105

Date of Drilling: 9/22/99

Driller: T. High

Logged By: M. Stacy

Location: See Drawing No. 2

Borehole Diameter: 8"

Groundwater Depth (ft): 30.0

Ground Surface Elevation (ft): Not Available

Equipment: BK-81 Hollow Stem Auger

Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk				
			FILL: SILTY SAND With Clay and Gravel; tan, dry			6			
	2		WELL GRADED SAND With Silt and Gravel (SW-SM); trace clay, dense, tan, slightly moist						
			---with cobbles, very dense						
	4					35/4"			
						35/7"			
	6								
	8								
			---dense			35/8"	5		
	10					35/4"			
	12								
	14		---very dense			60/9"	4		
	16								
	18		---partially cemented, moderately hard			52			
	20								
	22								
	24								
	26								
	28								
	30								
	32								
	34								
	36								
	38								
	40		End of Exploration at 40.0'						

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION

Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

Converse Consultants

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in Engineering and

A 24



Log No. B-105

Date of Drilling: 9/22/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 30.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples		Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk				
			WELL GRADED SAND With Silt and Gravel (SW-SM); dense, grayish brown, slightly moist			44			
	22								
	24					35/1"			
	26								
	28								
	30	---with cobbles				35/3"			
	32					35/2"	3		
	34								
	36					35	13	122	
	38		CEMENTED SAND AND GRAVEL; hard, grayish brown, slightly moist			35/0"			
	40								
	42								
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Log No. B-106

Date of Drilling: 9/22/99
Driller: T. High
Logged By: M. Stacy

Location: See Drawing No. 2
Borehole Diameter: 8"
Groundwater Depth (ft): 30.0

Ground Surface Elevation (ft): Not Available
Equipment: BK-81 Hollow Stem Auger
Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
	0		SILTY SAND With Gravel (SM); medium dense, grayish brown, dry			23				
	2									
	4		---very dense			35/6"		7	111	
	6		---tan			52/9"				
	8									
	10		---dense			44				
	12					37				
	14		---very dense			60/11"		5		
	16									
	18					58/7"				
	20									
	22									
	24									
	26									
	28									
	30									
	32									
	34									
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	100									

End of Exploration at 33.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
Basic Management Incorporated
Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-23

99-33437-01 G.P.U. 16



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Over 50 Years of Dedication
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Construction

Log No. B-106

Date of Drilling: 9/22/99
 Dr. T. High
 Logged By: M. Stacy

Location: See Drawing No. 2
 Borehole Diameter: 8"
 Groundwater Depth (ft): 30.0

Ground Surface Elevation (ft): Not Available
 Equipment: BK-81 Hollow Stem Auger
 Driving Wt. and Drop: 140#/30"

DRAFTED BY GLE	Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples			Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
				Drive	Bulk	Blow Count				
			SILTY SAND With Gravel (SM); dense, grayish brown, dry			35/2"				
	22									
	24	—with cobbles				35/6"				
	26									
	28									
	30	---gray, wet				35/8"		15	114	Cu
	32	CEMENTED SAND AND GRAVEL; hard, gray, wet								
	34									
	36									
	38									
APPROVED BY										

End of Exploration at 33.0'

Converse Sampler (white symbol=no recovery)

SPT Sampler (white symbol=no recovery)

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
 Basic Management Incorporated
 Clark County, Nevada

Project No.

99-33437-01

Drawing No.

A-34

99-33437-01 GFL



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 Environmental Sciences

KEY TO SOILS SYMBOLS AND TERMS

Terms used in this report for describing soils according to their texture and grain size distributions are generally in accordance with the UNIFIED SOILS CLASSIFICATION SYSTEM.

TERMS DESCRIBING CONDITION, CONSISTENCY, AND HARDNESS

COARSE GRAINED SOILS (major portion retained on No. 200 sieve) includes clean gravels, silty or clayey gravels, and silty, clayey, or gravelly sands. Consistency is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERM	RELATIVE DENSITY
very loose	0 to 15%
loose	15 to 40%
medium dense	40 to 70%
dense	70 to 85%
very dense	85 to 100%

FINE GRAINED SOILS (major portion passing No. 200 sieve) includes inorganic and organic silts and clays, gravelly, silty, or sandy clays, and clayey silts. Consistency is rated according to shearing strength as indicated by penetrometer readings or by direct shear tests.

DESCRIPTIVE TERM	SHEAR STRENGTH (ksf)
very soft	less than 0.25
soft	0.25 to 0.50
firm	0.50 to 1.00
stiff	1.00 to 2.00
very stiff	2.00 to 4.00
hard	4.00 and up







ROCK includes gravels, cobbles, rock, caliche, and bedrock materials. Hardness is related to field identification procedures described below.

DESCRIPTIVE TERM	SHEAR STRENGTH (ksf)
soft	can be dug by hand and crumbled by fingers
moderately hard	friable, can be gouged deeply with knife and will crumble readily under light hammer blows
hard	knife scratch leaves dust trace and will withstand a few hammer blows before breaking
very hard	scratched with knife with difficulty and is difficult to break with hammer blows

LEGEND OF LABORATORY TESTS

A Liquid & Plastic Limits	G Grain	R Resistivity
C Consolidation	H Horticultural Tests	RV R-Value
Ch Chemical	K Permeability	S Swell
Disp Dispersion	N Chemical Heave	Sol Solubility
DR Drill Rate	P Compaction	T Triaxial
DS Direct Shear	pp Unconfined Compressive Strength (tsf)	UU Unconsolidated, Undrained

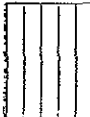



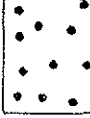
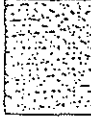
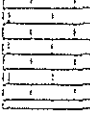

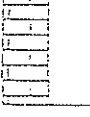
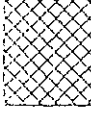
SAMPLER TYPES

 Converse Sampler	 Converse Sampler (no recovery)
 Standard Penetration Test (SPT)	 SPT Sampler (no recovery)
 Shelby Sampler	 Bulk Sample

SIZE PROPORTIONS

DESIGNATION	PERCENT BY WEIGHT
trace	0 to 5
few	5 to 10
little	15 to 25
some	30 to 45



SOIL TYPE GRAPHIC KEY

	Silt		Lean Clay
	Elastic Silt		Fat Clay
	Gravel		Sand
	Caliche or Cemented Soil		Gypsum
	Partially Cemented		Fill

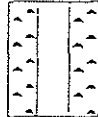



SOIL TYPE GRAPHIC KEY

MOISTURE CONTENT IS INDICATED BY
dry
slightly moist
moist
very moist
wet

GROUNDWATER LEVEL KEY

	Water level during drilling
	Stabilized water level

WELL DESIGN GRAPHIC KEY

	Grout		Bentonite
	PVC Screen		Silica Sand



CLASSIFICATION OF SOILS

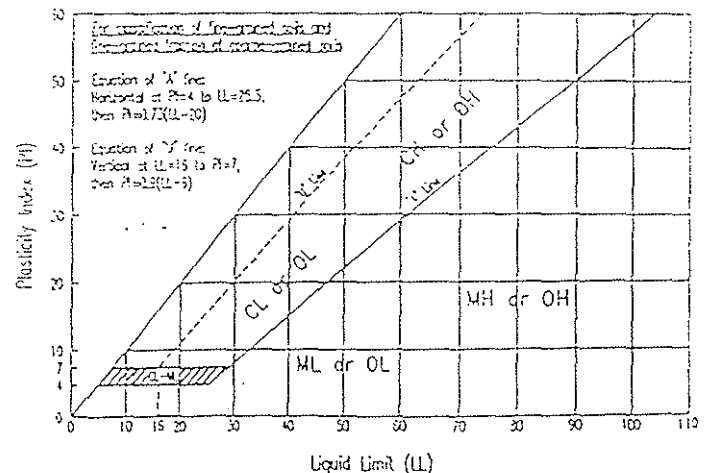
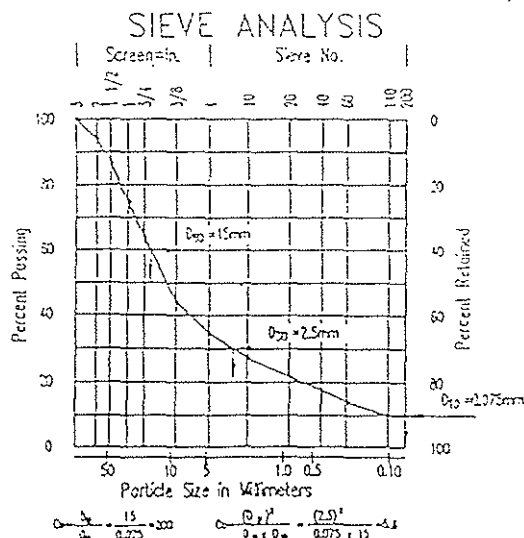
ASTM Designation: D2487-93
(ASTM version of Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names using Laboratory Tests ^a				Soil Classification Group Symbol	Group Name ^b
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on #4 sieve	Clean Gravels Less than 5% fines ^c	$Cu \geq 4$ and $1 < Cc \leq 3$ ^e	GW	Well-graded gravel ^f
			$Cu < 4$ and/or $Cc < 1$ or $Cc > 3$ ^e	GP	Poorly graded gravel ^f
		Gravels with Fines More than 12% fines ^c	Fines classify as ML or MH	GM	Silty gravel ^{f, g, h}
	Sands 50% or more of coarse fraction passes #4 sieve	Clean Sands Less than 5% fines ^c	$Cu \geq 6$ and $1 < Cc \leq 3$ ^e	SW	Well-graded sand ⁱ
			$Cu < 6$ and/or $Cc < 1$ or $Cc > 3$ ^e	SP	Poorly graded sand ⁱ
		Sands with Fines More than 12% fines ^c	Fines classify as ML or MH	SM	Silty sand ^{g, h, i}
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	Silt and Clays Liquid limit less than 50	Inorganic	Pl > 7 and plots on or above "A" line ^j	CL	Lean clay ^{k, l, m}
			Pl < 4 or plots below "A" line ^j	ML	Silt ^{k, l, m}
		Organic	Liquid limit - oven dried Liquid limit - not dried < 0.75	OL	Organic clay ^{k, l, m, n} Organic silt ^{k, l, m, o}
			Pl plots on or above "A" line	CH	Fat clay ^{k, l, m}
	Silt and Clays Liquid limit 50 or more	Inorganic	Pl plots below "A" line	MH	Elastic silt ^{k, l, m}
		Organic	Liquid limit - oven dried Liquid limit - not dried < 0.75	OH	Organic clay ^{k, l, m, n} Organic silt ^{k, l, m, o}
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor			PT	Peat

- a. Based on the material passing the 3-in. (75-mm) sieve.
b. If field sample contained cobbles or boulders, or both, add "with cobbles" or "with boulders", or both to group name.
c. GW-GM well graded gravel with silt
GM-GC well graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
d. Sands with 5-12% fines require dual symbols:
SW-SM well graded sand with silt
SW-SC well graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

- e. $Cu = \frac{D_u}{D_{30}}$ $Cc = \frac{(D_{60})^2}{D_{30} \times D_{10}}$
f. If soil contains $\geq 15\%$ sand, add "with sand" to group name.
g. If fines classify as CL-ML, use dual symbol: GC-GM or SC-SM.
h. If fines are organic, add "with organic fines" to group name.
i. If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
j. If Atterberg limits plot in hatched area, soil is a CL-ML silty clay.

- k. If soil contains 15-29% plus No. 200, add "with sand" or "with gravel", whichever is predominant.
l. If soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
m. If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
n. Pl ≥ 4 and plots on or above "A" line
o. Pl < 4 or plots below "A" line
p. Pl plots on or above "A" line
q. Pl plots below "A" line



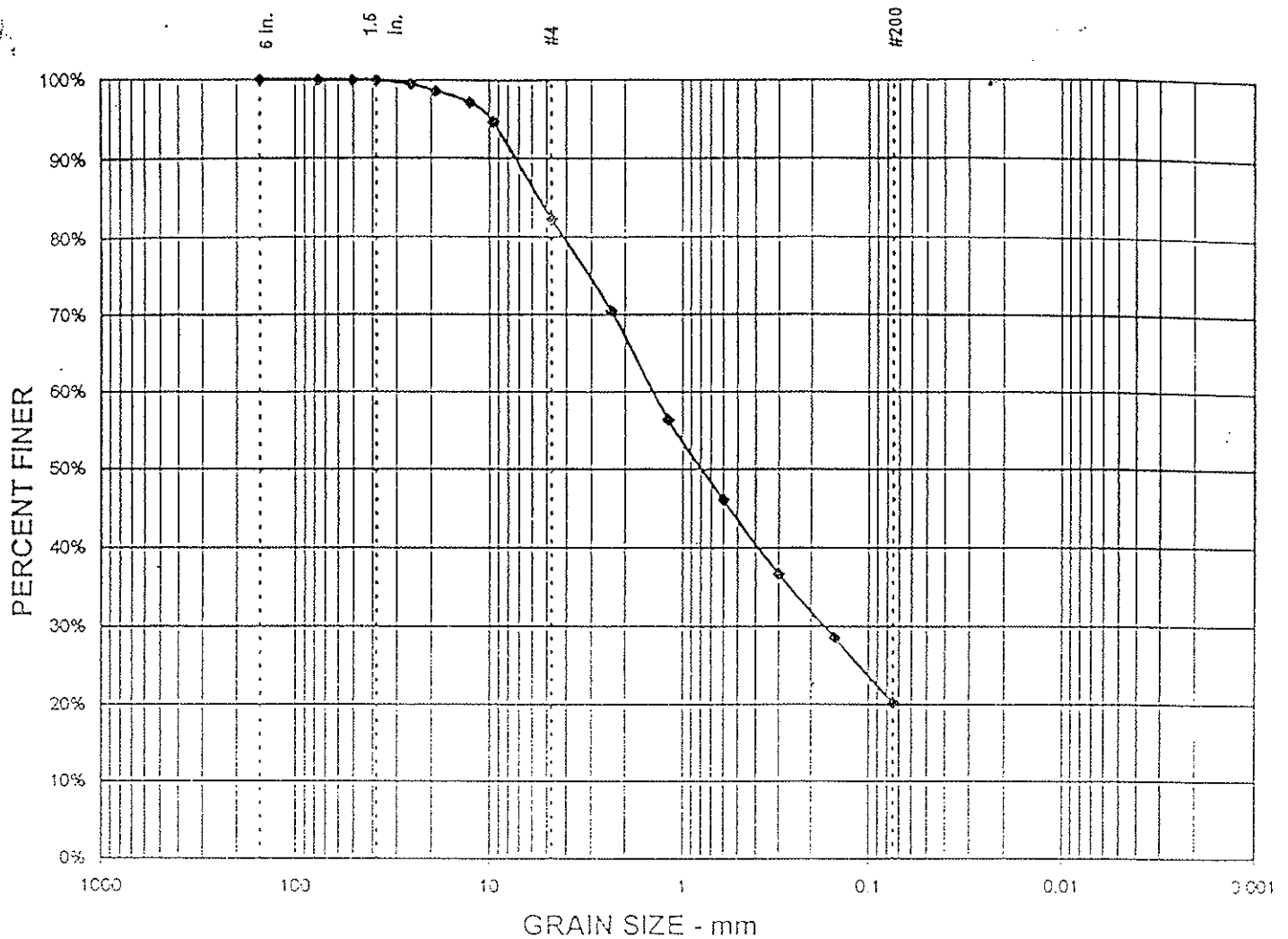
CONVERSE CONSULTANTS

Over 50 Years of Dedication
in Engineering and
Environmental Sciences

Drawing No.

A-36

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	18%	$D_{85} = 5.5$	$D_{15} =$
% SAND =	62%	$D_{50} = 1.4$	$D_{10} =$
% SILT & CLAY =	20%	$D_{50} = 0.8$	$C_u =$
		$D_{20} = 0.2$	$C_c =$

Project No.: 99-33437-01

Project Name: BMI Landfill

Date sampled: Oct 1999

Location: B 1 @ 20-25'

Silty Sand with Gravel

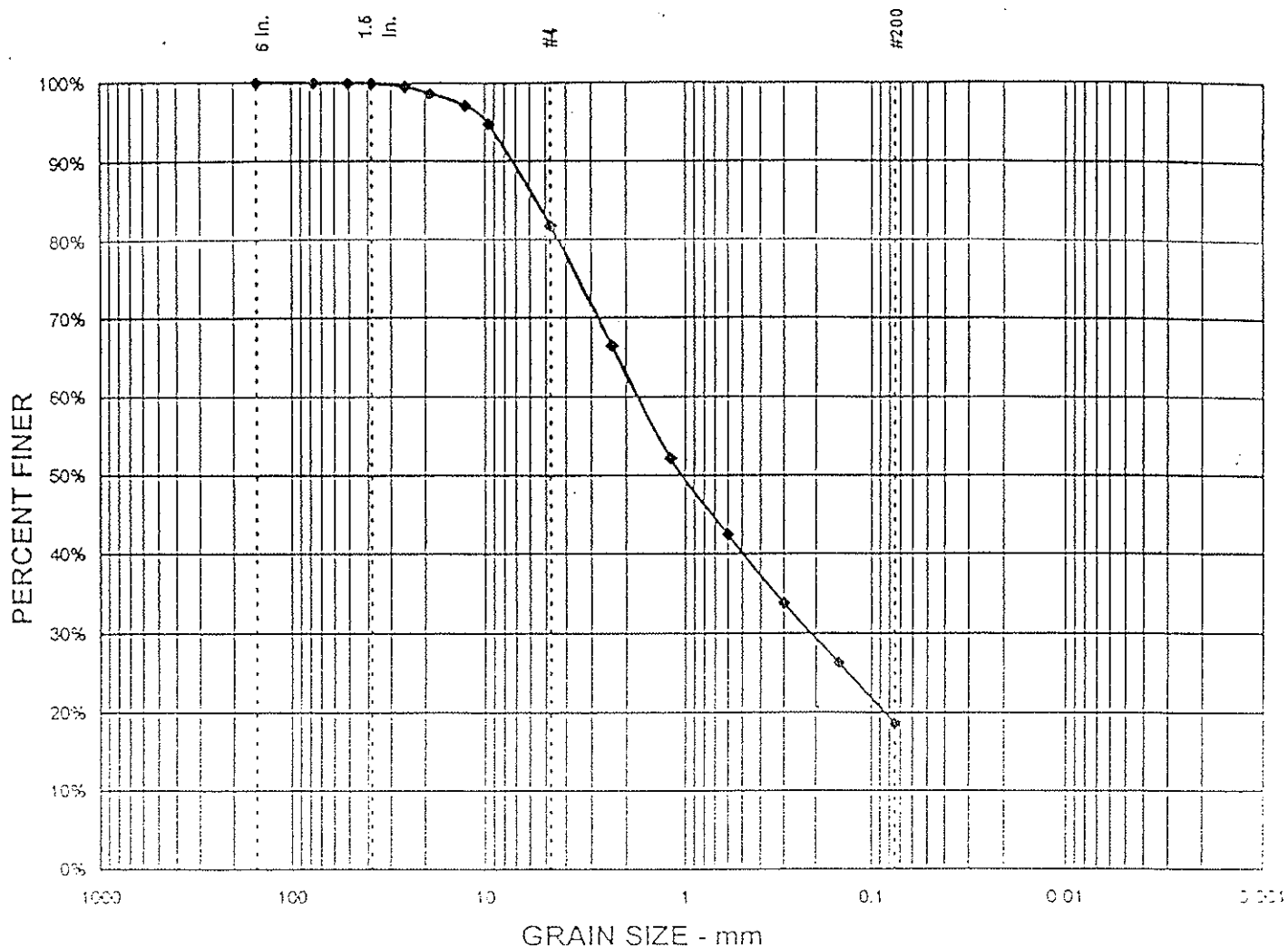


GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS

Drawing No. A-37

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	18%	$D_{35} = 5.6$	$D_{15} =$
% SAND =	63%	$D_{50} = 1.7$	$D_{10} =$
% SILT & CLAY =	19%	$D_{50} = 1.0$	$C_u =$
		$D_{30} = 0.2$	$C_c =$

Project No.: 99-33437-01

Project Name: BMI Landfill

Date sampled: Oct 1999

Location: B 1 @ 30-35'

Silty Sand with Gravel

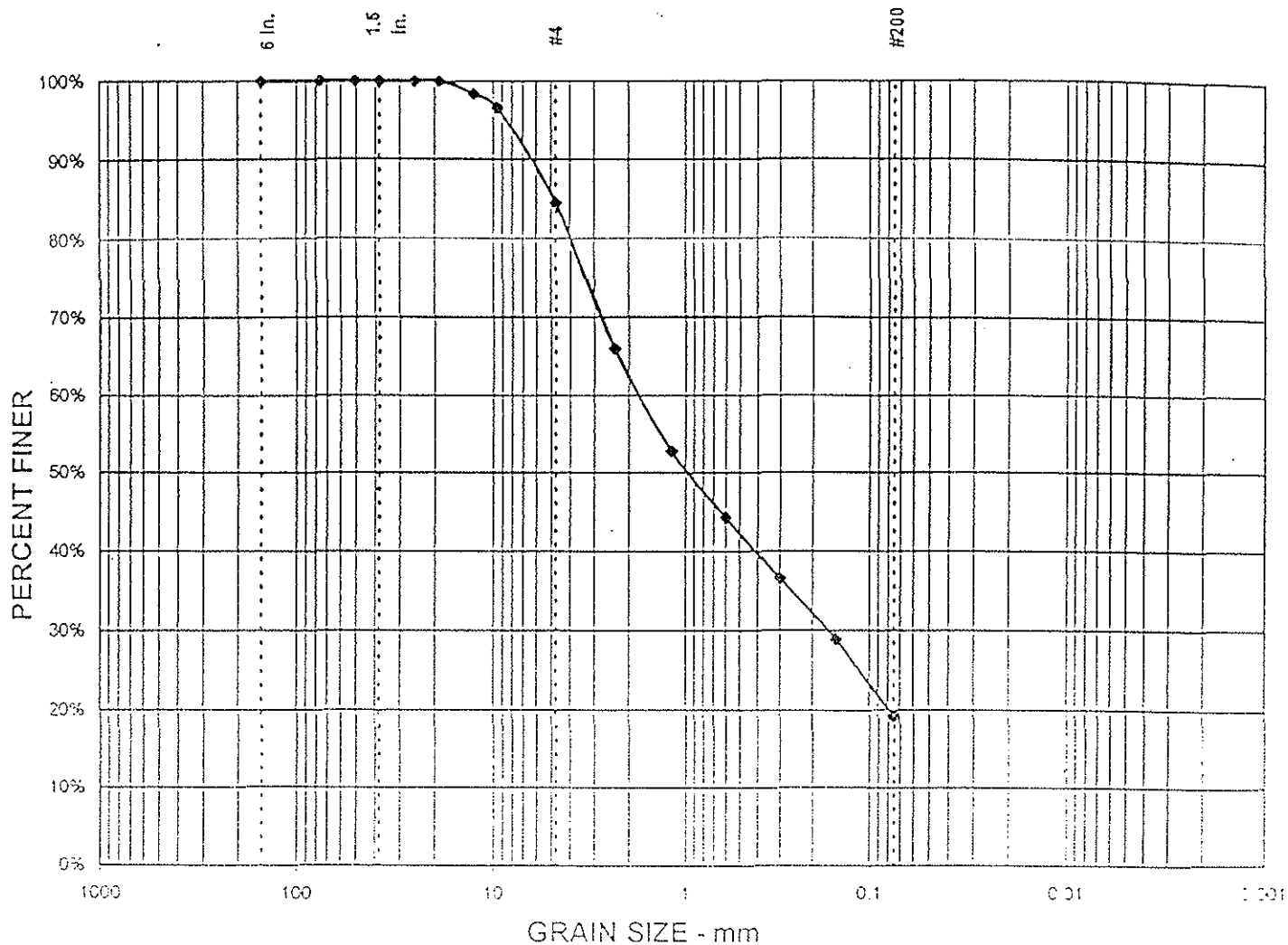


GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS

Drawing No. A-38

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	16%	$D_{35} = 4.9$	$D_{15} =$
% SAND =	65%	$D_{50} = 1.7$	$D_{10} =$
% SILT & CLAY =	19%	$D_{50} = 0.9$	$C_u =$
		$D_{30} = 0.2$	$C_c =$

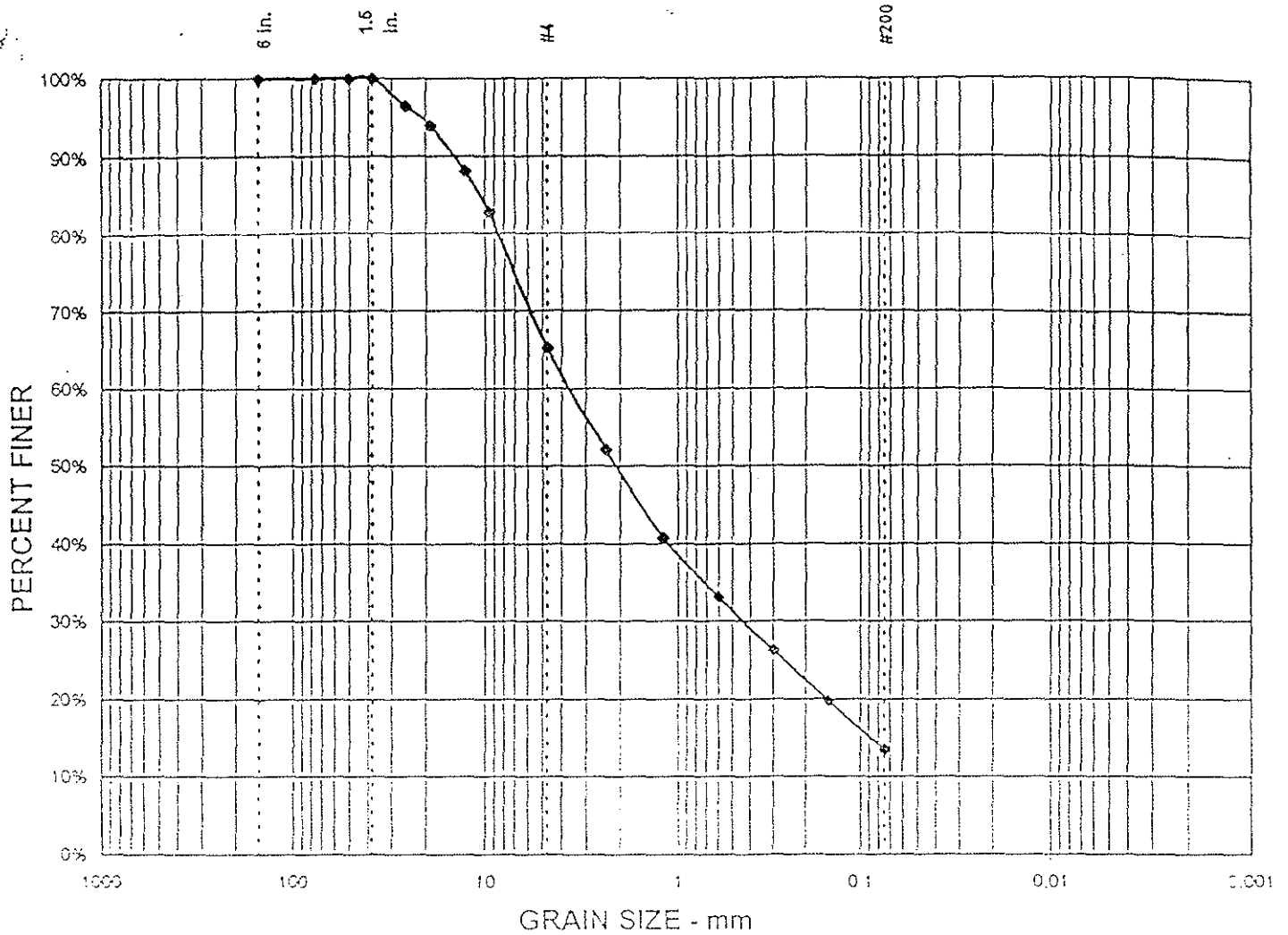
Project No.: 99-33437-01
 Project Name: BMI Landfill
 Date sampled: Oct 1999
 Location: B5 @ 20-25'
 Silty Sand with Gravel



GRAIN SIZE DISTRIBUTION TEST REPORT
CONVERSE CONSULTANTS

Drawing No. A-39

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	35%	$D_{35} = 10.8$	$D_{15} = 0.1$
% SAND =	52%	$D_{50} = 3.6$	$D_{10} =$
% SILT & CLAY =	14%	$D_{50} = 2.1$	$C_u =$
		$D_{30} = 0.4$	$C_c =$

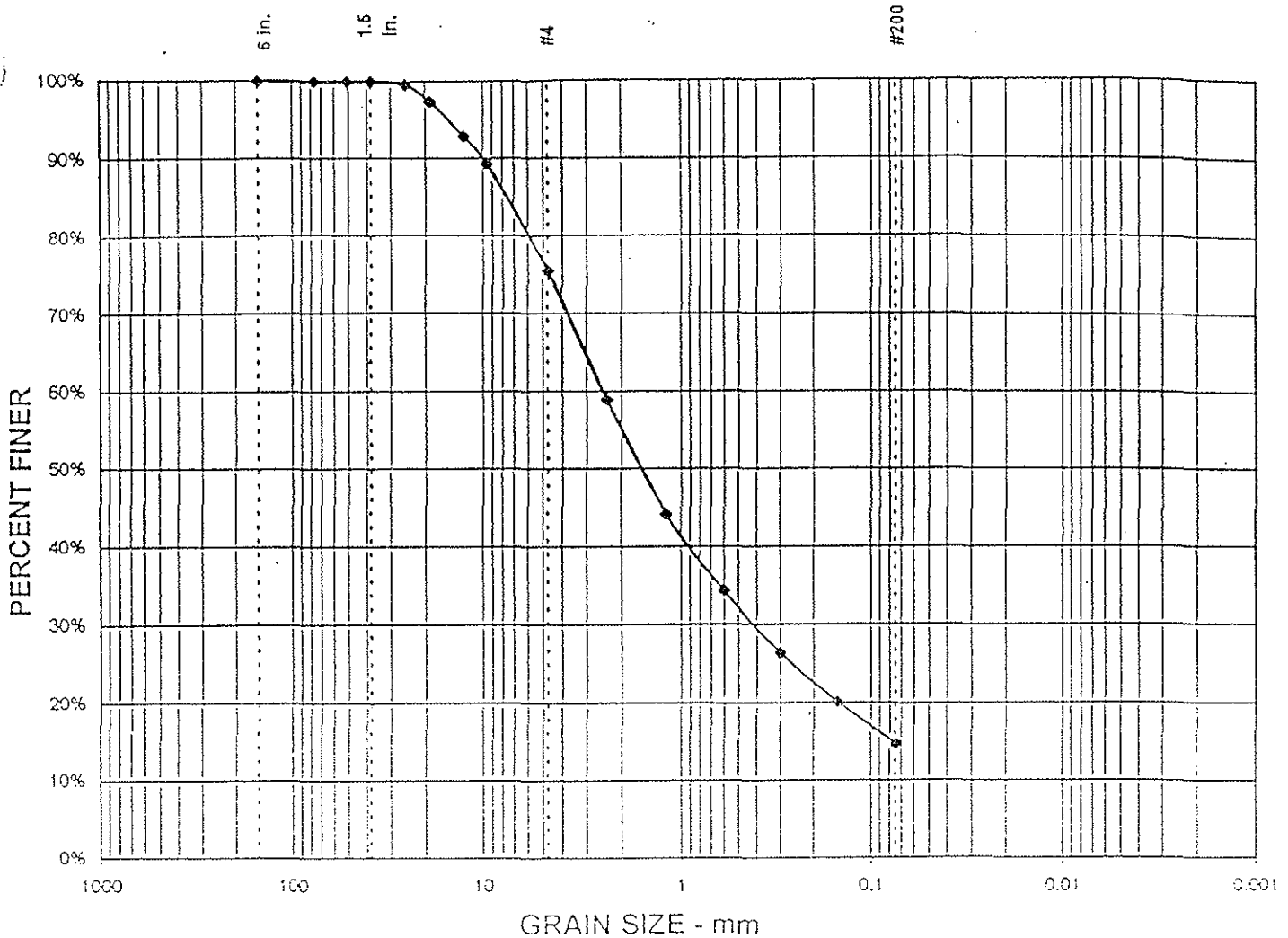
Project No.: 99-33437-01
 Project Name: BMI Landfill
 Date sampled: Oct 1999
 Location: B 8 @ 35-40'
 Silty Sand with Gravel



GRAIN SIZE DISTRIBUTION TEST REPORT
CONVERSE CONSULTANTS

Drawing No. A-41

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	24%	$D_{35} = 7.7$	$D_{15} = 0.1$
% SAND =	61%	$D_{50} = 2.5$	$D_{10} =$
% SILT & CLAY =	15%	$D_{50} = 1.5$	$C_u =$
		$D_{30} = 0.4$	$C_c =$

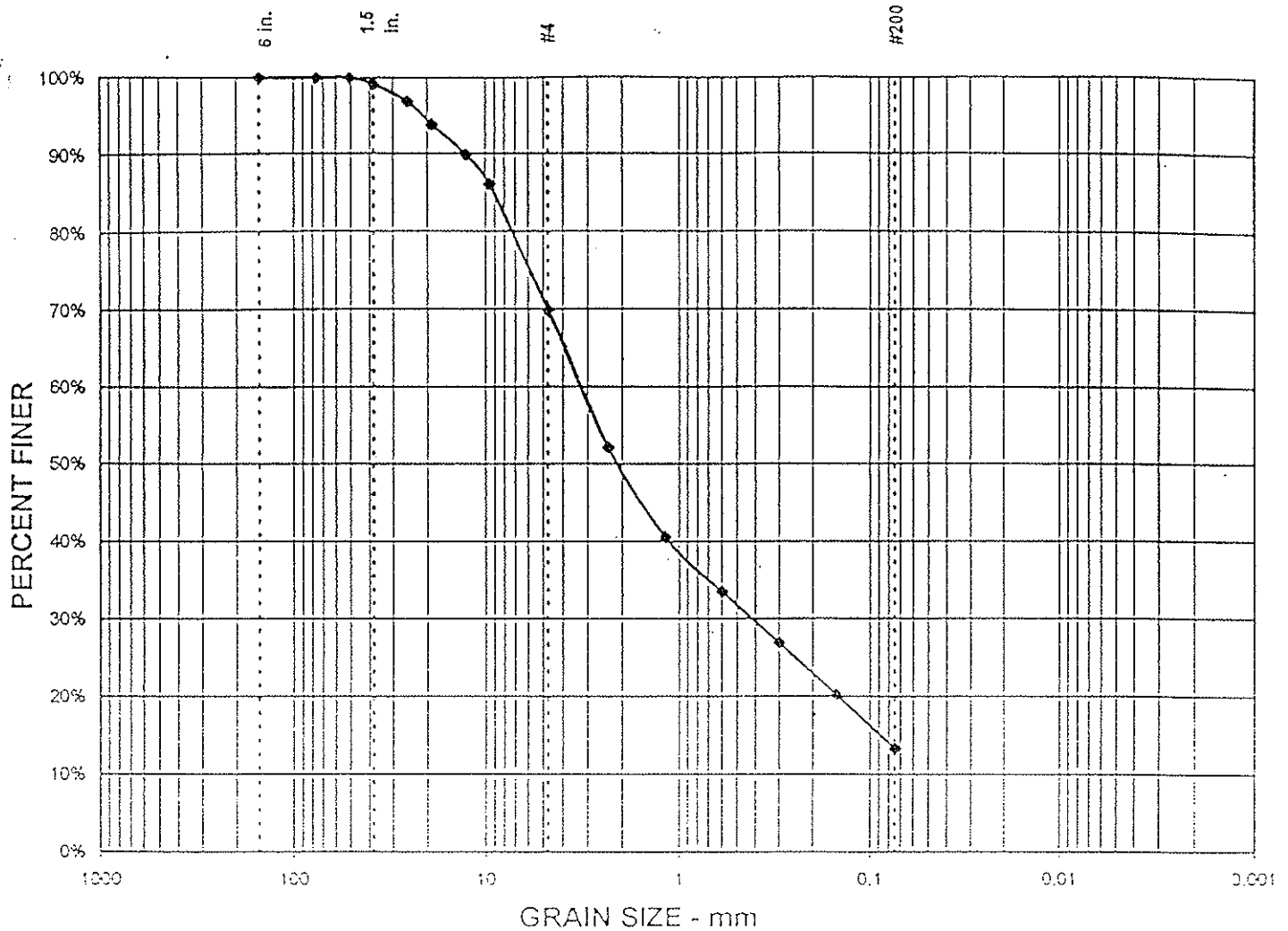
Project No.: 99-33437-01
 Project Name: BMI Landfill
 Date sampled: Oct 1999
 Location: B 10 @ 30-35'
 Silty Sand with Gravel



GRAIN SIZE DISTRIBUTION TEST REPORT
CONVERSE CONSULTANTS

Drawing No. A-41

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	30%	$D_{35} = 9.1$	$D_{15} = 0.1$
% SAND =	57%	$D_{50} = 3.2$	$D_{10} =$
% SILT & CLAY =	13%	$D_{50} = 2.1$	$C_u =$
		$D_{30} = 0.4$	$C_c =$

Project No.: 99-33437-01

Project Name: BMI Landfill

Date sampled: 10/01/99

Location: B12 @ 10-15'

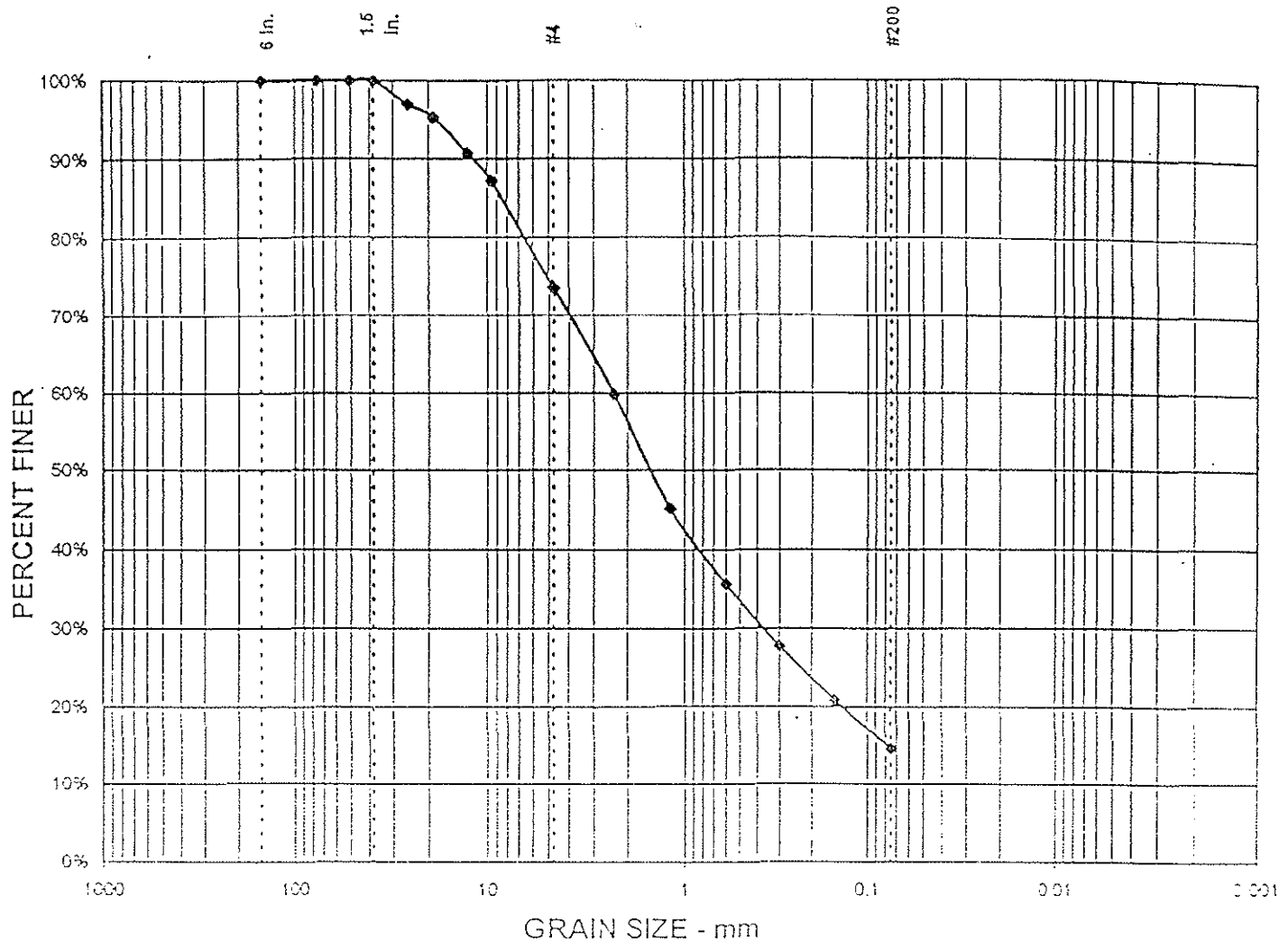
Silty Sand with Gravel



GRAIN SIZE DISTRIBUTION TEST REPORT
CONVERSE CONSULTANTS

Drawing No. A-42

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	26%	$D_{85} = 8.5$	$D_{15} = 0.1$
% SAND =	59%	$D_{50} = 2.4$	$D_{10} =$
% SILT & CLAY =	15%	$D_{50} = 1.5$	$C_u =$
		$D_{30} = 0.4$	$C_c =$

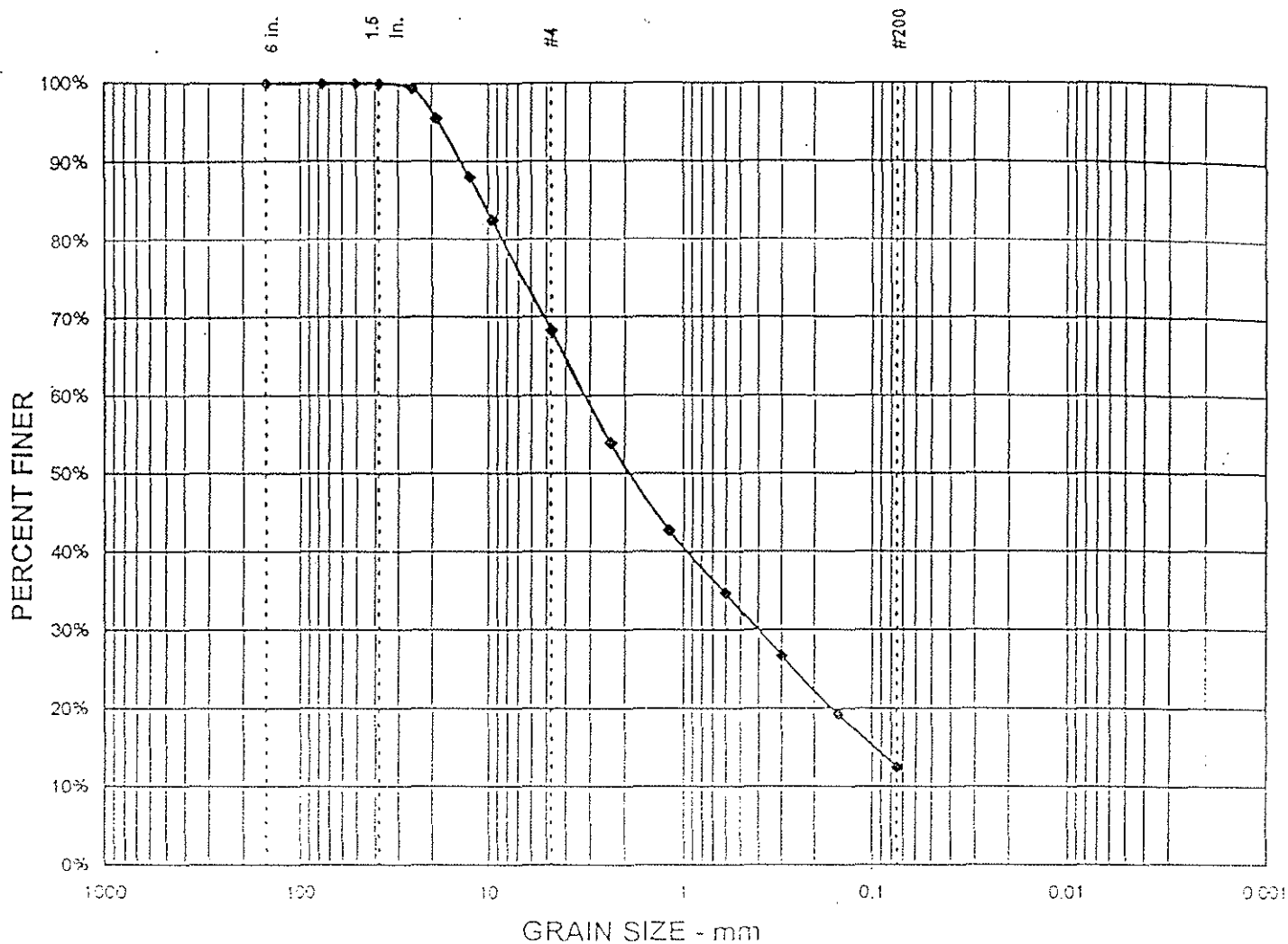
Project No.: 99-33437-01
 Project Name: BMI Landfill
 Date sampled: Oct 1999
 Location: B 101 @ 5-10'
 Silty Sand with Gravel



GRAIN SIZE DISTRIBUTION TEST REPORT
CONVERSE CONSULTANTS

Drawing No. A-4.

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	32%	$D_{35} = 10.9$	$D_{15} = 0.1$
% SAND =	56%	$D_{50} = 3.2$	$D_{10} =$
% SILT & CLAY =	12%	$D_{50} = 1.9$	$C_u =$
		$D_{30} = 0.4$	$C_c =$

Project No.: 99-33437-01

Project Name: BMI Landfill

Date sampled: Oct 1999

Location: B 102 @ 20-25'

Silty Sand with Gravel

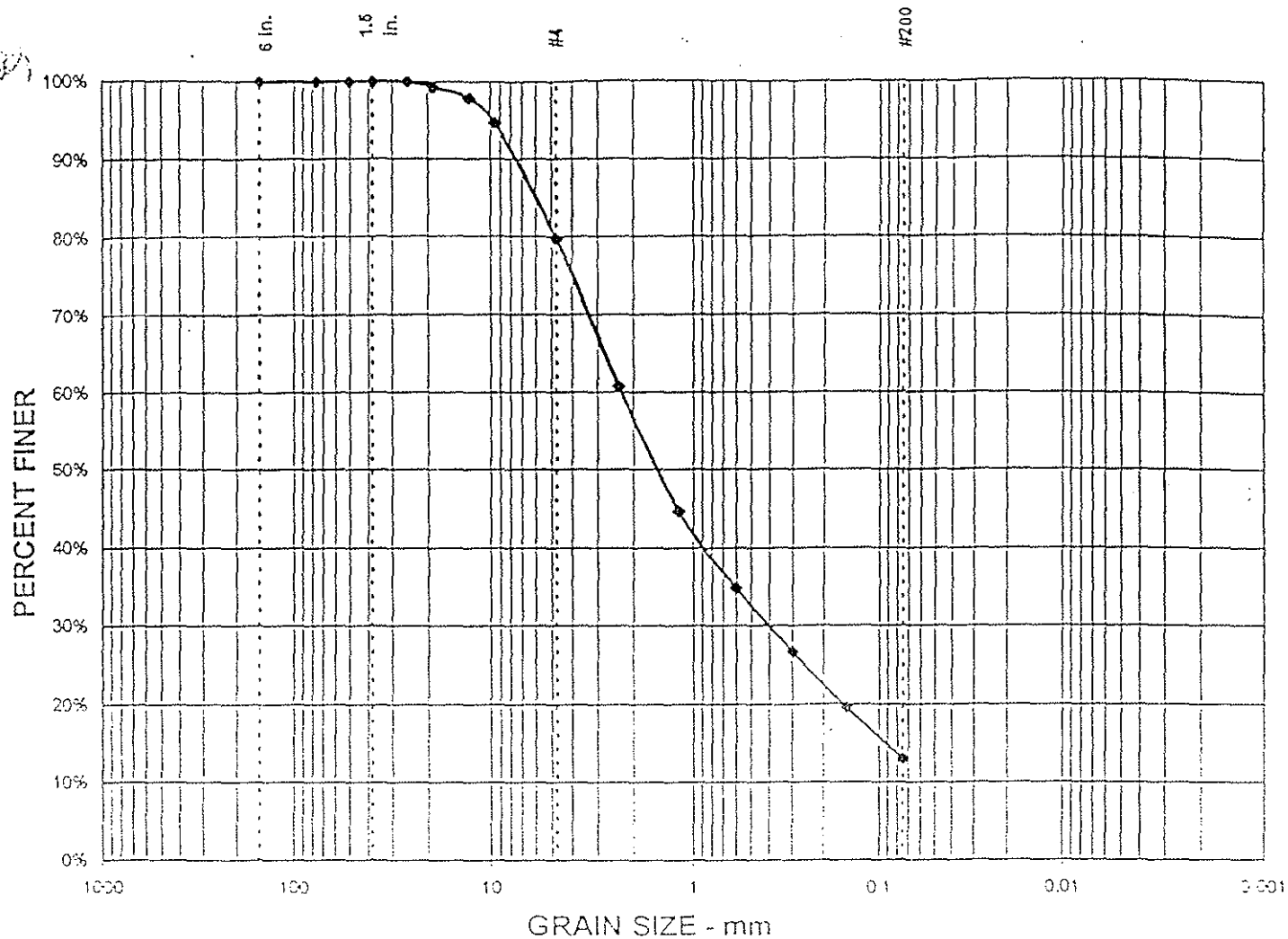


GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS

Drawing No. A-44

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	20%	$D_{85} = 6.1$	$D_{15} = 0.1$
% SAND =	57%	$D_{60} = 2.3$	$D_{10} =$
% SILT & CLAY =	13%	$D_{50} = 1.5$	$C_u =$
		$D_{30} = 0.4$	$C_c =$

Project No.: 99-33437-01

Project Name: BMI Landfill

Date sampled: Oct 1999

Location: B 103 @ 30-35'

Silty Sand with Gravel

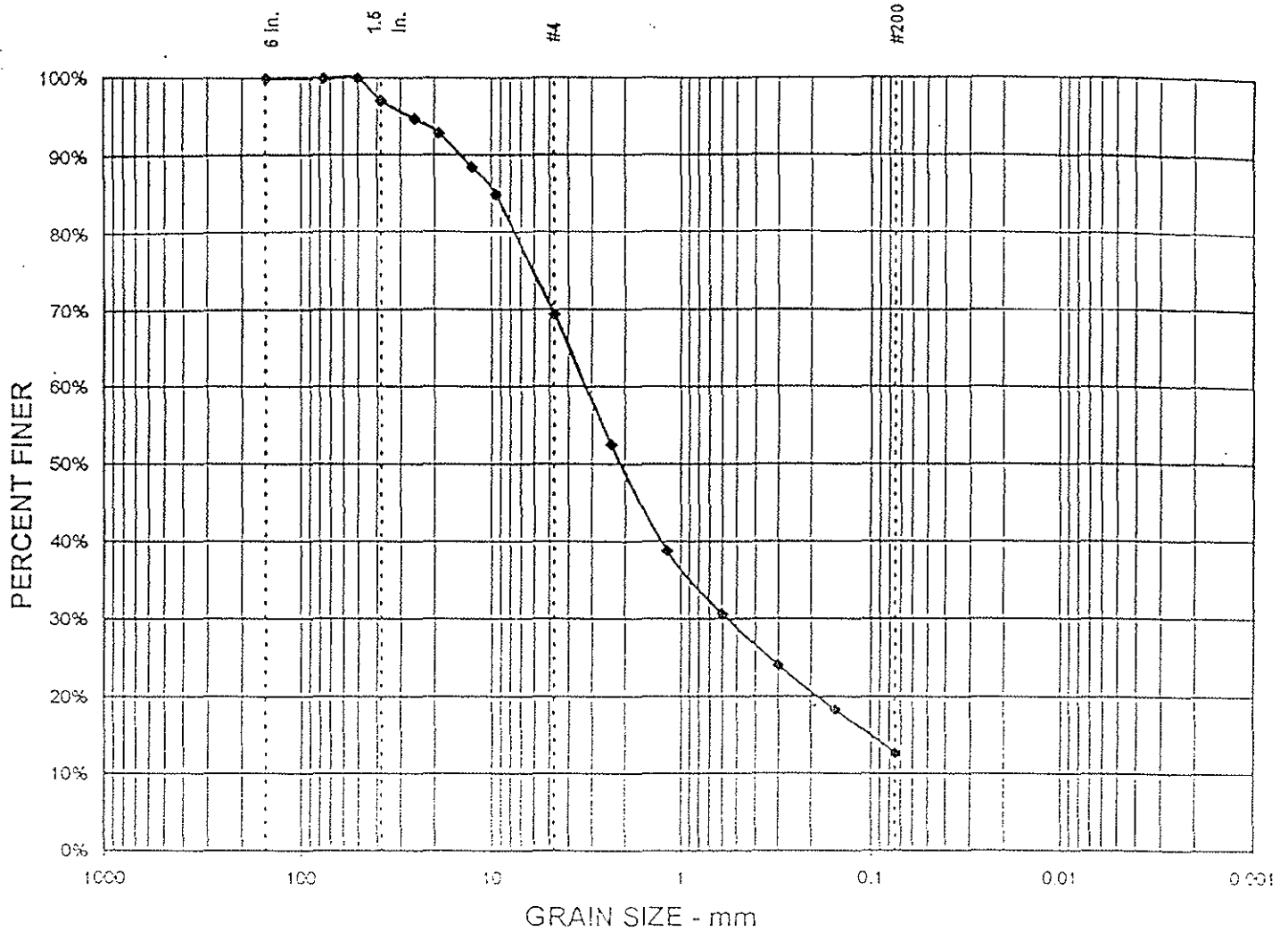


GRAIN SIZE DISTRIBUTION TEST REPORT

CONVERSE CONSULTANTS

Drawing No. A-4!

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	31%	$D_{35} = 9.6$	$D_{15} = 0.1$
% SAND =	57%	$D_{50} = 3.2$	$D_{10} =$
% SILT & CLAY =	13%	$D_{50} = 2.1$	$C_u =$
		$D_{30} = 0.6$	$C_c =$

Project No.: 99-33437-01

Project Name: BMI Landfill

Date sampled: Oct 1999

Location: B 104 @ 10-15'

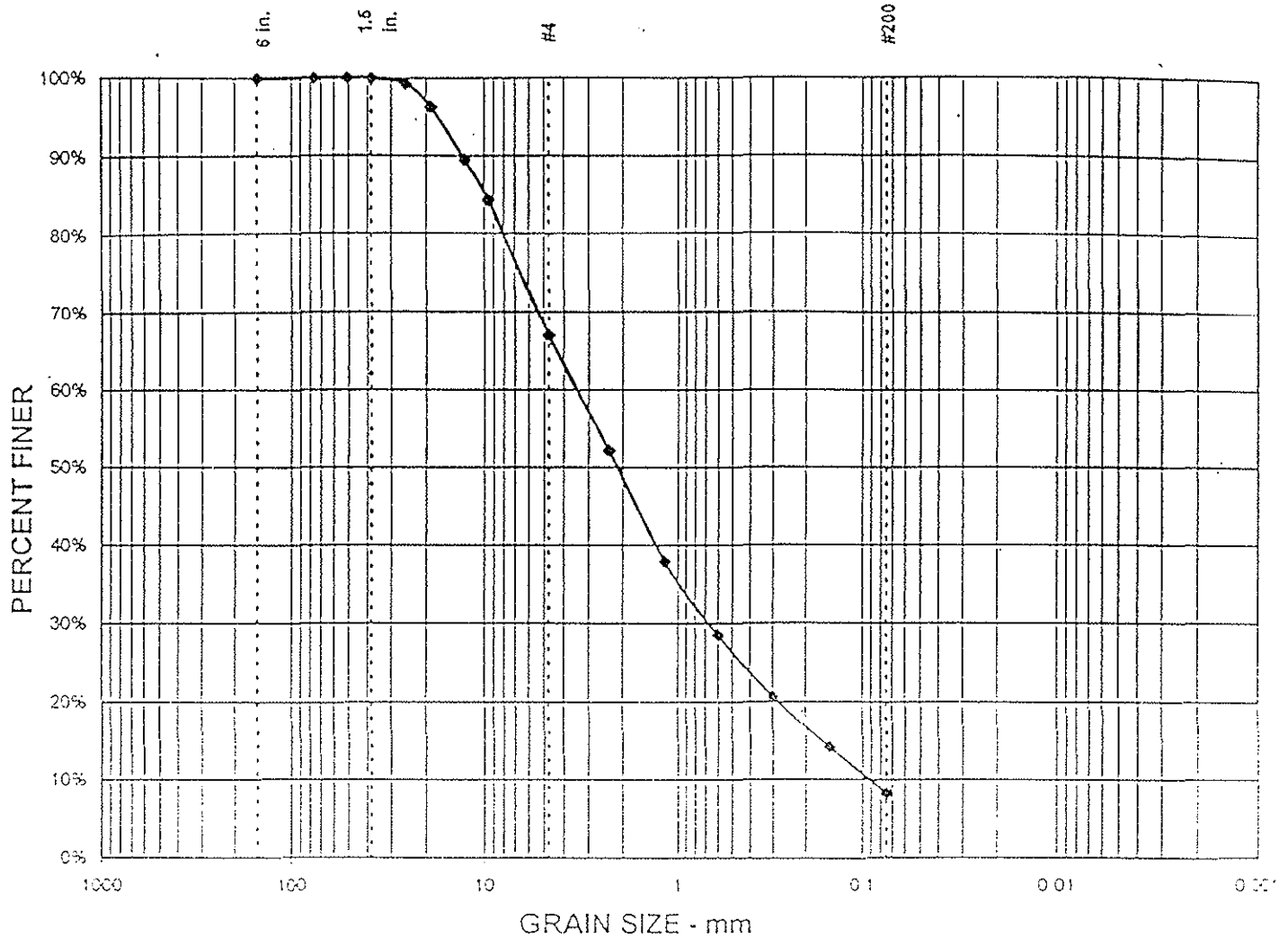
Silty Sand with Gravel



GRAIN SIZE DISTRIBUTION TEST REPORT
CONVERSE CONSULTANTS

Drawing No. A-46

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY

% GRAVEL =	33%	$D_{35} = 9.9$	$D_{15} = 0.2$
% SAND =	59%	$D_{50} = 3.4$	$D_{10} = 0.1$
% SILT & CLAY =	8%	$C_u = 37.4$	$C_c = 1.4$

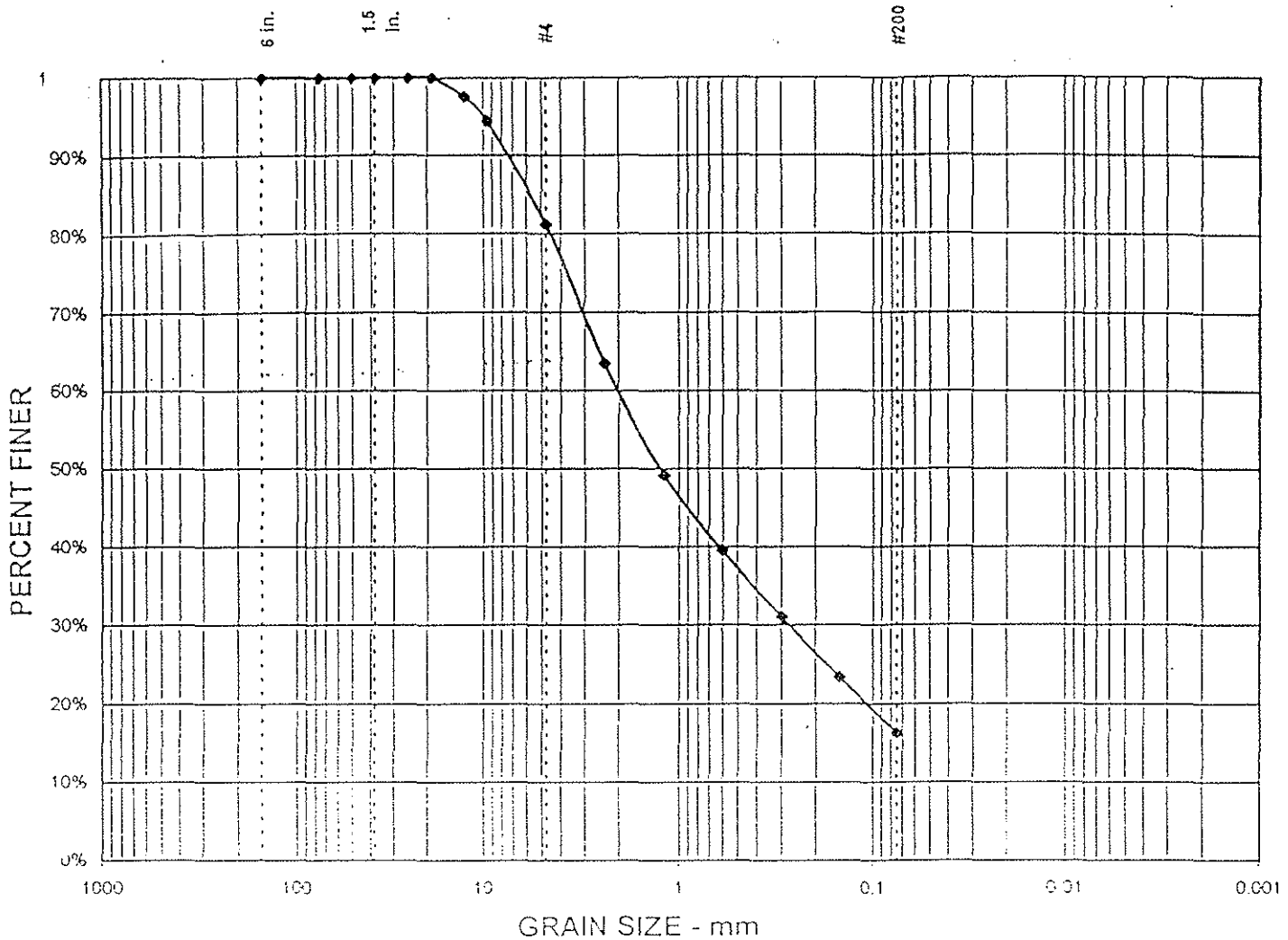
Project No.: 99-33437-01
 Project Name: BMI Landfill
 Date sampled: Oct 1999
 Location: B105 @ 20-25'
 Well Graded Sand with Silt & Gravel



GRAIN SIZE DISTRIBUTION TEST REPORT
CONVERSE CONSULTANTS

Drawing No. A-47

GRAIN SIZE DISTRIBUTION GRAPH



TEST SUMMARY -

% GRAVEL =	19%	$D_{85} = 5.8$	$D_{15} =$
% SAND =	65%	$D_{50} = 2.0$	$D_{10} =$
% SILT & CLAY =	16%	$D_{50} = 1.2$	$C_u =$
		$D_{30} = 0.3$	$C_c =$

Project No.: 99-33437-01

Project Name: BMI Landfill

Date sampled: Oct 1999

Location: B 106 @ 0-5'

Silty Sand with Gravel



GRAIN SIZE DISTRIBUTION TEST REPORT
CONVERSE CONSULTANTS

Drawing No. A-41

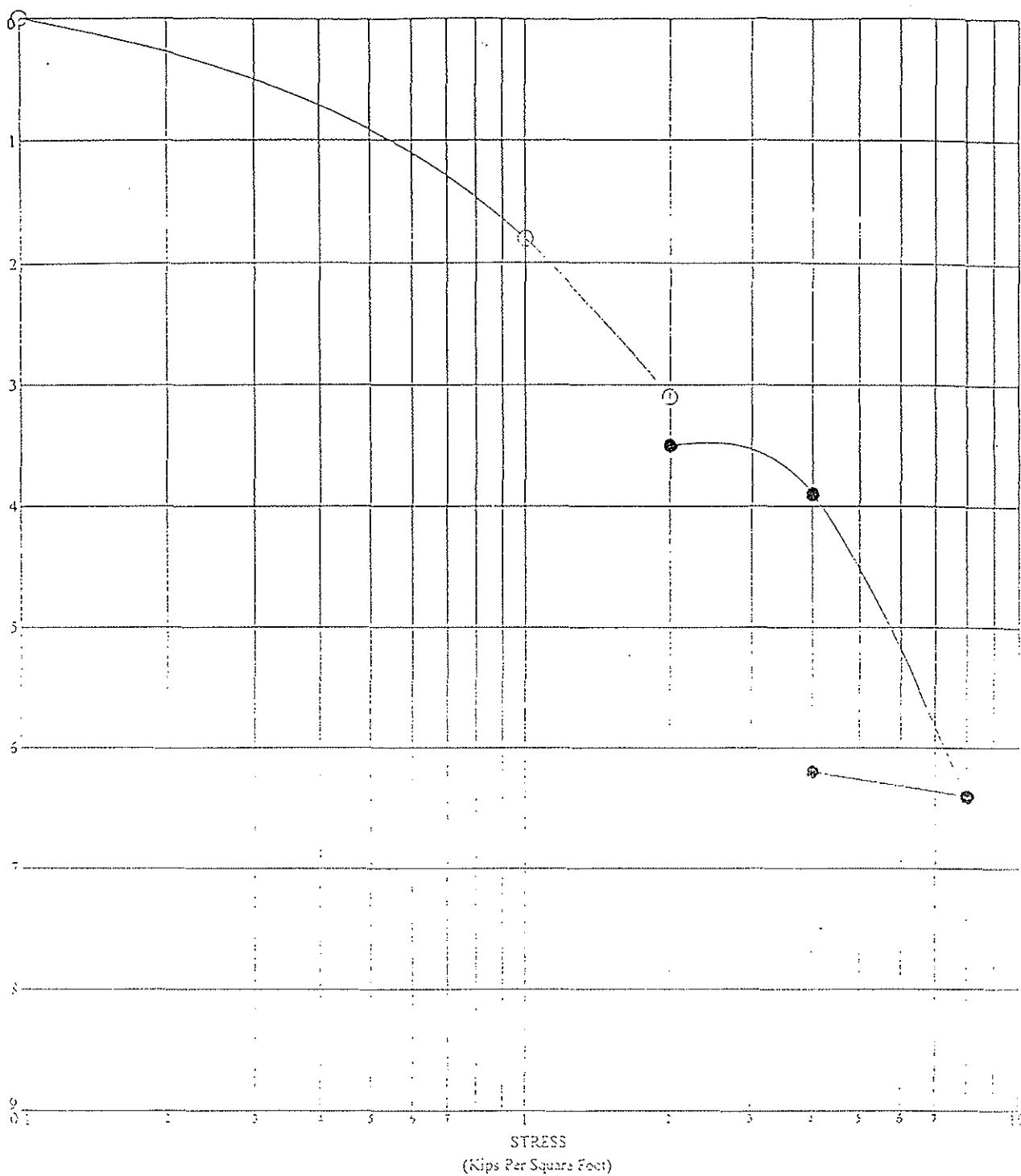
No.

-01

No.

DRAFT

CONSOLIDATION
(Percent of Sample Thickness)



APPROVED BY

BORING NO: B- 8
DEPTH: 39.0
DESCRIPTION: LEAN CLAY
DRY DENSITY: 58 PCF
MOISTURE CONTENT: 64%

● READINGS AFTER SATURATION WITH WATER
CONSOLIDATION TEST

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION

Project No.
99-33437-01



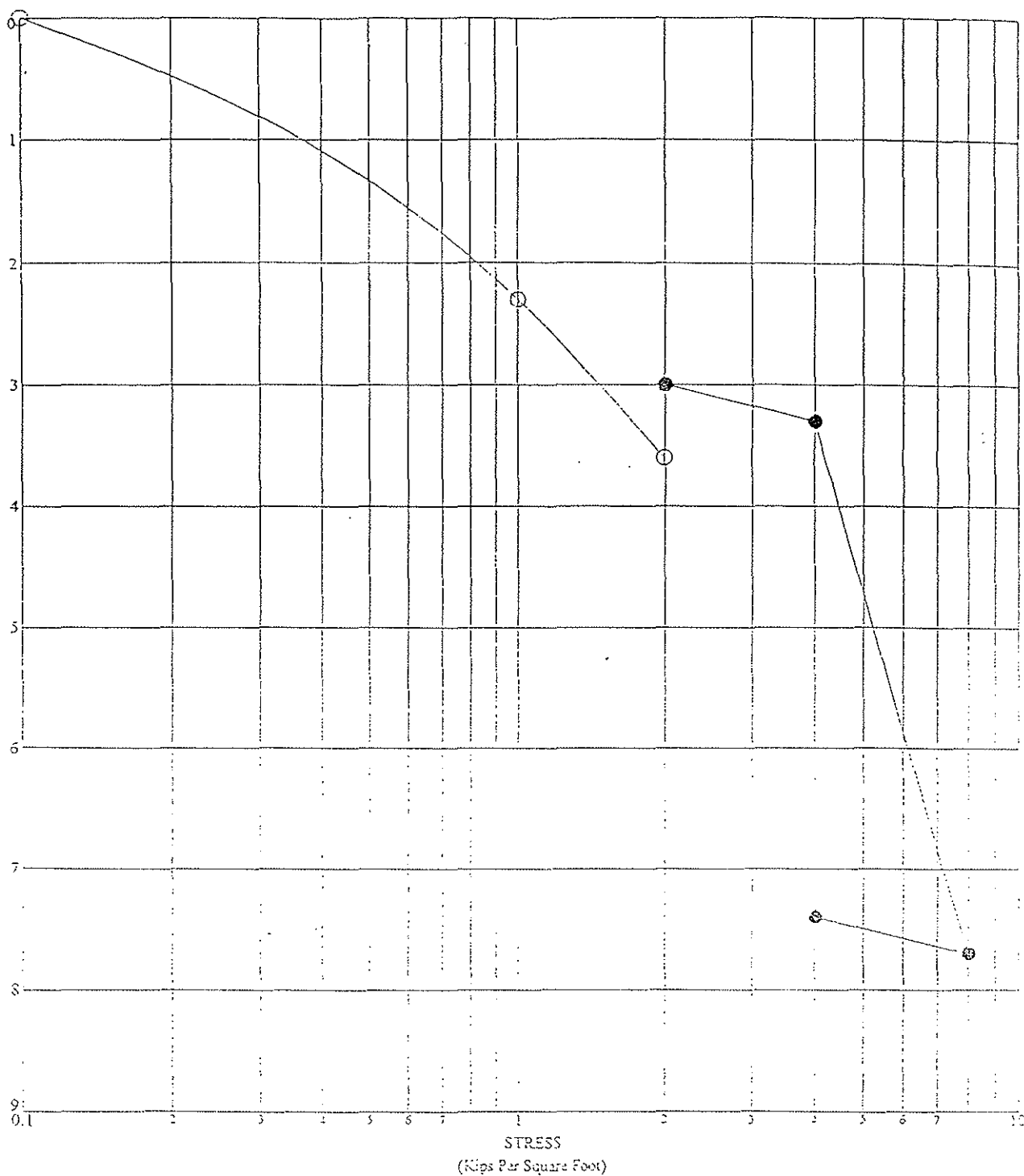
Converse Consultants

Geotechnical Engineering
and Applied Sciences

Drawing No.
A-50

DRAFTED BY GLE

CONSOLIDATION
(Percent of Sample Thickness)



APPROVED BY ON

BORING NO: B- 8
DEPTH: 49.0
DESCRIPTION: LEAN CLAY
DRY DENSITY: 70 PCF
MOISTURE CONTENT: 51 %

● READINGS AFTER SATURATION WITH WATER
CONSOLIDATION TEST

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION

Project No.
99-33437-01



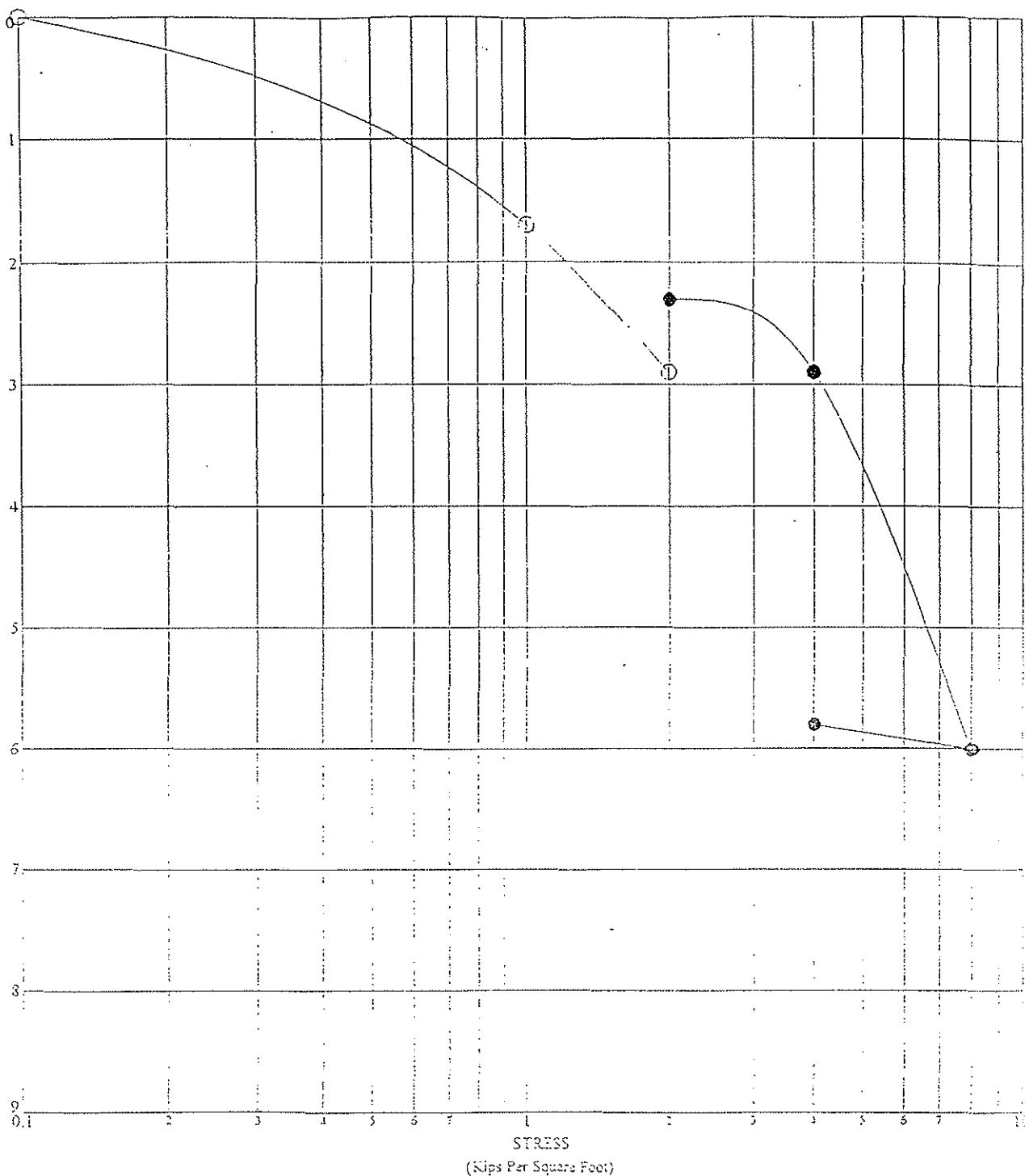
Converse Consultants

Geotechnical Engineering
and Applied Sciences

Drawing No.
A-51

DRAFT CYCLE

CONSOLIDATION
(Percent of Sample Thickness)



APPROVED BY ON

BORING NO: B-10.
DEPTH: 54.0
DESCRIPTION: LEAN CLAY
DRY DENSITY: 61 PCF
MOISTURE CONTENT: 68%

● READINGS AFTER SATURATION WITH WATER
CONSOLIDATION TEST

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION Project No. 99-33437-01



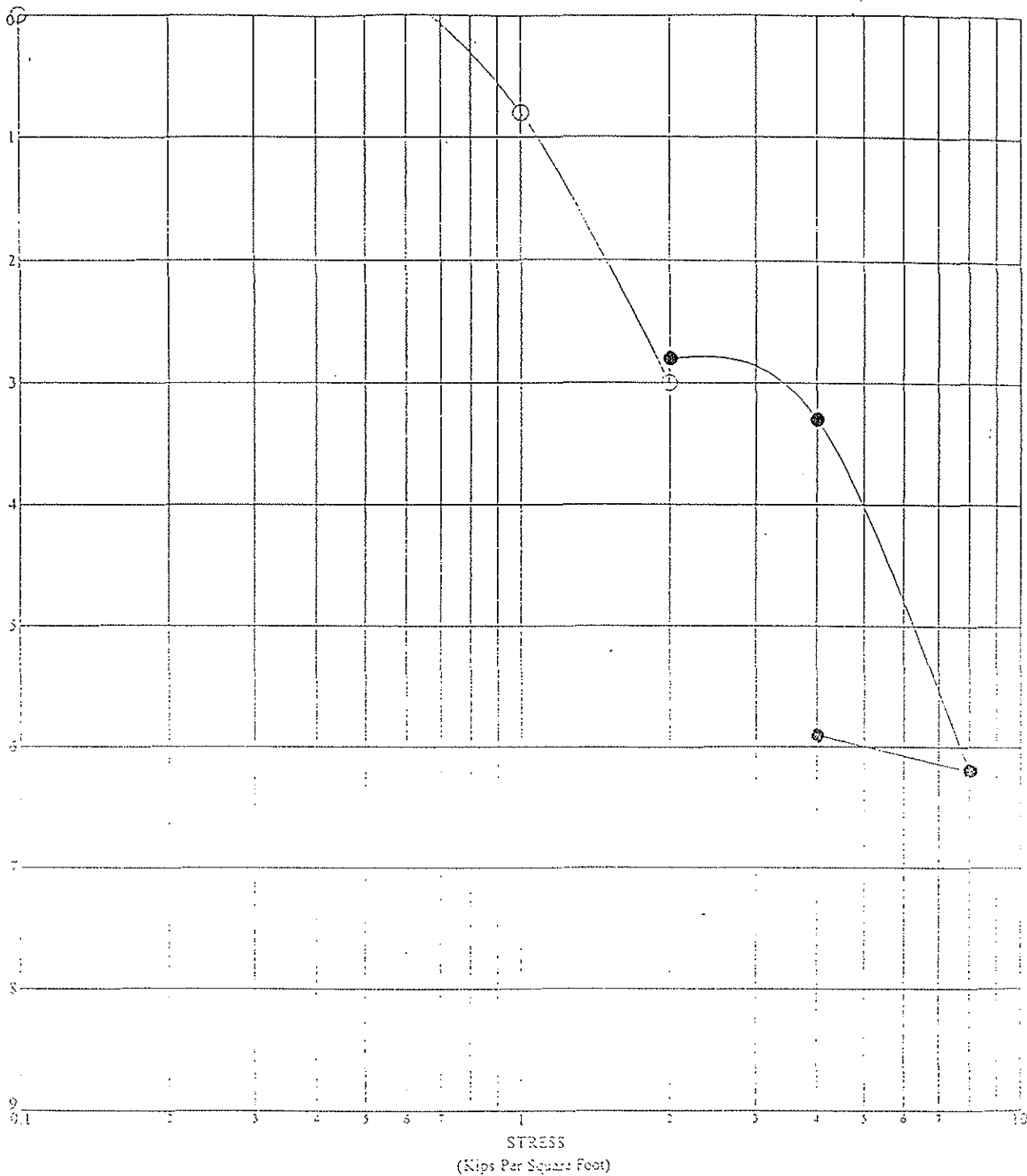
Converse Consultants

Geotechnical Engineering
and Applied Sciences

Drawing No.
A-52

DRAFTED BY GLE

CONSOLIDATION
(Percent of Sample Thickness)



APPROVED BY ON

BORING NO: B-101
DEPTH: 39.0
DESCRIPTION: LEAN CLAY
DRY DENSITY: 66 PCF
MOISTURE CONTENT: 45%

READINGS AFTER SATURATION WITH WATER
CONSOLIDATION TEST

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION

Project No.
99-33437-01



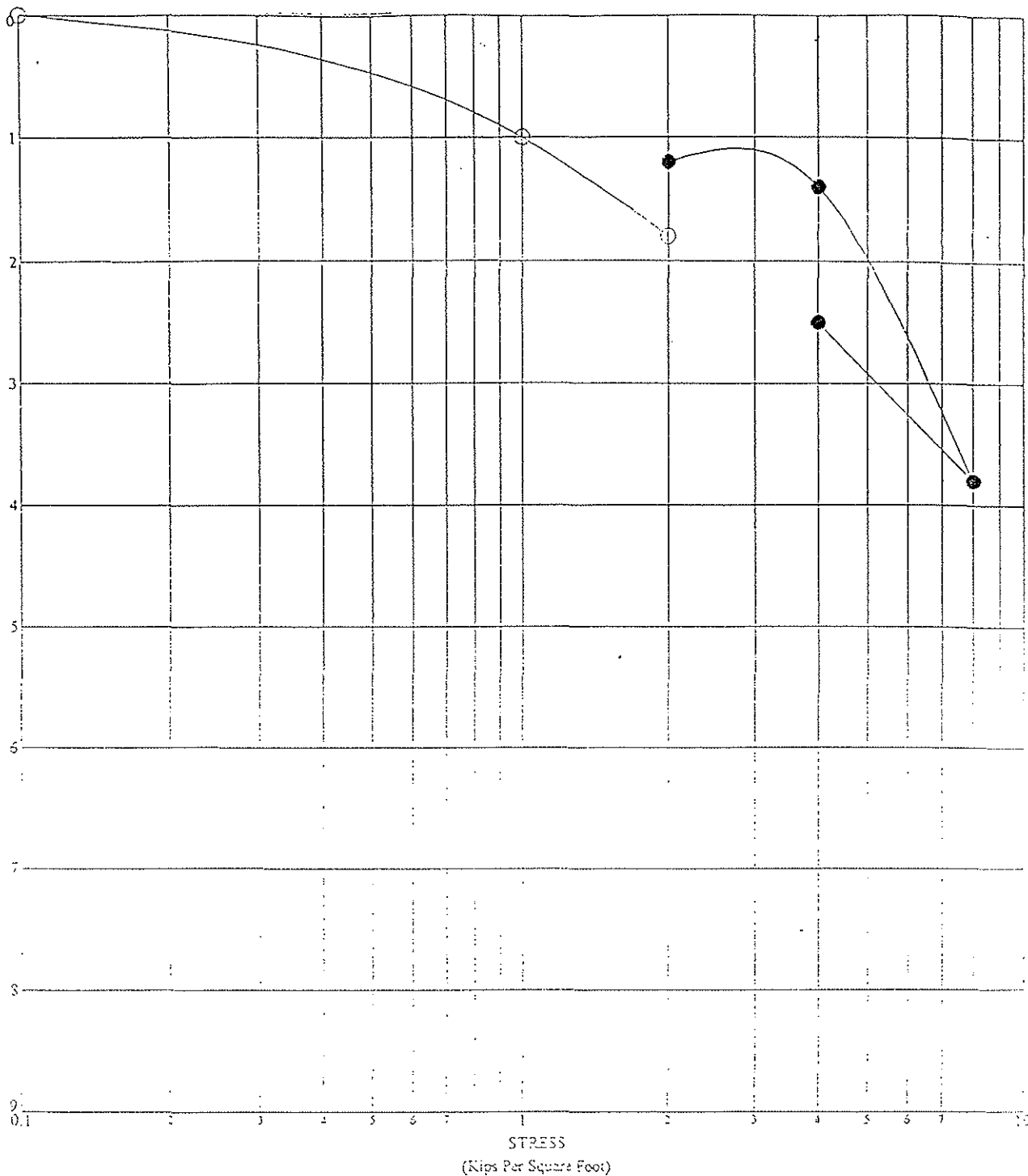
Converse Consultants

Geotechnical Engineering
and Applied Sciences

Drawing No.
A-53

DRAFTED BY: GLE

CONSOLIDATION
(Percent of Sample Thickness)



APPROVED BY: ON

BORING NO: B-101
 DEPTH: 59.0
 DESCRIPTION: LEAN CLAY
 DRY DENSITY: 73 PCF
 MOISTURE CONTENT: 38%

● READINGS AFTER SATURATION WITH WATER
 CONSOLIDATION TEST

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION Project No. 99-33437-01



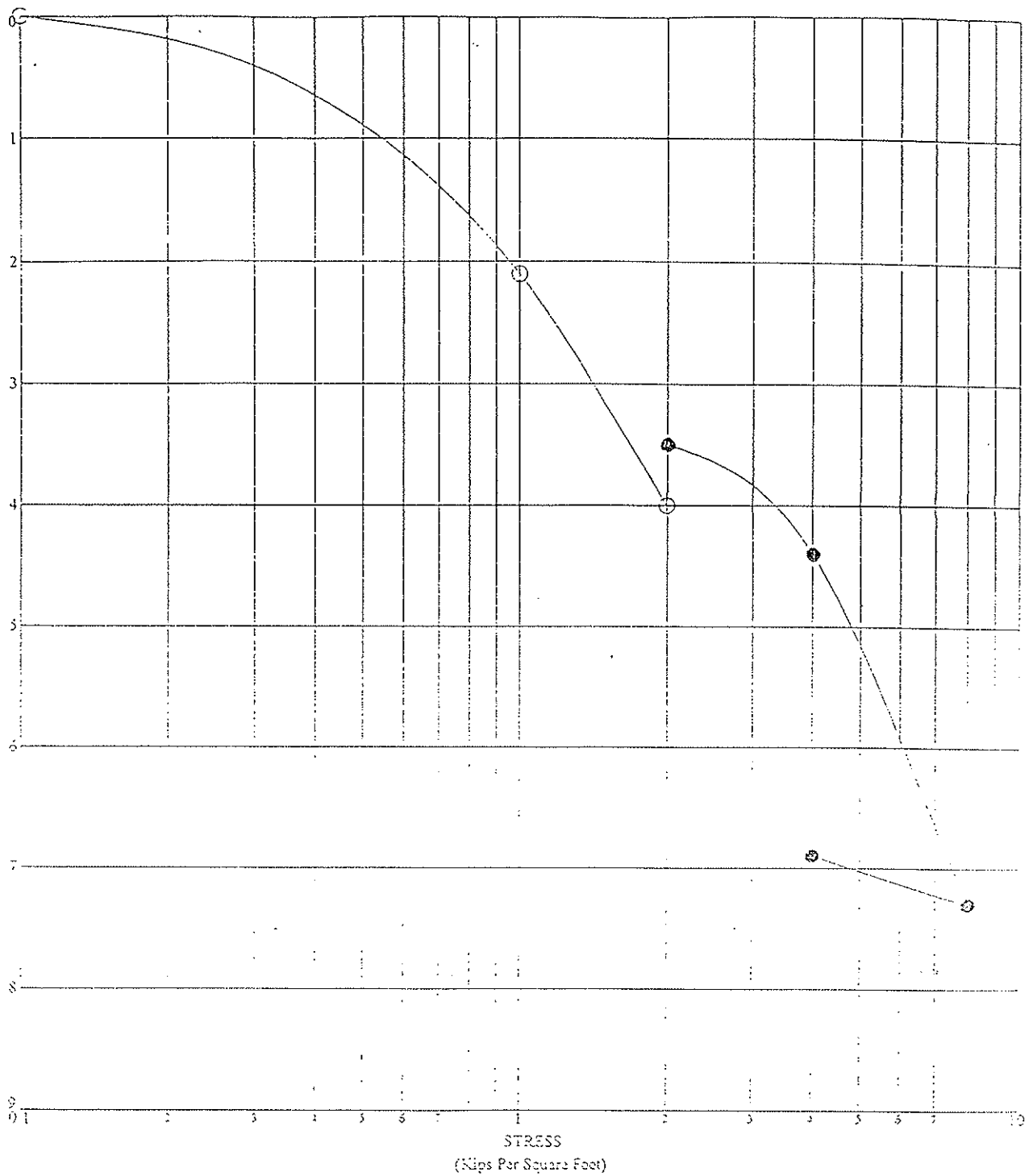
Converse Consultants

Geotechnical Engineering
and Applied Sciences

Drawing No.
A-54

DRAFTED BY GLE

CONSOLIDATION
(Percent of Sample Thickness)



APPROVED BY ON

BORING NO: B-102
DEPTH: 49.0
DESCRIPTION:
DRY DENSITY: 67 PCF
MOISTURE CONTENT: 49 %

● READINGS AFTER SATURATION WITH WATER
CONSOLIDATION TEST

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION Project No. 99-33437-01



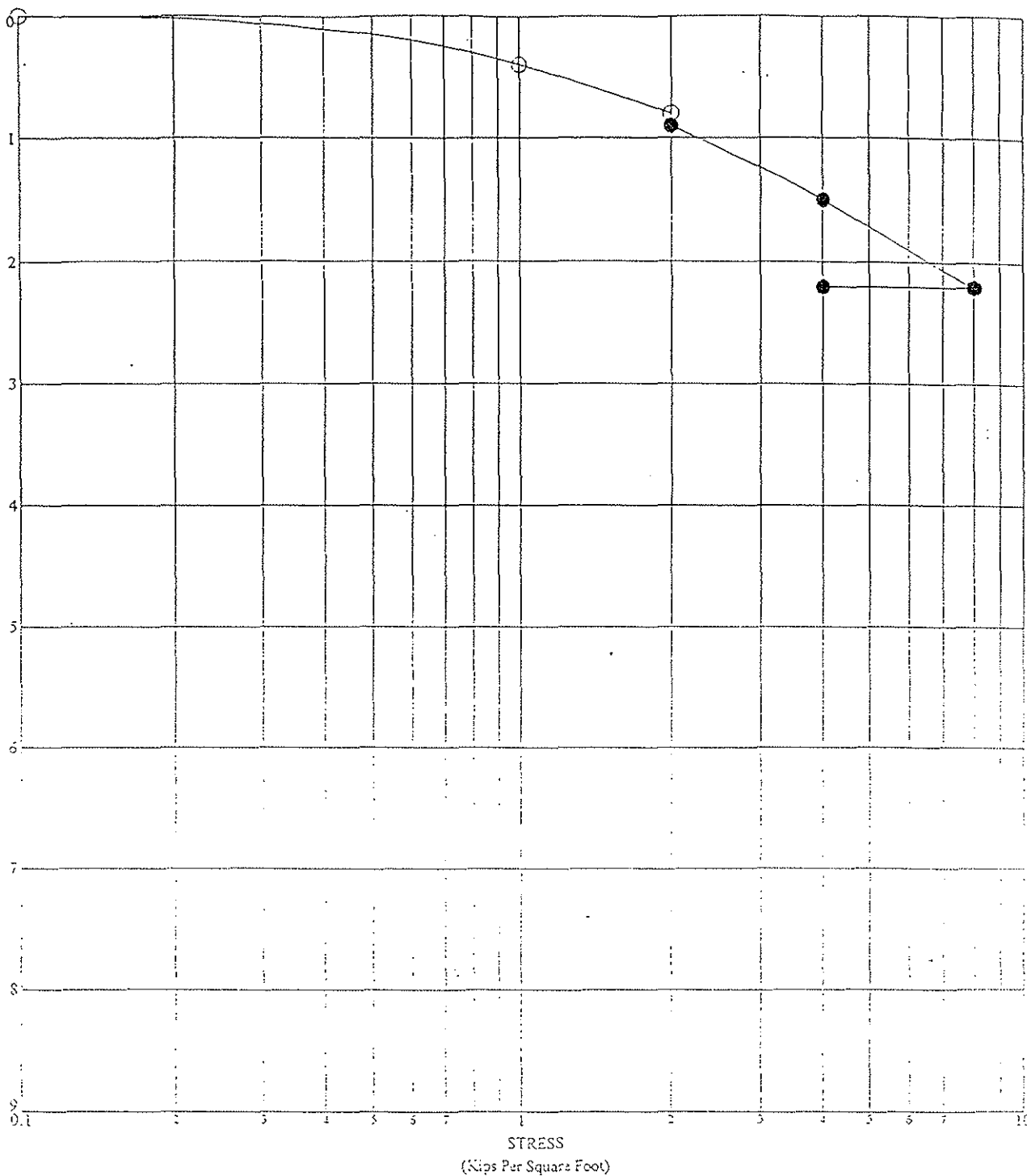
Converse Consultants

Geotechnical Engineering
and Applied Sciences

Drawing No.
A-55

DRAFTED BY GLE

CONSOLIDATION
(Percent of Sample Thickness)



APPROVED BY ON

BORING NO: B-105
DEPTH: 34.0
DESCRIPTION: SILTY SAND With Gravel
DRY DENSITY: 101 PCF
MOISTURE CONTENT: 5 %

● READINGS AFTER SATURATION WITH WATER
CONSOLIDATION TEST

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION

Project No.
99-33437-01

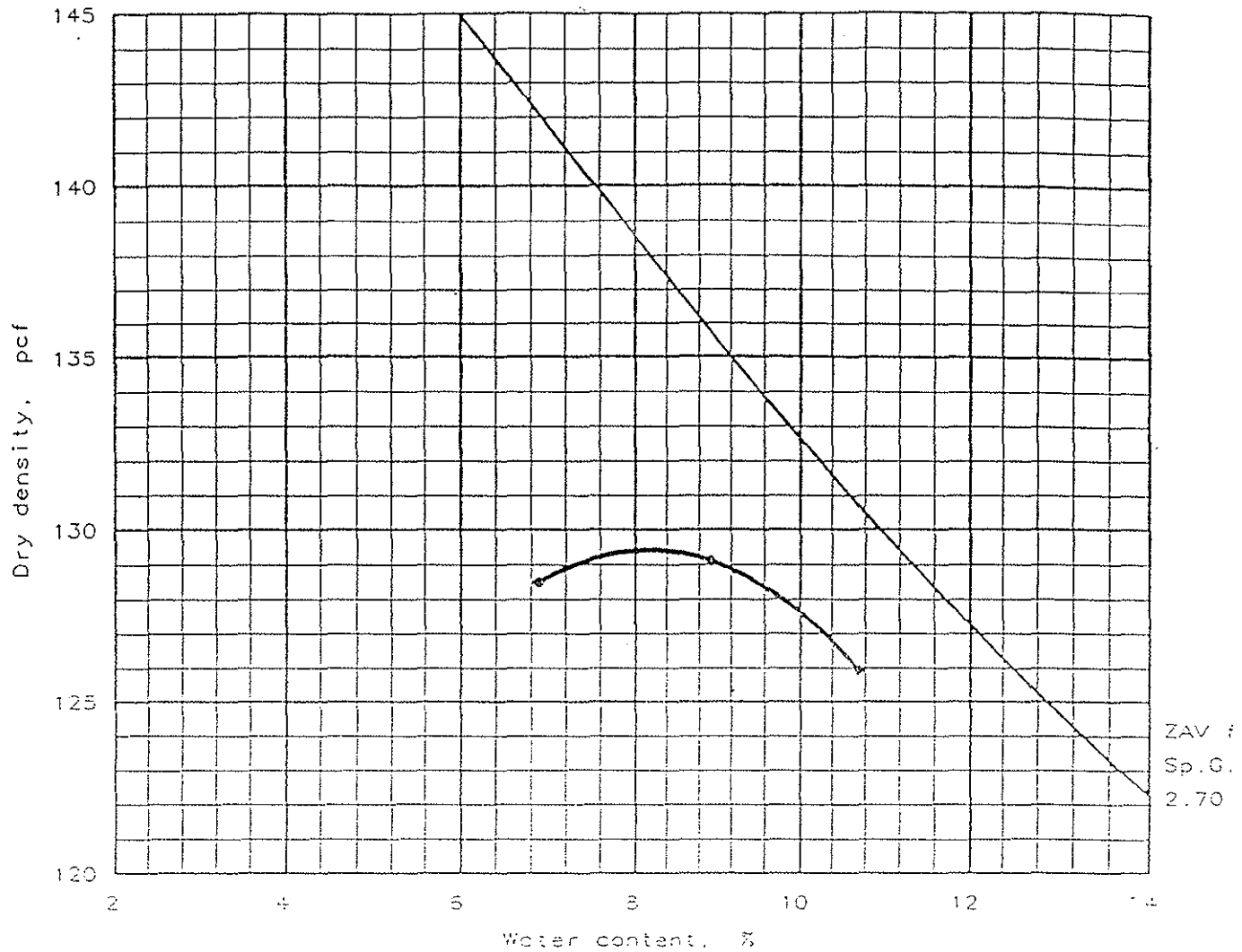


Converse Consultants

Geotechnical Engineering
and Applied Sciences

Drawing No.
A.56

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 1557-91 Procedure C, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No. 2
	USCS	AASHTO						
	SM				NV	NP	1.4 %	20.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 129.4 pcf Optimum moisture = 8.2 %	Silty Sand with Gravel

Project No.: 99-33437-01

Project: BMI Landfill

Location: B1 @ 20-25'

Date: 10-15-1999

MOISTURE-DENSITY RELATIONSHIP TEST

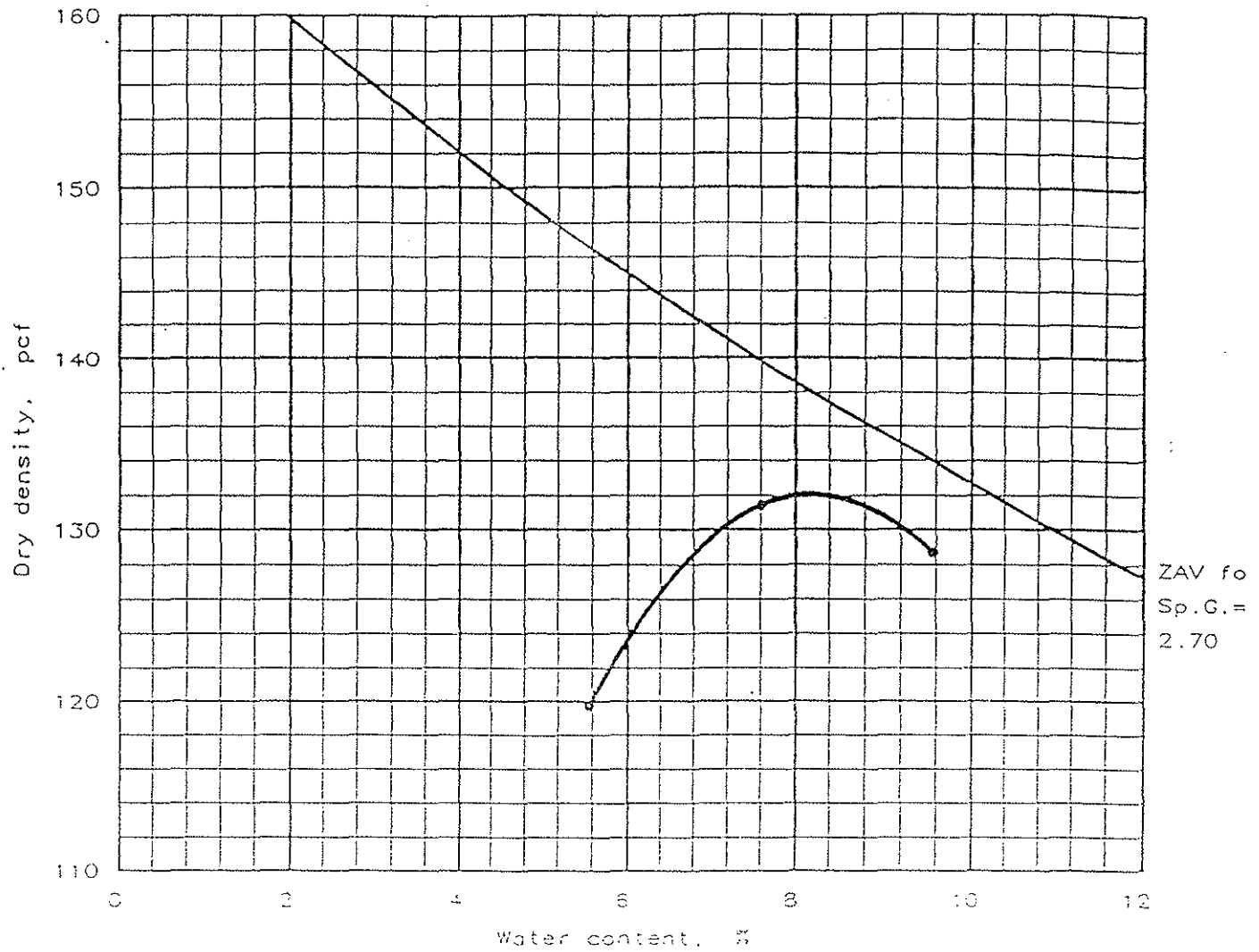
CONVERSE CONSULTANTS



Fig. No.

A-57

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 1557-91 Procedure C, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
	USCS	AASHTO						
	SM				NV	NP	0 %	19.2 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 132.1 pcf Optimum moisture = 8.2 %	Silty Sand with Gravel

Project No.: 99-33437-01

Project: BMI Landfill

Location: BS @ 20-25'

Date: 10-15-1999

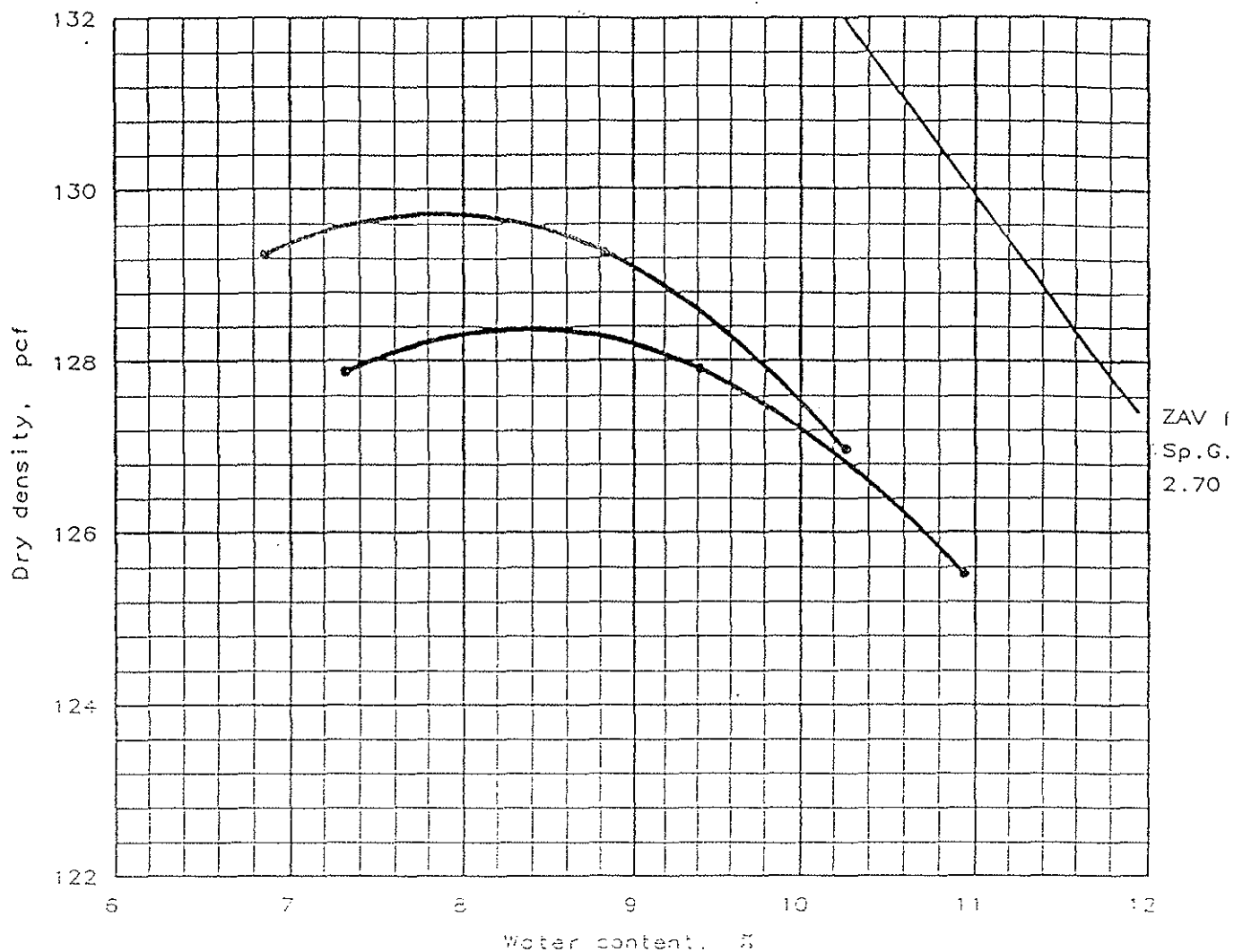
MOISTURE-DENSITY RELATIONSHIP TEST
CONVERSE CONSULTANTS



Fig. No.

A-58

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 1557-91 Procedure C, Modified
Oversize correction applied to each point

Elev/ Depth	Classification		Net. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No. 2
	USCS	AASHTO						
	SM				NV	NP	6.2 %	13.3

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 129.7 pcf Optimum moisture = 7.9 %	128.4 pcf 8.4 %	Silty Sand with Gravel

Project No.: 99-33437-01

Project: BMI Landfill

Location: B12 @ 10-15'

Date: 10-15-1999

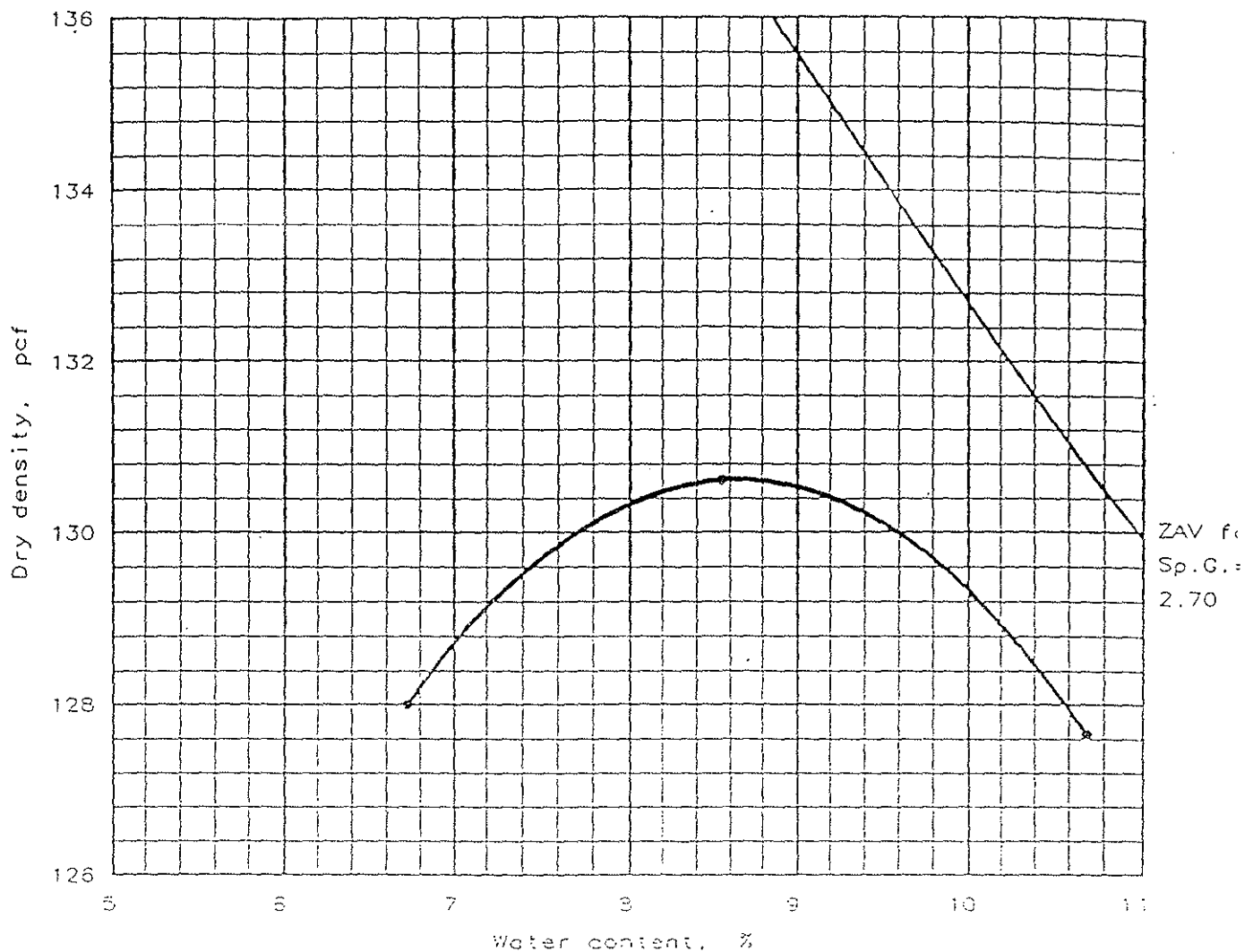
MOISTURE-DENSITY RELATIONSHIP TEST
CONVERSE CONSULTANTS



Fig. No.


A-59

MOISTURE-DENSITY RELATIONSHIP TEST

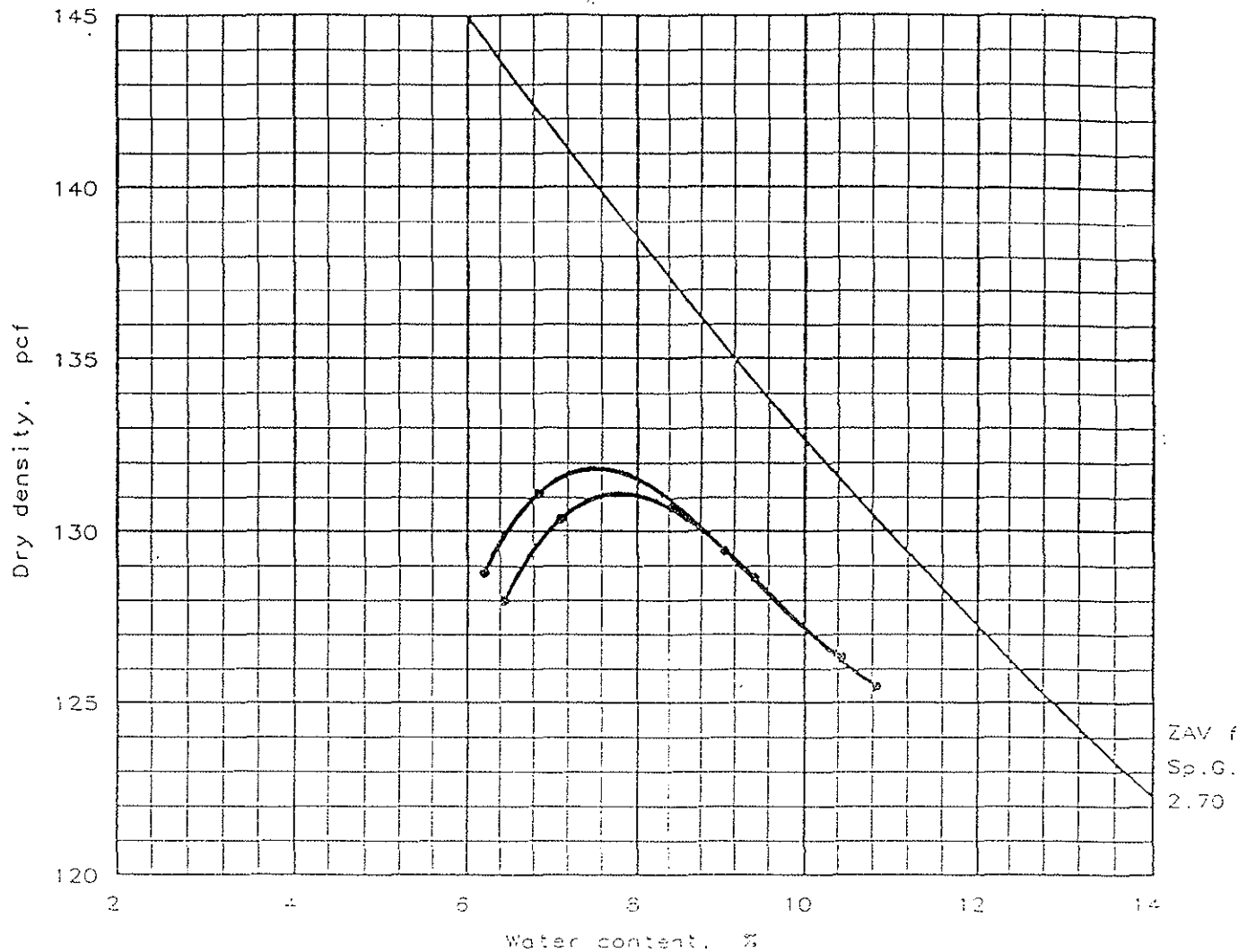


Test specification: ASTM D 1557-91 Procedure C, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No. 200
	USCS	AASHTO						
	SM				NV	NP	4.7 %	14.7 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 130.6 pcf Optimum moisture = 8.7 %	Silty Sand with Gravel
Project No.: 99-33437-01 Project: BMI Landfill Location: B 101 @ 5-10' Date: 10-15-1999	
MOISTURE-DENSITY RELATIONSHIP TEST CONVERSE CONSULTANTS	Fig. No. A-60

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 1557-91 Procedure C, Modified
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No. 2
	USCS	AASHTO						
	SW-SM				NV	NP	3.7 %	8.3

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 131.6 pcf Optimum moisture = 7.5 %	131.1 pcf 7.8 %	Well Graded Sand with Silt & Gravel

Project No.: 99-33437-01
Project: BMI Landfill
Location: B 105 @ 20-25'

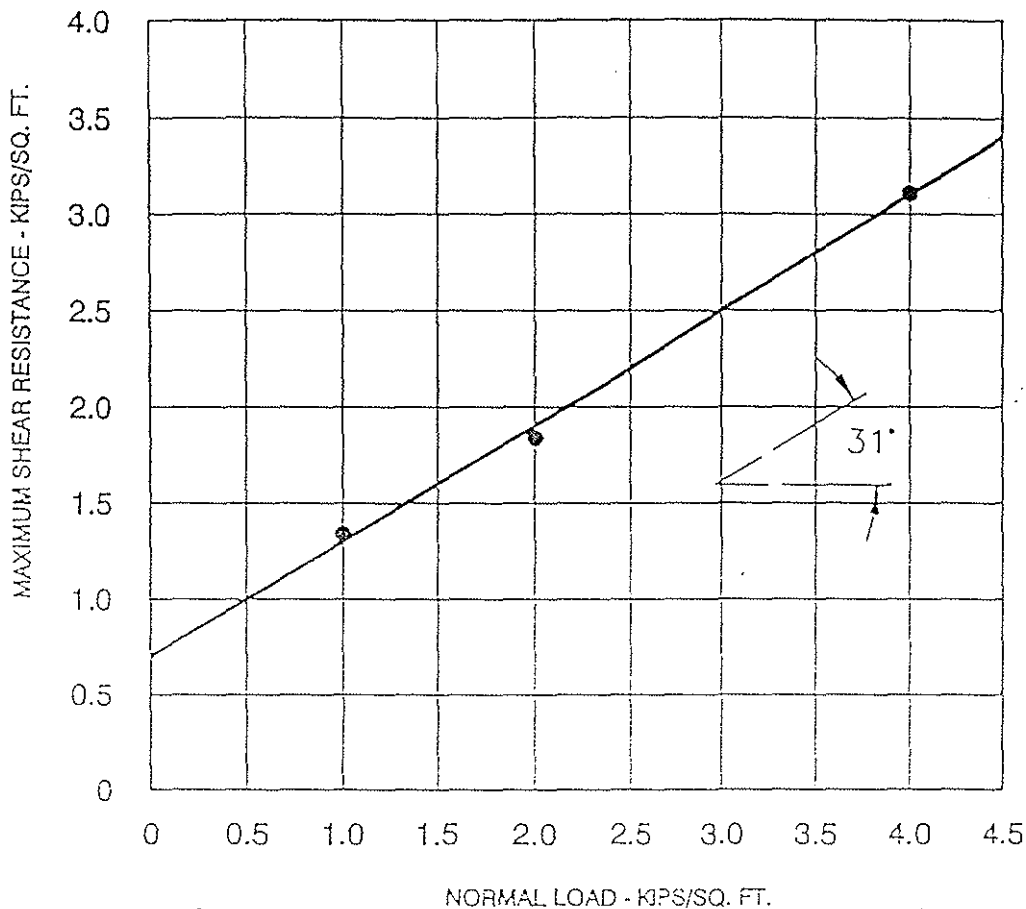
Date: 10-15-1999

MOISTURE-DENSITY RELATIONSHIP TEST
CONVERSE CONSULTANTS



Fig. No.

A-61



Exploration Location = B-4
 Sample Depth = 14 - 14.5 FT
 Angle of Shearing Resistance, $\phi = 31^\circ$
 Cohesion, $c = 0.70$ KIPS/SQ. FT.

DIRECT SHEAR TEST RESULTS

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 Basic Management Incorporated
 Clark County, Nevada

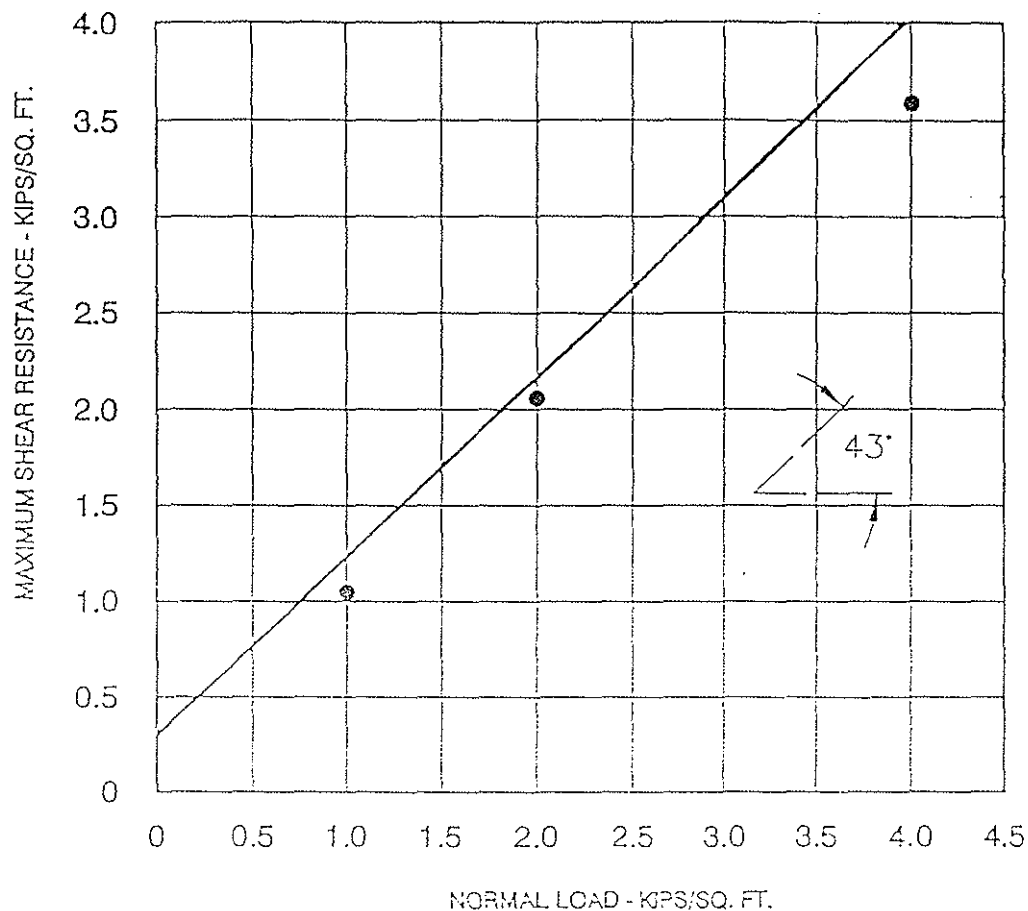
Scale	N/A	File No.	4370153
Date	10/20/99	Project No.	99-33437-01
Drafted By	GLE	Figure No.	
Checked By	MKK		
Approved By			



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A-62



Exploration Location = B-5
 Sample Depth = 14 - 15 FT
 Angle of Shearing Resistance, $\phi = 43^\circ$
 Cohesion, $c = 0.30$ KIPS/SQ. FT.

DIRECT SHEAR TEST RESULTS

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
 Basic Management Incorporated
 Clark County, Nevada

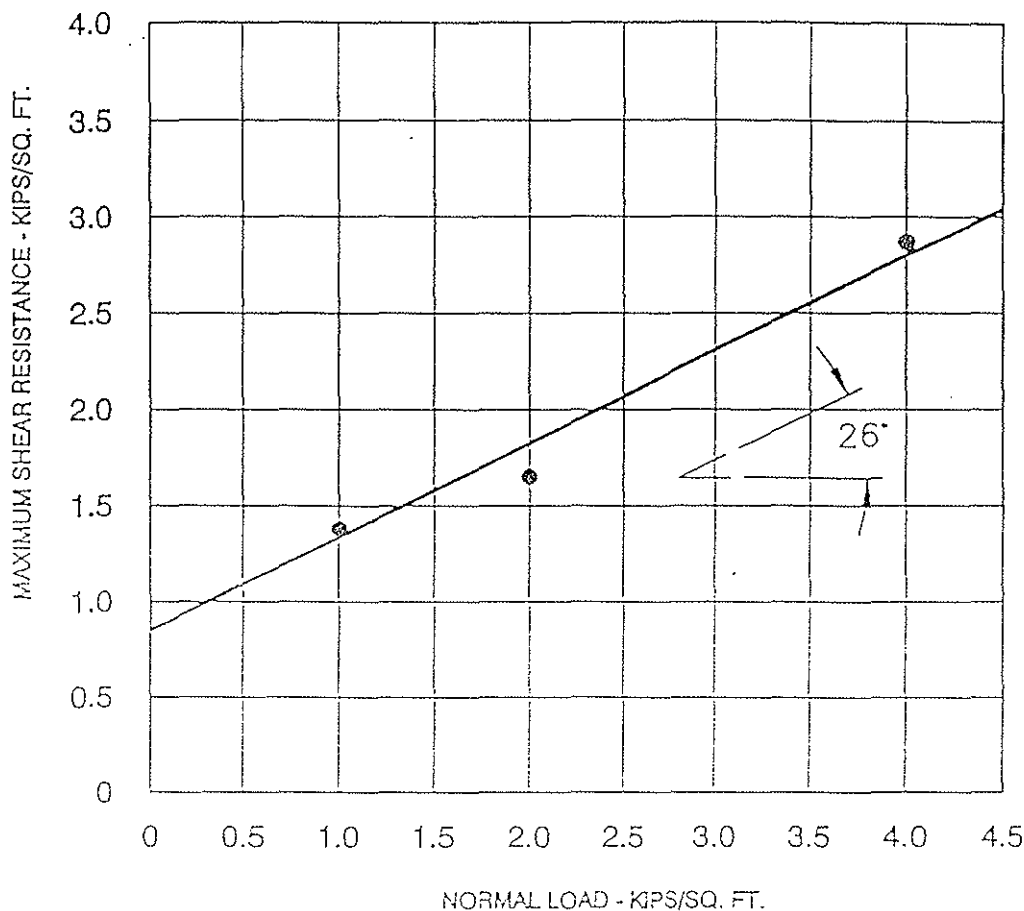
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Date	10/20/99	Project No.	99-33437-01
Drafted By	GLE	Figure No.	
Checked By	MKK		
Approved By			



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A-63



Exploration Location = B-10
 Sample Depth = 54 - 54.5 FT
 Angle of Shearing Resistance, $\phi = 26^\circ$
 Cohesion, $c = 0.85$ KIPS/SQ. FT.

DIRECT SHEAR TEST RESULTS

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
 Basic Management Incorporated
 Clark County, Nevada

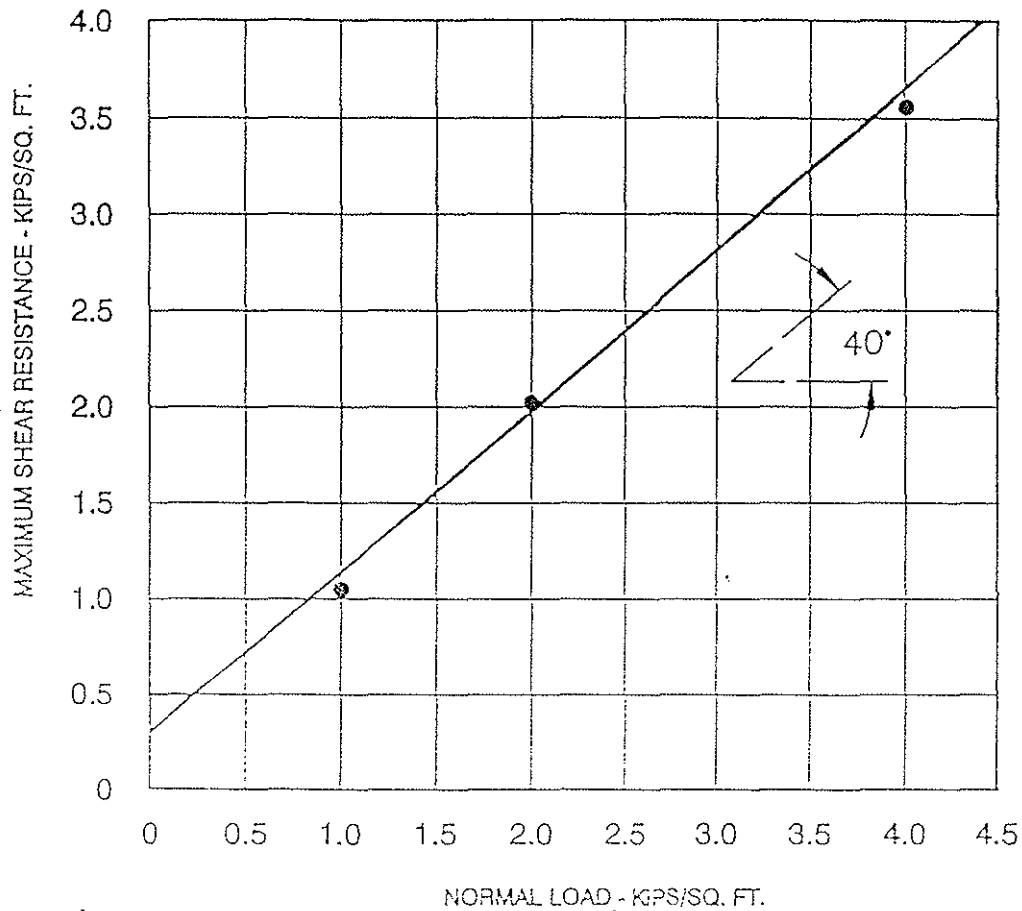
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Date	10/20/99	Project No.	99-33-437-0
Drafted By	GLE	Figure No.	
Checked By	MKK		
Approved By			



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A-64



Exploration Location = B-12
 Sample Depth = 14 - 15 FT
 Angle of Shearing Resistance, $\phi = 40^\circ$
 Cohesion, $c = 0.30$ KIPS/SQ. FT.

DIRECT SHEAR TEST RESULTS

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
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 Clark County, Nevada

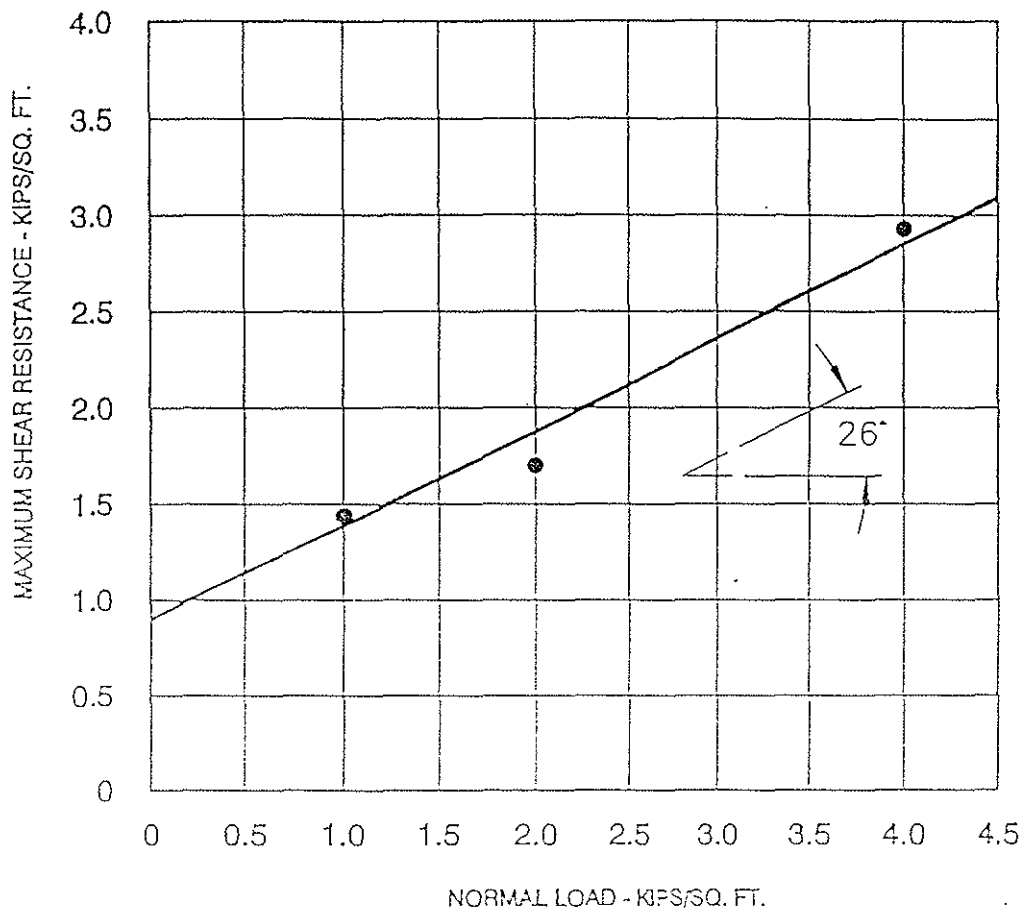
Scale	N/A	File No.	43701B5
Date	10/20/99	Project No.	99-33437-C
Drafted By	GLE	Figure No.	
Checked By	MKK		
Approved By			



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A-65



Exploration Location = B-101
 Sample Depth = 39 - 40 FT
 Angle of Shearing Resistance, $\phi = 26^\circ$
 Cohesion, $c = 0.90$ KIPS/SQ. FT.

DIRECT SHEAR TEST RESULTS

PRELIMINARY GEOLOGIC AND GEOTECHNICAL INVESTIGATION
 Basic Management Incorporated
 Clark County, Nevada

Scale N/A
 Date 10/20/99
 Drafted By J. GLE
 Checked By MKK
 Approved By

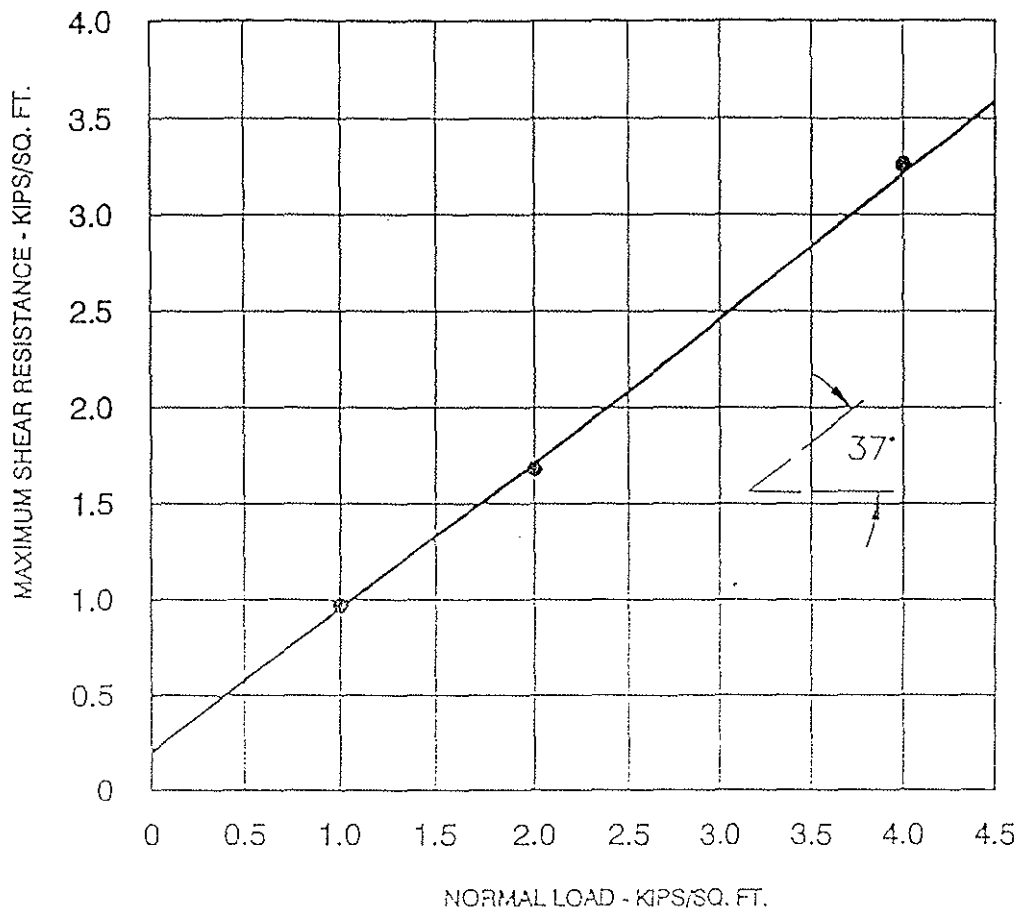
File No. 4370135
 Project No. 99-33437-0
 Figure No.



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A-66



Exploration Location = B-102
 Sample Depth = 20 - 25 FT
 Angle of Shearing Resistance, $\phi = 37^\circ$
 Cohesion, $c = 0.20$ KIPS/SQ. FT.

DIRECT SHEAR TEST RESULTS

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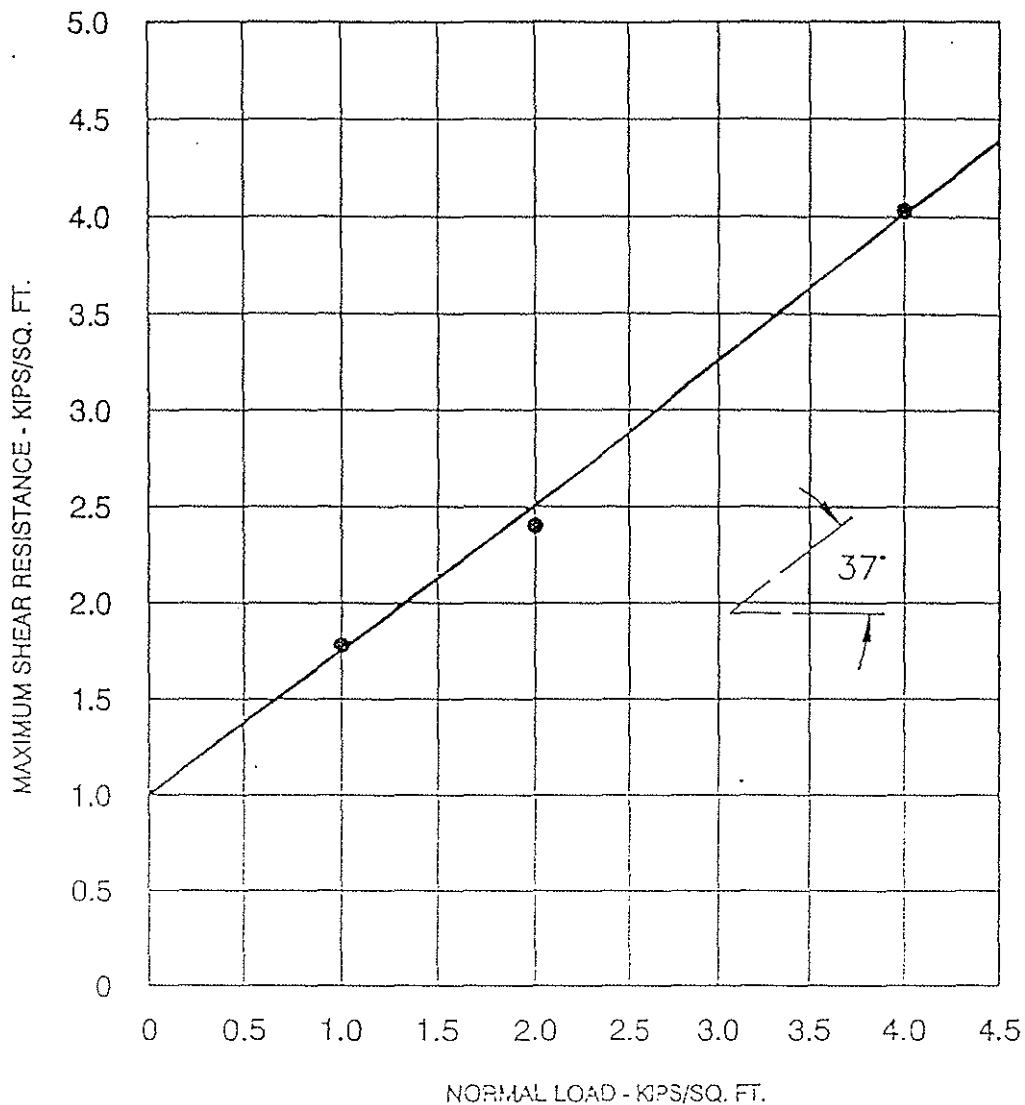
Scale	N/A	File No.	43701B6
Date	10/20/99	Project No.	99-33437-0
Drafted By	GLE	Figure No.	
Checked By	MKK		
Approved By			



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A-67



Exploration Location = B-103
 Sample Depth = 49 - 50 FT
 Angle of Shearing Resistance, $\phi = 37^\circ$
 Cohesion, $c = 1.00$ KIPS/SQ. FT.

DIRECT SHEAR TEST RESULTS

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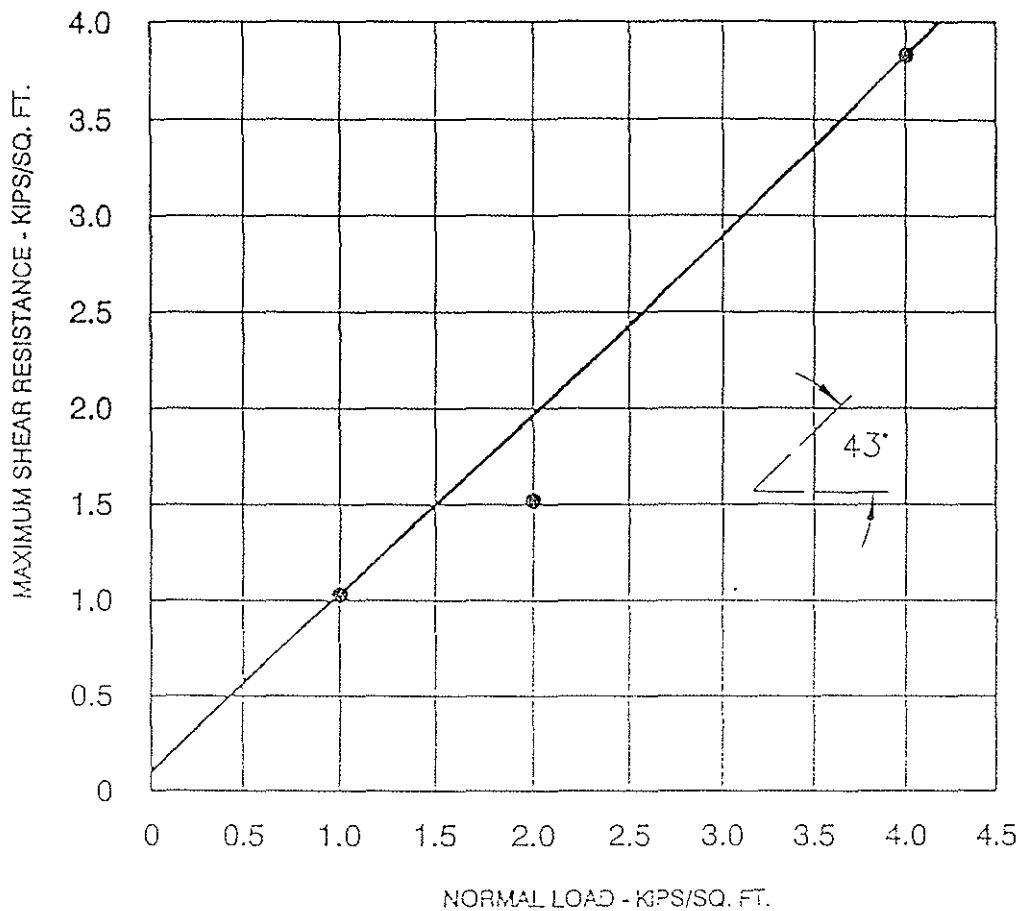
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Date	10/20/99	Project No.	99-33437-01
Drafted By	GLE	Figure No.	
Checked By	MKK		
Approved By			



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A-68



Exploration Location = B-104
 Sample Depth = 10 - 15 FT
 Angle of Shearing Resistance, $\phi = 43^\circ$
 Cohesion, $c = 0.10$ KIPS/SQ. FT.

DIRECT SHEAR TEST RESULTS

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Scale	N/A	File No.	43701B6:
Date	10/20/99	Project No.	99-33437-0
Drafted By	GLE	Figure No.	
Checked By	MKK		
Approved By			



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A-69

Atlas Chemical Testing Laboratories

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TESTING MATERIALS

ACT LAB NO: 9218(b)

DATE: October 13, 1999

PROJECT NO: 99-33437-01

P.O.: 18154

ANALYZED BY: *Robert L. Summers*

LAB ID:

WATER SOLUBLE SALT ANALYSIS IN SOIL

1:5 (soil:water) Aqueous Extraction

AWWA 3500-Na D, ASTM D 516
BMI LANDFILL

Sample No.	Location	Depth (Feet)	Sodium (Percent)	Water Soluble Sulfate (SO ₄) (Percent)	Total Available Water Soluble Sodium Sulfate(Na ₂ SO ₄) (Percent)
	B-5	10-15	0.07	0.13	0.20
	B-8	19-20	0.07	0.06	0.08
	B-101	5-10	0.17	0.06	0.08
	B-102	0-5	0.17	0.03	0.05
	B-106	0-5	0.15	0.08	0.12
	B-106	29-30	0.15	0.06	0.08

A-7C

Notes: The results for each constituent denote the percentage of that analyte, at a 1:5 (soil:water) extraction ratio, which is present in the soil. Sodium was determined by flame photometry, sulfate turbidimetrically, and sodium sulfate by calculation.

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY TEST ASTM D5084

Project Name: Preliminary Geologic Investigation
 Project No.: 99-33437-01
 Boring No.: B-1
 Sample No.: — Depth: 14-15' feet
 Soil Description: Olive Brown Silty Sand w/ gravel
 Test Condition:
 Confining Pressure = 11 PSI

Tested by PS Date 10/12/99
 Calculated by SY Date 10/20/99
 Checked by AP Date 10/20/99

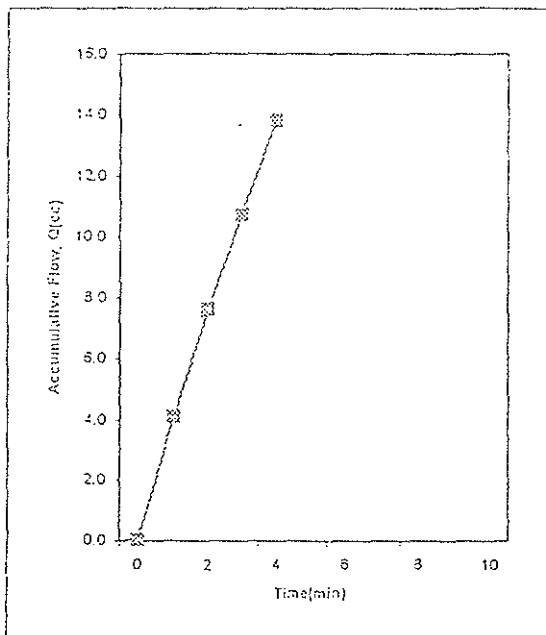
INITIAL CONDITION OF SPECIMEN

Diameter (d) 2.42 in
 Sample Area (A) 4.58 in²
 Length (L) 2.48 in
 Weight Before 286.60 g

Wet Density 95.97 pcf
 Dry Density 91.48 pcf

	Before	After
Container No.		
Wt. Wet Soil+Container(gms)	340.95	361.62
Wt. Dry Soil+Container(gms)	327.35	316.13
Wt. Container (gms)	50.51	50.02
Moisture, (%)	4.91	17.07

TEST RESULTS



Time (min)	Flow Rdg (cm)	Burette Factor	Q (cc)	Head, h (psi)	h/L	Q/t (cc/s)
0	29.2	1	0.0	1.0	11.2	0
1	25.1	1	4.1	1.0	11.2	6.83E-02
2	21.6	1	7.6	1.0	11.2	5.83E-02
3	18.5	1	10.7	1.0	11.2	5.17E-02
4	15.4	1	13.8	1.0	11.2	5.17E-02

Hydraulic Conductivity (cm/sec): 1.57E-04

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY TEST ASTM D5084

Project Name: Preliminary Geologic Investigation
 Project No.: 99-33437-01
 Boring No.: B-8
 Sample No.: — Depth: 44-45' feet
 Soil Description: Lt Olive Brown Sandy Silt
 Test Condition: Confining Pressure = 33 PSI

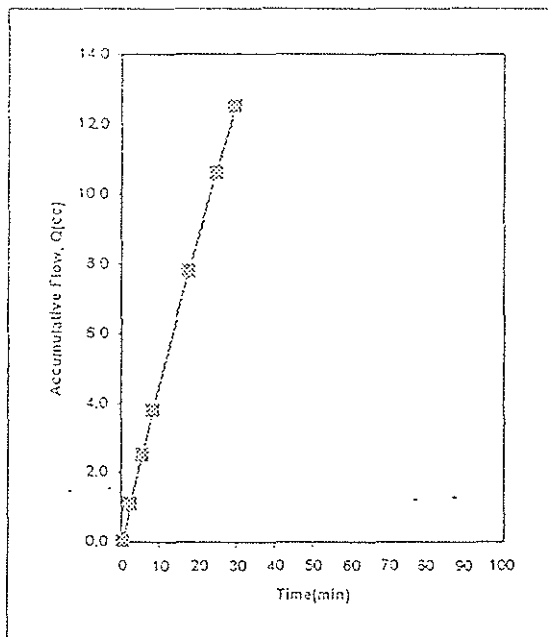
Tested by PS Date 10/12/99
 Calculated by SY Date 10/20/99
 Checked by AP Date 10/20/99

INITIAL CONDITION OF SPECIMEN

Diameter (d) 2.42 in
 Sample Area (A) 4.58 in²
 Length (L) 3.48 in
 Weight Before 457.60 g
 Wet Density 109.24 pcf
 Dry Density 85.69 pcf

	Before	After
Container No.		
Wt. Wet Soil+Container(gms)	248.6	412.7
Wt. Dry Soil+Container(gms)	205.71	323.46
Wt. Container (gms)	49.67	53.72
Moisture, (%)	27.49	33.03

TEST RESULTS



Time (min)	Flow Rdg (cm)	Burette Factor	Q (cc)	Head, h (psi)	h/L	Q/t (cc/s)
0	27.2	1	0.0	1.0	7.95	0
2	26.1	1	1.1	1.0	7.95	9.17E-03
5	24.7	1	2.5	1.0	7.95	7.78E-03
8	23.4	1	3.8	1.0	7.95	7.22E-03
17	19.4	1	7.8	1.0	7.95	7.41E-03
24	16.6	1	10.6	1.0	7.95	6.67E-03
29	14.7	1	12.5	1.0	7.95	6.33E-03
34	12.9	1	14.3	1.0	7.95	6.00E-03

Hydraulic Conductivity (cm/sec): 2.90E-05

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY TEST ASTM D5084

Project Name: Preliminary Geologic Investigation
 Project No.: 99-33437-01
 Boring No.: B-4
 Sample No.: — Depth: 24-25 feet
 Soil Description: Lt Olive Brown Silty Sand w/ gravel
 Test Condition:
 Confining Pressure = 18 PSI

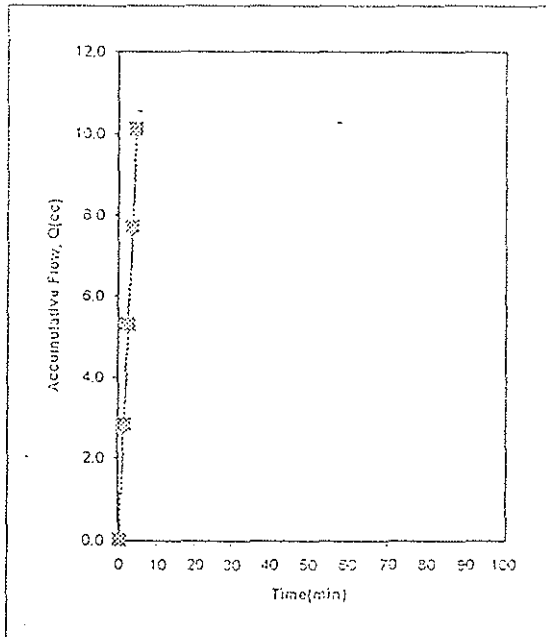
Tested by PS Date 10/12/99
 Calculated by SY Date 10/20/99
 Checked by AP Date 10/20/99

INITIAL CONDITION OF SPECIMEN

Diameter (d) 2.42 in
 Sample Area (A) 4.58 in²
 Length (L) 3.00 in
 Weight Before 437.24 g
 Wet Density 121.20 pcf
 Dry Density 114.78 pcf

	Before	After
Container No.		
Wt. Wet Soil+Container(gms)	308.84	421.32
Wt. Dry Soil+Container(gms)	295.15	372.45
Wt. Container (gms)	50.05	49.46
Moisture, (%)	5.59	15.13

TEST RESULTS



Time (min)	Flow Rdg (cm)	Burette Factor	Q (cc)	Head, h (psi)	h/L	Q/L (cc/s)
0	32.6	1	0.0	1.0	9.23	0
1	29.3	1	2.8	1.0	9.23	4.67E-02
2	27.3	1	5.3	1.0	9.23	4.17E-02
3	24.9	1	7.7	1.0	9.23	4.00E-02
4	22.5	1	10.1	1.0	9.23	4.00E-02

Hydraulic Conductivity (cm/sec): 1.47E-04

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY TEST ASTM D5084

Project Name: Preliminary Geologic Investigation
 Project No.: 99-33437-01
 Boring No.: B-12
 Sample No.: Depth: 39-39.5 feet
 Soil Description: Yell Brown Silty Clay w/ siltstone
 Test Condition:
 Confining Pressure = 29 PSI

Tested by PS Date 10/14/99
 Calculated by SY Date 10/20/99
 Checked by AP Date 10/20/99

4/99
 3/99
 3/99

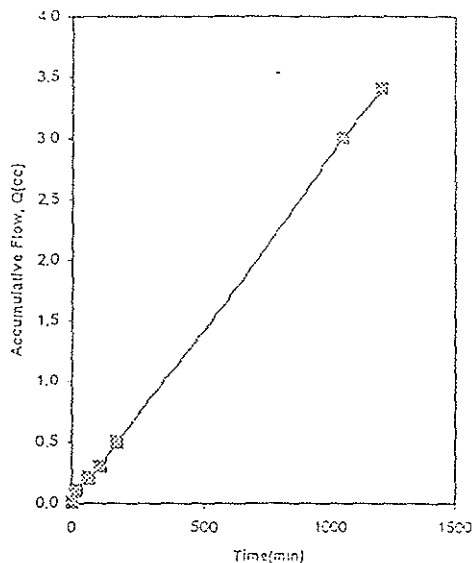
INITIAL CONDITION OF SPECIMEN

Diameter (d) 2.42 in
 Sample Area (A) 4.58 in²
 Length (L) 3.00 in
 Weight Before 410.32 g
 Wet Density 113.73 pcf
 Dry Density 86.05 pcf

	Before	After
Container No.		
Wt. Wet Soil+Container(gms)	173.15	470.17
Wt. Dry Soil+Container(gms)	137.46	363.54
Wt. Container (gms)	26.53	50.02
Moisture, (%)	32.17	34.01

65
 28
 05
 36

TEST RESULTS



Time (min)	Flow Rdg (cm)	Burette Factor	Q (cc)	Head, h (psi)	h/L	Q/t (cc/s)
0	22.3	1	0.0	1.0	9.23	0
19	22.2	1	0.1	1.0	9.23	8.77E-05
63	22.1	1	0.2	1.0	9.23	3.79E-05
109	22.0	1	0.3	1.0	9.23	3.62E-05
171	21.8	1	0.5	1.0	9.23	5.38E-05
1052	19.3	1	3.0	1.0	9.23	4.73E-05
1207	18.9	1	3.4	1.0	9.23	4.30E-05

Hydraulic Conductivity (cm/sec): 1.76E-07

FLEXIBLE WALL HYDRAULIC CONDUCTIVITY TEST ASTM D5084

Project Name: Preliminary Geologic Investigation
 Project No.: 99-33437-01
 Boring No.: B-105
 Sample No.: Depth: 30-35 feet
 Soil Description: Grayish Brown Silty Sand
 Test Condition: Remolded to 85 % Relative Compaction @ Opt
Confining Pressure = 23 PSI

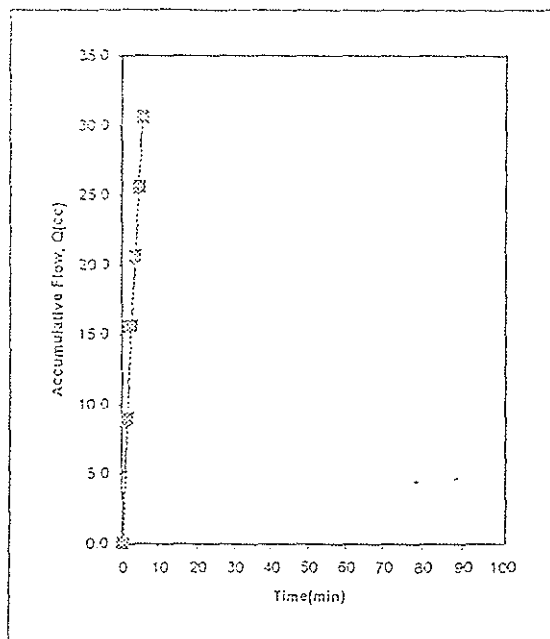
Tested by PS Date 10/14/99
 Calculated by SY Date 10/20/99
 Checked by AP Date 10/20/99

INITIAL CONDITION OF SPECIMEN

Diameter (d) 2.42 in
 Sample Area (A) 4.58 in²
 Length (L) 3.00 in
 Weight Before 432.56 g
 Wet Density 119.90 pcf
 Dry Density 112.01 pcf

	Before	After
Container No.		
Wt. Wet Soil+Container(gms)	309.87	317.64
Wt. Dry Soil+Container(gms)	300.27	282.06
Wt. Container (gms)	164.05	49.93
Moisture, (%)	7.05	15.32

TEST RESULTS



Time (min)	Flow Rdg (cm)	Burette Factor	Q (cc)	Head, h (psi)	h/L	Q/t (cc/s)
0	45.3	1	0.0	1.0	9.23	0
1	36.4	1	8.9	1.0	9.23	1.48E-01
2	29.7	1	15.6	1.0	9.23	1.12E-01
3	24.7	1	20.6	1.0	9.23	8.33E-02
4	19.7	1	25.6	1.0	9.23	8.33E-02
5	14.7	1	30.6	1.0	9.23	8.33E-02

Hydraulic Conductivity (cm/sec): 3.05E-04