Re107

LIMITED GEOTECHNICAL EVALUATION
CONTAMINATED SOIL REPLACEMENT
4919 TIDEWATER AVENUE
OAKLAND, CALIFORNIA

THIS REPORT HAS BEEN PREPARED FOR:

RWL INVESTMENTS

4919 TIDEWATER AVENUE

OAKLAND, CALIFORNIA 94601

APRIL 2006

MURRAY
ENGINEERS INC
GEOTECHNICAL SERVICES

MURRAY
GEOTECHNICAL SERVICES

April 5, 2006
Project No. 455-1R1

RWL Investments
4919 Tidewater Avenue
Oakland, California 94601

RE: LIMITED GEOTECHNICAL EVALUATION, CONTAMINATED SOIL REPLACEMENT, 4919 TIDEWATER AVENUE, OAKLAND, CALIFORNIA

Attn: Mr. Robert Lawlor

Ladies & Gentlemen:

We are pleased to present the results of our limited geotechnical evaluation relating to the removal of contaminated soils and replacement with imported engineered fill at the existing trucking facility site located at 4919 Tidewater Avenue in Oakland, California. This report summarizes the results of our field, laboratory and engineering work, and presents conclusions, recommendations, and design parameters concerning shoring and backfilling of the planned excavation

Our report is contingent upon our final approval of the project plans and our observation and testing, as necessary, of the earthwork and drainage aspects of the construction.

If you have any questions concerning our investigation, please call.

Very truly yours,
MURRAY ENGINEERS, INC.

William P. Carter
Staff Engineer

Andrew D. Murray, P.E.
Principal Engineer

WPC:ADM

Copies: Addressee (2)
Applied Remediation Technology (2)
Attn: Mr. Apri Ghuman, P.E.
ERAS Environmental (3)
Attn: Mr. David Siegel, REA

2951 El Camino Real, Palo Alto, California 94306
Phone: 650.326.0440 Fax: 650.326.0540

TABLE OF CONTENTS

Page No.

TABLE OF CONTENTS
(CONTINUED)

LIMITED GEOTECHNICAL EVALUATION
CONTAMINATED SOIL REPLACEMENT
4919 TIDEWATER AVENUE
OAKLAND, CALIFORNIA

INTRODUCTION

This report contains the results of our limited geotechnical evaluation relating to the proposed removal of contaminated soils and replacement with imported engineered fill at 4919 Tidewater Avenue in Oakland, California. The project location is indicated on the Vicinity Map, Figure A-1. The purpose of our investigation was to further evaluate the site's subsurface conditions in order to assist with development of the excavation shoring design, and to fulfill the requirements of the City of Oakland's Municipal Code, which must be met in order to obtain a grading permit for the proposed excavation and backfill work.

Project Description

Although the scope of our limited geotechnical evaluation includes only shoring and backfill of an excavation to remove and replace contaminated soils, we understand that the long-term project involves redevelopment of the existing, approximately 4-acre trucking facility, located in Oakland, California at the eastern fringe of the San Francisco Bay. Prior to redevelopment, however, an environmental remediation must be performed at the site, including removal of an estimated 10,000 to 15,000 cubic yards of diesel-contaminated soil and groundwater and subsequent backfilling of the excavation with imported fill. The layout of the existing site improvements and the planned area of excavation (approximately 1-acre) are shown in the site plan, Figure A-2. Prior to the excavation of the contaminated soils, it is our understanding that the existing improvements on the site, including the buildings and pavement, will be removed. Following removal of the existing site improvements, the perimeter of the planned excavation will be temporarily shored with steel sheet piles in order to limit the flow of contaminated water into the excavation from beyond the excavation limits. Once the sheet piles are installed, the excavation will be dewatered and the contaminated soils will be excavated. We understand that the excavation of the existing contaminated fill will most likely start at the west end of the excavation and move gradually towards Tidewater Avenue to maintain an equipment staging area easily accessed from the street. The excavation thus created will be backfilled with compacted, imported fill.

A prior environmental study at the site (Gen-Tech Environmental, Inc., May 17, 1994) generally established that the site is capped with up to about 3 feet of fill overlying very soft to soft silty clay (younger bay mud). The thickness of the soft younger bay mud at the site was not previously established and, therefore, the purpose of our study was to develop additional subsurface information addressing the thickness of the and its engineering properties in order to assist with development of the excavation shoring design, which will be prepared by Applied Remediation Technology (and/or its subcontractors).

In addition, our investigation is intended to fulfill the requirements of the City of Oakland's Municipal Code (Section 3304.4.9 Permit Application – Soils Report Contents), which must be met in order to obtain a grading permit for the proposed excavation and backfill work. The code also requires that prior to the start of grading the geotechnical consultant must complete an Initial Statement of the Engineer, and upon completion of the grading activities, the geotechnical consultant must complete Section 3304.7.1 Statement of Completion of Civil Engineer(s) in Charge – Final Completion.

Scope of Services

We performed the following services in accordance with our agreement dated February 23, 2006 (executed on February 23, 2006):

- Reviewed geologic and seismic conditions in the site vicinity and commented on the geologic hazards that could potentially affect the site and the proposed improvements.
- Performed a reconnaissance of the site.
- Explored the subsurface conditions by advancing, sampling, and logging four exploratory borings on the site.
- Performed laboratory testing and analysis of selected soil samples for soil classification and to evaluate engineering properties of the subsurface materials.
- Performed geotechnical engineering analyses to develop shoring design parameters for use by the project shoring designer/contractor.
- Provided recommendations for backfilling the excavation, including characteristics of acceptable import fill material, compaction requirements, and special considerations regarding backfilling on top of the soft soils underlying the site.
- Prepared this report containing a summary of our investigation and our geotechnical conclusions and recommendations and generally meeting the requirements of the City's Section 3304.4.9 Permit Application – Soils Report Contents.

GEOLOGIC & SEISMIC CONDITIONS

Geologic Overview

We reviewed the Quaternary Geologic Map of Alameda and the Surrounding Areas, derived from the digital database Open File Report 97-97, prepared by E.J. Helley and R.W. Graymer, dated 1997 (Figure A-3), which indicates that the site is located in an area underlain by geologically recent artificial fill (af) that is underlain by Holocene age alluvial fan deposits (Qhaf), basin deposits (Qhb), younger alluvial fan deposits (Qhafl), and/or bay mud deposits (Qhbm). The artificial fill generally consists of man made deposits of various materials and ages. Some of the artificial fill is compacted and quite firm, but fill placed before 1965 is generally not compacted and simply consists of dumped materials. The younger alluvial fan deposits and alluvial fan deposits consist of poorly-sorted, dense, sandy or gravelly clay and medium dense to dense gravely sand or sandy gravel that generally grades upward to sandy or silty clay, respectively. Basin deposits are very fine silty clay to clay deposits occupying flat-floored basins at the distal edge of alluvial fans adjacent to bay mud. The bay mud is typically found to consist of water-saturated estuarine mud, clay, and silty clay underlying marshlands and tidal mud flats. The bay mud also contains a few lenses of well-sorted, fine sand and silt, shell layers, and peat.

According to Special Report 97 – Geology of San Francisco Bay (California Division of Mines and Geology, 1969), the site is located in an area mapped as being underlain by approximately 5 to 20 feet of younger bay mud. Younger bay mud is the youngest unit in the San Francisco bay, overlaying older bay mud and a sand unit covering most of the bay bottom. The younger bay mud consists of soft, uniform, gray silty clay containing 45 to 95 percent clay-sized particles, minor fine sand, and fragments of shells. The clay is soft and plastic when wet and tends to shrink, harden and become brittle upon drying. From a foundation engineering standpoint, the younger bay mud is the most troublesome of the sediments in the bay.

According to the State of California Seismic Hazard Zone map for the Oakland East and part of the Las Trampas Ridge Quadrangles (California Geologic Survey, 2002), the site is located within an area believed to be potentially susceptible to earthquake-induced liquefaction. A copy of the relevant portion of the State's liquefaction hazard zones map is presented on Figure A-4.

Seismicity

Geologists and seismologists recognize the San Francisco Bay Area as one of the most active seismic regions in the United States. There are three major faults that trend in a northwest direction through the Bay Area, which have generated about 12 earthquakes per century

large enough to cause significant structural damage. The faults causing these earthquakes are part of the San Andreas fault system that extends for at least 700 miles along the California Coast, and includes the San Andreas, Hayward, and Calaveras faults. The main trace of the Hayward fault is located approximately 4.6 kilometers northeast of the site. The Calaveras and San Andreas faults are located approximately 19 kilometers northeast and 25 kilometers southwest of the site, respectively.

Seismologic and geologic experts convened by the U. S. Geological Survey concluded that there is a 62 percent probability for at least one "large" earthquake of magnitude 6.7 or greater in the Bay Area before 2032. They also maintain that there could be more than one earthquake of this magnitude and that numerous "moderate" earthquakes of about magnitude 6 are probable before 2032. The San Andreas fault is estimated to have a 21 percent probability of producing a magnitude 6.7 or larger earthquake by the year 2032. The Hayward fault is estimated to have a 27 percent probability of producing a similar size earthquake during the same time period (WGCEP, 2003).

PRIOR INVESTIGATIONS

The soil and groundwater investigation prepared for the site by Gen-Tech Environmental, Inc. (GTE), dated May 17, 1994, which included a total of three monitoring wells and 11 exploratory borings ranging from 5.5 to 12 feet deep across the site, indicates that the entire site is capped with artificial fill, which has raised the surface to approximately 5 feet above the high tide line. Please note that the report we were provided with was missing the logs for Monitoring Well MW-2 and boring logs EB-6 and EB-11. The fill, which varied in the GTE well and boring logs from 2 to 9.25 feet in thickness across the site, is assumed to have been placed prior to the development of the current site configuration. The fill is underlain by native peat, silty clay, silt, and clayey sand. The native cohesive soils and peat ranged from stiff to very soft and had blow counts as low as 2 blows per foot (sampler type not listed). Groundwater was encountered in each of the borings at depths of about 1 to 3.5 feet and was observed to enter the boreholes slowly. Logs of the monitoring well installation and soil borings are included in Appendix D.

SITE EXPLORATION AND RECONNAISSANCE

Exploration Program

Our subsurface investigation was performed on February 27, 2006 and included the excavation, sampling, and logging of four exploratory borings to depths of 30 feet below existing ground surface at the locations shown on Figure A-2. The boring locations were approximately determined by measuring distance from the corners of existing structures

using a tape measure and should be considered accurate only to the degree implied by the mapping technique used.

The borings were advanced using a truck-mounted drill rig equipped with hollow stem augers. Soil samples were collected with split-spoon samplers that were driven with a 140-pound hammer repeatedly dropped from a height of 30 inches with a wire line. The samplers included the 2-inch outside diameter (OD) Standard Penetration Test (SPT) sampler, as well as 2.5- and 3-inch OD split-spoon samplers. In addition, relatively undisturbed soil samples were obtained with 3-inch OD Shelby tube samplers for selected laboratory testing of engineering parameters. The associated blow count data required to drive the split-spoon samplers is presented on the boring logs. The data has not been corrected for sampler type or hammer efficiency. The logs of our borings are presented in Appendix B as Figures B-1 through B-4. Also included in Appendix B are Figure B-5, Key to Boring Logs and Figure B-6, Unified Soil Classification System.

Our staff engineer logged the borings in general accordance with the Unified Soil Classification System. The boring logs show our interpretation of the subsurface conditions at the location and on the date indicated and it is not warranted that these conditions are representative of the subsurface conditions at other locations and times. In addition, the stratification lines shown on the logs represent approximate boundaries between various soil materials and the transitions may be gradual.

Site Description

The essentially flat, approximately 3.61-acre site is located on the southwest side of Tidewater Avenue near the eastern edge of the San Leandro Bay in Oakland, California. It appears that the site was raised above the surrounding marshland by the placement of between approximately 1 and 9 feet of artificial fill. The majority of the subject site is surfaced with asphaltic concrete (AC) pavement. There is an approximately 11,800 square-foot, single-story trucking terminal building along the north side of the property, an approximately 2,770 square-foot, single-story truck repair shop at the southern property boundary, and an above-ground fuel storage tank located on the north side of the repair shop. The site is currently in use as a trucking facility and large trucks are continuously parked throughout the site. The AC paving throughout the site exhibited some cracking, which is typical for sites placed on old fills over the soft soils in the area.

Subsurface

In general, our exploratory borings encountered variable quantities of fill overlying bay mud and alluvial fan deposits to the full depth explored of approximately 30 feet. Boring B-1 was advanced at the eastern edge of the site near Tidewater Avenue, Boring B-2 was advanced near the northern property boundary, and Borings B-3 and B-4 were advanced in the southwestern quadrant of the site.

Specifically, Borings B-1 through B-4 encountered between 3 and 7.5 feet of fill, respectively, consisting of loose to dense, clayey or gravelly sand and soft to very stiff, sandy or silty clay. Beneath the fill, our borings encountered very soft to hard, silty clays and clayey silts with occasional fine sand lenses to depths ranging from approximately 20 to 25 feet. The upper, very soft to firm portions of this material can be classified as younger bay mud, which transitions to stiff to hard and medium dense older bay mud or alluvial fan deposits at depths ranging between approximately 15.8 to 20.5 feet. In general, the bay mud is underlain by alluvial fan deposits, consisting of medium dense to very dense, silty or coarse gravelly sand and stiff to very stiff, silty or sandy clay and clayey or sandy silt. The alluvium persisted to the full depth explored of 30 feet.

Based on our laboratory testing, the average total unit weight of the younger bay mud is approximately 90 pcf with an average degree of saturation of about 96 percent. The overlying, relatively granular fill soils have an estimated average total unit weight of approximately 110 pcf.

Atterberg limits testing for the younger bay mud collected from Boring B-4 at a depth of 10 to 11.5 feet included a liquid limit of 44 percent and plasticity index of 27 percent, indicating highly plastic fines. Atterberg limits testing for the younger bay mud collected from Boring B-3 at a depth of 10 to 11.5 feet included a liquid limit of 104 percent and plasticity index of 75 percent, indicating critically plastic fines. Atterberg limits testing for the older bay mud collected from Boring B-1 at a depth of 16 to 17.5 feet included a liquid limit of 56 percent and plasticity index of 45 percent, indicating critically plastic fines (see Figure C-1). A sieve analysis of the older bay mud encountered in Boring B-3 between 20 and 21.5 feet yielded 57 percent passing the No. 200 Sieve. A sieve analysis of the alluvium encountered in Boring B-1 between 20 and 21.5 feet yielded 48 percent passing the No. 200 Sieve.

Groundwater

Groundwater was encountered in Boring B-1 at a depth of approximately 3.5 feet below the existing ground surface and in Borings B-2 through B-4 at depths of approximately 4 feet below the existing ground surface at the time of drilling. We note that fluctuations in the

level of groundwater can occur due to variations in rainfall, landscaping, and other factors not evident at the time our observations and measurements were made.

CONCLUSIONS & RECOMMENDATIONS

From a geotechnical perspective, in our opinion, the primary constraints to completion of the planned temporary sheet pile shoring, excavation and resulting backfill are the shallow groundwater and the presence of very soft to soft, younger bay mud immediately underlying the contaminated soils to be replaced. These weak soils will provide only very limited passive resistance to the active sheet pile loads and therefore will dictate relatively large pile driving depths and selection of a sheet pile with a relatively large section modulus. In addition, the weak excavation base soils will require extreme caution during the backfill process to avoid the creation of mud waves and even disturbance of the weak soil from heavy equipment. We also note that the unit weight of the imported fill should not be significantly greater than the unit weight of the existing fill to be removed or substantial differential consolidation settlements could result between undisturbed existing fill areas and reworked areas.

Based on our subsurface investigation and our summary of previously obtained subsurface information at the site, the area of the contaminated soil to be removed is underlain by approximately 3 to 9 feet of loose to dense and soft to very stiff artificial fill. The fill is underlain by between about 10 to 17 feet of very soft to firm younger bay mud, which is prone to large consolidation settlement when loaded beyond its preconsolidation pressure. The younger bay mud is underlain by more competent older bay mud, and medium dense to very dense and stiff to very stiff alluvial fan deposits to the depth explored of 30 feet. In addition, several lenses of loose to medium dense silty sand were encountered within our borings within the upper 30 feet of soil profiles, indicating a potential liquefaction hazard for future redevelopment of the site.

Based on the results of our laboratory testing and our geotechnical analyses of the soils underlying the site, we have provided soil criteria for use in the design of the sheet piles that will shore the perimeter of the proposed excavation. In the following sections, we have also provided several alternative recommendations regarding placement and compaction of the excavation backfill material with the intent of minimizing the potential for excavation bank failures and the development of mud waves due to unbalanced loading of the younger bay mud during fill placement. We recommend that special consideration be given to placement of the new fill material on top of the existing soft bay mud layer underlying the site.

Future Redevelopment

Although it is beyond the scope of this investigation, we note that future redevelopment of the site will require careful consideration of the potential for liquefaction and overall consolidation settlements of any proposed improvements. We anticipate that a design-level geotechnical engineering analysis will be performed by the developer's geotechnical engineer and that it will be tailored specifically to the proposed redevelopment. We anticipate that the foundations for future structures constructed at the site will likely consist of piers and/or driven piles extending through the softer bay mud layers and into competent alluvial material and/or harder bay mud deposits.

SHORING DESIGN PARAMETERS

Our recommended sheet pile shoring design parameters are based on a total stress analysis of the younger bay mud with our understanding that a) after installation of sheet piles and prior to interior soil excavation that the groundwater within the excavation will be drawn down with dewatering wells to the level of the planned base of the excavation, b) that the groundwater level outside of the shoring will remain at approximately 3 feet below the existing ground surface, and c) that the shoring will be installed on a temporary, short-term basis and will not be relied on to support more than 10 feet of excavation. If more than 10 feet of excavation will be required, we note that sheet pile anchors tied back to deadman supports may be required to limit the bending forces in the pile to acceptable levels. The use of tiebacks is beyond the scope of our current investigation. The shoring design contractor should also consider the affect of equipment surcharges on the planned sheet piles, including loading from pile driving and earth excavation equipment, and haul trucks. The shoring contractor is also responsible for anticipating deflection of the piles and the resultant effect on any adjoining property and/or structures.

Younger Bay Mud - Based on the results of our unconsolidated, undrained direct shear tests on the younger bay mud, we recommend use of a total (wet) unit weight of approximately 90 pcf and a cohesion value of approximately 250 pounds per square foot with an angle of internal friction of 0 degrees for short term (rapid) loading.

Older Bay Mud & Alluvium - We have estimated the cohesion of the older bay mud and alluvium generally underlying the Younger bay mud to be approximately 1,000 pounds per square foot.

Existing Fill - We estimate an angle of internal friction of 30 degrees and a total unit weight of 110 pcf for the existing, relatively granular fill materials to be retained by the sheet piling.

EARTHWORK

Due to the complexities relating to the excavation and backfill of a large volume of fill over a relatively thick sequence of very soft, saturated Bay Mud, we strongly recommend that the grading subcontractor retained for the project be familiar with Bay Mud operations. Special earth moving equipment such as mudcats (wide track dozers and excavators) may be required to adequately distribute the equipment loads both within the excavation and above any unshored banks of the excavation. We note that any substantial equipment loads located near the edges of unshored portions of the excavation may cause bank failures resulting in loss of equipment within the soft bay mud. In addition, uneven placement of fill within the excavation can easily result in the creation of mud waves, or lateral displacement of the underlying soft bay mud. According to Lee and Prasker (CDMG, 1969), one commonly used backfilling method is to pump hydraulic fill over the younger bay mud in order to evenly distribute a thin layers of sand uniformly over an area and thereby avoid creating mud waves over broad areas of reclamation. At this site, however, we expect that hydraulic filling of the excavation with sand would likely not be a suitable backfilling alternative since the delivery water, which would ultimately have to be removed from the site, would likely become contaminated with diesel fuel remaining in the excavation.

The grading contractor may have other viable excavation and backfill methods to prevent the creation of mud waves, which can be evaluated prior to construction. However, we have provided two suggested backfill alternatives for consideration.

Control Density Fill (CDF) Backfill Alternative

In our opinion, an acceptable alternative to hydraulic fill involves pumping of up to about 12 to 18 inches of control density fill (CDF) consisting of a low-strength mixture of sand, cement and water over a geosynthetic strength fabric such as Mirafi 600X that is placed over the entire bottom of the excavation. The advantage of CDF versus a hydraulic fill is that the water would be consumed by the curing process and would not need to be off-hauled. As with a hydraulic fill, we anticipate that a very high slump mixture of CDF could be pumped in relatively thin lifts over the entire excavation. Once the CDF achieves sufficient depth and has set, in our opinion, it would likely be possible to begin placement and compaction of import fill soils using relatively lightweight compaction equipment. Please note, however, that even 12 to 18 inches of CDF might not be sufficient to bridge the soft soils and create a stable base for compaction equipment. The thickness of CDF required to create a stable base should be evaluated early in the process in order to minimize costs associated with importing large volumes of CDF.

Excavation/Backfill Sequencing Alternative

An additional completion methodology which may be less expensive than CDF in terms of materials, but likely more expensive than CDF in terms of shoring costs, involves sequencing the shoring and backfill such that only relatively long and narrow contiguous areas are contained with the shoring and then excavated and backfilled prior to repeating the process on an adjacent shoring-contained area. We expect that the narrow width of the individual contained areas may need to be limited to twice the reach of a track excavator or grade-all so that both the excavation and at least the initial backfill can be achieved without entering the excavation. The shoring and excavation could be completed in a leap-frog manner from west to east with a series of completely shoring-contained, long, parallel excavation areas. Once one long area has been shored, excavated and backfilled, a second long contiguous area can be contained by shoring the three remaining sides and repeating the process.

Prior to backfill of the completed excavation, at a minimum, we recommend that the excavation bottom be covered first with a layer of stabilization/separation fabric, such as Mirafi 600X. The fabric should then be overlain with an 8-inch deep section of the GeoWeb GW20V cellular confinement system. The GeoWeb cells should then be backfilled with ½-inch, clean crushed rock placed by an excavator located outside of the excavation. Once the GeoWeb and sand fill have been placed over the entire base of the excavation, it should be possible to begin placing and compacting thin, uniform lifts of relatively cohesive fill soils to approximately 87 to 90 percent relative density (ASTM D1557). We recommend that the imported fill be compacted from outside of the excavation using a compaction wheel mounted on a track excavator until at least 2 feet of fill has been placed and compacted above the base of the excavation. It may be possible to place and compact fill above a depth of 2 feet using lightweight earthmoving and compaction equipment.

Import Material for Fill

It is our understanding that fill material will be imported to the subject site from a source that has not yet been established. However, to minimize the potential for future differential consolidation settlement between undisturbed fill areas and reworked areas, we recommend that the fill materials have a compacted moist unit weight of not more than approximately 110 pcf, which will generally imply a relatively cohesive or clayey soil. In addition, imported cohesive soils should have a plasticity index of less than 20 percent

As noted above, the lower 8 inches of fill, however, should consist of ½-inch clean crushed rock placed within the cellular compartments of the GeoWeb. Pea gravel will generally not be allowed.

Any proposed fill for import should be approved by Murray Engineers, Inc. prior to importing to the site. Our approval process will require laboratory testing to establish the compacted unit weight and plasticity index of the soil; therefore, it is important that we receive any such samples in order to grant approval at least 3 days prior to planned importing.

Temporary Slopes, Trench Excavations & Shoring

The contractor should be responsible for all temporary slopes and trenches excavated at the site and design and construction of any required shoring. Shoring and bracing should be provided in accordance with all applicable local, state, and federal safety regulations, including the current OSHA excavation and trench safety standards. Because of the potential for variable soil conditions, field modifications of temporary cut slopes may be required. Unstable materials encountered on the slopes during the excavation should be trimmed off, even if this requires cutting the slope back at flatter inclinations.

REQUIRED FUTURE SERVICES

Plan Review

To establish conformance of the final design documents with the recommendations contained in this report, and to better comply with the City of Oakland's code requirements, Murray Engineers, Inc. must review the completed project plans prior to construction. The plans should be made available for our review as soon as possible after completion so that we can better assist in keeping your project schedule on track. At a minimum, we recommend that the following note be added to the architectural, structural and civil plans:

- All earthwork involved in the soil removal and replacement project, including placement and compaction of engineered fill should be performed in accordance with the geotechnical report prepared by Murray Engineers, Inc., dated April 5, 2006. Murray Engineers, Inc. should be provided at least 48 hours advance notification of any earthwork operations and should be present to observe and test, as necessary, the earthwork phases of the project.

Construction Observation Services

Murray Engineers, Inc. should observe and test (as necessary) the earthwork and foundation phases of construction in order to a) confirm that subsurface conditions exposed during construction are substantially the same as those interpolated from our limited subsurface exploration, on which the analysis and design were based; b) observe compliance with the geotechnical design concepts, specifications and recommendations; and c) allow design

changes in the event that subsurface conditions differ from those anticipated. The recommendations in this report are based on limited subsurface information. The nature and extent of variation across the site may not become evident until construction. If variations are exposed during construction, it may be necessary to re-evaluate our recommendations.

LIMITATIONS

This report has been prepared for the sole use of the RWL Investments, Inc., specifically for developing geotechnical design criteria relating to the soil removal and replacement project at 4919 Tidewater Avenue in Oakland, California. The opinions presented in this report are based upon information obtained from borings at widely separated locations, site reconnaissance, review of field data made available to us, and upon local experience and engineering judgment, and have been formulated in accordance with generally accepted geotechnical engineering practices that exist in the San Francisco Bay Area at the time this report was prepared. Further, our recommendations are based on the assumption that soil and geologic conditions at or between borings do not deviate substantially from those encountered. In addition, geotechnical issues may arise that are not apparent at this time. No other warranty, expressed or implied, is made or should be inferred. We are not responsible for data presented by others.

The recommendations provided in this report are based on the assumption that we will be retained to provide the Future Services described above in order to evaluate compliance with our recommendations. If we are not retained for these services, Murray Engineers, Inc. cannot assume any responsibility for any potential claims that may arise during or after construction as a result of misuse or misinterpretation of this report by others. Furthermore, if another geotechnical consultant is retained for follow-up service to this report, Murray Engineers, Inc. will at that time cease to be the Engineer-of-Record.

The opinions presented in this report are valid as of the present date for the property evaluated. Changes in the condition of a property can occur with the passage of time, whether due to natural processes or the works of man, on this or adjacent properties. In addition, changes in applicable standards of practice can occur, whether from legislation or the broadening of knowledge. Accordingly, the opinions presented in this report may be invalidated, wholly or partially, by changes outside of our control. Therefore, this report is subject to review and should not be relied upon after a period of three years. In addition, this report should not be used and is not applicable for any property other than that evaluated.

REFERENCES

Gen-Tech Environmental, May 17, 1994, Soil and Groundwater Investigation, Site at 4919 Tidewater Avenue, Oakland, CA, Project No. 9344

ASTM International, Annual Book of ASTM Standards, 2003, Section Four, Construction, Volume 04.08, Soil and Rock (I): D 420-D 5611.

California *Division of Mines* and Geology, 1969, Special Report 97 – Geology of San Francisco Bay

California Department of Conservation, Division of Mines and Geology, 1974, Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Central Coast Region, Oakland East Quadrangle.

California Department of Conservation, Division of Mines and Geology, 1997, Guidelines for Evaluating and Mitigating Seismic Hazards in California: Special Publication 117.

California Geological Survey, 2003, State of California Seismic Hazard Zones Map of the Oakland East and Part of the Las Trampas Ridge Quadrangles.

Day, Robert W., 2002, Geotechnical Earthquake Engineering Handbook, McGraw-Hill, Inc., New York.

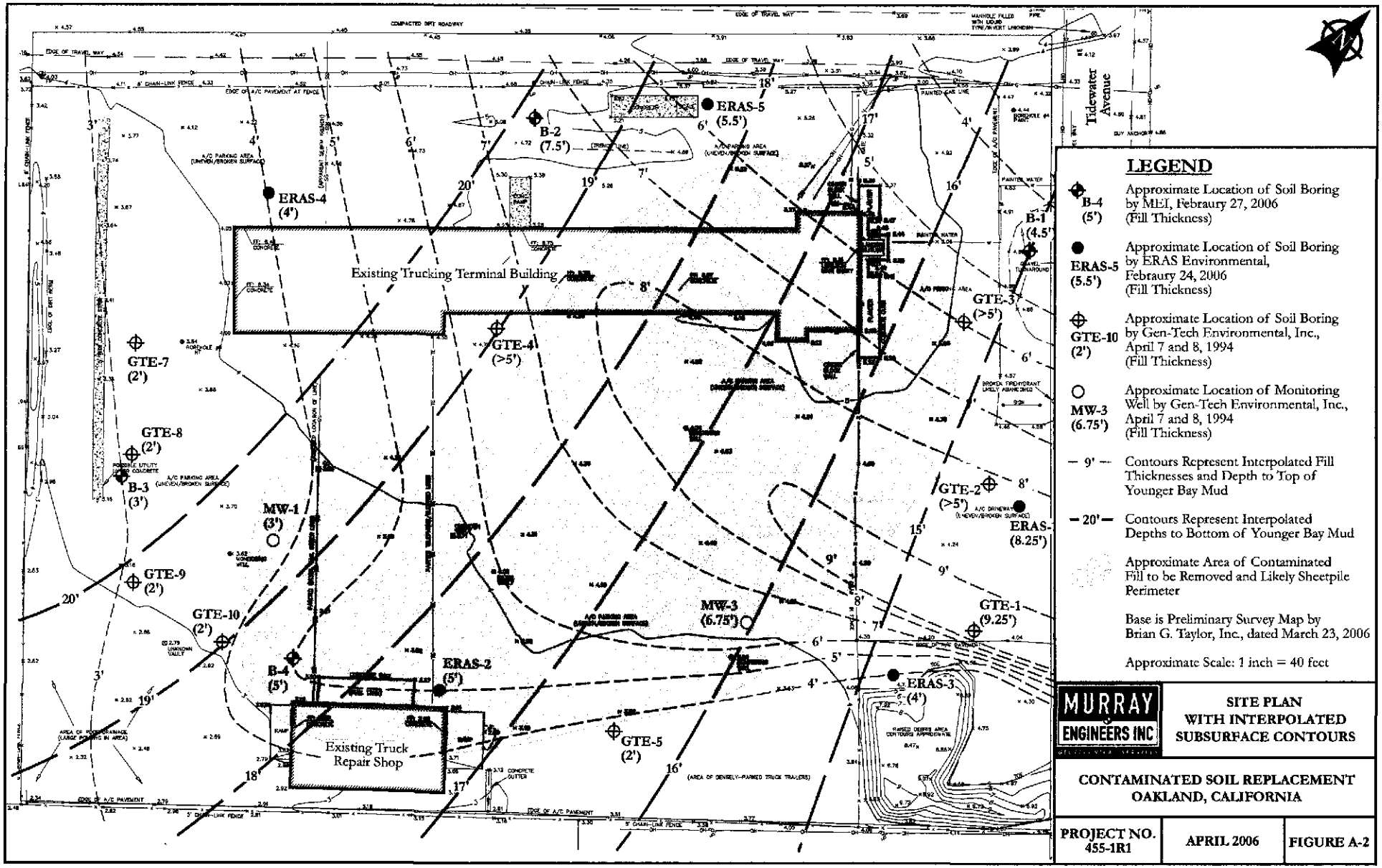
Helley, E.J. & R.W. Graymer, 1997, Quaternary Geologic Map of Alameda and Surrounding Areas, derived from digital database open file 97-97.

International Conference of Building Officials, March 1998, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada. (To be used with 1997 Uniform Building Code)

Working Group on California Earthquake Probabilities (WGCEP), 2003, Earthquake Probabilities in the San Francisco Bay Region: 2002 to 2031, U.S. Geological Survey, Open-File Report 03-214.

Base is USGS Oakland East Quadrangle, 7.5 Minute Series, (Topographic), 1997. Scale is 1 inch = 2,000 feet.

MURRAY ENGINEERS INC GEOTECHNICAL SERVICES	CONTAMINATED SOIL REPLACEMENT OAKLAND, CALIFORNIA		VICINITY MAP
	PROJECT NO. 455-1R1	APRIL 2006	FIGURE A-1



LEGEND

- B-4 (5') — Approximate Location of Soil Boring by MEI, Febraury 27, 2006 (Fill Thickness)
- ERAS-5 (5.5') — Approximate Location of Soil Boring by ERAS Environmental, Febraury 24, 2006 (Fill Thickness)
- GTE-10 (2') — Approximate Location of Soil Boring by Gen-Tech Environmental, Inc., April 7 and 8, 1994 (Fill Thickness)
- MW-3 (6.75') — Approximate Location of Monitoring Well by Gen-Tech Environmental, Inc., April 7 and 8, 1994 (Fill Thickness)
- — 9' — Contours Represent Interpolated Fill Thicknesses and Depth to Top of Younger Bay Mud
- — 20' — Contours Represent Interpolated Depths to Bottom of Younger Bay Mud
- Approximate Area of Contaminated Fill to be Removed and Likely Sheetpile Perimeter

Base is Preliminary Survey Map by Brian G. Taylor, Inc., dated March 23, 2006

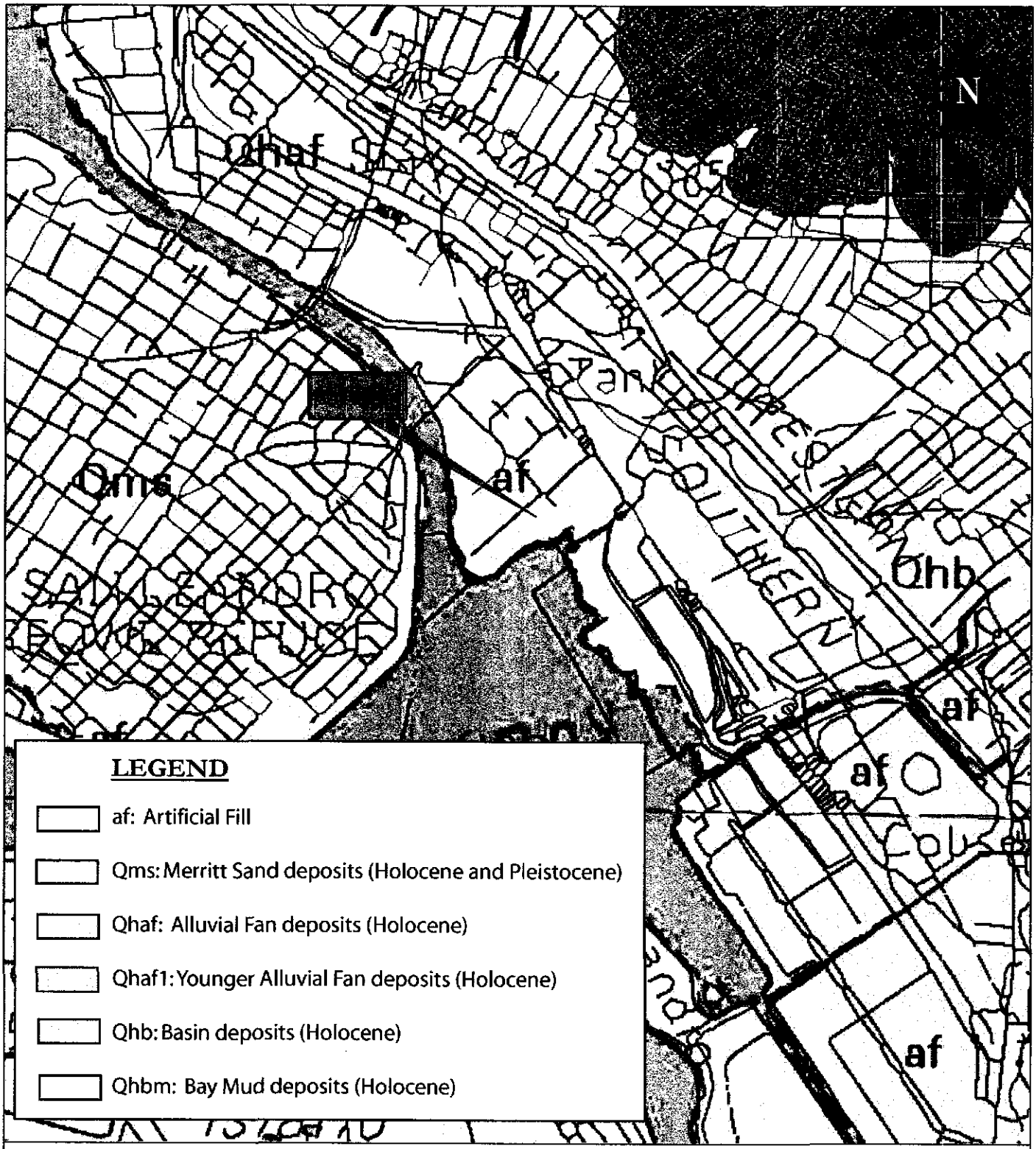
Approximate Scale: 1 inch = 40 feet

MURRAY ENGINEERS INC

SITE PLAN WITH INTERPOLATED SUBSURFACE CONTOURS

CONTAMINATED SOIL REPLACEMENT OAKLAND, CALIFORNIA

PROJECT NO. 455-1R1	APRIL 2006	FIGURE A-2



Base is the Quarternary Geology of Alameda and Surrounding Areas, Derived from the digital database open file 97-97 by E.J Helley and R.W. Graymer, 1997. Please refer to the Geology section of this report for a description of pertinent geologic symbols noted above. Scale: 1:24,000.

MURRAY ENGINEERS INC GEOTECHNICAL SERVICES	CONTAMINATED SOIL REPLACEMENT OAKLAND, CALIFORNIA	VICINITY GEOLOGIC MAP
	PROJECT NO. 455-1R1 / APRIL 2006	FIGURE A-3

LEGEND

Areas where historical occurence of liquefaction, or local geological, geotechnical and groundwater conditions indicate potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693 (c) would be required

Base is California Geological Survey Seismic Hazard Zones Map of the Oakland East and Part of the Las Trampas Ridge Quadrangles, (Topographic), 2003. Scale is 1 inch = 2,000 feet.

MURRAY ENGINEERS INC GEOTECHNICAL SERVICES	CONTAMINATED SOIL REPLACEMENT OAKLAND, CALIFORNIA	LIQUEFACTION HAZARD MAP
PROJECT NO. 455-1R1	APRIL 2006	FIGURE A-4

Date(s) Drilled **February 27, 2006**	Logged By **WPC**	Checked By **ADM**
Drilling Method **Continuous Flight Auger**	Drill Bit Size/Type **8-inch hollow stem auger**	Total Depth of Borehole **30 feet bgs**
Drill Rig Type **Mobile B53**	Drilling Contractor **Exploration Geoservices, Inc.**	Approximate Surface Elevation **5 feet (relative)**
Groundwater Level and Date Measured **3.5 feet ATD**	Sampling Method(s) **SPT, 2.5", and 3" split spoon, 3" shelby tube**	Hammer Data **140 lb, 30 in drop, wire line**
Borehole Backfill **Bentonite Slurry**	Location **Northeast corner of site near Tidewater Avenue**	

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	MATERIAL DESCRIPTION	Water Content, %
5	0			Dense to Medium Dense	SC	FILL: CLAYEY SAND, some gravel, dark yellowish brown to dark gray, heterogeneous, moist.	
			41				15
			13			(ATD) ▽	12
0	5			Very Soft	CH	SILTY CLAY, olive gray, high to critically high plasticity, homogeneous, wet (Younger Bay Mud).	21
			1				54
							76
						Cohesion = 350 psf, Phi = 0 degrees	22
							33
-5	10						
						Occasional lenses of silty fine sand (up to approximately 15 inches thick)	
-10	15						
			13	Stiff	CH	SILTY CLAY, trace fine gravels, olive gray, critically high plasticity, very moist (Older Bay Mud).	25
			13			PI = 45%, LL = 56% (sample from 16 to 17.5)	24
-15	20						25
			26	Very Dense	SM	CLAYEY SAND, trace fine rounded gravel, trace silt, light yellowish brown, low plasticity fines, wet (Alluvial Fan Deposits).	18
			67			Percent Fines = 48% (sample from 20 to 21.5 feet bgs)	19
-20	25		50/5"				19
			15	Stiff	ML	CLAYEY SILT, pale olive to yellow, very moist. (Alluvial Fan Deposits)	25
-25	30					Bottom of Boring at 30 feet bgs	
-30	35						

P:\AA Bonin\GS Files\Projects\RWL Investments - 48 EGI Oakland.bgs [Murray New 35 - WC.tpl]

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

LOG OF BORING B-1

PROJECT NO. 455-1R1 | **APRIL 2006** | **FIGURE B-1**

Date(s) Drilled **February 27, 2006**	Logged By **WPC**	Checked By **ADM**
Drilling Method **Continuous Flight Auger**	Drill Bit Size/Type **8-inch hollow stem auger**	Total Depth of Borehole **30 feet bgs**
Drill Rig Type **Mobile B53**	Drilling Contractor **Exploration Geoservices, Inc.**	Approximate Surface Elevation **5 feet (relative)**
Groundwater Level and Date Measured **4 feet ATD**	Sampling Method(s) **SPT, 2.5", and 3" split spoon, 3" shelby tube**	Hammer Data **140 lb, 30 in drop, wire line**
Borehole Backfill **Bentonite Slurry**	Location **Parking area on north side of existing trucking terminal building**	

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	MATERIAL DESCRIPTION	Water Content, %
5	0			Very Stiff to Stiff	CL	FILL: SANDY CLAY, with silt, olive gray, heterogeneous, very moist.	
			41				
			11			(ATD) ▽	12
0	5		3				42
				Soft	CH	SILTY CLAY, olive gray, homogeneous, high to critically high plasticity, moist (Younger Bay Mud).	120
-5	10					Cohesion = 360 psf, Phi = 0 degrees	
-10	15					Occassional lenses of fine-grained sand.	
			4				43
			4				43
-15	20		47	Dense	SM	SILTY SAND, with clay, trace fine gravel, dark blue-gray (Alluvial Fan Deposits).	39
			75	Very Dense	SP	GRAVELLY SAND, some silt, coarse-grained sand, fine gravel, trace clay, mottled gray and dark yellowish brown, heterogeneous, very moist (Alluvial Fan Deposits).	19
-20	25		18	Very Stiff	CL-ML		24
				Very Stiff	CL	CLAYEY SILT/SILTY CLAY, light brown, moderate plasticity, very moist (Alluvial Fan Deposits).	
			20	M. Dense	SP	SANDY CLAY, trace fine gravel, light yellowish brown, very moist (Alluvial Fan Deposits).	22
-25	30					SAND, brown, with fine gravel, poorly graded (Alluvial Fan Deposits).	
-30	35					Bottom of Boring at 30 feet bgs	

P:\AABorinGS Files\Projects\RWL Investments - 4B EGI Oakland.bgs [Murray New 36 - WC.tpl]

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

LOG OF BORING B-2

PROJECT NO. 455-1R1 | **APRIL 2006** | **FIGURE B-2**

Date(s) Drilled **February 27, 2006**	Logged By **WPC**	Checked By **ADM**
Drilling Method **Continuous Flight Auger**	Drill Bit Size/Type **8-Inch hollow stem auger**	Total Depth of Borehole **30 feet bgs**
Drill Rig Type **Mobile B53**	Drilling Contractor **Exploration Geoservices, Inc.**	Approximate Surface Elevation **3 feet (relative)**
Groundwater Level and Date Measured **4 feet ATD**	Sampling Method(s) **SPT, 2.5", and 3" split spoon, 3" shelby tube**	Hammer Data **140 lb, 30 in drop, wire line**
Borehole Backfill **Bentonite Slurry**	Location **Parking area on southwest of existing trucking terminal building**	

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	MATERIAL DESCRIPTION	Water Content, %
3	0			Loose	SW-SC	FILL: GRAVELLY SAND, some clay, moist.	
			11				12
			5	Very Soft to Firm	CH	SILTY CLAY, bluish gray, homogeneous, critically high plasticity, very moist (Younger Bay Mud). (ATD) ▽	50
-2	5		2				35
						Cohesion = 400 psf, Phi = 0 degrees	
-7	10		3			PI = 75%, LL = 100% (sample from 10 to 11.5 feet bgs)	105
-12	15		4			Occasional lenses of fine sand.	56
			6				
-17	20		20	Very Stiff	MH	SANDY SILT, trace fine gravel, trace white sea shell fragments, olive gray, homogeneous, high plasticity, fine-grained sand, wet (Older Bay Mud).	23
			24				20
-22	25		15	Stiff to Very Stiff	ML	Percent Fines = 57% (sample from 20-21.5 feet bgs)	17
						SANDY SILT, light yellowish brown, fine-grained sand, very moist (Alluvial Fan Deposits).	20
-27	30		23			Grading to Buff	25
-32	35					Bottom of Boring at 30 feet bgs	

P:\AABorinGS Files\Projects\RWL Investments - 4B EGI Oakland.bgs [Murray New 35 - WC.tpl]

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

LOG OF BORING B-3

PROJECT NO. 455-1R1 | **APRIL 2006** | **FIGURE B-3**

Date(s) Drilled **February 27, 2006**	Logged By **WPC**	Checked By **ADM**
Drilling Method **Continuous Flight Auger**	Drill Bit Size/Type **8-inch hollow stem auger**	Total Depth of Borehole **30 feet bgs**
Drill Rig Type **Mobile B53**	Drilling Contractor **Exploration Geoservices, Inc.**	Approximate Surface Elevation **3 feet (relative)**
Groundwater Level and Date Measured **4 feet ATD**	Sampling Method(s) **SPT, 2.5", and 3" split spoon, 3" shelby tube**	Hammer Data **140 lb, 30 in drop, wire line**
Borehole Backfill **Bentonite Slurry**	Location **Parking area near existing truck repair shop**	

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	MATERIAL DESCRIPTION	Water Content, %
3	0			Stiff to Soft	CL	FILL: SILTY CLAY, dark gray, with trace gravels, wooden stake, heterogeneous, very moist.	
			11				
			5			(ATD) ▽	20
-2	5		3	Very Soft to Soft	CH-MH	CLAYEY SILT TO SILTY CLAY, bluish gray, homogeneous, high plasticity, moist (Younger Bay Mud).	177
			2			Cohesion = 300 psf, Phi = 0 degrees	
-7	10		2			PI = 27%, LL = 44% (sample from 10 to 11.5 feet bgs)	45
			4				33
-12	15		6	Loose	SM	Occasional lenses of fine silty sand. SILTY SAND, trace organics, fine-grained sand, bluish gray, very moist (Younger Bay Mud).	45
				Stiff	MH	Occasional silt lenses.	
-17	20		8			CLAYEY SILT, trace fine gravel, greenish gray, homogeneous, high plasticity, very moist (Older Bay Mud).	24
			30	Medium Dense	SM	SILTY SAND, trace clay, fine-grained sand, light yellowish brown, very moist (Alluvial Fan Deposits).	16
-22	25		20				23
			15	Stiff	ML	CLAYEY SILT, light yellowish brown to pale yellow, moderate plasticity, very moist. (Alluvial Fan Deposits)	38
-27	30					Bottom of Boring at 30 feet bgs	
-32	35						

P:\AABorinGS Files\Projects\RWL Investments - 4B EGI Oakland.bgs [Murray New 35 - WC.tpl]

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

LOG OF BORING B-4

PROJECT NO. 455-1R1 | **APRIL 2006** | **FIGURE B-4**

Elevation, feet	Depth, feet	Sample Type	Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	MATERIAL DESCRIPTION	Water Content, %
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1. **Elevation, feet:** Elevation (MSL, feet)
2. **Depth, feet:** Depth in feet below the ground surface.
3. **Sample Type:** Type of soil sample collected at the depth interval shown.
4. **Sampling Resistance, blows/foot:** Number of blows to advance driven sampler foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
5. **Relative Consistency:** Relative consistency of the subsurface material.
6. **USCS Symbol:** USCS symbol of the subsurface material.
7. **MATERIAL DESCRIPTION:** Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8. **Water Content, %:** Water content of the soil sample, expressed as percentage of dry weight of sample.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

TYPICAL MATERIAL GRAPHIC SYMBOLS

- Sandstone
- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- Well graded GRAVEL with Silt (GW-GM)
- Well graded GRAVEL with Clay (GW-GC)
- Poorly graded GRAVEL with Silt (GP-GM)
- Poorly graded GRAVEL with Clay (GP-GC)
- Silty GRAVEL (GM)
- Clayey GRAVEL (GC)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- Well graded SAND with Silt (SW-SM)
- Well graded SAND with Clay (SW-SC)
- Poorly graded SAND with Silt (SP-SM)
- Poorly graded SAND with Clay (SP-SC)
- Silty SAND (SM)
- Clayey SAND (SC)
- SILT, SILT w/SAND, SANDY SILT (ML)
- Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)
- SILT, SILT w/SAND, SANDY SILT (MH)
- Fat CLAY, CLAY w/SAND, SANDY CLAY (CH)
- SILT, SILT with SAND, SANDY SILT (ML-MH)
- Lean-Fat CLAY, CLAY w/SAND, SANDY CLAY (CL-CH)
- SILTY CLAY (CL-ML)
- Lean CLAY/PEAT (CL-OL)
- Fat CLAY/SILT (CH-MH)
- Fat CLAY/PEAT (CH-OH)
- Silty SAND to Sandy SILT (SM-ML)
- Silty SAND to Sandy SILT (SM-MH)
- Clayey SAND to Sandy CLAY (SC-CL)
- Clayey SAND to Sandy CLAY (SC-CH)
- SILT to CLAY (CL/ML)
- Silty to Clayey SAND (SC/SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- 2 inch-OD Unlined Split Spoon (SPT)
- 2.5 inch-OD Unlined Split Spoon
- 3 inch-OD Unlined Split Spoon
- Shelby Tube (thin-walled, fixed head)
- Grab Sample
- Bulk Sample
- Pitcher Sample
- Other Sampler

OTHER GRAPHIC SYMBOLS

- Water level (at time of drilling, ATD)
- Water level (after waiting a given time)
- Minor change in material properties within a stratum
- Inferred or gradational contact between strata
- ? Queried contact between strata

GENERAL NOTES

1. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

P:\AABorinGS Files\Projects\RWL Investments - 4B EGI Oakland.bgs [Murray New 35 - WC.tpl]

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

KEY TO
LOG OF BORING

PROJECT NO. 455-1R1 | APRIL 2006 | FIGURE B-5

PRIMARY DIVISIONS			SOIL TYPE	SECONDARY DIVISIONS
COURSE GRAINED SOILS (< 50 % Fines)	GRAVEL	CLEAN GRAVEL (< 5% Fines)	GW	Well graded gravel, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVEL with FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SAND	CLEAN SAND (< 5% Fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SAND WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS (> 50 % Fines)	SILT AND CLAY Liquid limit < 50%		ML	Inorganic silts and very fine sands, with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, lean clays.
			OL	Organic silts and organic clays of low plasticity.
	SILT AND CLAY Liquid limit > 50%		MH	Inorganic silt, micaceous or diatomaceous fine sandy or silty soil.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

RELATIVE DENSITY

SAND & GRAVEL	BLOWS/FOOT*
VERY LOOSE	0 to 4
LOOSE	4 to 10
MEDIUM DENSE	10 to 30
DENSE	30 to 50
VERY DENSE	OVER 50

CONSISTENCY

SILT & CLAY	STRENGTH^	BLOWS/FOOT*
VERY SOFT	0 to 0.25	0 to 2
SOFT	0.25 to 0.5	2 to 4
FIRM	0.5 to 1	4 to 8
STIFF	1 to 2	8 to 16
VERY STIFF	2 to 4	16 to 32
HARD	OVER 4	OVER 32

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILT & CLAY
		COURSE	FINE	COURSE	MEDIUM	FINE	
	12"	3"	3/4"	4	10	40	200

SIEVE OPENINGS — U.S. STANDARD SERIES SIEVE

Classification is based on the Unified Soil Classification System; fines refer to soil passing a No. 200 sieve.

* Standard Penetration Test (SPT) resistance, using a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler; blow counts not corrected for larger diameter samplers.

^ Shear strength in tons/sq. ft. as estimated by SPT resistance, field and laboratory tests, and/or visual observation.

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

UNIFIED SOIL CLASSIFICATION SYSTEM

PROJECT NO. 455-1R1 | **APRIL 2006** | **FIGURE B-6**

APPENDIX C

LABORATORY TESTS

Laboratory testing for the project was performed by Murray Engineers, Inc. (MEI) and by Cooper Testing Laboratory of Palo Alto, California, in accordance with instructions from MEI.

Samples from the subsurface exploration were selected for tests to establish the physical and engineering properties of the soils. The tests performed are briefly described below.

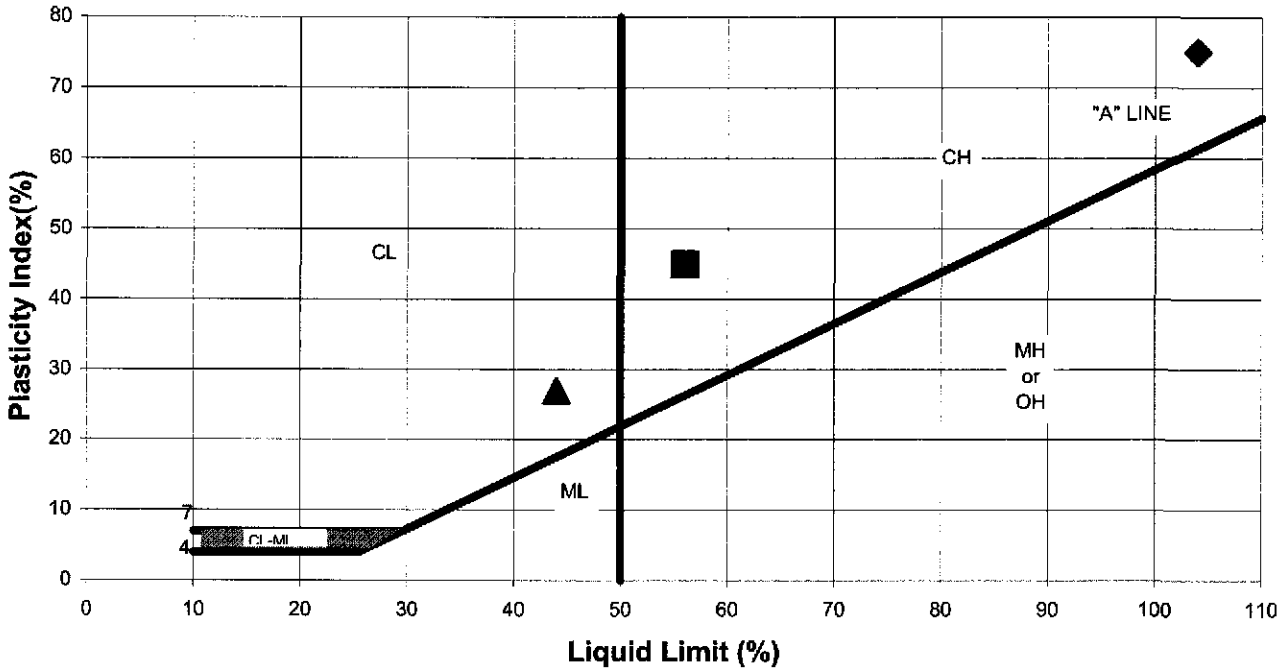
The natural moisture content was determined in accordance with ASTM D 2216 on most samples recovered from the borings. This test determines the moisture content, representative of field conditions, at the time the samples were collected. The results are presented on the boring logs at the appropriate sample depths. In addition, the wet and dry densities were determined in accordance with ASTM guidelines on four samples recovered from the borings.

The Atterberg Limits were determined on three samples in accordance with ASTM D 4318. The Atterberg limits are the moisture content within which the soil is workable or plastic. The results of this test are presented in Figure C-1 and on the boring logs at the appropriate sample depths.

The amount of silt and clay sized material present was determined on one sample in accordance with ASTM D 1140. The results are presented on the boring log at the appropriate sample depth.

Direct Shear testing was performed on five selected samples in accordance with ASTM D3080. The results of the direct shear testing are shown on Figures C-2 through C-6.

Consolidation testing was performed on three selected samples in accordance with ASTM D4186. The results of the consolidation testing are shown on Figures C-7 through C-9.



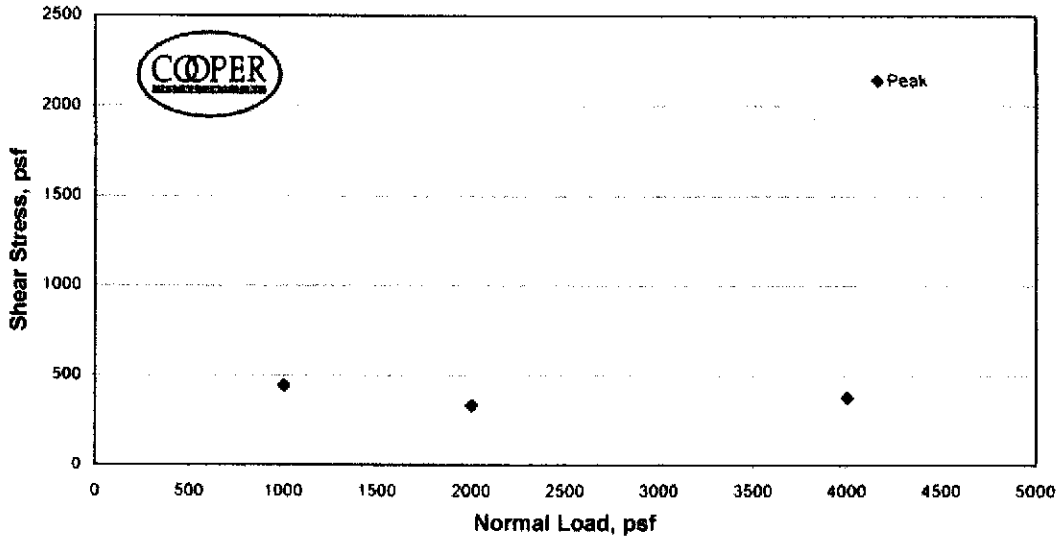
Key Symbol	Boring Number	Sample Depth (ft)	Water Content (%)	Liquid Limit (%)	Plasticity Index (%)	Plastic Limit (%)	Liquidity Index	Passing No. 200 Sieve (%)	Unified Soil Classification Symbol
■	B-1	16 to 17.5	25	56	45	11	0.3	N/A	CH
◆	B-3	10 to 11.5	105	104	75	29	1.0	N/A	CH
▲	B-4	10 to 11.5	45	44	27	18	1.0	N/A	CH

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

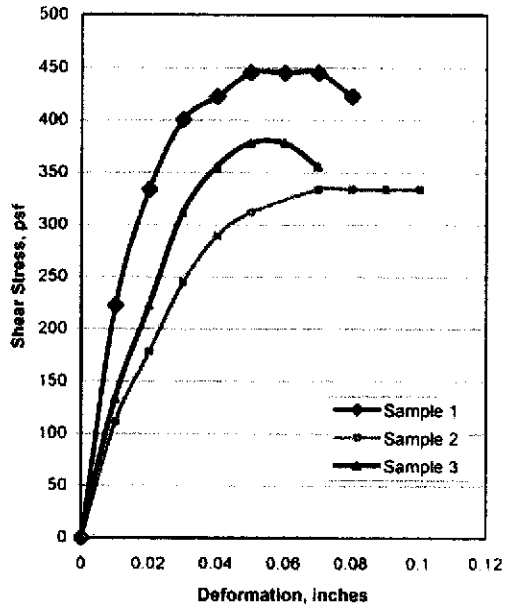
CONTAMINATED SOIL REPLACMENT
OAKLAND, CALIFORNIA

PLASTICITY CHART AND DATA

PROJECT NO. 455-1R1 | **APRIL 2006** | **FIGURE C-1**



P. Phi (degrees)		Ult. Phi (degrees)	
P. Cohesion(psf)		Ult. Cohesion (psf)	



	Sample Data: Initial			
	1	2	3	4
Moisture %	73.9	70.1	87.4	
Dry Dens., pcf	55.8	55.6	49.9	
Void Ratio	2.023	2.029	2.379	
Saturation %	98.7	93.2	99.1	
Diameter	2.87	2.87	2.87	
Height	1.00	1.00	1.00	
	Sample Data: At Test			
Moisture %	87.4	70.1	87.4	
Dry Dens., pcf	51.8	55.6	49.9	
Void Ratio	2.023	2.029	2.379	
Saturation %	98.7	93.2	99.1	
Diameter	2.87	2.87	2.87	
Height	1.00	1.00	1.00	
Normal Stress, psf	1000	2000	4000	
Shear Stress, psf	445	334	378	
Strengths picked at	peak	peak	peak	
Ult. Stress, psf				
Strain Rate, in/min	0.020	0.020	0.020	

CTL #	560-013a
Client:	Murray Engineers
Project	RWL Investments - 455-1R1
Tested By:	MD
Reduced By:	RU
Date:	3/22/2006

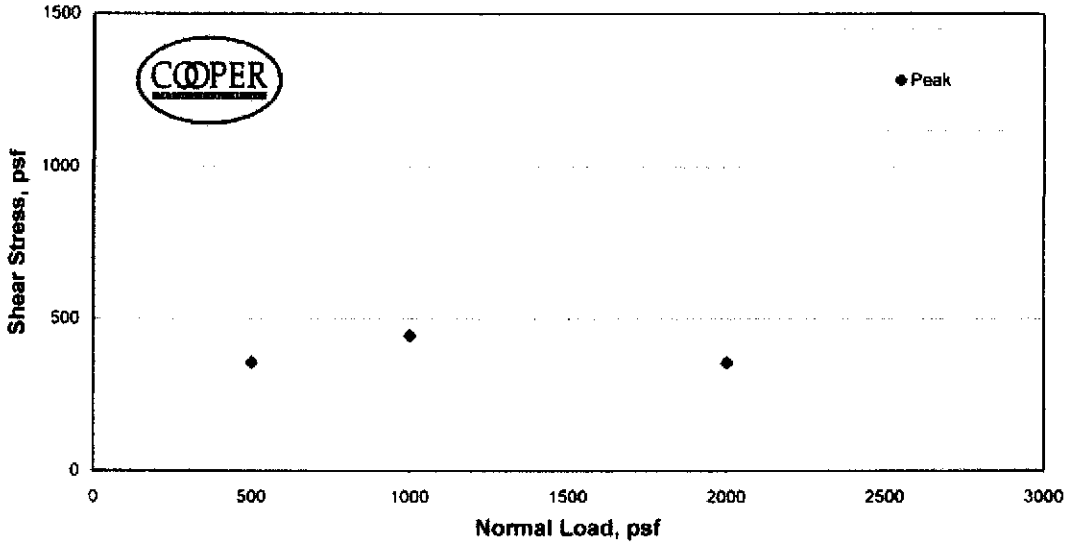
Specimen #	Boring:	Sample:	Depth, ft:	Visual Soil Classification
1	B-1		6.5-9	Gray CLAY, trace organics (bay mud)
2	B-1		6.5-9	Gray CLAY, trace organics (bay mud)
3	B-1		6.5-9	Gray CLAY, trace organics (bay mud)
4				
Remarks:	*DS-UU* Quick shear run at field moisture. Patching required on Sample 2.			

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

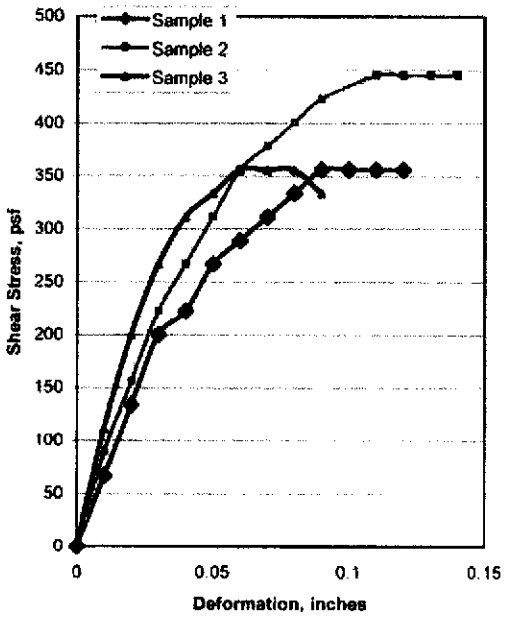
CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

DIRECT SHEAR TEST RESULTS
BORING B-1, 6.5-9 FEET

PROJECT NO. 455-1R1 | APRIL 2006 | FIGURE C-2



P. Phi (degrees)		Ult. Phi (degrees)	
P. Cohesion(psf)		Ult. Cohesion (psf)	



	Sample Data: Initial			
	1	2	3	4
Moisture %	104.4	114.1	101.8	
Dry Dens., pcf	43.3	38.5	43.4	
Void Ratio	2.894	3.383	2.884	
Saturation %	97.3	91.0	95.3	
Diameter	2.87	2.87	2.87	
Height	1.00	1.00	1.00	
	Sample Data: At Test			
Moisture %	101.8	114.1	101.8	
Dry Dens., pcf	43.8	38.5	43.4	
Void Ratio	2.894	3.383	2.884	
Saturation %	97.3	91.0	95.3	
Diameter	2.87	2.87	2.87	
Height	1.00	1.00	1.00	
Normal Stress, psf	500	1000	2000	
Shear Stress, psf	356	445	356	
Strengths picked at	peak	peak	peak	
Ult. Stress, psf				
Strain Rate, in/min	0.0287	0.0287	0.0287	

CTL #	560-013b
Client:	Murray Engineers
Project	RWL Investments - 455-1R1
Tested By:	MD
Reduced By:	RU
Date:	3/22/2006

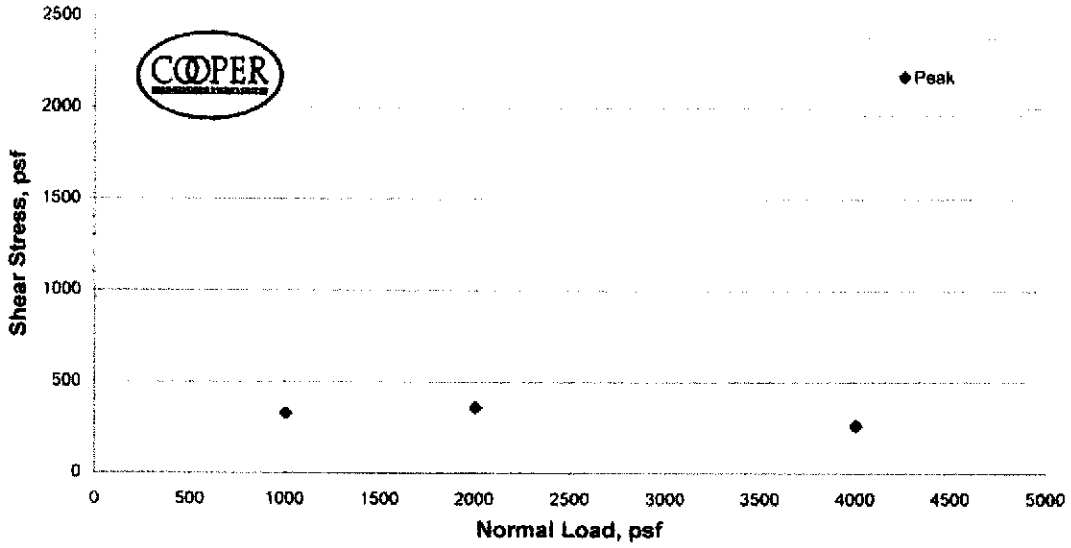
Specimen #	Boring:	Sample:	Depth, ft:	Visual Soil Classification
1	B-2		8-10.5	Gray CLAY w/ organics (bay mud)
2	B-2		8-10.5	Gray CLAY w/ organics (bay mud)
3	B-2		8-10.5	Gray CLAY w/ organics (bay mud)
4				
Remarks:	*DS-UU* Quick shear run at field moisture.			

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

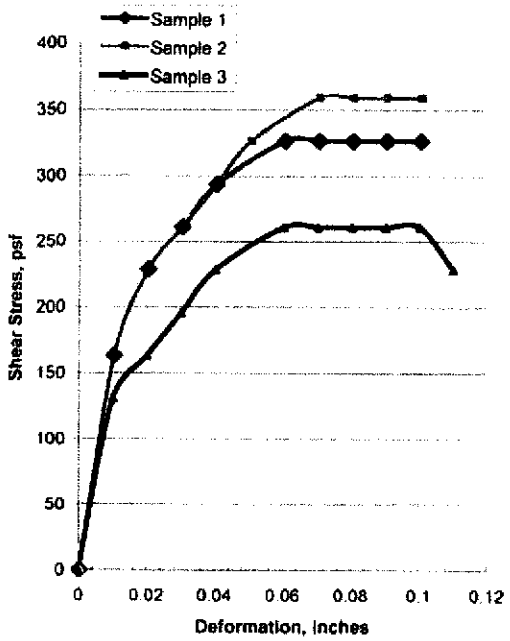
CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

DIRECT SHEAR TEST RESULTS
BORING B-1, 8-10.5 FEET

PROJECT NO. 455-1R1 | APRIL 2006 | FIGURE C-3



P. Phi (degrees)		Ult. Phi (degrees)	
P. Cohesion(psf)		Ult. Cohesion (psf)	



	Sample Data: Initial			
	1	2	3	4
Moisture %	96.6	105.3	99.6	
Dry Dens., pcf	45.8	42.5	44.0	
Void Ratio	2.683	2.967	2.835	
Saturation %	97.2	95.8	94.9	
Diameter	2.37	2.37	2.37	
Height	1.00	1.00	1.00	
	Sample Data: At Test			
Moisture %	99.6	105.3	99.6	
Dry Dens., pcf	45.1	42.5	44.0	
Void Ratio	2.683	2.967	2.835	
Saturation %	97.2	95.8	94.9	
Diameter	2.37	2.37	2.37	
Height	1.00	1.00	1.00	
Normal Stress, psf	1000	2000	4000	
Shear Stress, psf	326	359	261	
Strengths picked at	peak	peak	peak	
Ult. Stress, psf				
Strain Rate, in/min	0.020	0.020	0.020	

CTL #	560-013d
Client:	Murray Engineers
Project	RWL Investments - 455-1R1
Tested By:	MD
Reduced By:	RU
Date:	3/22/2006

Specimen #	Boring:	Sample:	Depth, ft:	Visual Soil Classification
1	B-4		8.5-10	Gray CLAY
2	B-4		8.5-10	Gray CLAY
3	B-4		8.5-10	Gray CLAY
4				

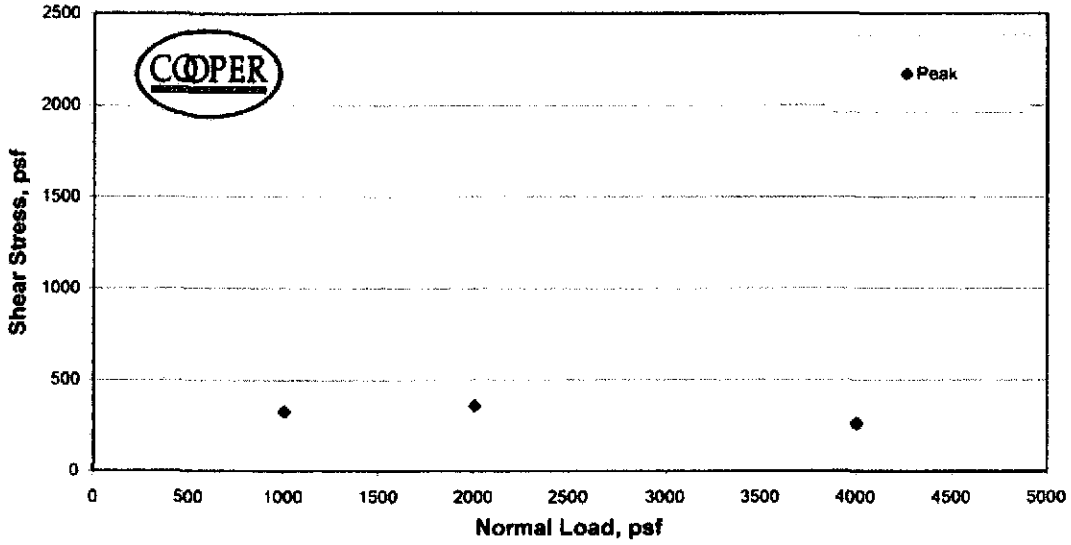
Remarks: *DS-UU* Quick shear run at field moisture.

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

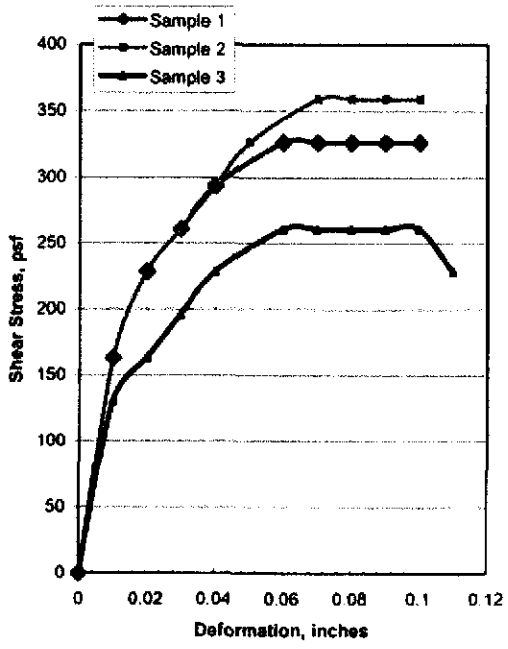
CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

DIRECT SHEAR TEST RESULTS
BORING B-4, 8.5-10 FEET

PROJECT NO. 455-1R1 | APRIL 2006 | FIGURE C-4



P. Phi (degrees)		Ult. Phi (degrees)	
P. Cohesion(psf)		Ult. Cohesion (psf)	



	Sample Data: Initial			
	1	2	3	4
Moisture %	96.6	105.3	99.6	
Dry Dens., pcf	45.8	42.5	44.0	
Void Ratio	2.683	2.967	2.835	
Saturation %	97.2	95.8	94.9	
Diameter	2.37	2.37	2.37	
Height	1.00	1.00	1.00	
	Sample Data: At Test			
Moisture %	99.6	105.3	99.6	
Dry Dens., pcf	45.1	42.5	44.0	
Void Ratio	2.683	2.967	2.835	
Saturation %	97.2	95.8	94.9	
Diameter	2.37	2.37	2.37	
Height	1.00	1.00	1.00	
Normal Stress, psf	1000	2000	4000	
Shear Stress, psf	326	359	261	
Strengths picked at	peak	peak	peak	
Ult. Stress, psf				
Strain Rate, in/min	0.020	0.020	0.020	

CTL #	560-013d
Client:	Murray Engineers
Project	RWL Investments - 455-1R1
Tested By:	MD
Reduced By:	RU
Date:	3/22/2006

Specimen #	Boring:	Sample:	Depth, ft:	Visual Soil Classification
1	B-4		8.5-10	Gray CLAY
2	B-4		8.5-10	Gray CLAY
3	B-4		8.5-10	Gray CLAY
4				
Remarks:	*DS-UU* Quick shear run at field moisture.			

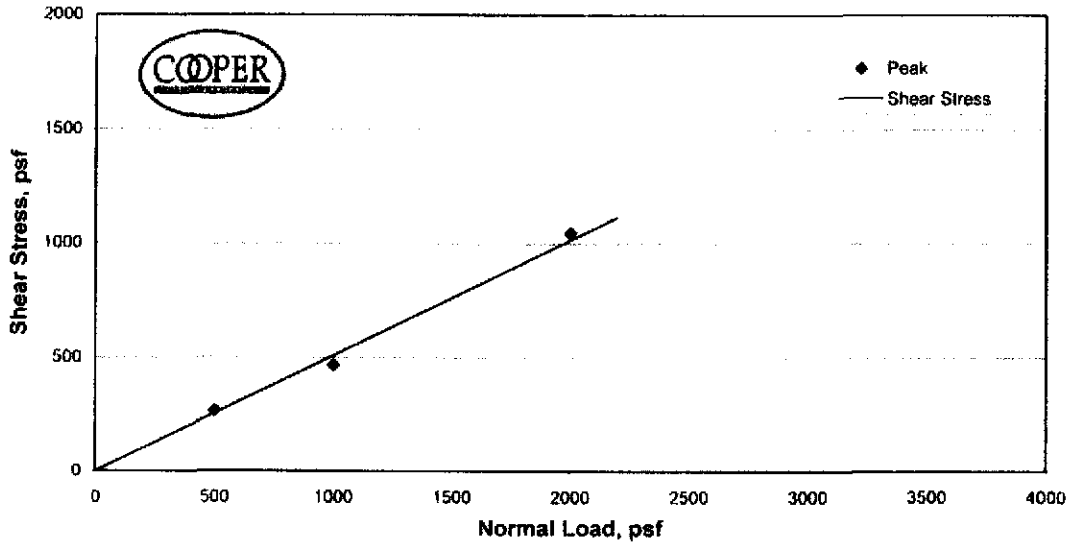
MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

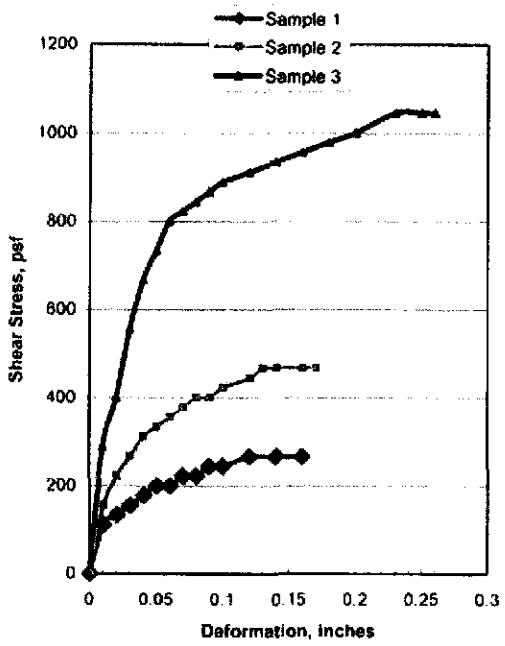
DIRECT SHEAR TEST RESULTS
BORING B-4, 8.5-10 FEET

PROJECT NO. 455-1R1 | APRIL 2006 | FIGURE C-5

ASTM D3080m



P. Phi (degrees)	26.9	Ult. Phi (degrees)	
P. Cohesion(psf)	0	Ult. Cohesion (psf)	



	Sample Data: Initial			
	1	2	3	4
Moisture %	43.6	42.8	43.6	
Dry Dens., pcf	76.4	76.8	76.6	
Void Ratio	1.207	1.193	1.202	
Saturation %	97.5	96.7	98.0	
Diameter	2.87	2.87	2.87	
Height	1.00	1.00	1.00	
	Sample Data: At Test			
Moisture %	43.6	42.8	43.6	
Dry Dens., pcf	78.1	79.8	80.8	
Void Ratio	1.073	1.015	0.965	
Saturation %	95.7	96.4	98.8	
Diameter	2.87	2.87	2.87	
Height	0.94	0.92	0.89	
Normal Stress, psf	500	1000	2000	
Shear Stress, psf	267	467	1046	
Strengths picked at	4.2%	4.5%	8.0%	
Ult. Stress, psf				
Strain Rate, in/min	0.020	0.020	0.020	

CTL #	560-013e
Client:	Murray Engineers
Project	RWL Investments - 455-1R1
Tested By:	MD
Reduced By:	RU
Date:	3/31/2006

Specimen #	Boring:	Sample:	Depth, ft:	Visual Soil Classification
1	B-4		18.5-21	Gray SILT w/ Sand (slighlty plastic), trace organics (bay mud)
2	B-4		18.5-20	Gray SILT w/ Sand (slighlty plastic), trace organics (bay mud)
3	B-4		18.5-20	Gray SILT w/ Sand (slighlty plastic), trace organics (bay mud)
4				
Remarks:	*DS-CU* A fully undrained condition may not be attained in this test.			

MURRAY ENGINEERS INC
GEOTECHNICAL SERVICES

CONTAMINATED SOIL REPLACEMENT
OAKLAND, CALIFORNIA

DIRECT SHEAR TEST RESULTS
BORING B-4, 18.5-21 FEET

PROJECT NO. 455-1R1 | APRIL 2006 | FIGURE C-6

Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 **Boring/Well No.** MW-1
Client: DiSalvo Trucking **Date Drilled:** April 8, 1994
Location: 4919 Tidewater, Oakland, CA **Logged by:** EL
Drilling Method: Hollowstem Auger **Permit:** ACWCFCD 94193
Water Levels: 1st Enc: 3± Static: no measurement

Borehole Completion
Well Installed: 2" dia. PVC sch 40
Total Depth: 8' Casing Depth: 8'
Screen Length: 5' 0.020" Blank Length: 3'
Sand Pack: 2/12 Top Sand: 2.5' Top Bentonite: 2'
Grout Seal: 2' to surface vault box
Casing Elev. MSL: 2.68'

Sample No.	HAN	Blow Count
MW-1@ con. fill	Trace	66
MW-1@ @5'	No Test	3
MW-1@ @7	No Test	3
MW-1@ @8'	No Test	2

Sample

Depth

Lithology Log

Asphalt and Baserock and concrete rubble.

Artificial FILL, wood, concrete very dense, moist.

OM-PT - SILT and PEAT, black, highly plastic, soft, very moist.

5

Same as above.

Same as above, thin interbeds of clay in peat.

10

Bottom of Boring = 8 feet

Well Detail/ Backfill

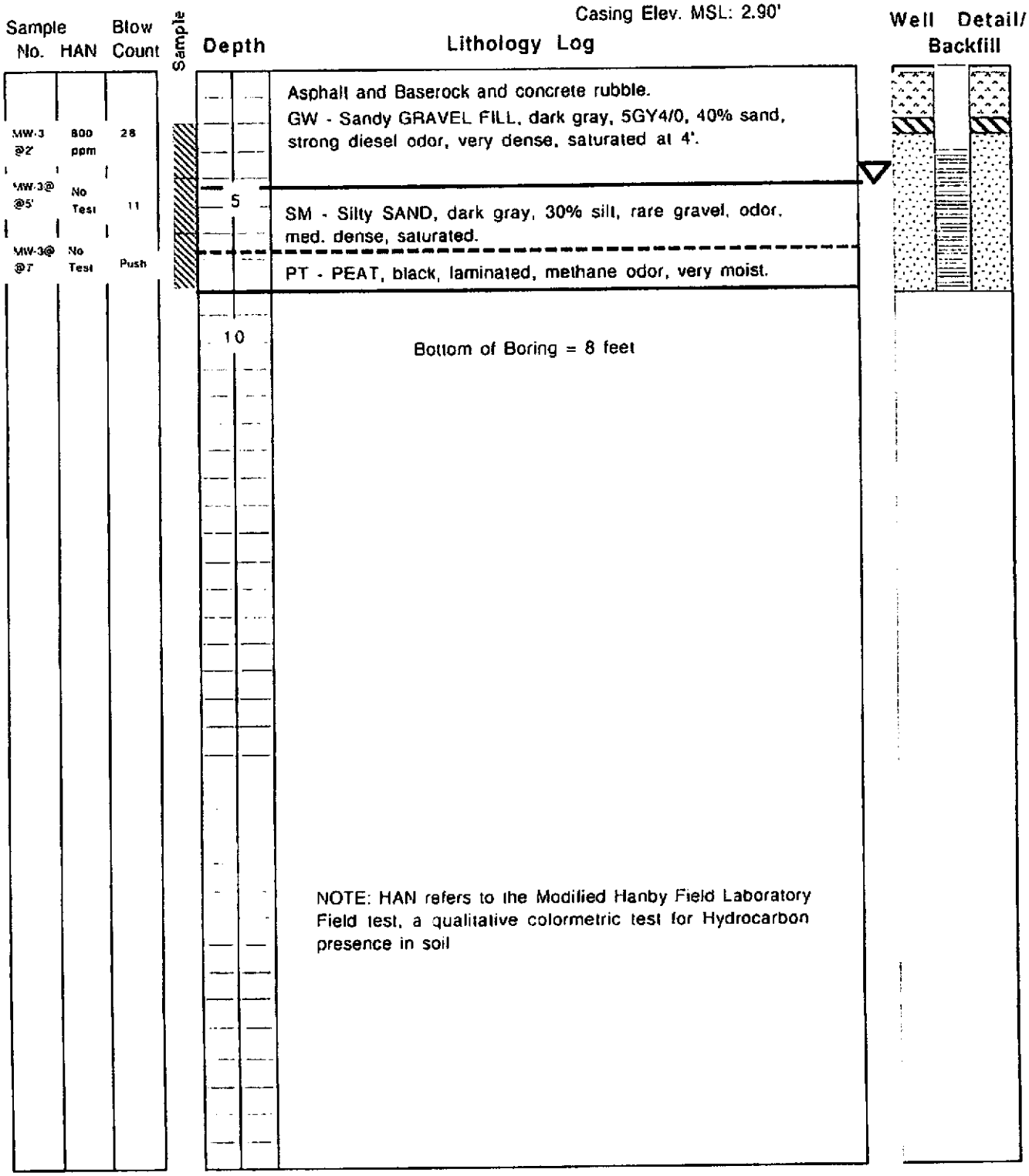
NOTE: HAN refers to the Modified Hanby Field Laboratory Field test, a qualitative colormetric test for Hydrocarbon presence in soil

Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 **Boring/Well No.** MW-3
Client: DiSalvo Trucking **Date Drilled:** April 8, 1994
Location: 4919 Tidewater, Oakland, CA **Logged by:** EL
Drilling Method: Hollowstem Auger **Permit:** ACWCFCD 94193
Water Levels: 1st Enc: 4.0' Static: 2.0'

Borehole Completion
Well Installed: 2" dia. PVC sch 40
Total Depth: 8' Casing Depth: 8'
Screen Length: 5' 0.020" Blank Length: 3'
Sand Pack: 2/12 Top Sand: 2.5' Top Bentonite: 2'
Grout Seal: 2' to surface vault box
Casing Elev. MSL: 2.90'



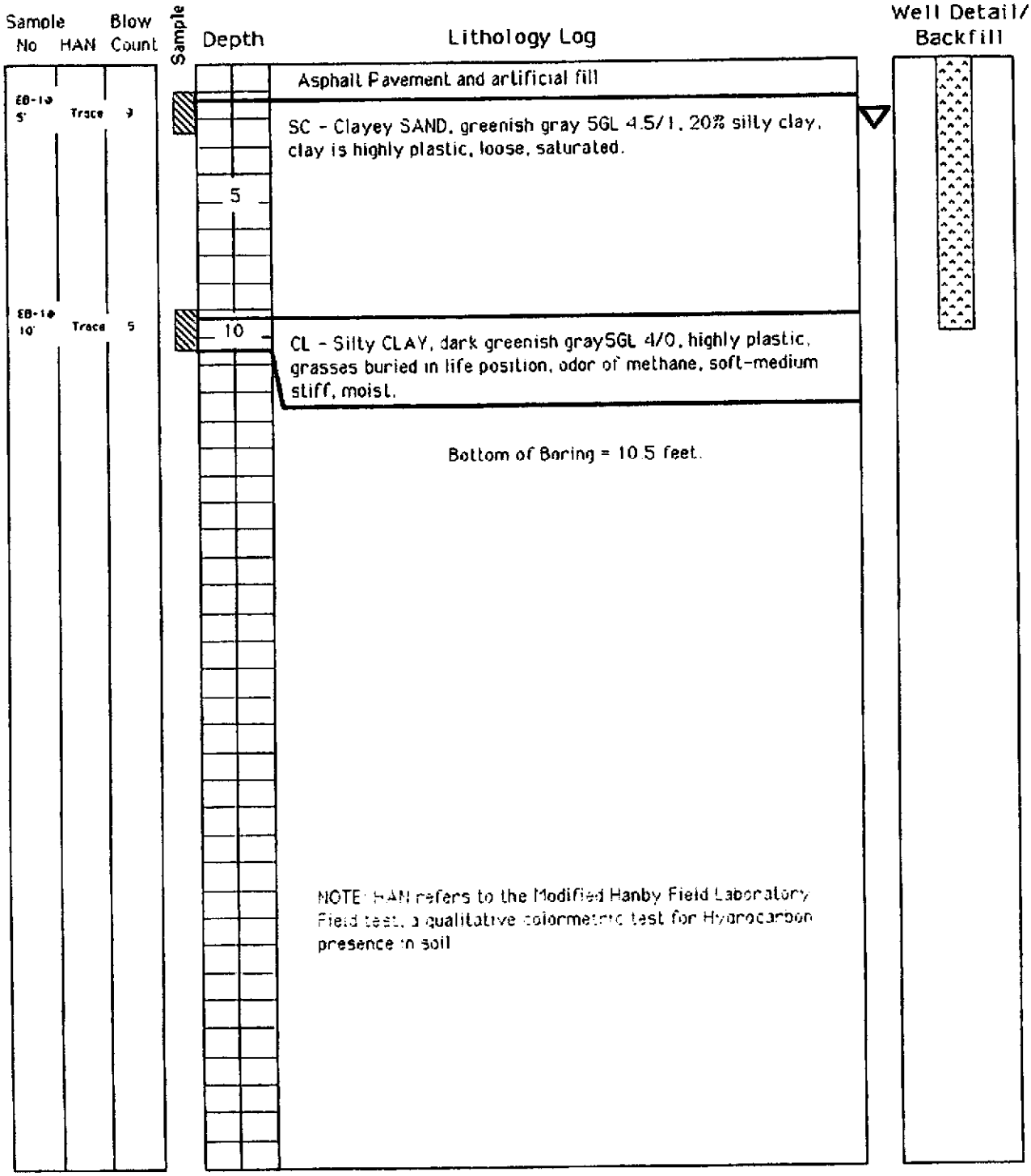
Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 **Boring/Well No.** EB-1
Client: DiSalvo Trucking **Date Drilled:** April 7, 1994
Location: 4919 Tidewater, Oakland, CA **Logged by:** EL
Drilling Method: Hollowstem Auger **Permit:** N/R
Water Levels: 1st Enc: 2.5' Static: no measurement

Borehole Completion
Well Installed: NO

Cement Grout Seal: 10.5' to surface

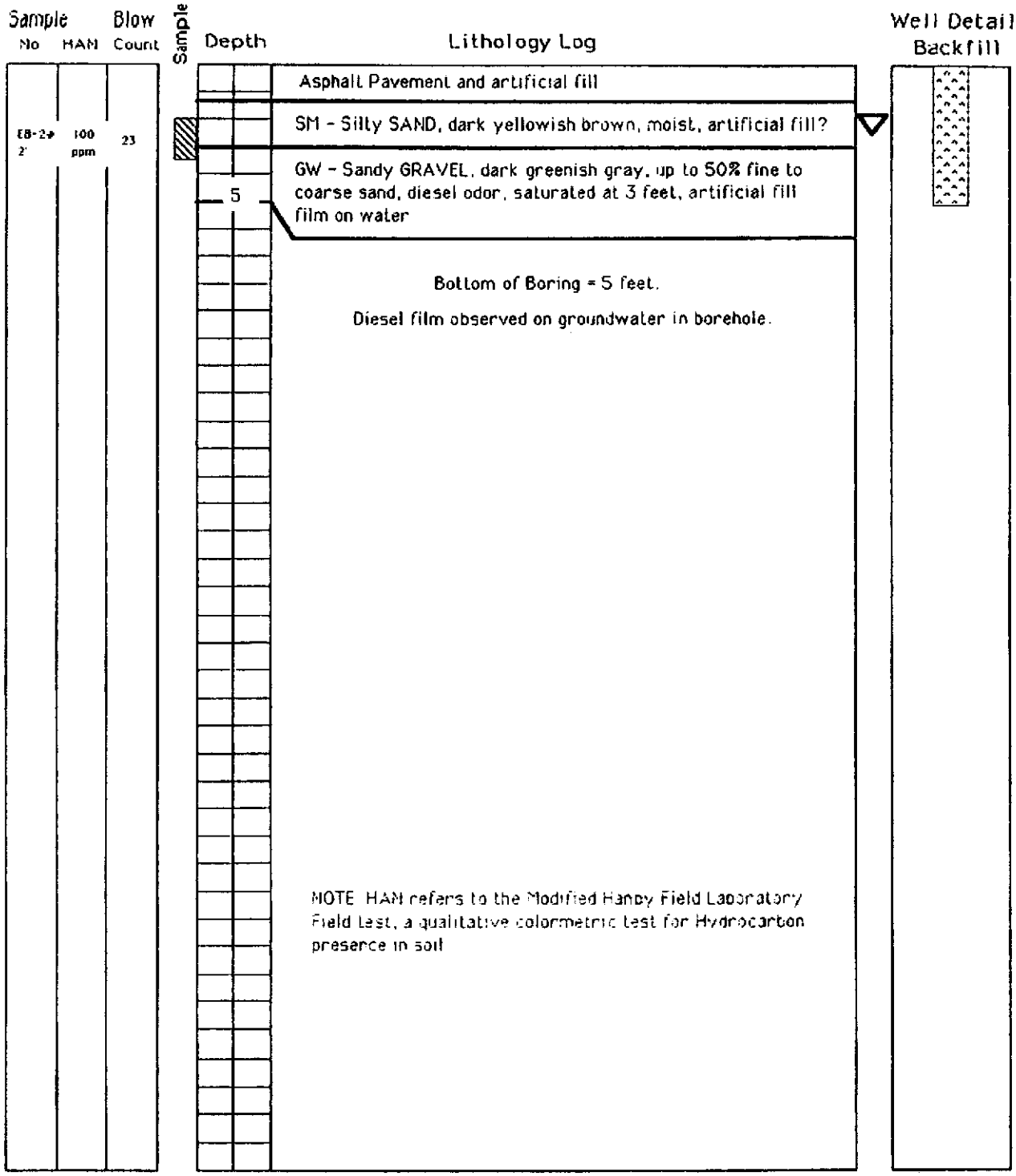


Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 Boring/Well No. EB-2
Client: DiSalvo Trucking Date Drilled: April 7, 1994
Location: 4919 Tidewater, Oakland, CA Logged by: EL
Drilling Method: Hollowstem Auger Permit: N/R
Water Levels: 1st Enc: 2.7' Static: no measurement

Borehole Completion
Well Installed: NO
Cement Grout Seal: 5 ' to surface



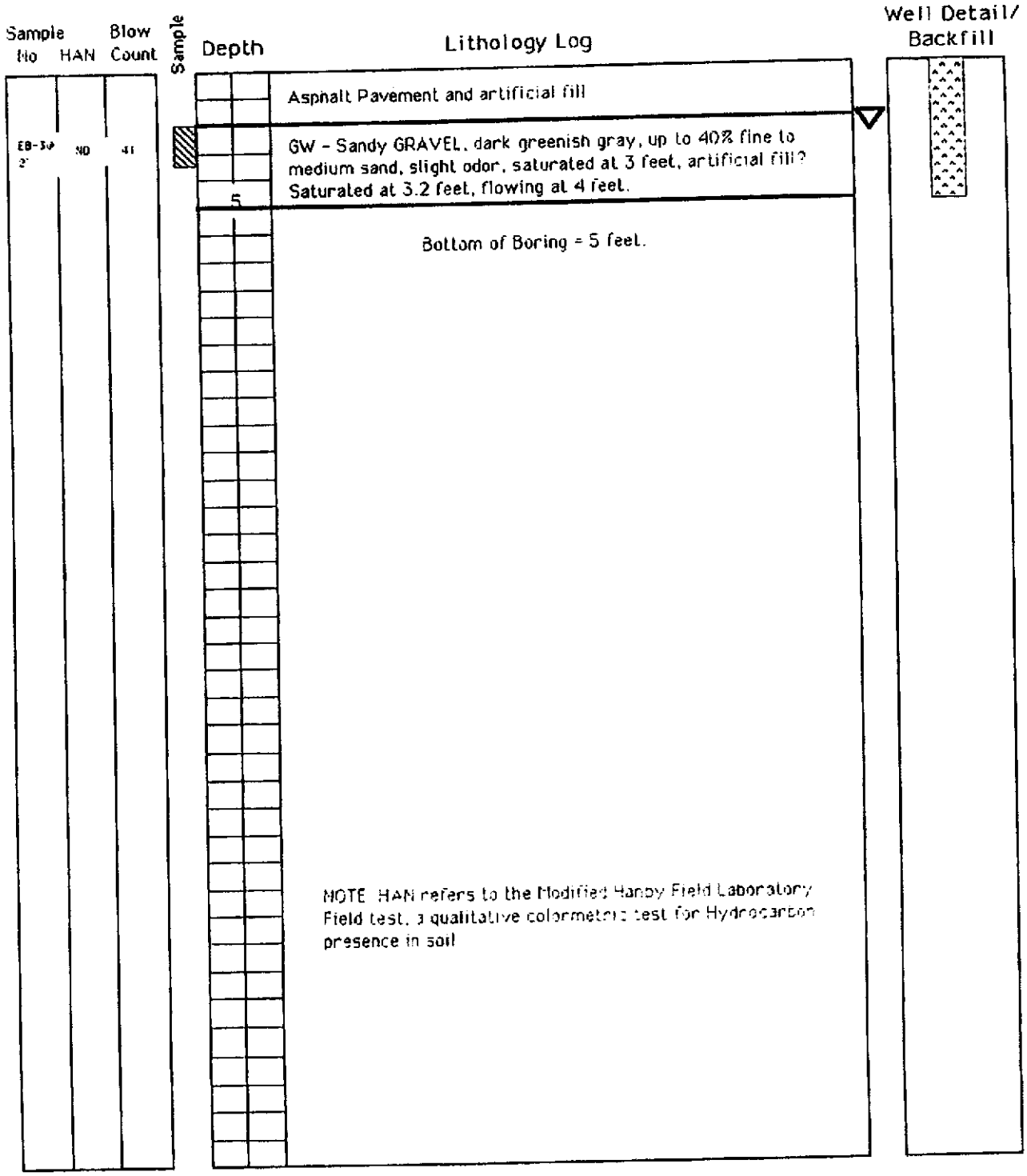
Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 Boring/Well No. EB-3
Client: DiSalvo Trucking Date Drilled: April 7, 1994
Location: 4919 Tidewater, Oakland, CA Logged by: EL
Drilling Method: Hollowstem Auger Permit: N/R
Water Levels: 1st Enc: 3.2' Static: no measurement

Borehole Completion
Well Installed: NO

Cement Grout Seal: 5 ' to surface



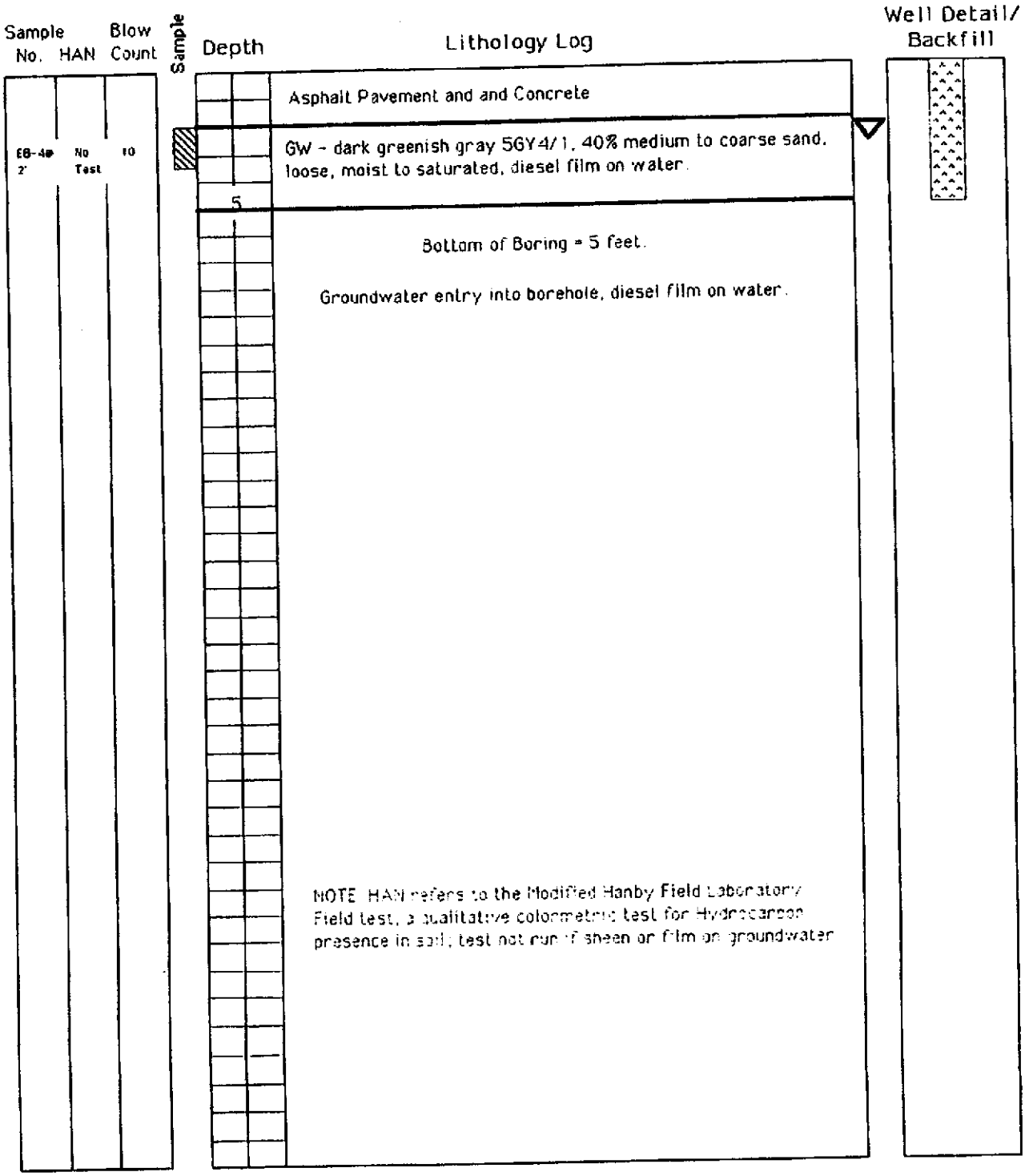
Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 **Boring/Well No.** EB-4
Client: DiSalvo Trucking **Date Drilled:** April 7, 1994
Location: 4919 Tidewater, Oakland, CA **Logged by:** EL
Drilling Method: Hollowstem Auger **Permit:** N/R
Water Levels: 1st Enc: 2.8' Static: no measurement

Borehole Completion
Well Installed: NO

Cement Grout Seal: 5' to surface



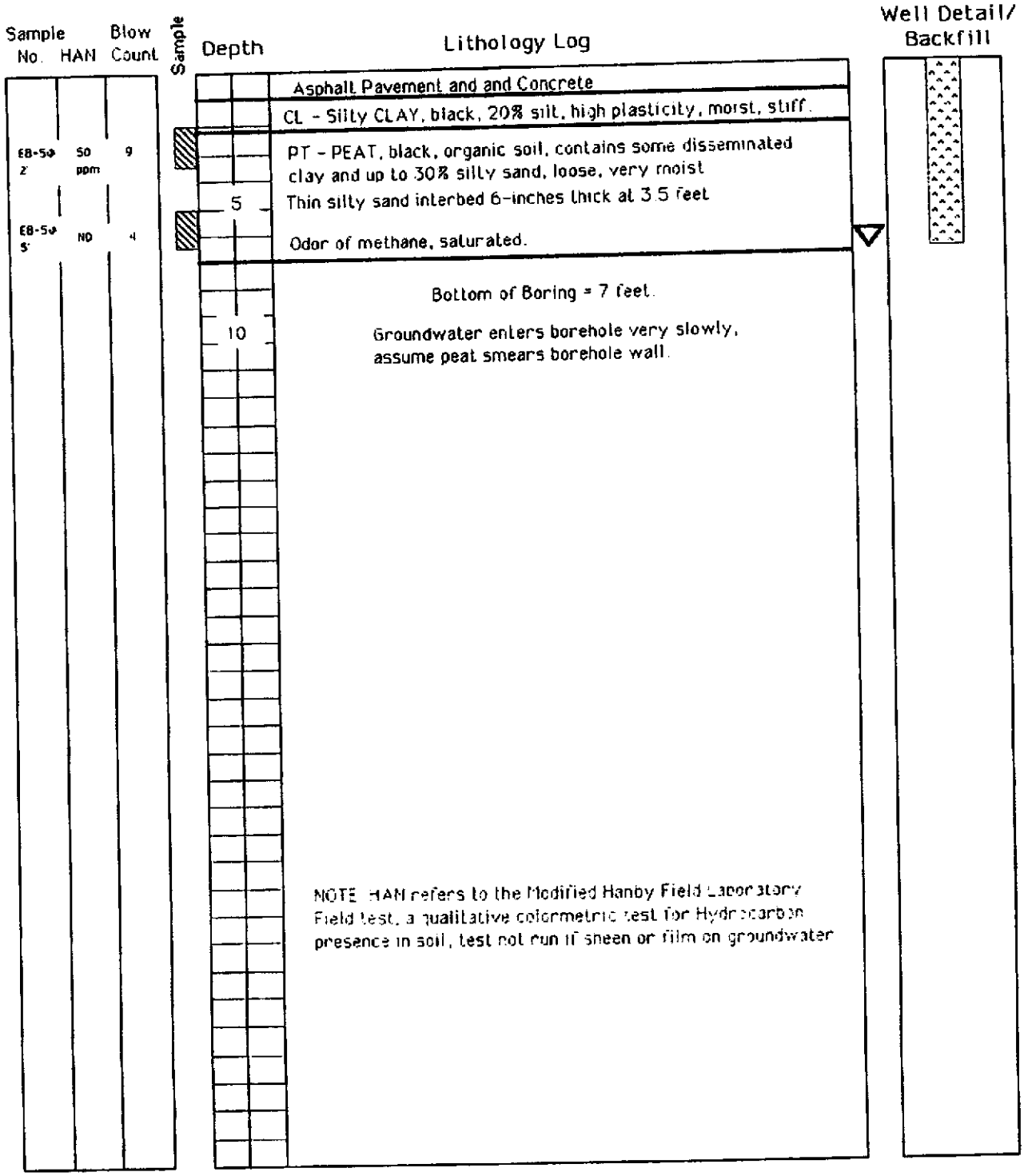
Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 Boring/Well No. EB-5
Client: DiSalvo Trucking Date Drilled: April 7, 1994
Location: 4919 Tidewater, Oakland, CA Logged by: EL
Drilling Method: Hollowstem Auger Permit: N/R
Water Levels: 1st Enc: 6 2' Static: no measurement

Borehole Completion
Well Installed: NO

Cement Grout Seal: 7' to surface



Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 Boring/Well No. EB-7

Client: DiSalvo Trucking Date Drilled: April 7, 1994

Location: 4919 Tidewater, Oakland, CA Logged by: EL

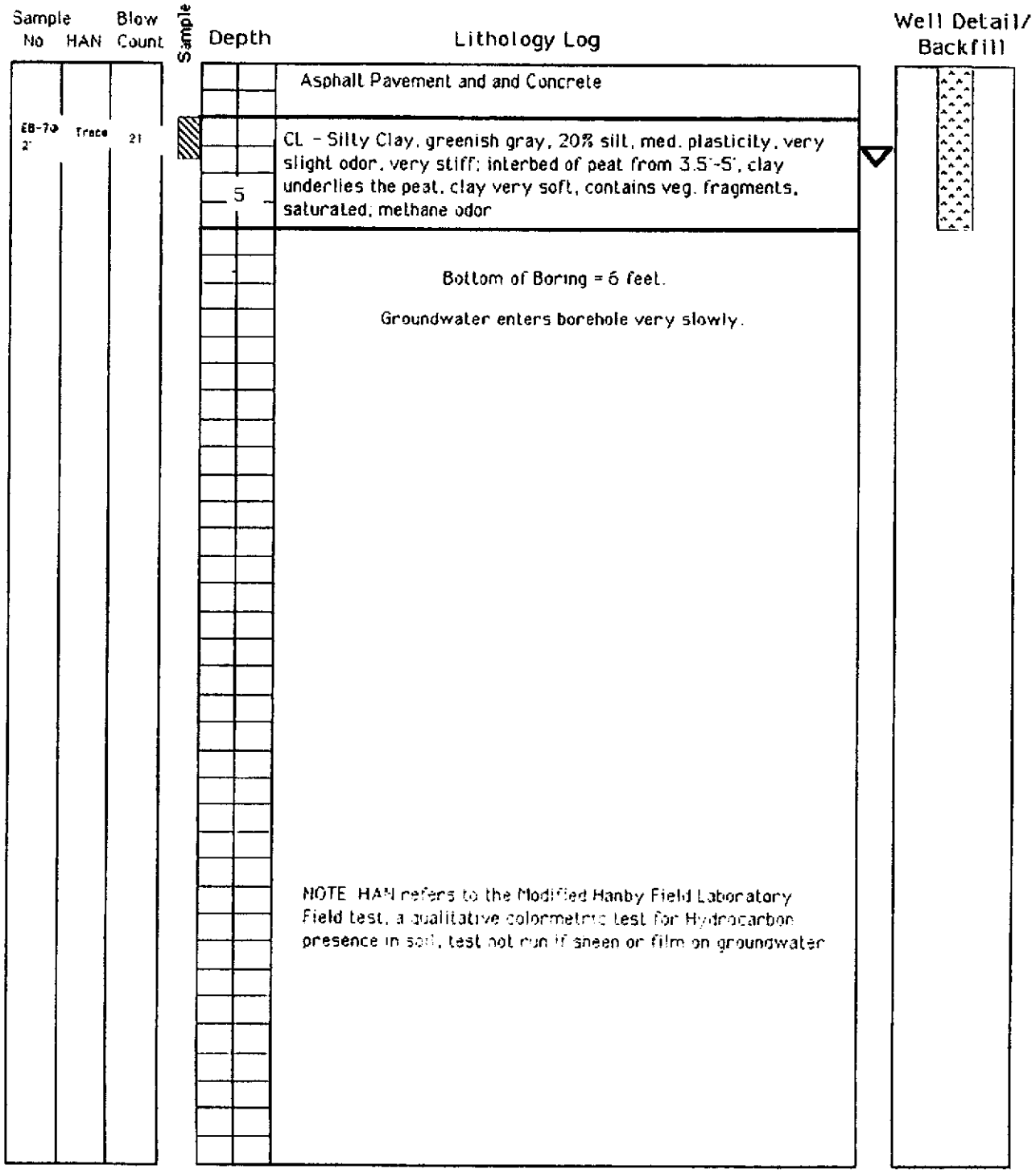
Drilling Method: Hollowstem Auger Permit: N/R

Water Levels: 1st Enc: 3.5' Static: no measurement

Borehole Completion

Well Installed: NO

Cement Grout Seal: 6' to surface



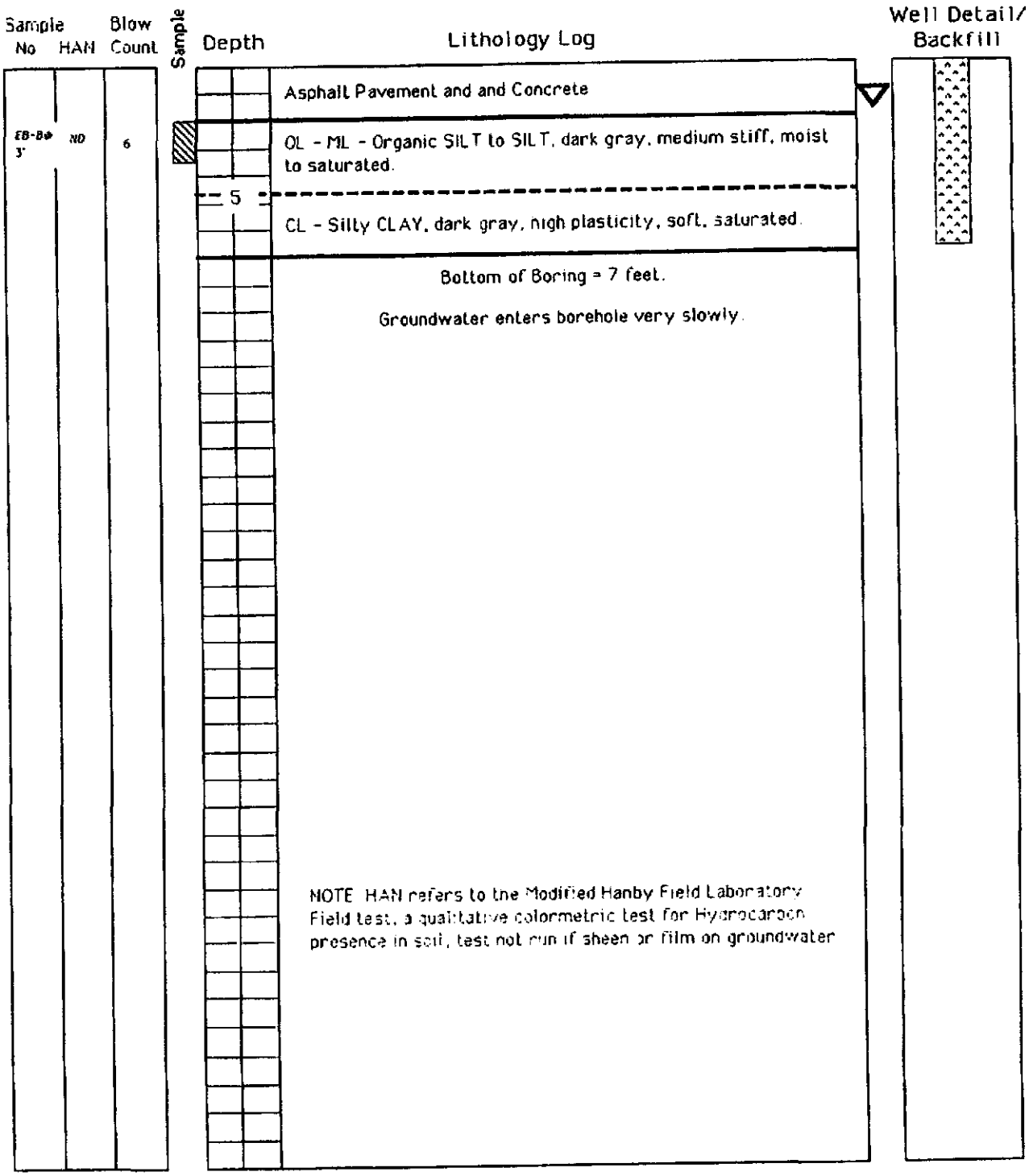
Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 Boring/Well No. EB-8
Client: DiSalvo Trucking Date Drilled: April 7, 1994
Location: 4919 Tidewater, Oakland, CA Logged by: EL
Drilling Method: Hollowstem Auger Permit: N/R
Water Levels: 1st Enc: 1.25' Static: no measurement

Borehole Completion
Well Installed: NO

Cement Grout Seal: 7' to surface



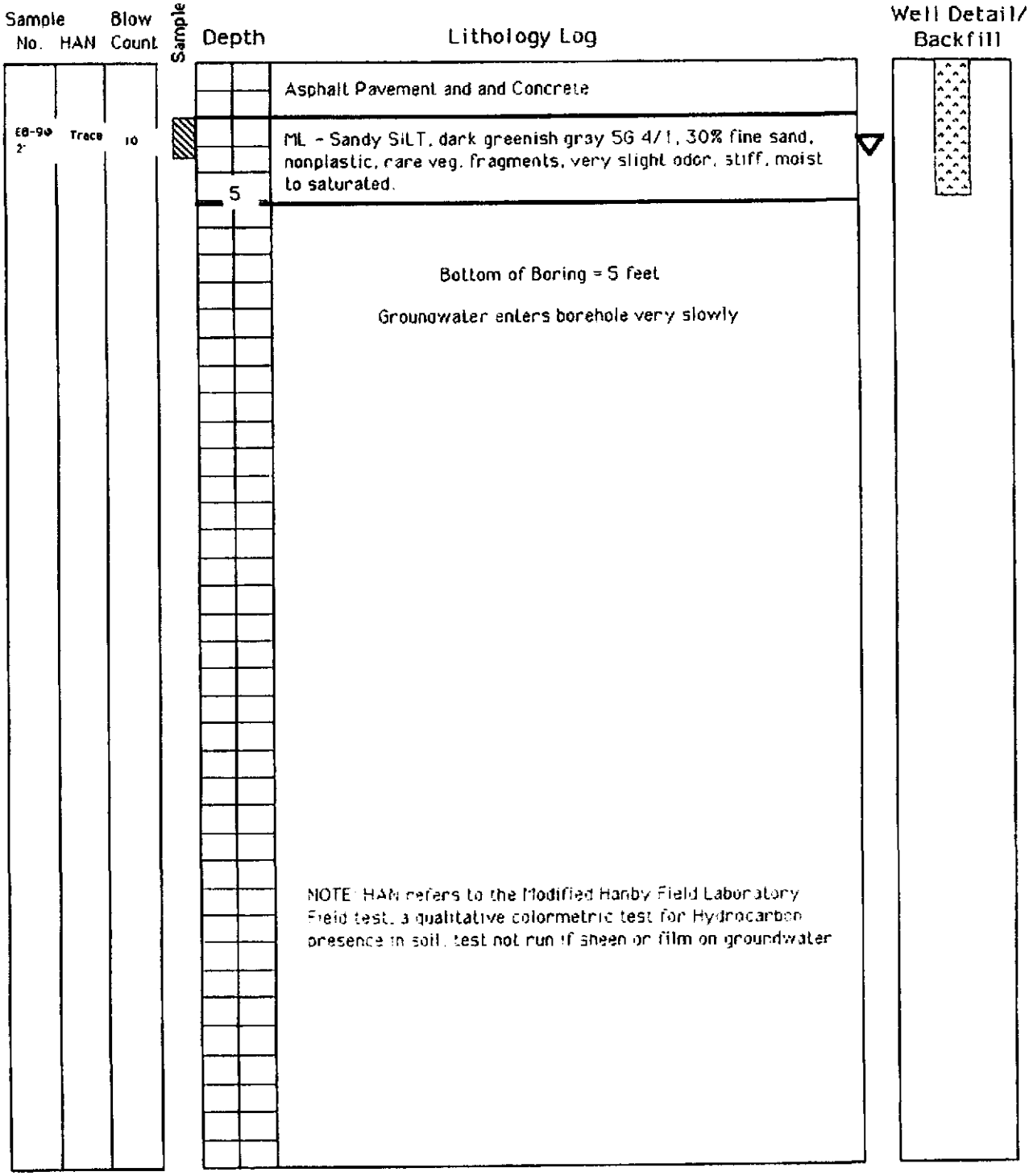
Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 Boring/Well No. EB-9
Client: DiSalvo Trucking Date Drilled: April 7, 1994
Location: 4919 Tidewater, Oakland, CA Logged by: EL
Drilling Method: Hollowstem Auger Permit: N/R
Water Levels: 1st Enc: 3.40' Static: no measurement

Borehole Completion
Well Installed: NO

Cement Grout Seal: 5' to surface



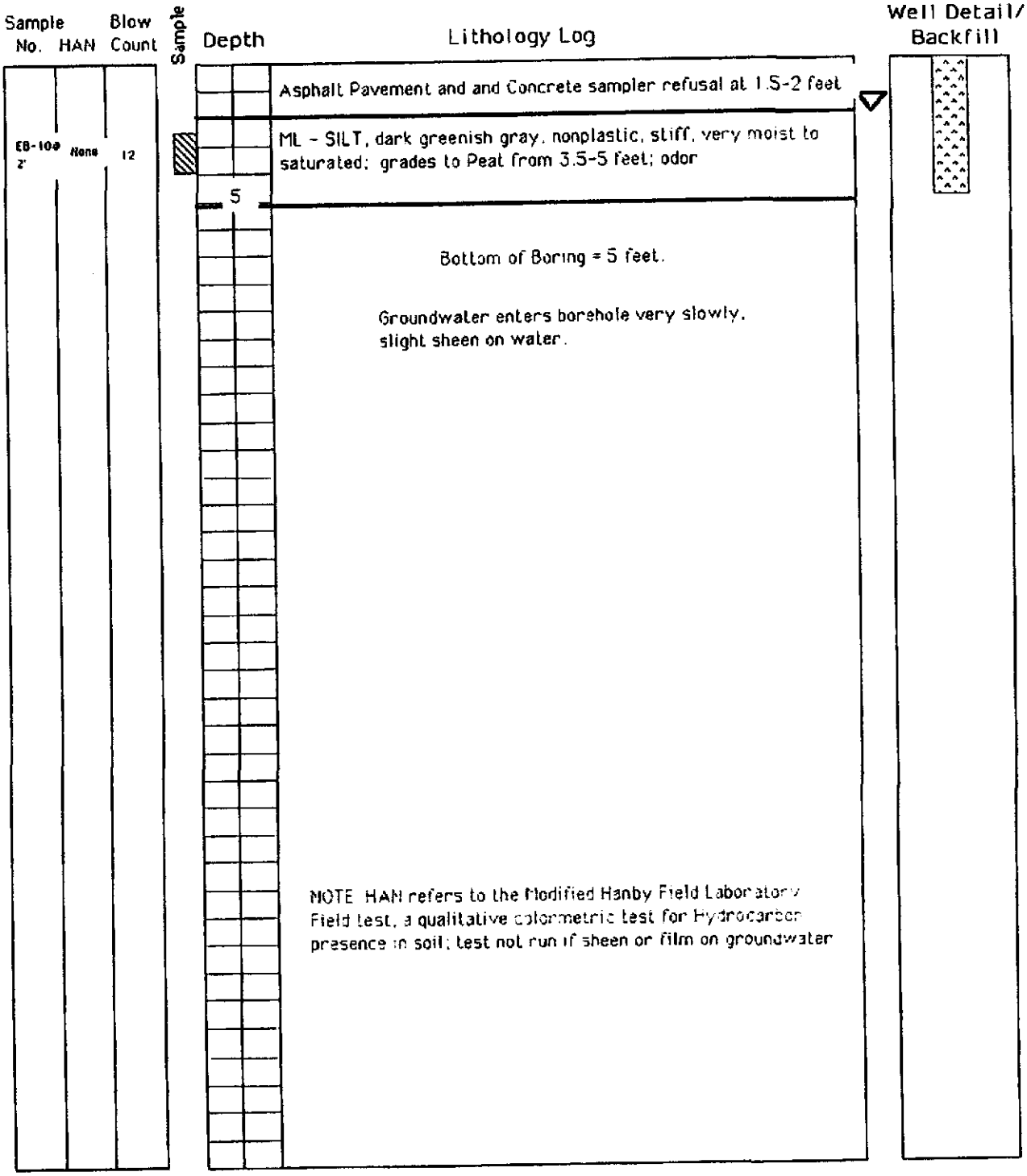
Gen Tech Environmental, Inc. San Jose, CA

Exploratory Boring Log

Project No. 9407 **Boring/Well No.** EB-10
Client: DiSalvo Trucking **Date Drilled:** April 8, 1994
Location: 4919 Tidewater, Oakland, CA **Logged by:** EL
Drilling Method: Hollowstem Auger **Permit:** N/R
Water Levels: 1st Enc: 1.8' Static: no measurement

Borehole Completion
Well Installed: NO

Cement Grout Seal: 5' to surface



ERAS Environmental — **Log of Boring** B-1

PROJECT: 05-001-06	ADDRESS: 4919 Tidewater
JOB NUMBER: 05-001-06	LOCATION: Front NE
DATE STARTED: 2-24-06	First Water (ft. bgs.): 2.5 DATE: 2-24-06
DATE FINISHED: 2-24-06	TOTAL DEPTH: 11 feet
DRILLING METHOD: Direct Push	GEOLOGIST: Andrew Savage
DRILLING COMPANY: Hew Drilling	Reviewed By: Gail Jones

DEPTH ft.	PID (ppm)	SAMPLE NO.	RECOVERY	GRAPHIC LOG	WATER LEVEL	GEOLOGIC DESCRIPTION
						Asphalt + Base rock
			NR	GP	▽	Sandy Gravel, dark yellowish brown (10YR 4/6), damp, dense, ~30% sand, fine to coarse well graded sand, ~70% gravel, ± ~1½ subrounded, no product odor Fill
	@3' 0		NR	SP		silty Sand, dark gray (10YR4/1), wet, medium dense, ~15% silt, ~85% fine to medium grain poorly graded sand, slight hydrocarbon odor
5			NR			
	@7' 0					
				CH		Clay w/ Organics, Black (10YR2/1), wet, soft, high plasticity, no product odor
10			NR			
						Bottom of boring 11 feet bgs 2-24-06
15						
20						

ERAS Environmental	Log of Boring B-2
PROJECT: 05-001-06	ADDRESS: 4919 Tidewater
JOB NUMBER: 05-001-06	LOCATION: NE Diesel Tank
DATE STARTED: 2-24-06	First Water (ft. bgs.): 3'3" DATE: 2-24-06
DATE FINISHED: 2-24-06	TOTAL DEPTH: 10 feet
DRILLING METHOD: Direct Push	GEOLOGIST: Andrew Savage
DRILLING COMPANY: Hew Drilling	Reviewed By: Gail Jones

DEPTH ft.	PID (ppm)	SAMPLE NO.	RECOVERY	GRAPHIC LOG	WATER LEVEL	GEOLOGIC DESCRIPTION
						Asphalt + Base Rock
				CL		Silty Clay, black (10YR2/1), stiff, damp, medium plasticity, diesel odor
					▽	
	@59" 201			SW		Gravely Sand, very dark brown (10YR2/2) wet, ~5% silt, ~70% fine to coarse well graded sand, ~25% $\frac{1}{8}$" - $\frac{1}{2}$" subrounded gravel, heavy staining and diesel odor
5				Clt		Clay w/ Organics, Black (10YR2/1), wet, soft, high plasticity, slight hydrocarbon odor
	@73" 0		NR			
	@86" 0					
10						Bottom of boring 9.5 feet bgs 10-24-06
15						
20						

ERAS Environmental	Log of Boring B-3
PROJECT: 05-001-06	ADDRESS: 4919 Tidewater
JOB NUMBER: 05-001-06	LOCATION: NE along fence
DATE STARTED: 2-24-06	First Water (ft. bgs.): 2½ DATE: 2-24-06
DATE FINISHED: 2-24-06	TOTAL DEPTH: 8.5
DRILLING METHOD: Direct Push	GEOLOGIST: Andrew Savage
DRILLING COMPANY: Hex Drilling	Reviewed By: Gail Jones

DEPTH ft.	PID (ppm)	SAMPLE NO.	RECOVERY	GRAPHIC LOG	WATER LEVEL	GEOLOGIC DESCRIPTION
						Asphalt + Base Rock
	@3' 0		NR NR NR	SW		Auger to 1 foot. Gravely Sand, dark yellowish brown (10YR4/6) damp dense, ~75% sand, fine to coarse well graded sand, ~25% gravel ¼" - 2" subrounded gravel, no product odor; PID=1.1
					▽	wet @ 2½ feet slight hydrocarbon odor
						Coal
5	@7' 0		NR NR NR	CH		Clay w/ organics, Black, (10YR2/1), wet, soft, high plasticity, no product odor
						Bottom of boring 8.5 feet @ 2-24-06
10						
15						
20						

ERAS Environmental — **Log of Boring** B-4

PROJECT: 05-001-06	ADDRESS: 1199 Tidewater
JOB NUMBER: 05-001-00	LOCATION: SW corner of man bldg
DATE STARTED: 2-24-06	First Water (ft. bgs.): 3.5 DATE: 2-24-06
DATE FINISHED: 2-24-06	TOTAL DEPTH: 8 feet
DRILLING METHOD: Direct Push	GEOLOGIST: Andrew Savage
DRILLING COMPANY: Hew Drilling	Reviewed By: Gail Jones

DEPTH ft.	PID (ppm)	SAMPLE NO.	RECOVERY	GRAPHIC LOG	WATER LEVEL	GEOLOGIC DESCRIPTION
						Asphalt + Base Rock
	@3' 0.2			GW		Auger to 1 foot Sandy Gravel, dark yellowish brown (10YR4/6), damp, dense, ~30% sand fine to coarse, well graded sand, ~70% ⅛" - ½" subrounded gravel, no product odor, Fill
	@3.9' 0			CH	▽	Wet @ 3.5 feet Clay w/ Organics, Black (10YR2/1), wet soft, high plasticity, no product odor
5						
						Bottom of boring 8 feet bgs 2-24-06
10						
15						
20						

ERAS Environmental — **Log of Boring** B-5

PROJECT: 05-001-06	ADDRESS: 4919 Tidewater
JOB NUMBER: 05-001-06	LOCATION: N of Truck Scale
DATE STARTED: 2-24-06	First Water (ft. bgs.): 4'9" DATE: 2-24-06
DATE FINISHED: 2-24-06	TOTAL DEPTH: 8.5
DRILLING METHOD: Direct Push	GEOLOGIST: Andrew Samaja
DRILLING COMPANY: Hew Drilling	Reviewed By: Gail Jones

DEPTH ft.	PID (ppm)	SAMPLE NO.	RECOVERY	GRAPHIC LOG	WATER LEVEL	GEOLOGIC DESCRIPTION
						Asphalt + Base Rock
				SP		Silty Sand, dark yellowish brown (10YR4/6), damp, dense, ~15% silt, ~85% fine to medium grain sand, poorly graded, no product odor
			NR			
5	53				▼	@4'9" color change to dark gray (10YR4/1), wet, slight hydrocarbon odor
	0					
	21			CH		Clay w/ organics, black (10YR2/1), wet, soft, high plasticity, no product odor
	0					
						Bottom of boring 8.5 feet bgs 2-24-06
10						
15						
20						