City of Santa Monica

Information Item

Date: March 24, 2010

To: Mayor and City Council

From: Lee E. Swain, Director of Public Works

Subject: History of Environmental Studies Implemented at the Proposed Resource Recovery Center Site and Implications of Pursuing the Leadership in Energy and Environmental Design (LEED) Gold or Platinum Certification

Introduction

On November 17, 2009, staff presented to City Council a concept design to construct a more efficient Resource Recovery Center (RRC) at the site of the existing transfer and recycling station on Delaware Avenue. This concept design constituted the project description for purposes of initiating environmental review of this proposed project. In response to inquiries from the community at the meeting, City Council requested that staff provide additional information on previous environmental studies performed at the proposed site and potential impact to the community if the project did not move forward. City Council also directed staff to investigate the possibility of pursuing the Leadership in Energy and Environmental Design (LEED) Platinum Certification for the project.

Background

From the mid-1940s through December 1970, the City operated a municipal solid waste landfill and incinerator at the proposed site on Delaware Avenue. The proposed site was originally a clay-mining pit that had been in operation since 1906. The pit was used as a depository for local inert construction materials, rubble, and organic materials, with no documented disposal of hazardous materials in the landfill. At cessation of landfill operations, the existing clay-mining pit was capped with five to seven feet of clay and sand. Attachment A contains more information about the landfill in the Geotechnical Study Report prepared by Converse Consultants in May 2009.

The landfill operations were established prior to the passage of the California Environmental Quality Act (CEQA) in 1970, and as a result, no environmental studies were performed at that time. Subsequent projects were subject to CEQA requirements, and therefore, several environmental studies have been completed at the site since 1970. In 1961, the City began to expand its solid waste operations to include a refuse transfer facility. Permits were obtained from the Los Angeles Department of Health Services as required by State law.

Discussion

<u>Historical Environmental Reviews of the Site</u>

In 1991, the City sought to increase the allowed tonnage of materials accepted from the original 200 tons per day in 1978 to the current 400 tons per day. The permit process required an initial environmental study to determine the impacts of the proposed increase. The independent study found that there would be no significant impacts, but outlined several measures to mitigate some minor impacts. Among the mitigation measures tied to the Mitigated Negative Declaration (MND) were programs to prevent excessive vehicle exhaust emissions, provide protection of worker's health, prevent accidental spills, and the widening of the Cloverfield Boulevard off-ramp and intersection.

In 1994, the City contracted with Arthur D. Little to perform a Solid Waste Assessment Test, testing the impact of the abandoned landfill on the adjacent soil, air, and water. The study, which was approved by the South Coast Air Quality Management District (SCAQMD) in 1996, found that the landfill was unlikely to be releasing hazardous materials that would impact local groundwater quality. The study also showed that soil and ground water samples did not contain detectable concentrations of harmful or hazardous materials.

Simultaneous with the ground water study, Arthur D. Little sampled and tested the air quality around the landfill site, incorporating in-ground probes, surface testing, and landfill gas migration monitoring. The study found that the gas produced by the landfill is primarily methane and carbon dioxide. Methane is a flammable, non-poisonous gas produced by the decomposition of buried organic materials. As recommended by the study, the City expanded the gas extraction system, which had been in operation since 1995. The landfill gas control system currently operates under permits from the Los Angeles County Health Services and SCAQMD.

An Environmental Impact Report (EIR) was produced in November 2000 to study the potential impacts of the City purchasing the Mountain View Mobile Home Park located at 1930 Stewart Street in the Pico Neighborhood of Santa Monica. The initial study identified six environmental factors for study that included air, earth, hazardous materials, human health, financial impact, and utilities. A total of 11 soil borings were taken in support of the study, ranging from 11 to 46 feet in depth from the surface. The soil was found to be mixed with organic materials, wood chips, paper, and at the lower levels, brick and concrete fragments.

The 2000 EIR incorporated measures to mitigate specific environmental issues identified in the study, including the continuation of the subsurface monitoring and remediation measures to control and remove gasses from the former landfill. Two studies in conjunction with the 2000 EIR showed that the City's gas control system had been successful in both removing the landfill gasses and mitigating subsurface migration.

To the north of the historical pit area, the City operates a vehicle maintenance and fueling facility. In 2002, remedial actions were initiated to remove fuel-related contaminants from the soil. By 2006, the soil at the facility was treated, and the remediation effort was deemed successful by the Regional Water Quality Board.

As part of the preparation for the design and construction of the Resource Recovery Center in 2008-2009, the City commissioned a new Geotechnical Report and a Soils Management Plan for the site (Attachment A). Nine new test bores up to 73 feet in depth were made, three outside and six within the boundaries of the abandoned landfill. Soil samples were taken and tested in an independent laboratory. Based on the results of the subsurface soil samples and quarterly tests of the boundary probes, it was concluded that there are no significant sources of contamination in the landfill.

Ongoing Monitoring and Mitigation

Gas emanating from the landfill is continually collected in extraction wells and delivered to a treatment system. In addition to the methane extraction system, probes at the site are monitored quarterly for carbon dioxide, oxygen, hydrogen sulfide, and non-methane organic vapors. To date, all samples remain within compliance levels. Due to the extended period that landfills typically generate gas, it is anticipated that the monitoring and extraction system will be in operation through 2012 and potentially through 2014.

Next Environmental Review Steps

A Draft Initial Study/Mitigated Negative Declaration for the RRC was prepared and published on March 1, 2010, initiating the 30-day public review and comment period. It is anticipated that the final report, including public comments and modifications, will be completed and ready for the Planning Commission review by mid April of 2010.

Reasons for the Proposed Project

While the existing facility currently meets State mandated diversion requirements, an improved Materials Recovery Facility (MRF) would be able to accommodate increases in diversion rates in order to achieve the City's zero waste goal by the year 2030. If the City elects to continue with existing site operations, it would be difficult to meet the zero waste goal and may have the following community impacts:

- The MRF would not be able to increase the amount of recyclable resources recovered from residents and businesses, thus limiting the expansion of recycling programs.
- The economies of co-locating the self haul and Southern California Disposal's transfer station would not be achieved, with the City maintaining the self haul tipping area at the expense of MRF expansion.
- Current operations would continue in the open air. The potential to mitigate airborne noise, trash, and odors would be lost, and employee working conditions unimproved.

- There would be no improvement to the bearing capacity of the ground under the existing structures and pavement. Uneven settlement of the paving and building foundations would continue, causing inadequate surface drainage and deterioration of the concrete and asphalt.
- City-owned curbs, paving, and street lights would not be improved.
- Commercial and public traffic and pedestrians would continue to mix on the Delaware Street Drop Off and Buyback centers.

LEED Certification

LEED Certification for new construction is predicated upon conditioned space and is not easily applied to open-air, campus style facilities. Enclosed, conditioned area comprises only 5.5% of the total project building area, which makes obtaining some of the LEED credits difficult to achieve. The amount of paving required also poses a challenge. Even with these limitations, careful attention to site design, water efficiency, and use of appropriate materials could yield a LEED Silver Certification for the project.

Reaching the next level, Gold, would require enhanced commissioning and verification, increased ventilation levels for occupied areas, increasing day-lighting and views for occupants, and incorporating all of the "Innovation in Design" credits. Typical innovation credits include increasing the amount of regional material and recycled content beyond that required for LEED Silver Certification, 95% landfill diversion, and initiating educational programs. If obtainable, these efforts would add approximately 10% to 15% to the preliminary construction cost of $23.7 million. Staff estimates that a LEED Gold Certified facility would cost approximately $27.2 million.

Assuming the U.S. Green Building Council (USGBC) would accept all the credits listed above, a Platinum level would likely require an extensive underground system for capturing and recycling storm and/or gray water. In addition, the onsite renewable energy generation would need to almost double from 7% to 13%. The current design includes $700,000 for photovoltaic panels. Doubling the generating capacity plus the cost of an enhanced storm water system could add another $2 to $3 million. Overall, LEED Platinum Certification could add 20% to 25% to the preliminary project cost of $23.7 million, resulting in a $29.6 million project.

Estimated Project Costs

A preliminary budget of $23.7 million was prepared by the design consultant in November 2009, based on conceptual sketches, square-foot costs, and historical data. This estimate included a 25% design contingency, as the specific components of the project had not yet been determined. As the construction documents progress, actual costs can be more accurately determined and engineering cost savings will be implemented when feasible. The first estimate based on construction drawings is expected in May 2010.

Improvements to the Resource Recovery Center will be financed through an increase to the Solid Waste user fees.

Prepared by: Michael Collins, Architect

Attachment:
A – Geotechnical Study Report by Converse Consultants, May 2009

Converse Consultants

Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

GEOTECHNICAL STUDY REPORT
Santa Monica Recycling and Drop Off Facility Project
2411 Delaware Avenue, Santa Monica, California

Converse Project No. 08-31-324-01

May 1, 2009

Prepared For:

City of Santa Monica
Architecture Services Division
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Converse Consultants
Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

May 1, 2009

Mr. Alex Parry, Architect
City of Santa Monica
Architecture Services Division
1437 4th Street, Suite 300
Santa Monica, CA 90401

Subject: **GEOTECHNICAL STUDY REPORT**
Santa Monica Recycling and Drop Off Facility Project
2411 Delaware Avenue, Santa Monica, California
Converse Project No. 08-31-324-01

Dear Mr. Parry:

Presented herein are the results of our geotechnical study performed for the proposed Santa Monica Recycling and Drop Off Facility Project located at 2411 Delaware Avenue in Santa Monica, California. Our services were provided in accordance with our revised proposal for geotechnical engineering services dated December 15, 2008 and your notice to proceed dated January 26, 2009.

Based on our field investigation, laboratory testing, geologic evaluation and geotechnical analysis, the site is suitable from a geotechnical standpoint for the proposed project provided our conclusions and recommendations are implemented during design and construction. The findings of the study and recommendations for the design and construction of the structure are presented in the attached report and are summarized in the Executive Summary Section following this letter.

Thank you for this opportunity to be of service. If you have any questions, or if we can be of additional service, please do not hesitate to contact us at (626) 930-1200.

CONVERSE CONSULTANTS

William H. Chu, P.E., G.E.
Senior Vice President/Principal Engineer

Dist: 6/Addressee

SCL/EMJ/MBS/WHC/dlr

PROFESSIONAL CERTIFICATION

This report has been prepared by the staff of Converse Consultants under the professional supervision of the individuals whose seals and signatures appear hereon.

The findings, recommendations, specifications or professional opinions contained in this report were prepared in accordance with generally accepted professional engineering and engineering geologic principles and practice in this area of California. There is no warranty, either expressed or implied.

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EXECUTIVE SUMMARY

The following is a summary of our Geotechnical Study, Findings, Conclusions, and Recommendations, as presented in the body of this report. This summary is presented for the cursory review of the study report and may not be adequate for other purposes. The summary should not be used separately for design and/or construction. Please refer to the appropriate sections of the report for complete conclusions and recommendations. In the event of a conflict between this summary and the report, or an omission in the summary, the report shall prevail.

- The proposed Santa Monica Recycling and Drop off Facility is located at 2411 Delaware Avenue, Santa Monica, California. The site is located on the southwest portion of the abandoned clay pit/ refuse landfill area.
- The subject site is considered suitable from a geotechnical engineering viewpoint for the proposed Santa Monica Recycling and Drop off Facility, provided that the recommendations presented in the attached report are incorporated into the design and construction.
- The proposed development consists of semi-enclosed pre-engineered metal buildings and open-air operation areas including, Material Recovery Facility (MRF), Buy Back Center (BBC), Recycling Drop Off Area (RDOA), Household Hazardous Waste Facility (HHWF), Self Hauling Facility (SHF), Storage Area (SA) and Solid Waste Management Office (SWMO).
- The field exploration for the geotechnical study consisted of drilling nine (9) exploratory borings to depths varying from approximately 41.5 to 73 feet below the existing ground surface (bgs) on March 26, 27, 28 and April 4, 2009. Subsurface conditions encountered in the borings were logged and classified in the field by visual/manual examination, in accordance with the Unified Soil Classification System.
- Laboratory testing of soil samples collected during the geotechnical study included in-place moisture and density, laboratory maximum unit weight and optimum moisture determination, direct-shear strength, gradation, expansion index (EI), consolidation, R-value, pH, minimum electrical resistivity, soluble sulfate, and chloride concentration testing.
- The project site is not within a currently designated State of California Earthquake Fault-Rupture Hazard Zone and not within the City of Santa Monica Fault Hazard Management Zone. The site is, however, located in a seismically active zone. Ground-shaking resulting from earthquakes associated with nearby and more distant faults may occur during the lifetime of the project. Recommendations for seismic design of the project in accordance with the California Building Code (CBC, 2007) are contained in the report.

- Based on our subsurface field exploration, the project site is overlain by artificial fill approximately five (5) to seven (7) feet in thickness, loose refuse fill (heterogeneous waste materials placed into former clay pit and landfill) to a maximum depth of 58 feet below ground surface (bgs), and dense to very dense alluvium to a maximum exploration depth of 73 feet bgs.

- Groundwater was encountered in BH-4 at a depth of 59 feet bgs within native alluvium as measured at the completion of drilling. Perched water (trapped water) was also encountered in BH-6, BH-7, and BH-9 between 29 feet and 57 feet bgs within the refuse landfill. The water in BH-6, BH-7, and BH-9 was oily and muddy, which apparently came from the surface infiltration and trapped fluids within the loose layers of refuse fill. Based on review of the Seismic Hazard Evaluation Report (Open-File Report 98-14) for the Beverly Hills 7.5-Minute Quadrangle, the Historical high groundwater elevation is about 40 feet below the existing ground surface.

- Percolation testing was performed utilizing two (2) exploratory borings (BH-1 and BH-8) on March 27, 2009. Tests were performed using the Falling Head Test Method.

- A major portion of the project site is located in the Santa Monica City Yards landfill operated as a municipal solid waste and incinerator ash landfill from 1940 until 1970. The landfill underlies the current "Allan Yard", "Hanson Aggregate Yard" and "Nursery Yard".

- Based on our field exploration, the bottom of the landfill refuse was encountered between 30 feet and 58 feet bgs. The landfill refuse was capped with soils consisting of clayey sand, silty sand and clay encountered on the upper 5 to 7 feet of landfill. The refuse encountered in the borings consisted of wood chips, trash, bricks, soils and other man-made materials organic debris and waste. The landfill materials are not considered to be suitable for any structural support from a geotechnical standpoint.

- Due to the existing undocumented fill materials and loose to very loose refuse waste materials encountered to a total depth of 58 feet below ground surface (bgs), the existing refuse fill area and adjacent area are prone to potential settlement.

- Based on the preliminary proposed plan, we recommend the MRF building be supported by shallow foundations tied with grade beams on compacted fill pad.

- Trailers, modular buildings and canopies are proposed for BBC and HHWF which are mainly located inside the refuse landfill area. Those proposed structures are light weight structures built on a rigid steel frame. We recommend the structures located inside the landfill area should be supported by piles bearing into underlying native alluvium. As an alternative to piles, the trailers, modular buildings and canopies may be supported by adjustable foundation systems that can be periodically corrected to level once settlement occurs.

- The proposed scale should be supported entirely on a minimum 4 feet thick of uniform compacted fill blanket or entirely on native alluvium.
- The proposed SHF structure appears to be located above a deep landfill area. We recommend the SHF should be supported on piles embedded into the underlying native alluvium.
- We recommend the upper 4 feet of cap fill on top of refuse landfill be removed and replaced with new engineered fills provided our recommendations are incorporated into the construction plan. Although the surface ground condition is expected to be improved per our grading recommendation, settlement due to underlying refuse fill remains unresolved. Maintenance of surface pavement may be required periodically to repair distresses due to settlement.
- Environmental testing and remediation on the proposed project is outside our scope of work, any soil material or waste material excavated, moved, handled or stockpiled within the landfill area should be evaluated and monitored by an environmental consulting company.
- Based on our laboratory testing, the upper 5 feet of on-site soil is considered to be low in expansion potential. Special design and/or construction for expansive soils are not considered necessary.
- It is expected that site soils can be excavated with conventional heavy-duty earth-moving equipment.
- Based on the laboratory testing results, on-site soils appear to be "corrosive" to ferrous metals. Conventional mitigation measures for protection of ferrous metals in contact with the soils are considered adequate for general use. A Corrosion Engineer may be consulted for special or critical applications.
- Surface drainage should be sloped away from the structures. Ponding of surface water should not be allowed adjacent to the structures.
- Temporary construction slopes, greater than four feet in height, should be sloped or shored in accordance with the requirements of CAL-OSHA.

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Illustrations (End of Document)

Appendices

1.0 INTRODUCTION

This report presents the findings of our geotechnical study performed for the proposed Santa Monica Recycling and Drop Off Facility project to be located at 2411 Delaware Avenue, Santa Monica, California. The location of the project is shown on Drawing No. 1, *Site Location Map.* The purpose of this study was to evaluate the nature and pertinent engineering properties of the subsurface materials and to provide recommendations regarding general site earthwork, seismicity, and geotechnical parameters for the design and construction of the proposed facilities. Evaluation of environmental issues or the potential presence of hazardous materials and substances was not within the scope of services provided.

We have reviewed available boring logs provided by the City of Santa Monica obtained from borings performed within the perimeters of the proposed project site for preparation of this report. The previous and recent boring logs as well as laboratory test results were incorporated into this study.

This report is for the proposed recycling and drop off facility described herein, and is intended for use by the city of Santa Monica and its design professionals. Since this report is intended for use by the designer(s), it should be recognized that it is impossible to include all construction details in this report at this phase in the project. Additional consultation may be prudent to interpret these findings for contractors, or possibly refine these recommendations based upon the final design and actual conditions encountered during construction.

2.0 PROJECT DESCRIPTION

The proposed Santa Monica Recycling and Drop off Facility is located at 2411 Delaware Avenue, Santa Monica, California. The site is located on the southwest portion of an abandoned clay pit/ landfill area. The recycling center is located north of Santa Monica Interstate Freeway I-10. The former clay pit/ landfill covered an irregular shaped area that extends from the Santa Monica Interstate I-10 Freeway northward to Broadway Avenue and from Cloverfield Street to Centinela Avenue.

The proposed project consists of the development of new facilities and building structures in an area approximately 4.0 acres within the existing Santa Monica Recycling Center. The following facilities are part of the proposed project:

- **Material Recovery Facility (MRF):** The MRF proposed to be located in the general vicinity of the existing City Transfer Station (City Yard). The MRF is proposed to be a semi-enclosed pre-engineered metal building structure and it will house a sorting line and special processing equipment for separating and recovering various commodities of recyclables from co-mingled curbside and commercial recyclable collections. The proposed MRF will have an open tipping floor for collection vehicles to enter and unload their materials. It is anticipated that all traffic will access the MRF form Delaware Street. A loading dock and access ramp is proposed to be provided to load materials into trailers. The MRF is proposed to also incorporate an employee break room and restrooms. One inbound and one outbound scale are proposed for weighing traffic in and out. Based on the preliminary proposed site plan, the majority area of MRF is located on the existing thin fill overlying native alluvium in the current "City Yard" area. We recommend MRF be supported on shallow foundation tied with grade beams embedded in certified compacted fill.

- **Buy Back Center (BBC):** The BBC is proposed to be located east of the MRF. It will be an open air operation with a scale for weighing recyclables. A small trailer or modular building is proposed to be built adjacent to the scales. The trailer or modular building are light weight structures built on a rigid steel frame. The public is proposed to access the BBC from its own driveway off Delaware Avenue. Based on the preliminary proposed site plan, major area of BBC is located on the existing refuse landfill in the current "Allan Yard". We recommend the trailer or modular building be supported on a structural slab supported by piles or on a shallow adjustable foundation system so that the floor can be corrected to level once settlement occurs. The proposed scale should be supported on a minimum 4 feet thick of engineered compacted fill blanket.

- **Recycling Drop Off Area (RDOA):** The RDOA is proposed to be adjacent to the BBC and will provide for the public to drop off recyclables that would not be subject to cash redemption. It is envisioned to be an open air operation with containers provided for each of the various recyclables materials to be unloaded. Based on the preliminary proposed site plan, the RDOA is located on the existing refuse landfill in the current "Hanson Aggregate Yard". We recommend the upper five feet of fill be replaced with new engineered fill per our grading recommendations for any on grade flatwork.

- **Household Hazardous Waste Facility (HHWF):** The HHWF is proposed to be in the same general area as the BBC and RDOA. It is planned to be an open area covered by a canopy on a concrete slab. A small trailer or modular building will likely need to be provided for the operator of the facility. Based on the preliminary proposed site plan, the HHWF is located on the existing refuse landfill in the current "Hanson Aggregate Yard". We recommend the trailer, modular building and canopy be supported on a structural slab supported by piles or on a shallow adjustable foundation systems so that the floor can be corrected to level once settlement occurs.

- **Self Haul Facility (SHF):** The SHF is proposed to be a large covered building with tipping floor. Based on the preliminary proposed site plan, the majority of SHF is located on the existing refuse landfill in the current "Hanson Aggregate

Yard" and "Nursery Yard". We recommend SHF should be supported on a pile foundation system bearing in underlying native alluvium.

- **Solid Waste Management Office (SWMO):** The Solid Waste Management Division's offices and customer service center is currently located in a trailer. It is proposed to create a new administrative office and customer service center for the Solid Waste Management Division within the project area. This may be incorporated within the MRF building or at another location within the project site.
- **Storage Area (SA):** The SA will be proposed on a location within the subject site to store and perform onsite repair of bins and other collection containers.

3.0 SITE DESCRIPTION

3.1 Site Location and General Conditions

The project site is an L-shape lot surrounded by industrial building lots on the north and west bounds, by Delaware Avenue and parking areas on the south and by Stewart Street Park and mobil homes on the east. The site is currently used as a recycling center subdivided in four (4) sections (from west to southeast): City Yard, Allan Yard, Hanson Aggregate Yard and City Nursery Yard. The City Yard is currently used as trash collection center with a scale and a trailer at the entrance. Southwest of the City Yard is currently used as a parking area for trucks loaded with trash. This area is approximately eight (8) feet below the adjacent grade. Allan Yard is currently used as a paper recycling center. Hanson Aggregate Yard (formerly named Blue Diamond Aggregate Yard) is currently used as gravel material and concrete recycling yard. The City Nursery area is occupied by two small building structures used as storage, several trash bins, and a pile of sand materials. The area is fenced with chicken-wire fence and an asphalt pave road that traverses the area east-west.

The ground surface elevation of the subject site is about 156 feet above Mean Sea Level (MSL). General topography of the project site is relative flat. The coordinates of the subject site are latitude: 34.0255 N and longitude: 118.4683 W.

3.2 On-Site Refuse Landfill

A major portion of the project site is located in the Santa Monica City Yards landfill (also known as the City of Santa Monica Landfill No. 2) operated as a municipal solid waste and incinerator ash landfill from 1940 until 1970. The landfill began in what was an old clay-mining pit in the late 1940's. Based on the available Landfill Study Report prepared by SCS Engineers (2007), the landfill underlies the current "Allan Yard", "Hanson Aggregate Yard" and "Nursery Yard". The estimated boundary of landfill is depicted on Drawing No. 2, *Site Plan and Approximate Location of Borings*.

The following landfill descriptions are quoted from SCS Engineers Report (2007):

"On record drawing of the City indicates that the total fill volume of the pit is 440,900 cubic yards, based on a topographic survey of the pit conducted in June 1947. The record drawing illustrates a section of the pit where a water line existed some 35 feet below the present level of the facility, at elevation 117 mean sea level (MSL). The depth of the pit below that waterline is unknown. According to the record drawing, the pit has an area of 11.36 acres on the surface and an area of 1.49 acres for the water line, which is assumed to designate the pit bottom. The pit is assumed to have vertical or near-vertical walls along its perimeters; however no detailed surveys were found to corroborate this. For the purpose of our study and report, the vertical walls were assumed to vary from vertical in the west area of the pit to a 2:1 (horizontal: vertical) slope in the east and south areas."

Based on our recent field exploration, the bottom of the landfill was encountered between 30 feet and 58 feet bgs. Landfill cap fills consisting of clayey sand, silty sand and clay were encountered in the upper 5 to 7 feet of landfill.

Several landfill related distresses of the existing structures and pavements on site were identified by SCS Engineers (2007) including, differential settlement of structures, unlevel concrete pads (10 degrees rotation), vertical drop off on asphalt ramps (2 feet in 4 years), leaning light poles, localized depressions on pavement, cracks on concrete foundation. Based on our recent field observations, differential settlement of structures, depressions on pavement surfaces and cracks on concrete walls were observed on the subject site.

4.0 SCOPE OF WORK

The scope of work of this investigation includes the following tasks:

4.1 Literature Review

As part of this investigation, Converse professionals have reviewed available pertinent geotechnical and geologic reports and maps for the area including, a landfill study report prepared by SCS Engineers, a sampling program report and a compliance report of landfill prepared by ICF, and the Guidelines for Geotechnical Report for the City of Santa Monica. A copy of available previous boring logs pertaining to this project are attached in Appendix A, *Field Explorations*.

4.2 Subsurface Exploration

The field exploration for the geotechnical study consisted of drilling nine (9) exploratory borings to depths approximately 41.5 and 73.0 feet below the existing ground surface (bgs) on March 26, 27, 28 and April 4, 2009 shown on Drawing No. 2, *Site Plan and*

Approximately Location of Borings. Each boring was visually logged by our geologist and sampled at regular intervals and at changes in subsurface soils. Both relatively undisturbed and bulk soil samples were obtained for laboratory testing; for a description of the field exploration and sampling program see Appendix A, *Field Exploration*.

Standard Penetration Tests (SPTs) were performed in all borings at selected intervals using a standard (1.4 inches inside diameter and 2.0 inches outside diameter) split-barrel sampler. Borings were advanced using an 8-inch diameter hollow-stem auger drill rig. All borings were backfilled with cement slurry. Soil cuttings were collected in drums and set aside in the designated area.

Borings (BH-1 and BH-8) were also used to perform two percolation tests using continuous pre-soak (falling-head) test method. The holes were pre-soaked for up to 24 hours. During testing, the water level in the test holes was filled to a depth of five (5) feet below the ground surface. After about 30 minutes, a depth measurement was taken and logged. Following each reading, the test hole was refilled to approximately the same depth as the initial water level. This method was repeated over a six-hour period for each percolation test hole. The drop in water level was recorded to the nearest 1/4 inch. The data collected was recorded in inches per hour. Results of percolation tests are presented in Appendix C, *Percolation Testing.* Following testing, the casings were extracted from the ground and borings were backfilled with cement slurry.

4.3 Laboratory Testing

Representative samples of the site soils were tested in the laboratory to aid in the soils classification and to evaluate the relevant engineering properties of the site soils. These tests included:

- *In-situ* moisture content and dry density (ASTM Standard D2216)
- Maximum dry density and optimum moisture content (ASTM Standard D1557)
- Direct shear (ASTM Standard D3080)
- Grain-size analysis (ASTM Standard D422)
- Percent of fines passing #200 sieve (ASTM D1140)
- Expansion Index (UBC Standard 29-2, ASTM Standard D4829)
- Consolidation and Collapse (ASTM Standard D2435)
- R-value (Caltrans 301)
- pH, chloride, sulfate, and minimum electrical resistivity (Caltrans 643, 422, 417, and 532).

For a description of the laboratory test methods and test results, see Appendix B, *Laboratory Testing Program*. For in-situ moisture and dry density data, see the Logs of Borings in Appendix A, *Field Exploration*.

4.4 On-Site Percolation Testing

Percolation testing was performed utilizing two (2) exploratory borings (Borings Nos. BH-1 and BH-8) on March 26, 2009. Tests were performed using the Falling Head Test Method. The test results are summarized in section 9.0 and in Appendix C, *Percolation Testing.*

4.5 Analysis and Report Preparation

Data obtained from the field exploration and laboratory testing program were compiled and evaluated. Geotechnical analyses of the compiled data were performed and this report was prepared to present our findings, conclusions and recommendations for the proposed development.

5.0 ENGINEERING GEOLOGY

5.1 Regional Geology

The site is located in the northeast portion of the City of Santa Monica, California, within the Santa Monica Plain. The Santa Monica Plain is one of the six physiographic features of the Santa Monica Basin. The basin is bounded by the Santa Monica Mountains to the northwest, the Pacific Ocean to the west and southwest, the Newport-Inglewood fault to the northeast, and the Ballona escarpment and Baldwin Hills to the south and southwest. The Santa Monica Basin forms part of the Los Angeles Basin which originated as a depositional basin in mid-Miocene to early Pliocene time owing to crustal extension associated with strike-slip deformation and was subsequently shortened and modify by additional strike slip movement and rotation of crustal blocks (Biddle, 1991; Rumelhart and Ingersoll, 1997).

The Los Angeles Basin forms part of Peninsular Ranges Geomorphic Province, located on the northernmost portion of the province and at the boundary with Traverse Ranges Province. The Peninsular Ranges are a series of northwest-southeast trending geologic structures that extends from the Santa Monica and San Gabriel Mountains to 775 miles south of the Mexican border. While the Transverse Ranges Province is characterized by east-west striking geologic structures, the Peninsular Ranges Province is dominated by northwest trending right-lateral faults. The structural interaction of the two provinces is compression interaction associated with the big bend of the San Andreas Fault Zone. The San Andreas Fault System is categorized as a transform fault that plays the role as a boundary between North American and the Pacific plates.

The tectonic compression of the two colliding provinces on the northern Los Angeles Basin causes a complex structural setting of two major convergent fault systems. The first group includes the northwest-southeast trending high angle strike slip faults from the northern terminus of the Peninsular Ranges province. Faults in this group include the Palos Verdes, Newport-Inglewood and Whittier-Elsinore fault zones. The second group includes the east-west trending low angle reverse or reverse-oblique faults bounding the south margin of the Transverse Range province. Faults in this group include the Malibu-Santa Monica, Hollywood, Raymond and Sierra Madre fault zones.

5.2 *Local Geology*

Drawing No. 4, *Geologic Map of Site Vicinity*, has been prepared to show the location of the project site with respect to geologic exposures mapped by Thomas W. Dibblee, Jr. According to the Geologic Map of the Beverly Hills-Van Nuys (South ½) Quadrangle (Dibblee, 1991), the site is located partially on Quaternary age alluvial on the north and Older Dune Sand of Late Pleistocene age on the south. The Quaternary alluvium consist of sand, silt, and clay derived mainly from the Santa Monica Mountains and also includes gravels and sands of stream channels. The Older Dune Sand consists of fine to medium sand with minor sandy silt, clay, and gravel lenses. These Quaternary age sediments overlie Tertiary-age marine bedrock units of the Monterey and Fernando Formations approximately 5000 meters thick.

Based on review of the City of Santa Monica Geologic Hazards Map (2008), the site is partially located in a former clay pit mine area for brick factory that was then converted into a landfill with a trash incinerator. The incinerator ashes and waste were then disposed into the pit. The published reports indicated that many of the pits, about 10 to 30 feet deep, were still open into the early 1960's. Since the cessation of the clay mining activities, the pits have been backfilled. No documentation was available to verify that the fill was placed and compacted in accordance with engineering standards. These reports indicated that the pits were backfilled after cessation of the mining operations.

Our exploratory borings indicated that the north and northeast areas of the project site are underlain by three distinctive material layers. The top two layers are landfill related including undocumented landfill cap fills and refuse waste landfill materials to depths ranging between 30 feet and 58 feet bgs. The bottom layer occurs naturally as shallow marine sediments to the maximum explorated depth of seventy three (73.0) feet bgs.

The undocumented landfill cap fills are approximately five (5) to seven (7) feet in thickness and consists of clayey sand and clay. The consistency or relative density of the fill is considered medium dense to dense. The cap fill is underlain by twenty (20) to fifty-three (53) feet of landfill waste. The landfill waste consists of a mixture of soil, wood, glass, and other debris. The soil is generally clayey and grayish black in color. Between depths of 35 to 55 feet bgs the land fill material appears to be oversaturated with an oily and thick liquid. The landfill is underlain by shallow marine sediment consisting of medium dense to dense interbedded layers of light brown to light gray sand and silty sand.

5.3 City of Santa Monica Geologic Hazards

The City of Santa Monica has enacted more stringent requirements for seismic hazards mitigation requiring a higher level of performance than the minimum California statewide safety standards. The City of Santa Monica is currently treating the Santa Monica Fault as being active, although the State of California has not zoned the fault as an active Earthquake Fault Zone in accordance with the Alquist-Priolo Earthquake Fault Zoning Act of 1972. The project site is not located within the city of Santa Monica Fault Hazard Management Zone.

Data from recent fault investigations performed on the Santa Monica Fault have demonstrated that the North Branch of the Santa Monica Fault has likely been active within the Holocene period (within 11,000 years before present). Fault investigations by Pratt (1998) and Dolan (2000) reveal that the north-dipping Santa Monica Fault zone comprises of two major branches that merge at a depth of about 6,500 feet. The North Branch is a steeply dipping fault that projects to the ground surface and exhibits geomorphic expression including fault scarps, pressure ridges, lineaments, and fault folds. Quaternary activity on the Santa Monica Fault appears to be concentrated along the North Branch Fault.

The South Branch of the Santa Monica Fault is less defined and based on interpretations of oil well and seismic reflection data. Pratt (1998) and Dolan (2000) conducted a geophysical investigation of the South Branch of the Santa Monica Fault in the City of Los Angeles beneath Purdue Avenue and the Veterans Hospital. The South Branch of the Santa Monica Fault was identified as a buried thrust fault structure located more than 2,400 feet below ground surface. Quaternary age sedimentary strata overlying the South Branch of the Santa Monica Fault do not appear to have been deformed by fault movement during the last 1.5 million years. The South Branch of the Santa Monica Fault was believed to be active as a reverse fault between 1.5 and 5 million years ago. (Wright 1991, Tsutsumi 1996).

Review of the City of Santa Monica Geologic Hazards Map (Drawing No. 5, *City of Santa Monica Hazard Map,* shows the subject property located at approximately 500 feet south of the mapped trace of the South Branch of the Santa Monica Fault. This fault branch is believed to be buried more than 2,400 feet below ground surface and dips northward between 30° and 55°. Since the South Branch of the Santa Monica Fault is buried and confined to relatively deep depths, it is not considered to be a hazard in terms of surface fault rupture. However, this fault can generate moderate to strong ground shaking directly beneath the project site.

5.4 Subsurface Earth Materials

Based on our field exploration, fill, refuse landfill and alluvium materials were encountered at the project site to a maximum explored depth of 73 feet. For a detailed description of the earth materials encountered in the bore holes, please see the Log of Borings in Appendix A, *Field Exploration*.

- **Fill and Cap Fill (Af):** The fills observed in the borings were encountered to a maximum depth of 7 feet over native alluvium and refuse landfill. The fill encountered within our borings consists of clayey sand (SC) and silty sand (SM) with trace amounts of man-made debris. The fill is not suitable for any structural support under its current conditions.
- **Refuse landfill (Rf):** The refuse landfill observed in our borings BH-3 through BH-7, and BH-9 consists of various mixed earth materials including clayey sand (SC), sand (SP), clay (CL), silty sand (SM), sandy sit (ML), trash, papers and woodchips. The landfill material extends to a depth between 30 and 58 feet bgs within our borings. The refuse landfill is not suitable for any structural support under its current conditions.
- **Alluvium (Qal):** The alluvium observed in the borings consists of clayey sand (SC), sand (SP), clay (CL) and silt (ML). The alluvium is moderately dense to dense and can be used for foundation support or base to receive new compacted fill.

5.5 Groundwater

Groundwater occurs in all sediments of the Santa Monica Basin from recent alluvium to deposits of Miocene age. The existence of perched or semiperched aquifers is likely to be present under the refuse waste fill area of the project site. Groundwater was encountered in BH-4 at a depth of 59 feet bgs within native alluvium as measured at the completion of drilling. Perched water (trapped water) was encountered at depths ranging from 29 to 57 feet bgs within refuse waste landfill in borings BH-6, BH-7 and BH-9. The groundwater encountered in our borings BH-6, BH-7 and BH-9 was oily and muddy, and apparently came from surface infiltration or from decomposition of refuse materials and trapped in the loose layers of refuse fill. No groundwater was encountered to a maximum depth of 41.5 feet within our borings BH-1, BH-2 and BH-8 where the natural alluvium was encountered near ground surface.

Based on review of the Seismic Hazard Evaluation Report (Open-File Report 98-14) for the Beverly Hills 7.5-Minute Quadrangle, Los Angeles County, California, published by the California Department of Conservation, Division of Mines and Geology (CDMG) in 1998, the historic high groundwater level of about 40 feet below the ground surface was noted from wells and soil borings information in the vicinity of the site. The historic groundwater appears to be consistent with the water level observed during the field exploration.

5.6 *Subsurface Variations*

Based on results of the subsurface exploration and our experience, some variations in the continuity and nature of subsurface conditions within the project site should be anticipated. Because of the uncertainties involved in the nature and depositional characteristics of the earth material at the site, care should be exercised in interpolating or extrapolating subsurface conditions between or beyond the boring locations. If, during construction, subsurface conditions different from those presented in this report are encountered, this office should be notified immediately so that recommendations can be modified, if necessary.

6.0 FAULTING AND SEISMICITY

6.1 *Faulting*

The project site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone of California (name changed from Alquist-Priolo Special Studies Zone in January 1994). However, the site, as is all of Southern California, is located within a seismically active area. Accordingly, strong ground shaking due to seismic activity is anticipated at this site. The nearest known surface trace of an active fault is the South Branch of the Santa Monica fault, located about 0.13 miles northwest of the site, and the Newport-Inglewood fault, about 7 miles to the east.

The Santa Monica fault is a major north-dipping reverse fault that dips steeply beneath the Santa Monica Mountains. The Malibu Coast and Hollywood faults, both within 5 miles of the site, are also part of the province boundary.

Two other northwest-trending faults, which roughly parallel the northern end of the Newport Inglewood, are known from subsurface information to be present between the Baldwin Hills and the site. The westernmost of the two is the Charnock fault, which has been mapped as a groundwater barrier within about 5 miles south of the site. If projected northwestward, the trend of the fault would pass within 1000 feet east of the site. The Charnock fault is considered to be "potentially active" because it appears to affect groundwater flow in Pleistocene-age sediments. There is no evidence that the fault offsets Holocene sediments (<11,000 years old), which is the criteria usually required to consider a fault to be "active."

An additional class of faults has been recognized in the Los Angeles Basin relatively close to the site. These are low angle reverse faults known as blind thrusts. These faults usually have no surface expression except for folding and secondary faulting of near-surface sediments and bedrock. Since these structures are buried and confined to relatively deep depths, they are not considered to be a hazard in terms of surface fault rupture. However, they can generate moderate to strong ground shaking over a broad area.

The Compton-Los Alamitos Thrust defined by Dolan et al. (1995) is an inferred blind thrust fault located within the southwestern portion of the Los Angeles Basin. The thrust fault is suggested to extend over 50 miles from the Santa Monica Bay coastline southeast into northwestern Orange County and may connect with the Elysian Park thrust to the northwest along a detachment fault below Los Angeles.

The Elysian Park Fold and Thrust Belt as originally defined by Hauksson (1990) were postulated to extend northwesterly from the Santa Ana Mountains to the Santa Monica Mountains, extending westerly and paralleling the Santa Monica-Hollywood and Malibu Coast faults. The Elysian Park Fold and Thrust Belt are now thought to consist of two components known as the Santa Monica Mountains Thrust and the Elysian Park Thrust. The Elysian Park Thrust is the closest segment of the Elysian Park Fold and Thrust Belt. These thrust faults are not exposed at the surface and do not present a potential surface rupture hazard; however, the Elysian Park Fold and Thrust Belt should be considered an active feature capable of generating future earthquakes.

The Puente Hills Blind Thrust has been interpreted to be about 42 km long and 19 km wide with a depth range of 3 km to 13 km below ground surface (Dolan, J.F., et al., 2003). The thrust fault dips northward from the Montebello Hills and Puente Hills beneath the San Gabriel Basin. Paleoseismic studies of the Puente Hills Blind Thrust have indicated the occurrence of at least four large (moment-magnitude 7.2 to 7.5) earthquakes of this fault during the past 11,000 years (Dolan, J.F. et al., 2003). The Puente Hills Blind Thrust may continue northward beneath the San Gabriel Basin as a thrust flat (Ryberg and Fuis, 1998), but this fault plane does not appear to have been reactivated seismically in the 1987 Whittier Narrows earthquake and may lie beneath the seismogenic zone.

6.2 Seismicity

The proposed site is situated in a seismically active region. As is the case for most areas of Southern California, ground-shaking resulting from earthquakes associated with nearby and more distant faults may occur at the project site. During the life of the project, seismic activity associated with active faults can be expected to generate moderate to strong ground shaking at the site.

According to the California Building Code (2007), the proposed site is located in Seismic Zone 4. Seismic Zone 4 includes those areas of California that have experienced major (Richter magnitude greater than seven) historic earthquakes and high levels of recent seismicity. Major damage corresponding to intensities VIII or higher on the Modified Mercalli Intensity Scale should be expected within this zone.

Based on ground motion data discussed in the Seismic Hazard Evaluation Report (Open File Report 98-14) for the Beverly Hills 7.5-Minute Quadrangle, it was reported that the site could be subjected to a peak ground acceleration of 0.47g with a 10 percent probability of exceedance in 50 years. A magnitude of 6.6 and a distance of 2 km were noted as the predominant earthquake and distance that contributes most to the hazard. Table No.1, *Summary of Regional Faults*, presents nearest distances of the site from various active faults.

Table No. 1, Summary of Regional Faults

Fault Name and Section	Approximate Distance to Site (kilometers/miles)	Source Type (A, B, C)	Max. Moment Magnitude (Mmax)	Slip Rate (mm/yr)
SANTA MONICA	2.7	B	6.6	1.00
MALIBU COAST	6.0	B	6.7	0.30
NEWPORT-INGLEWOOD (L.A. Basin)	6.9	B	6.9	1.00
HOLLYWOOD	8.6	B	6.5	1.00
PALOS VERDES	10.0	B	7.1	3.00
ANACAPA-DUME	21.3	B	7.3	3.00
VERDUGO	23.9	B	6.7	0.50
RAYMOND	25.0	B	6.5	0.50
SIERRA MADRE (San Fernando)	29.9	B	6.7	2.00
SIERRA MADRE (Central)	30.4	B	7.0	3.00
SANTA SUSANA	31.4	B	6.6	5.00
SAN GABRIEL	36.9	B	7.0	1.00
HOLSER	40.3	B	6.5	0.40
SAN ANDREAS - 1857 Rupture	66.8	A	7.8	34.0
CUCAMONGA	67.0	A	7.0	5.00
NEWPORT-INGLEWOOD (Offshore)	70.3	B	6.9	1.50

6.3 CBC 2007 Seismic Coefficients

Based on the results of our borings, and laboratory testing, and in accordance with the California Building Code (2007 CBC, Table 1613A.5.2) the site should be considered as Site Class D.

Table No. 2, CBC Seismic Parameters for the Subject Site

Seismic Parameters	Outside Landfill
Latitude	34.0255
Longitude	118.4683
Site Class	"D"
Mapped Short period (0.2-sec) Spectral Response Acceleration, S_s	1.809g
Mapped 1-second Spectral Response Acceleration, S_1	0.612g
Site Coefficient (from Table 1613.5.3(1)), F_a	1.0
Site Coefficient (from Table 1613.5.3(2)), F_v	1.5
MCE 0.2-sec period Spectral Response Acceleration, SM_s	1.809g
MCE 1-second period Spectral Response Acceleration, SM_1	0.918g
Design Spectral Response Acceleration for short period, S_{ds}	1.206g
Design Spectral Response Acceleration for 1-sec. period, S_{d1}	0.612g
Seismic Design Category for Occupancy Category III	D

7.0 SEISMIC HAZARDS

In addition to direct effects on structures, strong ground shaking from earthquakes can also produce other site effects that include surface fault rupture, soil liquefaction, lateral spreading, seismically induced settlement, ground lurching, landsliding, earthquake-induced flooding, seiches, and tsunamis. Results of a site-specific evaluation of each of the above possible seismic hazards are explained below:

7.1 Surface Fault Rupture

As discussed in Section 6.1, no active faults cross or project toward the site vicinity. The nearest surface trace of an active fault to the site (1.4 miles) is the North Branch of the Santa Monica fault that dips northward, away from the site. The South Branch of the Santa Monica Fault is interpreted to be a buried thrust fault structure located more than 2,400 feet below ground surface. The South Branch is not considered to be a hazard in terms of surface fault rupture. The Charnock fault, which is not active but is considered "potentially active", appears to trend several hundred feet east of the site. Therefore, the potential for surface fault rupture at the site is considered to be low.

7.2 Liquefaction

Soil liquefaction occurs when saturated, loose granular soils, located within about 50 feet of the ground surface, lose strength during cyclic loading by an earthquake. The support for structures overlying the liquefied layer may be lost, resulting in severe damage to those structures. Factors known to influence liquefaction potential include soil type and depth, grain size, relative density, groundwater level, degree of saturation, and both the intensity and duration of ground shaking.

The site is not located in an area susceptible to liquefaction according to the Seismic Hazard Zones map for the Beverly Hills Quadrangle published by the California Division of Mines and Geology (CDMG) in 1998.

Groundwater was encountered at a depth of 59 feet bgs in boring BH-4. According to Plate 1.2 of the *Seismic Hazard Zone Report for the Beverly Hills 7.5-Minute Quadrangle (Open File Report 98-14)*, the historically highest ground water level at the subject site is approximately 40 feet below original surface grade.

Liquefaction analysis was conducted based on "*Recommended Procedures for Implementation of DMG Special Publication 117* Guidelines *for Analyzing and Mitigating Liquefaction in California*, March 1999". The Standard Penetration Tests from Borings No. BH-2 and BH-3 were used for liquefaction analysis. Liquefaction analysis was performed using *LiquefyPro,* Version 5.5h, 2008, by Civil Tech Software. The results of the liquefaction analysis are presented in Appendix E, *Liquefaction Analysis*. Based on the liquefaction analysis the subject onsite soil has a very low susceptibility to liquefaction under earthquake ground shaking.

7.3 Seismically-Induced Settlement

Differential settlement has been observed during earthquakes primarily when the soil underlying a structure liquefies non-uniformly. Based on the results of our liquefaction analysis, the total settlement (dry sand plus saturated sand conditions) due to seismic shaking is expected to be 0.29 inch. The differential settlement can be assumed to be half of the total settlement. The results of the seismically-induced settlement analysis are presented in Appendix E, *Liquefaction Analysis*. However, the total and differential settlement may exceed the expected seismic settlement reported above within the refuse landfill area due to highly heterogeneous characteristics of fill materials. The evaluation of seismic induced settlement within the refuse landfill is beyond our scope of work. The existing refuse area and adjacent areas are prone to potential settlement.

7.4 Lateral Spreading

Seismically induced lateral spreading involves lateral movement of earth materials due to strong ground shaking. The initial gradient of the area that fails in lateral spreading can be very small because the soil mass usually moves on a liquefied layer of loose, saturated granular material. As discussed above, the conditions for liquefaction are not present at the site so that the potential for lateral spreading appears to be low.

7.5 Seismically-Induced Slope Instability

Slope failures are common during strong seismic shaking in areas of significant relief. The site area is virtually flat. The potential hazard is not applicable to the site.

7.6 Earthquake-Induced Flooding

If a dam or other water-retaining structure fails because of an earthquake, areas downstream from the structure can be flooded. Several small reservoirs are located on the alluvial fan surface within a mile north of the site. Larger reservoirs are located on south side of the Santa Monica Mountains, two to three miles from the site. None of these appears to be large enough or close enough to pose a hazard to the site.

7.7 Tsunami and Seiche

A tsunami is a sea wave generated on the ocean floor due to earthquake fault movement or large-scale submarine landsliding. These waves travel in the deep ocean as low-amplitude compressional waves. As a tsunami wave approaches a coastline, the height of the wave increases because of the shallowing bottom. If the tsunami is large enough, it can damage harbors and other areas near the coast. The site is located more than two miles inland from the coast at an elevation of about 156 feet MSL. The possibility of a tsunami affecting the site area is considered to be remote. Similarly, damage to the site due to a seiche, a seismic wave set up in a restricted body of water, is not likely at the site because no such bodies of water are present near the site.

8.0 LABORATORY TESTING

Tests were conducted in our laboratory on representative soil samples to assist in classification of the soil and to provide information about the physical characteristics and engineering properties of the soil. The number and type of laboratory tests were selected to meet the geotechnical requirements of the project. Test results are presented in this appendix and are noted on the Boring Logs in Appendix A. Test results from previous borings are presented at the end of this appendix.

Results of the various laboratory tests are discussed below.

- *In-situ* Moisture and Dry Density – *In-situ* dry density and moisture content of existing soils at the upper five (5) feet ranged from 77 to 124 pounds per cubic feet (pcf) and 10 to 30 percent, respectively. Results of *in-situ* moisture and dry density tests are presented on the Logs of Borings in Appendix A, *Field Exploration.*

- Grain Size Analysis – Six (6) representative samples were tested to determine the relative grain sizes. Results are presented in Appendix B, *Laboratory Testing*.

- Expansion Index – Two (2) representative samples from the upper five (5) feet of the on-site soils were tested to evaluate Expansion Index (EI) in accordance with the California Building Code (CBC, 2001) Standard. Test results are included in Appendix B, *Laboratory Testing Program*. The values of EI indicate that the site soils have "Very Low" expansion potential.

- Maximum Dry Density and Optimum Moisture Content – Typical moisture-density relationship of two (2) representative near surface soil samples are presented in Appendix B, *Laboratory Testing Program*. The test results show that the laboratory maximum dry density is in the range of 118.5 to 129.5 pounds per cubic foot (pcf). The optimum moisture content of samples tested is in the range of 8.5 to 14.3 percent.

- Consolidation Test – Three (3) consolidation tests were performed on representative samples of the site soils. The results of the tests are presented in Appendix B, *Laboratory Testing*. Based on the results of this test, the compressibility of the site native soils is moderate.

- Direct Shear – Three (3) direct shear tests were performed on representative samples. Result of the direct shear tests is presented in Appendix B, *Laboratory Testing*.

- Soil Corrosivity – Two (2) representative samples of the site soils were tested to determine soil corrosivity with respect to common construction materials such as concrete and steel. The test results are presented in Appendix B, *Laboratory Testing*. Test results are also discussed in Section 12.9, *Soil Corrosivity Evaluation*.

- R-value - Two (2) representative samples were tested to determine the R-value for the pavement design. Results are presented in Appendix B, *Laboratory Testing*.

9.0 PERCOLATION TESTING

Percolation testing was performed utilizing two (2) exploratory borings (BH-1 and BH-8) on March 27, 2009. Tests were performed using the Falling Head Test Method.

The bottom fifteen (15) feet of each boring was screened with casing. Each boring was cased using a combination of two-inch diameter solid-wall casing and 0.02 inch perforated casing. Fifteen-foot section of perforated casing (from 5 feet to 20 feet bgs) was used at each boring. Water was added to the boring until the water level was at the ground surface and allowed to presoak for 24 hours. Second day, water was again added to the boring until the water level was about five (5) feet below the existing ground surface. The water level was measured to the nearest 1/10-inch and recorded after 30 minutes. Following each reading, the test hole was be refilled to approximately the same depth as the initial water level. This method was repeated over a six-hour period for each percolation test hole. The results of the percolation tests are tabulated below and in Appendix C, *Percolation Testing.*

Table No. 3, Summary of Percolation Test Results

Boring No.	Depth of Boring (feet)	Predominant Soil Types (USCS)	Average Percolation Rate (minutes/inch)
BH-1	40	Clayey Sand (SC)/ Sand (SP)	23.0
BH-8	40	Clayey Sand (SC)/ Clay (CL)/ Silt (ML)	299.7

10.0 GEOTECHNICAL EVALUATIONS AND CONCLUSIONS

10.1 Geotechnical Findings and Evaluations

A major portion of the project site is located in the Santa Monica City Yards Landfill operated as a municipal solid waste and incinerator ash landfill from 1940 until 1970. The landfill underlies the current "Allan Yard", "Hanson Aggregate Yard" and "Nursery Yard".

Based on our filed exploration, the bottom of landfill was encountered between 30 feet and 58 feet bgs. Landfill cap fills consisting of clayey sand, silty sand and clay were encountered on the upper 5 to 7 feet of landfill. The underlying landfill refuse consists of wood chips, trash, bricks, soils and other man-made materials, organic debris and waste. The landfill materials are not considered to be suitable for any structural support from a geotechnical standpoint.

Groundwater was encountered in BH-4 at a depth of 59 feet bgs within native alluvium as measured at the completion of drilling. Perched water (trapped water) was encountered at depths ranging from 29 to 57 feet below ground surface within refuse landfill in borings BH-6, BH-7 and BH-9. The groundwater encountered in our borings BH-6, BH-7 and BH-9 was oily and muddy, and apparently came from surface infiltration or from decomposition of refuse materials and trapped in the loose layers of refuse fill.

No groundwater was encountered to a maximum depth of 41.5 feet within our borings BH-1, BH-2 and BH-8 where the natural alluvium is shallow. Based on our liquefaction analysis, the site is considered not susceptible to liquefaction.

The major hazard of the subject site is the vertical settlement and lateral displacement due to the unknown characteristics of the existing refuse waste in the landfill. To mitigate the potential hazards due to refuse landfill, we recommend all proposed structures should be supported entirely on engineered fill or entirely on native alluvium provided our recommendations are incorporated into the design and construction plans.

10.2 Conclusions

Based on the results of our field exploration, laboratory testing, engineering analysis, and our experience with similar projects, it is our opinion that the site is suitable for the proposed recycling and drop off facility project from a geotechnical engineering standpoint provided that the recommendations presented herein are incorporated in the design and construction of the project.

The primary concerns for foundation design is the compressibility and non-uniformity of the undocumented fill and refuse waste encountered across a major portion of the site. No documentation was available to verify that the existing fill was placed and compacted in accordance with engineering standards after cessation of the clay mining activities at the site. The undocumented fill is considered to be prone to settlement and lack of lateral resistance, which could be detrimental to the integrity of the on-site structures.

Based on the preliminary proposed plan, we recommend the MRF building be supported by shallow spread foundation tied with grade beam on compacted fill pad. The loading area at the northeast corner of MRF building is across the boundary of landfill. The loading area should be supported by 4 feet of engineered fill prepared per Section 11.3.

Trailers, modular buildings and canopies are proposed for BBC and HHWF which are mainly located inside the refuse landfill area. Those structures are light weight structures built on a rigid steel frames. We recommend the structures located inside the landfill area should be supported by piles bearing into underlying native alluvium. As an alternative to piles, the trailers, modular buildings and canopies may be supported by adjustable foundation systems that can be periodically corrected to level once settlement occurs.

The proposed scale should be supported entirely on a minimum 4 feet thick of uniform engineered compacted fill blanket or entirely on native alluvium.

The proposed SHF structure appears to be located above a deep landfill area. We recommend the SHF should be supported on piles embedded into the underlying native alluvium.

We recommend the upper 4 feet of landfill cap fill on top of refuse landfill be removed and replaced with new engineered fills provided our recommendations are incorporated into the construction plan. Although the surface ground condition is expected to be improved per our grading recommendation, settlement due to underlying refuse fill remains unresolved. Maintenance of surface pavement may be required periodically to repair distresses due to settlement.

11.0 SITE GRADING AND EARTHWORK RECOMMENDATIONS

Site grading recommendations provided below are based on our experience with similar projects in the area and our evaluation of this study. Environmental remediation on the proposed project is beyond our scope, any removed soil material within the landfill area should be consulted with an environmental engineering company.

11.1 Removal and Replacement for Structures Outside Refuse Landfill Area

Site grading recommendations provided below are based on our experience with similar projects in the area and our evaluation of this investigation. Environmental remediation on the proposed project is beyond our scope, any removed earth materials within the landfill area should be consulted with an environmental engineering company.

Based on the preliminary proposed plan, the MRF building is located at the "City Yard" where is outside the refuse landfill area. Based on our field exploration and laboratory test results, the existing fill and upper 2 feet of earth materials in this area are not considered suitable for supporting the proposed structure or additional fill. All undocumented fill within the proposed structure area should be removed, moisture-conditioned if necessary, and replaced as compacted fill. At least three (3) feet below the proposed foundations or the depth to the existing fill, whichever is deeper, should be removed and replace with compacted material. The excavation to remove unsuitable soils should be extended three (3) feet beyond the proposed structure limits where the space is available. For concrete flatwork, driveway and parking area, at least two (2) feet bgs should be removed and replaced with compacted material. Loose material should be removed and replace with properly compacted fill at two (2) percent above optimum moisture to at least 90 percent of the maximum laboratory dry density in accordance with the ASTM Standard D1557 test method.

The actual depth of removal should be based on recommendations and observations made during grading. Therefore, some variations in the depth and lateral extend of over-excavation recommended in this report should be anticipated.

Excavation activities should not disturb existing utilities, buildings, and structures to remain. Existing utilities should be removed and adequately capped at the project boundary line, or salvaged/rerouted as designed.

11.2 Removal and Replacement for Structures Inside Refuse Landfill Area

Based on our field exploration and available literatures, the landfill cap fills on top of the refuse is approximately 5 feet to 7 feet in thickness. For flatwork within refuse landfill area, at least four (4) feet below ground surface should be removed and replace with compacted material. In lieu of additional over-excavation or continuing placing the stabilization materials to reach firm and unyielding bottom, it is our recommendation that geo-fabric should be utilized to stabilize the soft bottom of the over-excavation. Remove the loose material and prepare a smooth surface at the bottom of the over-excavation then place a geo-fabric, (i.e. Mirafi 600X, HF570 or equivalent) at the bottom. After placement of geo-fabric, at least 24 inches of base materials or cement slurry should be used to create firm bottom to receive compacted fill. Crushed miscellaneous base may be used and should be compacted to a 95 percent of laboratory maximum dry weight density. Once a firm base layer is established, place another layer of geo-fabrics, (i.e. Mirafi 600X, HP570 or equivalent) on top of base to receive compacted fill. On-site soil and/or imported soil may be used for backfill. The soils used for compacted fill should be inspected and approved by the geotechnical engineer prior to placement of fill.

Acceptable soil material should be placed in lifts not exceeding eight (8) inches in thickness when loose and should be properly compacted to at least 90 percent of the maximum dry density as determined by ASTM Test Method D1557. Soil materials should be compacted with the water content at, or within two (2) percent above the optimum as determined from ASTM Test Method D1557. The placement and compaction of all fill should be performed under the observation and testing of a Converse Consultants representative.

11.3 Site Preparation

Site preparation for the proposed structure will require removal of existing improvements, asphalt concrete paving and other existing underground manmade structures and utilities.

The site soils can be excavated utilizing conventional heavy-duty earth-moving equipment. The excavated site soils, free of organic material may be placed as compacted fill in structural areas after proper processing. Rocks larger than three inches in the largest dimension should not be placed as fill. The extent of removal should be determined by the geotechnical representative based on soils observation during grading.

Loosened soil, utility lines, existing paving, concrete foundation and deleterious substances should be removed. To provide adequate bearing and uniform support for the structures, the undocumented fill should be improved prior to use for support.

For concrete flatwork, driveway, the parking areas, and for minor non-load bearing structures, at least 24 inches of removal and recompaction is recommended. The actual depth of fill removal and recompaction should be determined in the field by the geotechnical engineer at the time of construction. We recommend that the exposed surface be scarified to a minimum depth of six (6) inches and be compacted to a minimum density of at least 90 percent relative compaction as determined by ASTM Designation D1557.

The excavated on-site soils may be reused as compacted fill, provided they are free of potentially hazardous materials and deleterious substances and have suitable moisture content to obtain proper compaction. Debris and other deleterious substances in the fill should be removed prior to use. Based on our review, most of the undocumented fill may not be suitable for use as fill. Any soils imported from off-site sources should be non-expansive, with an expansion index of less than 20, and be approved by the geotechnical engineer prior to placement.

Acceptable fill material should be placed in lifts not exceeding eight (8) inches in thickness when loose and should be properly compacted to at least 90 percent of the maximum dry density as determined by ASTM Test Method D1557. On-site materials should be compacted with the water content at least two (2) percent above optimum for clayey soils and within two (2) percent above the optimum for granular soils as determined from ASTM Test Method D1557. The placement and compaction of all fill should be performed under the observation and testing of a Converse Consultants representative.

11.4 Temporary Construction Slopes and Temporary Shoring

It is anticipated that temporary construction slopes and/or temporary shoring will be required to facilitate construction of the structures. Temporary shoring may be required in certain areas due to the proximity of adjacent roads, buildings and structures, to minimize the size of excavations, and other reasons.

It is suggested that the owner and the contractor be familiar with the applicable local, state, and federal regulations for both temporary construction slopes and shoring, including the current OSHA Excavation and Trench Safety Standards. It should be noted that the contractor will be solely responsible for the design and construction of temporary construction slopes and shoring. If a shoring system is used, the shoring system should be design by the contractor and reviewed by the geotechnical and structural engineers.

The contractor should be aware that in no case should the slope height, inclination, and excavation depths exceed those specified in local, state, or federal safety regulations. Specifically, one needs to be aware of the current OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if violated, the owner and/or the contractor could be liable for substantial penalties.

11.4.1 Temporary Construction Slopes

Based on the materials encountered in the exploratory borings sloped temporary excavations may be supported by shoring or constructed according to the slope ratios presented in Table No. 4, *Slope Ratios for Temporary Excavations*. Temporary cuts encountering loose fill or loose dry sand, excavated near existing structures may required shoring or have to be constructed at a flatter gradient than presented in the following table.

Table No. 4, Slope Ratios for Temporary Excavations

Maximum Depth of Excavation (feet)	Maximum Slope Ratio (horizontal:vertical)
0 – 4	Vertical
4 – 10	1:1
10 – 15	1.5:1

[1]Slope ratio assumed to be uniform from top to toe of slope.

For steeper temporary construction slopes or deeper excavations, shoring should be provided by the contractor as necessary, to protect the workers in the excavation. If potentially unstable soil conditions are encountered, modifications of slope ratios for temporary cuts may be required.

Surfaces exposed in slope excavations should be kept moist but not saturated to retard raveling and sloughing during construction. Adequate provisions should be made to protect the slopes from erosion during periods of rainfall. Surcharge loads, including construction materials, should not be placed within five (5) feet of the unsupported slope edge. Stockpiled soils with a height larger than six (6) feet will require greater distance from trench edges.

All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act of 1987 and current amendments, and the Construction Safety Act should be met. The soils exposed in cuts should be observed during excavation by a Converse representative competent person employed by the. If potentially unstable soil conditions are encountered, modifications of slope ratios for temporary cuts may be required.

11.4.2 Temporary shoring

Temporary shoring will be required where open cut excavations will not be feasible and where there are space limitations because of nearby existing structures or facilities. Temporary shoring may consist of the use of a conventional soldier piles and lagging, or interlocking sheet pile system.

For design of the temporary cantilever shoring supporting a level grade, an equivalent fluid pressure of 25 psf/ft can be used. In addition to the lateral earth pressure, surcharge pressures due to miscellaneous loads (such as vehicular traffic, soil stockpiles, or construction equipment) located adjacent to the shoring should be included in the design.

For the design of soldier piles spaced at three times the diameters on centers, the passive resistance of the soils adjacent to the piles may be assumed to be 300 psf/ft of embedment depth. The upper 2 feet of the embedded depth below grade on the resisting side should be neglected in providing passive lateral support. Soldier piles should be placed in drilled holes with minimum diameter of 18 inches, and should be properly backfill with sand/cement slurry or lean concrete in order to develop the required passive resistance. For sheet piles, a passive resistance of 200 psf/ft of embedment can be used.

It is recommended that the required temporary shoring be designed by the contractor or his specialty subcontractor. We recommend that our office and the structural engineer's office review the final temporary shoring plans. In addition, we recommend that a representative from our office observe the installation of the temporary shoring systems. All appropriate requirements of OSHA should be incorporated into the design of the temporary shoring system by the contractor.

12.0 DESIGN RECOMMENDATIONS

12.1 General

The various design recommendations provided in this section are based on the assumption that in preparing the site, earthwork and grading recommendations presented in Section 11.0 and Appendix C will be implemented. The proposed MRF building may be supported on shallow continuous and isolated spread foundations provided our recommendations are incorporated in the design and construction plans.

Any proposed structures located within the refuse landfill area should be supported by precast concrete driven piles and/or cast-in-drilled-hole (CDIH) piles bearing into underlying alluvium.

Trailers, modular buildings and canopies are light weight structures built on a rigid steel frame. We recommend these structures located inside the landfill area should be supported by piles bearing into underlying native alluvium. As an alternative to piles, the trailers, modular buildings and canopies may be supported by an adjustable foundation systems can be periodically corrected to level once settlement occurs.

12.2 Shallow Foundation

The design recommendations provided in this section are based on the assumption that in preparing the site, earthwork and grading recommendations presented in Section 11.1 and 11.2 and Appendix C will be implemented. The proposed MRF building may be supported on shallow continuous and isolated spread foundations tied with grade beams provided our recommendations are incorporated in the design and construction plans.

12.2.1 Vertical Capacity

Shallow continuous footing should be at least 15 inches wide and embedded at least 24 inches below lowest adjacent grade into compacted fill. The footing reinforcement should be based on structural design. Conventional spread footings founded on compacted fill may be designed for a net bearing pressure of 2,000 psf.

A 20 percent increase is allowable for each additional foot of excavation depth and 10 percent increase for each additional foot of excavation width up to a maximum value of 4000 psf.

The net allowable bearing values indicated above are for the dead loads and frequently applied live loads and are obtained by applying a factor of safety of 3.0 to the net ultimate bearing capacity.

12.2.2 Lateral Capacity

Resistance to lateral loads can be assumed to be provided by friction acting at the base of foundations and by passive earth pressure. A coefficient of friction of 0.3 between concrete and fill may be used with the dead load forces. An allowable passive earth pressure of 300 psf per foot of depth may be used for compacted fill. A factor of safety of 1.5 was applied in calculating passive earth pressure. The maximum value of the passive earth pressure should be limited to 1,500 psf for compacted fill.

12.2.3 Dynamic Increases

Vertical and lateral bearing values indicated above are for the total dead loads and frequently applied live loads. If normal code requirements are applied for design, the above vertical bearing and lateral resistance values may be increased by 33 percent for short duration loading, which will include the effect of wind or seismic forces.

12.2.4 Settlement

The static settlement of structures supported on continuous and/or spread footings founded on compacted fill will depend on the actual footing dimensions and the imposed vertical loads. Based on the maximum allowable net bearing pressures presented above, static settlement is anticipated to be less than 0.5 inch. Seismically induced settlement is anticipated to be 0.29 inch. Therefore a total settlement of 0.8 inch should be considered into structural design. Differential settlement is expected to be one-half of the total settlement over a 30 feet span.

12.3 Precast Concrete Driven Pile

One feasible alternative for a pile foundation is the driven pile system even though the noise, vibration and predrilling are disadvantages.

12.3.1 Vertical Capacity

For design purposes, we recommend 12-inch, or 14-inch precast, prestressed concrete piles deriving their capacity from the skin friction and end bearing. We recommend the pile should be driven at least 30 feet below native alluvium. The allowable capacities are presented in Table No. 5, *Driven Pile Capacities* and on Appendix F, *Pile Analysis and Installation Specifications*. A factor of safety of 3.0 has been applied for allowable values from the ultimate capacities.

Table No.5, Allowable Driven Pile Capacities

Pile Type	Depth (ft)*	Downward Axial Pile Capacity (kips)	Upward Axial Pile Capacity (kips)
12" Square Driven Pile	88	86.7	52.1
14" Square Driven Pile	88	118.6	68.0

* Minimum recommended depth from existing ground surface assuming native alluvium at 58 feet bgs.

The allowable capacities may be increased by one-third for transient loads, including wind or seismic forces. Piles should have a minimum center-to-center spacing of 3 times the pile width.

The portion of pile in contact with refuse landfill is subject to downdrag force due to potential settlement. The downdrag force is estimated between 200 psf and 600 psf for the portion in contact with refuse fill, depending on the thickness of fill. The downdrag force should be incorporated in the pile design.

12.3.2 Lateral Capacity

Lateral resistance for piles may be assumed to be provided by passive pressure acting on the piles embedded into alluvium. The allowable passive pressure for piles spaced at least 3 diameters on center may be taken as 400 psf on the pile per foot of depth, measured below the bottom of existing fill. The allowable maximum passive resistance should not exceed 6,000 psf. It should be noted that the above values for passive earth pressure given for the design of piles have been adjusted for potential arching between piles and no additional increases for arching should be assumed. The point of fixity can be assumed at one foot below the bottom of existing fill.

12.3.3 Dynamic Increases

Bearing values indicated above are for total dead load and frequently applied live loads. The above vertical bearing may be increased by 33 percent for a short duration of loading which will include the effect of wind or seismic forces.

12.4 Cast-In-Drilled-Hole (CIDH) Pile

12.4.1 Vertical Pile Capacity

CIDH piles are a feasible alternative if the piles can be properly installed within the landfill layer and below the groundwater table by means of casing or bentonite slurry and tremie concrete. For design purposes, we recommend 24-inch diameter or 30-inch diameter piles deriving their capacity primarily from the skin friction. The allowable capacities are presented in Table 6, *CIDH Pile Capacities* and on Appendix F, *Pile Analysis and Installation Specifications*. A factor of safety of 2.5 has been applied on the ultimate capacities to obtain allowable values.

Table 6, CIDH Pile Capabilities

Pile Type	Depth (ft)*	Downward Axial Pile Capacity (kips)	Upward Axial Pile Capacity (kips)
24" CIDH pile	88	137.4	104
30" CIDH pile	88	187.6	143.6

* Minimum recommended depth from existing ground surface assuming native alluvium at 58 feet bgs

The embedment of piles should be at least thirty (30) feet below the native alluvium. In order to eliminate reductions in capacities and problems in construction, the minimum pile spacing should be three (3) times pile-diameter on center. Piles should be tied with grade beams determined by structural engineer.

To mitigate the potential downdrag forces acting along the pile shaft in contact with refuse fill, we recommend a Sonotube or equivalent form should be installed to isolate the pile shaft from refuse fill.

To maintain the stability of the borehole for the drilled pile, casing is recommended for the portion exposed refuse landfill material and the use of bentonite slurry is recommended below the groundwater table while advancing the excavation to the final depth. Drilled pile excavations should be filled with concrete on the same day they are drilled. The drilling for piles should not be performed adjacent to recently excavated or recently poured piles until the concrete in the completed piles has been allowed to set for several hours. The minimum recommended spacing between adjacent pours may be taken as 6 times the pile diameters. Piles in groups should be drilled and poured in an alternating sequence to minimize the potential for fresh concrete flowing into adjacent open pile excavations.

The placement of reinforcement and concreting operations should conform to ACI and other applicable code requirements. Concrete placement should be continuous from the bottom to the top of the drilled pile. Concrete placement should continue after the borehole is filled until good quality concrete is evident at the top of the shaft. Concrete should be placed through a tremie or pump system and the discharge end of the tremie/orifice should be immersed at least 5 feet in concrete at all times after the start of the concrete flow. In addition, the level of concrete in the tremie should be maintained above the level of slurry in the borehole at all times to prevent slurry intrusion into the shaft concrete.

We recommend that the installation of the drilled piles be observed by a representative of Converse Consultants.

12.4.2 Lateral Pile Capacity

Lateral resistance for piles may be assumed to be provided by passive pressure acting on the piles embedded into alluvium. The allowable passive pressure for piles spaced at least 3 diameters on center may be taken as 400 psf on the pile per foot of depth, measured below the bottom of existing fill. The allowable maximum passive resistance should not exceed 6,000 psf. It should be noted that the above values for passive earth pressure given for the design of piles have been adjusted for potential arching between piles and no additional increases for arching should be assumed. The point of fixity can be assumed at one foot below the bottom of existing fill.

12.4.3 Dynamic Increases

Bearing values indicated above are for total dead load and frequently applied live loads. The above vertical bearing may be increased by 33 percent for a short duration of loading which will include the effect of wind or seismic forces. For design of support of short duration wind and/or seismic loading, downward capacities derived from the above skin friction may be increased by 33 percent. Short term up lift capacities may be assumed to be equal to half the short term downward friction capacities.

12.4.4 Concrete Placement

The placement of reinforcement and concreting operations should conform to ACI and other applicable code requirements. Concrete placement should be continuous from the bottom to the top of the drilled pile. Concrete placement should continue after the borehole is filled until good quality concrete is evident at the top of the shaft. Concrete should be placed through a tremie or pump system and the discharge end of the tremie/orifice should be immersed at least 5 feet in concrete at all times after the start of the concrete flow. In addition, the level of concrete in the tremie should be maintained above the level of slurry in the borehole at all times to prevent slurry intrusion into the shaft concrete.

To maintain the stability of the borehole for the drilled pile, casing is recommended for the portion exposed refuse landfill material and the use of bentonite slurry is recommended below the groundwater table while advancing the excavation to the final depth. Drilled pile excavations should be filled with concrete on the same day they are drilled. The drilling for piles should not be performed adjacent to recently excavated or recently poured piles until the concrete in the completed piles has been allowed to set for several hours. The minimum recommended spacing between adjacent pours may be taken as 6 times the pile diameters. Piles in groups should be drilled and poured in an alternating sequence to minimize the potential for fresh concrete flowing into adjacent open pile excavations.

We recommend that the installation of the drilled piles be observed by a representative of Converse Consultants. Observation of the grouting is an important aspect of the quality control process. We recommend that the grout take and the volume pumped in discrete element along the pile be recorded. As a minimum, the increments should be recorded every 5 feet. A minimum grout head of five (5) feet is required and a minimum volume of 115 percent the theoretical volume is required for each increment.

12.5 Pile Group

For precast concrete piles and CIDH piles, the pile group efficiency can be computed using the following relationship:

$$E_g = 1-\theta \; \frac{(n-1)\,m + (m-1)n}{90mm}$$

Where:

E_g = Pile Group Efficiency, Percentage of Single Pile Capacity
n = Number of piles in a row
m = Number of piles in a cap
$\theta = \tan^{-1}$ (D/S) in degrees
D = Pile Diameter, ft.
S = Center-to-Center Pile Spacing, ft.

The total load-carrying capacity of the pile group is calculated as:

$T = NE_gP$

Where:

T = Total Capacity of Pile Group
N = Number of Piles in a Group
E_g = Pile Group Efficiency, as calculated above
P = Allowable Load of a single Pile

The weight of the pile may be assumed to be carried by end bearing provided the bottom of the excavation is relatively free of lose or disturbed material at the time the concrete is placed.

12.6 Adjustable Foundation

The trailer, modular building and canopy are light weight structures built on a rigid steel frame. In such a case, trailer, modular building and canopy may be supported by an adjustable foundation system that can be periodically corrected to level once settlement occurs as an alternative to piles.

The various design recommendations provided in this section are based on the assumption that in preparing the site, earthwork and grading recommendations presented in Section 11.4 and Appendix C will be implemented.

12.6.1 Vertical Capacity

The foundation should be at least 24 inches wide and embedded at least 12 inches below lowest adjacent grade into compacted fill. The footing reinforcement should be based on structural design. Conventional spread footings founded on compacted fill over refused landfill may be designed for a net bearing pressure of 700 psf.

The net allowable bearing values indicated above are for the dead loads and frequently applied live loads and are obtained by applying a factor of safety of 3.0 to the net ultimate bearing capacity.

12.6.2 Lateral Capacity

Resistance to lateral loads can be assumed to be provided by friction acting at the base of foundations and by passive earth pressure. A coefficient of friction of 0.3 between concrete and fill may be used with the dead load forces. An allowable passive earth pressure of 200 psf per foot of depth may be used for compacted fill. A factor of safety of 1.5 was applied in calculating passive earth pressure. The maximum value of the passive earth pressure should be limited to 800 psf for compacted fill.

12.6.3 Dynamic Increases

Vertical and lateral bearing values indicated above are for the total dead loads and frequently applied live loads. If normal code requirements are applied for design, the above vertical bearing and lateral resistance values may be increased by 33 percent for short duration loading, which will include the effect of wind or seismic forces.

12.6.4 Settlement

Based on the available referenced report (SCS Engineers, 2007), the static settlement of structures supported on adjustable footings founded on compacted fill over refuse landfill is expected to be greater than 24 inches. Trailer, modular buildings and canopies may be supported by an adjustable foundation that the floor can be periodically corrected to level once settlement occurs.

12.7 Floor Slabs

We recommend that the floor slabs be supported on at least 2 feet of compacted aggregate base above the improved soils. The aggregate base in general, have very low expansion potential. Slabs supported on the compacted fill must be adequately reinforced in both directions or sectionalized with structural separations to control cracking. If import soils are to be used, we recommend that the imported fill be predominantly granular and non-expansive with an expansion index of less than 20. The import material should be approved by the Geotechnical Engineer prior to placement.

If migration of moisture through the slab is undesirable, we recommend that a moisture barrier such as an 10-mil (minimum) polyethylene sheet be used under new slabs. The moisture barrier should be covered with 2 inches of coarse sand to facilitate concrete curing and to protect the polyethylene sheet.

Adequate provisions are to be made to limit and/or prevent moisture content changes in the subgrade beneath all footings and floor slabs. These should include: positive drainage away from building foundations with a minimum gradient of two (2) percent; impervious cut-off barriers along exterior walls adjacent to landscape planters; and properly sealed joints for interior piping beneath interior and exterior slab areas.

12.8 Retaining Walls

The earth pressure behind any buried walls depends primarily on the allowable wall movement, type of backfill materials, backfill slopes, wall inclination, surcharges, and any hydrostatic pressure.

The earth pressure behind any subsurface walls depends on several factors including: the allowable wall movement, type of backfill material, backfill slopes, wall inclination, surcharges, and hydrostatic pressure, if any. The following equivalent fluid pressures are recommended for vertical walls with no hydrostatic pressure, no surcharge, and level backfill:

EQUIVALENT FLUID PRESSURES (pcf)	
Free to Deflect	60
Restrained	100

In addition, walls subjected to surcharge loads located within a distance equal to the height of the wall, should be designed for an additional uniform lateral pressure equal to one-third or one-half the anticipated surcharge load for unrestrained or restrained walls, respectively. These values are applicable for backfill placed between the wall stem and an imaginary plane rising at 45 degrees from below the edge (heel) of the wall footings.

The recommended lateral pressures assume that the walls are fully back-drained to prevent build-up of hydrostatic pressures. Adequate drainage could be provided by means of either weep holes or by means of permeable drainage materials wrapped in filter fabric installed behind the walls. The drainage system should consist of perforated pipe surrounded by free draining, uniformly graded, ¾ -inch washed, crushed aggregate, and wrapped in filter fabric such as Mirafi 140N or equivalent, and should extend to about 2 feet below the finished grade. The filter fabric should overlap approximately 12 inches or more at the joints. The subdrain pipe should consist of perforated, four-inch diameter, rigid ABS (SDR-35) or PVC A-2000, or equivalent, with perforations placed down. Alternatively, a prefabricated drainage composite system such as the Miradrain G100N or equivalent can be used.

Retaining walls higher than 12 feet as measured from the top of the foundation should be designed to resist additional earth pressure caused by seismic ground shaking. A dynamic earth pressure of 15H psf, based on an inverted triangular distribution, can be used for design of the wall.

12.9 Soil Corrosivity

Environmental Geotechnical Laboratory, Inc. (EGL) tested two (2) bulk soil samples from BH-2 and BH-6 at depths zero to five feet. The tests included minimum resistivity, pH, soluble sulfates, and chloride content.

Table No. 7, Soil Corrosivity

Sample Location (Boring /Depth)	pH (Caltrans 643)	Soluble Chlorides (Caltrans 422) ppm	Soluble Sulfate (Caltrans 417) ppm	Saturated Resistivity (Caltrans 532) Ohm-cm
BH-2 (0-5')	9.7	330	230	1,350
BH-6 (0-5')	8.7	270	580	1,050

According to the Los Angeles County Department of Public Works, if the soluble sulfate concentration of the soil is less than 2,000 ppm, no mitigation measures will need to be taken to protect any concrete in contact with the soils. Type I or II Portland Cement may be used for the construction of the foundations and slabs.

The chloride content and pH value of both samples BH-2 and BH-6 are in the non-corrosive range. The saturated resistivity of both samples indicate a "Corrosive" potential to ferrous metals in contact with these soils.

A corrosion engineer may be consulted for the detailed mitigation procedures, if needed. Conventional corrosion mitigation measures may include the following:

- All steel and wire concrete reinforcement should have at least three (3) inches of concrete cover where cast against soil, unformed.
- As a minim, below-grade ferrous metals should be given a high-quality protective coating, such as 18-mil plastic tape, extruded polyethylene, coal-tar enamel or Portland cement mortar.
- Below-grade metals should be electrically insulated (isolated) from above-grade metals by means of dielectric fittings in ferrous utilities and/or exposed metal structures breaking grade.

12.10 Surface Drainage

Positive surface drainage should be provided adjacent to each structure to direct surface water away from the foundations and slabs toward suitable discharge facilities. Ponding of surface water should not be allowed adjacent to the structure or on flatwork. Landscaped areas should be designed with a minimum slope of two (2) percent. Desirable slopes in paved areas are at least one (1) percent.

12.11 Concrete Flatwork

All exterior slabs and concrete flatwork including the sidewalks should be supported directly on at least 24 inches of properly compacted fill. We recommend that concrete slabs be at least 6 inches thick and be properly reinforced in accordance with the structural requirements.

12.12 Paving

All areas to be paved should be graded in accordance with the general recommendations for site grading presented under Section 9.4 - Site Preparation and Grading. If the proposed pavement areas have become disturbed or desiccated after the site grading prior to placing base course, the subgrade may have to be re-scarified to a depth of at least 12 inches, be moisture conditioned as required to obtain optimum moisture conditions, and be recompacted to at least 95 percent of the maximum dry density. This decision will be made at the time of construction by our field representative.

R (resistance) value test were performed on bulk samples of near-surface clayey soil from boring BH-2 and BH-8. The results indicate R-value of soils ranged between 20 and 27. The type of fill to be used beneath the proposed pavement has not been determined at this time. The R-value of the subgrade soils will depend on the quality of the fill to be placed for the pavement subgrade. An R-value of 20 is considered to be a reasonable estimate for compacted subgrade if the silty and clayey materials are recompacted. Based on the R-value of 20, and the selected traffic index values indicated below, the following minimum flexible pavement sections were computed for budget purposes. Our computations were based on the Caltrans Highway Design Manual, fourth edition:

Pavement Component	Thickness (Inches)	
	Automobile Traffic Areas Ti = 4.5	Truck Traffic Areas Ti = 6.5
Asphalt Concrete	3.0	4.0
Aggregate Base	6.0	11.0
Total Pavement Thickness	9.0	15.0

The R-value used for the final pavement section design will depend on the material actually used for compacted fill at the subgrade level. We recommend that R-value tests be performed during grading to determine the actual R-value for design. Additional pavement sections can be presented upon request for imported fill subbase or for different traffic index values. Selection of the traffic indices should be made by your civil engineer based on his knowledge of traffic flow and loading.

The aggregate base course for the pavement should be composed of crushed rock or of processed natural material conforming with Section 200-2.2 or 200-2.4, *Standard Specifications for Public Works Construction*. The aggregate base and asphalt concrete should be compacted to at least 95 percent of the maximum dry density in accordance with ASTM D1557.

12.13 Utilities

The on-site soils are suitable for backfill of utility trenches from one foot above the top of the pipe to the surface, provided the material is free of organic matter and deleterious substances.

It is anticipated that the natural soils will provide a firm foundation for site utilities. Any soft and/or unstable material encountered at the pipe invert should be removed and replaced with an adequate bedding material.

The on-site soils are not considered suitable for bedding or shading of utilities. Therefore, we recommend that non-expansive granular soils with a Sand Equivalent (SE) greater than 30 as determined by ASTM Test Method D2419 be imported for that purpose. Trench backfill soils should be compacted to at least 90 percent of the maximum dry density as determined by ASTM Test Method D1557.

13.0 PLAN REVIEW AND INSPECTIONS DURING CONSTRUCTION

As foundation and grading plans are completed, they should be forwarded to Converse Consultants for review and conformance with the intent of these recommendations. All grading and fill compaction should be performed under the observation of and testing by a Converse representative. Foundation excavation should be observed prior to placing steel and concrete to verify that the subgrade are founded on satisfactory soils, and that the excavations are free of loose and disturbed materials.

14.0 CLOSURE

This report has been prepared for the sole benefit and exclusive use of the Dominion Property Partners in accordance with the terms and conditions attached to our proposal under which these services have been provided. Any reliance on this report by third parties shall be at third party's sole risk. Our services have been performed in accordance with applicable state and local ordinances, and generally accepted practices within our profession. No other warranty, either expressed or implied, is made.

Converse Consultants is not responsible or liable for any claims for damages associated with interpretation of available information provided by others. Site exploration identifies actual soil conditions only at those points where samples are taken, when they are taken. Data derived through sampling and analytical testing are extrapolated by Converse employees who then render an opinion about the overall soil conditions. The recommendations presented are not considered final because they are developed principally from judgment and opinion. Actual conditions in areas not sampled may differ. In the event that changes to the property occur, or additional, relevant information about the property is brought to our attention, the recommendations contained in this report may not be valid unless these changes and additional relevant information are reviewed and the recommendations of this report are modified or verified in writing. In addition, the recommendations can be finalized only by observing actual subsurface conditions revealed during construction. Converse cannot assume responsibility or liability for the recommendations if we are not afforded the opportunity to perform construction observation.

15.0 REFERENCES

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APPENDIX A

FIELD EXPLORATIONS

APPENDIX A

FIELD EXPLORATIONS

The field study for the proposed project consisted of a site reconnaissance and a subsurface exploration program. The site reconnaissance was conducted on March 12, 2009 to observe surficial conditions, to verify site access for drilling equipment, and to stake planned exploratory boring locations. The test borings were located by pacing from existing topography and boundary features, and should be considered accurate only to the degree implied by the method used.

The test borings were advanced using a truck-mounted rig (CME 75) equipped hollow stem auger drilling equipment for soil sampling. A total of nine (9) borings were drilled for the present exploration on March 26, 27, 28 and April 4, 2009 to a maximum depth of 73 feet below existing grade. Soils encountered in the borings were logged by our geologist and classified in the field by visual examination in accordance with the Unified Soil Classification System. The field descriptions have been modified where appropriate to reflect laboratory test results.

Relatively undisturbed ring and bulk samples of the subsurface soils were obtained at frequent intervals in the borings. The relatively undisturbed samples were obtained using a California Drive Sampler (2.4-inch inside diameter (I.D.), 3.0-inch outside diameter O.D.) lined with thin sample rings, and disturbed samples were obtained using a split spoon sampler (1⅜-inch I.D. and 2-inch O.D). Both sampler types are indicated in the "drive samples" column of the boring logs as presented in this appendix.

Resistance blow counts were obtained with the sampler by dropping a 140-pound automatic hammer through a 30-inch free fall. The sampler was driven 18 inches, and the number of blows were recorded for each six (6) inches of penetration. The blows per foot recorded on the boring logs represent the accumulated number of blows required for the last 12 inches or shorter distance as indicated when refusal was encountered. Due to the higher energy delivered by the automatic hammer system, these blow counts are not the standard penetration resistance values when the split spoon sampler was used. Based on our experience, these values should be multiplied by a factor of 1.3 to convert to equivalent standard penetration resistance values. However, due to the large diameter of the California drive sampler, the blow counts recorded for this sampler are approximate standard penetration resistance values.

For a key to soil symbols and terminology used in the boring logs, refer to Drawing No. A-1, *Unified Soil Classification and Key to Boring Log Symbols*. Borings Logs for the present investigations are presented on Drawings Nos. A-2a through A–9c Log of Boring. Previous borings by Authur D. Little are presented at the end of the Appendix.

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING LOG SYMBOLS

SAMPLE TYPE

- STANDARD PENETRATION TEST — Split barrel sampler in accordance with ASTM D-1586-84 Standard Test Method
- DRIVE SAMPLE 2.42" I.D. sampler.
- DRIVE SAMPLE No recovery
- BULK SAMPLE
- GROUNDWATER WHILE DRILLING
- GROUNDWATER AFTER DRILLING

LABORATORY TESTING ABBREVIATIONS

TEST TYPE
(Results shown in Appendix B)

CLASSIFICATION	
Plasticity	pi
Grain Size Analysis	ma
Passing No. 200 Sieve	wa
Sand Equivalent	se
Expansion Index	ei
Compaction Curve	max
Hydrometer	h

STRENGTH	
Pocket Penetrometer	p
Direct Shear	ds
Direct Shear (single point)	ds*
Unconfined Compression	uc
Triaxial Compression	tx
Vane Shear	vs
Consolidation	c
Collapse Test	col
Resistance (R) Value	r
Chemical Analysis	ca
Electrical Resistivity	er

UNIFIED SOIL CLASSIFICATION AND KEY TO BORING LOG SYMBOLS

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. A-1

Log of Boring No. BH-1

Dates Drilled: 3/27/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): NOT ENCOUNTERED

SUMMARY OF SUBSURFACE CONDITIONS

This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Depth (ft)	Summary of Subsurface Conditions	Samples: Drive	Samples: Bulk	Blows	Moisture (%)	Dry Unit Wt. (pcf)	Other
0	3" ASPHALT		X				ma,ei
	FILL (Af): **CLAYEY SAND (SC):** medium-grained, reddish brown.	X	X	7/19/12	11	124	
5	-traces of brick grains						
	ALLUVIUM (Qal): **CLAYEY SAND (SC):** medium-grained, some porosity, reddish brown.	X		12/23/37	9	124	c
10		X		10/18/28	11	114	
15		X		10/15/18			
20		X		16/19/22	14	109	
25	**SAND (SP):** fine-grained, light brown / light gray.	X		18/20/21			
30		X		12/25/50(6")	8	93	

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 Drawing No. A-2a

Log of Boring No. BH-1

Dates Drilled: 3/27/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): NOT ENCOUNTERED

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		SAND (SP): fine-grained, light brown / light gray.	X		11/16/20			
40			■		16/18/22	22	99	
		End of boring at 41.5 feet. Groundwater was not encountered during drilling. Borehole was used for percolation test. Borehole was backfilled with cement slurry. Soil cuttings were collected in drums and set aside on the designated area. PVC perforated and solid pipes were extracted from borehole.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 | Drawing No. A-2b

Log of Boring No. BH-2

Dates Drilled: 3/27/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): NOT ENCOUNTERED

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		9" CONCRETE						
		ALLUVIUM (Qal): **SANDY CLAY (CL):** trace of gravel and medium grained sand, dark gray.			6/10/13	19	106	ma,max r,ca,er
5		-ironized coarse-grained rock fragments, approximately 0.5" in maximum dimension, reddish dark gray			7/18/21	15	116	ds
					7/14/20	31	107	c
10					8/18/20	20	107	
15		-reddish brown			5/8/10	23	99	
20		-reddish brown			4/6/10			
25		**CLAYEY SILT (ML):** trace of medium grained sand, brown.			7/12/18	28	91	
30					5/8/14			

Converse Consultants

Project Name: PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 | Drawing No. A-3a

Log of Boring No. BH-2

Dates Drilled: 3/27/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): NOT ENCOUNTERED

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		CLAYEY SILT (ML): fine-grained, reddish brown / bluish gray.			7/9/9	26	98	
40					6/8/8			
		End of boring at 41.5 feet. Groundwater was not encountered during drilling. Borehole was used for percolation test. Borehole was backfilled with cement slurry. Soil cuttings were collected in drums and set aside on the designated area. PVC perforated and solid pipes were extracted from borehole.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 | Drawing No. A-3b

Log of Boring No. BH-3

Dates Drilled: 4/4/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): NOT ENCOUNTERED

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		6" ASPHALT OVER 8" BASE						ma,ei
		CAP FILL (Af): **CLAYEY SAND (SC):** medium-grained, trace of gravels up to 1" in maximum dimension, grayish black.			18/18/19	14	116	
5					7/15/16	8	106	
		REFUSE LANDFILL (Rf): **SAND (SP):** medium to coarse-grained, trace of concrete debris, grayish black.			12/15/15	10	117	
10					12/18/17	13	89	
15		-wood chips and glass, 95% sandy clay						
20		-long pine wood, light brown			31/36/50(5")			
		-cuttings, clayey sand with wood chips						
25		-approximately 80% organic material			6/7/7			
30		**ALLUVIUM (Qal):** **SAND (SP):** medium-grained, bluish gray.			9/11/15			

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 Drawing No. A-4a

Log of Boring No. BH-3

Dates Drilled: 4/4/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): NOT ENCOUNTERED

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		SAND (SP): coarse-grained, small layer of clay, grayish black.			12/12/13			
40		**SANDY SILT (ML):** grayish black, beach sand with stained, traces of pebbles, gravels up to 0.5" in maximum dimension.			17/22/35	16	106	
					5/9/11			wa(70%)
45		-fine-grained, bluish gray			24/31/50(5")	15	108	
		-interbedded layer of silt (approx. 5")			12/19/20			wa(79%)
50					19/30/50(5")	21	110	
					11/21/23			wa(48%)
55					23/33/50(3")	4	105	
					24/50(5")			
		End of boring at 58 feet. Groundwater was not encountered during drilling. Borehole was backfilled with cement slurry. Soil cuttings were collected in drums and set aside on the desginated area.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 Drawing No. A-4b

Log of Boring No. BH-4

Dates Drilled: 4/4/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): 59

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		CAP FILL (Af): **SILTY SAND (SM):** fine to medium grained, gravels up to 0.3" in maximum dimension, trace of concrete debris, grayish black.			30/36/22	8		
5						10	120	
		REFUSE LANDFILL (Rf): **CLAYEY SAND (SC):** some glass, wood chips, 20% organic and asphalt debris.			8/39/48	10	110	
10		-concrete debris			22/35/20	9		
15		**SAND (SP):** trace of clay, grayish black.			47/10/12			
20		-trash (100%), pieces of shoes, wood chips			9/20/22			
25		-thin layers of sand, 90% trash, cardboard, wood chips			4/5/6			
30		-90% trash, organic wood chips			16/12/6			

Converse Consultants

Project Name: PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY, SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 | Drawing No. A-5a

Log of Boring No. BH-4

Dates Drilled: 4/4/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): 59

SUMMARY OF SUBSURFACE CONDITIONS

This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Depth (ft)	Summary of Subsurface Conditions	Samples (Drive / Bulk)	Blows	Moisture (%)	Dry Unit Wt. (pcf)	Other
	-90% trash, organic wood chips	Drive	6/4/5			
40	**SILTY SAND (SM):** fine-grained, bluish gray.	Drive	4/6/13			
45	-40% organic, pressed paper	Drive	6/45/50(5")	16	83	
50	**SANDY SILT (ML):** fine-grained sand, bluish gray.	Drive	5/10/14			
	<u>ALLUVIUM (Qal):</u>	Drive	32/50(3")	6	110	
55	**GRAVELLY SAND (SP):** coarse-grained, gravels up to 0.3" in maximum dimension, light brown.	Drive	25/50(2")			
		Drive	36/41/50(2")			
59	▽ (water)					
60						
		Drive	45/50(4")	13	91	
65		Drive	17/23/25			

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 | Drawing No. A-5b

Log of Boring No. BH-4

Dates Drilled: 4/4/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): 59

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		GRAVELLY SAND (SP): coarse-grained, gravels up to 0.3" in maximum dimension, light brown.	■		20/50(3")	8	91	
		End of boring at 71.5 feet. Groundwater was encountered at 59 feet bgs during drilling. Borehole was backfilled with cement slurry. Soil cuttings were collected in drums and set aside on the desginated area.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. A-5c

Log of Boring No. BH-5

Dates Drilled: 4/4/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): NOT ENCOUNTERED

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
0–7		**CAP FILL (Af):** **SILTY SAND (SM):** fine-grained, gravels up to 0.5" in maximum dimension, dark brown.		X				
5								
7–35		**REFUSE LANDFILL (Rf):** **CLAYEY SAND (SC):** fine-grained, wood chips, trash, grayish black.						
10		-abundant wood chips, grayish black, oily						
15								
20								
25								
30								

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 | Drawing No. A-6a

Log of Boring No. BH-5

Dates Drilled: 4/4/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): NOT ENCOUNTERED

SUMMARY OF SUBSURFACE CONDITIONS

This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Depth (ft)	Graphic Log	Summary of Subsurface Conditions	Samples: Drive	Samples: Bulk	Blows	Moisture (%)	Dry Unit Wt. (pcf)	Other
		CLAYEY SILT (CL): fine-grained, wood chips, grayish black.						
40		**CLAYEY SAND (SC):** fine-grained, abundant wood chips, gray.	X		2/1/1			
45								
50		-clayey sand saturated	X		6/6/6			
55								
			X		34/50(6")			
		<u>**ALLUVIUM (Qal):**</u> **GRAVELLY SAND (SP):** medium to coarse-grained, gravels up to 0.5" in maximum dimension, angular, light brown.						
60		-gravels up to 1" in maximum dimension	■		50(5")	9	108	
65			■		50(6")	8	95	
		SANDY SILT (ML): fine-grained sand, yellowish brown.	X		50(6")			

Converse Consultants

Project Name: PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY, SANTA MONICA, CALIFORNIA

Project No.: 08-31-324-01 | Drawing No.: A-6b

Log of Boring No. BH-5

Dates Drilled: 4/4/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): NOT ENCOUNTERED

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		SANDY SILT (ML): fine-grained sand, light gray.	X		50(6")	7	96	
		End of boring at 73 feet. Groundwater was not encountered during drilling. Borehole was backfilled with cement slurry. Soil cuttings were collected in drums and set aside on the desginated area.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 | Drawing No. A-6c

Log of Boring No. BH-6

Dates Drilled: 4/4/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): 29

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		CAP FILL (Af): **SILTY SAND (SM):** coarse-grained, trace of clay, gravels up to 0.5" in maximum dimension, dark gray.			50(4")	5		ma,max ca,er
5					6/14/18	13	121	
		REFUSE LANDFILL (Rf): **CLAYEY SAND (SC):** fine-grained, with trash and woodchips.			6/6/4			
10		-wood chips						
15								
20								
25					4/6/6			
30		-mud						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 | Drawing No. A-7a

Log of Boring No. BH-6

Dates Drilled: 4/4/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): 29

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		CLAY (CL): wood chips, saturated dark gray.						
40		pieces of glass	X		7/8/8			
45		-mostly woodchips						
50		-mud, saturated clay and wood chips	X		1/2/0			
55		**ALLUVIUM (Qal):** **SILTY SAND (SM):** fine-grained, yellowish brown.	X		6/7/9			
60			■		7/18/28			
		SAND (SP): fine-grained, thinnly bedded, light gray with yellowish brown layers.	X		6/15/19			
65			■		28/50(4")	22	92	
		-yellowish brown -grayish brown						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. A-7b

Log of Boring No. BH-6

Dates Drilled: 4/4/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): 29

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		SILTY SAND (SM): fine-grained, ligth gray.	■		28/50(4")	10	88	
					16/20/22			
		End of boring at 73 feet. Groundwater was encountered at 29 feet during drilling. Borehole was backfilled with cement slurry. Soil cuttings were collected in drums and set aside on the desginated area.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. A-7c

Log of Boring No. BH-7

Dates Drilled: 4/4/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): 34

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		REFUSE LANDFILL (Rf): **CLAYEY SILT (ML):** fine-grained, with abundant wood chips.						
40		-mulch			2/3/3			
45					1/2/3			
50		-saturated clayey sand, wood chips			2/7/7			
55					23/20/24			
		ALLUVIUM (Qal): **SAND (SP):** medium-grained, black and white.						
60					40/50(6")	24	97	
					18/22/50(6")			
65					37/50(4")	14	88	ds
					25/50(5")			

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. A-8b

Log of Boring No. BH-7

Dates Drilled: 4/4/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): 34

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		CAP FILL (Af): **SILTY SAND (SM):** fine to medium-grained, dark brown.		X				
5		**REFUSE LANDFILL (Rf):** **CLAYEY SILT (ML):** fine-grained, some clay, with abundant wood chips.						
10								
15		-wood chips (mulch), oily smell	X		2/3/7			
20								
25								
30		-clay/wood chips	X		1/2/2			

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. A-8a

Log of Boring No. BH-7

Dates Drilled: 4/4/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): 34

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		SILTY SAND (SM): medium-grained, trace of clay, gray.			50(6")	16	115	
		SANDY CLAY (CL): medium-grained, gray.			50(6")			
		End of boring at 73 feet. Groundwater was encountered at 34 feet during drilling. Borehole was backfilled with cement slurry. Soil cuttings were collected in drums and set aside on the desginated area.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY SANTA MONICA, CALIFORNIA

Project No. **08-31-324-01**

Drawing No. **A-8c**

Log of Boring No. BH-8

Dates Drilled: 3/27/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): NOT ENCOUNTERED

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES: DRIVE	SAMPLES: BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
0		2" ASPHALT OVER 2" BASE		X (0–5 ft)				ma,r
		ALLUVIUM (Qal): **CLAYEY SAND (SC):** fine to medium-grained, dark organic material, dark gray with reddish brown.	■		4/6/10	30	77	
5			■		4/5/15	24	111	c
		-layer of gravelly silty sand, light brown	■		8/24/27	20	106	ds
10		-gray	■		8/19/23	17	112	
15		-reddish brown	X		7/12/14			
20		-reddiish brown/gray	■		11/12/15	23	96	
25		-coarse-grained, reddish brown	X		9/17/22			
		SAND (SP): medium to coarse-grained, reddish brown.						
30		**CLAYEY SAND (SC):** medium to coarse-grained, reddish brown.	■		7/14/20	21	105	
		CLAY (CL): gray/reddish brown.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 Drawing No. A-9a

Log of Boring No. BH-8

Dates Drilled: 3/27/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): NOT ENCOUNTERED

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		CLAYEY SAND (SC): fine to medium-grained, reddish brown.			7/7/8			
		SANDY SILT (ML): fine-grained sand, gray.						
40		**CLAYEY SAND (SC):** medium-grained, reddish brown.			11/50(6")	10	114	
		End of boring at 41.5 feet. Groundwater was not encountered during drilling. Borehole was used for percolation test. Borehole was backfilled with cement slurry and soil cuttings were collected on drums and set aside on the designated area.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 Drawing No. A-9b

Log of Boring No. BH-9

Dates Drilled: 3/26/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): 35

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
0–5		**CAP FILL (Af):** **CLAYEY SAND (SC):** coarse-grained, pieces of brick, dark gray.	■		9/14/18			ma
5		**REFUSE LANDFILL (Rf):** -abundant organic material with wood chips						
10								
15		-dark gray						
20								
25								
30								

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 Drawing No. A-10a

Log of Boring No. BH-9

Dates Drilled: 3/26/2009 | Logged by: EMJ | Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER | Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A | Depth to Water (ft): 35

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		REFUSE LANDFILL (Rf):						
		-piece of shoe, low methane reading						
40		-odor smell, low methane reading, mud grease						
45			X		2/2/2			
50		-pieces of paper, wood chips	X		1/1/2			
55								
		ALLUVIUM (Qal): **SAND (SP):** fine-grained, orange brown.	X		17/25/30			
60			■		18/30/(4")	19	97	
			X		20/28/40			
65		-light gray / bluish gray with oxidation	■		30/50(5")	21	97	
		-thinly bedded	X		30/42/50(2")			

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 | Drawing No. A-10b

Log of Boring No. BH-9

Dates Drilled: 3/26/2009 Logged by: EMJ Checked By: SCL

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): N/A Depth to Water (ft): 35

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 together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES DRIVE	SAMPLES BULK	BLOWS	MOISTURE (%)	DRY UNIT WT. (pcf)	OTHER
		SAND (SP): fine-grained, light gray.	■		39/50(5")	14	95	
		End of boring at 71.5 feet. Groundwater was encountered at 35 feet during drilling. Borehole was backfilled with cement slurry. Soil cuttings were collected in drums and set aside on the designated area.						

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01 Drawing No. A-10c

ARTHUR D. LITTLE LOGS

Arthur D Little
2500 Michelson Drive, Suite 110 Irvine, California 92612
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SOIL BORING LOG FOR LFP-2

PROJECT NUMBER 33226
PROJECT NAME City of Santa Monica
DRILLING COMPANY/DRILLER Layne Christensen / A. Carrera
DRILLING METHOD 8-inch-Diameter Hollow-Stem Auger
GROUND ELEVATION Not Measured
REMARKS

LOCATION Corporation Yard
DATE DRILLED March 18, 1998
LOGGED BY A. Jaksich
SAMPLING METHOD 2-inch-Diameter Split Spoon
INITIAL DEPTH TO WATER Not Encountered

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM	NM	0					Grass	1.5
NM	NM	0		5	CL		Black (5Y 2/1) SANDY-SILTY-CLAY, slight plasticity, soft to medium stiffness, low moisture, no odor, with appreciable fines, approximately 5% organic material comprised of wood fibers	7.5
20	3 11 13	0 3 6			CL		As above	9.5
12	4 5 3	0 0 2		10	CL		Same as above with approximately 30% to 50% organic material, wood pieces	11.5

SOIL BORING LOG 33226S~1.GPJ ADL_IRVN.GDT 6/26/00

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SOIL BORING LOG FOR LFP-4

PROJECT NUMBER 33226
PROJECT NAME City of Santa Monica
DRILLING COMPANY/DRILLER Layne Christensen / A. CArrera
DRILLING METHOD 8-Inch-Diameter Hollow-Stem Auger
GROUND ELEVATION Not Measured
REMARKS

LOCATION Corporation Yard
DATE DRILLED April 27, 1999
LOGGED BY A. Jaksich
SAMPLING METHOD 2-Inch-Diameter Split Spoon
INITIAL DEPTH TO WATER Not Encountered

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM	NM	0					ASPHALT	0.5
3.9	NM	0			CL		Dark Gray (7.5YR 3/1) SILTY CLAY, low plasticity, soft, moist, no odor	5.0
14.8	2 3 9	3 6 6		5			REFUSE, mixed with organic material, wood chips, small twig fragments, also 1/2" brick fragments present, moist, musty odor	10.0
50.2	12 50X6"	3 6 3		10			REFUSE as above, organic material content increasing, larger fragments of wood chips, twigs	12.0

SOIL BORING LOG 33226S-1.GPJ ADL_IRVN.GDT 6/26/00

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SOIL BORING LOG FOR LFP-5

PROJECT NUMBER	33226	LOCATION	Corporation Yard
PROJECT NAME	City of Santa Monica	DATE DRILLED	April 27, 1999
DRILLING COMPANY/DRILLER	Layne Christensen / A. CArrera	LOGGED BY	A. Jaksick
DRILLING METHOD	8-inch-Diameter Hollow-Stem Auger	SAMPLING METHOD	2-Inch-Diameter Split Spoon
GROUND ELEVATION	Not Measured	INITIAL DEPTH TO WATER	Not Encountered
REMARKS			

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM	NM	0					ASPHALT	
7.3	NM	0			CL		Dark Gray (7.5YR 3/1) SILTY CLAY, slight to low plasticity, soft, low moisture, no odor	0.5
6.9	7 8 3	3 6 6		5	CL		Dark Gray (5YR 3/1) CLAY, low plasticity, soft, moist, musty odor, small amount of wood fibers/organic material	5.0
21.3	3 4 21	3 6 6		10	SM		Dark Gray (5YR 3/1) SILTY SAND, mixed with small percentage of refuse composed of rubber pieces and wood fibers	10.0
NM	18 11 7	0		15			REFUSE, composed of concrete	15.0
								15.5

SOIL BORING LOG 33226S-1.GPJ ADL_IRVN.GDT 6/26/00

Arthur D Little

Soil Boring Log

Boring No. LFG-9
Client CSM-LFG
Project LFG EXPANSION
Case No. 70280-32

Date Start 8/3/00	Contractor LAYNE
Date Complete	Drill Method CME 75
Hole Diameter	Type Of Rig
Casing Size	Drilling Additives
Boring Depth	Geologist
Sampling Method	

LOCATION

Scale in Feet	SAMPLE Type and number	Interval	Recovery	Blows Per 6"	Total Organics (ppm)	GEOLOGIC DESCRIPTION Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description
0.0						
2						
4						
6	1600	5.0 TO 6.5	0 0 5	2 3 5	8.6	MISC ROCK/ASPHALT.
8						
10	1605	10.0 TO 11.5	0 0 6	6 8 11	15.0	ROCK & CLAY.
12						
14						
16	1610	15.0 TO 16.5	6 6 6	1 2 3	0.0	CLAY CONTINUOUS.
18						
20	1615	20 TO 21.5	4 6 6	2 3 6	0.0	CLAY AS ABOVE
22						
24						
26						

Arthur D Little	Soil Boring Log Continuation Page	Boring No. Client Project Case No.

Scale in Feet	SAMPLE Type and number	Interval	Recovery	Blows Per 6"	Total Organics (ppm)	GEOLOGIC DESCRIPTION Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description
26	1620	25.0 TO 26.5	6 6 6	3 4 4	0.0	CLAY AS ABOVE
28						
30	1625	30.0 TO 31.5	3 6 6	5 5 8	0.0	CLAY AS ABOVE INCREASE SAND
32						
34						
36	1630	35.0 TO 36.5	6 6 6	4 5 8	0.0	CLAY AS AT 25.0
38						
40						
42						
44						

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SOIL BORING LOG FOR LFG9

PROJECT NUMBER 70280
PROJECT NAME City of Santa Monica
DRILLING COMPANY/DRILLER Layne Christensen / A.Carrera
DRILLING METHOD 12-inch-Diameter Hollow-Stem Auger
GROUND ELEVATION Not Measured
REMARKS

LOCATION Corporation Yard
DATE DRILLED August 3, 2000
LOGGED BY E. Klock
SAMPLING METHOD 2-inch-Diameter Split Spoon
INITIAL DEPTH TO WATER Not Encountered

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	DEPTH (ft. BGS)	U.S.C.S.	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM	NM	0			Concrete	
NM	NM	0			Gravel Fill	0.4
8.5	2 3 5	0 0 5	5		Gravel Fill	5.0
15.0	6 8 11	0 0 6	10		Gravel Fill with 40% Pale Yellowish Brown (10YR 6/2) SILTY CLAY, slight plasticity, low to slight moisture	10.0
0.0	1 2 3	6 6 6	15	CL	Dark Yellowish Brown (10YR 4/2) CLAY, slight plasticity, low to slight moisture	15.0
0.0	2 3 6	4 6 6	20	CL	As above	20.0
0.0	3 4 4	6 6 6	25	CL	As above	25.0
0.0	5 5 8	3 6 6	30	ML	Dusky Yellowish Brown (10YR 2/2) to Dark Yellowish Brown (10YR 4/2) SILTY TO CLAYEY FINE SANDS, light plasticity, low to slight moisture, with appreciable fines present	30.0

Continued Next Page

SOIL BORING LI 30S-2.GPJ ADL_IRVN.GDT 10/9/00

Arthur D Little

Soil Boring Log

Boring No. LFG-10
Client CSM-LFG
Project LFG EXPANSION
Case No. 70280-32

Date Start
Date Complete
Hole Diameter
Casing Size
Boring Depth
Sampling Method

Contractor LAYNE
Drill Method
Type Of Rig
Drilling Additives
Geologist

LOCATION

Scale in Feet	SAMPLE Type and number	Interval	Recovery	Blows Per 6"	Total Organics (ppm)	GEOLOGIC DESCRIPTION Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description
0.0						
2.0						
4.0						
6.0	0845	5.0 TO 6.5	4 5 6	11 12 13	2.0 10.5 16.5	
8.0						
10.0	0850	10.0 TO 11.5 ~~11.0 TO~~ ~~12.0~~	6 6 6	4 5 5	10.5 110.8 —	REFUSE @ 10.5' GLASS/WOOD CHIPS STAINING @ 10.5' SLIGHT HC ODOR
12.0						
14.0						
16.0	0855	15.0 TO 16.5	0 0 6	2 3 8	27.8 — —	REFUSE
18.0						
20.0	0900	20.0 TO 21.5	5 6 6	5 19 14	15.7 92.2 157.2	REFUSE - HC ODOR
22.0						
24.0						
26.0						

Arthur D Little

Soil Boring Log
Continuation Page

Boring No. LFG-10
Client
Project
Case No.

Scale in Feet	SAMPLE Type and number	Interval	Recovery	Blows Per 6"	Total Organics (ppm)	GEOLOGIC DESCRIPTION Unified Soil Class ID, color (Munsell System), grain size, sorting, moisture, compaction, indication of contaminants (unusual odor or sheen), and general stratigraphic description
26.0	0905	25.0 TO 26.5	Ø Ø Ø	2 2 2	NS NS NS	CUTTINGS INDICATE REFUSE, VERY MOIST WOOD DEBRIS, GLASS
28.0						
30.0	0910	30.0 TO 31.5	0 4 6	3 3 4	– 10.7 –	PHONE BOOK, WOOD DEBRIS
32.0						
34.0						
36.0	0915	35.0 TO 36.5	4 6 6	7 7 8	– 16.1 –	TIN FOIL, GLASS, PLASTIC, WOOD DEBRIS, NEWSPRINT.
38.0						
40.0	0920	40.0 TO 41.5	3 6 6	3 5 7	9.8 1.9 4.4	40.0 - 41.0 REFUSE (TYP.) 41.0 - 41.5 SAND
42.0	0925	41.5 TO 43.0	4 6 6	1 2 3	18.6 –	41.5 TO 42.0 SAND ↑ SATURATED w/ H_2O 42.0 TO 43.0 CLAY VERY WET & SOFT
44.0	0930	43.0 TO 44.5	6 6 6	1 1 2	– 53.9 –	CLAY MOSTLY w/ SAND LENSE ABOUT 2" THICK @ 43.5'. CLAY IS SATURATED. HC STAINS @ 44.0'
46.0	0935	44.5 TO 46.0	Ø 6 6	2 2 2	– 4.8 –	SATURATED CLAY, NO SAND PRESENT

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SOIL BORING LOG FOR LFG10

PROJECT NUMBER 70280
PROJECT NAME City of Santa Monica
DRILLING COMPANY/DRILLER Layne Christensen / A.Carrera
DRILLING METHOD 12-inch-Diameter Hollow-Stem Auger
GROUND ELEVATION Not Measured
REMARKS

LOCATION Corporation Yard
DATE DRILLED August 3, 2000
LOGGED BY E.Kiock
SAMPLING METHOD 2-inch-Diamter Split Spoon
INITIAL DEPTH TO WATER Not Encountered

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM NM	NM NM	0 0					Asphalt	0.5
					CL		Moderate Yellowish Brown (10YR 5/4) CLAY, slight plasticity, low to slight moisture, minor refuse odor	
2 10.5 15.5	11 12 13	4 5 6		5	CL		As above	5.0
					CL		Dark Yellowish Brown (10YR 4/2) to Dusky Yellowish Brown (10YR 2/2) CLAY, slight plasticity, low to slight moisture, minor refuse odor, minor refuse component	5.5
							Dusky Yellowish Brown (10YR 2/2) to Black (N1) CLAY with 50% REFUSE component, slight plasticity in clay, slight to low moisture, minor refuse odor	6.0
					CL		Dark Yellowish Brown (10YR 4/2) to Dusky Yellowish Brown (10YR 2/2) CLAY, slight plasticity, low to slight moisture, minor refuse odor, minor refuse component	6.5
10.5 110.8	4 5 5	6 6 6		10	CL		Grayish Black (N2) CLAY, slight plasticity, slight moisture, minor refuse odor	10.0
							REFUSE characterized by 1" to 2" wood chunks, broken glass, and newspaper, mixed with approximately 10% as above soil	10.5
27.8	2 3 8	0 0 6		15			As above	15.0
15.7 92.2 157.2	5 19 14	5 6 6		20			As above	20.0
							As above, also characterized by 1" to 3" broken asphalt and concrete chunks	21.0
NM	2 2 2	0 0 0		25				
10.7	3 3 4	0 4 6		30			As above	30.0

Continued Next Page

SOIL BORING LC 280S-2.GPJ ADL_IRVN.GDT 10/9/00

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SOIL BORING LOG FOR PP-5

PROJECT NUMBER 30497
PROJECT NAME City of Santa Monica
DRILLING COMPANY/DRILLER Layne Christensen / D. Kirsnis
DRILLING METHOD 8-inch-Diameter Hollow-Stem Auger
GROUND ELEVATION Not Measured
REMARKS

LOCATION Corporation Yard
DATE DRILLED September 26, 1996
LOGGED BY K. Ohara
SAMPLING METHOD 2-inch-Diameter CA Modified Split Spoon
INITIAL DEPTH TO WATER Not Encountered

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM	NM	0					Graded fill, silt and gravel.	1.0
0.0	NM	0			CL		Dark Yellowish Brown (10YR 5/4) SILTY CLAY, no to low plasticity, very slight moisture, no odor or sheen, with ~10% fine gravel and brick fragments	5.0
0.0	11 18 22	3 6 6		5			Olive Gray (5Y 3/2) SILTY CLAY, no to low plasticity, very stiff, dry, no odor or sheen	
0.0	14 21 36	6 6 6		10	CL			15.0
0.0	8 11 14	3 6 6		15	CL ML		Olive Gray (5Y 3/2) CLAY and SILT, low to no plasticity, very stiff, dry, no odor or sheen	20.0
0.0	7 9 15	4 6 6		20	CL		Olive Gray (5Y 3/2) SILTY CLAY, moderate plasticity, stiff, slightly moist, no odor or sheen	25.0
0.0	11 10 38	6 6 6		25	CL		Olive Gray (5Y 3/2) SILTY CLAY, low to moderate plasticity, very stiff, slightly moist, no odor or sheen	

Continued Next Page

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SOIL BORING LOG FOR PP-5

PROJECT NUMBER 30497
PROJECT NAME City of Santa Monica
LOCATION Corporation Yard
DATE DRILLED September 26, 1996

Continued from Previous Page

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
0.0	9 11 15	4 6 6		30	CL		Olive Gray (5Y 3/2) SANDY CLAY, low to moderate plasticity, stiff, slightly moist, no odor or sheen, with fine-grained sand and appreciable silt	30.0
0.0	8 10 14	1 6 6		35	ML		Olive Gray (5Y 3/2) SANDY, CLAYEY, SILT, soft, moist, no odor or sheen, with fine-grained sand	35.0
								36.0

SOIL BORING LOG 30497S-1.GPJ ADL_IRVN.GDT 6/28/00

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SOIL BORING LOG FOR PP-6

PROJECT NUMBER	30497	LOCATION	Corporation Yard
PROJECT NAME	City of Santa Monica	DATE DRILLED	September 25, 1996
DRILLING COMPANY/DRILLER	Layne Christensen / D. Kirsnis	LOGGED BY	K. Ohara
DRILLING METHOD	8-inch-Diameter Hollow-Stem Auger	SAMPLING METHOD	2-Inch-Diameter Split Spoon
GROUND ELEVATION	Not Measured	INITIAL DEPTH TO WATER	Not Encountered
REMARKS			

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM	NM	0					Concrete	0.5
0.0	NM	0			CL		Dark Yellowish Brown (10YR 4/2) SILTY CLAY, low plasticity, dry, no odor or sheen, with ~25% coarse-grained gravel	
0.0	13 19 27	4 6 6		5	CL ML		Olive Gray (5y 3/2) CLAY and SILT, low plasticity, very stiff, dry, no odor or sheen	5.0
0.0	11 36 45	5 6 6		10	CL		Olive Gray (5Y 3/2) SILTY CLAY, low plastity, hard, dry, no odor or sheen	10.0
0.0	7 10 14	0 6 6		15	CL		Olive Gray (5Y 3/2) SANDY CLAY, moderate plasticity, very stiff, slightly moist, no odor or sheen, with fine-grained, poorly graded sand, ~10% silt	15.0
0.0	8 11 13	4 6 6		20	CL		Olive Gray (5Y 3/2) SILTY CLAY, no to low plasticity, very stiff, dry, no odor or sheen	20.0
0.0	9 14 19	4 6 6		25	CL		Olive Gray (5Y 3/2) CLAY and SILT, low to no plasticity, very stiff, dry, no odor or sheen Latter 13" to 16" - Olive Gray (5Y 3/2) SANDY CLAY, low to no plasticity, very stiff, slightly moist, no odor or sheen	25.0

Continued Next Page

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SOIL BORING LOG FOR PP-6

PROJECT NUMBER 30497
PROJECT NAME City of Santa Monica
LOCATION Corporation Yard
DATE DRILLED September 25, 1996

Continued from Previous Page

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
					ML			
4.3	7 10 14	3 6 6		30	SC		Olive Gray (5Y 3/2) SANDY CLAY to CLAYEY SAND, moderate plasticity, medium dense sand, fine-grained sand, poorly graded, slightly moist, no odor or sheen Alternating layers within sample; 0"-5" SC; 5"-10" CL; 10"-15" SC	30.0
0.0	9 14 16	0 6 6		35	ML		Dark Yellowish Brown (10YR 4/2) CLAYEY SILT, no plasticity, slightly moist, no odor or sheen	35.0
							Latter 8" - ML Olive Gray (5Y 3/2) SANDY, CLAYEY SILT, no plasticity, no odor or sheen, with fine-grained sand	36.0

SOIL BORING LOG 30497S-1.GPJ ADL_IRVN.GDT 6/26/00

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SOIL BORING LOG FOR PP14

PROJECT NUMBER 33226
PROJECT NAME City of Santa Monica
DRILLING COMPANY/DRILLER Layne Christensen / A. Carrera
DRILLING METHOD 8-Inch-Diamter Hollow-Stem Auger
GROUND ELEVATION Not Measured
REMARKS

LOCATION Corporation Yard
DATE DRILLED March 16, 1998
LOGGED BY A.Jaksich
SAMPLING METHOD 2-Inch-Diameter Split Spoon
INITIAL DEPTH TO WATER Not Encountered

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM	NM	0					Gravel	1.0
NM	NM	0			CL		Dark Brown (7.5 YR 4/3) SILTY CLAY, low plasticity, stiff, slight moisture, no odor	4.5
0	5 12 19	4 6 6		5	CL		As above	9.5
0	3 9 21	2 6 6		10	CL		Dark Brown (7.5 YR 4/3) SILTY CLAY, low plasticity, increasing stiffness, decreasing moisture, no odor	14.5
0	5 13 21	6 6 6		15	CL		Dark Grayish Brown (10YR 4/2) SILTY CLAY, slight to low plasticity, medium stiff to stiff, low moisture, no odor	19.5
0	3 5 8	6 6 6		20	CL		As above	24.5
0	3 7 17	6 6 6		25	CL		As above	29.5
0	4 6 13	6 6 6		30	CL		Dark Grayish Brown (10YR 4/2) SILTY CLAY, slight to low plasticity, medium stiff to stiff, low moisture, no odor, with inreasing silt content from above	34.5
0	9 10 14	6 6 6		35	CL		Reddish Brown (5YR 4/3) SANDY CLAY, none to slight plasticity, soft to medium stiffness, fine to very fine sand grain size, slight moisture, no odor	37.5
0	5 17 18	6 6 6			CL		Reddish Brown (5YR 4/3) SANDY CLAY, none to slight plasticity, soft to medium stiffness, fine to very fine sand grain size, increasing moisture from above, no odor	39.0

SOIL BORING LOG 33226S~1.GPJ ADL_IRVN.GDT 6/26/00

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SOIL BORING LOG FOR PP20

PROJECT NUMBER	70280	LOCATION	Corporation Yard
PROJECT NAME	City of Santa Monica	DATE DRILLED	April 3, 2000
DRILLING COMPANY/DRILLER	Layne Christensen / A. Carrera	LOGGED BY	E. Stahl
DRILLING METHOD	8-inch-Diameter Hollow-Stem Auger	SAMPLING METHOD	2-inch-Diameter Split Spoon
GROUND ELEVATION	Not Measured	INITIAL DEPTH TO WATER	Not Encountered
REMARKS			

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM	NM	0					Concrete	0.4
NM	NM	0			CL		Dark Yellowish Brown (10YR 4/2) CLAY, no to slight plasticity, dry to moist, no odor	4.5
0.0	2 4 10	6 6 6		5	CL		As above	9.5
0.0	14 12 18	6 6 6		10	CL		As above	14.5
0.0	3 3 5	6 6 6		15	CL		Dark Yellowish Brown (10YR 4/2) CLAY, moderate plasticity, moist to wet, no odor	19.5
0.0	2 4 9	6 6 6		20	CL		As above	24.5
0.0	3 6 9	6 6 6		25	CL		As above	29.5
1.9	4 7 10	6 6 6		30	SW		Dark Yellowish Brown (10YR 4/2) SAND, well graded sands, fine sand grain size, moist, no odor	34.5
7.4	3 4 6	6 6 6		35	SM		Dark Yellowish Brown (10YR 4/2) SILTY SAND mixture, very fine to fine sand grain size, moist, no odor	37.5
2.3	6 9 12	6 6 6			ML		Dark Yellowish Brown (10YR 4/2) ROCK FLOUR, silty fine sands, no plasticity, moist, no odor	39.0

SOIL BORING LOG PP20.GPJ ADL_IRVN.GDT 6/26/00

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SOIL BORING LOG FOR PP21

PROJECT NUMBER	70280	LOCATION	Corporation Yard
PROJECT NAME	City of Santa Monica	DATE DRILLED	March 31, 2000
DRILLING COMPANY/DRILLER	Layne Christensen / A. Carrera	LOGGED BY	E. Stahl
DRILLING METHOD	8-inch-Diameter Hollow-Stem Auger	SAMPLING METHOD	2-inch-Diameter Split Spoon
GROUND ELEVATION	Not Measured	INITIAL DEPTH TO WATER	Not Encountered
REMARKS			

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM NM	NM NM	0 0					Concrete	0.3
					CL		Olive Black (5Y 2/1) CLAY to LEAN CLAY, with well-rounded to subrounded granule- to pebble-sized clasts, moderate plasticity, moist to wet, no odor	4.5
0.0	2 2 2	6 6 6		5	CL		As above	9.5
0.0	6 14 17	6 6 6		10	CL		Dark Yellowish Brown (10YR 4/2) CLAY, no plasticity, moist, no odor	14.5
3.3	3 5 8	6 6 6		15	CL		Greenish Black (5GY 2/1) SILTY CLAY, no plasticity, moist, no odor	19.5
2.1	5 7 12	6 6 6		20	CL		Dark Yellowish Brown (10YR 4/2) CLAY, slight plasticity, moist, no odor	24.5
3.9	4 8 13	6 6 6		25	CL		As above	29.5
3.1	3 5 7	6 6 6		30	CL		Dark Yellowish Brown (10YR 4/2) SILTY CLAY, slight plasticity, moist, no odor	34.5
2.8	3 4 7	6 6 6		35	CL		As above	37.5
4.4	7 12 14	6 6 6			CL		As above	39.0

SOIL BORING LOG PP21.GPJ ADL_IRVN.GDT 6/26/00

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SOIL BORING LOG FOR PP22

PROJECT NUMBER	70280	LOCATION	Corporation YArd
PROJECT NAME	City of Santa Monica	DATE DRILLED	March 31, 2000
DRILLING COMPANY/DRILLER	Layne Christensen / A. Carrera	LOGGED BY	E. Stahl
DRILLING METHOD	8-inch-Diameter Hollow-Stem Auger	SAMPLING METHOD	2-inch-Diameter Slpit Spoon
GROUND ELEVATION	Not Measured	INITIAL DEPTH TO WATER	Not Encountered
REMARKS			

PID (ppmv)	BLOWS per 6 inches	RECOVERY (inches)	SAMPLE TYPE	DEPTH (ft. BGS)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH
NM NM	NM NM	0 0			SC		Concrete Dark Yellowish Brown (10YR 4/2) CLAYEY SAND, fine to medium sand grain size, poorly graded, moist, no odor	0.4
0.9	6 16 17	2 6 6		5	SC		As above	4.5
0.9	5 13 21	4 6 6		10	SC		As above	9.5
3.2	11 19 25	6 6 6		15	SC		Olive Gray (5Y 2/1) to Dark Yellowish Brown (10YR 4/2) CLAYEY SAND, fine to medium sand grain size, poorly graded, moist, no odor	14.5
0.0	14 22 27	4 6 6		20	SM		Light Brown (5YR 5/6) to Moderate Yellowish Brown (10YR 5/4) SILTY SAND, with minor granule sized clasts, fine to medium sand grain size, poorly-graded, moist, no odor	19.5
13.5	14 21 24	6 6 6		25	ML		Dark Yellowish Orange (10YR 6/6) SILTY SAND, silt to fine sand grain size, well-graded, moist, no odor	24.5
6.9	11 15 21	6 6 6		30	ML		As above	29.5
11.6	13 20 22	6 6 6		35	ML		Moderate Yellowish Brown (10YR 5/4) ROCK FLOUR, well-graded, moist, no odor	34.5
2.8	14 17 22	6 6 6			SM		Moderate Yellowish Brown (10YR 5/4) SILTY SAND, with well-rounded pebble-sized clasts, silt to fine sand grain size, poorly-graded, moist, no odor	37.5 39.0

SOIL BORING LOG PP22.GPJ ADL_IRVN.GDT 6/26/00

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Moisture Content and Dry Density

Moisture content and dry density determinations were performed on relatively undisturbed ring samples to aid in classification of the soils and to provide quantitative measure of the *in-situ* dry density. Data obtained from this test also provides an indication of the strength and compressibility characteristics of the soil. Moisture content and dry density for each sample tested are listed at the depth that the sample was taken on the Boring Logs in Appendix A, *Borings*.

Grain Size Analysis

To aid in classification of the soils, mechanical grain-size analyses were performed on six (6) representative samples. Testing was performed in accordance with the ASTM Standard D422 test method. For test results, see Drawings No. B-1a and B-1b, *Grain Size Distribution Results.*

Percentage of Soil Finer than the No. 200 Sieve

The percentage finer than sieve No. 200 test was performed on four soil samples (* indicates the results from three Grain Size Distribution Analysis) to aid in the classification of the on-site soils and to estimate other engineering parameters. Testing was performed in general accordance with the ASTM Standard D1140 test method. The test results are presented in the following table:

Table No. B-1, Percent Passing Sieve # 200 Results

Boring No.	Depth (feet)	Soil Classification	Percent Passing Sieve No. 200
BH-1*	0-5	Clayey Sand (SC)	42
BH-2*	0-5	Sandy Clay (CL)	68
BH-3*	0-5	Clayey Sand (SC)	28
BH-3	41.5	Sandy Silt (ML)	70
BH-3	46.5	Sandy Silt (ML)	79
BH-3	51.5	Sandy Silt (ML)	48
BH-6*	0-5	Silty Sand (SM)	18
BH-8*	0-5	Clayey Sand (SC)	44
BH-9*	0-5	Clayey Sand (SC)	27

Note: * Results from grain-size analysis

Maximum Dry Density Test

Two (2) laboratory maximum dry density-moisture content relationship test was performed on one representative bulk sample. The test was conducted in accordance with ASTM Standard D1557 laboratory procedure. The test result is presented on Drawing No. B-2, *Moisture-Density Relationship Result.*

Expansion Index Test

Two (2) representative bulk samples were tested to evaluate the expansion potential of material encountered at the site. The test was conducted in accordance with California Building Code (CBC, 2001). Test result is presented in the following table.

Table No. B-2, Expansion Index Test Results

Boring No.	Depth (feet)	Soil Description	Expansion Index	Expansion Potential
BH-1	0-5	Clayey Sand (SC)	3	Very low
BH-3	0-5	Clayey Sand (SC)	3	Very low

Consolidation Tests

Data obtained from this test performed on three (3) relatively undisturbed soil samples was used to evaluate the settlement characteristics of on-site soils under loads. This test involved loading a specimen into the test apparatus, which contained porous stones to accommodate vertical drainage during testing. A porous stone was also placed over the sample to accommodate drainage. The normal load was then applied to the specimen. Resulting vertical deflections were recorded at various time periods. The load was increased after the sample reached a reasonable state of equilibrium. The samples were tested under field moisture conditions up to a normal load of 2 kip per square foot. The samples were then submerged with water. Test results are presented on Drawings No. B-3 through B-5, *Consolidation Test Results.*

Direct Shear Tests

Three (3) direct shear tests were performed on relatively undisturbed ring samples under soaked moisture conditions. Each sample was divided into three sets of two brass rings each. Each set of brass rings was placed into the test apparatus and different a normal load was applied. Shear stress was then applied to deform the sample at a constant strain rate of 0.005 inch per minute. Deformation and shear stress were recorded periodically until a maximum of about 0.3-inch shear displacement was achieved. Based on our visual examination of the specimen after each test, the particle size along shear plane is less than 10 percent of specimen diameter per ASTM 3080. Ultimate strength was selected from the shear stress vs. deformation data and plotted to determine the shear strength parameters. Direct shear test data, including sample density and moisture content and loading sequence, are shown on Drawing No. B-6 through B-8. The results are summarized in terms of friction angle and cohesion in the table below.

Table No. B-3, Summary of Direct Shear Test Results

Boring No.	Depth (feet)	Soil Description	Cohesion (psf)	Friction Angle (degrees)
BH-2	5	Clay (CL)	300	31
BH-7	65	Sand (SP)	250	30
BH-8	7	Clayey Sand (SC)	400	35

Soil Corrosivity

Two (2) soil samples were analyzed for minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of these tests is to determine the corrosion potential of site soils when placed in contact with common construction materials. The Environmental Geotechnology Laboratory, Inc. (EGL) in Arcadia, California, performed these tests. Test results are summarized below in Table No. B-2, *Corrosivity Test Results*.

Table No. B-4, Corrosivity Test Results

Boring No.	Depth (feet)	pH CALTRANS 643	Chloride (ppm) CALTRANS 422	Sulfate (ppm) CALTRANS 417	Minimum Resistivity (ohm-cm) CALTRANS 643
BH-2	0-5	9.7	330	230	1350
BH-6	0-5	8.7	270	580	1050

R-Value Test

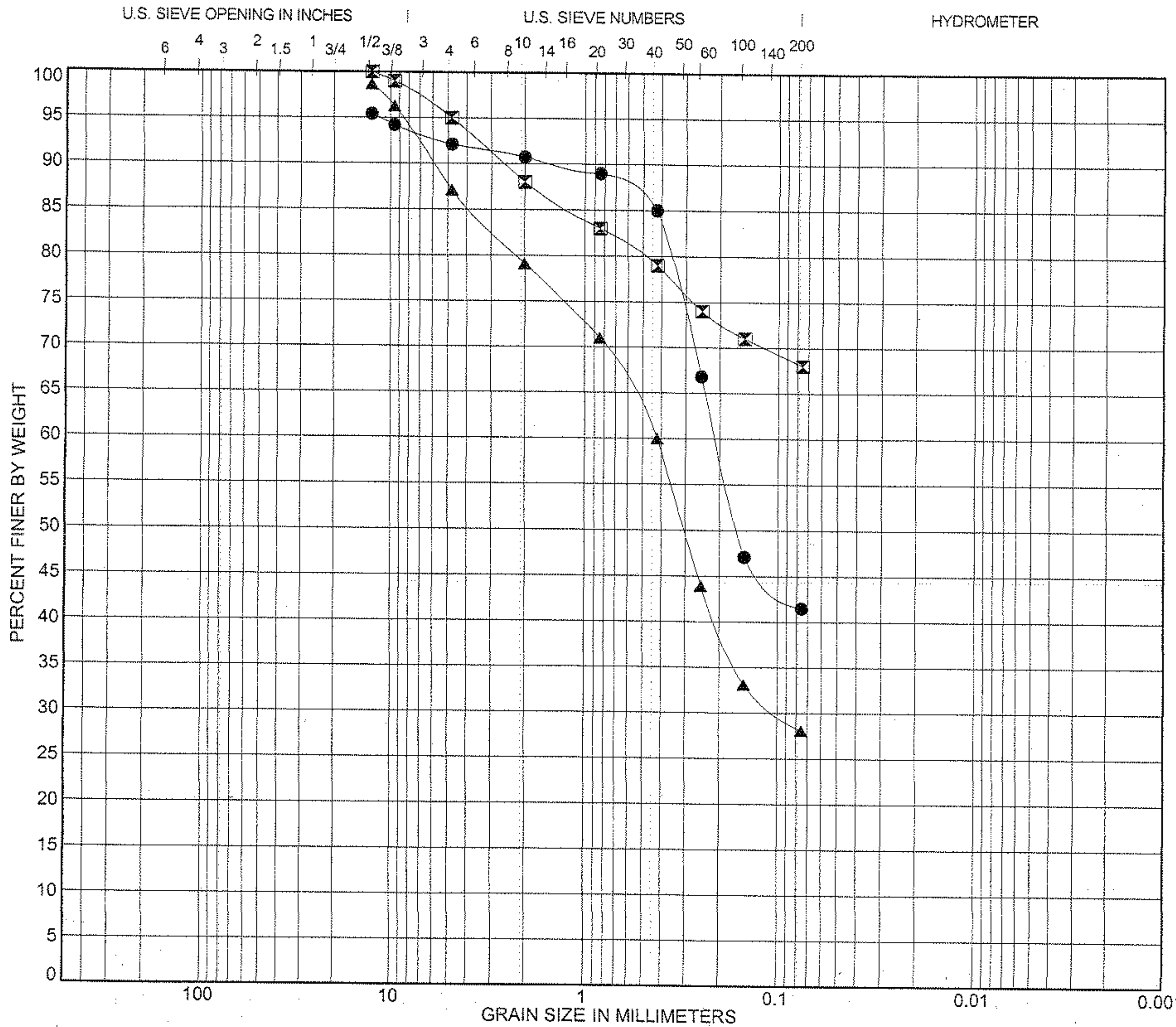
Two (2) representative soil sample of the near-surface soils encountered at the site was tested for R-value. The test was performed in accordance with Caltrans Test Method 301. The test result is presented in the following table.

Table No. B-5, R-Value Test Results

Boring No.	Depth (feet)	R-Value (Caltrans 301)
BH-2	0-5	20
BH-8	0-5	27

Sample Storage

Soil samples presently stored in the Converse soils laboratory will be discarded 30 days after the date of this report, unless this office receives a specific request, and an appropriate fee, to retain the samples for a longer period.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	**BH-1**	**0-5**	**CLAYEY SAND (SC)**					
⧗	**BH-2**	**0-5**	**SANDY CLAY (CL)**					
▲	**BH-3**	**0-5**	**CLAYEY SAND (SC)**					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH-1**	**0-5**	**12.5**	**0.209**			**3.3**	**50.6**	**41.5**	
⧗	**BH-2**	**0-5**	**12.5**				**5.0**	**27.0**	**68.0**	
▲	**BH-3**	**0-5**	**12.5**	**0.42**	**0.097**		**11.6**	**59.0**	**28.1**	

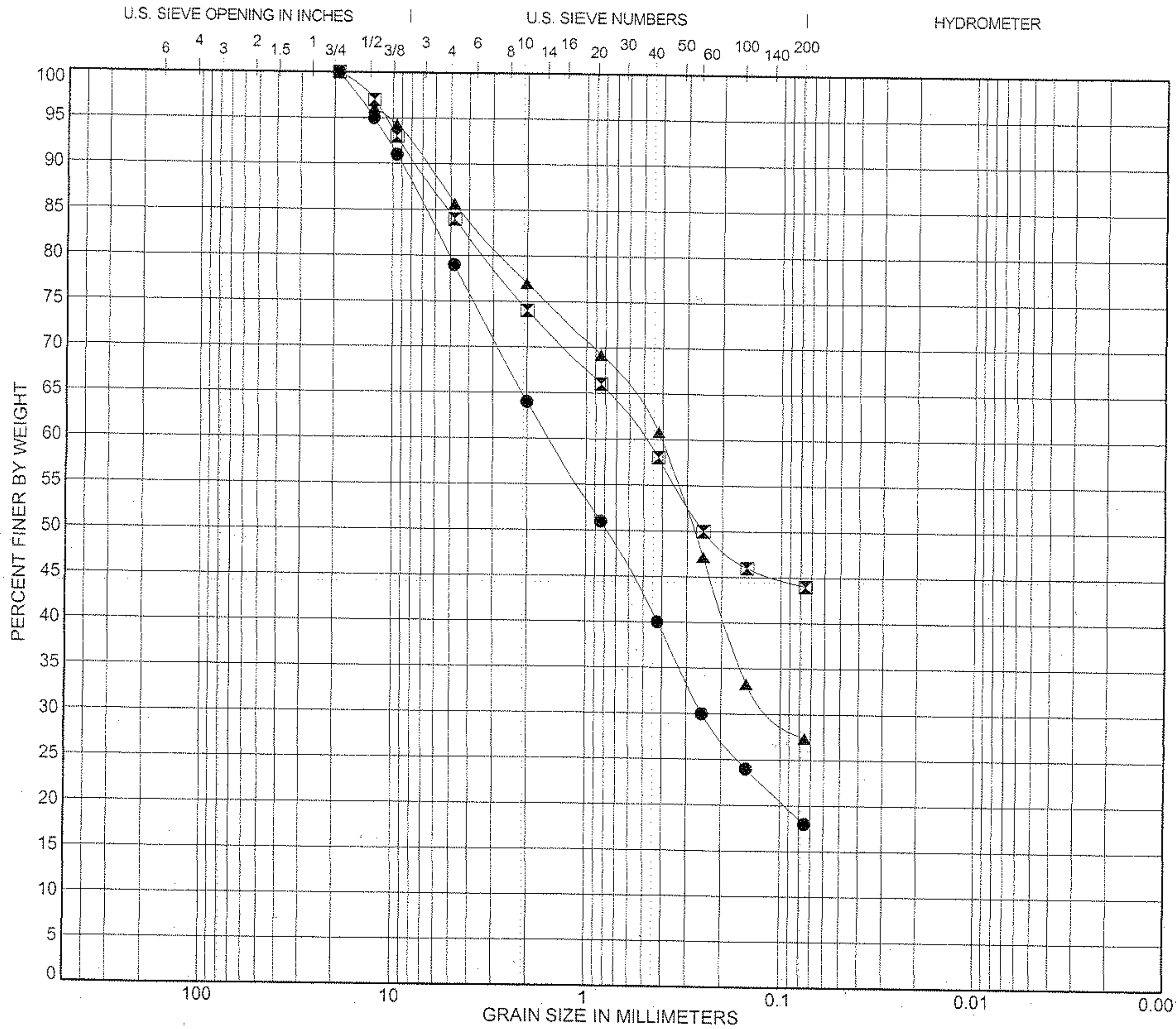
GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY SANTA MONICA, CALIFORNIA

Project No. **08-31-324-01**

Drawing No. **B-1a**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
●	BH-6	0-5	**SILTY SAND (SM)**					
⧗	BH-8	0-5	**CLAYEY SAND (SC)**					
▲	BH-9	0-5	**CLAYEY SAND (SC)**					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH-6	0-5	19	1.531	0.25		21.0	61.0	18.0	
⧗	BH-8	0-5	19	0.499			16.0	40.0	44.0	
▲	BH-9	0-5	12.5	0.407	0.101		10.4	58.3	27.4	

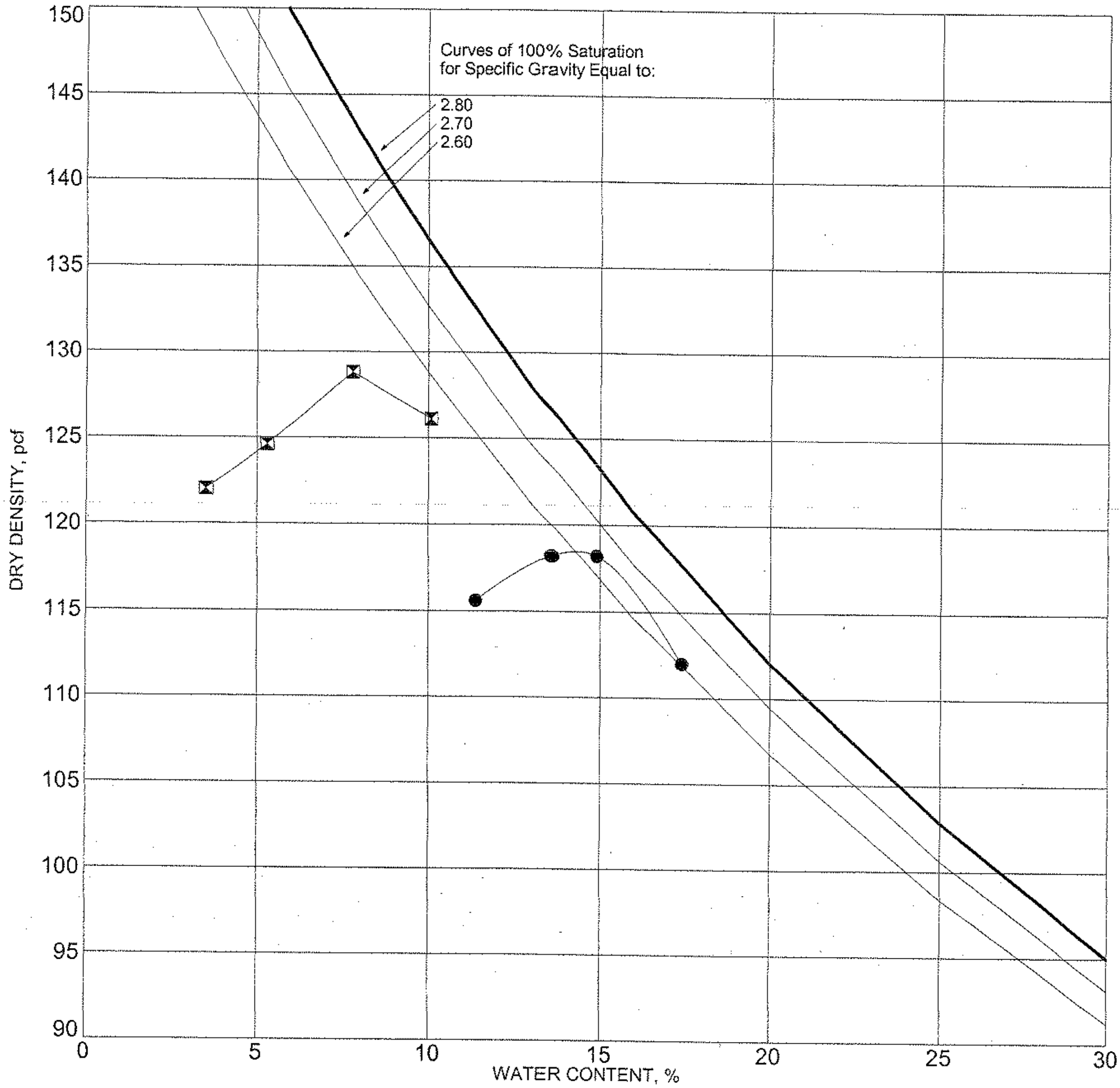
GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. B-1b



SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	BH-2	0-5	SANDY CLAY (CL)	D1557 Method B	14.3	118.5
⧗	BH-6	0-5	SILTY SAND (SM)	D1557 Method C	8.5	129.5

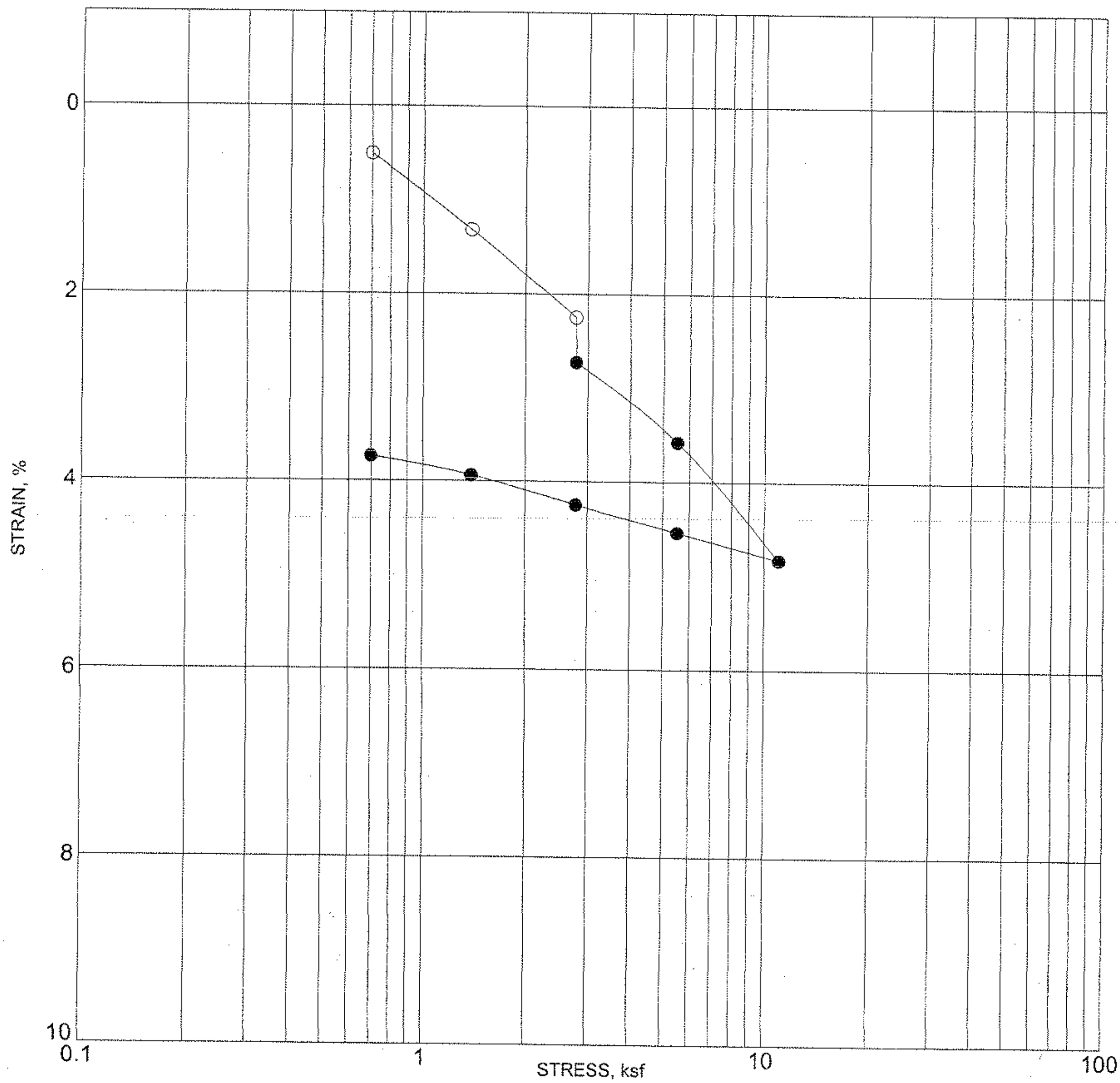
MOISTURE-DENSITY RELATIONSHIP RESULTS

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. **08-31-324-01**

Drawing No. **B-2**



BORING NO. :	BH-1	DEPTH (ft) :	7
DESCRIPTION :	CLAYEY SAND (SC)		

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	9.2	124.3		
FINAL	13.5	124.3		

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

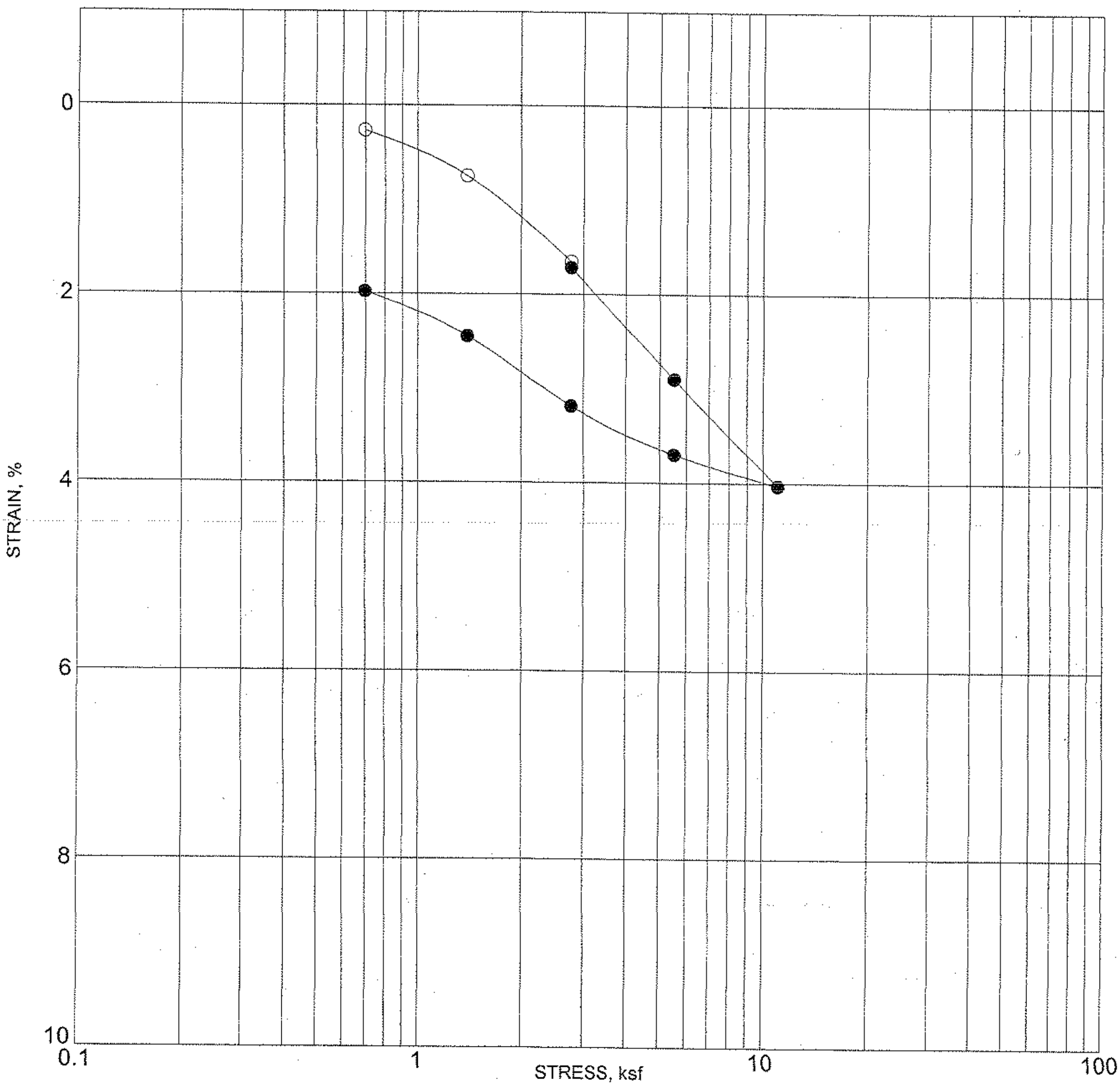
CONSOLIDATION TEST RESULTS

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. B-3



BORING NO. :	BH-2	DEPTH (ft) :	7
DESCRIPTION :	CLAY (CL)		

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	30.7	106.5		
FINAL	23	106.5		

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

CONSOLIDATION TEST RESULTS

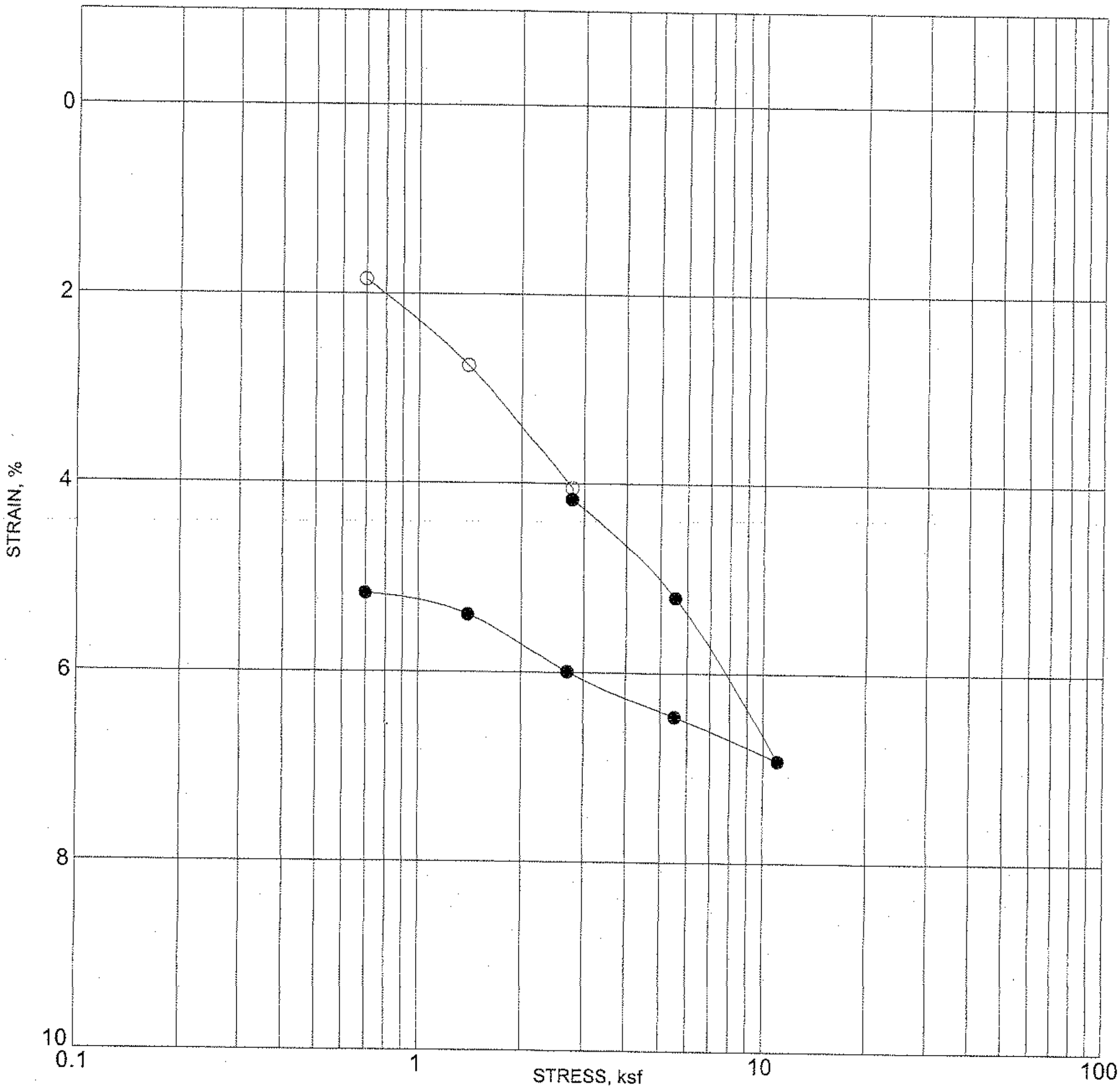
Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. B-4

Project ID: 08-31-324-01.GPJ; Template: CONSOLIDATION



BORING NO. :	BH-8	DEPTH (ft) :	5
DESCRIPTION :	CLAYEY SAND (SC)		

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	24.2	110.6		
FINAL	19.7	110.6		

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

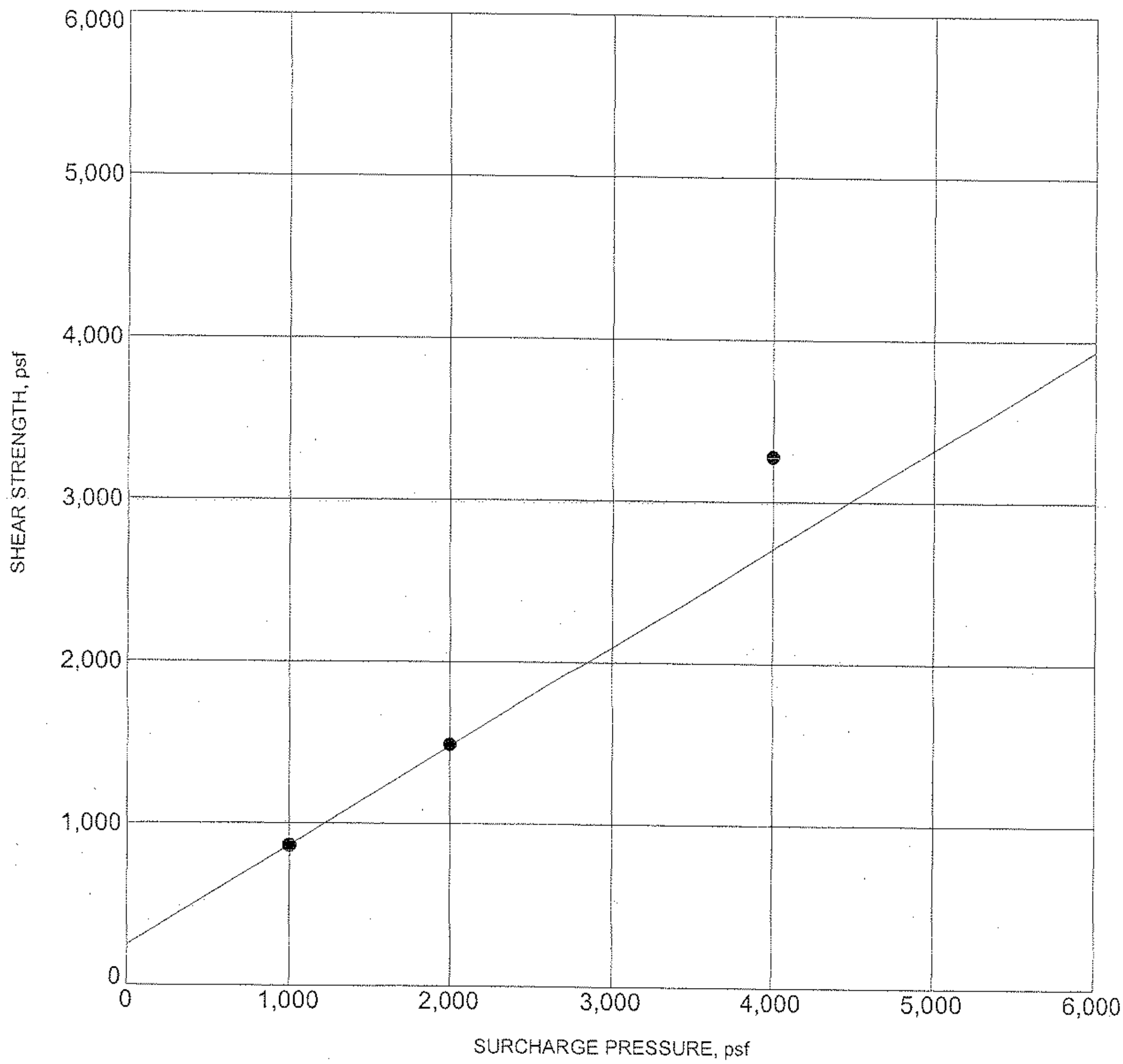
CONSOLIDATION TEST RESULTS

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. B-5



BORING NO. :	BH-2	DEPTH (ft) :	5
DESCRIPTION :	CLAY (CL)		
COHESION (psf) :	300	FRICTION ANGLE (degrees):	31
MOISTURE CONTENT (%) :	15.3	DRY DENSITY (pcf) :	116.2

NOTE: Ultimate Strength.

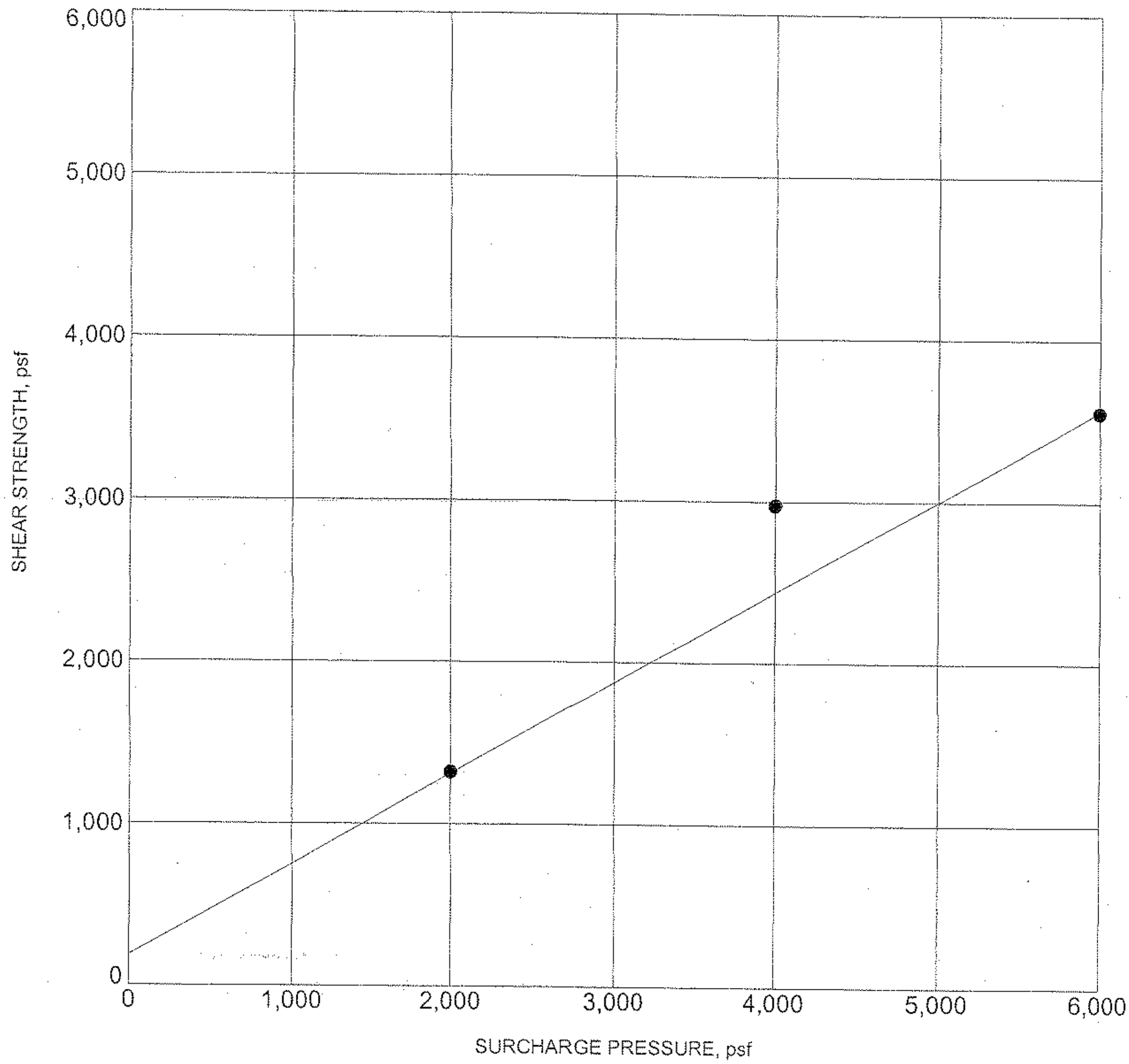
DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. B-6



BORING NO. :	BH-7	DEPTH (ft) :	65
DESCRIPTION :	SAND (SP)		
COHESION (psf) :	250	FRICTION ANGLE (degrees):	30
MOISTURE CONTENT (%) :	13.6	DRY DENSITY (pcf) :	88.4

NOTE: Ultimate Strength.

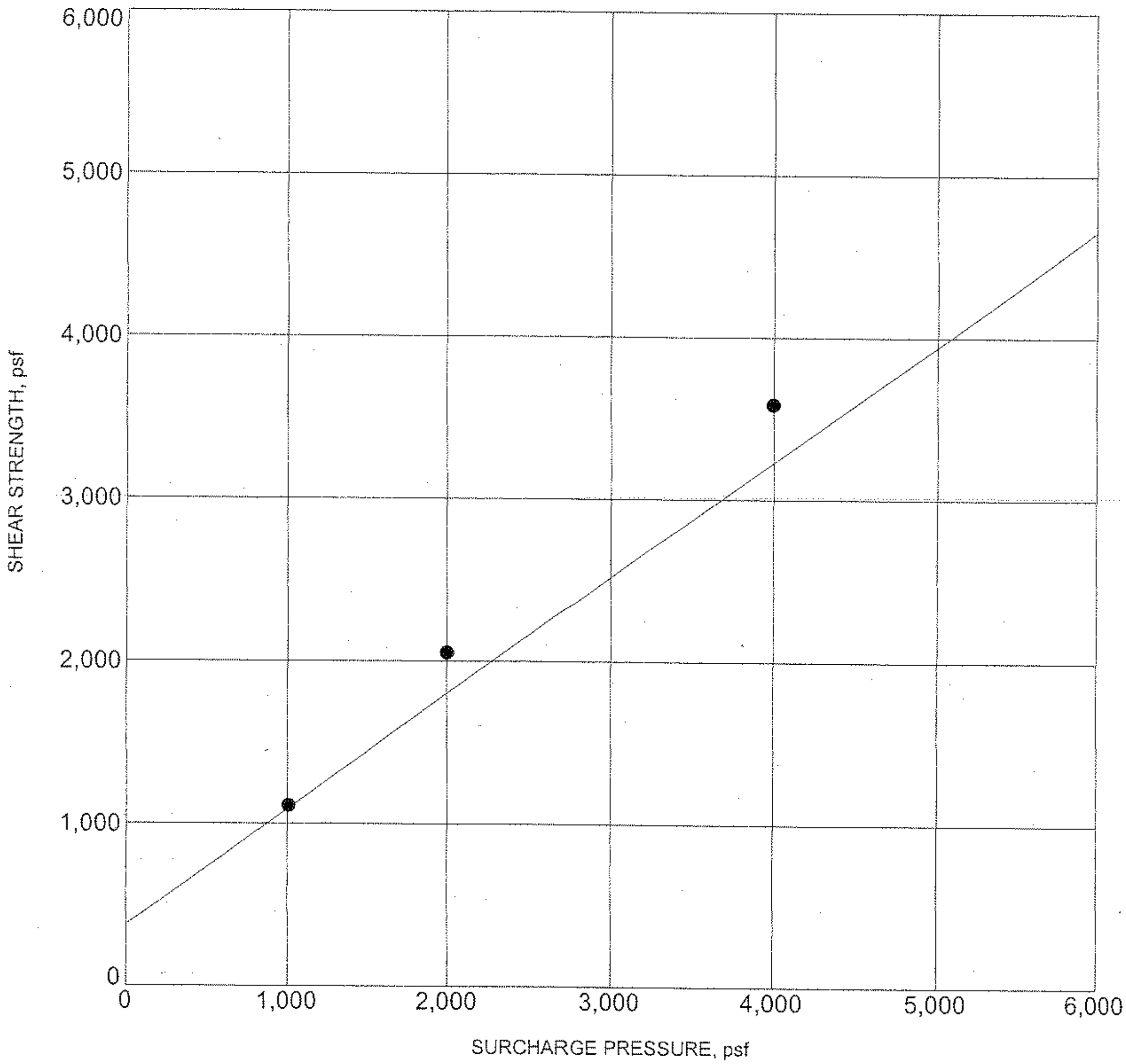
DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. B-7



BORING NO. :	BH-8	DEPTH (ft) :	7
DESCRIPTION :	CLAYEY SAND (SC)		
COHESION (psf) :	400	FRICTION ANGLE (degrees):	35
MOISTURE CONTENT (%) :	20.0	DRY DENSITY (pcf) :	105.9

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Project Name
PROPOSED SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No. 08-31-324-01

Drawing No. B-8

APPENDIX C

PERCOLATION TESTING

APPENDIX C

PERCOLATION TESTING

Percolation Test Procedures

Percolation testing was performed utilizing two (2) exploratory borings (BH-1 and BH-8) on March 27, 2009. Tests were performed using the Falling Head Test Method.

The bottom fifteen (15) feet of each boring was screened with casing. Each boring was cased using a combination of two-inch diameter solid-wall casing and 0.02 inch perforated casing. Fifteen-foot section of perforated casing (from 5 feet to 20 feet bgs) was used at each boring. Water was added to the boring until the water level was at the ground surface and allowed to presoak for 24 hours. Second day, water was again added to the boring until the water level was about five (5) feet below the existing ground surface. The water level was measured to the nearest 1/10-inch and recorded after 30 minutes. Following each reading, the test hole was be refilled to approximately the same depth as the initial water level. This method was repeated over a six-hour period for each percolation test hole. The results of the percolation tests are tabulated below.

Table No. C-1, Summary of Percolation Test Results

Boring No.	Depth of Boring (feet)	Predominant Soil Types (USCS)	Average Percolation Rate (minutes/inch)
BH-1	40	Clayey Sand (SC)/ Sand (SP)	23.0
BH-8	40	Clayey Sand (SC)/ Clay (CL)/ Silt (ML)	299.7

Percolation Testing

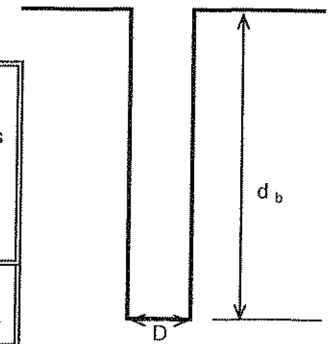
Test No. BH - 1

Job Name: Santa Monica Recycling & Drop Off Facility
Job No.: 08-31-324-01
Location: Santa Monica
Test Date: March 27, 2009

Depth of Boring (d_b): 40.0 feet
Diameter of Boring (D): 0.50 feet
Technician: JAC
Concerns/Issues:

Gravel Pack Depth 36
Gravel Pack Correction 42.0%

Time of Testing			Depth to Water Level					Q	Pit Minutes per Inch (180/Q)
Initial Time	Final Time	Time Interval	Depth to Bottom	Initial Height	Final Height	Drop in Height	Average length of water column	Q	
T_i	T_f	^ T	d_b	d_i	d_f	$F = d_f - d_i = \wedge d$	L_{ave}	(F D 9) / (L_{ave} ^ T)	
		(hr)	(feet)	(feet)	(feet)	(feet)	(feet)	g/sf/d	
Presoak	3/26/2009	2:45 PM							
Percolation Test									
8:25 AM	8:55 AM	0.50	40.0	5.00	26.00	21.00	24.50	7.71	23.3
9:00 AM	9:30 AM	0.50	40.0	5.00	25.80	20.80	24.60	7.61	23.7
9:36 AM	10:06 AM	0.50	40.0	5.00	25.48	20.48	24.76	7.44	24.2
10:11 AM	10:41 AM	0.50	40.0	5.00	25.53	20.53	24.74	7.47	24.1
10:47 AM	11:17 AM	0.50	40.0	5.00	25.57	20.57	24.72	7.49	24.0
11:23 AM	11:53 AM	0.50	40.0	5.00	25.62	20.62	24.69	7.52	23.9
11:57 AM	12:27 PM	0.50	40.0	5.00	25.62	20.62	24.69	7.52	23.9
12:31 PM	1:01 PM	0.50	40.0	5.00	25.65	20.65	24.68	7.53	23.9
1:06 PM	1:36 PM	0.50	40.0	5.00	25.68	20.68	24.66	7.55	23.8
1:41 PM	2:11 PM	0.50	40.0	5.00	25.57	20.57	24.72	7.49	24.0
2:15 PM	2:45 PM	0.51	40.0	5.00	25.68	20.68	24.66	7.42	24.2
2:49 PM	3:19 PM	0.50	40.0	5.00	25.54	20.54	24.73	7.48	24.1



Gravel Pack Correction 3.12
% of Gravel Pack to Total Depth 0.90
New Q = (0.7)*(0.5) + (0.3)*(1.1) 0.68

Mean mpi= 23.9
Most Conservative mpi= 24.2

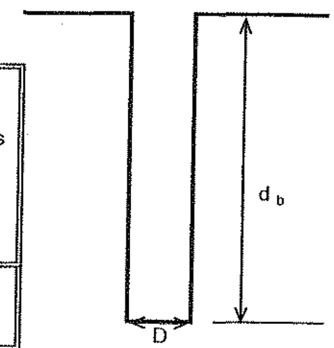
Most Conservative Q (g/sf/d)= 7.42

Percolation Testing

Test No. BH - 8

Job Name: Santa Monica Recycling & Drop Off Facility
Job No.: 08-31-324-01
Location: Santa Monica
Test Date: March 27, 2009

Depth of Boring (d_b): 40.0 feet
Diameter of Boring (D): 0.50 feet
Technician: JAC
Concerns/Issues:



Gravel Pack Depth 40
Gravel Pack Correction 42.0%

Time of Testing			Depth to Water Level					Q	Pit Minutes per Inch (180/Q)
Initial Time	Final Time	Time Interval	Depth to Bottom	Initial Height	Final Height	Drop in Height	Average length of water column		
T_I	T_f	^T	d_b	d_I	d_f	$F = d_f - d_I = \wedge d$	L_{ave}	(F D 9) / (L_{ave} ^ T)	
		(hr)	(feet)	(feet)	(feet)	(feet)	(feet)	g/sf/d	
Presoak	3/26/2009	10:15 AM							
Percolation Test									
8:51 AM	9:21 AM	0.50	40.0	5.00	7.50	2.50	33.75	0.67	270.0
9:25 AM	9:55 AM	0.50	40.0	5.00	7.17	2.17	33.92	0.58	312.6
9:57 AM	10:27 AM	0.50	40.0	5.00	7.17	2.17	33.92	0.58	312.6
10:31 AM	11:01 AM	0.50	40.0	5.00	7.16	2.16	33.92	0.57	314.1
11:04 AM	11:34 AM	0.50	40.0	5.00	7.19	2.19	33.91	0.58	309.6
11:36 AM	12:07 PM	0.51	40.0	5.00	7.38	2.38	33.81	0.62	290.1
12:10 PM	12:40 PM	0.50	40.0	5.00	7.31	2.31	33.85	0.61	293.0
12:42 PM	1:12 PM	0.50	40.0	5.00	7.34	2.34	33.83	0.62	289.1
1:13 PM	1:47 PM	0.55	40.0	5.00	7.51	2.51	33.75	0.61	297.3
1:51 PM	2:21 PM	0.50	40.0	5.00	7.35	2.35	33.83	0.63	287.9
2:25 PM	2:55 PM	0.50	40.0	5.00	7.26	2.26	33.87	0.60	299.7
3:01 PM	3:31 PM	0.50	40.0	5.00	7.12	2.12	33.94	0.56	320.2

Gravel Pack Correction	0.24
% of Gravel Pack to Total Depth	1.00
New Q = (0.25)*(1.3) + (0.75)*(0.55)	0.74

Mean mpi=	299.7
Most Conservative mpi=	320.2

Most Conservative Q (g/sf/d)=	0.56

APPENDIX D

EARTHWORK SPECIFICATIONS

APPENDIX D

EARTHWORK SPECIFICATIONS

D1.1 Scope of Work

The work includes all labor, supplies and construction equipment required to construct the building pads in a good, workmanlike manner, as shown on the drawings and herein specified. The major items of work covered in this section include the following:

- Site Inspection
- Authority of Geotechnical Engineer
- Site Clearing
- Excavations
- Preparation of Fill Areas
- Placement and Compaction of Fills
- Observation and Testing

D1.2 Site Inspection

1. The contractor shall carefully examine the site and make all inspections necessary in order to determine the full extent of the work required to make the completed work conform to the drawings and specifications. The contractor shall satisfy himself as to the nature and location of the work, ground surface and the characteristics of equipment and facilities needed prior to and during prosecution of the work. The contractor shall satisfy himself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered. Any inaccuracies or discrepancies between the actual field conditions and the drawings, or between the drawings and specifications must be brought to the owner's attention in order to clarify the exact nature of the work to be performed.
2. This *Geotechnical Investigation Report* prepared by Converse Consultants may be used as a reference to the surface and subsurface conditions on this project. The information presented in this above referenced report is intended for use in design and is subject to confirmation of the conditions encountered during construction. The exploration logs and related information depict subsurface conditions only at the particular time and location designated on the boring logs. Subsurface conditions at other locations may differ from conditions encountered at the exploration locations. In addition, the passage of time may result in a change in subsurface conditions at the exploration locations. Any review of this information shall not relieve the contractor from performing such independent

investigation and evaluation to satisfy himself as to the nature of the surface and subsurface conditions to be encountered and the procedures to be used in performing his work.

D1.3 Authority of the Geotechnical Engineer

1. The geotechnical engineer will observe the placement of compacted fill and will take sufficient tests to determine the uniformity and degree of compaction of filled ground.
2. As the owner's representative, the geotechnical engineer will (a) have the authority to cause the removal and replacement of loose, soft, disturbed and other unsatisfactory soils and uncontrolled fills; (b) have the authority to approve the preparation of native ground to receive fill material; and (c) have the authority to approve or reject soils proposed for use in building areas.
3. The civil engineer and/or owner will decide all questions regarding (a) the interpretation of the drawings and specifications, (b) the acceptable fulfillment of the contract on the part of the contractor and (c) the matters of compensation.

D1.4 Site Clearing

1. Clearing and grubbing shall consist of the removal of all existing pavement, utilities, and vegetation from building areas to be graded.
2. Organic and inorganic materials resulting from the clearing and grubbing operations shall be hauled away from the areas to be graded.

D1.5 Excavations

1. Based on observations made during our field explorations, the surficial soils can be excavated with conventional earthwork equipment.

D1.6 Preparation of Fill Areas

1. All organic material, organic soils, incompetent alluvium, undocumented fill soils and debris should be removed from the proposed building areas.
2. After the required removals have been made, the exposed native earth materials should be excavated to provide a zone of structural fill for the support of footings, slabs-on-grade, and exterior flatwork. All loose, soft or disturbed earth materials should be removed from the bottom of excavations before placing structural fill. As a minimum, the on-site soils in the building area and to five (5) feet beyond the building limits and appendages should be removed and recompacted to provide at least two (2) feet of properly compacted fill underneath all slabs and all footings.
3. The subgrade in all areas to receive fill should be scarified to a minimum depth of six (6) inches, the soil moisture adjusted to at least two (2) percent above

optimum for clayey soils and within two (2) percent of optimum moisture content for granular soils, and then compacted to at least 90 percent of maximum dry density as determined by ASTM D1557. Scarification may be terminated on moderately hard to hard, cemented earth materials with the approval of the geotechnical engineer.

4. Compacted fill may be placed on native soils that have been properly scarified and recompacted as discussed above.

5. All areas to receive compacted fill shall be observed and approved by the geotechnical engineer before the placement of fill.

D1.7 Placement and Compaction of Fills

1. Compacted fill placed for the support of footings, slabs-on-grade, exterior concrete flatwork, and driveways should be considered structural fill. Structural fill may consist of approved on-site soils or imported fill that meets the criteria indicated below.

2. Fill consisting of selected on-site earth materials or imported soils approved by the geotechnical engineer shall be placed in layers on approved earth materials. Soils used as compacted structural fill shall have the following characteristics:

   a. All fill soil particles should not exceed three (3) inches in nominal size, and should be free of organic matter and miscellaneous inorganic debris and inert rubble.

   b. In order to limit moisture penetration to foundation earth materials, imported fill materials should be similar to on-site earth materials with at least 30 percent passing the No. 200 sieve. As an alternative to 30 percent passing the No. 200 sieve, import materials with a remolded permeability of 1 x 10 (-6) cm/sec or less would be acceptable.

   c. Fill materials should have an Expansion Index (EI) less than 20. All imported fill should be compacted to at least 90 percent of maximum dry density (ASTM D1557) at about two (2) percent above optimum moisture for fine grained soils, and within two (2) percent of optimum for granular soils.

   d. Imported fill materials should have less than 0.1 percent sulfate salts, if possible. If laboratory test results indicate import fill materials contain more than 0.1 percent sulfate salts, a concrete mix should be designed to resist the sulfate levels indicated by the laboratory test results.

3. Fill soils shall be evenly spread in maximum nine-inch lifts, watered or dried as necessary, mixed and compacted to at least the density specified below. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the geotechnical engineer.

4. All fill placed at the site shall be compacted to at least 90 percent of the maximum laboratory density as determined by ASTM D1557. Granular soils should be moisture conditioned to within two (2) percent, and clayey soils to at least two (2) percent above, optimum moisture content.

5. Fill exceeding five (5) feet in height shall not be placed on native slopes that are steeper than 5 to 1 (horizontal to vertical). Where native slopes are steeper than 5 to 1, and the height of the fill is greater than five (5) feet, the fill shall be benched into competent materials. The height and width of the benches shall be at least two (2) feet.

6. Representative samples of materials being used as compacted fill will be analyzed in the laboratory by the geotechnical engineer to obtain information on their physical properties. Maximum laboratory density of each soil type used in the compacted fill will be determined by the ASTM D1557-00 compaction method.

7. Fill materials shall not be placed, spread or compacted during unfavorable weather conditions. When site grading is interrupted by heavy rain, filling operations shall not resume until the geotechnical engineer approves the moisture and density conditions of the previously placed fill.

8. It shall be the grading contractor's obligation to take all measures deemed necessary during grading to provide erosion control devices in order to protect slope areas and adjacent properties from storm damage and flood hazard originating on this project. It shall be the contractor's responsibility to maintain slopes in their as-graded form until all slopes are in satisfactory compliance with job specifications, all berms have been properly constructed, and all associated drainage devices meet the requirements of the civil engineer.

D1.8 Observation and Testing

1. During the progress of grading, the geotechnical engineer will provide observation of the fill placement operations.

2. Field density tests will be made during grading to provide an opinion on the degree of compaction being obtained by the contractor. Where compaction of less than specified herein is indicated, additional compactive effort with adjustment of the moisture content shall be made as necessary until the required degree of compaction is obtained.

3. A sufficient number of field density tests will be performed to provide an opinion to the degree of compaction achieved. In general, density tests will be performed on each one-foot lift of fill, but not less than one for each 500 cubic yards of fill placed.

APPENDIX E

LIQUEFACTION ANALYSIS

APPENDIX E

LIQUEFACTION ANALYSIS

The subsurface data obtained from exploratory borings were used to evaluate the seismic settlement potential of the subject site. The Logs of Borings are presented in Appendix A, *Field Exploration.*

The seismic settlement was performed utilizing SPT data obtained from Boring No. BH-2 and BH-3. The analysis was performed in accordance with the method published by Southern California Earthquake Center (March 1999) using Liquefy Pro computer program. The earthquake of magnitude 6.6 was selected for this analysis from the *Seismic Hazard Evaluation of the Beverly Hills 7.5-Minute Quadrangle*. The Design Short Period (0.2-sec) Spectral Response Acceleration is calculated to be 1.206g. Per ASCE 7-05, Section11.8.3, this number is then divided by 2.5 to obtain the maximum acceleration used for liquefaction analysis purposes. The maximum acceleration used for liquefaction analysis is calculated to be 0.48g.

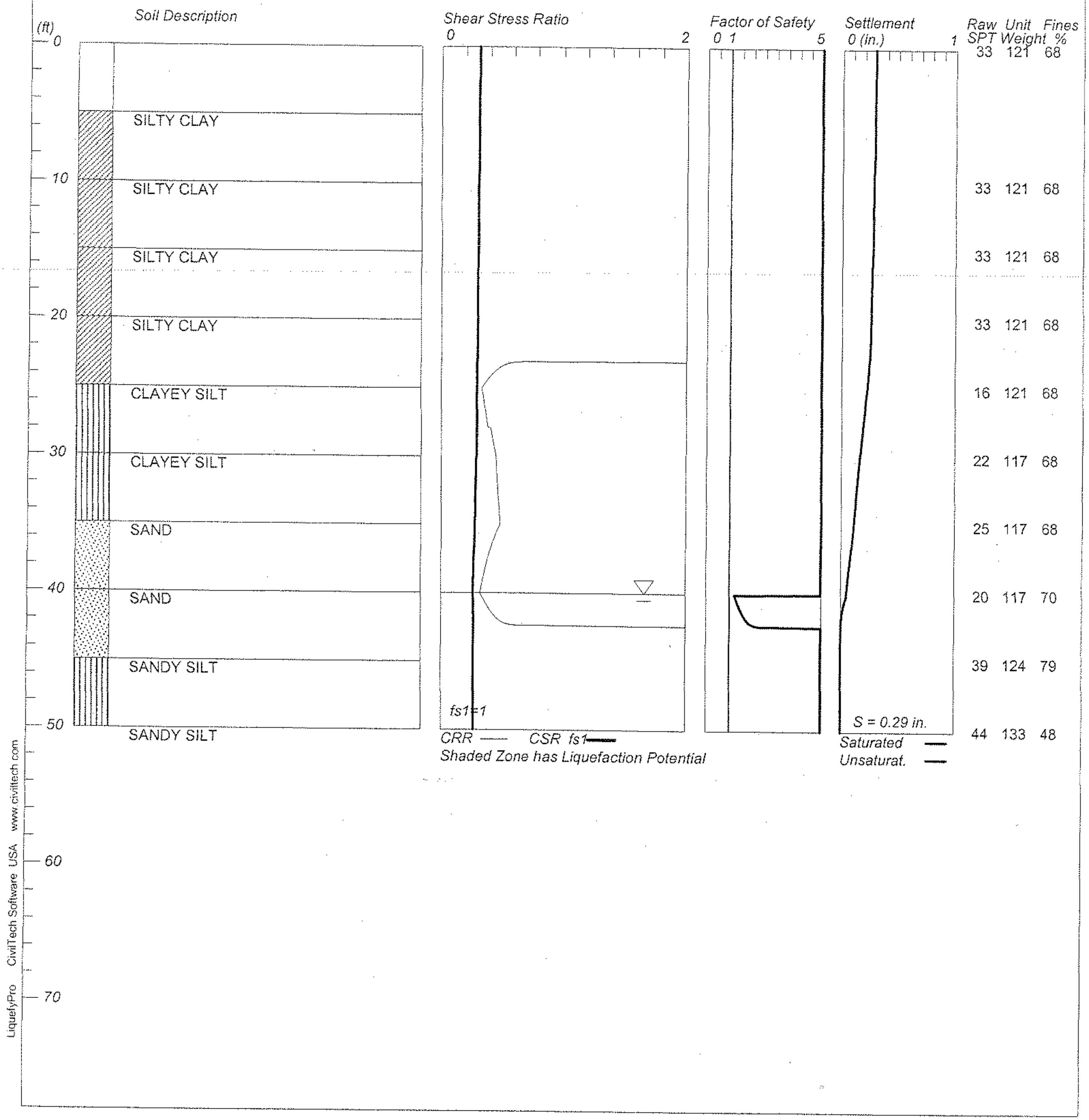
For the purpose of the evaluation, the historical highest groundwater table at 40 feet below the existing ground surface was used.

LIQUEFACTION ANALYSIS

Santa Monica Recycling & Drop Off Facility

Hole No.=BH-2 &3   Water Depth=40 ft

Magnitude=6.6
Acceleration=.48g



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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: F:\Liquefy5\08-31-324-01 LQ.liq
Title: Santa Monica Recycling & Drop Off Facility
Subtitle: Boring No.BH-2 & 3

Surface Elev.=
Hole No.=BH-2 &3
Depth of Hole= 50.00 ft
Water Table during Earthquake= 40.00 ft
Water Table during In-Situ Testing= 59.00 ft
Max. Acceleration= 0.48 g
Earthquake Magnitude= 6.60

Input Data:
Surface Elev.=
Hole No.=BH-2 &3
Depth of Hole=50.00 ft
Water Table during Earthquake= 40.00 ft
Water Table during In-Situ Testing= 59.00 ft
Max. Acceleration=0.48 g
Earthquake Magnitude=6.60

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1
9. User request factor of safety (apply to CSR) , User= 1.25
   Plot one CSR curve (fs1=1)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	33.00	121.00	68.00
10.00	33.00	121.00	68.00
15.00	33.00	121.00	68.00
20.00	33.00	121.00	68.00
25.00	16.00	121.00	68.00
30.00	22.00	117.00	68.00
35.00	25.00	117.00	68.00
40.00	20.00	117.00	70.00
45.00	39.00	124.00	79.00
50.00	44.00	133.00	48.00

Output Results:
Settlement of Saturated Sands=0.05 in.
Settlement of Unsaturated Sands=0.25 in.
Total Settlement of Saturated and Unsaturated Sands=0.29 in.
Differential Settlement=0.147 to 0.194 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	2.77	0.31	5.00	0.05	0.25	0.29
0.50	2.77	0.31	5.00	0.05	0.25	0.29
1.00	2.77	0.31	5.00	0.05	0.25	0.29
1.50	2.77	0.31	5.00	0.05	0.24	0.29
2.00	2.77	0.31	5.00	0.05	0.24	0.29
2.50	2.77	0.31	5.00	0.05	0.24	0.29
3.00	2.77	0.31	5.00	0.05	0.24	0.29
3.50	2.77	0.31	5.00	0.05	0.24	0.29
4.00	2.77	0.31	5.00	0.05	0.24	0.29
4.50	2.77	0.31	5.00	0.05	0.24	0.29
5.00	2.77	0.31	5.00	0.05	0.24	0.29
5.50	2.77	0.31	5.00	0.05	0.24	0.29
6.00	2.77	0.31	5.00	0.05	0.24	0.29
6.50	2.77	0.31	5.00	0.05	0.24	0.29
7.00	2.77	0.31	5.00	0.05	0.24	0.29
7.50	2.77	0.31	5.00	0.05	0.24	0.29
8.00	2.77	0.31	5.00	0.05	0.24	0.29
8.50	2.77	0.31	5.00	0.05	0.24	0.28
9.00	2.77	0.31	5.00	0.05	0.24	0.28
9.50	2.77	0.31	5.00	0.05	0.23	0.28
10.00	2.77	0.30	5.00	0.05	0.23	0.28
10.50	2.77	0.30	5.00	0.05	0.23	0.28
11.00	2.77	0.30	5.00	0.05	0.23	0.28
11.50	2.77	0.30	5.00	0.05	0.23	0.28
12.00	2.77	0.30	5.00	0.05	0.23	0.28
12.50	2.77	0.30	5.00	0.05	0.23	0.28
13.00	2.77	0.30	5.00	0.05	0.23	0.28
13.50	2.77	0.30	5.00	0.05	0.23	0.28
14.00	2.77	0.30	5.00	0.05	0.23	0.27
14.50	2.77	0.30	5.00	0.05	0.22	0.27
15.00	2.77	0.30	5.00	0.05	0.22	0.27
15.50	2.77	0.30	5.00	0.05	0.22	0.27
16.00	2.77	0.30	5.00	0.05	0.22	0.27
16.50	2.77	0.30	5.00	0.05	0.22	0.27
17.00	2.77	0.30	5.00	0.05	0.22	0.27
17.50	2.77	0.30	5.00	0.05	0.22	0.27
18.00	2.77	0.30	5.00	0.05	0.22	0.26
18.50	2.77	0.30	5.00	0.05	0.21	0.26
19.00	2.77	0.30	5.00	0.05	0.21	0.26
19.50	2.77	0.30	5.00	0.05	0.21	0.26
20.00	2.77	0.30	5.00	0.05	0.21	0.26
20.50	2.77	0.30	5.00	0.05	0.21	0.26
21.00	2.77	0.30	5.00	0.05	0.21	0.26
21.50	2.77	0.30	5.00	0.05	0.21	0.25
22.00	2.77	0.30	5.00	0.05	0.20	0.25
22.50	2.77	0.30	5.00	0.05	0.20	0.25
23.00	2.77	0.30	5.00	0.05	0.20	0.25
23.50	0.48	0.29	5.00	0.05	0.19	0.24
24.00	0.42	0.29	5.00	0.05	0.19	0.24
24.50	0.37	0.29	5.00	0.05	0.18	0.23
25.00	0.33	0.29	5.00	0.05	0.18	0.23
25.50	0.34	0.29	5.00	0.05	0.17	0.22
26.00	0.35	0.29	5.00	0.05	0.16	0.21

26.50	0.36	0.29	5.00	0.05	0.16	0.21
27.00	0.37	0.29	5.00	0.05	0.15	0.20
27.50	0.37	0.29	5.00	0.05	0.14	0.19
28.00	0.41	0.29	5.00	0.05	0.14	0.19
28.50	0.42	0.29	5.00	0.05	0.13	0.18
29.00	0.43	0.29	5.00	0.05	0.13	0.18
29.50	0.44	0.29	5.00	0.05	0.12	0.17
30.00	0.45	0.29	5.00	0.05	0.12	0.16
30.50	0.45	0.29	5.00	0.05	0.11	0.16
31.00	0.46	0.29	5.00	0.05	0.11	0.15
31.50	0.46	0.29	5.00	0.05	0.10	0.15
32.00	0.46	0.29	5.00	0.05	0.09	0.14
32.50	0.47	0.28	5.00	0.05	0.09	0.14
33.00	0.47	0.28	5.00	0.05	0.08	0.13
33.50	0.47	0.28	5.00	0.05	0.08	0.13
34.00	0.48	0.28	5.00	0.05	0.07	0.12
34.50	0.48	0.28	5.00	0.05	0.07	0.12
35.00	0.48	0.28	5.00	0.05	0.06	0.11
35.50	0.46	0.28	5.00	0.05	0.06	0.11
36.00	0.43	0.27	5.00	0.05	0.05	0.10
36.50	0.42	0.27	5.00	0.05	0.05	0.09
37.00	0.40	0.27	5.00	0.05	0.04	0.09
37.50	0.38	0.27	5.00	0.05	0.03	0.08
38.00	0.37	0.27	5.00	0.05	0.03	0.07
38.50	0.36	0.27	5.00	0.05	0.02	0.07
39.00	0.34	0.27	5.00	0.05	0.01	0.06
39.50	0.33	0.27	5.00	0.05	0.01	0.06
40.00	0.32	0.26	5.00	0.05	0.00	0.05
40.50	0.35	0.26	1.32	0.03	0.00	0.03
41.00	0.38	0.27	1.44	0.02	0.00	0.02
41.50	0.42	0.27	1.58	0.01	0.00	0.01
42.00	0.48	0.27	1.79	0.00	0.00	0.00
42.50	2.53	0.27	5.00	0.00	0.00	0.00
43.00	2.52	0.27	5.00	0.00	0.00	0.00
43.50	2.52	0.27	5.00	0.00	0.00	0.00
44.00	2.51	0.27	5.00	0.00	0.00	0.00
44.50	2.50	0.27	5.00	0.00	0.00	0.00
45.00	2.50	0.27	5.00	0.00	0.00	0.00
45.50	2.49	0.27	5.00	0.00	0.00	0.00
46.00	2.48	0.27	5.00	0.00	0.00	0.00
46.50	2.48	0.27	5.00	0.00	0.00	0.00
47.00	2.47	0.27	5.00	0.00	0.00	0.00
47.50	2.46	0.27	5.00	0.00	0.00	0.00
48.00	2.46	0.27	5.00	0.00	0.00	0.00
48.50	2.45	0.27	5.00	0.00	0.00	0.00
49.00	2.44	0.27	5.00	0.00	0.00	0.00
49.50	2.44	0.27	5.00	0.00	0.00	0.00
50.00	2.43	0.27	5.00	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Depth = ft, Stress or Pressure = atm (tsf), Unit Weight = pcf, Settlement = in.

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1 atm (atmosphere) = 1 tsf (ton/ft2)

CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands

S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

APPENDIX F

PILE ANALYSIS AND INSTALLATION SPECIFICATIONS

APPENDIX F

PILE ANALYSIS AND INSTALLATION SPECIFICATIONS

F1.0 Pile Capacity Analysis

The pile capacity analyses were performed for precast driven piles and CIDH piles utilizing All-Pile computer program (v. 6) by CivilTech. The analyses are based on the soil profile obtained from Boring No. BH-7, assuming the bottom of landfill is 58 feet bgs. The refuse landfill material was assumed to have a density of 115 pcf, cohesion of 50 psf and friction angle of 5 degrees.

For driven piles, we have calculated the pile capacities for 12-inches square and 14-inches square precast concrete pile. For drilled piles, we have calculated the pile capacities for 24-inch diameter and 30-inch diameter piles deriving their capacity primarily from the skin friction. The results of the pile capacity analyses are presented in the attached Figure F-1 through F-8.

F2.0 Guide Specifications for Drilled Pile Installation

Pile drilling and concrete placement should be performed in accordance the recommendations presented herein and the *Standards and Specifications* of ADSC, *(Association of Foundation Drilling Contractors).* It should be the responsibility of the Contractor to select proper construction equipment and method to correctly install the piles based on his interpretation of the information presented in this report. The following recommendations are provided as a guide for preparing plans and specifications and for quality control.

- Pile installation shall be performed during continuous observation by a geotechnical or SCE representative to confirm that the recommended earth materials are penetrated, that the dimensions of the installed piles are at least as large as that indicated on the foundation plan, and that pile installation has been performed as specified. The Contractor shall provide access and necessary facilities, including droplights, at Contractor expense, to accommodate pile drill hole observations.
- Pile installation shall be performed such that compliance with all safety rules and requirements is achieved. Drilling equipment, casing, reinforcement, and other items required for installation shall be kept a safe distance from all overhead lines.
- Piles shall be located as indicated on the drawings. Any pile installed, having a center more than three (3) inches off plan centerlines will require structural analysis. The cost of such analysis and any work or materials resulting from correcting an error in location of piles shall be borne by the Contractor.

- Pile shafts shall be machine-drilled. Pile shafts shall be plumb to a tolerance of not more than one (1) inch in six (6) feet.

- Groundwater was encountered in the exploratory boreholes at depth of 29 to 51.5 feet bgs. The casing, if required to control caving, should not be left in-place as the pile designs are based on skin friction only. The Contractor should have equipment on-site with sufficient pulling capacity to pull the casing at the proper time. The casing should have outside diameter not less than the specified diameter of the pile.

- At the completion of drilling, secure covers shall be placed over pile excavations. Concrete placement shall begin within four hours after completion of drilling. Concrete shall not be allowed to fall freely more than six (6) feet. Concrete pumps, tremies or other such devices shall be used to comply with this requirement. Concrete placement shall continue until suitable concrete extends to the top of the pile shaft. The tremie or concrete pump pipe may be raised slowly as the pile shaft is filled with concrete, provided that the bottom of the pipe is never more than five (5) feet above the level of the concrete. When there is water in the shaft, the pipe shall extend into the placed concrete mass, or the bottom of the shaft, the pipe shall extend below concrete level or the bottom of the shaft. Concrete placement shall be continuous without interruption, and at such a rate that fresh concrete will not be deposited on concrete hardened sufficiently to form seams or planes of weakness.

- Pile spaced closer than three (3) diameters center-to-center shall be drilled and filled with concrete alternately, allowing at least 12 hours after concrete placement in one shaft before drilling of an adjacent shaft.

- Reinforcement shall be rigidly installed and secured to prevent movement or dislodgement during concrete placement.

- The Soils Consultant should check the bottom of each borehole prior to placement of concrete. The bottom of the excavation must be cleaned of any loose soil cuttings exceeding one-inch thickness before placement of concrete.

- In the event that pile installation procedures specified above are not adhered to, the Contractor may be required to core the concrete pile to confirm that a continuous concrete pile has been installed. The cost of such coring shall be borne by the Contractor.

- Any piles deemed defective should be replaced with substitute piles as directed by the Structural Engineer. The cost of installation of such substitute piles shall be borne by the Contractor. Costs associated with analysis and design of substitute piles shall also be borne by the Contractor.

- The reinforcing bars in the piles should have a minimum of three (3) inches of concrete cover. Sufficient space should be provided in the reinforcing cage to allow insertion of a concrete tremie tube for concrete placement. The reinforcing cage must be carefully placed in uncased holes to prevent gouging of the sides. This will cause loose material to fall into the hole. The cage of reinforcing steel should be placed to the depth required by the plans, and adequately supported at the top.

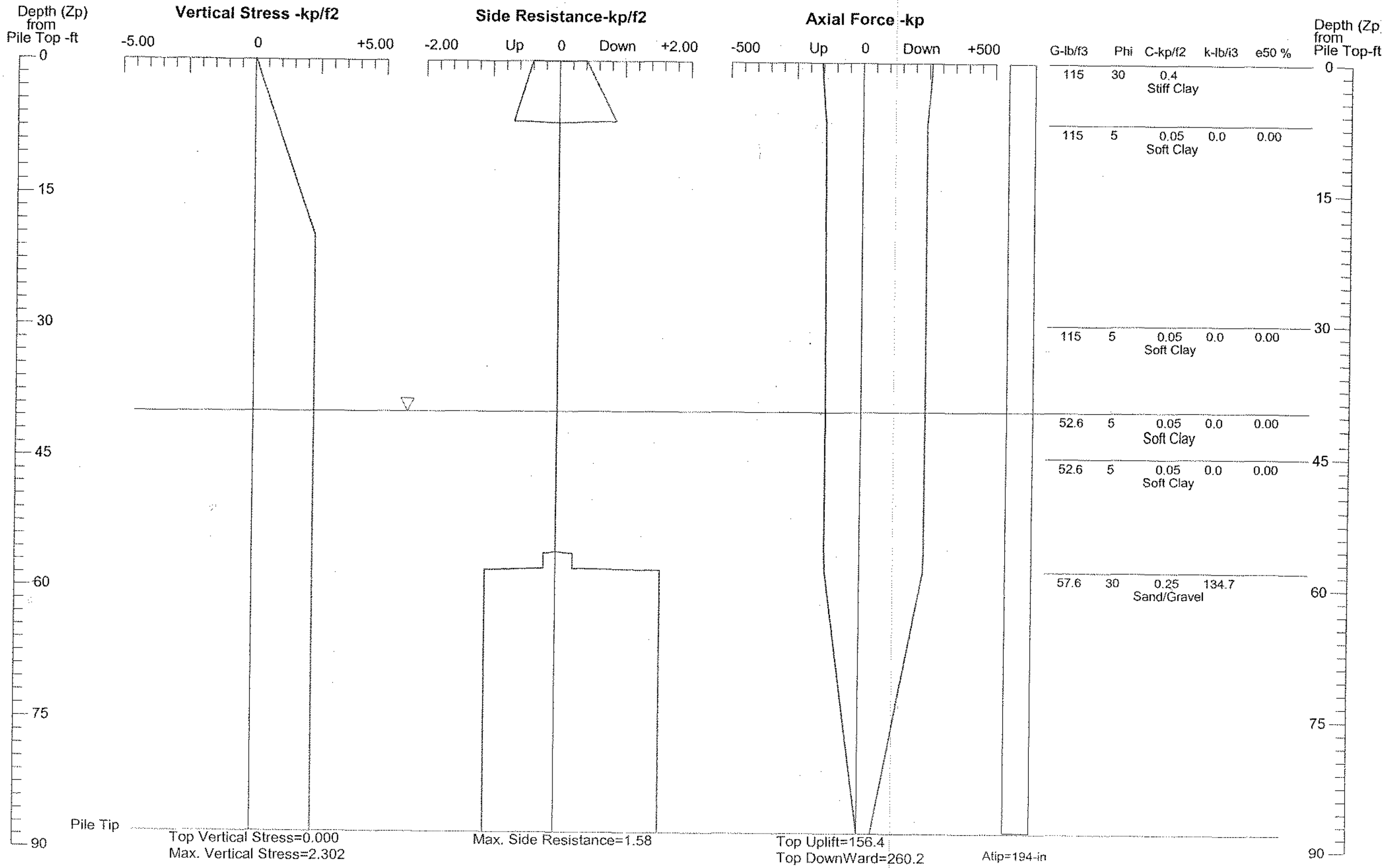
- The concrete should be flowable, non-segregating concrete with slump near the maximum allowable to obtain satisfactory consolidation without vibration, and to facilitate filling of all voids outside the casing. Concrete should not exhibit rapid slump loss. The recommended slump for uncased drilled piles is 5-inches +/- 1-inch). When casing is withdrawn, the minimum slump should be 6-inches and specially designed concrete with retard to prevent arching of concrete during casing withdrawal, or setting of the concrete until after the casing is withdrawn, should be used.

- Casing should be pulled as the concrete is being poured, while always maintaining a head of concrete inside the casing. The bottom of the casing should be maintained not more than five (5) feet nor less than one (1) foot below the top of the concrete during withdrawal and placing operations.

- In the event that any pile excavation becomes bell-shaped and cannot be advanced due to severe caving, the caved region may be filled with sand and Portland cement slurry. Drilling may continue when the slurry has hardened. In this case, it may be prudent to utilize casing or other special methods to facilitate continued drilling after the slurry has set.

SOIL STRESS, SIDE RESISTANCE, & AXIAL FORCE vs DEPTH

Based on Ultimate Load Condition

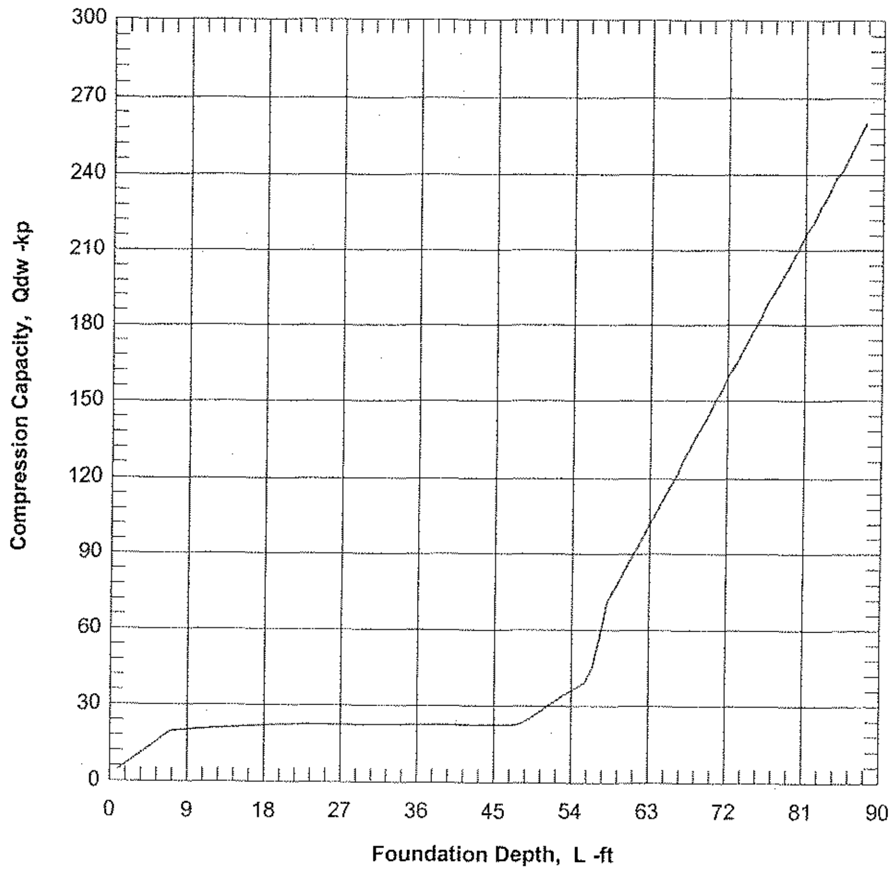


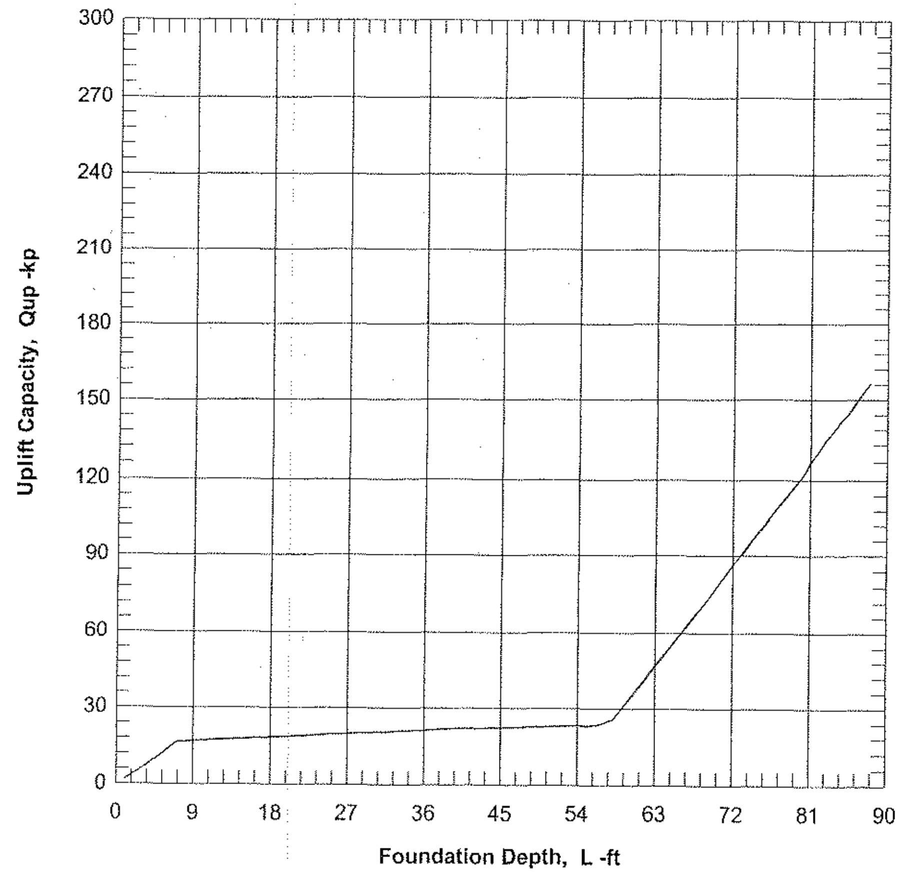
CivilTech Software

Driving Concrete Pile
12" Square Concrete Pile

Figure F-1

ULTIMATE CAPACITY vs FOUNDATION DEPTH



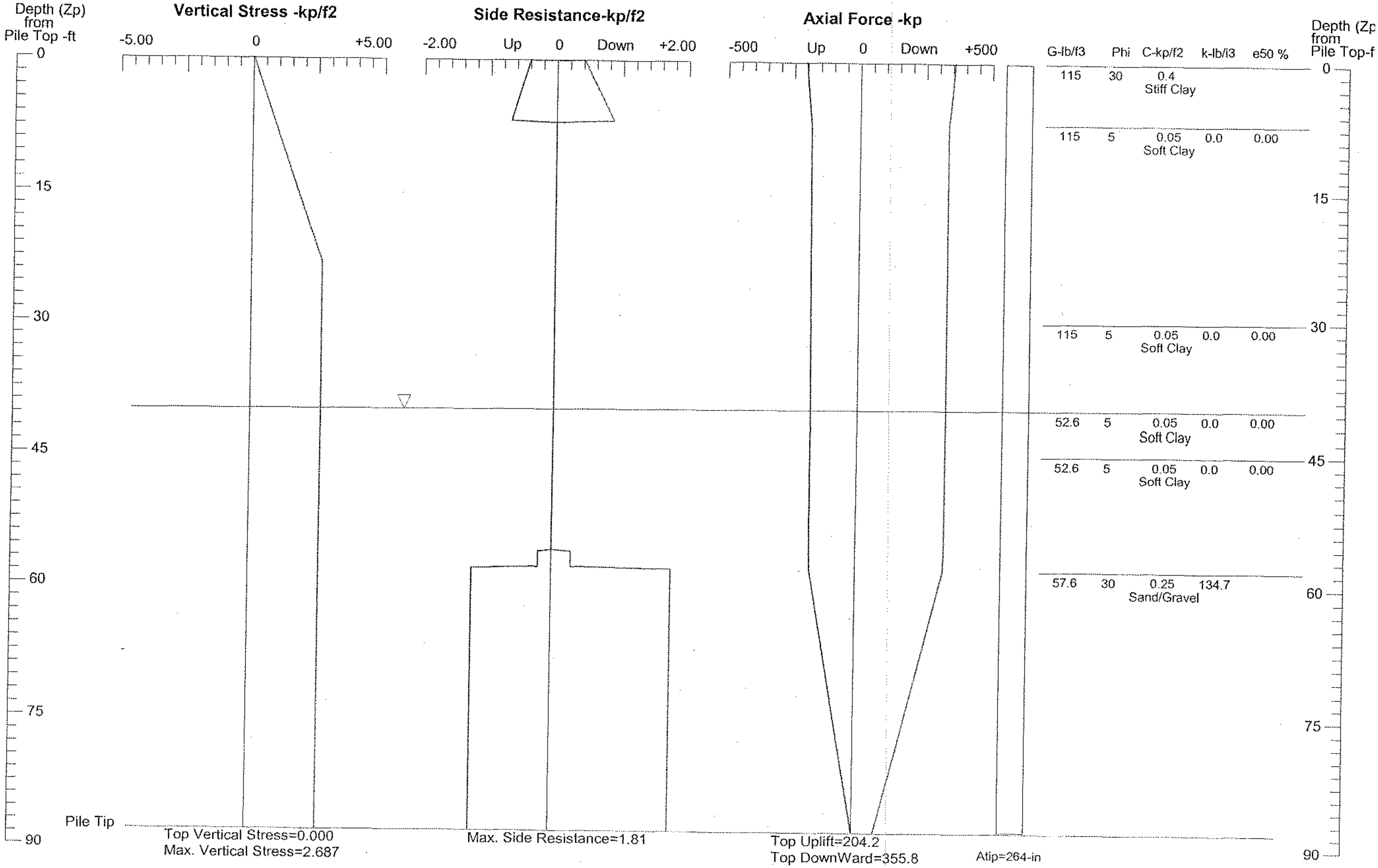


CivilTech Software

Driving Concrete Pile
12" Square Concrete Pile

Figure F-2

SOIL STRESS, SIDE RESISTANCE, & AXIAL FORCE vs DEPTH
Based on Ultimate Load Condition

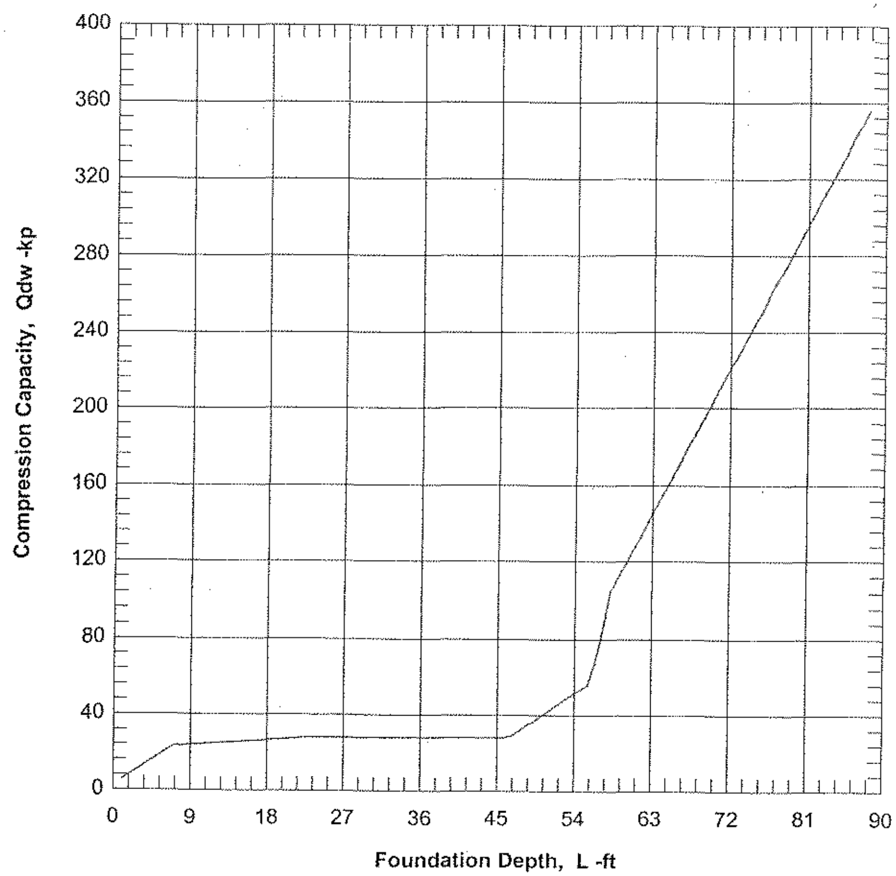


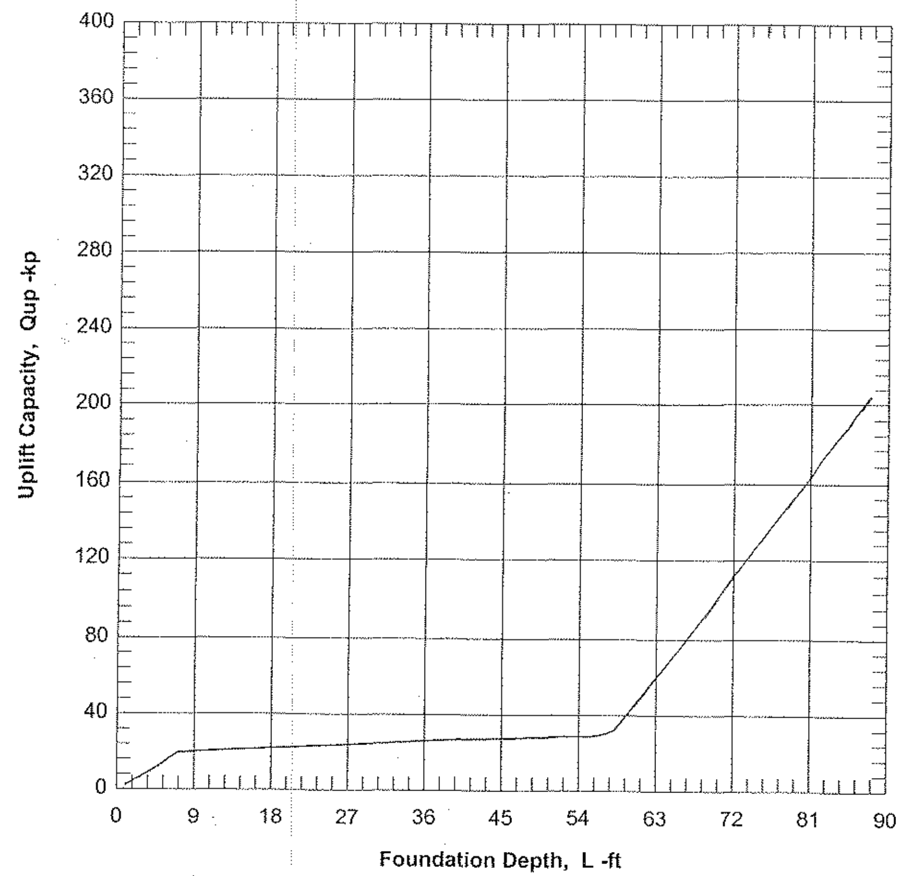
CivilTech Software

Driving Concrete Pile
14" Square Concrete Pile

Figure F-3

ULTIMATE CAPACITY vs FOUNDATION DEPTH

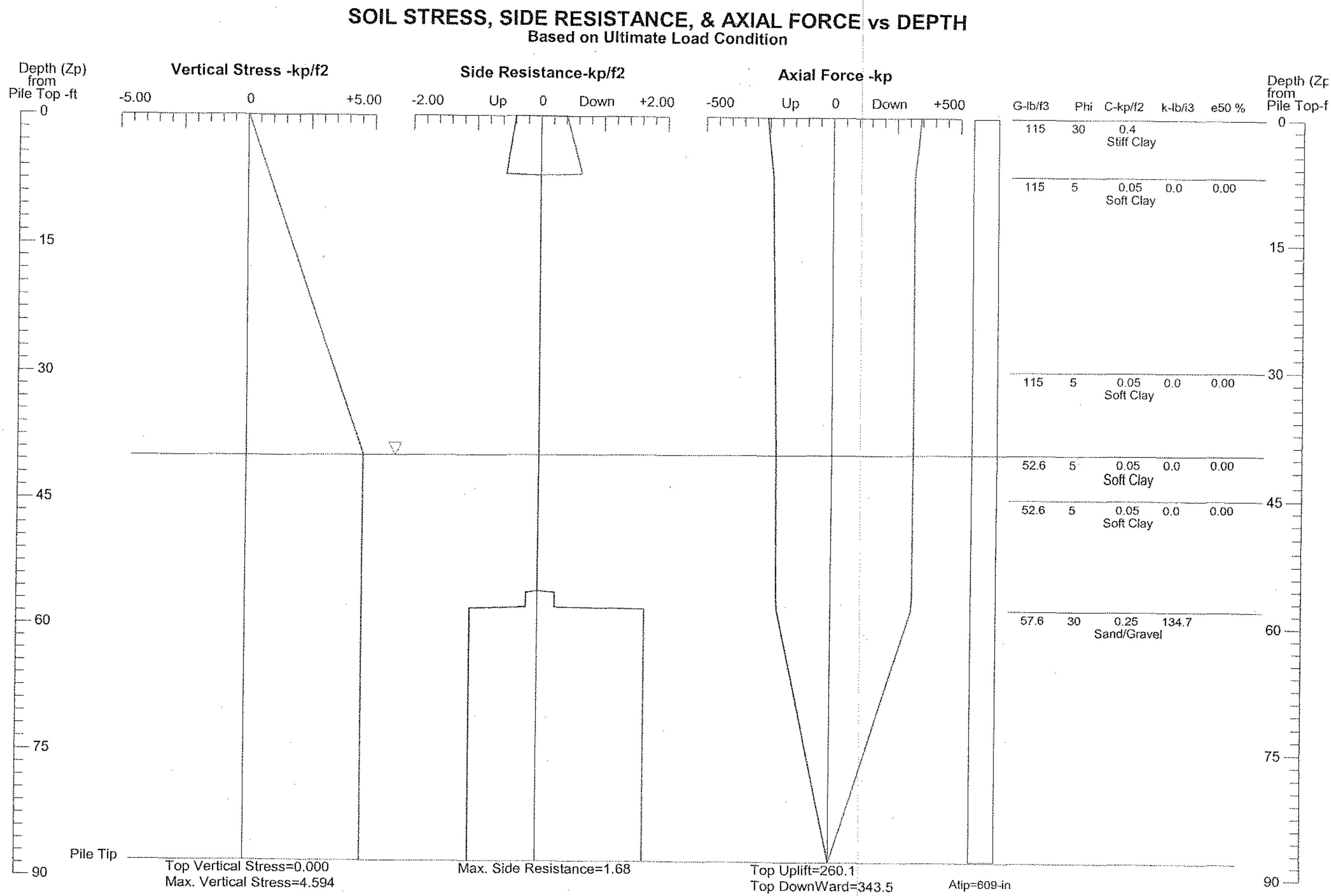




CivilTech Software

Driving Concrete Pile
14" Square Concrete Pile

Figure F-4

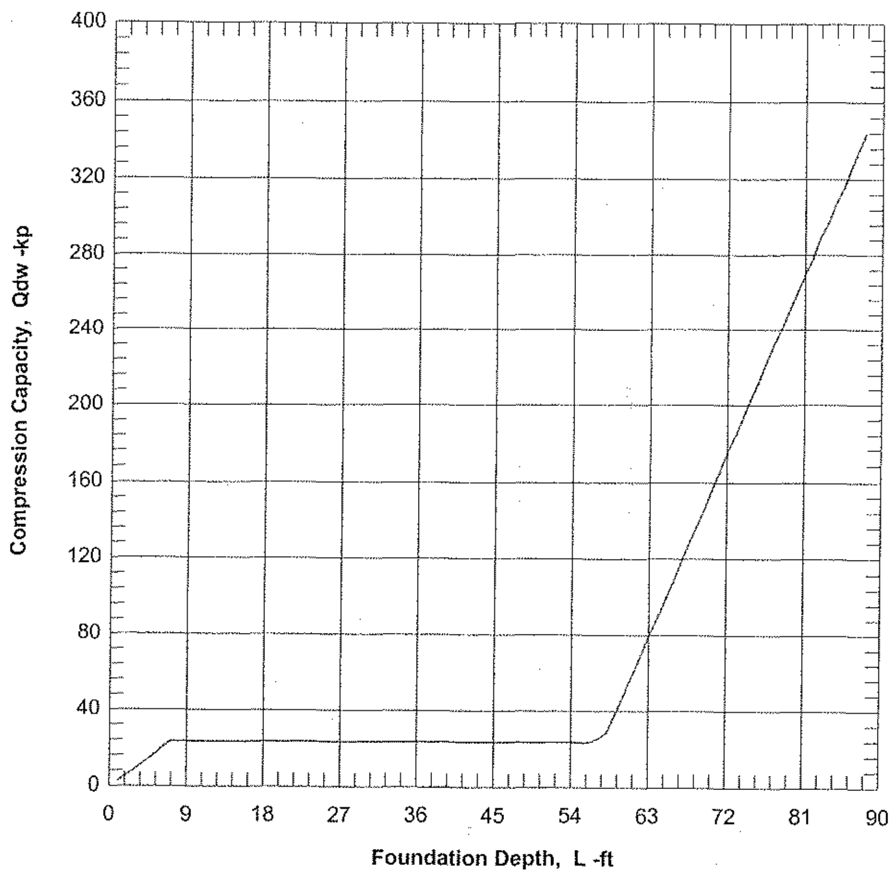


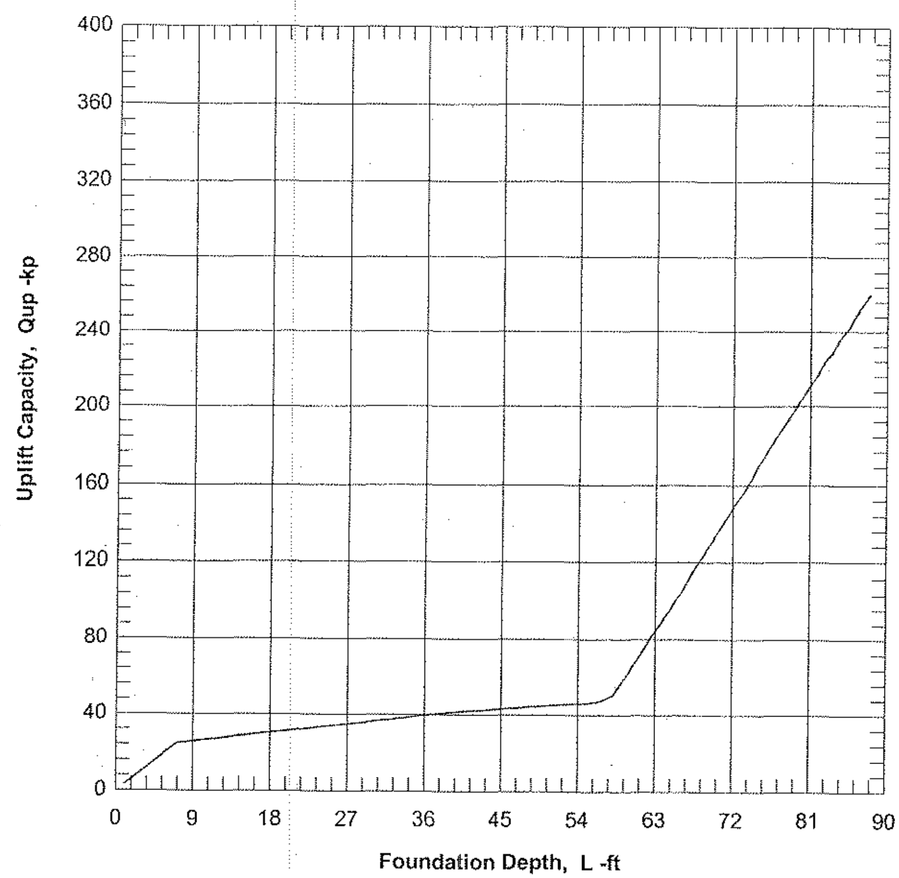
CivilTech Software

Cast-In-Drilled-Hole Concrete Pile
24" Diameter Concrete Pile

Figure F-5

ULTIMATE CAPACITY vs FOUNDATION DEPTH



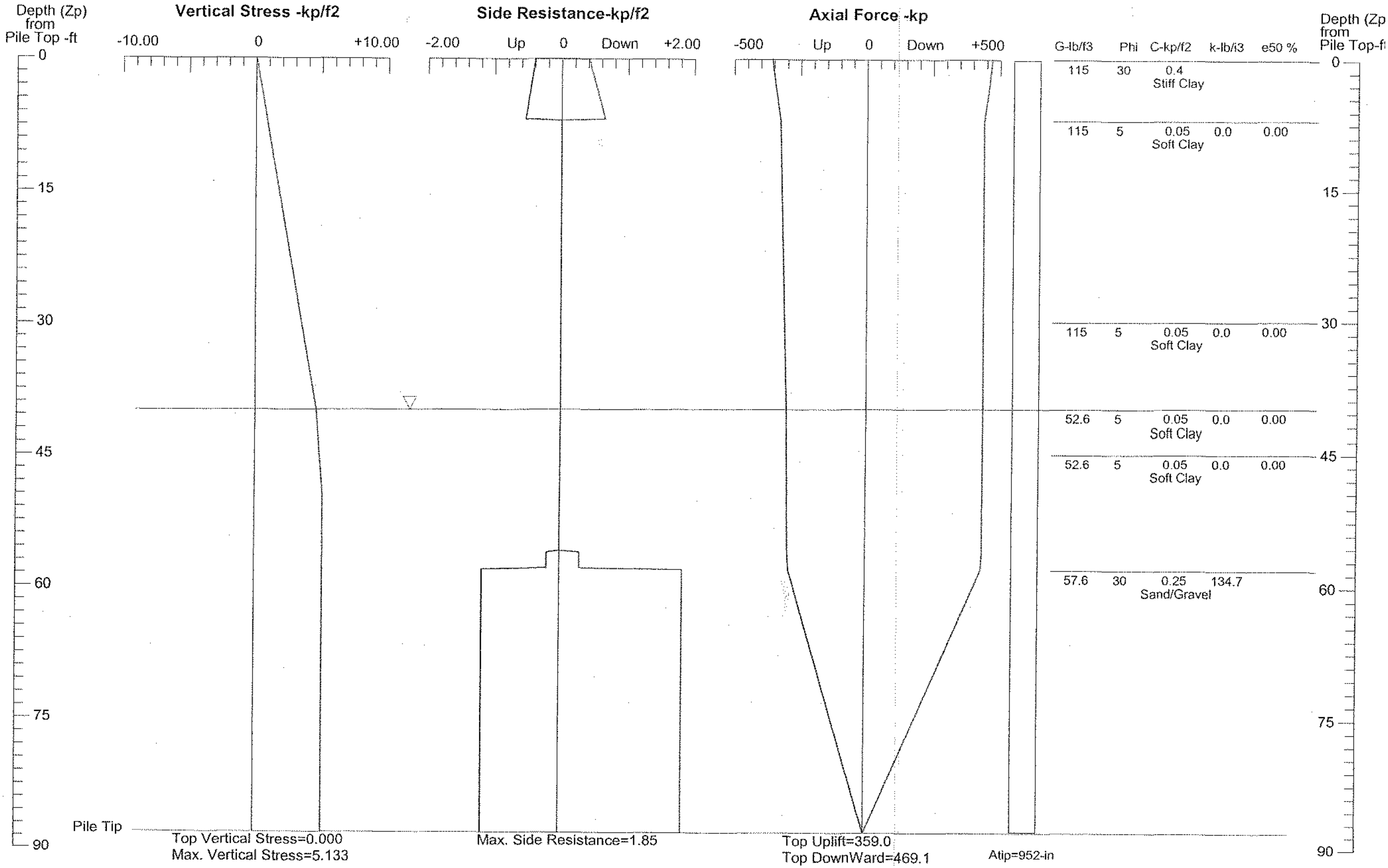


CivilTech Software

Cast-In-Drilled-Hole Concrete Pile
24" Diameter Concrete Pile

Figure F-6

SOIL STRESS, SIDE RESISTANCE, & AXIAL FORCE vs DEPTH
Based on Ultimate Load Condition

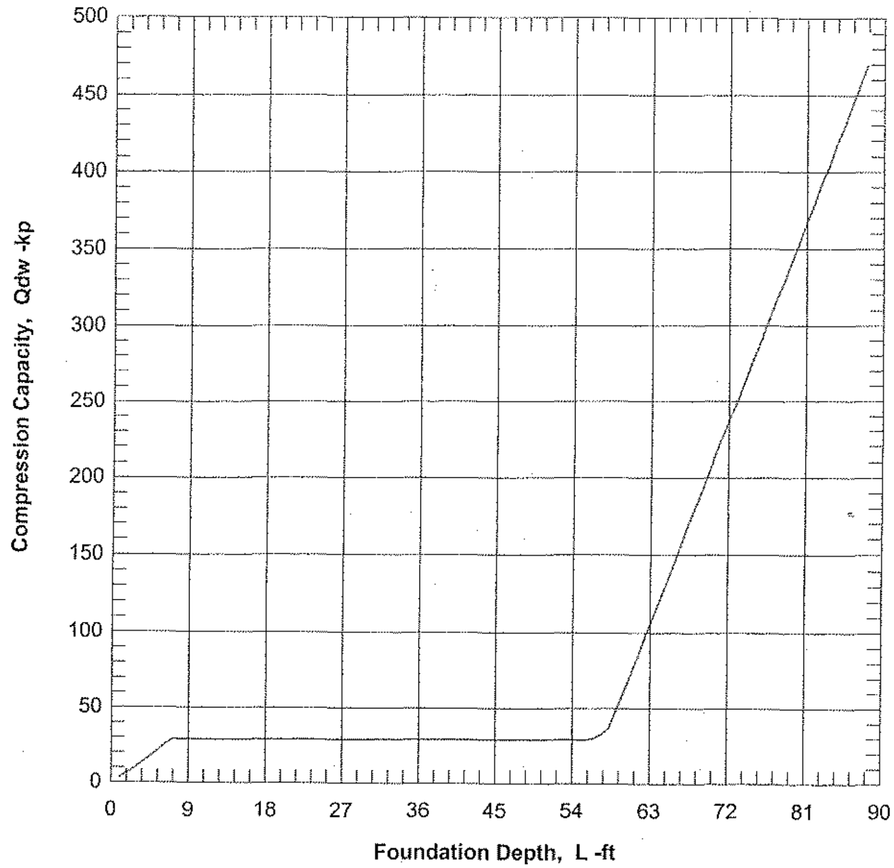


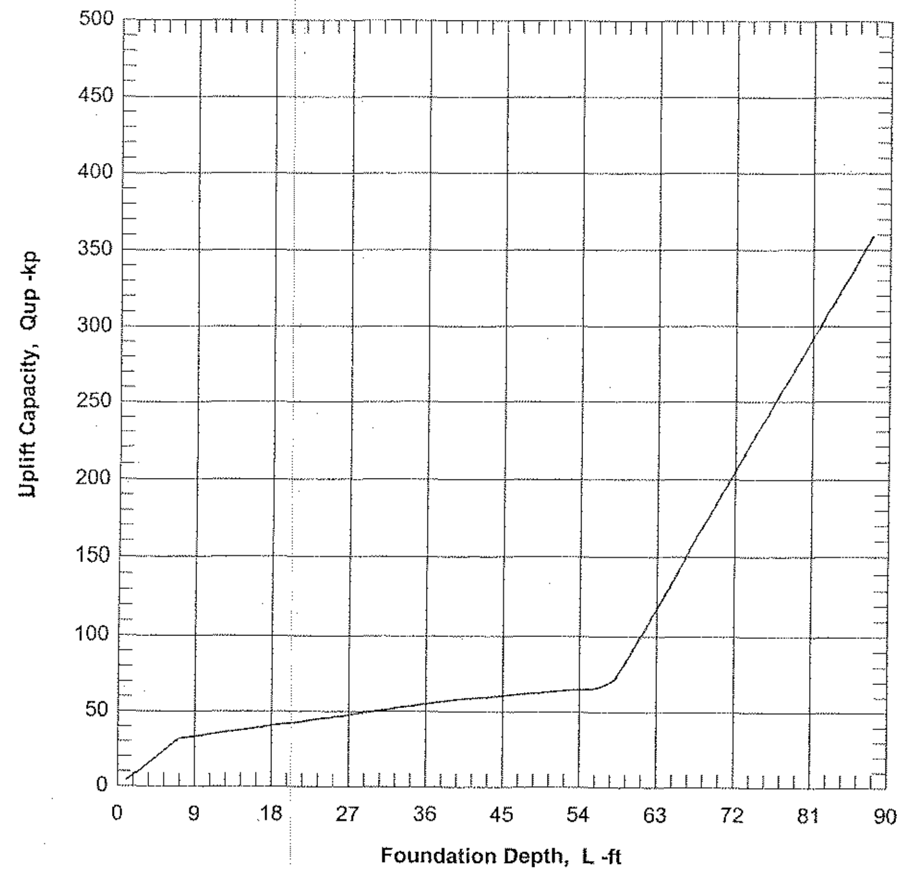
CivilTech Software

Cast-In-Drilled-Hole Concrete Pile
30" Diameter Concrete Pile

Figure F-7

ULTIMATE CAPACITY vs FOUNDATION DEPTH

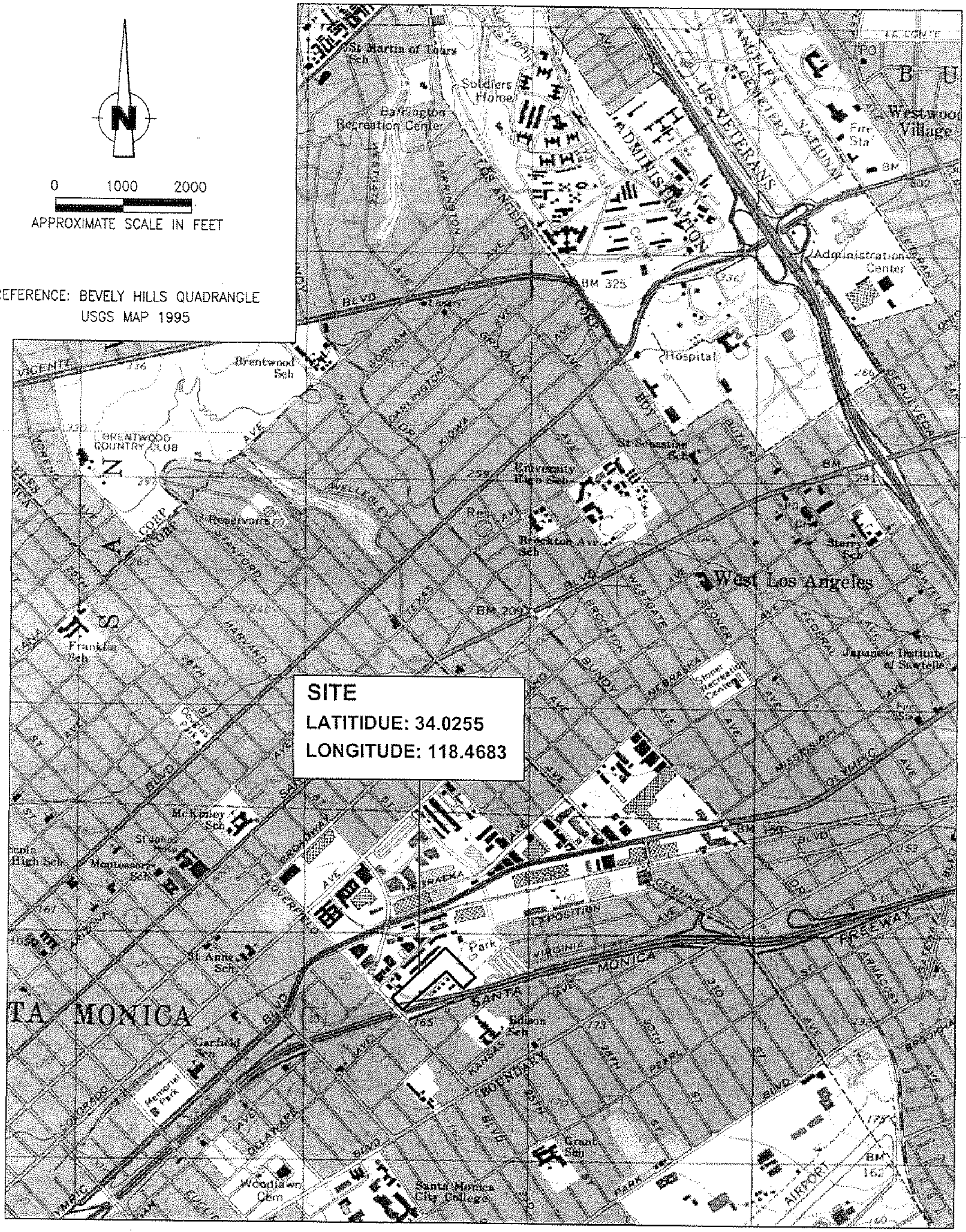




CivilTech Software

Cast-In-Drilled-Hole Concrete Pile
30" Diameter Concrete Pile

Figure F-8

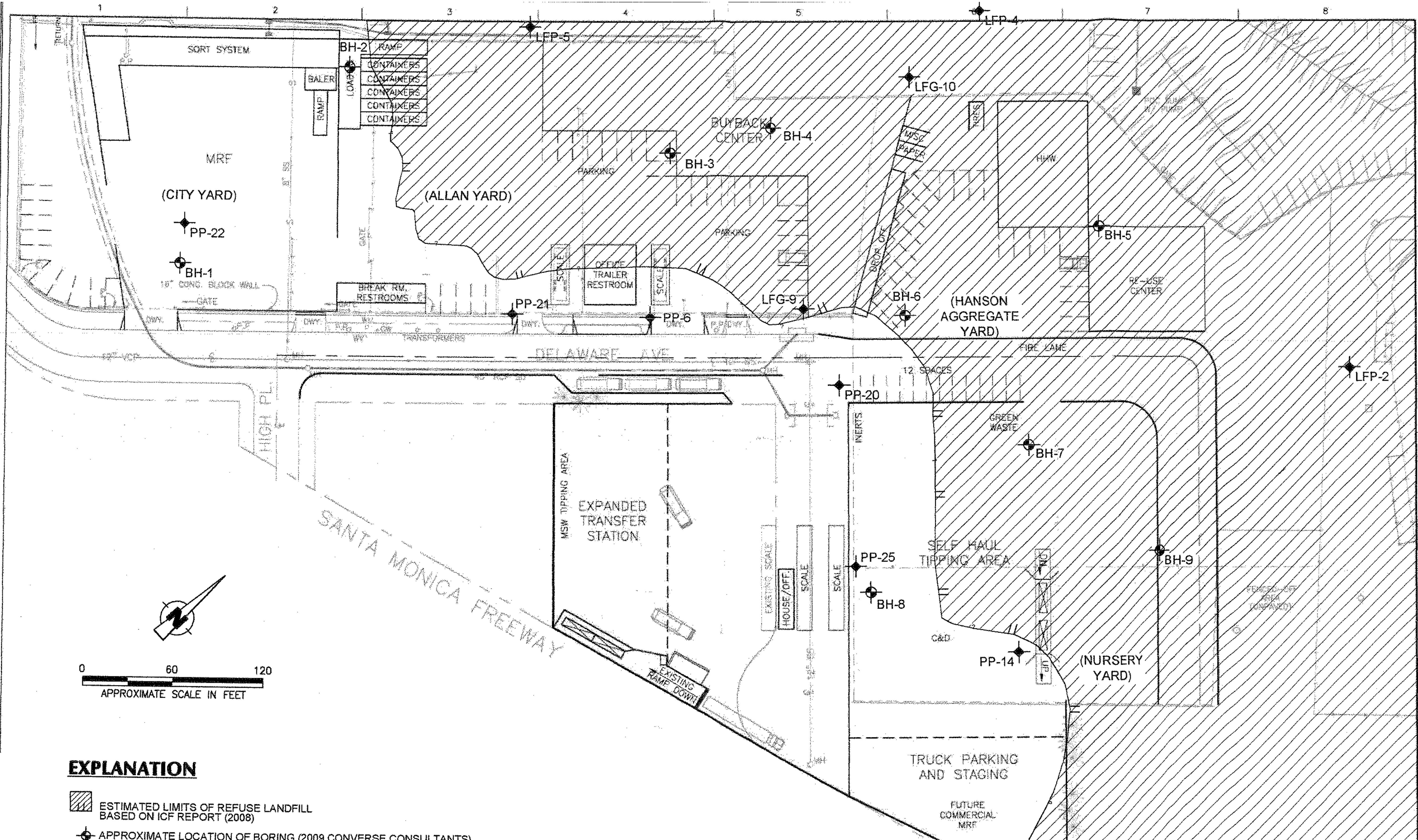


SITE LOCATION MAP

Converse Consultants

SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No.	Drawing No.
08-31-324-01	1



EXPLANATION

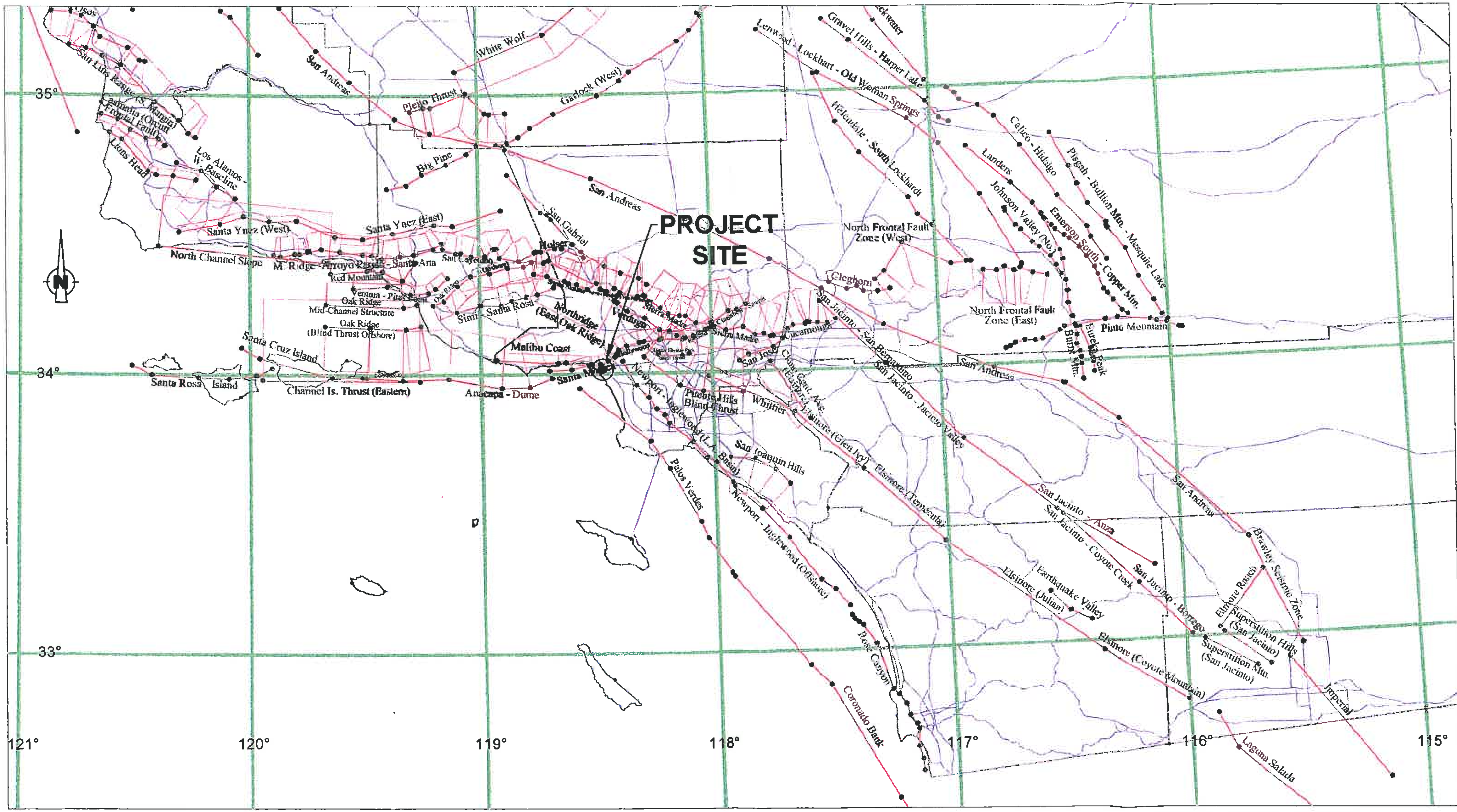
- ESTIMATED LIMITS OF REFUSE LANDFILL BASED ON ICF REPORT (2008)
- APPROXIMATE LOCATION OF BORING (2009 CONVERSE CONSULTANTS)
- PREVIOUS SOIL BORING (ARTHUR D. LITTLE)

SITE PLAN AND APPROXIMATE LOCATION OF BORINGS

Converse Consultants

SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No.	Drawing No.
08-31-324-01	2



REFERENCE: PORTION OF CGS 2002 CALIFORNIA FAULT MODEL MODIFIED FOR USE WITH FRISKSP AND EQFAULT BY THOMAS F. BLAKE, AUGUST 2004

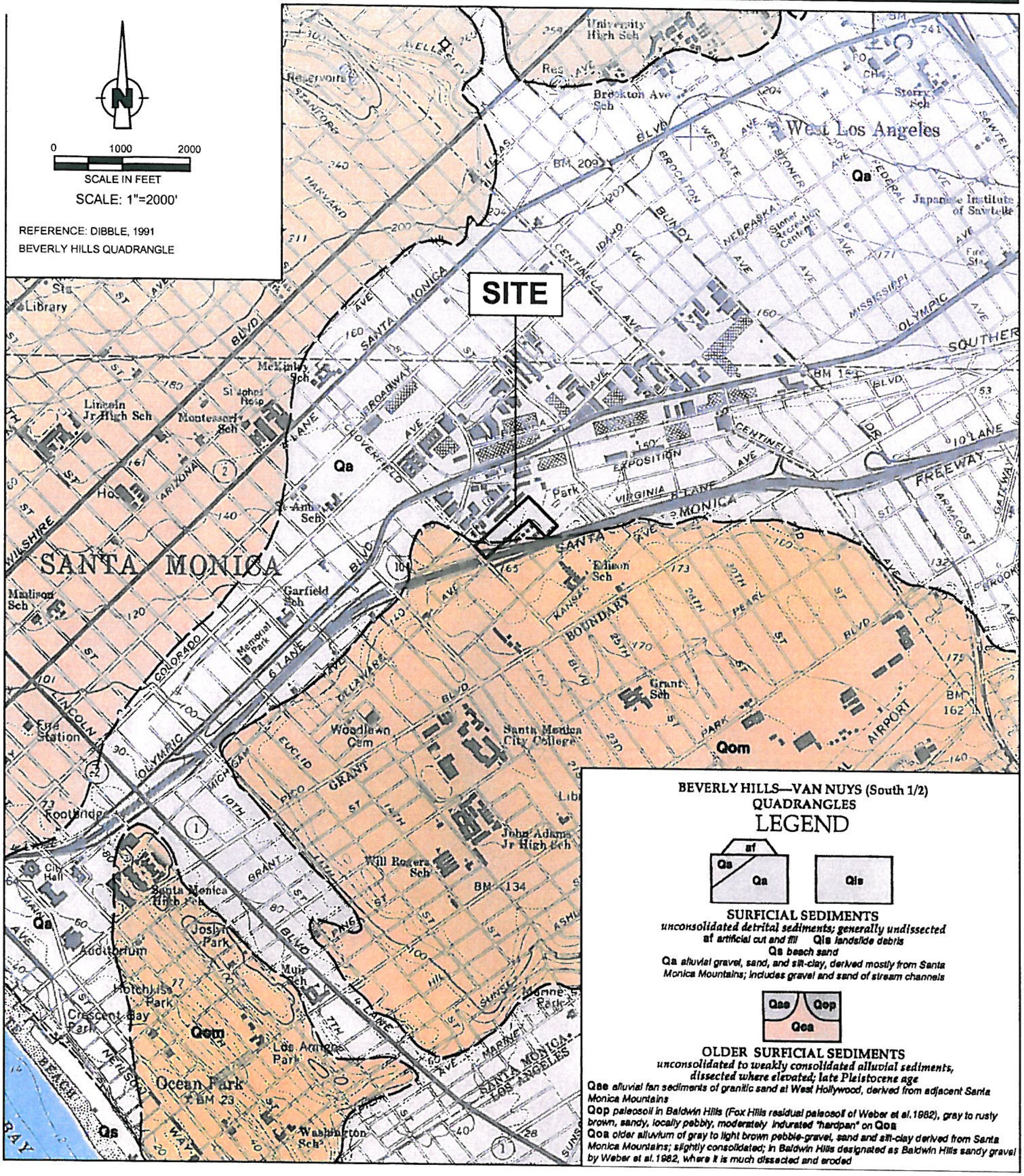
FAULT SOURCES

BLIND THRUST FAULT, POLYGONS INDICATE RUPTURE PLANES AND DIP DIRECTION

SOUTHERN CALIFORNIA REGIONAL FAULT MAP

Converse Consultants

Project No.	Drawing No.
08-31-324-01	3



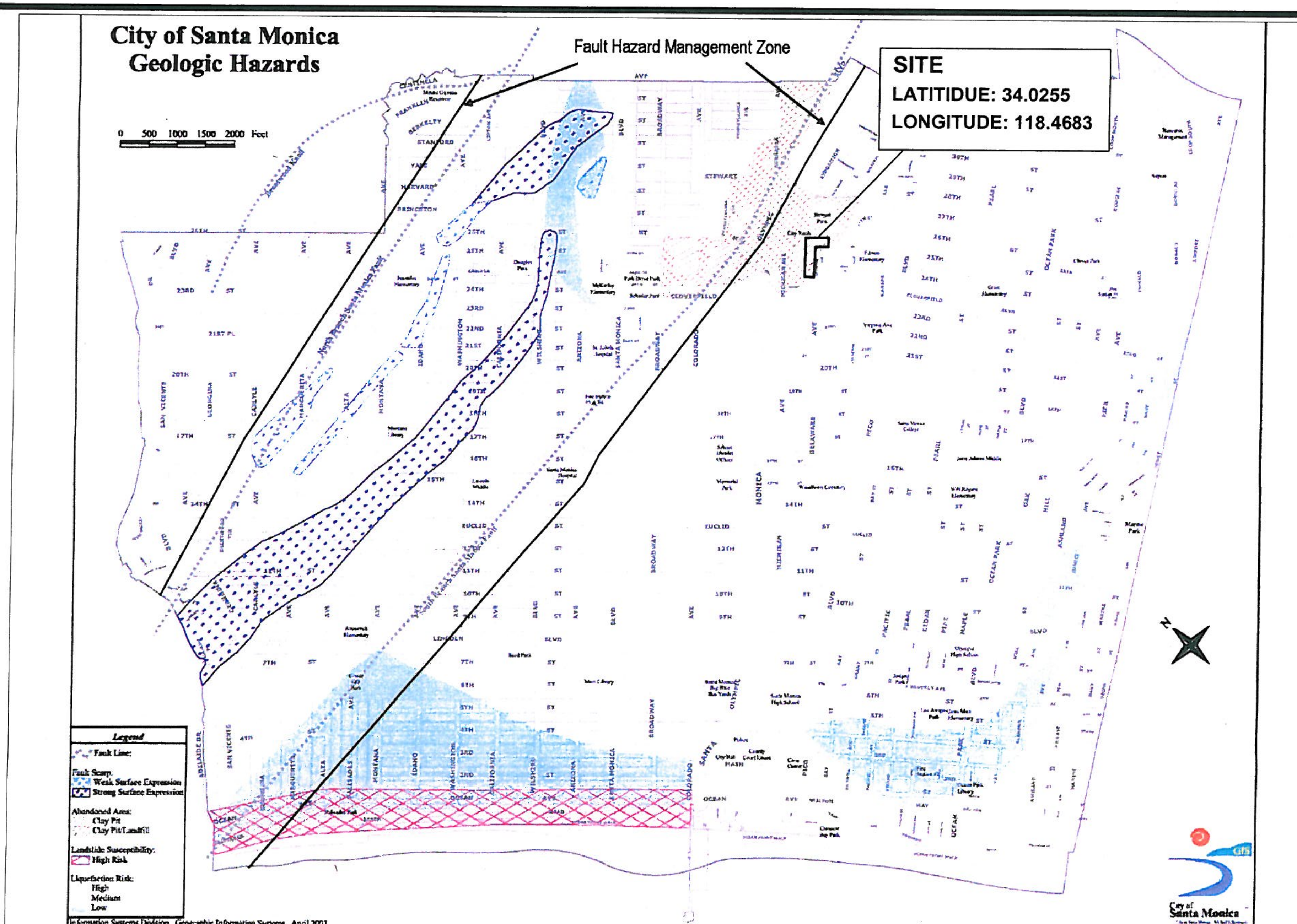
GEOLOGIC MAP OF SITE VICINITY

SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No.
08-31-324-01

Converse Consultants

Drawing No.
4



CITY OF SANTA MONICA GEOLOGIC HAZARD MAP

Converse Consultants

SANTA MONICA RECYCLING
AND DROP OFF FACILITY
SANTA MONICA, CALIFORNIA

Project No.	Drawing No.
08-31-324-01	5