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GEOTECHNICAL STUDY
BAY CENTER PROJECT
Emeryville, California

Prepared for

THE MARTIN COMPANY
391 Diablo Road
Danville, California

By

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GEOMATRIX

November 14, 1985
Project 1084B

The Martin Company
391 Diablo Road
Danville, California 94526

Attention: Mr. J. David Martin

Gentlemen:

We are pleased to submit the results of our geotechnical study for the three office buildings comprising the Bay Center Project in Emeryville, California. The accompanying report presents recommendations and design criteria for foundation support of the office buildings and earthwork construction associated with developing the building pads, parking areas, and roadways. The recommendations and design criteria given in the report were discussed with Mr. Steven Tipping, the structural engineer, and Mr. Alan McKay during the course of the study.

A draft of the report was issued to members of the design team on October 28, 1985. The review comments received have been taken into account in preparing this final report.

We appreciate the opportunity to work with you and your design team on this interesting and important project. Please contact the undersigned or Mr. John Egan, who assisted with the foundation analyses, if you have any questions regarding this report.

Sincerely yours,

Carl Basore

Carl Basore
Principal Engineer

dla

Enclosures

cc: Alan R. McKay & Associates
Attn: Mr. Alan McKay

Gensler and Associates, Architects
Attn: Mr. Jim Porter

Steven Tipping & Associates
Attn: Mr. Steven Tipping

HMH, Incorporated
Attn: Mr. Keith Handy

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GEOTECHNICAL STUDY
BAY CENTER PROJECT
Emeryville, California

INTRODUCTION

The Bay Center Project includes the construction of three low-rise office buildings and adjacent parking areas on a 16-1/2 acre site in Emeryville, California. The locations of the site and the proposed office buildings are shown in Figure 1.

The north and south office buildings will be five stories high while the center building will be three stories in height. The buildings will be steel frame structures with several braced frames located in each builidng to resist lateral wind and seismic forces. The first floor slabs will be constructed on grade, since no basements are planned for the buildings. Typical column loads for the five-story buildings are given below. The seismic loads can act in both tension and compression.

	Column Loads (kips)	
Column	DL + LL	Seismic
Exterior	230	0
Interior	400 to 600	0
Core Area	150 to 300	1000

The site slopes gently downward toward the north. Finished floor elevations for the buildings have not yet been selected, but two plans have been discussed. One approach is to construct all three buildings at the same elevation (about elevation 16 feet). The second approach is to step the buildings down toward the north to follow existing grade. In the latter case, the finished floor elevations would probably vary from about elevation 15 feet to elevation 17 feet.

The purpose of the geotechnical study has been to explore subsurface conditions at the site and develop foundation recommendations for the three office buildings. Specifically, the following information, recommendations, and design criteria are included in this report:

- description of subsurface conditions encountered in the exploratory borings drilled at the site;
- design pile capacities for foundation support of the buildings;
- discussion of foundation construction considerations;
- design earth pressures and pile capacities to resist lateral loads;
- estimated settlement of the buildings and surrounding areas;
- recommendations regarding support of the first level concrete floor slabs; and
- recommendations for earthwork construction.

FIELD EXPLORATION AND LABORATORY TESTS

A total of 14 exploratory borings were drilled at the site to help define subsurface conditions. Borings 1 through 4 were drilled on April 23, 1985 to obtain samples of fill material for environmental testing. Two of the borings were drilled to a depth of 11 feet and two borings were drilled 36 feet deep.

Borings 5 through 14 were drilled with a rotary drill rig between September 10 and 19, 1985. Borings 5 through 11 were drilled to depths of 51-1/2 feet to 101-1/2 feet to explore subsurface conditions in the building areas for foundation design. Borings 12, 13, and 14 were shallow borings (5 to 7 feet deep) drilled in the eastern parking area to provide information for site grading. The general locations of the borings are shown on Figure 1.

Soil samples were obtained at selected depths in Borings 5 through 11 and transported to the laboratory for examination and testing. Selected samples were tested to evaluate the strength, density, and physical characteristics of the underlying bearing soils. Logs of the borings were prepared based on soil classifications made in the field and on laboratory test results. Logs of the borings are presented as Figures A-2 through A-27 in Appendix A. Results of laboratory tests are presented at the corresponding sample locations on the boring logs and in Figures A-28 and A-29. A more detailed description of the field exploration and laboratory testing program is given in Appendix A.

SITE AND SUBSURFACE CONDITIONS

Two truck terminal buildings and a maintenance shop presently occupy the 16-1/2 acre site. The remaining area is paved with asphalt concrete surfacing. The terminal buildings have dock high floors and are used by trucking firms to store and transfer goods.

The site slopes gently downward from about elevation 15 feet at the south end of the site to elevation 11 feet along the northern edge of the property. The floor slabs in the truck terminal buildings are about 3-1/2 feet above surrounding grade.

The site has been reclaimed from the bay by placing fill over soft bay sediments. A review of aerial photographs indicates the site may have been a disposal area for construction debris and by-products of nearby manufacturing plants. Prior to constructing the existing truck terminal buildings and paved areas, the site was overlain with imported fill material.

The upper 15 to 20 feet of soil encountered in the borings consists of a combination of fill and soft bay sediments. The upper 1-1/2 to 2-1/2 feet of soil is generally pavement materials and imported fill. A dark-colored heterogeneous fill of sand, clay, construction debris, and slag or rock fragments was encountered below the pavement and imported fill materials and extended to depths of 6 to 10 feet below grade. In general, a layer of soft silty clay or loose sand was encountered below the heterogeneous fill and extended to firm soil at a depth of 15 to 20 feet below grade (approximate elevation -6 feet).

The boundary between fill and the underlying soft bay deposits was difficult to distinguish in the borings. In many borings, debris was encountered in the underlying soft clay, indicating the fill may have settled into the soft clay or was otherwise mixed with the soft clay.

Strata of stiff to very stiff silty and sandy clay and dense to very dense silty sand were encountered below the fill and soft bay deposits and extended to the depth of the borings. The upper 20 feet of firm bearing soil is primarily dense silty sand with occassional layers of silty and sandy clay. Stiff to very stiff clay was encountered below a depth of about 40 feet and extended to the depth of the borings. A fifteen-foot thick stratum of dense to very dense silty sand and gravelly sand was encountered below a depth of 60 feet and 75 feet in Borings 11 and 8, respectively.

Groundwater was encountered at depths of 5 to 8 feet in Borings 1 through 4 drilled in April, 1985. However, stabilized groundwater levels were not obtained in Borings 5 through 11 because rotary drilling methods were used to advance these borings. Groundwater was not encountered in Borings 12, 13, and 14 which extended only 5 to 7 feet below grade. More detailed information regarding subsurface conditions is presented on the boring logs in Appendix A.

DISCUSSION

General

The upper 15 to 20 feet of heterogeneous fill and soft bay deposits encountered at the site are considered too weak and compressible to support the proposed three- and five-story buildings on shallow foundations without detrimental settlement. It is recommended, therefore, that the buildings be supported on deep foundations extending through the upper fill and soft bay deposits and deriving support in the underlying stiff clays and dense sands. In view of the high groundwater level, weak fill materials, and strata of sandy soils, it would be difficult to install drilled pier foundations at the site. Therefore, driven piles are considered to be the most appropriate type of deep foundation for use at this site and are recommended for the three office buildings. Specific foundation recommendations and design criteria are given in the Recommendations section of this report.

Some grading of the site will be required to develop building pads and parking areas. However, it is planned to minimize changes in existing grade to reduce settlement caused by raising existing grade and construction difficulties caused by excavating into the weak heterogeneous fill. The upper 1-1/2 to 2-1/2 feet of pavement and imported fill are compacted materials. However, below this cap of good material, the quality and density of the fill decreases.

Settlement

The upper 15 to 20 feet of heterogeneous fill and soft bay deposits are moderate to high in compressibility. As a result, areas where fill is placed to raise existing grade will settle. To aid in planning site grading and utility connections to buildings, a settlement analysis was undertaken to estimate settlement at the site. The estimated range of settlement for different thicknesses of new fill is presented below:

Thickness of New Fill (feet)	Estimated Range of Settlement (inches)
0	0 - 1
2	3 - 4
4	6 - 8

The heterogeneous nature of the fill and soft bay deposits at the site will result in nonuniform settlement, both in terms of magnitude and rate. We estimate that the above settlement values will occur within 10 to 15 years after fill placement.

Settlement of the office buildings, if supported on driven pile foundations, is expected to be nominal. Specifically, building settlements are not expected to exceed 1/2 inch.

Some differential settlement is expected to occur between the first level floor slab and the pile supported columns and walls of the building if the floor slab is supported on grade. The magnitude of floor settlement is dependent on the thickness of new fill required to bring the building pad to grade. Therefore, if finish grade is essentially at or below existing grade, settlement of slab-on-grade floors would be small. In this case, if some uneveness of the floor is acceptable, then the first level floor slab could be supported on grade. However, to provide an even floor throughout the building, regardless of finish grade, it is recommended that the first level floor slab be supported on pile foundations.

Utility lines should be designed to accommodate the estimated settlement values given above. Specifically, flexible connections should be provided where utility lines enter or leave the pile supported buildings. Also, possible changes in slope should be taken into consideration when designing gravity lines.

RECOMMENDATIONS

Foundations

It is recommended that the three office buildings be supported on driven pile foundations. In addition, to prevent settlement and uneveness of the floor slabs it is recommended that the first level floor slabs also be supported on driven piles. Based on the anticipated building loads and subsurface conditions encountered in the borings, it is our opinion that 12-inch square prestressed concrete piles are appropriate piles for this project. Accordingly, the design criteria presented in this section are for 12-inch square prestressed concrete piles.

It is recommended that vertical load capacity of foundation piles be based on the pile capacity design curves given in Figure 2. The solid curve is for combined dead and live structural loads. The pile capacity can be increased 33 percent to resist downward transient (wind or seismic) loads. The dashed curve is for transient wind or seismic uplift loads.

It is anticipated that the foundation system for the buildings will include two categories of piles. One category will be short, low capacity piles developing end-bearing support in the sand strata encountered directly below the heterogeneous fill and soft bay deposits. The second category will be long, high capacity piles developing skin friction support in the deeper stiff to very stiff clays and dense sands. The low capacity piles should have a design capacity of 35 tons and extend to a tip elevation of -18 feet or below. On the other hand, high capacity piles can be designed for dead and live loads of between 60 and 100 tons with embedments of about 60 to 80 feet below existing grade.

Preliminary foundation analyses indicate that short, low capacity piles can be used to support the concrete floor slab while longer, higher capacity piles are appropriate for supporting the building column and wall loads.

There is a possibility that pile capacities of 50 to 60 tons can be developed in the upper sand stratum at locations where the sand is very dense and no clay layers interrupt the stratum. Conditions encountered in Borings 6 and 8 are condusive to increased capacities for short end-bearing piles. However, it is recommended that the design pile lengths be based on the design curves given in Figure 1. Then, based on the results of the indicator pile and dynamic pile monitoring program undertaken prior to starting production pile driving, possible adjustments in pile lengths can be evaluated.

At building sites where fill is placed to raise existing grade, settlement will occur and impose downdrag loads on the foundation piles. It is recommended that the following downdrag loads be added to the structural loads to be resisted by each pile:

Thickness of New Fill (feet)	Design Downdrag Load (tons)
0	0
2	8
4	10

It is recommended that piles in groups be spaced at least 4 feet apart, measured from the centers of adjacent piles. A minimum group of two piles should be used to support individual column loads. In addition, piles subject to transient uplift loads should be adequately tied into the pile cap using either the pile prestressing strand or reinforcing steel dowels.

Indicator Piles

In order to evaluate variations in pile lengths at the three building sites and to assess the pile driving criteria, it is recommended that at least 10 to 15 indicator piles be driven at each building site prior to casting piles for production pile driving. The pile locations should be selected to provide good coverage across the building site. About half of the piles should be high capacity piles and half should be short, low capacity piles. The indicator piles should be cast at least 5 feet longer than design length to allow the piles to be driven deeper into the bearing soil if necessary.

It is recommended that a program of dynamic pile monitoring also be undertaken during installation of the indicator piles to provide information regarding:

- pile capacity;
- pile stress during driving;
- pile integrity; and
- efficiency of the pile hammer.

Dynamic pile monitoring consists of measuring force and acceleration near the top of the pile during driving and analyzing the data with a pile analyzer. By analyzing selected piles during the indicator pile program, an assessment of pile capacity and pile lengths can be obtained. This would be particularly important in assessing the capacity of short end-bearing piles and the possibility of increasing the capacity of these piles at selected locations at the site. Appropriate pile driving criteria can also be obtained from the pile measurements. A specific program of dynamic pile monitoring can be developed as part of the indicator pile program.

Lateral Load Resistance

Resistance to seismically or wind-induced transient lateral loads can be developed by passive earth pressure acting against the sides of pile caps and grade beams, and by bending of the piles. For design purposes, a passive earth pressure equal to a fluid weighing 500 pcf can be used against the face of pile caps or grade beams which are in direct contact with soil. If additional lateral resistance is required, the lateral load capacity of the foundation piles can be taken into account.

The capacity of 12-inch square prestressed concrete piles to resist lateral loads in bending was studied using a computer program that takes into account the nonlinear behavior of soils. The lateral load resistance of piles increases with increasing deflection of the pile. For purposes of this analysis, the load causing a 1/2-inch deflection of the pile head for both the free head and fixed head condition was computed. Increased lateral resistance can be developed if greater pile deflection is allowed. However, 1/2-inch deflection seems reasonable for short term loading conditions associated with wind or seismic forces. Results of the analysis, giving lateral loads and resulting bending moments are summarized below.

Pile Head Condition	Lateral Load (tons)	Maximum Bending Moment (inch-kips)
Free	9	300
Fixed	18	900

The lateral load analysis has taken into account the increase in soil strength and stiffness under transient loading conditions.

The above lateral load capacity values are for a single pile. Because of interaction between adjacent piles, the capacity of pile groups to resist lateral loads is less than the sum of the capacity of individual piles. Accordingly, the lateral resistance of piles in groups should be reduced, depending on the spacing between adjacent piles. Reduction factors for lateral resistance of piles in groups are given below.

Spacing Between Piles (feet)	Reduction Factor on Single Pile Capacity (%)
4	40
6	70
8	100

Pile Installation

Since some construction debris was encountered in the miscellaneous fill in the exploratory borings, it may be necessary to predrill through the fill at each pile location to prevent breakage or misalignment of the piles. Accordingly, the contractor should have appropriate drilling equipment at the site for use when required. The predrill auger should not be larger than 12 inches in diameter.

Two different categories of piles will be driven at the site and each category will have different driving criteria. The short, low capacity piles will develop most of their support in end bearing. As a result, the final driving resistance will be important in evaluating the capacity of these piles. The long, high capacity piles will develop support pirmarily by skin friction and driving resistance is not as important in evaluating the capacity of these piles. Specific driving criteria for the low capacity end-bearing piles and high capacity friction piles are discussed below.

The pile contractor should select a hammer (or hammers) that is capable of driving the piles to their design tip elevations without overstressing the concrete in either compression or tension. It is recommended that the short piles be driven with a hammer having a rated energy of at least 35,000 foot-pounds. The long piles should be driven with a hammer having a rated energy of 50,000 foot-pounds or more.

Preliminary pile driving criteria, consisting of minimum and refusal blow counts, have been developed for both short and long piles for two different hammer energies. The criteria are intended to be used as a guide for driving the indicator piles. The driving criteria should be reviewed and modified as necessary after the indicator pile and dynamic pile monitoring programs have been completed and before production pile driving starts.

Rated Hammer Energy (ft-lbs)	Pile Capacity (tons)	Pile Length	Minimum Blow Count (blows/ft)	Refusal Blow Count (blows/ft)
50,000	35	short	10	25
	60	long	10	30
	100	long	22	65
80,000	60	long	8	25
	100	long	15	45

The general driving criteria for both short and long piles are as follows:

- Drive piles to their design tip elevation.
- If driving resistance is below the minimum blow count, continue driving pile until the minimum blow count criteria is met.
- If hard driving resistance is encountered above the design tip elevation, driving can stop provided the pile tip is within 5 feet of design tip elevation and the driving resistance meets the refusal blow count criterian.

If the short end-bearing piles do not develop support in the upper sand layer, they should be driven about 10 feet deeper to develop sufficient skin friction support.

It is recommended that a representative of our firm observe both the indicator and production pile driving operations to compare actual driving conditions with those anticipated from the exploratory borings. Based on the results of the indicator pile and dynamic pile monitoring programs, final driving criteria will be developed for installation of the foundation piles.

Concrete Floor Slabs

It is anticipated that the first level floor slabs will be structural floors at least 6 inches thick supported on pile foundations. As a result, the floors will be reasonably good barriers against moisture migration from the soil into the buildings. If additional protection against dampness of the floor slabs is desired, a 4-inch thick layer of open-graded gravel should be placed under the floor slabs to act as a capillary break. A moisture-proof membrane should then be installed over the gravel and covered with a thin layer of sand or other material to protect the membrane from damage during construction.

The open-graded gravel should be clean crushed rock meeting the following grading requirements:

Seive Size	Percent Passing Sieves
1"	100
3/4"	90 - 100
No. 4	0 - 10

Earthwork

Earthwork construction will consist of removing the existing buildings and bringing the building pads and parking areas to grade by excavating and filling. Areas to receive fill should be firm and compacted. In general, the existing asphalt concrete surfacing should be excavated in areas to receive fill. However, in parking areas, the existing pavement may be incorporated into the new pavement by overlaying the surface with additional asphaltic concrete. An alternative to overlaying the existing pavement is to recycle the surfacing and incorporate the pulverized material into the new parking area pavement section.

The miscellaneous fill encountered 1-1/2 to 2-1/2 feet below existing grade is relatively weak. Therefore, excavations deeper than 2 feet should be avoided (except for foundations and utility lines) if at all possible. It is anticipated that the underlying miscellaneous fill will be difficult to compact when exposed as subgrade soil. If a firm, compacted subgrade cannot be obtained, the subgrade should be subexcavated about one foot and replaced with select, imported fill to bridge over the soft fill material.

After the subgrade soils have been compacted, fill may be placed to bring the site to finished grade. Fill should be placed in uniform lifts not exceeding 8 inches in uncompacted thickness and compacted to the requirements specified below as determined by ASTM Designation D-1557. Before compaction begins, the fill should be brought to a water content that will permit proper compaction by either: (1) aerating the material is it is too wet; or, (2) spraying it with water if it is too dry. Each lift should be thoroughly mixed to ensure a uniform distribution of water content.

Fill Location	Minimum Compaction (%)
Building pads and non-street or parking areas	90
Parking and street areas (with 2 feet of finish grade)	95

The existing pavement and imported fill materials encountered to depths of 1-1/2 to 2-1/2 feet at the site are suitable for use as fill at the site. The asphalt concrete surfacing should be broken into pieces smaller than 3 inches. Concrete pavement and the underlying miscellaneous fill should not be reused as fill at the site.

All imported fill should be a select, non-expansive material. The material should be a soil or soil-rock mixture free of organic matter or other deleterious material. It should not contain rocks or lumps over 6 inches in largest dimension, and no more than 15 percent of the material should be larger than 2-1/2 inches in size. In addition, the material should meet the following quality requirements:

Maximum Plasticity Index	15
Maximum percent passing No. 220 sieve	50

Utility trenches will probably extend into the underlying heterogeneous fill which contains some debris. The fill is relatively weak and may require shoring and bracing to maintain vertical sides. Excavations less than 5 feet deep are not expected to encounter groundwater. Provisions for controlling groundwater seepage should be available for deeper trench excavations, particularly at the north end of the site.

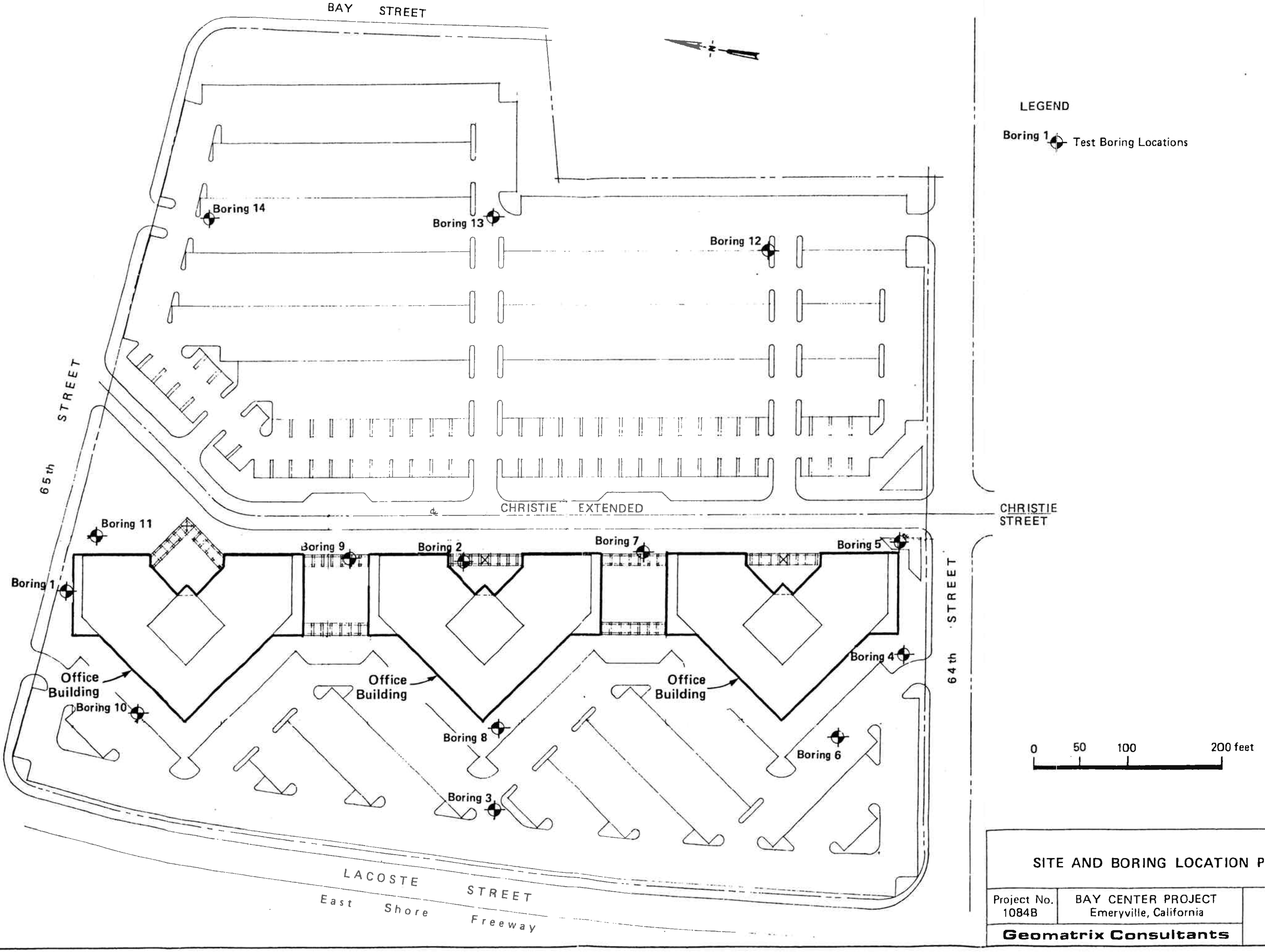
Excavations extending to or below groundwater level will encounter soft fill materials. To provide a stable trench bottom for supporting workmen and pipe, a 6- to 12-inch thich pad of crushed rock (3/4-inch size) should be placed over the bottom of the trench excavation.

The heterogeneous fill and debris excavated from the trenches are not suitable for reuse as compacted backfill. Trench backfill should consist of select, imported fill or the good quality fill that overlies the site to depths of 1-1/2 to 2-1/2 feet. The backfill should be placed in uniform lifts not exceeding 12 inches for granular soil or 8 inches for clayey soil and compacted to a minimum of 90 percent.

BASIS FOR RECOMMENDATIONS

The recommendations made in this report are based on the assumption that the soil conditions do not deviate appreciably from those disclosed in the borings. If any variations or undesirable conditions are encountered during construction, the effects of these conditions on the recommendations presented herein should be evaluated and, if necessary, supplemental recommendations developed. The recommendations are also made for the specific project described in this report. Significant changes in the locations, types of structures, or loading conditions should be evaluated as to their effects on the recommendations.

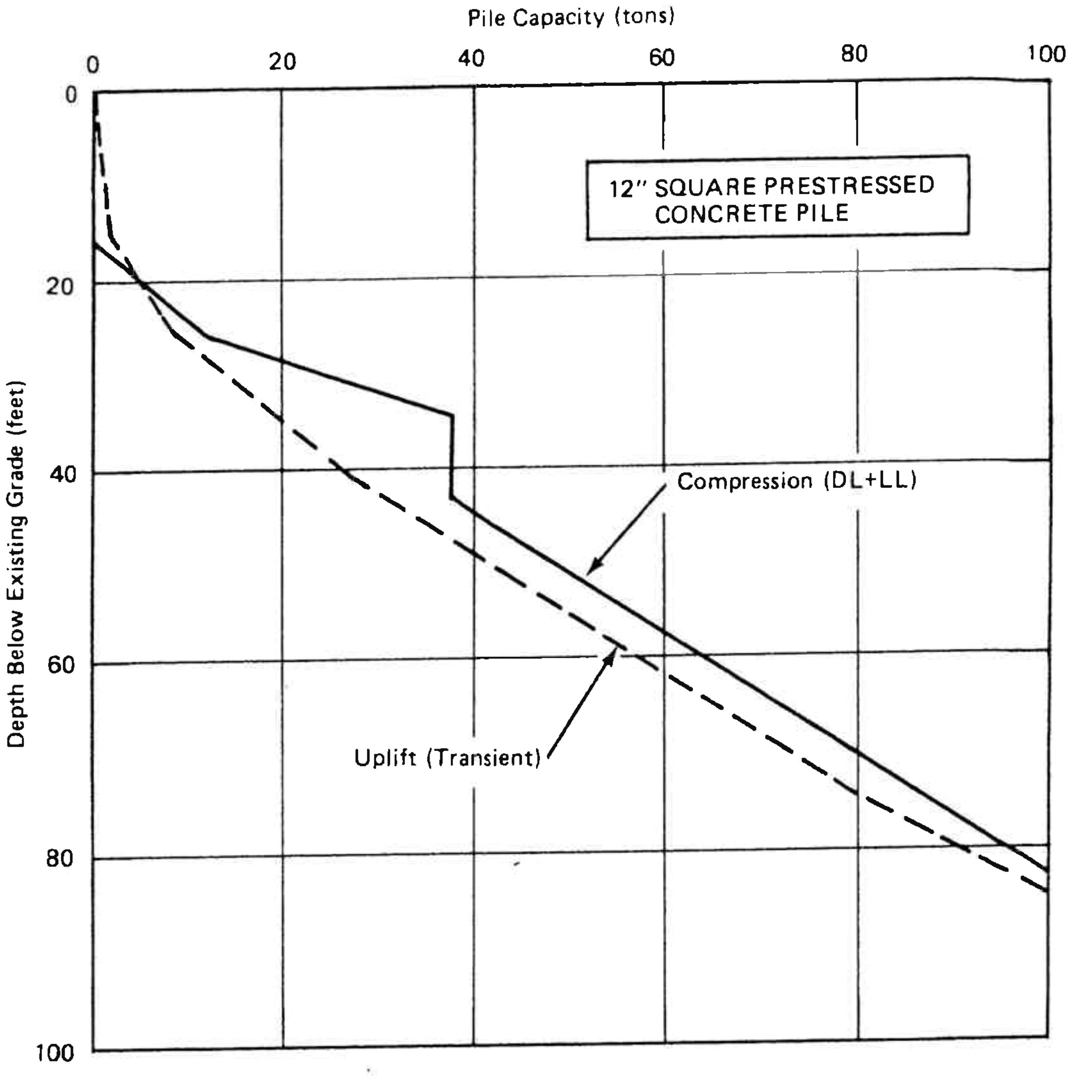
It is recommended that we review the foundation and grading plans and specifications to determine that the intent of the recommendations presented herein have been properly interpreted and incorporated into the contract documents. In addition, a representative of our firm should observe the pile driving operations and site grading work to verify that the subsurface conditions used as a basis for the recommendations are encountered throughtout the site.



SITE AND BORING LOCATION PLAN

Project No. 1084B	BAY CENTER PROJECT Emeryville, California	Figure 1

Geomatrix Consultants



Project No. 1084B	BAY CENTER PROJECT Emeryville, California	PILE CAPACITY DESIGN CURVES	Figure 2
Geomatrix Consultants			

APPENDIX A

FIELD EXPLORATION AND LABORATORY TESTS

EXPLORATORY BORINGS

Fourteen exploratory borings were drilled at the locations shown in Figure 1 to evaluate subsurface conditions at the site. The borings were drilled in two different phases. The initial four borings (Borings 1 through 4) were drilled on April 23, 1985 to obtain samples of fill material for environmental testing. The borings were drilled with a truck mounted hollow stem auger rig operated by Datum Exploration Inc. of Martinez, California. The remaining 10 borings (Borings 5 through 14) were drilled during the period of September 10 through 19, 1985 to explore subsurface conditions for foundation design and earthwork considerations. The borings were drilled by All Terrain Exploration Drilling of Roseville, California using a rotary drill rig.

Soil samples were obtained from 11 of the 14 borings using two types of samples.

- Modified California Drive Sampler (2-inch I.D. and 2-1/2 inch O.D.) with thin brass liners; and
- Shelby Tube Sampler (nominal 3-inch-diameter).

The California Sampler was driven either 12 or 18 inches into the soil at the bottom of the hole with either a 140-pound uphole hammer falling 30 inches, or a 280-pound downhole hammer falling 30 inches. The Shelby Tube Sampler was pushed into the soil using hydraulic pressure. When a sample was obtained, the sampler was withdrawn from the borehole. For the modified Califiornia Sampler, the brass liner tubes containing the soil samples were removed and sealed to preserve the natural moisture content of the soil. The ends of the Shelby Tubes were also sealed to preserve the natural water content of the soil.

Selected soil samples from Borings 1 through 4 were delivered to Brown and Caldwell Analytical Laboratories in Emeryville for environmental testing. Samples from Borings 5 through 11 were delivered to Woodward-Clyde Consultants' laboratory in Pleasant Hill for examination and testing.

The initial four borings were observed and logged by Mr. Charles Taylor of our firm. Mr. Jon Rosso and Ms. Zena Hlobil observed the Phase 2 drilling and sampling operations conducted in September 1985.

Visual soil classifications were made in the field and reviewed after further inspection of the samples in the laboratory. Boring logs were prepared from the field and laboratory data and are presented in Figures A-2 through A-27 of this Appendix. A legend sheet of the boring logs is included as Figure A-1.

The groundwater level was measured in Borings 1 through 4 at the completion of each boring. These water levels are noted on the boring logs. It was not possible to measure the groundwater levels in Borings 5 through 11 because the borings were drilled with a rotary rig which continuously circulates water and drilling mud in the boring during the drilling process.

The initial four borings were located in the field with the aid of an aerial photograph of the site prepared by HMH, Incorporated and dated December 22, 1983 (1 inch = 30 feet). A topographic survey map of the site prepared by HMH, Incorporated in August 1985 (1 inch = 40 feet) was used to locate the remaining borings. The elevation of the ground surface at each boring location was obtained from the August 1985 topographic survey of the site.

LABORATORY TESTING

Selected samples from Borings 1 through 4 were tested for environmental purposes. The results of these tests were presented in a letter report dated August 21, 1985. Selected samples from Borings 5 through 11 were tested to evaluate the strength and compressibility of the underlying soil for foundation analysis and design. The basic testing program consisted of water content and dry density determinations and unconfined compressive strength tests. The results of these tests, along with the resistance to penetration of the sampler, are shown at the corresponding sample locations on the Logs of Borings, Figures A-2 through A-27.

The liquid and plastic limits were determined for four samples of clay encountered at the site to help correlate and classify the various layers. Results of the tests are presented in Figure A-28.

Grain size analyses were performed on three samples of sand encountered in the exploratory borings to help classify the soil. The grain size distribution curves are presented in Figure A-29.

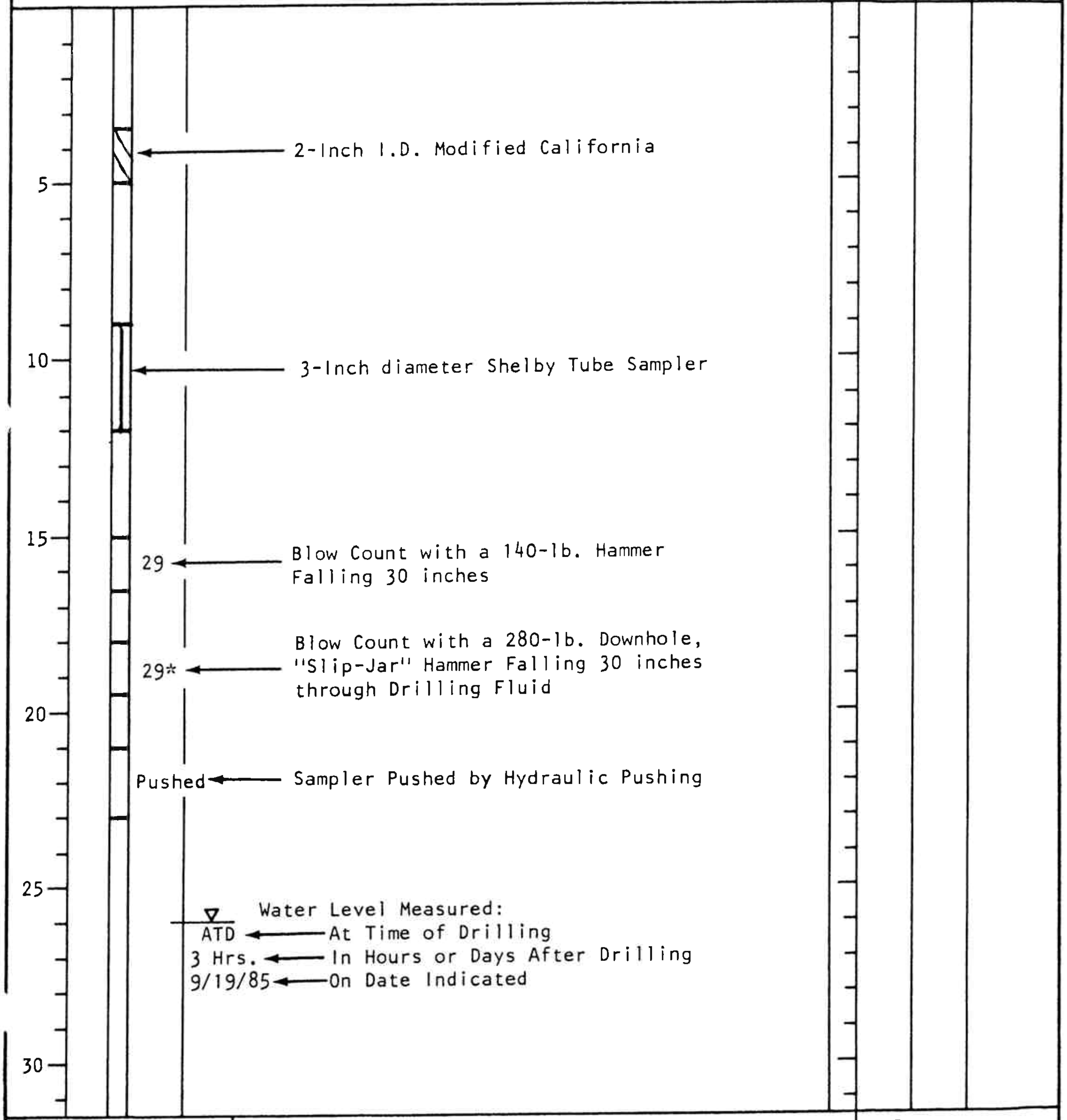
Project: **BAY CENTER PROJECT**
Emeryville, California

BORING LOG LEGEND SHEET

Date Drilled:
Type of Boring:
Hammer Weight:

Remarks:

Depth, Ft	Samples	Blows/Ft	DESCRIPTION	LABORATORY TESTS Moisture Content, %	 Dry Density, pcf	 Unconfined Compressive Strength, psf



2-Inch I.D. Modified California

3-Inch diameter Shelby Tube Sampler

Blow Count with a 140-lb. Hammer Falling 30 inches

Blow Count with a 280-lb. Downhole, "Slip-Jar" Hammer Falling 30 inches through Drilling Fluid

Sampler Pushed by Hydraulic Pushing

Water Level Measured:
At Time of Drilling
In Hours or Days After Drilling
On Date Indicated

Project No. 1084B | **Geomatrix Consultants** | **Figure A-1**

Project: BAY CENTER PROJECT Emeryville, California	# Log of Boring No. 1

Date Drilled: 4/23/85

Type of Boring: 8" Hollow Stem Auger

Hammer Weight: 140 lbs.

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS Moisture Content, %	 Dry Density, pcf	 Unconfined Compressive Strength, psf
			Surface Elevation: 11±			
			10" Asphalt Surfacing and Aggregate Base Material			
	1	12/6"	GRAVELLY CLAY FILL Stiff, moist, yellow-brown	--	---	----
	2	5/6"	CLAY FILL Soft to medium stiff, brown to black, with misc. debris	--	---	----
5	3	3/6"	▽ ATD	--	---	----
			SILTY CLAY (CH) Soft, grey			
10	4	3/6"	← Petroleum oder	--	---	----
			SANDY CLAY (CL) Stiff, grey-green			
15	5	20/6"		--	---	----
			SANDY CLAY (CL) Very stiff, brown			
20						
			SILTY SAND (SM) Dense to very dense, brown			
25	6	50/4"		--	---	----
			SILTY CLAY (CH) Stiff, blue-grey			
30						

Project No. 1084B | **Geomatrix Consultants** | Figure A-2

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 1
(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SILTY CLAY (CH) Stiff, blue-grey			
35	7	13/6"	SILTY SAND (SM) Medium dense, blue-grey	--	--	----
			Bottom of Boring at 36'			
40						
45						
50						
55						
60						
65						

Project: **BAY CENTER PROJECT**
Emeryville, California

Log of Boring No. 2

Date Drilled: 4/23/85
Type of Boring: 8" Hollow Stem Auger
Hammer Weight: 140 lbs.

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Surface Elevation: 14±

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			10" Asphalt Surfacing and Aggregate Base Material			
	1	27/6"	CLAYEY SAND FILL Medium dense, black, with misc. debris (burnt wood, metal, glass, copper wire and slag)	--	---	----
	2	38/6"		--	---	----
			} Stiff, black silty clay layer			
5	3	26/6"		--	---	----
			∇ ATD			
			SANDY CLAY FILL Stiff, brown			
			CLAYEY SAND (SC) Loose, blue-grey			
			SILTY CLAY (CH) Soft, black and green Petroleum oder			
10	4	15/6"		--	---	----
			Bottom of Boring at 10½'			
15						
20						
25						
30						

Project No. 1084B

Geomatrix Consultants

Figure A-4

Project: **BAY CENTER PROJECT**
Emeryville, California

Log of Boring No. 3

Date Drilled: 4/23/85
Type of Boring: 8" Hollow Stem Auger
Hammer Weight: 140 lbs.

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			Surface Elevation: 12±			
			14" Asphalt Surfacing and Aggregate Base Material			
	1	16/6"	CLAYEY SAND FILL Medium dense, moist, black, with glass, metal and pyrite like crystals	--	---	----
	2	3/6"		--	---	----
			SAND FILL Loose, wet, grey			
5	3	2/6"	SANDY CLAY FILL Stiff, moist, brown ▽ ATD	--	---	----
			SILTY SAND FILL Loose, black			
			SILTY CLAY (CH) Soft, blue-grey, with some sand layers			
10	4	3/6"		--	---	----
			Bottom of Boring at 11'			
15						
20						
25						
30						

Project No. 1084B

Geomatrix Consultants

Figure A-5

Project: **BAY CENTER PROJECT**
Emeryville, California

Log of Boring No. 4

Date Drilled: 4/23/85
Type of Boring: 8" Hollow Stem Auger
Hammer Weight: 140 lbs.

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Surface Elevation: 13±

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			12" Asphalt Surfacing and Aggregate Base			
			GRAVELLY CLAY FILL Stiff, moist, yellow-brown			
	1	22/6"	MIXED CLAY AND SAND FILL Black, with misc. debris	--	---	----
5	2	3/6"	← Seepage	--	---	----
		▽ ATD	SILTY CLAY (CH) Soft, black, with organic material			
			← Petroleum oder			
10	3	1/6"		--	---	----
15	4	2/6"		--	---	----
			SILTY SAND (SM-SP) Loose, gray, with some clay layers			
20						
			SILTY CLAY (CL) Very stiff, brown			
25	5	12/6"		--	---	----
			SILTY SAND (SM-SP) Medium dense to dense, brown			
30						

Project No. 1084B

Geomatrix Consultants

Figure A-6

Project: **BAY CENTER PROJECT**
Emeryville, California

Log of Boring No. 4
(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SILTY SAND (SM-SP) Medium dense to dense, brown			
35	6 ▨	15/6"		--	---	----
			Bottom of Boring at 36'			
40						
45						
50						
55						
60						
65						

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 5

Date Drilled: 9/18/85
Type of Boring: 4" Rotary
Hammer Weight: 280 lbs.

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Surface Elevation: 14±

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			3" Asphalt Surfacing			
			CLAYEY SAND FILL Dense, brown, with rock fragments			
			CLAYEY SAND FILL Loose, dark brown, with misc. debris (glass, wood, steel)			
5						
			SILTY CLAY FILL Soft to medium stiff, dark grey, with misc. debris			
10	1	6*		28	94	----
			}Wood, brick, slag (oily)			
15	2	4*		No Recovery		
20	3	52*	GRAVELLY SAND (SW) Dense, orange-brown	21	102	----
25	4	34*	SANDY CLAY (CL) Very stiff, orange-brown	No Recovery		
	5	31*		19	112	----
			SILTY SAND (SP-SM) Dense, orange-brown			
30	6	76/6"*		--	---	----

Project No. 1084B

Geomatrix Consultants

Figure A-8

Project: **BAY CENTER PROJECT**
Emeryville, California

Log of Boring No. 5
(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SILTY SAND (SP-SM) Dense, orange-brown			
35	7	19*	SILTY CLAY (CL) Stiff, grey, with some sand	No Recovery		
	8	30*		19	111	1920
40	9	63/6"*	SILTY SAND (SM-SP) Very dense, dark grey	--	---	----
45	10	36*	SILTY CLAY (CL) Very stiff, dark gray	22	104	6150
			Becoming sandy clay			
50	11	59*	Becoming grey silty clay	20	108	6630
55						
			Becoming dark grey and stiff			
60	12	24*		40	80	2600
65						

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 5
(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SILTY CLAY (CL) Stiff, dark grey			
70	13	67*	SANDY CLAY (CL) Very stiff, orange-brown, with some gravel	24	100	3790
75						
			GRAVELLY SAND (SW) Very dense, orange-brown			
80	14	57*	SANDY CLAY (CL) Very stiff, orange-brown	22	105	2580
85						
90	15	60*	SILTY CLAY (CL) Very stiff, orange-brown mottled with grey with some gravel	22	104	5570
			Becoming sandy clay (CL)			
95						
			Bottom of Boring at 100'			
	16	79*		22	104	1860

Project No. 1084B

Geomatrix Consultants

Figure A-10

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 6

Date Drilled: 9/19/85
Type of Boring: 4'' Rotary
Hammer Weight: 280 lbs.

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS		
				Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			Surface Elevation: 15±			
			SILTY CLAY FILL Stiff, grey-brown, with gravel and misc. debris (metal, wire, etc.)			
5			Becoming soft and dark grey (debris includes bricks, glass, and metal)			
10	1	7*		--	---	----
15	2	2*	SILTY CLAY (FILL ?) Soft, light grey, with dark grey streaking	67	59	330
20	3	16*	CLAYEY SAND (SC) Medium dense, grey, with shells	--	---	----
			SILTY CLAY (CL) Stiff, orange-brown, with sand			
25	4	59*		--	---	----
			CLAYEY SAND (SC) Dense, grey-brown			
30	5	29*		19	111	----

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 6

(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			CLAYEY SAND (SC) Dense, grey-brown			
35	6	70/6"*		--	---	----
			SILTY CLAY (CL) Stiff, grey			
40	7	93*		--	---	----
			SILTY SAND (SP-SM) Dense, dark grey			
45	8	63/6"*		--	---	---
			SILTY CLAY (CL) Very stiff, dark grey, with some sand			
50	9	47*	Becoming sandier	21	106	6590
			Less sand			
55						
			SILTY CLAY (CL) Very stiff, brown			
60	10	98*		--	---	----
			Bottom of Boring at 61½'			
65						

Project No. 1084B

Geomatrix Consultants

Figure A-12

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 7

Date Drilled: 9/16/85
Type of Boring: 4" Rotary
Hammer Weight: 140 lbs.

Remarks:
(See Legend Sheet for sampler types and hammer weights)

				LABORATORY TESTS		
Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			Surface Elevation: 15±			
			4" Asphalt Surfacing			
			CLAYEY SAND FILL Dense, grey-brown, with rock fragments			
5			CLAYEY SAND FILL Loose, dark grey, with organic material and misc debris (metal, glass, wood, bricks, etc.) Becoming more clayey with rocks, slag and oily materials			
10			Rock			
15						
			SANDY CLAY (CL) Medium stiff to stiff, orange-brown			
20	1	16		25	100	2350
25	2	21	Grading to grey-brown sandy clay (CL)	19	110	4780
30	3	34		23	101	----

Project No. 1084B | **Geomatrix Consultants** | **Figure A-13**

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 7

(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SILTY CLAY (CL) Stiff, dark grey, with some sand			
35	4	87/6"	SILTY SAND (SP-SM) Very dense, grey-brown	19	110	260
40	5	36	SANDY CLAY (CL) Stiff, dark grey	18	113	780
45	6	34		24	101	6340
			SILTY CLAY (CL) Very stiff, dark grey Becoming sandy clay			
50	7	43		18	111	5760
55			SILTY CLAY (CL) Very stiff, orange-brown Grading to grey silty clay			
	8	30		35	87	4610
60			Bottom of Boring at 60'			
65						

Project No. 1084B

Geomatrix Consultants

Figure A-14

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 8

Date Drilled: 9/17/85
Type of Boring: 4" Rotary
Hammer Weight: 140 and 280 lbs.

Remarks:
(See Legend Sheet for sampler types and hammer weights)

Surface Elevation: 13±

				LABORATORY TESTS		
Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			4" Asphalt Surfacing			
			CLAYEY SAND FILL Medium dense, brown, with gravel			
			CLAYEY SAND FILL Loose, brown, with construction debris (concrete, bricks, rocks, steel)			
5						
			Becoming black and oily			
10	1	3	SILTY CLAY FILL Soft, dark grey (less debris)	28	95	----
15	2	18		--	---	----
			SILTY SAND (SP-SM) Loose, dark grey, with some shells			
20	3	34	SILTY SAND (SP-SM) Medium dense to dense, orange-brown	19	113	----
			Medium stiff, orange-brown, sandy clay (CL)			
25	4	24		18	112	2240
30	5	101	Becoming very dense	--	---	----

Project No. 1084B

Geomatrix Consultants

Figure A-15

Project: **BAY CENTER PROJECT**
Emeryville, California

Log of Boring No. 8

(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SILTY SAND (SP-SM) Very dense, orange-brown			
35	6	59/6"*		--	---	----
40	7	57	SILTY SAND (SP-SM) Very dense, dark grey	--	---	----
			SANDY CLAY (CL) Very stiff, dark grey			
45	8	49*		22	105	7270
50	9	32*	Grading to clayey sand (SC)	16	115	1480
			Increasing gravel content			
			SANDY CLAY (CL) Very stiff, orange-brown			
55						
			Becoming silty clay (CL)			
60	10	46*	SILTY CLAY (CL) Stiff, gray-brown	31	90	2110
65						

Proj. No.

Geomatrix Consultants

Figure A-16

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 8

(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			Increasing sand content			
			Becoming plastic silty clay (CH)			
70	11	56*		21	105	6640
75						
			GRAVELLY SAND (SW) Very dense, orange-brown, with gravel to 1" diam.			
80	12	81/6"*		--	---	----
85						
90	13	72*	SILTY CLAY (CL) Very stiff, light grey	23	101	4730
95			Grading to grey-brown			
100	14	34/6"*	Bottom of Boring at 101½'	23	101	7570

Project No. 1084B

Geomatrix Consultants

Figure A-17

Project: **BAY CENTER PROJECT**
Emeryville, California

Log of Boring No. 9

Date Drilled: 9/13/85
Type of Boring: 4" Rotary
Hammer Weight: 140 lbs.

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Surface Elevation: 13±

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			10" Asphalt Surfacing			
			CLAYEY SAND FILL Medium dense, grey			
5			CLAYEY FILL Medium stiff, green-grey, with organic material and misc. debris			
10			SILTY SAND FILL Loose, grey to black, with wood and rock fragments (slag ?)			
15			SILTY CLAY FILL Soft, black, with organic material, wood and glass (oily)			
	1	14		--	---	----
			SILTY SAND (SM-SP) Loose, black, with shells			
20	2	19	CLAYEY SAND (SC) Medium dense, orange-brown, with some gravel to 1/4" diam.	21	106	990
25			Grading to silty sand (SP-SM)			
	3	30		19	110	----
30	4	24	SILTY CLAY (CL-CH) Stiff, dark grey	37	82	3030

Project No. 1084B | **Geomatrix Consultants** | **Figure A-18**

Project: **BAY CENTER PROJECT**
Emeryville, California

Log of Boring No. 9
(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SILTY CLAY (CL-CH) Stiff, dark grey			
			SILTY SAND (SP-SM) Dense, brown to grey			
35	5	28	} Stiff, silty clay (CL-CH)	--	---	----
40	6	44	SANDY CLAY (CL) Very stiff, dark grey	--	---	----
45	7	44	SILTY CLAY (CL) Very stiff, grey-brown	18	111	6090
50	8	25		29	93	3860
55			SILTY CLAY (CL) Stiff, grey			
60	9	17		39	81	3420
			Bottom of Boring at 60'			
65						

Figure A-19

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 10

Date Drilled: 9/12/85
Type of Boring: 4" Rotary
Hammer Weight: 140 lbs.

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Surface Elevation: 12±

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			5" Concrete Slab			
			FILL Medium dense, clayey gravel			
5			CLAYEY SAND FILL Loose, dark brown, with organic materials and misc. debris (wood, bricks, glass, etc.)			
10			CLAYEY FILL Soft, black, with organic material and debris ↓ Rock fragments (slag ?)			
15	1	Pushed	SILTY CLAY (CH) Soft, blue-grey	--	---	----
			SANDY CLAY (CL) Stiff, orange-brown, with some gravel ↓ Increasing gravel content			
20	2	20	SILTY CLAY (CL-CH) Stiff, orange-brown	23	101	4880
			↓ Becoming very stiff			
25	3	52		--	---	----
			SILTY SAND (SP-SM) Very dense, orange-brown			
30	4	23	SILTY CLAY (CL-CH) Stiff, grey	27	97	4590

Project No. 1084B

Geomatrix Consultants

Figure A-20

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 10

(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SILTY CLAY (CL-CH) Stiff, grey			
35	5	105	SILTY SAND (SP-SM) Very dense, grey-brown	--	---	----
			SILTY CLAY (CL-CH) Stiff, grey			
40	6	110	SILTY SAND (SP-SM) Very dense, dark grey	--	---	----
			SANDY CLAY (CL) Stiff, dark grey			
45	7	18		23	102	2020
50	8	66	Becoming light grey and very stiff	17	101	7490
			Bottom of Boring at 51½'			
55						
60						
65						

Project No. 1084B

Geomatrix Consultants

Figure A-21

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 11

Date Drilled: 9/10/85 and 9/12/85
Type of Boring: 4" Rotary
Hammer Weight: 140 lbs.

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Surface Elevation: 11±

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			4" Asphalt Surfacing CLAYEY SAND FILL Medium dense, brown, with rock fragments to 2" diam.			
			CLAYEY FILL Soft, dark brown, with misc. debris (wood, glass, slag, etc.)			
5			▽ 9/11/85 7:00am } Wood			
10						
	1	2	SILTY CLAY (CL-CH) Soft, dark grey, with some shells	44	76	----
15						
	2	25	SANDY CLAY (CL) Stiff, orange-brown, with some gravel	22	105	6330
20						
	3	38	SILTY SAND (SP-SM) Dense, brown	--	---	----
25						
	4	25	} Stiff, grey, silty clay (CL-CH)	27	95	3330
30						

Project No. 1084B

Geomatrix Consultants

Figure A-22

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 11

(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SILTY SAND (SP-SM) Dense, brown			
	5	26		28	94	2020
35			SILTY CLAY (CL) Stiff, dark grey			
	6	39		26	97	2550
40			GRAVELLY SAND Dense, grey-brown			
	7	30	SANDY CLAY (CL-CH) Stiff to very stiff, grey	23	102	2380
45			Increasing gravel content			
			SILTY CLAY (CH) Very stiff, grey, with some gravel			
	8	25		27	96	5470
50						
			Becoming brown			
	9	46		No Recovery		
55						
			Becoming blue-gray			
	10	39		--	---	----
60			SILTY SAND (SM-SP) Dense, blue-grey, with alternating strata of stiff silty clay			
	11	48		21	105	5610
65			SANDY CLAY (CL) Very stiff, brown mottled with grey			

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 11
(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			SANDY CLAY (CL) Very stiff, brown mottled with grey			
	12	49		--	---	----
70			GRAVELLY SAND (SW) Dense, orange-brown			
			GRAVELLY CLAY			
	13	55	Very stiff, orange-brown	14	119	3700
75						
			SILTY CLAY (CL) Very stiff, light grey			
	14	32		21	105	7220
80			Becoming sandy clay ↓			
	15	46		21	104	7760
85			CLAYEY SAND (SC) Dense, orange-brown, with some gravel to 3/4"			
	16	73		15	117	4280
90			SANDY CLAY Very stiff, orange-brown			
	17	90		17	113	7180
95						
			GRAVELLY SAND (SP) Very dense, orange-brown, with gravel to 1½" diam.			
	18	84	Bottom of Boring at 99½'	16	111	2960

Project No. 1084B

Geomatrix Consultants

Figure A-24

Project: **BAY CENTER PROJECT**
Emeryville, California

Log of Boring No. 12

Date Drilled: 9/19/85
Type of Boring: 6" Auger
Hammer Weight: ——

Remarks:
(See Legend Sheet for sampler types and hammer weights)

Depth, Ft	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS: Moisture Content, %	LABORATORY TESTS: Dry Density, pcf	LABORATORY TESTS: Unconfined Compressive Strength, psf
			Surface Elevation: 14±			
			2" Asphalt Surfacing, 4" Aggregate Base			
			SANDY GRAVEL FILL Grey with some cobbles			
5			SILTY CLAY FILL Dark grey, with sand and gravel and some bricks			
			Bottom of Boring at 7'			
10						
15						
20						
25						
30						

Project No. 1084B | **Geomatrix Consultants** | Figure A-25

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 13

Date Drilled: 9/19/85
Type of Boring: 6" Auger
Hammer Weight: ———

Remarks:

(See Legend Sheet for sampler types and hammer weights)

				LABORATORY TESTS		
Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			Surface Elevation: 12±			
			2" Asphalt Surfacing, 4" Aggregate Base			
			SILTY CLAY FILL Brown, with gravel			
			SILTY CLAY FILL Dark grey, with wood, metal, bricks, and wire			
5			Bottom of Boring at 5'			
10						
15						
20						
25						
30						

Project No. 1084B

Geomatrix Consultants

Figure A-26

Project: BAY CENTER PROJECT
Emeryville, California

Log of Boring No. 14

Date Drilled: 9/19/85

Type of Boring: 6" Auger

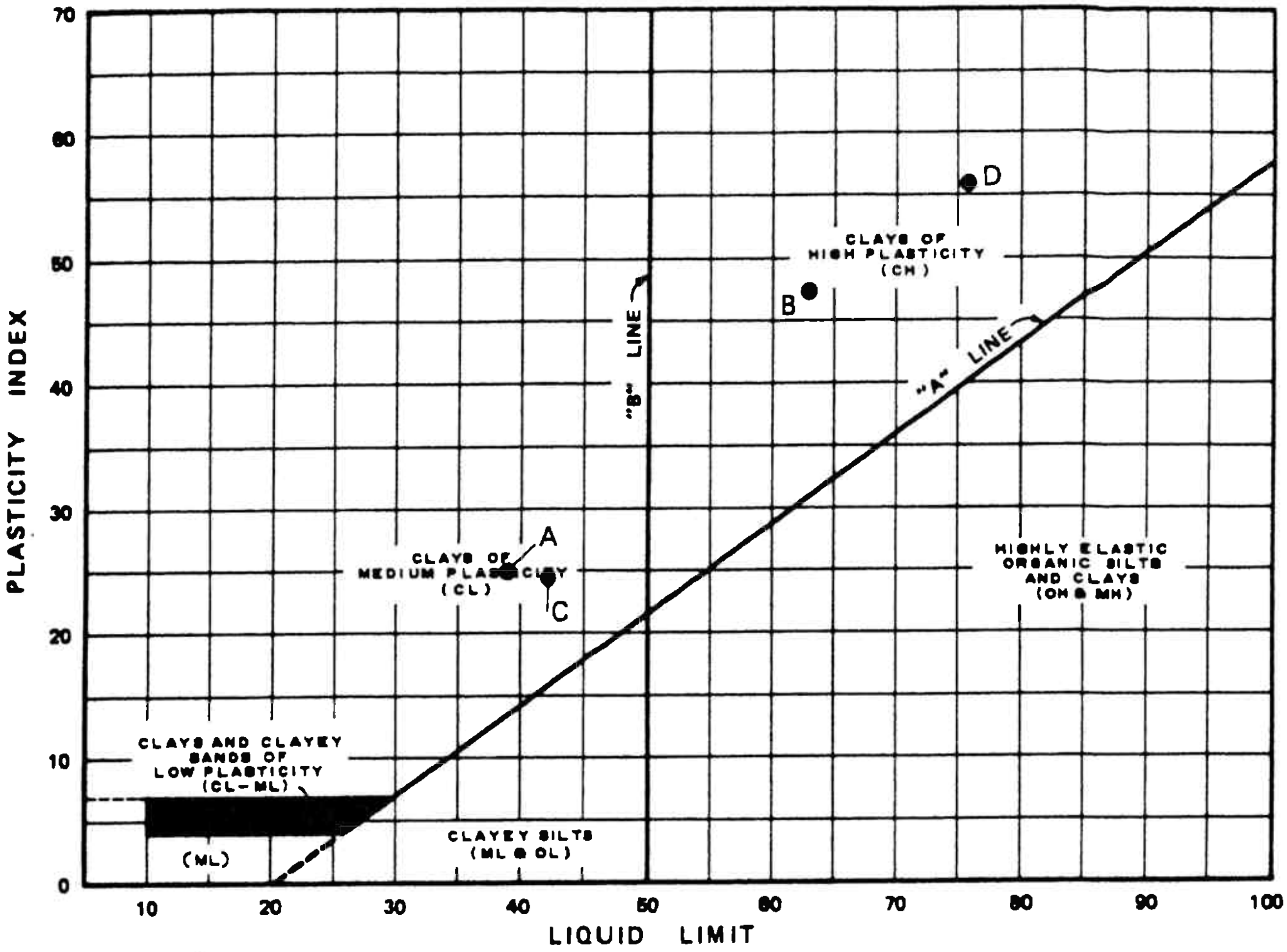
Hammer Weight: ——

Remarks:

(See Legend Sheet for sampler types and hammer weights)

Depth, Ft	Samples	Blows/Ft	MATERIAL DESCRIPTION	LABORATORY TESTS		
				Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
			Surface Elevation: 12±			
			2" Asphalt Surfacing, 4" Aggregate Base			
			SANDY GRAVEL FILL Grey, with some cobbles			
			SILTY CLAY FILL Grey, with sand and gravel			
5			SILTY CLAY FILL Dark grey, with bricks, wood, rocks, metal, and wire			
			Bottom of Boring at 5'			
10						
15						
20						
25						
30						

Project No. 1084B | **Geomatrix Consultants** | Figure A-27



SAMPLE IDENTIFICATION				ATTERBERG LIMITS		
LETTER DESIG'N	BORING NO.	SAMPLE NO.	DEPTH, FT.	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
A	7	6		39	14	25
B	8	11		63	16	47
C	8	14		42	18	24
D	11	8		76	18	56

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BAY CENTER PROJECT
Emeryville, California

Geomatrix Consultants

PLASTICITY CLASSIFICATION

Figure A-28

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Project No.
1084B

BAY CENTER PROJECT
Emeryville, California

GRAIN SIZE DISTRIBUTION CURVES

BORING NO.	SAMPLE NO.	DEPTH, FT.	SYMBOL	LIQUID LIMIT	PLASTICITY INDEX	UNIFIED CLASSIFICATION
5	6	31	———————	—	—	SM
5	9	41	—— —— ——	—	—	SP–SM
8	5	46	– – – – – – –	—	—	SP–SM

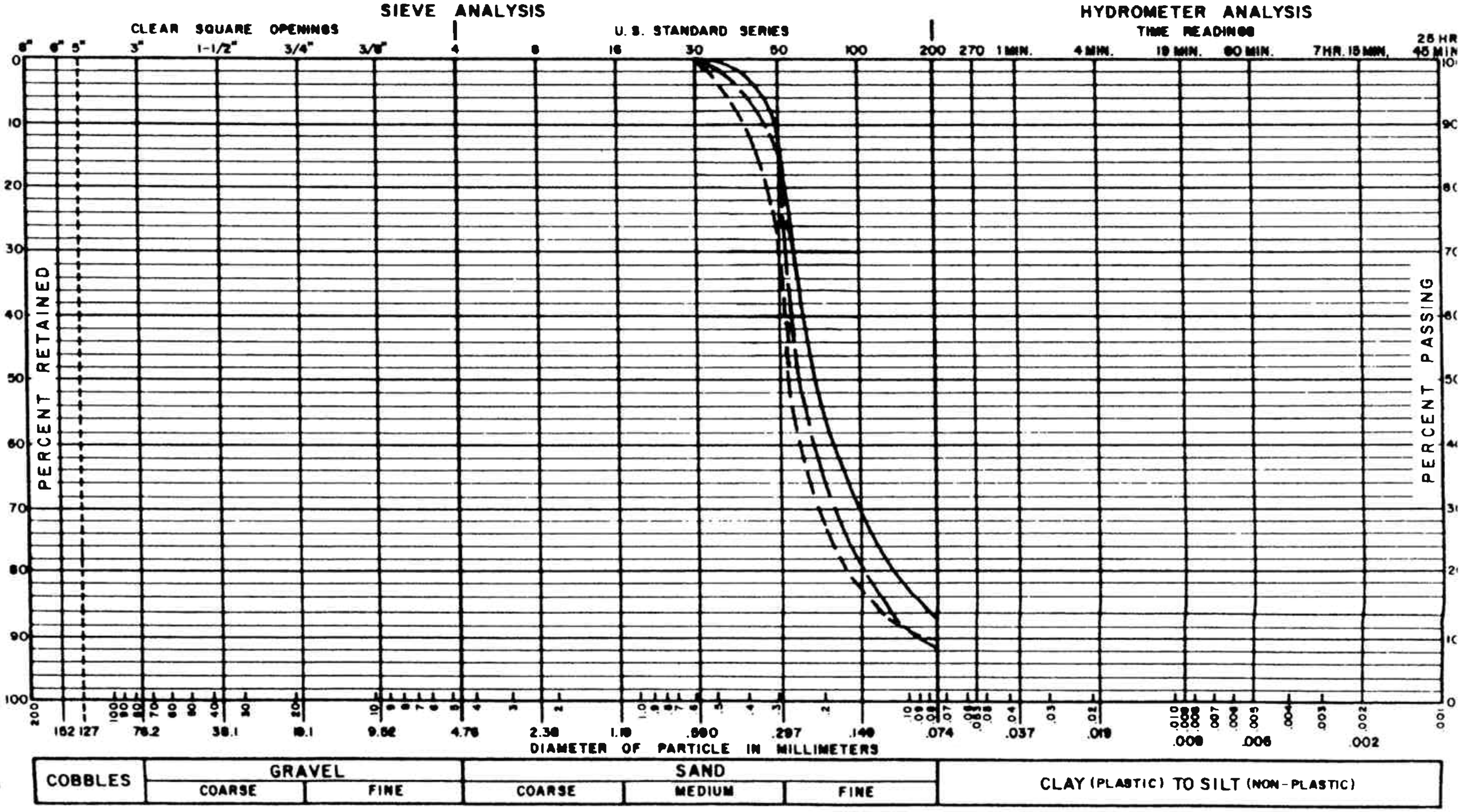

Figure A-29