Delta Environmental Consultants, Inc.

3164 Gold Camp Drive
Suite 200
Rancho Cordova, California 95670-6021
916/638-2085
FAX: 916/638-8385

September 4, 2001

Ms. Eva Chu
Alameda County Health Care Services Agency
Environmental Health Department
1131 Harbor Bay Parkway, 2nd Floor
Alameda, CA 94502

Subject: *Former Chevron Station #21-0208*
6006 International Boulevard
Oakland, CA
Delta Project No. DG20208G.5C01

Ms. Chu:

I'm sending the attached report as you requested in our telephone conversation this afternoon. This letter also confirms that as part your closure evaluation you are requesting boring logs and cross-sections for the area explored by GeoProbe borings, and a conduit (utility) and well survey. Information regarding subsurface utilities in the immediate vicinity of the site will be obtained from utility companies operating in the area. Information regarding wells within ½-mile of the subject site will be obtained from Alameda County Dept. of Public Works records. Finally, you requested that TPHg be included in the RBCA analysis in addition to the BTEX constituents.

Please call me at 916.631.1300 if you have questions.

Sincerely,
DELTA ENVIRONMENTAL CONSULTANTS, INC.
Network Associate GETTLER-RYAN INC.

Stephen J. Carter, R.G.
Senior Geologist

Attachment: *Geotechnical Investigation, International boulevard Family Housing Development, Oakland, California*, Subsurface Consultants Inc. project SCI 790.008, dated February 21, 2001.

cc (without attachment):
Mr. Tom Bauhs, Chevron Products Company, P.O. Box 6004, San Ramon, CA 94583
Mr. James Coles, Resources for Community Development, 2131 University Avenue, Suite 94704, Berkeley, CA 94704
Mr. Mike Berrington, Delta Environmental Consultants, Inc., 3164 Gold Camp Drive, Suite 200, Rancho Cordova, CA 95670-6021

210208

SCI

Subsurface Consultants, Inc.

Geotechnical & Environmental Engineers

GEOTECHNICAL INVESTIGATION
INTERNATIONAL BOULEVARD FAMILY HOUSING DEVELOPMENT
OAKLAND, CALIFORNIA
SCI 790.008

Prepared for:

Mr. James Cole
Resources for Community Development
2131 University Avenue, Suite 224
Berkeley, California 94704

Glenn Young
510/267-4424

By:

SCI Subsurface Consultants, Inc.

Steven M. Wu, P.E.
Civil Engineer 58317 (expires 6/30/02)

Robin N. Bartlett, P.E., G.E.
Geotechnical Engineer 2457 (expires 12/31/02)

February 21, 2001

3736 Mt. Diablo Boulevard - Suite 200 - Lafayette, California 94549-3659 - 925.299.7960 - FAX 925.299.7970
171 - 12th Street - Suite 202 - Oakland, California 94607-4911 - 510.268.0461 - FAX 510.268.0137
870 Market Street - Suite 716 - San Francisco, California 94102 - 415.352.0900 - FAX 415.352.0901
301 River Street - Suite 9 - Napa, California 94559-3416 - 707.257.6993 - FAX 707.257.6995

TABLE OF CONTENTS

TABLES

PLATES

APPENDICES:

DISTRIBUTION:

2 copies: James Cole
Resources for Community Development
2131 University Avenue, Suite 224
Berkeley, California 94704

1 copy: Bob Gong
GNG Engineers
1255 Park Avenue, Suite D
Emeryville, California 94608

1 copy: Betsy Yost
Pyatok Associates
1629 Telegraph Avenue, 3rd Floor
Oakland, California 94612

2 copies: Paul Kibel
Fitzgerald Abbott and Beardsley
1221 Broadway, 21st Floor
Oakland, California 94612

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation by Subsurface Consultants, Inc. (SCI) for the proposed International Boulevard Family Housing Development project to be located at 6006 International Boulevard in Oakland, California. The site is located on the east side of International Boulevard (as referenced to the project north), between Seminary Avenue and 61st Street, as shown on the Vicinity Map, Plate 1, and the Site Plan, Plate 2. This investigation was performed on behalf of Resources for Community Development (RCD) in accordance with our proposal dated December 13, 2000.

1.1 Project Description

The site occupies three City of Oakland parcels (tracts 7, 8-1, and 10-1) in block 3220, as defined on the City of Oakland's Assessor's Map 38. Currently, tracts 7 and 8-1 are each occupied by one-story single-family residential homes with detached, single-story garages/sheds in the back yard. Tract 10-1 is a paved lot used for automobile and bus parking, with a one-story building located on the northwest side of the tract. We understand that tract 10-1 was formerly a Chevron service station, which may have contained underground storage tanks (USTs), hoists, and associated piping. A Phase 1 Environmental Site Assessment (ESA) has been completed by others for the site.

As currently planned, the project will consist of demolishing the existing buildings at the site and constructing a new residential development in their place. The proposed development will consist of five new three-story wood framed buildings containing a total of 24 residential units. No basements are planned for the new buildings. The new development will include a new parking lot at the northeast side of the site. The anticipated structural loads were not available to us at the time of this report.

1.2 Scope of Services

The purpose of our work, as outlined in our proposals dated October 4, 2000 and December 13, 2000, was to perform a geotechnical investigation and limited environmental assessment for the proposed development. Our services consisted of drilling test borings, performing a geophysical survey, performing geotechnical engineering and analyses, performing environmental testing, and summarizing our findings and conclusions in this report.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Geophysical Survey

On January 15, 2001, SCI's subconsultant, NORCAL Geophysical Consultants, Inc. (NORCAL), conducted a limited geophysical survey on tract 10-1 (the former gas station site). The geophysical survey was conducted using a magnetometer to identify shallow ferric objects, such as underground storage tanks (USTs), hoists, associated piping, and certain underground utilities, if present. The geophysical survey also included the use of ground penetrating radar (GPR) near detected magnetic anomalies.

Results of the survey identified numerous underground utilities, the approximate location of the former pump island, three magnetic anomalies in the southern portion of the site, and a surficial vault box in the sidewalk along 61st Street. The results of the GPR survey did not confirm the presence of USTs at any of the three magnetic anomalies. The GPR survey detected hyperbolic reflections typical of a UST near the surficial vault box and the magnetometer survey identified underground utilities that appeared to lead from the UST to former pump island, suggesting that the UST was likely related to the former service station operations. The estimated dimensions of this UST are 4 to 5 feet wide and 11 feet long. The measured depth to the bottom of a steel pipe housed within the vault box was approximately 7 feet. A copy of the Geophysical Investigation Report, including maps summarizing the results of the survey, is presented in Appendix A.

2.2 Field Sampling Activities

Our subsurface exploration for the project was performed using a truck-mounted drill rig equipped with 7-inch-diameter hollow stem augers. On January 25, 2001, five test borings were drilled at the site to depths ranging from approximately 20 to 25 feet below the ground surface. SCI observed the drilling and sampling operations, prepared logs of the borings, and screened samples with an organic vapor meter (OVM) to check for the presence of certain volatile organic compounds (VOCs). Selected soil samples from Borings B-4 and B-5 were retained in stainless steel liners and capped with Teflon sheeting and plastic end-caps. Upon completion of soil sampling, grab groundwater samples were collected from Borings B-4 and B-5 by lowering slotted PVC casing into the boring and obtaining a grab groundwater sample with a clean disposable bailer. The soil and groundwater samples were stored in ice-chilled coolers until delivery to the chemical testing laboratory under standard chain-of-custody.

The approximate locations of the borings are shown on Plate 2. The subsurface conditions encountered during the investigation are summarized in Section 3. Logs of the boring and details regarding the field investigation are included in Appendix B. Details of our geotechnical testing program are included in Appendix C. A description of our environmental testing program is described below.

2.3 Chemical Testing Program

Four soil samples and two grab groundwater samples from Borings B-4 and B-5 were submitted to a state-certified chemical testing laboratory for the following analyses:

- Total petroleum hydrocarbons as gasoline (TPHg), diesel (TPHd), and motor oil (TPHo), and benzene, toluene, ethylbenzene, and xylenes (BTEX) using USEPA Method 8015m/8020 (2 soil samples and 2 groundwater samples)

- Total lead using USEPA Method 6010 (2 soil samples).

A copy of the environmental testing reports is included in Appendix D.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The project is located in a developed area of east Oakland, and is bounded by International Boulevard to the west and 61st Street to the south (as referenced to the project north). This area of Oakland has been developed with one- to two-story commercial and residential structures. As shown on Plate 2, the site is roughly an L-shaped lot with leg dimensions of approximately 160 feet on the east and 190 feet on the south. The site has approximately 110 feet fronting International Boulevard. The site is approximately level.

The eastern half of the site is currently occupied by two single-family homes, with associated detached garages/sheds and grass covered front and rear yards. The western half of the site is currently occupied by a asphalt paved parking lot, with a one-story structure located along the northwest portion of the site. No information was provided to us regarding foundations for the existing buildings. We anticipate that the structures are supported on relatively shallow spread footing foundations.

3.2 Subsurface and Groundwater Conditions

In general, the soils encountered at the site consist of lean clay with varying sand and gravel content, poorly graded sand with clay, and clayey sand. The sandy lean clay encountered near the ground surface has moderate bearing capacity and relatively low compressibility. More specific details about the subsurface conditions encountered are described below.

Stiff to very stiff sandy lean clay was encountered in the borings from the ground surface to depths of approximately 8 to 14 feet. In Boring B-1, medium dense poorly graded sand with clay was encountered between depths of 8 to 11 feet, between layers of sandy lean clay. Medium dense clayey sand was encountered below the lean clay and extended to depths of 12 to 20 feet. Stiff to very stiff lean clay was encountered below the clayey sand and extended to the maximum depths explored (20½ to 25½ feet).

In the test borings, groundwater was encountered during drilling at depths of approximately 8 to 13 feet. Stabilized groundwater levels measured at the end of the day ranged from 6 to 8 feet below the ground surface. Fluctuations in the groundwater level could occur due to change in seasons, variations in rainfall, and other factors.

Elevated OVM readings as well as strong petroleum hydrocarbon odors were detected in soil samples from borings B-4 and B-5. Where detected, the OVM readings are presented on the boring logs in Appendix B.

3.3 Geologic Setting and Hazards

The site is located west of the Oakland Hills within the Coast Ranges Geomorphic Province of Northern California. This province is characterized by a series of generally northwest-trending faults and folds. The Bay Area experienced uplift and faulting in several episodes during late Tertiary time (about 25 to 2 million years ago) producing series of northwest-trending valleys and mountain ranges, including the Oakland/Berkeley Hills, the San Francisco Peninsula, and the intervening San Francisco Bay. The geologic condition of the area is strongly influenced by the nearby Hayward Fault, which consists of a set of northwest-trending, right-lateral transcurrent faults along the base of the hills.

The San Francisco Bay region is seismically active and the site is likely to be subject to strong ground shaking during the life of the facility. Principal active faults in the Bay Area include the San Andreas, Hayward, Calaveras, Healdsburg-Rogers Creek, San Gregorio, and Green Valley-Concord faults. Earthquakes occurring along these faults are capable of generating strong groundshaking at the site. The faults capable of producing the strongest groundshaking at the site are the Hayward and the San Andreas. The site is about 2 miles southwest of the Hayward Fault, and about 17 miles northeast of the San Andreas Fault.

The Active Fault Near-Source Zones Map accompanying 1997 Uniform Building Code (UBC) show the site to be approximately 3 kilometers from a Type A Seismic Source (the Hayward Fault). The site is not within a State of California Alquist-Priolo Earthquake Hazard Zone. Additional information regarding geologic and seismic conditions is presented in Appendix E.

Locally, the site is situated on a broad alluvial plain that is generally characterized by nearly level topography. The area has been mapped as being underlain by undifferentiated alluvial deposits from the Temescal formation and the San Antonio Formation. These Quaternary Age deposits consist of interfingering lenses of sand, sandy silty clay, and sand-clay-silt mixtures.

3.4 Results of Environmental Testing

For soil samples (B4@9.5' and B5@10.5'), analyses detected TPHd concentrations ranging from 110 to 310 milligrams per kilogram (mg/kg), TPHo concentrations ranging from 6 to 14 mg/kg, TPHg concentrations ranging from 340 to 1,300 mg/kg, and a benzene concentration of 0.19 mg/kg. For two shallow soil samples (B4@0.5' and B5@1.0'), analyses detected total lead concentrations ranging from 3.2 to 93 mg/kg.

For the two grab groundwater samples (B-4 and B-5), analyses detected TPHd concentrations ranging from 1,300 to 3,600 micrograms per liter (ug/l), a TPHo concentration of 260 ug/l, TPHg concentrations ranging from 3,600 to 4,200 ug/l, and benzene concentrations ranging from 5.7 to 22 ug/l. Results of analyses are summarized on Table 1. Copies of the laboratory reports are included in Appendix D.

4.0 DISCUSSION AND CONCLUSIONS

We conclude that the proposed development is feasible from a geotechnical engineering standpoint, provided that the recommendations presented in this report are incorporated into the project design and specifications. The principal geotechnical considerations for the project are discussed in the following sections.

4.1 Seismic Considerations

The site is located in a seismically active region of California. Significant earthquakes in the Bay Area have been associated with movements along well-defined fault zones. Earthquakes occurring along the Hayward, San Andreas or any of a number of other Bay Area faults has the potential to produce strong groundshaking at the site. For this reason, the structures should be designed to resist lateral and uplift forces generated by earthquake shaking, in accordance with local design practice.

Settlement can occur at some sites as a result of seismic groundshaking due to liquefaction or densification of the subsurface soils. Soils most susceptible to liquefaction and densification are loose, clean, poorly graded, fine-grained sands. The soils encountered at the site generally consist of stiff to very stiff clay and medium dense clayey sand. Accordingly, the potential for liquefaction or densification at the site is considered very low. Other geologic hazards such as slope instability, lurching, or fault rupture are considered to be unlikely at this site due to the nature of the near surface soils, topography, and the distance of the site from known active faults.

4.2 Foundation Support and Settlement

Based on the subsurface information obtained in this geotechnical investigation, we judge that the new structure can be supported on conventional spread footing foundations founded on medium stiff to stiff lean clay.

Total settlement of properly constructed foundations under the anticipated loads should be less than 1 inch. Differential settlements will likely be around one-half of the total settlement. Geotechnical recommendations for the design of spread footing foundations are presented in Section 5.2 of this report.

4.3 Environmental Conditions

Results of chemical analyses detected the presence of TPHd, TPHo, TPHg, and BTEX analytes in soil and grab groundwater samples collected from the site. The presence of these detected hydrocarbons is likely related to the former UST and services station operations at the site. Based on our review of the Phase I ESA, it appears there are no other documented USTs and no documented spills or leaks for the Site. Additionally, analyses detected slightly elevated total lead on one shallow soil sample. The detected total lead is significantly less than the Total Threshold Limit Concentration (TTLC) value of 1,000 mg/kg, one of the criteria for determining whether a material is considered hazardous. The detected total lead concentration exceeds 50 mg/kg, one of the criteria often used by landfill facilities to evaluate whether testing for soluble lead will be required.

4.4 Other Considerations

The western portion of the site (i.e. tract 10-1) was formerly occupied by a gas station. Sites of this nature often contain abandoned USTs and/or non-engineered fill placed as backfill for former USTs. Non-engineered fill and abandoned USTs were not encountered at the site in our geotechnical investigation; however, evidence of one UST was observed beneath the sidewalk along 61st Street. The contractor should anticipate that if UST(s) or non-engineered fill are encountered during construction, the UST(s) should be removed in accordance with appropriate State and Local permit requirements and non-engineered fill should be excavated and replaced with properly compacted engineered fill.

5.0 RECOMMENDATIONS

5.1 Site Preparation and Earthwork

5.1.1 Clearing and Site Preparation

Prior to site grading, the existing structures at the site should be demolished. Within the limits of grading, all previous improvements including old foundations and pavements should be removed. The site should be stripped of near-surface soils containing debris, vegetation and associated root balls, and organic-rich surface soils. Site strippings are not suitable for later use as engineered fill; however, they may be used as fill in landscaped areas. Any existing underground utilities at the site (e.g., electric, gas, water, telephone, storm drains, and sewers) should be identified and either properly abandoned or relocated. Additionally, non-engineered fill identified at the site should also be removed.

Excavated material meeting the requirements for engineered fill may be stockpiled for reuse as fill as discussed below. Holes resulting from the removal of underground obstructions or non-engineered fill should be cleared and backfilled with properly compacted fill as described below.

5.1.2 Subgrade Preparation

Following stripping and excavation for fill placement, the exposed native soils beneath and five feet beyond the proposed building footprint, and 2 feet beyond exterior slabs-on-grade, and concrete flatwork should be scarified to a depth of at least eight inches or to the depth of shrinkage cracks, moisture conditioned near optimum water content, and compacted to at least 90 percent relative compaction (as determined by ASTM D1557).

The subgrade in areas to receive asphalt pavements should be scarified to a depth of at least 6 inches, and be recompacted to at least 95 percent relative compaction.

The compacted surfaces should be firm and unyielding, and should be protected from damage caused by traffic or weather. The subgrade should be kept moist during construction.

5.1.3 Fill Materials

Fill materials should have a liquid limit not exceeding 40 percent and a plasticity index not exceeding 15. The fill should contain no environmental contaminants or construction debris. Fill should not contain rocks or lumps larger than 4 inches in greatest dimension with not more than 15 percent larger than 2.5 inches.

5.1.4 Fill Placement

Fill materials satisfying the criteria described in Section 5.1.3 should be placed at or near the optimum moisture content, spread in lifts not exceeding 8 inches in uncompacted thickness, and compacted to at least 90 percent relative compaction as determined by ASTM Designation D1557-91. If the fill materials are clean sands, they should be compacted to at least 95 percent relative compaction as determined by ASTM Designation D1557-91. Regardless of the material type, the upper 6 inches of soil beneath pavement areas should be compacted to at least 95 percent relative compaction.

5.1.5 Trench Backfill

Pipeline trenches should be backfilled with fill materials satisfying the criteria described in Section 5.1.3, placed in lifts of approximately 8 inches in uncompacted thickness. However, thicker lifts can be used provided the method of compaction is approved by the geotechnical engineer and the required minimum degree of compaction is achieved. Trench backfill should be compacted to at least 90 percent relative compaction by mechanical means only (no jetting), and sufficient water should be added during backfilling operations to prevent the soil from "bulking" during compaction. Imported sand can be used for trench backfill if it is compacted to at least 95 percent relative compaction. Regardless of the material type, the upper 6 inches of fill should be compacted to at least 95 percent relative compaction beneath planned pavement areas.

5.1.6 Surface Drainage

The finished surface adjacent to the buildings should be graded to direct surface water away from foundations and towards suitable discharge facilities. Ponding of surface water should not be allowed adjacent to the structures or on pavements. Roof downspouts should direct water away from the foundations and toward suitable discharge or collection points through closed pipes or over paved areas.

5.2 Spread Footing Foundations

As discussed in Section 4.2, we recommend that the new building be supported on conventional spread footing foundations that derive support from bearing on the medium stiff to stiff clays near the ground surface.

The maximum allowable bearing pressures for design of new spread footings are presented below:

Load Condition	Allowable Bearing Capacity (pounds per square foot)
Dead Load	2,000
Dead Plus Live Loads	3,000
Total Loads, including wind or seismic	4,000

New perimeter footings should be founded at least 24 inches below the lowest adjacent grade and new interior footings should be founded at least 18 inches below the lowest adjacent grade. Isolated footings should be at least 24 inches wide, and continuous footings should be at least 18 inches wide, regardless of load. Footing excavations should be kept moist and cleaned of loose soil and water prior to concrete placement.

Resistance to lateral loads may be provided by friction along the base of foundations and by passive pressures acting on the sides of foundations. A friction coefficient of 0.35 times the dead load may be used to evaluate the ultimate frictional resistance along the bottom of foundations. Ultimate passive pressures may be evaluated using an equivalent fluid weight of 400 pounds per cubic foot (pcf). Passive pressure in the upper one foot of soil should be ignored if not confined by a slab-on-grade or pavement. The above values are ultimate values; an appropriate factor of safety should be included in design. A qualified geotechnical engineer should observe all foundation excavations.

5.3 Slab-on-Grade Floors

Soil subgrades beneath concrete slabs-on-grade should be properly prepared according to the recommendations of Section 5.1.2 and should be smooth and non-yielding under equipment loads. A layer of clean, angular crushed rock, at least 4 inches thick, should be placed beneath interior slabs to provide a capillary moisture break. The crushed rock should conform to the following gradation criteria:

Sieve Size	Percent Passing
1 inch	100
3/4 inch	90 – 100
No. 200	0 – 3

Moisture vapor is likely to condense on the underside of interior slab-on-grade floors. A vapor barrier consisting of an impermeable membrane at least 10 mil thick should be placed above the crushed rock. The membrane should be covered with 2 inches of sand for protection during construction.

Slab reinforcing should be provided in accordance with the anticipated use and loading of the slab.

5.4 Seismic Design Criteria

Based on the published geologic information and the results of our field investigation, it is our opinion that a soil profile type S_D, as defined in the 1997 Uniform Building Code is applicable to the site. Near surface seismic factors for the site are governed by the proximity of the Hayward Fault. In our opinion, the following seismic design factors and coefficients are applicable to the site:

Seismic Zone Factor, Z	=	0.4
Near Source Factor, Na	=	1.4
Seismic Coefficient, Ca	=	0.44Na = 0.62
Near Source Factor, Nv	=	1.9
Seismic Coefficient, Cv	=	0.64Nv = 1.22

5.5 Pavement Design

Asphalt concrete pavement sections will be constructed on the east side of the development. We developed the following recommended pavement sections using the Caltrans R-value design method for flexible pavements and assumed traffic indices.

RECOMMENDED PAVEMENT DESIGN ALTERNATIVES

Traffic Index	Pavement Components		
	Asphalt Concrete (inches)	Caltrans Class 2 Aggregate Base (inches)	Total Thickness (inches)
4.0	2.0	9.0	11.0
5.0	3.0	11.0	14.0
6.0	3.0	14.0	17.0

The aggregate baserock for use in pavements should conform to Caltrans Standard Specification Section 26-1.02A for Class 2 Aggregate Base. The aggregate baserock used in pavement sections should be compacted to 95 percent relative compaction (as determined by ASTM Designation D1557-91).

The above sections are based on an assumed R-value of 5, which is typical of the near surface soils at the site and should be confirmed during construction. The assumed traffic indices of 4.0 and 5.0 are considered to be reasonable values for automobile and light truck parking areas and access drives, respectively. A traffic index of 6.0 is applicable for moderate truck access and parking areas. The traffic indices were not based on a traffic study; the project civil engineer should review the traffic indices to confirm that they are appropriate and select the areas where the sections will be used. The pavement sections are also based on a typical pavement life of between 10 and 20 years with normal maintenance.

In areas where the pavements will abut landscaped or undeveloped areas, the pavement baserock layer should be protected against water infiltration. Concrete curbs, if used, should extend to the bottom of the baserock layer, forming a cut-off wall between the landscaped area and the pavement section. If no curbs are used, the area adjacent to the pavement should be graded to slope away from the pavement and should consist of low permeability clay. Alternatively, the asphalt concrete may be extended below the baserock layer.

5.6 Environmental Hazard Considerations

Based on the results of field observations and chemical analyses, elevated concentrations of hydrocarbons are present in soil and groundwater at the site. SCI recommends presenting these findings to the Local Oversight Program (LOP), which for this site will be Alameda County Department of Environmental Health (ACDEH). Discussions with ACDEH should include confirmation regarding the need and scope of additional site characterization and risk assessment activities.

SCI also recommends that RCD notify Chevron of the detected UST and hydrocarbons in soil and groundwater samples. RCD should request that Chevron properly close the former UST in accordance with State and local requirements and provide information regarding the previous

UST locations and site configurations to assist with regulatory discussions and site characterization activities.

If RCD implements construction activities at the site, their contractor should be notified of the potential presence of UST(s) as well as the presence of hydrocarbons and lead detected in soil at the site and implement an appropriate health and safety plan (HSP) for intrusive activities. The HSP should be prepared by a Certified Industrial Hygenist (CIH) familiar with this type of site and will likely include provisions for field observation and monitoring to confirm acceptable working conditions during intrusive and soil handling activities. The contractor should anticipate that if a UST(s) is encountered during construction, the UST(s) should be removed in accordance with appropriate State and Local permit requirements. If construction activities involve the offsite disposal of soil, RCD should coordinate with an appropriate landfill to determine the need and scope of additional chemical testing as a condition for obtaining landfill acceptance.

5.7 Plan Review/Services During Considerations

SCI should review geotechnical aspects of the project plans and specifications to check for conformance with the intent of our recommendations. During construction, our field engineer should observe and/or test the following:

- Soil conditions exposed by site excavations, to check that they are consistent with those encountered during the field exploration,
- Footing excavation,
- Fill placement and compaction, including backfill of utilities and compaction of pavement sections, and
- Concrete slab-on-grade and pavement subgrade preparation.

6.0 LIMITATIONS

Our services consist of professional opinions, conclusions, and recommendations that are made in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

Variations may exist and conditions not observed or described in this report could be encountered during construction. Our conclusions and recommendations are based on the observed conditions. If conditions other than those described in this report are encountered, we should be notified so that additional recommendations, if warranted, can be provided.

This report has been prepared for the exclusive use of Resources for Community Development and their consultants for specific application to the proposed project described herein. In the event that there are any changes in the ownership, nature, design or location of the project, or if any future additions are planned, the conclusions and recommendations contained in this report should not be considered valid unless (1) the project changes are reviewed by SCI, and (2) conclusions and recommendations presented in this report are modified or verified in writing. Reliance on this report by others must be at their risk, unless we are consulted on its use or limitations. We cannot be responsible for the impacts of any changes in geotechnical standards, practices, or regulations subsequent to performance of our services without our further consultation. We can neither vouch for the accuracy of information supplied by others, nor accept consequences for unconsulted use of segregated portions of this report.

TABLE

Table 1: Results of Analyses
International Boulevard Family Housing
Oakland, California

Soil Samples	Units	TPHd *	TPHo *	TPHg	Benzene	Toluene	Ethyl benzene	Xylenes	Lead
B4@0.5'	mg/kg	--	--	--	--	--	--	--	**93**
B4@9.5'	mg/kg	**110**	**14**	**340**	**0.19**	<0.1	**1.3**	**0.45**	--
B5@1.0'	mg/kg	--	--	--	--	--	--	--	**3.2**
B5@10.5'	mg/kg	**310**	**6**	**1,300**	<0.2	<0.2	**2.6**	**2.6**	--

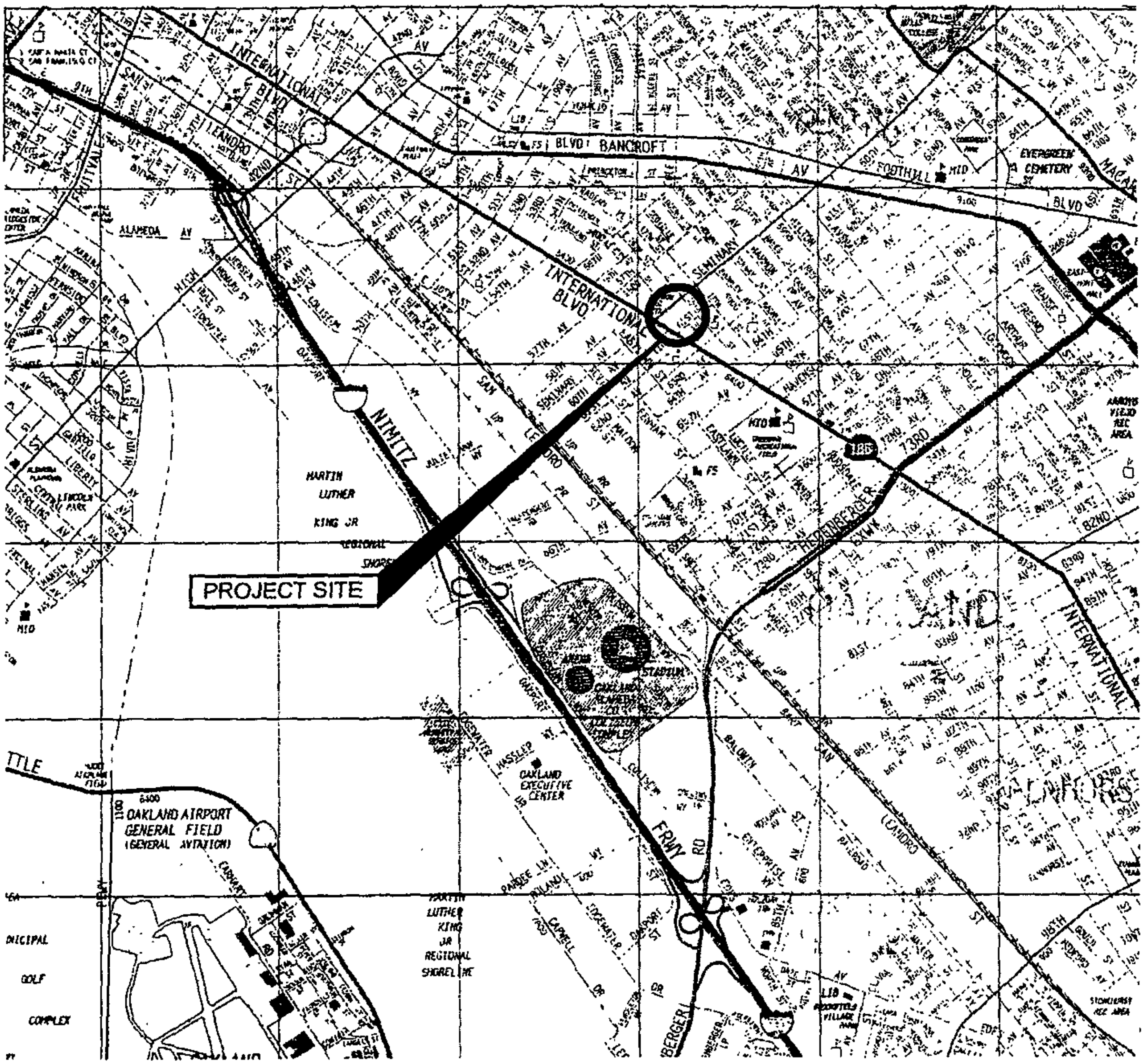
Grab Groundwater Samples	Units	TPHd *	TPHo *	TPHg	Benzene	Toluene	Ethyl benzene	Xylenes	Lead
B-4	ug/l	**3,600**	<250	**3,600**	**22**	**1.8**	**49**	**2.9**	--
B-5	ug/l	**1,300**	**260**	**4,200**	**5.7**	**1.7**	**7**	**5.4**	--

Notes:

Soil samples collected on January 25, 2001
Detected concentrations shown in bold
TPHd: Total Petroleum Hydrocarbons as diesel
TPHo: Total Petroleum Hydrocarbons as motor oil
TPHg: Total Petroleum Hydrocarbons as gasoline
*: Using silica gel cleanup

mg/kg: milligrams per kilogram
ug/l: micrograms per liter
--: Sample not analyzed
<: Not detected at or above the laboratory reporting limit

PLATES



APPROXIMATE SCALE IN FEET

0 2400 4800

N

NOTE:

THIS VICINITY MAP IS BASED ON A THOMAS GUIDE MAP FOR SAN FRANCISCO, ALAMEDA AND CONTRA COSTA COUNTIES, CALIFORNIA, MAP 670, YEAR 2000

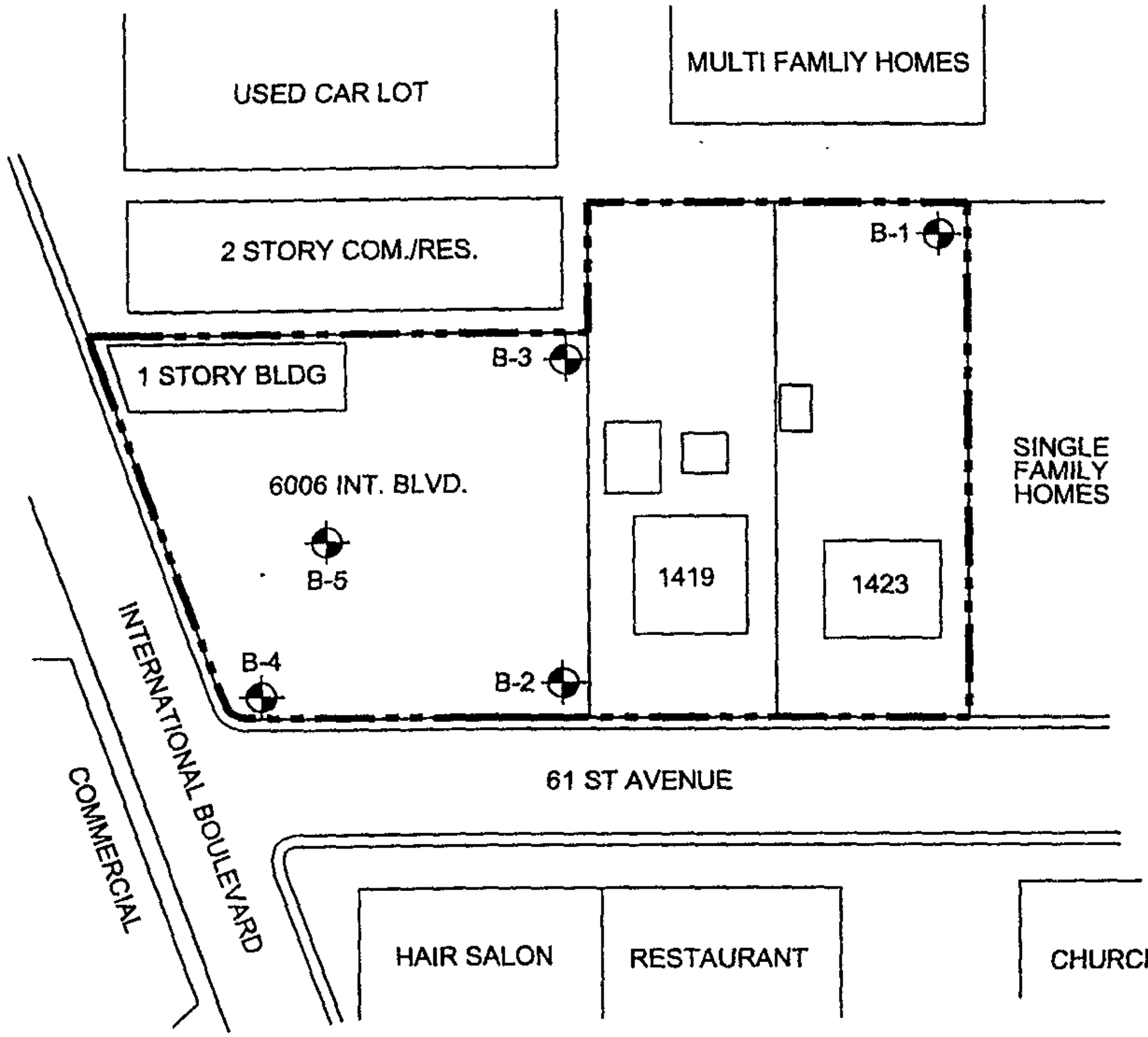
VICINITY MAP

INTERNATIONAL BOULEVARD FAMILY HOUSING PROJECT
OAKLAND, CALIFORNIA

SCI **Subsurface Consultants, Inc.**
Geotechnical & Environmental Engineers

DRAWN BY:	DATE	PLATE
CFY	2/2/01	1
JOB NUMBER	FILE NUMBER:	
790.008	A790.008.01	

G:\JOBDOCS\790\790.008\Plates\A790.008.01.dwg 2-02-01 10:35:47 AM cyoung



LEGEND:

B-1 APPROXIMATE LOCATION OF TEST BORING

NOTE:

THIS SITE MAP IS ADAPTED FROM A DRAWING TITLED "SITE AND ADJOINING PROPERTY MAP, 6006 INT. BLVD./ 1419 AND 1423 61ST AVE." BY CLAYTON GROUP SERVICES, DRAWING NO. 70-01319.00, DATED 8/4/00.

SITE MAP

INTERNATIONAL BOULEVARD FAMILY HOUSING PROJECT
OAKLAND, CALIFORNIA

Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

DRAWN BY:	DATE	PLATE
CFY	2/2/01	2
JOB NUMBER	FILE NUMBER:	
790.008	A790.008.02	

G:\JOBDOCS\790\790.008\Plates\A790.008.02.dwg 2-02-01 10:36:04 AM cyoung

APPENDIX A
GEOPHYSICAL INVESTIGATION REPORT

NORCAL GEOPHYSICAL CONSULTANTS, INC.

LETTER OF TRANSMITTAL

TO: Subsurface Consultants, Inc.
3736 Mt. Diablo Boulevard, #200
Lafayette, CA 94549

ATTN: Mr. Glenn Young

REF: Geophysical Investigation,
6006 International Blvd., Oakland, CA

VIA: MAIL:( ) PRIORITY:( ) EXP:( ) **UPS:** RED.(X) 2ND:( ) GRD:( ) FED.X:( )

ENCLOSED PLEASE FIND THE FOLLOWING/COMMENTS:

Two (2) copies of final report for the above referenced.

BY: Donald J. Kirker

DATE: February 2, 2001

1350 INDUSTRIAL AVENUE, SUITE A • PETALUMA, CA 94952 • TELEPHONE (707) 763-1312 • FAX (707) 762-5587
SOUTHERN CALIFORNIA: TELEPHONE (714) 708-7727 • FAX (714) 708-7720

February 2, 2001

Subsurface Consultants, Inc.
3736 Mt. Diablo Boulevard, #200
Lafayette, CA 94549

Subject: Geophysical Investigation,
6006 International Blvd., Oakland, CA

Attention: Mr. Glenn Young

This report presents the findings of the geophysical investigation performed by NORCAL Geophysical Consultants, Inc. at the subject property. It is located on the northwest corner of 61st Street and International Boulevard in Oakland, California. The survey was conducted on January 15, 2001 by Geophysicist, Donald J. Kirker.

I PURPOSE

Site information, provided by Subsurface Consultants, Inc., indicates that the subject property was formerly occupied by a Shell service station. However, records are incomplete as to the removal of the underground storage tanks (UST's) used at this station. Therefore, the purpose of this survey is to obtain subsurface information that will aid in determining if UST's exist at the subject property.

In addition to the UST survey, subsurface investigations were conducted at 5 proposed boring sites, designated as B-1 through B-5. The purpose of these investigations was to locate detectable utilities and subsurface features in the vicinity of each proposed drilling location to minimize the potential for encountering utilities and other possible subsurface obstructions.

II SITE DESCRIPTION

The area of investigation measures approximately 80 by 120 feet and is covered with asphalt. It is bound by a small building, trailer, vehicle, and surface debris to the west, and a chain link fence to the north, south, and east. All facilities related to the previous service station have been removed. However, cracks in the asphalt pavement suggest that the service station building and pump island were located in the southeast corner of the survey area, as shown on Plate 1. Five metal light and sign poles are located around the perimeter of the survey area. The survey area is generally free from above ground obstructions.

A possible UST vault lid is located in the sidewalk adjacent to 61st Street. Since this vault is located outside of the designated survey area, Subsurface Consultants, Inc. expanded the geophysical survey to include the area immediately adjacent to the vault.

III APPROACH

Our approach was to use the vertical magnetic gradient (VMG), ground penetrating radar (GPR), and electromagnetic line locating (EMLL) methods. The VMG method was used to determine the location of buried ferrous metal that may indicate the presence of a UST. The GPR and EMLL methods were used to aid in further characterizing the source of any detected VMG anomalies. The EMLL was also used to scan the survey area for near surface metal that may represent an UST. The GPR was also used to investigate the suspect UST vault and those areas where VMG could not be obtained, such as in close proximity to the chain link fence.

In addition, the EMLL and GPR methods were used to investigate the proposed boring locations for detectable utility alignments and potential drilling obstructions. Descriptions of the VMG, GPR, and EMLL methods are provided in Appendix A.

IV DATA ACQUISITION AND ANALYSIS

Descriptions of data acquisition and analysis procedures for the VMG, EMLL, and GPR surveys are provided in Appendix A.

V CONTOUR MAP INTERPRETATION

The VMG data obtained within the designated survey area were processed to produce the VMG contour map shown on Plate 2. This contour map illustrates the variations in the vertical magnetic gradient across the site. Areas where there is no below or above ground ferrous metal are characterized by very low magnetic gradients. In these areas, there are very few contours. In areas where there is above or below ground ferrous metal, the magnetic gradient is relatively steep. These areas are characterized by numerous closely spaced contours and are considered anomalous. If the source of the anomaly is linear (e.g. underground utilities or fence lines), then the contours tend to be parallel and evenly distributed. If the source of the anomaly is localized (e.g. sign post, buried drum, etc.), then the contours tend to form circular or elliptical closures proportional to the size of the object. The larger the object and the closer it is to the magnetometer, the more contours there are in a given area. Magnetic anomalies that cannot be attributed to above ground objects (fences, vehicles, buildings, etc.) are assumed to be caused by buried objects.

UST's are often characterized by circular to elliptical contour closures. These closures have magnitudes ranging from several hundred to several thousand nano-Tesla per meter (nT/m) depending on the size and depth of the tank. If the UST is cylindrical and flat lying, it will often produce a bi-polar VMG anomaly. This consists of two adjacent contour closures. One has VMG values that increase towards the center of the closure and is referred to as a positive lobe. The second has VMG values that decrease towards the center of the closure and is referred to as a negative lobe. Typically, the positive lobe is situated directly above the UST and the negative lobe is to the north of the UST. Utilities and scattered metal debris, on the other hand, are generally characterized by single circular or irregular shaped negative lobes, or a group of alternating positive and negative lobes (closures). These closures typically have magnitudes ranging from less than fifty to several hundred nano-Tesla per meter (nT/m) depending on the size, depth, and amount of utilities and debris in a given area.

VI RESULTS

Geophysical Site Surveys

The results of the geophysical investigation are presented on the Site Map and Geophysical Survey Map, Plates 1 and 2, respectively. The Site Map shows the limits of the survey area, the structures or above ground cultural features that may be in close proximity to the site, and the locations of the GPR traverses. This map also shows the locations of proposed borings B-2 through B-5. B-1 is not shown on this map because it is located north of the subject property. The Geophysical Survey Map shows the EMLL detected utilities and the VMG contour map. The contour map represents the variations in the vertical magnetic gradient throughout the site. Magnetic variations that could not be attributed to above ground cultural effects are considered anomalous, as described above. Detailed descriptions of the EMLL, VMG, and GPR results are provided in the following paragraphs.

EMLL Investigation

Prior to the VMG investigation, we performed a reconnaissance survey using the EMLL technique throughout the site. The results of this investigation defined the location of several undifferentiated utility alignments. These utilities are generally located in the south half of the survey area, as shown on Plate 2. Some of these utilities extend from the former building footprint and pump island. Others extend from the present facilities. Therefore, we believe that the utilities detected at this site represent several generations of past and present uses of the property. The locations of the detected utilities were marked on the ground surface with pink spray paint. It should be noted, that some of the detected utilities extend from the former building and pump island to the suspect UST vault in the sidewalk. Since a utility survey was not an objective of the geophysical investigation, there may be additional utilities within the survey area that were not detected.

VMG Survey

The results of the VMG survey indicate a highly variable magnetic gradient through the site. These variations include closely spaced contours along the east and south boundaries, and in the northwest corner of the survey area. We interpret these magnetic gradients as representing effects from the chain link fence to the east and south, and the trailer and above ground equipment in the northwest corner. Magnetic gradients that could not be associated with above ground cultural effects are labeled A through C, on Plate 2. Anomalies A and B are characterized as high amplitude bi-polar anomalies with values ranging from 500 to 1,800 nT/m. It has been our experience that anomalies of these magnitudes and areal extent can be due to many different metallic sources including small UST's. Anomaly C is comprised of a large group of circular contours. The closely spaced contours in this area suggests accumulations of buried metal. Possible sources for these closures may include debris, UST's, utility vaults, and/or utility alignments. Since these closures generally occur adjacent to International Boulevard, some may also represent interference from magnetic fields associated with nearby high tension electric lines.

Because of the high number of closures, it is uncertain as to which group of closures may represent buried metal objects such as a UST.

GPR Survey

GPR data were obtained over Anomalies A through C, adjacent to the chain link fence to the east, and around the suspect UST vault lid in the 61st Street sidewalk. The GPR data obtained over the VMG anomalies and along the chain link fence define reflection patterns that are typical of utility alignments or small objects, shallow fill horizons associated with the pavement, and deeper reflecting horizons characteristic of uniform subsurface conditions. The GPR data do not indicate hyperbolic signatures within the upper two to four feet large enough to represent a UST. Therefore, the source of these anomalies is probably buried deeper than the GPR detection capabilities, or represents effects from the nearby utilities.

The GPR data obtained around the suspect vault defines large hyperbolic reflection patterns that are typical of a UST. This data indicates that the UST parallels 61st Street and is approximately 4 to 5 feet wide by 11 feet long, as shown on Plate 2. Typically, gas stations use more than one UST. Therefore, it is possible that additional UST's may exist on either side of the detected UST (beneath the chain link fence binding the subject property or beneath 61st Street). Because of the physical obstruction and magnetic interference caused by the fence, the GPR or VMG cannot detect a UST located directly beneath the fence.

Borehole Site Surveys

The results of the borehole site surveys are shown on Plate 2. As described above, EMLL and GPR were systematically used over each location. During the course of this investigation, we detected several undifferentiated utility alignments. The surface trace of these utilities, as well as the proposed boring locations, were marked with spray paint on the ground surface.

VII LIMITATIONS

EMLL Techniques

The detection of underground utilities is dependent upon the composition and construction of the line of interest, as well as depth. Standard line locating techniques (EMLL) and ground penetrating radar (GPR) are typically used in conjunction with each other to detect various utilities. Utilities detectable with standard line location techniques include any continuously connected metal pipes, cables/wires or utilities with tracer wires. Unless carrying a passive current these utilities must be exposed at the surface or in accessible utility vaults. These generally include water, electric, natural gas, telephone, and other conduits related to facility operations. Utilities that may not be detectable using standard electromagnetic line location techniques include certain abandoned utilities, utilities not exposed at the ground surface, or those made of non-electrically conductive materials such as PVC, fiberglass, vitrified clay, and metal pipes with insulating joints. Pipes generally deeper than about five to seven feet may not be detected.

GPR Techniques

The ability to detect subsurface targets is dependent on site specific conditions. These conditions include depth of burial, the size or diameter of the target, the condition of the specific target in question, the type of backfill material associated with the target, and the surface conditions over the target. Typically, the GPR depth of detection will be reduced as the clay content in the subsurface increases. Therefore, it is possible that targets (UST's and utilities), buried greater than 2 to about 4 feet, may not be detectable by the GPR technique.

STANDARD CARE AND WARRANTY

The scope of NORCAL's services for this project consisted of using geophysical methods to explore the area of investigation for underground storage tanks. The accuracy of our findings is subject to specific site conditions and limitations inherent to the techniques used. We performed our services in a manner consistent with the level of skill ordinarily exercised by members of the profession currently employing similar methods. No warranty, with respect to the performance of services or products delivered under this agreement, expressed or implied, is made by NORCAL.

We appreciate having the opportunity to provide our geophysical services to you.

Respectfully,

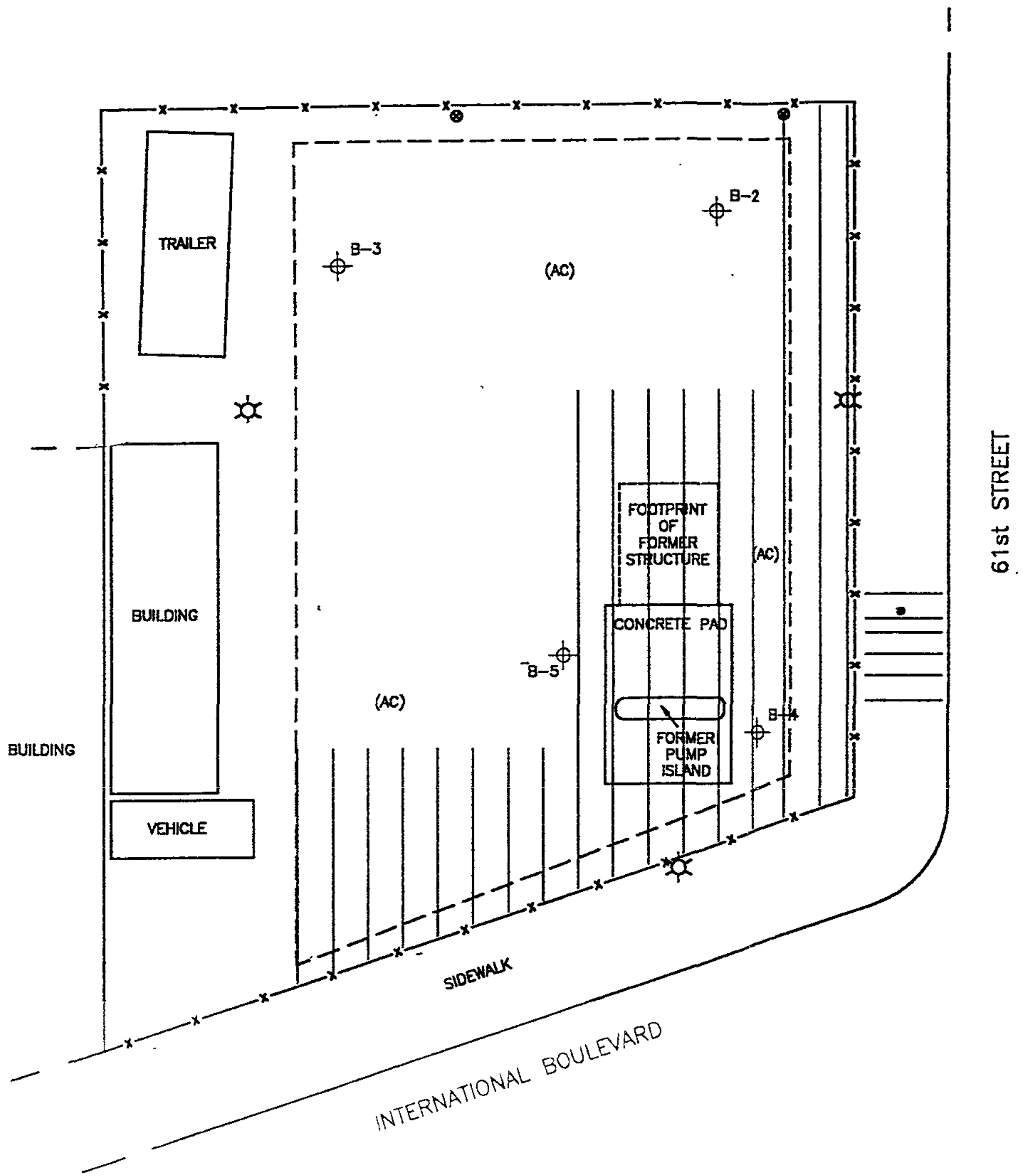
NORCAL Geophysical Consultants, Inc.

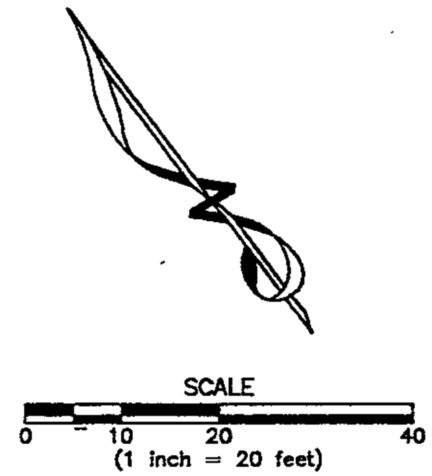
Donald J. Kirker

Donald J. Kirker
Geophysicist, GP-997

DJK/jh

Enclosure: Plates 1 and 2
Appendix A GEOPHYSICAL METHODOLOGY, DATA ACQUISITION AND ANALYSIS





LEGEND

– – – –	LIMITS OF VERTICAL MAGNETIC GRADIENT SURVEY
———	GPR TRAVERSE
⊕	PROPOSED BORING LOCATION
☼	LIGHT POLE
⊗	METAL POLE
•	UST VAULT
—x—	FENCE
(AC)	ASPHALT

NORCAL

GEOPHYSICAL SITE MAP
6006 INTERNATIONAL BOULEVARD

LOCATION: OAKLAND, CALIFORNIA

CLIENT: SUBSURFACE CONSULTANTS

NORCAL GEOPHYSICAL CONSULTANTS INC.

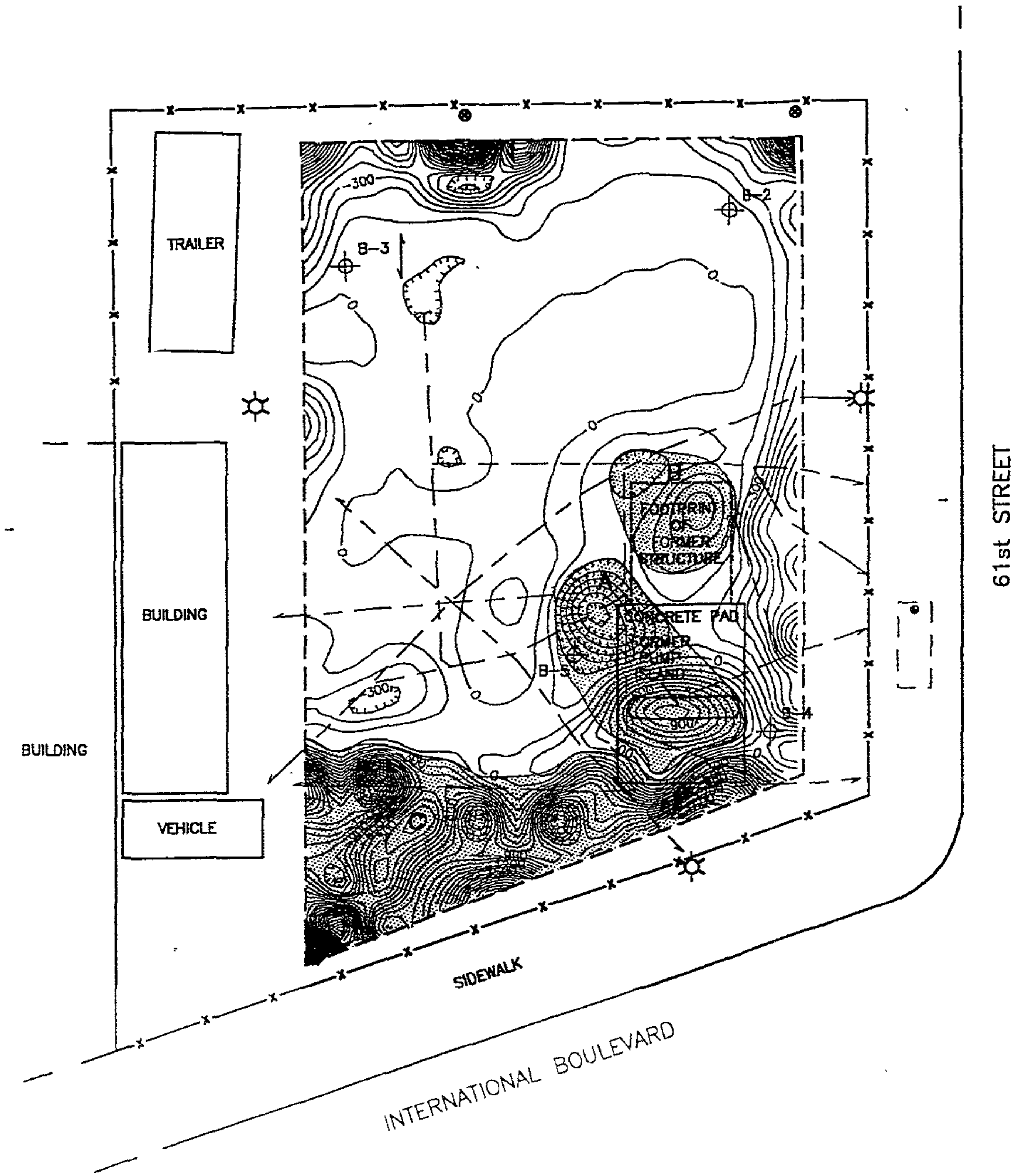
JOB #: 01-130.22

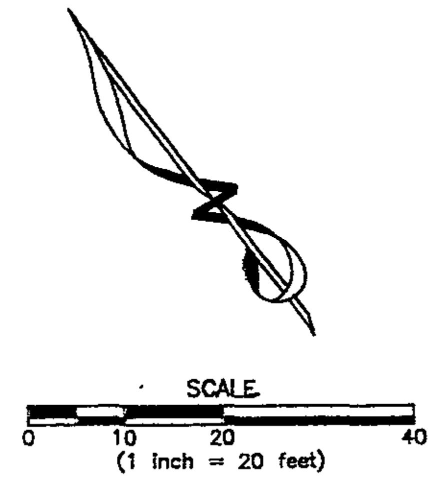
DATE: JAN. 2001

DRAWN BY: G.RANDALL

APPROVED BY: DJK

PLATE 1





LEGEND

— — —	LIMITS OF VERTICAL MAGNETIC GRADIENT SURVEY
—0—	VERTICAL MAGNETIC GRADIENT CONTOUR (*CONTOUR INTERVAL = 100 nT/m*)
(A)	VMG ANOMALY
[ ]	POSSIBLE UST
— — —	UNDIFFERENTIATED UTILITY LINE
⌖	PROPOSED BORING LOCATION
☼	LIGHT POLE
⊗	METAL POLE
•	UST VAULT
—x—	FENCE

NORCAL	GEOPHYSICAL SURVEY MAP 6006 INTERNATIONAL BOULEVARD	
	LOCATION: OAKLAND, CALIFORNIA	
	CLIENT: SUBSURFACE CONSULTANTS	PLATE
JOB #: 01-130.22	NORCAL GEOPHYSICAL CONSULTANTS INC.	2
DATE: JAN. 2001	DRAWN BY: G.RANDALL APPROVED BY: DJK	

Appendix A

GEOPHYSICAL METHODOLOGY, DATA ACQUISITION AND ANALYSIS

Appendix A

GEOPHYSICAL METHODOLOGY

Vertical Magnetic Gradiometer (VMG)

A magnetic gradiometer measures the vertical gradient of the earth's magnetic field. It consists of two total field magnetic sensors separated vertically by one-half meter. The magnetic field strength is measured simultaneously at both of these sensors. The difference in magnetic intensity between these measurements is proportional to the vertical gradient of the earth's magnetic field. Because the vertical gradient is constant with respect to time, the effect of diurnal variations is eliminated. Since a gradiometer is effected less by cultural features, it provides higher sensitivity and better resolution of near surface sources than total field magnetometers. Areas with significant amounts of buried metal typically produce anomalously steep magnetic gradients. Because the gradiometer is sensitive to ferrous metal sources both above and below ground, site and vicinity surface conditions can affect survey results.

We used an SCINTREX ENVI-MAP magnetometer to obtain the vertical magnetic gradient data. The instrument features a built-in memory that stores the vertical magnetic gradient and survey grid information. The information can be down loaded to a computer for further processing.

Ground Penetrating Radar (GPR)

Ground penetrating radar is a method that provides a continuous, high resolution cross-section depicting variations in the electrical properties of the shallow subsurface. The method is particularly sensitive to variations in electrical conductivity and electrical permittivity (the ability of a material to hold a charge when an electrical field is applied).

The GPR system operates by radiating electromagnetic pulses into the ground from a transducer (antenna) as it is moved along a traverse. Since most earth materials are transparent to electromagnetic energy, the signal spreads downward into the subsurface. However, when the signal encounters a variation in electrical permittivity, a portion of the electromagnetic energy is reflected back to the surface. When the signal encounters a metal object, all of the incident energy is reflected. The reflected signals are received by the same transducer and are printed in cross-section form on a graphical recorder. Changes in subsurface reflection character on the GPR records can provide information regarding the location of UST's, sumps, buried debris, underground utilities, and variations in the shallow stratigraphy.

For this investigation, we used a Geophysical Survey Systems, Inc. SIR-2 Subsurface Interface Radar Systems each equipped with a 500 megahertz (MHz) transducer. This transducer is near the center of the available frequency range and is used to provide high resolution at shallow depths.

Electromagnetic Line Location (EMLL)

Electromagnetic line location techniques are used to locate the magnetic field resulting from an electric current flowing on a line. These magnetic fields can arise from currents already on the line (passive) or currents applied to a line with a transmitter (active). The most common passive signals are generated by live electric lines and re-radiated radio signals. Active signals can be introduced by connecting the transmitter to the line at accessible locations or by induction.

The detection of underground utilities is affected by the composition and construction of the line in question. Utilities detectable with standard line location techniques include any continuously connected metal pipes, cables/wires or utilities with tracer wires. Unless carrying a passive current these utilities must be exposed at the surface or in accessible utility vaults. These generally include water, electric, natural gas, telephone, and other conduits related to facility operations. Utilities that are not detectable using standard electromagnetic line location techniques include those made of non-electrically conductive materials such as PVC, fiberglass, vitrified clay, and pipes with insulated connections.

Buried objects can also be detected, without direct contact, by using the induction mode. This is used to detect buried near surface metal objects such as rebar, manhole covers, UST's, and various metallic debris. The induction mode is used by holding the transmitter-receiver unit above the ground and continuously scanning the surface. The unit utilizes two orthogonal coils that are separated by a specified distance. One of the coils transmits an electromagnetic signal (primary magnetic field) which in turn produces a secondary magnetic field about the subsurface metal object. Since the receiver coil is orthogonal to the transmitter coil, it is unaffected by the primary field. Therefore, the secondary magnetic fields produced by buried metal object will generate an audible response from the unit. The peak of this response indicates when the unit is directly over the metal object.

Our instrumentation for this investigation consisted of a Radio Detection RD-400 and a Fisher TW-6 inductive pipe and cable locator.

DATA ACQUISITION

Horizontal Control

We based site definition and data acquisition on a horizontal control grid. We used spray paint to mark the grid nodes on 10 by 10 foot centers within the asphalt covered area. Survey points between these markers were paced during data acquisition. The location of the survey area is shown on Plate 1. The specific locations of the marked grid nodes are not shown on this plate.

Geophysical Survey

VMG data were collected at 5 foot intervals (stations) along south-north trending traverses spaced 5 feet apart. GPR data were obtained over significant VMG anomalies and along the fences adjacent to 61st Street and International Boulevard along south-north trending traverses spaced five feet apart. The length of these traverses ranged from 22 to 100 feet, as shown on Plate 1. The EMLL technique was systematically scanned throughout the survey area.

For the boring site surveys, the investigation at each of the 5 proposed boring locations included the use of both GPR and EMLL. GPR profiles were obtained along both north-south and east-west trending traverses with the boring positioned at their intersection. Each traverse was approximately 20 feet long. The EMLL system was operated within the same ten foot radius of the boring as the GPR. Detected utilities within these areas were identified and marked with spray paint on the ground surface.

DATA ANALYSIS

Computer Processing

We down loaded the VMG data to a lap-top computer and converted it into a format for contouring. The contouring program calculated an evenly spaced array of values (gridded) based on the observed field data. Finally, these gridded values were contoured to produce the VMG contour map shown on Plate 2.

GPR and EMLL Analysis

We examined the GPR records for reflection patterns characteristic of UST's and other buried debris. We also reviewed the records for changes in reflection character that could indicate variations in fill material associated with an excavation. For this survey, we estimate the depth of detection to average approximately two to three feet, with a maximum penetration of up to five feet in localized areas.

The EMLL instrumentation indicates the presence of buried metal by emitting an audible tone. There are no recorded data to analyze. The locations of buried objects detected with the EMLL method were marked on the ground surface with white marking paint.

APPENDIX B
FIELD EXPLORATION

APPENDIX B
FIELD EXPLORATION

Our field investigation was performed on January 25, 2001. The field exploration program consisted of drilling five exploratory borings to check subsurface conditions for building foundations. The borings were drilled using a truck-mounted drill rig equipped with 7-inch-diameter hollow stem flight augers. The borings extended to depths of approximately 20 to 25 feet. The approximate locations of the borings are shown on the Site Plan, Plate 2. The soils are classified in accordance with the Unified Soil Classification System (ASTM D 2487). The logs of the borings and Key to Test Data (Plate A1) are included in this appendix. Following completion of drilling, the bore shafts were backfilled with cement grout.

Representative soil samples were obtained from the borings at selected depths. The samples were obtained using a Modified California sampler (3.0-inch outside diameter (O.D.), 2.5-inch inside diameter (I.D.)). In the laboratory, we reexamined the samples from the borings and selected appropriate specimens for physical property testing. We also checked our field classifications and made corrections, as appropriate

Resistance blow counts were obtained with the sampler by dropping an automatically tripped 140-pound hammer through a 30-inch free fall. The sampler was driven 18 inches, and the number of blows was recorded for each 6 inches of penetration. The blows-per-foot recorded on the boring logs represent the accumulated number of blows that were required to drive the last 12 inches. Due to the larger diameter of the Modified California sampler (as compared to the Standard Penetration Test sampler), the blow counts recorded for this sampler are not standard penetration resistance values. A correction (reduction) factor of 0.65 should be used to convert the blowcounts to equivalent SPT values.

The attached boring log and related information show our interpretation of the subsurface conditions at the dates and locations indicated, and it is not warranted that they are representative of subsurface conditions at other locations and times.

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487-93)

MAJOR DIVISIONS				GROUP NAMES
COARSE-GRAINED SOILS More than 50% retained on the No. 200 sieve	GRAVELS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	Clean gravels less than 5% fines	GW	Well-graded gravel, Well-graded gravel with sand
			GP	Poorly graded gravel, Poorly graded gravel with sand
		Gravels with more than 12% fines	GM	Silty gravel, Silty gravel with sand
			GC	Clayey gravel, Clayey gravel with sand
	SANDS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	Clean sand less than 5% fines	SW	Well-graded sand, Well-graded sand with gravel
			SP	Poorly graded sand, Poorly graded sand with gravel
		Sands with more than 12% fines	SM	Silty sand, Silty sand with gravel
			SC	Clayey sand, Clayey sand with gravel
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	SILTS AND CLAYS Liquid Limit Less than 50%		ML	Silt, Silt with sand or gravel, Sandy or gravelly silt, Sandy or gravelly silt with gravel or sand
			CL	Lean clay, Lean clay with sand or gravel, Sandy or gravelly lean clay, Sandy or gravelly lean clay with gravel or sand
			OL	Organic silt or clay, Organic silt or clay with sand or gravel, Sandy or gravelly organic silt or clay, Sandy or gravelly organic silt or clay with gravel or sand
	SILTS AND CLAYS Liquid Limit Greater than 50%		MH	Elastic silt, Elastic silt with sand or gravel, Sandy or gravelly elastic silt, Sandy or gravelly elastic silt with gravel or sand
			CH	Fat clay, Fat clay with sand or gravel, Sandy or gravelly fat clay, Sandy or gravelly fat clay with gravel or sand
			OH	Organic silt or clay, Organic silt or clay with sand or gravel, Sandy or gravelly organic silt or clay, Sandy or gravelly organic silt or clay with gravel or sand
HIGHLY ORGANIC SOILS			PT	Peat

For definition of dual and borderline symbols, see ASTM D2487-93.

KEY TO TEST DATA AND SYMBOLS

Perm	-	Permeability
Consol	-	Consolidation
LL	-	Liquid Limit
PI	-	Plasticity Index
Gs	-	Specific Gravity
MA	-	Particle Size Analysis
-200	-	Percent Passing No. 200 Sieve
ND	-	Not Detected
■	-	Tube Sample
⊠	-	Bag or Bulk Sample
⊡	-	Lost Sample
▽	-	First Groundwater
▼	-	Stabilized Groundwater

	Shear Strength (psf)	Confining Pressure (psf)	
TxUU	3200	(2600)	Unconsolidated-Undrained Triaxial Shear
TxCU	3200	(2600)	Consolidated-Undrained Triaxial Shear
TxCD	3200	(2600)	Consolidated-Drained Triaxial Shear
SSCU	3200	(2600)	Consolidated-Undrained Simple Shear
SSCD	3200	(2600)	Consolidated-Drained Simple Shear
DSCD	2700	(2000)	Consolidated-Drained Direct Shear
UC	470		Unconfined Compression
LVS	700		Laboratory Vane Shear
FV	300		Field Vane Shear
RFV			
TV	800		Torvane Shear
PP	400		Pocket Penetrometer *(actual reading divided by 2)*

SCI **Subsurface Consultants, Inc.**
Geotechnical & Environmental Engineers

International Boulevard Family Housing Project Oakland, California		PLATE
JOB NUMBER 790.008	DATE 2/01	B1

Project Name & Location: International Boulevard Family Housing Project Oakland, California	Ground Surface Elevation: 0 feet Elevation Datum: Ground Surface
Drilling Coordinates: not surveyed	Start: Date 1/25/01 Time 15:00 / Finish: Date 1/25/01 Time 16:00
Drilling Company & Driller: BAE, Scott Fitche	Drilling Fluid: / Hole Diameter: 7"
Rig Type & Drilling Method: CM 75 / Hollow Stem Augers	
Sampler Type(s): A) Modified California (3" O.D., 2.5" I.D.) B) SPT (2" O.D., 1.4" I.D.)	Logged By: JW / ⊻ GWL During Drilling ⊻ GWL at Completion
Sampling Method(s): A) 140 lb automatically tripped hammer w/30" drop B) 140 lb automatically tripped hammer w/30" drop	Backfill Method: Cement Grout / Date: 1/25/01

Depth (feet)	Sampler Type	Blows/6 inches of Pressure	Blows/12 inches	SOIL DESCRIPTIONS: GROUP NAME (GROUP SYMBOL) color, consistency/density, moisture condition, other descriptions (Local Name or Material Type)	Moisture Content (%)	Dry Density (pcf)	Other
0	A	5, 10, 11	21	SANDY CLAY WITH GRAVEL (CL) Brown, stiff, moist	13.1	104	
	A	4, 6, 9	15		13.7	117	
5	A	6, 18, 20	38		15	116	UC = 2600 psf
				⊻			
				POORLY GRADED SAND WITH CLAY (SP-SC) Brown, medium dense, wet			
10	A	5, 15, 28	43				
				SANDY LEAN CLAY (CL) Yellowish brown, stiff, moist			
15	A	5, 11, 15	26	CLAYEY SAND WITH GRAVEL (SC) Dark yellowish-brown, medium dense, wet	14.6	116	
20	A	10, 15, 19	34	LEAN CLAY (CL) Light brown, very stiff, moist	14.6	117	
25							
30							

LOG OF BORING 790-008.GPJ GEO-ENV.GDT 2/14/01

SCI Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

International Boulevard Family Housing Project
Oakland, California

JOB NUMBER 790.008 | DATE 2/01 | BORING B-1

Project Name & Location: International Boulevard Family Housing Project, Oakland, California	Ground Surface Elevation: 0 feet
	Elevation Datum: Ground Surface
Drilling Coordinates: not surveyed	Start: Date 1/25/01, Time 09:00 / Finish: Date 1/25/01, Time 10:00
Drilling Company & Driller: BAE, Scott Fitche	Drilling Fluid: / Hole Diameter: 7"
Rig Type & Drilling Method: CM 75 / Hollow Stem Augers	
Sampler Type(s): A) Modified California (3" O.D., 2.5" I.D.) B) SPT (2" O.D., 1.4" I.D.)	Logged By: JW / ▼ GWL During Drilling ▽ GWL at Completion
Sampling Method(s): A) 140 lb automatically tripped hammer w/30" drop B) 140 lb automatically tripped hammer w/30" drop	Backfill Method: Cement Grout / Date: 1/25/01

Depth (feet)	Sampler Type	Blows/6 inches of Pressure	Blows/12 inches	SOIL DESCRIPTIONS: GROUP NAME (GROUP SYMBOL) color, consistency/density, moisture condition, other descriptions (Local Name or Material Type)	Moisture Content (%)	Dry Density (pcf)	Other
0	A	6, 6, 10	16	**CLAYEY GRAVEL (GC)** Dark yellowish-brown, medium dense, moist (fill) / **LEAN CLAY (CL)** Dark grayish-brown to brown, stiff, moist	20.3	105	LL = 42, PI = 18
	A	2, 6, 8	14				
5	A	3, 8, 10	18	**LEAN CLAY WITH SAND (CL)** Dark yellowish-brown, stiff, moist ▼	25	104	
10	A	6, 9, 16	25	**SANDY LEAN CLAY (CL)** Light yellowish-brown, stiff, moist ▽	19.5	106	
15	A	6, 8, 8	16	**CLAYEY SAND (SC)** Yellowish-brown, medium dense, wet	18.5	110	-200 = 30.4 %
20	A	6, 9, 15	24	**LEAN CLAY (CL)** Light yellowish-brown, stiff, moist	20.6	108	
25							
30							

LOG OF BORING 790-008.GPJ GEO-ENV.GDT 2/14/01

Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

International Boulevard Family Housing Project, Oakland, California		BORING
JOB NUMBER 790.008	DATE 2/01	**B-2**

Project Name & Location: International Boulevard Family Housing Project Oakland, California	Ground Surface Elevation: 0 feet Elevation Datum: Ground Surface
Drilling Coordinates: not surveyed	Start: Date 1/25/01 Time 12:00 / Finish: Date 1/25/01 Time 13:00
Drilling Company & Driller: BAE, Scott Fitche	Drilling Fluid: / Hole Diameter: 7"
Rig Type & Drilling Method: CM 75 / Hollow Stem Augers	
Sampler Type(s): A) Modified California (3" O.D., 2.5" I.D.) B) SPT (2" O.D., 1.4" I.D.)	Logged By: JW / GWL During Drilling; GWL at Completion
Sampling Method(s): A) 140 lb automatically tripped hammer w/30" drop B) 140 lb automatically tripped hammer w/30" drop	Backfill Method: Cement Grout / Date: 1/25/01

Depth (feet)	Sampler Type	Blows/6 Inches of Pressure	Blows/12 inches	SOIL DESCRIPTIONS: GROUP NAME (GROUP SYMBOL) color, consistency/density, moisture condition, other descriptions (Local Name or Material Type)	Moisture Content (%)	Dry Density (pcf)	Other
0	A	10 13 14	27	**CLAYEY GRAVEL (GC)** Yellowish-brown, medium dense, moist (fill) **LEAN CLAY WITH SAND (CL)** Dark gray, stiff, moist			
	A	3 7 23	30	**CLAYEY GRAVEL (GC)** Yellowish brown, medium dense, moist **SANDY LEAN CLAY (CL)** Light yellowish-brown, stiff, moist			
5	A	3 9 11	20		19.6	107	
							GWL During Drilling (approx. 6 ft)
10	A	3 7 10	17		19.6	109	
							GWL at Completion (approx. 12.5 ft)
15	A	10 12 16	28	**CLAYEY SAND WITH GRAVEL (SC)** Yellowish brown, medium dense, wet	16	116	
20	A	10 10 12	22	**LEAN CLAY (CL)** Yellowish-brown, medium stiff, moist	20.2	108	
25	A	2 4 7	11		35.5	95	
30							

LOG OF BORING 790-008.GPJ GEO-ENV.GDT 2/14/01

SCI Subsurface Consultants, Inc. Geotechnical & Environmental Engineers

International Boulevard Family Housing Project
Oakland, California

JOB NUMBER	DATE	BORING
790.008	2/01	B-3

Project Name & Location: International Boulevard Family Housing Project, Oakland, California	Ground Surface Elevation: 0 feet
	Elevation Datum: Ground Surface
Drilling Coordinates: not surveyed	Start: Date 1/25/01 Time 10:00 / Finish: Date 1/25/01 Time 11:00
Drilling Company & Driller: BAE, Scott Fitche	Drilling Fluid: / Hole Diameter: 7"
Rig Type & Drilling Method: CM 75 / Hollow Stem Augers	
Sampler Type(s): A) Modified California (3" O.D., 2.5" I.D.) B) SPT (2" O.D., 1.4" I.D.)	Logged By: JW / ¥ GWL During Drilling ¥ GWL at Completion
Sampling Method(s): A) 140 lb automatically tripped hammer w/30" drop B) 140 lb automatically tripped hammer w/30" drop	Backfill Method: Cement Grout / Date: 1/25/01

Depth (feet)	Sampler Type	Blows/6 inches of Pressure	Blows/12 inches	SOIL DESCRIPTIONS: GROUP NAME (GROUP SYMBOL) color, consistency/density, moisture condition, other descriptions (Local Name or Material Type)	Moisture Content (%)	Dry Density (pcf)	Other
0				ASPHALTIC CONCRETE 3 - INCHES THICK			
	A	13, 9, 11	20	CLAYEY SAND WITH GRAVEL (SC) Yellowish-brown to dark olive, medium dense, moist (fill)			OVM = 243 ppm
	A	3, 5, 8	13	LEAN CLAY (CL) Dark grayish-brown, medium stiff to stiff, moist			OVM = 120 ppm
5	A	6, 11, 13	24		19.9	107	OVM = 200 ppm UC = 2500 psf
				LEAN CLAY WITH SAND (CL) Olive-brown to yellowish-brown, stiff, moist (▼ GWL at completion)			
10	A	4, 7, 13	20	CLAYEY SAND (SC) Olive-gray, medium dense, wet (▽ GWL during drilling)			OVM > 3000 ppm
15	A	5, 7, 12	19	SANDY LEAN CLAY (CL) Yellowish-brown, medium stiff to stiff, moist	21	107	OVM = 13 ppm
20	A	5, 8, 13	21		23.3	103	
25	A	5, 6, 7	13		25.3	98.2	
30							

LOG OF BORING 790-008.GPJ GEO-ENV.GDT 2/14/01

SCI Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

International Boulevard Family Housing Project
Oakland, California

JOB NUMBER	DATE	BORING
790.008	2/01	B-4

Project Name & Location: International Boulevard Family Housing Project, Oakland, California	Ground Surface Elevation: 0 feet
	Elevation Datum: Ground Surface
Drilling Coordinates: not surveyed	Start: Date 1/25/01 Time 11:00 / Finish: Date 1/25/01 Time 12:00
Drilling Company & Driller: BAE, Scott Fitche	Drilling Fluid: / Hole Diameter: 7"
Rig Type & Drilling Method: CM 75 / Hollow Stem Augers	
Sampler Type(s): A) Modified California (3" O.D., 2.5" I.D.) B) SPT (2" O.D., 1.4" I.D.)	Logged By: JW / GWL During Drilling; GWL at Completion
Sampling Method(s): A) 140 lb automatically tripped hammer w/30" drop B) 140 lb automatically tripped hammer w/30" drop	Backfill Method: Cement Grout / Date: 1/25/01

Depth (feet)	Sampler Type	Blows/6 inches of Pressure	Blows/12 inches	SOIL DESCRIPTIONS: GROUP NAME (GROUP SYMBOL) color, consistency/density, moisture condition, other descriptions (Local Name or Material Type)	Moisture Content (%)	Dry Density (pcf)	Other
0				**ASPHALTIC CONCRETE 3 - INCHES THICK**			
	A	10 8 9	17	**CLAYEY SAND WITH GRAVEL (SC)** Yellowish brown, medium dense, moist (fill)			OVM = 91 ppm
				LEAN CLAY (CL) Mottled olive-gray and dark yellowish-brown, stiff, moist			
	A	2 5 8	13		21.4	99	OVM = 71 ppm UC =1250 psf
5	A	3 9 12	21	(GWL During Drilling ~6 ft)			OVM = 219 ppm
				CLAYEY SAND WITH GRAVEL (SC) Dark olive-gray, medium dense, wet (GWL at Completion ~10 ft)			
10	A	7 7 11	18				OVM > 3000 ppm
				LEAN CLAY WITH SAND (CL) Yellowish-brown, stiff, moist			
15	A	5 14 23	37		17.6	112	OVM = 5 ppm - 200 = 36.4%
				CLAYEY SAND (SC) Yellowish-brown, medium dense, wet, trace of gravel			
				LEAN CLAY (CL) Yellowish-brown, stiff, moist, trace of sand			
20	A	3 7 10	17		23.8	103	
25							
30							

APPENDIX C
GEOTECHNICAL TESTING PROGRAM

APPENDIX C
GEOTECHNICAL TESTING PROGRAM

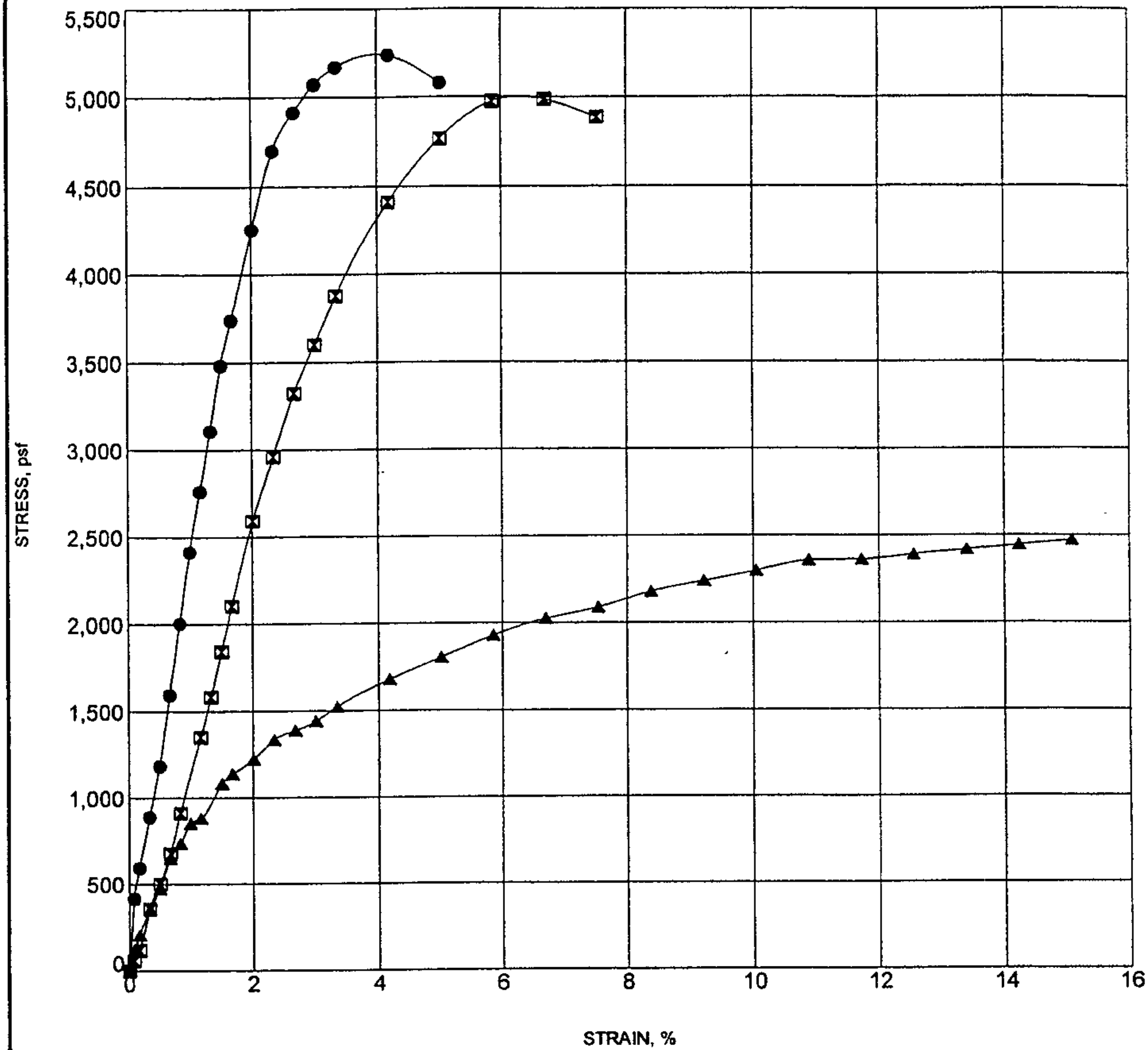
The purpose of the laboratory testing program was to provide data to assist in our evaluation of the physical and mechanical properties of the soils underlying the site.

The natural water content and dry density was determined on 22 samples of the materials recovered from the borings in accordance with ASTM Test Designation D2216. These water contents and dry densities are recorded on the boring logs at the sample depths.

Particle size (-200) analysis was performed on two samples to evaluate the fines content of the soil and aid in soil classification. The test was performed in accordance with ASTM Test Designation D1140. The results of the tests are presented on the appropriate boring log and sample depth.

Atterberg Limits determination were performed on one sample. The Atterberg Limits were determined in accordance with ASTM Test Designations D428 and D424. These values are used to classify the soil in accordance with the Unified Soil Classification System and to indicate the soil's compressibility and expansion potentials. The results of the test are presented on the boring logs at the appropriate sample depths and in this appendix.

Unconfined compression tests were performed on three relatively "undisturbed" samples to evaluate the undrained shear strength of the materials. The unconfined strength tests were performed in accordance with ASTM Test Designations D2166 on a sample having a diameter of 2.4 inches and a height-to-diameter ratio of at least two. Failure was taken as the peak normal stress. The results of the tests are presented on the boring logs at the appropriate sample depths.



	Specimen Identification		Classification	γ_d	MC%
●	B-1	4.5			
⊠	B-4	5.0			
▲	B-5	2.5			

UNCONFINED COMPRESSION TEST

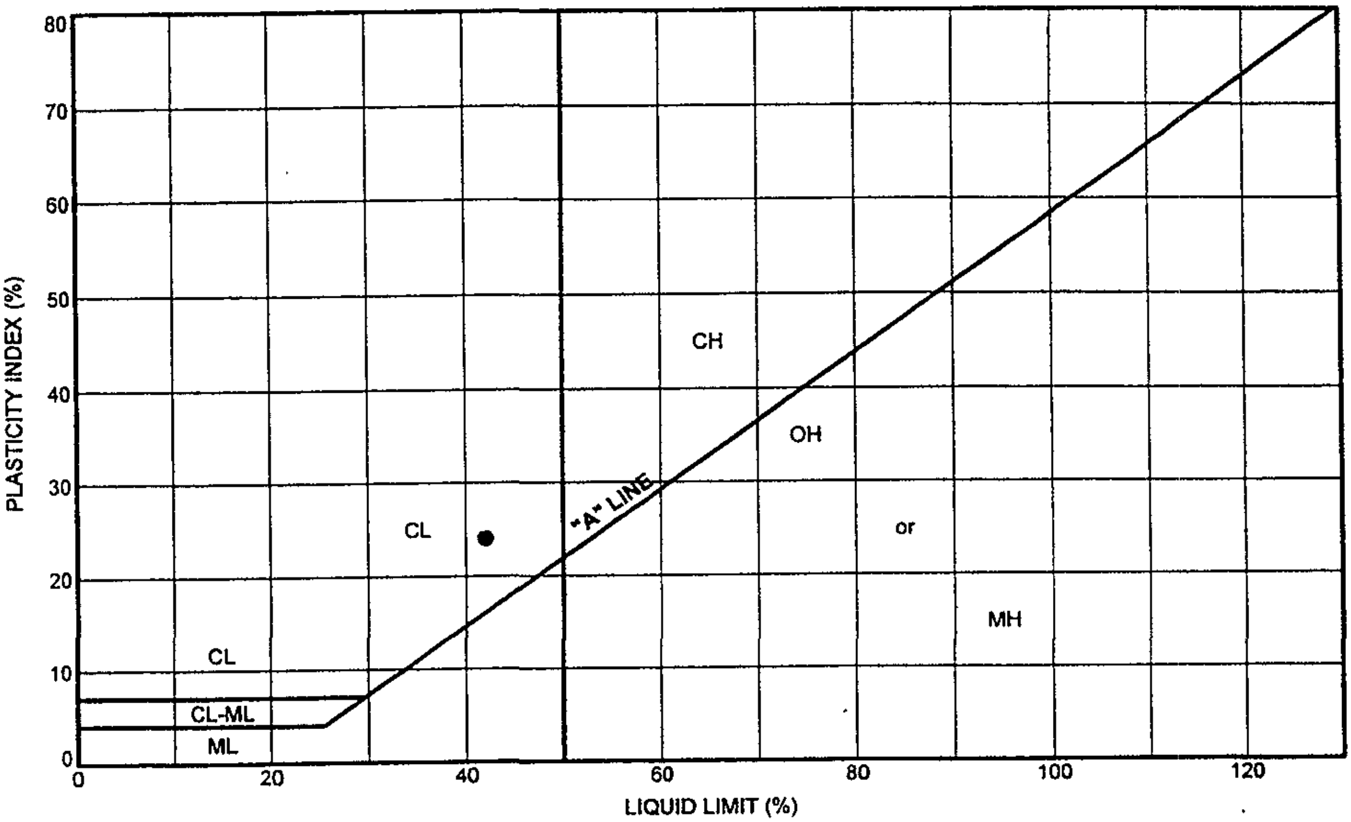
International Boulevard Family Housing Project
Oakland, California

JOB NUMBER 790.008

DATE 2/01

PLATE C1

SCI Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers



PLASTICITY DATA

KEY SYMBOL	BORING NUMBER	DEPTH (meters)	NATURAL WATER CONTENT W(%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX (W - PL)/(LL - PL)	UNIFIED SOIL CLASSIFICATION SYMBOL
●	B-1	1.5	20.3	18	42	24	0.10	CL

ATTERBERG LIMITS - PLASTICITY DATA

SCI **Subsurface Consultants, Inc.**
Geotechnical & Environmental Engineers

International Boulevard Family Housing Project
Oakland, California

JOB NUMBER 790.008

DATE 2/01

PLATE C2

ATTERBERG LIMITS 790-008.GPJ GEO-ENV.GDT 2/14/01

APPENDIX D
ENVIRONMENTAL TESTING REPORTS

McCAMPBELL ANALYTICAL INC.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Subsurface Consultants, Inc. 3736 Mt. Diablo Blvd., Ste. 200 Lafayette, CA 94549	Client Project ID: #790.008; International Blvd. Family Housing	Date Sampled: 01/25/01 Date Received: 01/26/01
	Client Contact: Glenn Young	Date Extracted: 01/26/01
	Client P.O:	Date Analyzed: 01/26-01/29/01

Diesel Range (C10-C23) and Oil-Range (C18+) Extractable Hydrocarbons as Diesel and Motor Oil with Silica Gel Clean-up*

EPA methods modified 8015, and 3550 or 3510; California RWQCB (SF Bay Region) method GCFID(3550) or GCFID(3510)

Lab ID	Client ID	Matrix	TPH(d)+	TPH(mo)'	% Recovery Surrogate
58795	B4 @ 9.5	S	110,d	14	96
58797	B5 @ 10.5	S	310,d	60	94
58798	B4	W	3600,d,i	ND	111
58799	B5	W	1300,d	260	100
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	50 ug/L	250 ug/L	
		S	1.0 mg/kg	5.0 mg/kg	

*water samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP / STLC / SPLP extracts in ug/L

cluttered chromatogram resulting in coeluted surrogate and sample peaks, or; surrogate peak is on elevated baseline, or; surrogate has been diminished by dilution of original extract.

'The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified diesel is significant; b) diesel range compounds are significant; no recognizable pattern; c) aged diesel? is significant); d) gasoline range compounds are significant; e) medium boiling point pattern that does not match diesel (stoddard solvent?); f) one to a few isolated peaks present; g) oil range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment.

DHS Certification No. 1644

[signature] for Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Subsurface Consultants, Inc. 3736 Mt. Diablo Blvd., Ste. 200 Lafayette, CA 94549	Client Project ID: #790.008; International Blvd. Family Housing	Date Sampled: 01/25/01 Date Received: 01/26/01
	Client Contact: Glenn Young	Date Extracted: 01/26/01
	Client P.O:	Date Analyzed: 01/26-01/30/01

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & BTEX*

EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g)[+]	MTBE	Benzene	Toluene	Ethyl-benzene	Xylenes	% Recovery Surrogate
58795	B4 @ 9.5	S	340,j	---	0.19	ND<0.10	1.3	0.45	---[#]
58797	B5 @ 10.5	S	1300,j	---	ND<0.2	ND<0.2	2.6	2.6	86
58798	B4	W	3600,a,i	---	22	1.8	49	2.9	117
58799	B5	W	4200,a	---	5.7	1.7	7.0	5.4	---[#]
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit	W	50 ug/L	5.0	0.5	0.5	0.5	0.5	
	S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	

* water and vapor samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP and SPLP extracts in ug/L

[#] cluttered chromatogram; sample peak coelutes with surrogate peak

[+]The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (?); f) one to a few isolated peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) no recognizable pattern.

DHS Certification No. 1644

[signature] for Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.

110 2nd Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Subsurface Consultants, Inc. 3736 Mt. Diablo Blvd., Ste. 200 Lafayette, CA 94549	Client Project ID: #790.008; International Blvd. Family Housing	Date Sampled: 01/25/01
		Date Received: 01/26/01
	Client Contact: Glenn Young	Date Extracted: 01/26/01
	Client P.O:	Date Analyzed: 01/29/01

Lead*

EPA analytical methods 6010/200.7, 239.2⁺

Lab ID	Client ID	Matrix	Extraction °	Lead*	% Recovery Surrogate
58794	B4 @ 0.5	S	TTLC	93	110
58796	B5 @ 1.0	S	TTLC	3.2	110
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		S	TTLC	3.0 mg/kg	
		W	TTLC	0.005 mg/L	
		—	STLC,TCLP	0.2 mg/L	

* soil and sludge samples are reported in mg/kg, wipe samples in ug/wipe, and water samples and all STLC / SPLP / TCLP extracts in mg/L

⁺Lead is analysed using EPA method 6010 (ICP)for soils, sludges, STLC & TCLP extracts and method 239.2 (AA Furnace) for water samples

DISTLC extractions are performed using STLC methodology except that deionized water is substituted for citric acid buffer as the extraction fluid. DISTLC results are not applicable to STLC regulatory limits.

° EPA extraction methods 1311(TCLP), 3010/3020(water,TTLC), 3040(organic matrices,TTLC), 3050(solids,TTLC); STLC - CA Title 22

surrogate diluted out of range; N/A means surrogate not applicable to this analysis

reporting limit raised due matrix interference

i) liquid sample that contains greater than ~2 vol. % sediment; this sediment is extracted with the liquid, in accordance with EPA methodologies and can significantly effect reported metal concentrations.

DHS Certification No. 1644

Edward Hamilton, Lab Director

n4003 = sci61

CHAIN OF CUSTODY FORM

PAGE 1 OF 1

PROJECT NAME: International Blvd Family Housing

JOB NUMBER: 790.008

LAB: McCampbell

PROJECT CONTACT: Glenn Young

TURNAROUND: Standard

SAMPLED BY: John Wolfe

REQUESTED BY: Glenn Young

LABORATORY I.D. NUMBER	SCI SAMPLE NUMBER	MATRIX: WATER	SOIL	WASTE	AIR	CONTAINERS: VOA	LITER	PINT	TUBE	METHOD PRESERVED: HCL	H_2SO_4	HNO_3	ICE	NONE	SAMPLING DATE: MONTH	DAY	YEAR	TIME	NOTES	ANALYSIS REQUESTED: TPHg/BTEX	TPHd to w/Silica Gel	Total Lead
	B4@0.5		✓						✓				✓		01	25	0ϕ	1000				✓
	B4@9.5		✓						✓				✓		01	25	0ϕ	1000		✓	✓	
	B5@1.0		✓						✓				✓		01	25	0ϕ	1100				✓
	B5@0.5		✓						✓				✓		01	25	0ϕ	1100		✓	✓	
+S	B4	✓				4	2			4			✓		01	25	0ϕ	1000		✓	✓	
+	B5	✓				4	2			4			✓		01	23	01	1100		✓	✓	

58794
58795
58796
58797
58798
58799

CHAIN OF CUSTODY RECORD

RELEASED BY: (Signature)	DATE / TIME		RECEIVED BY: (Signature)	DATE / TIME	
John Wolfe	1.26.01	1230	[signature]	1/26/01	1230
[signature]	1/26/01	1:30 p.	Maria Venegas	01/26	1:30 p.m

COMMENTS & NOTES:

SCI Subsurface Consultants, Inc.
171 - 12th Street, Suite 202, Oakland, CA 94607
(510) 268-0461 - FAX: (510) 268-0137
3736 Mt. Diablo Blvd., Ste. 200, Lafayette, CA 94549
(925) 299-7960 - (925) 299-7970

APPENDIX E
GEOLOGY AND SEISMICITY

APPENDIX E
GEOLOGY AND SEISMICITY

Bay Area Geology

The site is located in the Coast Ranges Geomorphic Province of California which is characterized by ranges and valleys that trend northwest, subparallel to the San Andreas fault. Two main bedrock units have been distinguished in this zone: the Franciscan Assemblage and the Great Valley Sequence. Both units are Jurassic to Cretaceous in age (about 90 to 180 million years old). The Franciscan Assemblage in most localities is characterized by northwest trending lithologic belts. Rocks of the Franciscan Assemblage are among the oldest in the province and were deposited in a marine environment along the western portion of the North American Plate. Rocks of the Franciscan Assemblage include graywacke, siltstone, shale and chert. The chert was often deposited in association with the eruption and intrusion of lavas and sills, which were subsequently altered to greenstone. Rocks of the Franciscan Assemblage are intimately associated with tectonic activity as evidenced by the lack of coherent stratigraphy and the presence of extensive shear zones and metamorphism. The Great Valley Sequence was deposited in a tectonically quieter environment and is composed of interbedded shale, siltstone, sandstone and conglomerate.

During the interval between Cretaceous and Quaternary time, the tectonic and depositional regime evolved to the present day San Andreas rift zone system. The present system involves the Pacific Plate moving to the northwest relative to the North American Plate along numerous northwest trending faults. The dominant fault of the system is the San Andreas Fault, which is southwest of the project site. Following deposition, Bay Area rocks were extensively altered and deformed by folds and faults that resulted from the collision of the Pacific and North American plates and subsequent strike-slip faulting along the San Andreas fault zone.

Deposition from the Pleistocene (1.85 million years ago) to the present was closely related to global fluctuations in sea level primarily related to glaciations, but also related to local tectonic movement. In the San Francisco Bay Area, bedrock is locally overlain by marine and sediments of Pleistocene and Holocene age. These deposits include alluvial and colluvial soil deposits, wind blown dune sand, and bay and marsh deposits.

Seismic Setting

The coastal areas of Northern California are tectonically located near the contact between the North American and Pacific crustal plates. This seismic regime is characterized by northwest trending faults. These faults exhibit mainly right lateral strike-slip movement, (which means that the movement is predominantly horizontal and when viewed from one side of the fault the opposite side of the fault is seen to move to the right).

It can be expected that the site will experience periodic minor earthquakes and possibly a major earthquake on one of the nearby active faults during the life of the development. Faults that are defined as active exhibit one or more of the following: (1) evidence of Holocene-age displacement (within about the past 11,000 years), (2) measurable tectonic creep along fault lines, and/or (3) close proximity to linear concentrations or trends of earthquake epicenters.

Potentially active faults are defined as those that have evidence of Quaternary-age displacement (within the past 2 million years). The locations of active and potentially active faults in California have been mapped by various researchers. In 1973, the Alquist-Priolo Earthquake Fault Zoning Act went into effect. The purpose of Alquist-Priolo is to regulate development near active faults so as to mitigate the hazard of surface fault rupture. As part of the Alquist-Priolo Fault Evaluation Program, the State Geologist in conjunction with the California Division of Conservation Department of Mines and Geology (CDMG) has delineated Earthquake Hazard Zones around known active faults. The project site is not within an Alquist-Priolo Earthquake Hazard Zone and no mapped faults cross the site.

Major active faults in the Bay Area include the San Andreas, San Gregorio, Hayward, Rodgers Creek, Concord-Green Valley, Calaveras and Greenville Faults. The Mt. Diablo blind thrust fault is a newly recognized earthquake source for the Bay Area. Various researchers have mapped the locations of principal Bay Area faults and uncertainties in the fault locations are largely inconsequential (from an engineering standpoint) outside of the Earthquake Hazard Zones.

The CDMG has developed Active Fault Near-Source Zones maps to be used in conjunction with the 1997 Uniform Building Code (UBC). The UBC methodology characterizes the more significant active faults as A or B based on the following: Seismic Source Type A refers to faults having a slip rate greater than 5mm per year that are capable of producing an earthquake having a maximum Moment Magnitude greater than 7. Source Type B refers to faults not included in Type A having a slip rate greater than 2mm per year capable of producing an earthquake having a maximum Moment Magnitude greater than 6.5. Faults that are deemed as less significant are classified as Source Type C which signifies faults having a slip rate less than 2mm per year that are not thought to be capable of producing an earthquake having a maximum Moment Magnitude greater than 6.5.

The following table presents the distances to major Bay Area active faults, the UBC seismic source type and the UBC estimated maximum moment magnitude earthquake for each fault.

Seismic Source Data
6006 International Boulevard, Oakland, California

Seismic Source	Approximate Distance and Direction from Site[1]	UBC Seismic Source Type[1]	UBC Maximum Moment Magnitude[1]	Probability of at least one M≥6.7 earthquake before 2030[2]
Hayward	3 km northeast	A	7.1	0.32[3]
San Andreas	27 km southwest	A	7.9	0.21
San Gregorio	35 km southwest	A	7.3	0.10
Rodgers Creek	38.5 km northwest	A	7.0	0.32[3]
Calaveras	18 km northeast	B	6.2	0.18
Concord-Green Valley	24.5 km northeast	B	6.9	0.06
West Napa	45 km northwest	B	6.5	-[4]
Mt. Diablo (blind thrust)	21 km northeast	-[5]	-[5]	0.04
Background	-		-	0.09
Regional Aggregate Probability				0.70

---

[1] Reference: California Department of Conservation Division of Mines and Geology (CDMG), Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada to be used with the 1997 Uniform Building Code, International Conference of Building Officials, February, 1988.

[2] Expert's weighted aggregate 30-year probabilities. Reference: Working Group on California Earthquake Probabilities (WG99), *Earthquake Probabilities in the San Francisco Bay Region:2000-2030 – A Summary of Findings,* United States Geological Survey (USGS) Open File Report 99-517, 1999.

[3] Aggregate probability for the Hayward-Rodgers Creek fault system.

[4] West Napa fault not specifically considered in WG99 probability analysis.

[5] Mt. Diablo blind thrust fault not included on referenced CDMG maps intended for use with 1997 UBC.

Since 1800, four earthquakes have occurred in the Bay Area having estimated Moment Magnitudes greater than 6. In 1836, an earthquake with a moment magnitude of approximately 6.3 occurred east of Monterey Bay. In 1838, an earthquake having a moment magnitude of about 7.5 occurred on the San Andreas Fault. The San Francisco Earthquake of 1906 with an estimated moment magnitude of about 7.9 created a 250-mile-long surface rupture along the San Andreas Fault extending from San Juan Bautista to Shelter Cove. The most recent earthquake to significantly affect the Bay Area was the 1989 Loma Prieta event with an estimated moment magnitude of 6.9.

In 1999, the Working Group on California Earthquake Probabilities (WG99), in conjunction with the United States Geological Survey (USGS), published an updated report evaluating the probabilities of significant earthquakes occurring in the Bay Area over the next three decades. WG99 finds that there is a 0.70 (70 percent) probability that at least one magnitude 6.7 or greater earthquake will occur in the San Francisco Bay region before 2030. This probability is an aggregate value that considers seven principal Bay Area fault systems and unknown faults (background values) and has a relatively high level of confidence (within 1 standard deviation). Estimated 30-year probabilities for an earthquake having a magnitude greater than 6.7 occurring on the individual fault systems incorporated into the WG99 model are presented in the previous table. The background value indicates that within the next 30 years, there is a 0.09 (9 percent) chance that an earthquake with a magnitude of greater than 6.7 may occur in the Bay Area on a fault system not characterized in the study.