FUGRO WEST, INC.

1000 Broadway, Suite 200
Oakland, California 94607
Tel: (510) 268-0461
Fax: (510) 268-0137

January 6, 2004
Project No. 1121.003

Mr. Neal Snedecor
City of Livermore
Engineering Division
1052 S. Livermore Avenue
Livermore, California 94550-4899

PERMIT 23101

Subject: Soil and Groundwater Investigation Report
Regional Performing Arts Theater Site
Livermore, California

Dear Mr. Snedecor:

With this letter, Fugro West, Inc. (Fugro) presents the results of the soil and groundwater investigation conducted during September 2003 at the referenced site. The purpose of this work was to investigate the potential presence of petroleum hydrocarbons in soil and/or groundwater at the site resulting from the historical use of the site as a service station. This work was conducted on behalf of the City of Livermore (City) as part of the City's redevelopment process. The Site location is illustrated on Plates 1 and 2.

BACKGROUND

Fugro understands that the City of Livermore (City) is considering the purchase of seven parcels that may comprise the future Regional Performing Arts Theater site. Fugro previously completed a Phase 1 Environmental Site Assessment (ESA) dated February 14, 2003, for these parcels. Based on those findings, Fugro recommended completing a subsurface investigation to evaluate soil and groundwater conditions at the Site for the purpose of evaluating potential impacts from the former on-site service station operations.

FIELD INVESTIGATION

Prior to drilling activities, Fugro procured a drilling permit from the Alameda County Zone 7 Water Agency. We also requested borehole clearance by Underground Service Alert (USA) and from a private utility locator at the proposed boring locations.

On September 17, 2003, Fugro advanced three soil probes (B-1 to B-3) to depths of approximately 40 feet below ground surface (bgs) using a limited-access hollow stem auger rig. The driller placed all of the cuttings from the drilling operations into labeled, 55-gallon drums which are stored on adjacent City property pending disposal.

Fugro's field geologist observed drilling operations and prepared detailed logs of the conditions encountered during drilling. Fugro collected soil samples and screened them in the field using an organic vapor meter (OVM) as well as olfactory methods. Soils were classified in accordance with the United Soil Classification System (USCS). Grab groundwater samples were also collected from Borings B-1 through B-3. Upon completions, borings were grouted with neat cement in accordance with permit requirements and the landscaping returned to pre-sampling conditions.

Subsurface Conditions

Based on our field observations, near-surface fill comprised of sand, gravel, silt, brick fragments and concrete debris was encountered from just below the sod to approximately 8 to 14 feet bgs. Near surface fill was underlain with interbedded silty sand, sand, and sandy clay in Borings B-1 through B-3 to approximately 40 feet below ground surface (bgs), the maximum depth explored. Groundwater was encountered in each boring approximately 34 feet bgs during drilling. No free phase hydrocarbons were observed. It should be noted the borings may not have been left open for a sufficient period of time to establish equilibrium groundwater conditions.

Slight staining and hydrocarbon odors were observed in Boring B-2 and Boring B-3 at approximately 23 feet bgs. Field screening of soil samples detected an OVM reading of 1.7 parts per million (ppm) for the soil sample obtained at 30 bgs in Boring B-2.

CHEMICAL TESTING PROGRAM

Soil and grab groundwater samples were retained in containers pre-cleaned by the supplier in accordance with EPA protocol. The samples were placed in a chilled cooler and transported under appropriate chain-of-custody documentation to STL, a State-certified laboratory. Selected samples were submitted for some or all of the following analyses:

- Total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, and xylenes (BTEX) and Methyl tert butyl ether (MTBE) using EPA Method 8015m / 8020,
- Total petroleum hydrocarbons as diesel and motor oil (TPHd and TPHmo) using EPA Method 8015m and silica gel cleanup, and
- Total lead using EPA Methods 6010.

Based on the total lead results, soluble lead was also conducted on sample B-2@3' using the Toxicity Leachability Characteristic Proceedure (TCLP).

DISCUSSION OF RESULTS

The analytical testing results for the current field investigation and sampling event are summarized in Table 1 and 2. The analytical reports are presented in Appendix B.

Soil Samples

Except for 9.6 milligrams per kilogram (mg/kg) of TPHd and 3.5 mg/kg of TPHg detected in B-2@30', analyses detected no TPHd, TPHmo, TPHg, BTEX, or MTBE concentrations in soil samples from Borings B-1, B-2, and B-3. The detected TPHd and TPHg concentrations are significantly less than 100 mg/kg, the Environmental Screening Level (ESL) established by the Regional Water Quality Control Board[1] for a residential or commercial setting. Analyses detected 3,700 mg/kg of total lead sample B-2@3', which is significantly greater than ESL[2] criteria for a residential and commercial setting as well as greater than the Total Threshold Limit Concentration (TTLC), one of the criteria used by the State of California to determine whether a soil is considered a hazardous waste for disposal purposes. Analyses for soluble lead using TCLP methods detected no soluble lead in sample B-2@3'.

Grab Groundwater Samples

Analyses detected no TPHmo and MTBE concentrations in the grab groundwater samples from Borings B-1, B-2, and B-3. Analysis detected 1,100 mg/kg of TPHd and 1,600 mg/kg of TPHg in the grab groundwater sample from Boring B-1; 57 mg/kg of TPHd and 90 mg/kg of TPHg in the grab groundwater sample from Boring B-2; and 42,000 mg/kg of TPHd and 18,000 mg/kg of TPHg in the grab groundwater sample from Boring B-3. The detected TPHd and TPHg concentrations in the grab groundwater samples from Boring B-1 and B-2 exceed respective ESLs for drinking water and for ecological receptors at a surface water body. However, groundwater at the site is not considered a source of drinking water and does not discharge to a surface water body. There are no established indoor air quality ESLs for TPHg and TPHd.

No BTEX concentrations were detected in the grab groundwater samples from Borings B-1 and B-2. In the grab groundwater sample from Boring B-3, analysis detected 140 mg/kg of benzene, 47 mg/kg of ethylbenzene, 120 mg/kg of toluene and 1,000 mg/kg of xylenes. Detected benzene and xylene concentrations exceed respective ESLs for drinking water and ecological receptors; however, groundwater at the site is not considered a source of drinking water and does not discharge to a surface water body. Detected TPHd and TPHg concentrations do not exceed respective indoor air quality ESLs.

CONCLUSIONS AND RECOMMENDATIONS

Results of this investigation detected the presence of total lead in near-surface fill material and concentrations of petroleum hydrocarbons, including benzene, and xylene in the groundwater. It is Fugro's opinion that these detected lead and petroleum hydrocarbons contaminants do not pose a significant adverse human health risk to park maintenance workers and City Park users at this time assuming the park is maintained in it's current condition, namely

[1] Table A of the Screening For Environmental Concerns at Sites with Contaminated Soil and Groundwater - Interim Final. San Francisco Bay Regional Water Quality Control Board. July 2003

[2] Table A, B and K-3 of the Screening For Environmental Concerns at Sites with Contaminated Soil and Groundwater - Interim Final. San Francisco Bay Regional Water Quality Control Board. July 2003

covered with pavement and sod, and that shallow groundwater at the site is not used as a source of drinking water. Because detected petroleum hydrocarbon concentrations do not exceed respective indoor air quality ELS criteria, the presence of petroleum hydrocarbons in groundwater at the site does not pose a significant human health risk for the anticipated possible future use as a performing arts theater.

The source of elevated lead concentration is unknown to Fugro but is likely related to the fill material at the site. The source of detected petroleum hydrocarbons in groundwater is likely associated with the historical service station operations at the site.

Based on our findings, Fugro presents the following recommendations for the City Park:

- If intrusive soil excavation or handling activities are conducted at the City Park, workers should be notified of the potential presence of elevated lead in shallow fill and appropriate dust mitigation should be implemented. Standard dust control methods such as the use of water spray should be sufficient to prevent exposure of workers to lead in the shallow fill.

- Based on the total lead results for sample B-2@3', if shallow fill is excavated from the site to be reused or disposed offsite, that soil should be tested to confirm that total lead concentrations are not hazardous for disposal purposes.

With respect to site redevelopment, Fugro presents the following recommendations:

- Results of this report should be provided to the developer and/or their contractor. Appropriate worker notification and a site-specific health and safety plan should be implemented to protect workers from lead in near-surface fill. In Fugro's opinion, standard dust control methods such as the use of water spray should be sufficient to prevent exposure of workers to lead in the shallow fill. The health and safety plan (HSP) should be prepared by a Certified Industrial Hygienist.

- If staining, chemical odors, or contaminated materials are encountered during the construction activities, we recommend that the City notify Fugro of such conditions and appropriate precautions, investigation, and/or mitigation should be implemented.

- Although it is Fugro's opinion that soil excavated from the site is likely non-hazardous for disposal purposes, results of analyses indicate the possibility that shallow fill may be considered a California Hazardous waste based on total lead concentrations exceeding 1,000 mg/kg. If soil is to be excavated from the site, Fugro recommends additional testing to confirm that disposal at a Class I hazardous waste landfill is not required.

LIMITATIONS

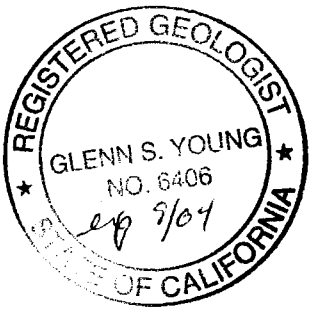
Fugro has prepared this report in a professional manner, using that degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. Fugro shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed at the time the report was prepared. Fugro also notes that the facts and conditions referenced in this report may change over time and the conclusions and recommendations set forth herein are applicable only to the facts and conditions as described at the time of this report. Fugro believes that conclusions stated wherein to be factual, but no guarantee is made or implied. This report has been prepared for the benefit of the City of Livermore.

CLOSING STATEMENT

We believe this provides the information required at this time. Please call if you have any questions or if we can be of further assistance.

Sincerely,

FUGRO WEST, INC.



Melissa L. Pleva
Staff Engineer & Geologist

Glenn S. Young, RG
Principal Geologist

MLP/GSY:kel

Attachments: Table 1 - Chemical Constituents in Soil
Table 2 - Chemical Constituents in Groundwater
Plate 1 – Vicinity Map
Plate 2 – Site Map
Appendix A - Log of Borings
Appendix B - Analytical Reports

Copies Submitted: (3) Addressee

Table 1
Summary of Analytical Results - Soil
Livermore Performing Arts Center
Livermore, California

Analyte	Units	B-1 3'	B-1 25.5'	B-2 3'	B-2 15.5'	B-2 30'	B-3 3'	B-3 25.5'	TTLC	STLC	ESL (Table B) Residential	ESL (Table B) Commercial/ Industrial	DESL (Table K-3) (Trench/ Construction Worker)
Hydrocarbons													
TPHd[1]	mg/Kg	--	<1.0	--	--	**9.6**	--	<1.0			500	500	23,000
TPHmo[1]	mg/Kg	--	<50	--	--	<50	--	<50			500	1,000	23,000
TPHg	mg/Kg	--	<1.0	--	<1.0	**3.5**	--	<1.0			100	400	23,000
VOCs													
Benzene	mg/Kg	--	<0.005	--	<0.005	<0.005	--	<0.005			0.18	0.38	17
Ethylbenzene	mg/Kg	--	<0.005	--	<0.005	<0.005	--	<0.005			4.7	13	400
Toluene	mg/Kg	--	<0.005	--	<0.005	<0.005	--	<0.005			9.3	9.3	650
Xylenes	mg/Kg	--	<0.005	--	<0.005	<0.005	--	<0.005			1.5	1.5	420
Methyl-tert-butyl-ether (MTBE)	mg/Kg	--	<0.005	--	--	<0.005	--	<0.005			2.0	5.6	2,800
Metals													
Lead	mg/Kg	**21**	--	**3,700**	--	--	**4.8**	--	1,000		200	750	750
Soluble Lead (TCLP)	mg/l	--	--	<0.50	--	--	--	--		5.0			

Notes:

Soil Samples obtained on September 17, 2003
TPHd = Total Petroleum Hydrocarbons as diesel fuel
TPHmo= Total Petroleum Hydrocarbons as motor oil
TPHg= Total Petroleum Hydrocarbons as gasoline
[1] = using silca gel cleanup
< = not detected at or above the listed analytical
mg/kg = milligrams per kilogram
-- = Not Analyzed
Detected concentrations are shown in **Bold**

TTLC = Total Threshold Limit Concentration
STLC = Soluble Threshold Limit Concentration
TCLP = Toxicity Characteristic Leaching Potential
ESL = Environmental Screening Levels established by the SFBRWQCB
SFRWQCB = San Francisco Bay Regional Water Quality Control Board
Table B: ESL for Shallow Soils (≤3m bgs) Interim Final - July 2003
Groundwater is Not a Current or Potential Source of Drinking Water
Table K-3: Direct-Exposure Screening Level (DESL) Interim Final - July 2003
Construction/Trench Worker Exposure Scenario

FUGRO

Table 2
Summary of Analytical Results - Groundwater
Livermore Performing Arts Center
Livermore, California

Analyte	Units	B-1	B-2	B-3	ESL (Table B)	GSL (Table F-1b) Indoor Air Quality
Hydrocarbons						
TPHd[1]	µg/L	**1,100**	**57**	**42,000**	640	NE
TPHmo[1]	µg/L	<1,000	<500	<10,000	640	NE
TPHg	µg/L	**1,600**	**90**	**18,000**	500	NE
VOCs						
Benzene	µg/L	<0.5	<0.5	**140**	46	530
Ethylbenzene	µg/L	<0.5	<0.5	**47**	290	14,000
Toluene	µg/L	<0.5	<0.5	**120**	130	500,000
Xylenes	µg/L	<0.5	<0.5	**1,000**	13	150,000
Methyl-tert-butyl-ether (MTBE)	µg/L	<5.0	<5.0	<50	1,800	24,000

Notes:

Soil Samples obtained September 17, 2003

TPHd = Total Petroleum Hydrocarbons as diesel fuel

TPHmo= Total Petroleum Hydrocarbons as motor oil

TPHg= Total Petroleum Hydrocarbons as gasoline

[1] = using silca gel cleanup

< = not detected at or above the listed analytical reporting limit

µg/L = micrograms per liter

-- = Not Analyzed

NE = Not Established

Detected concentrations are shown in **Bold**

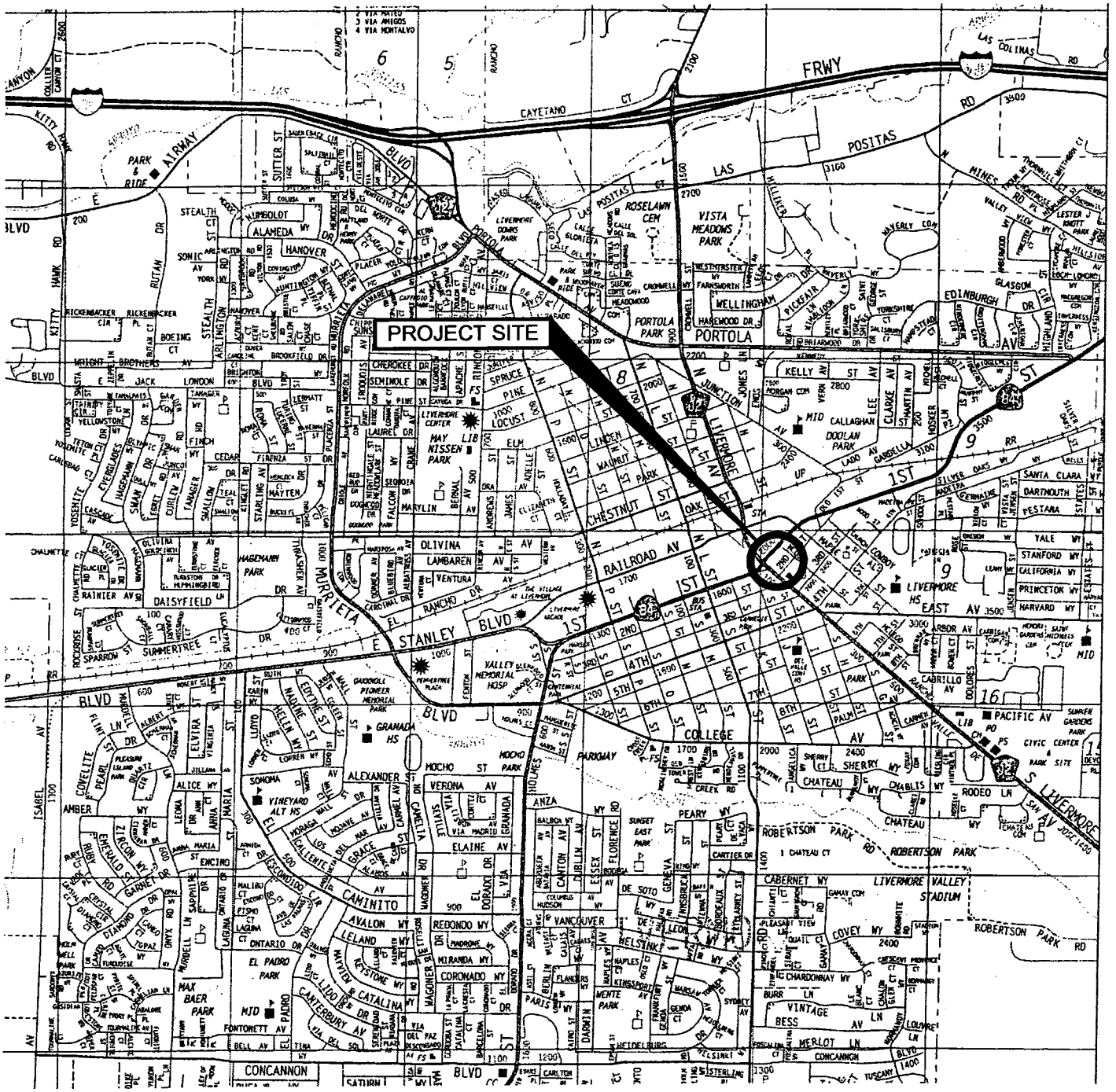
ESL = Environmental Screening Levels established by the SFBRWQCB

GSL = Groundwater Screening Levels established by the SFBRWQCB

SFRWQCB = San Francisco Bay Regional Water Quality Control Board

Table B: ESL for Groundwater Interim Final - July 2003
Groundwater is Not a Current or Potential Source of Drinking Water

Table F-1b: GSL for Groundwater is not a current or potential source of drinking water
Groundwater is Not a Current or Potential Source of Drinking Water



NOTE:

This Vicinity Map Is Based On Thomas Guide Maps For San Francisco, Alameda And Contra Costa Counties, California, Maps 695 and 715, YEAR 2000.

NORTH

0 2400 4800

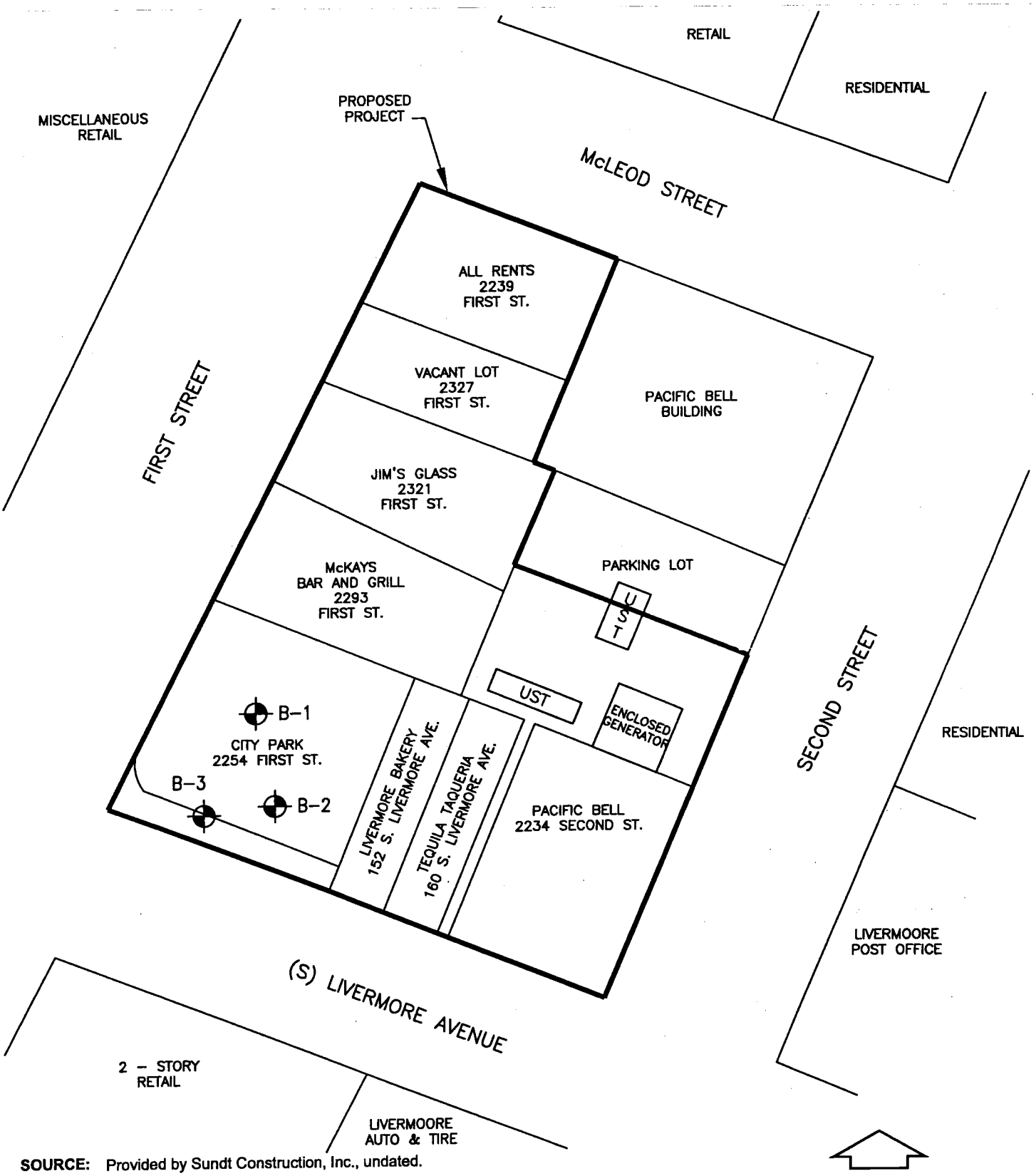
FEET

VICINITY MAP

Livermore Performing Arts Center
Livermore, California

PLATE 1

January 2004
Project No. 1121.003



SOURCE: Provided by Sundt Construction, Inc., undated.

LEGEND

B-3 APPROXIMATE LOCATION OF BORING

UST APPROXIMATE LOCATION OF UNDERGROUND STORAGE TANK

NORTH

0 60 120

FEET

SITE MAP

Livermore Performing Arts Center
Livermore, California

PLATE 2

G:\jobdocs\1121\1121.003\Plates\1121.003-01_rev1.dwg 1-06-04 02:28:44 PM flopez