SOMA
CORPORATION

August 20, 1996

Ms. Susan Hugo
Alameda County
Department of Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Regarding: 1258 64th Street, Emeryville, California

Dear Ms. Hugo:

Enclosed is a copy of the proposed Work Plan for a Phase II Site Characterization for lead. The Work Plan has been developed to address concerns expressed by the Department of Environmental Health Services in a letter addressed to the Redevelopment Agency of the City of Emeryville dated May 21, 1996.

It should be noted that the City of Emeryville has recently purchased the narrow strips of land adjacent to the property in question so that the physical configuration of the property is a rectangle that approximates the fence line of the property. Humann Company is presently preparing the appropriate drawings that will replace Figures 2 and 6 of this report. Copies of these drawings will be submitted when they are completed.

If you have any questions are comments prior to our meeting on August 28, 1996, please feel free to call us at (510) 654-3900.

Sincerely,

Norman T. Ozaki, Ph.D.
President and Principal Toxicologist

enclosure

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SOMA
CORPORATION

WORK PLAN
PHASE II SITE CHARACTERIZATION

VACANT LOT
1258 64TH STREET
EMERYVILLE, CALIFORNIA

SOMA 96-2088

August 20, 1996

Submitted to:

Alameda County
Department of Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Prepared for:

City of Emeryville Redevelopment Agency
Department of Economic Development and Housing
2200 Powell Street, Suite 1200
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WORK PLAN
PHASE II SITE CHARACTERIZATION
VACANT LOT
1258 64TH STREET
EMERYVILLE, CALIFORNIA

1.0 INTRODUCTION

SOMA Corporation (SOMA) is submitting this Work Plan on behalf of the City of Emeryville's Redevelopment Agency (Redevelopment Agency) to the Alameda County Department of Environmental Health (ACDEH) for the implementation of a Phase II Site Characterization of the vacant property located at 1258 64th Street in Emeryville, California ("the Site," Figure 1).

It is the intention of the Redevelopment Agency to prepare the Site to be suitable for residential redevelopment. In order to facilitate the construction of 3 proposed residential housing units, the Redevelopment Agency desires to obtain site closure from ACDEH. Lead has been identified as the chemical of concern at the Site.[1] In consideration of future residential use of the subject site, ACDEH requested in a letter dated May 21, 1996 that the Redevelopment Agency address the following compliance issues concerning elevated lead detected at the Site:

1. Identify the source of contamination.
2. Determine the vertical and lateral extent of the lead contamination in soil.
3. Determine the threat/or impact to groundwater.
4. Submit a corrective action plan which should include target cleanup levels, an evaluation of alternative treatment methods, and a cost effective plan which adequately protect[s] human health, safety and the environment.[2]

The Phase II Site Characterization described in this Work Plan is proposed as an appropriate cost- and time-efficient response to the compliance issues raised by ACDEH.

This Work Plan presents a strategic site investigation plan and outlines future activities the Redevelopment Agency proposes to undertake in order to attain site closure. The site

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1 A R.E.A. 1996.
2 ACDEH 1996, p. 1.

investigation plan has been developed in consideration of previous environmental assessments of the Site, ACDEH's concerns, and the Site's intended future land use. The site investigation will consist of collecting soil and groundwater samples from the subject site and the analysis of those samples by a state-certified laboratory for lead by U.S. EPA Method 7420. Laboratory analytical results from the sampling effort will be used to address the first three compliance issues raised by ACDEH. The submittal of a Corrective Action Plan (CAP), prepared on behalf of the Redevelopment Agency, will be used to address the fourth compliance issue raised by ACDEH.

2.0 SITE DESCRIPTION

The Site is located on the north side of 64th Street between Doyle and Vallejo Streets in the northern portion of the City of Emeryville, California (Figure 1). The Site has been identified as Alameda County Assessor's Parcel Number (APN) 049-1470-005-01.[3] The Site property lines traverse two separate lots, identified as Lot 3 and Lot 4, according to a Boundary and Topographic Survey of the Site prepared by Humann Co., Inc.[4] The Site sits on the western half of Lot 3 and the eastern half of Lot 4 (Figure 2). The Site measures approximately 50 feet by 107 feet in size, is currently vacant, and is owned by the City of Emeryville according to the Trustee's Deed dated March 2, 1995 and a Certificate of Acceptance dated March 8, 1995.[5] The Site has been limited to residential use since 1911. Prior to 1911, the Site was vacant. Although the adjacent property is residential in nature, commercial and industrial businesses are located as close as one-half block from the Site.[6]

According to a review of Sanborn Fire Insurance Maps conducted by A R.E.A. Environmental Services (A R.E.A.), a house and a shed existed on the subject site from 1911 until at least 1952. By 1967, the shed had been removed and a garage had been constructed.[7] These most recent two structures (i.e., the house and the garage) were fully demolished in the fall of 1995 between September 26 and October 3.[8]

As previously mentioned, the Redevelopment Agency desires to obtain site closure in order to facilitate the construction of 3 residential housing units at the subject site. The Redevelopment Agency has retained Siegel & Strain Architects for the design of the proposed residential housing units. The architectural designs are in the preliminary stage, but a hand-sketched rendering of the

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3 A R.E.A. 1996, p. 2.
4 Humann Co., Inc. 1995, as presented in GEI 1995.
5 The Foreclosure Company, Inc. 1995; Redevelopment Agency, 1995.
6 A R.E.A. 1996, p. 2.
7 A R.E.A. 1996, p. 9.
8 BAAQMD 1995.

floor plans for the proposed units was provided to SOMA by the Redevelopment Agency (Figure 6).[9] Based upon those renderings, future redevelopment will result in the Site consisting of covered areas (i.e., areas covered by concrete building pads and/or asphalt) and exposed areas (i.e., areas of exposed soil such as yards, landscaped areas, grass walk ways, etc.). Siegel & Strain has indicated that there will be no crawl spaces underneath the proposed housing units (i.e., there will be no potential exposures to soil in areas covered by housing units).[10]

3.0 SITE BACKGROUND

The following environmental reports, listed in chronological order of report date, have been reviewed in preparation of this Work Plan:

- Environmental Services. 1995. Memorandum to HRS Team from Ralph Ray II of Environmental Services. Subject: 1258 64th Street, Emeryville. May 8.
- Environmental Innovations Corporation (EIC). 1995. Building Inspection for ACM & Soil Sampling for Existing Lead Contamination. June 9.
- KELLCO. 1995. Pre-demolition and Post-demolition Soil Sampling and Lead Analysis Report. August and October.
- Geotechnical Engineering Inc. (GEI). 1995. Report - Soil Investigation Including Paving Design, Proposed Housing Development, 1258 64th Street, Emeryville, California. December 30.
- A R.E.A. Environmental Services (A R.E.A.). 1996. Phase I Environmental Site Assessment, Vacant Lot, Alameda County APN 049-1470-005-01, 1258 64th Street, Emeryville, California. March 26.

Information presented in the following subsections is based upon a review of these documents.

3.1 Environmental Services 1995: HUD Evaluation of Lead-based Paint Hazard Study

According to the Memorandum from Ralph Ray II to HRS Team, dated May 8, 1995, Environmental Services conducted an inspection of the Site in 1995 "using the protocol mandated by the Department of Housing and Urban Development (HUD) Evaluation of Lead-based Paint Hazard Study."[11] At the time of Environmental Services' site inspection, the house and garage (identified as a shed in their report) were still present on-site. Environmental Services collected 4

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9 Siegel & Strain 1995.
10 SOMA 1996.
11 Environmental Services 1995, p. 1.

soil samples and 4 interior dust wipe samples for lead analysis. Additionally, 14 exterior surfaces and 54 interior surfaces of the buildings were tested using X-ray Fluorimetry (XRF).

Environmental Services' report indicated that the lead concentration in 1 of the 4 soil samples exceeded 500 parts per million (ppm) and that "[t]he sample which yielded an elevated result was a composite drip line sample."[12] Sampling results for the interior dust wipe samples, exterior XRF samples, and interior XRF samples were presented qualitatively. Based upon the site investigation and sampling efforts, Environmental Services made the following observations and conclusions:

- During an exterior visual inspection of the Site, 3 car batteries in "the right side yard" were observed.[13]
- It was concluded that there is "a low risk of exposure to lead from soil."[14]
- It was concluded that "exterior surfaces that are lead-positive and accessible pose a high risk of lead exposure."[15] This assessment appears to be based on the lead results for 6 of the 14 exterior surfaces tested with XRF.
- It was concluded that "there is a moderate risk of lead exposure inside the dwelling."[16] This assessment appears to be based on the lead results for 20 of the 54 interior surfaces tested with XRF.

The absence of quantitative soil data precludes the usefulness of this report for performing a quantitative characterization of lead in soil at the Site.

3.2 EIC 1995: Building Inspection for ACM & Soil Sampling for Existing Lead Contamination

On May 31, 1995 EIC conducted a building inspection, bulk material sampling for suspected asbestos containing materials (ACM), and soil sampling for suspected lead-affected soils at the subject site. The site investigation resulted in the collection of 10 samples of suspected asbestos-containing building material and 9 samples of suspected lead contaminated exterior soil.

The 9 soil samples were collected from 3 different soil boring locations on the Site (south, north, and east of the former house). At each of the 3 borings, soil samples were collected from the

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12 Environmental Services 1995, p. 1.
13 Environmental Services 1995, Form 10.
14 Environmental Services 1995, p. 1.
15 Environmental Services, pp. 2-3.
16 Environmental Services, p. 4.

surface, 1.0 foot below ground surface (BGS), and 2.0-3.0 feet BGS. Soil samples were apparently analyzed for lead using Flame Atomic Absorption Spectroscopy (FLAA).

Original laboratory certificates indicating quality assurance quality control (QA/QC) information associated with the soil samples' analyses for lead were not included with EIC's report; however, a figure included with the report indicates the approximate locations of the 3 soil borings and identifies the concentrations of lead detected at the 3 sampled depths associated with each soil boring (Figure 3). Figure 3 is not drawn according to scale. Table 1 below presents the results of the lead analyses.

Table 1. Lead Concentrations (ppm) Associated with On-Site Soil Samples (EIC 05/31/95)

Depth of Soil Sample (feet BGS)	Location of Soil Sample		
	North Side of House	East Side of House	South Side of House
0'	258.2	595.5	2347.3
1.0'	440.9	304.0	318.4
2.0'-3.0'	647.7	289.9	365.4

3.3 KELLCO 1995: Pre-demolition and Post-demolition Soil Sampling and Lead Analysis Report

On August 2, 1995, KELLCO collected 8 samples from on-site soils prior to demolition of the house and garage. According to a telephone conversation between the Redevelopment Agency, KELLCO, and SOMA, the 8 soil samples represent laterally composited samples.[17] According to KELLCO, each soil sample collected is a composite of 3 to 6 discrete samples collected in lateral increments across the Site at a depth of approximately 2 inches BGS (Figure 4). Figure 4 is not drawn according to scale. According to KELLCO's original laboratory certificates, soil samples were analyzed for lead by EPA Method 7240 using FLAA.

On October 9, 1996, KELLCO collected 6 samples from on-site soils after the completion of the demolition activities. Exact soil sample locations and sampled depths are unknown, but a figure included with KELLCO's report roughly indicates the soil sample locations (Figure 5). Figure 5 is not drawn according to scale. The soil boring locations for the post-demolition sampling effort were different than those for the pre-demolition sampling effort. According to KELLCO's original laboratory certificates, post-demolition soil samples were analyzed for lead by EPA Method 7240 using FLAA.

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17 Redevelopment Agency 1996.

Table 2 and Table 3 present the lead concentrations detected in on-site soils pre- and post-demolition, respectively.

Table 2. Lead Concentrations Associated with Pre-Demolition On-Site Soil Samples (KELLCO 08/02/95)

Composited Samples; Depth = 2.0" BGS	
Sample No.	Analytical Result (mg/kg)
1 (3 sample composite)	2634
2 (4 sample composite)	474.6
3 (3 sample composite)	1421
4 (6 sample composite)	341.4
5 (4 sample composite)	297.8
6 (4 sample composite)	391.2
7 (4 sample composite)	444
8 (4 sample composite)	211.1

Table 3. Lead Concentrations Associated with Post-Demolition On-Site Soil Samples (KELLCO 10/09/95)

Discrete Samples; Unknown Depth	
Sample No.	Analytical Result (mg/kg)
1	144.5
2	327.3
3	166.8
4	295.4
5	452.5
6	580.7

3.4 GEI 1995: Report - Soil Investigation Including Paving Design

GEI undertook a geotechnical soil investigation of the subject site on December 28, 1995 (after the completion of the demolition activities) in order to evaluate the suitability of the Site for construction of the proposed residential units. GEI evaluated general subsurface conditions, performed associated testing and analyses, and provided recommendations for earthwork, drainage and foundation design parameters and paving.

Various information was presented in the GEI report that is relevant to the proposed Phase II Site Characterization presented in this Work Plan. GEI drilled 2 soil borings on the Site and collected continuous soil samples down to a depth of 11 feet BGS. Borings were "generally terminated in stiff natural soils, after encountering perched water seepage."[18] GEI included the following statements in their report:

- The Site is relatively level; "[E]xisting surface elevations range from 26 to 28 feet" above mean sea level.[19]
- "[T]he subsurface conditions appear to be relatively uniform. Beneath top soils and miscellaneous construction debris and upper fill (highly expansive clay), silty clay strata was encountered...below the top soils, an upper stratum of medium stiff and highly plastic clay was encountered... below from 2 to 3 feet, strata of stiff to very stiff silty clay were encountered."[20]
- "Slight water seepage was encountered in [one boring] at a depth of 3.5 feet (water apparently perched on surface of stiff clay). The water level is expected to fluctuate depending upon seasonal and climatic conditions. Free ground water was not encountered in [the other boring]."[21]
- "[A] stripping depth of approximately six inches would be appropriate."[22]
- "Regardless of the choice of foundation type, the subgrade beneath concrete floor slabs and any paving should be subexcavated at least 18 inches..."[23]
- "Because the upper on site clayey soils are highly plastic (expansive), they would be relatively difficult to compact and be used as engineered fill. Any required imported fill materials should consist of soils with a Plasticity Index of less than 15 percent."[24]
- "[F]inal grades [should] be selected so that a gentle slope is provided to divert all surface water away from the planned residences, slabs and paving."[25]
- The recommended paving design section for the asphaltic concrete paving is 3 inches of asphaltic concrete and 10 inches of Class II aggregate base for a total paving thickness of 13 inches.[26]

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18 GEI 1995, p. 2.
19 GEI 1995, p. 3.
20 GEI 1995, p. 3.
21 GEI 1995, pp. 3-4.
22 GEI 1995, p. 5.
23 GEI 1995, pp. 5-6.
24 GEI 1995, p. 6.
25 GEI 1995, p. 6.
26 Based upon information presented in tabular form in GEI 1995, p. 10.

3.5 A R.E.A. 1996: Phase I Environmental Site Assessment

A R.E.A. performed a Phase I Environmental Assessment of the Site in March 1996, based upon a site walk, subcontracted data base search, review of permits filed with environmental health agencies, and review of owners' files on the property and nearby properties. A R.E.A. performed a historical documentation of the Site based upon a review of historic maps and aerial photographs. A R.E.A.'s general document review included the 4 reports previously summarized in subsections 3.1 through 3.4 above.

Because salient information from the aforementioned reports has already been summarized in subsections 3.1 through 3.4, further information from A R.E.A.'s Phase I Environmental Site Assessment is not presented herein.

3.6 Summary of Lead Data From Previous Site Investigations

3.6.1 Preliminary Evaluation of Lead in On-Site Soils

Since no soil remediation of the Site has been performed, all previously collected and quantified soil lead data could be potentially useful for characterization of the Site.

Assuming that the quality of lead data collected and analyzed by EIC are acceptable, statistical summaries of the data indicate a lead concentration range of 258 mg/kg - 2347.3 mg/kg in soil collected from a depth interval of ground surface to 3 feet BGS. The limitations in using the EIC data are: 1) the absence of information that permits the identification of the approximate sampling locations; and 2) the absence of laboratory certificates indicating quality assurance/quality control (QA/QC) information necessary for the evaluation of data quality. The sample location map included with the report is not to scale and no survey information is provided to identify specific soil boring locations. Efforts will be exercised by SOMA to obtain laboratory certificates and to evaluate data quality, because the data is informative for purposes of general soil characterization.

The lead concentration data identified as pre-demolition samples collected by KELLCO are composite samples that represent surface samples. According to KELLCO, the samples were collected from the 2 inch depth interval.[27] The limitations in using the KELLCO pre-demolition data are: 1) the absence of information about the approximate location of the component discrete

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27 SOMA 1996.

samples; and 2) the absence of information about the discrete sample concentrations of the composite samples. Composite sample results have limited usefulness in quantitative risk analysis. The degree of uncertainty in the effective contribution of individual component discrete samples to the composite precludes the usefulness of the KELLCO pre-demolition data in quantitative risk analysis.

The post-demolition samples were collected as discrete samples. The limitations in using the KELLCO post-demolition data are: 1) the absence of information that permits the identification of the approximate sampling locations; and 2) the absence of information that permits the identification of the approximate sampling depths. The data is informative for purposes of general soil characterization.

Assuming that the KELLCO composited pre-demolition data are representative of surface soils on-site, and that the KELLCO post-demolition data are representative of surface soil samples (i.e., 0 to 24 inches BGS), statistical summaries of the data indicate a concentration range of 144.5 mg/kg - 2634 mg/kg, a geometric mean concentration of 412 mg/kg, and a 95 percent upper confidence limit (95% UCL) concentration of 939 mg/kg for lead in surface soil. These statistical summaries are based on a lognormal distribution of the lead data.

By combining EIC's surface soil lead data (Table 1) with KELLCO's pre- and post-demolition soil lead data (Table 2 and Table 3), statistical summaries of the combined data indicate a geometric mean concentration of 436 mg/kg and a 95% UCL concentration of 882 mg/kg for lead in surface soil. These statistical summaries are based on a lognormal distribution of the lead data.

Unless further information indicates otherwise, currently available information about the Site would indicate that the source of lead in soil is from lead-based paints that were used as exterior coatings on the former buildings. The higher lead concentrations in the surface soil reported by EIC and KELLCO appear to be within 18 inches to 24 inches of the former residential structures. This area (i.e., the 2-foot wide corridor which wraps around the perimeter of a building's foot print) is known as the "drip line." Elevated concentrations of lead in soils within the drip line of a current or former building are suggestive of a lead-based house paint source. This is due to the fact that as paint chips fall to the ground (caused by weathering or past practices of scraping off old paint prior to applying new paint), a build-up of lead concentrations in soil is observed in the adjacent area around the building. The distribution of lead concentrations in the surface soil at the subject site is consistent with a lead-based house paint source.

The elevated concentrations of lead at the 2.0-3.0 foot depth interval reported by EIC may be due to the presence of residual paint chips from the demolition activities of previous structures at the Site and/or past renovation activities of buildings that involved the sanding or scraping of exterior paint coatings which were later mixed with the deeper soils when grading and other construction activities were performed.

3.6.2 Preliminary Evaluation of Lead in Background Soils

RGA Environmental, Inc. (RGA) performed a site assessment of 3 properties located at 1268 64th Street and 1265-1269 Ocean Avenue in Emeryville, which are adjacent to the Site. On April 22 and 24, 1992, RGA drilled 4 soil borings at each of the 3 properties (i.e., B-1 through B-12) using a low access rig, collected a total of 15 soil samples at a depth of 5 feet BGS, and submitted those samples to Sequoia Analytical Laboratories for chemical analysis. One soil sample was collected from each of the 12 soil borings. The additional 3 samples represent composite soil samples of the previous 12 soil samples (i.e., B-1 through B-4; B-5 through B-8; and B-9 through B-12). Based upon their field investigation and the laboratory results, RGA made the following observations in an undated report:

- "The soil encountered in all borings was brown sandy clay to silty sand...The clay had low to medium plasticity..."[28]
- "The sites are situated in a low lying area... [that] is between 0 to 20 feet above mean sea level. Depth to groundwater is reported at between 5 to 10 feet below ground surface."[29]

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28 RGA 1992b.
29 RGA 1992b.

Table 4 below presents the analytical results for lead associated with the 12 discrete soil samples.

Table 4. Lead Concentrations
Associated with Background Soil Samples (RGA 4/22-24/92)

Soil Boring / Sample No.	Detection Limit (mg/kg)	Analytical Result (mg/kg)
B-1	5.0	9.9
B-2	5.0	ND
B-3	5.0	ND
B-4	5.0	5.0
B-5	5.0	15
B-6	5.0	6.6
B-7	5.0	13
B-8	5.0	7.4
B-9	5.0	6.2
B-10	5.0	7.9
B-11	5.0	ND
B-12	5.0	ND

Assuming that the quality of lead data collected by RGA and analyzed by Sequoia Analytical Laboratories are acceptable, statistical summaries of the data indicate a concentration range of less than 5.0 mg/kg - 15.0 mg/kg for lead at a depth interval of ground surface to 5 feet BGS. These concentration values resemble concentrations of lead that would be expected of naturally occurring background levels.

Due to the location of the properties and the analytical results associated with the soil samples collected from borings on those properties, these data may potentially represent background lead concentrations for the subject site. Because the soil samples were collected from the 5 foot depth interval, more information about the nature of the soil would be necessary before they could be used as background samples.

4.0 SCOPE OF PROPOSED WORK

The scope of work for the proposed site investigation will consist of the following tasks:

Task 1: Development of a Health and Safety Plan
Task 2: Soil Sampling
Task 3: Groundwater Sampling
Task 4: Evaluation of Groundwater Flow Direction
Task 5: Laboratory Analyses
Task 6: Presentation of Site Investigation Observations and Results
Task 7: Preparation of a Corrective Action Plan (CAP)

These tasks are described in detail below.

4.1 Task 1: Development of a Health and Safety Plan

In accordance with Occupational Safety and Health Administration (OSHA) guidelines, the SOMA Health and Safety Officer will develop a Health and Safety Plan (HSP). The HSP will include an analysis of potential hazards encountered by on-site workers conducting the proposed site investigation work and precautions to mitigate the identified hazards.

The health and safety measures presented in the HSP will be implemented during the investigation activities.

4.2 Task 2: Soil Sampling

In order to characterize the aerial distribution of lead in on-site soils, samples will be collected from 11 soil boring locations. The approximate locations of the proposed soil borings are shown in Figure 6. Seven soil borings are located within areas anticipated to represent exposed areas after redevelopment of the Site. The remaining 4 soil borings are located within areas anticipated to be covered areas after redevelopment of the Site. Soils within the general vicinity of the drip line of the formerly demolished buildings (e.g., shed, house, garage) are expected to represent soils with elevated lead concentrations. In order to characterize soils which are expected to have elevated lead, 3 of the 7 exposed area soil borings will be located in the general vicinity of the former buildings' drip lines where possible.

All necessary soil boring permit(s) will be obtained prior to initiation of drilling activities. Underground Services Alert (USA) will also be contacted to assist in locating underground utilities prior to the initiation of investigation activities. The proposed soil boring locations will be screened using a magnetometer to assess the potential presence of underground utilities.

The soil borings will be drilled using 8-inch diameter hollow stem augers. The hollow stem augers will be advanced into the soil using a truck mounted drill rig. In order to characterize the vertical distribution of lead in soils, 3 soil samples will be collected from each soil boring at significant lithologic changes, if necessary, and at the following approximate depths: 6" (0.5'), 18" (1.5'), and 48" (4.0').

The soil samples will be collected by driving a 2-inch Modified California Sampler (containing clean brass tubes) ahead of the hollow stem augers into undisturbed soil. The augers and drilling tools will be steam-cleaned prior to use. The Modified California Sampler will be washed with Alconox (a laboratory grade detergent), rinsed with tap water, and fitted with clean brass tubes between each soil sampling interval. The brass tubes will be retrieved from the sampler, immediately lined with aluminum foil, capped with air-tight plastic lids, sealed and labeled. After being sealed and labeled, soil samples will be maintained at a temperature of 4°C or lower during delivery to the laboratory and prior to analysis by the laboratory. Soil samples collected from the 48" (4.0') depth interval will be placed on hold pending the analytical results of the 6" (0.5') and the 18" (1.5') soil samples. Sample documentation and chain of custody procedures included in Appendix A will be strictly followed. Samples will be analyzed at the laboratory within recommended holding times.

4.3 Task 3: Groundwater Sampling

It is expected that groundwater will be encountered at approximately 5 to 15 feet BGS at the Site. Groundwater samples will be collected from 2 of the 11 borings (Figure 6). The proposed groundwater sampling locations will be screened using a magnetometer to assess the potential presence of underground utilities. The borings from which both soil and groundwater samples are to be collected will be terminated at an appropriate depth as determined by the field geologist.

Groundwater samples will be collected using the patented Hydropunch™ groundwater sampling tool or an equivalent technique. One sample will be collected from each of the 2 proposed Hydropunch™ locations.

Hollow steel casing containing a perforated PVC screen at the bottom of the casing will be advanced approximately 36 inches beyond the first permeable zone. The casing will then be retracted approximately 48 inches to allow for the infiltration of groundwater.

Groundwater samples will be collected by lowering a Teflon bailer through the hollow casing. Samples will be transferred into 1-liter plastic bottles. The samples will be stored in a chilled cooler and delivered to the laboratory by the end of the day. Upon receipt of the samples, the laboratory will immediately filter and preserve the samples (using a 0.45 micron filter and nitric acid) prior to laboratory analysis. Sample documentation and chain of custody procedures included in Appendix A will be strictly followed.

The equipment used during groundwater sampling activities which might come into contact with the affected materials will be thoroughly decontaminated before and after each use. This will be accomplished by washing with Alconox and rinsing with deionized, distilled, or fresh water.

The boreholes will be backfilled with grout upon completion of the sampling activities. Soil cuttings and water rinsate generated during the sampling activities will be stored on-site in labeled 55-gallon covered drums pending analytical results.

4.4 Task 4: Evaluation of Groundwater Flow Direction

Based upon a review of environmental reports prepared for properties in the general vicinity of the subject site, groundwater elevations are reportedly 5 to 10 feet BGS and groundwater flow trends in a westerly direction towards the San Francisco Bay.[30] The elevation of the groundwater surface (i.e., potentiometric surface) at neighboring sites will be used to estimate local groundwater elevation and to evaluate local groundwater flow direction. The resulting estimations of depth to groundwater and groundwater flow direction will be compared to information gathered during the sampling activities proposed in Task 2 and Task 3.

4.5 Task 5: Laboratory Analyses

The soil and groundwater samples will be analyzed by a state-certified laboratory for total lead using EPA Method 7420. Waste characterization samples will be analyzed according to the protocol of the proposed waste disposal facility. All samples will be analyzed on the laboratory's normal turnaround basis (2 weeks).

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30 RGA 1992a, p. 1; H+GCL 1994, Summary p. 1; SEACOR No Date, Figure 1 "Site Plan.".

4.6 Task 6: Presentation of Site Investigation Observations and Results

This task will include evaluating the field and laboratory analytical data obtained during the soil and groundwater sampling at the Site. Written and tabulated documentation will be prepared following completion of the site investigation activities and included as a part of the Corrective Action Plan (CAP) submittal (Task 7).

4.7 Task 7: Preparation of a Corrective Action Plan (CAP)

The fourth compliance issue raised by ACDEH in their May 21, 1996 letter to the Redevelopment Agency requested that a Corrective Action Plan (CAP) be prepared and submitted for approval and implementation. According to ACDEH, the CAP "should include target cleanup levels, an evaluation of alternative treatment methods, and a cost effective plan which adequately protect[s] human health, safety and the environment."[31]

SOMA proposes to prepare and submit a CAP on behalf of the Redevelopment Agency. Because the nature of the CAP submittal will be dictated by the analytical results of the soil and groundwater sampling and other site related issues, a budget for the preparation and implementation of the CAP will be submitted to the Redevelopment Agency after an adequate evaluation of the site investigation results.

Although the specific contents of the CAP cannot be presented at this time, SOMA has developed a conceptual approach to the CAP which is presented below. The site investigation activities previously proposed in this Work Plan were designed, in part, to facilitate realization of the following conceptual approach to the CAP.

4.7.1 Presentation of Site Investigation Observations and Results

Information generated during the site investigation will be included in the CAP submittal in order to establish a baseline characterization of the Site. The following information will be presented under the seal of a California Registered Geologist or Registered Engineer:

- Field investigation activities;
- Field observations, measurements, and readings;

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31 ACDEH 1996, p. 1.

- Lithologic logs;
- Groundwater data;
- Laboratory analytical results; and
- Findings regarding the extent of the lead-affected soils and/or groundwater.

Qualitative and quantitative interpretations of the vertical and lateral extent of lead in on-site soils and groundwater will be presented based upon the laboratory analytical results.

Since the Site is scheduled for residential redevelopment, information about lead concentrations in the surface soil (defined as the depth interval from ground surface to approximately 18" to 24" BGS) will be the most important data to characterize for the assessment of potential human health effects.

In addition, qualitative and quantitative presentations of the distribution of lead in on-site soils, with respect to the exposed areas and covered areas at the Site after completion of the proposed redevelopment, will be included.

Based upon the analytical data and other site-specific information, the potential source(s) of lead in soils and/or groundwater at the Site will be identified. Conclusions regarding the potential threat to local groundwater will be drawn based upon the laboratory analytical data associated with the Hydropunch™ locations, the estimation of groundwater flow direction, and other site-specific information.

4.7.2 Target Cleanup Level for Residual Soil Concentrations of Lead

Remediation of lead-affected soils may be required by ACDEH for site closure. Statistical summaries of the combined EIC and KELLCO pre- and post-demolition data indicate a geometric mean concentration of 436 mg/kg and a 95% UCL concentration of 882 mg/kg for lead in surface soil. Soil concentrations of lead as high as 2634 mg/kg and 1421 mg/kg were reported by KELLCO in association with 2 pre-demolition composited surface soil samples (Table 2). These concentrations would indicate that some type of remedial strategy might be appropriate.

SOMA proposes to develop a site-specific remedial cleanup goal based upon the use of DTSC's blood-lead bio-uptake model known as "Lead Risk Assessment Spreadsheet" (Lead Spread). SOMA will calculate an acceptable health-based threshold concentration for lead in on-site soils that will be protective of future residents.

Results generated by the use of Lead Spread are sensitive to the model input parameters which quantitatively define potential exposure conditions. For example, DTSC has used a default ambient airborne lead concentration of 0.15 µg/m^3. SOMA has obtained monitored ambient air quality data from the Bay Area Air Quality Management District (BAAQMD) indicating that the lead concentration in ambient air in the Bay Area is less than 0.05 µg/m^3. In addition, DTSC has used the federal action level of 15 µg/L as the default lead concentration in drinking water. SOMA has data from various water districts in the Bay Area which indicates that drinking water concentrations of lead at the source are less than 5 µg/L. SOMA proposes to obtain accessible and accurate site-specific information for use in the calculation of a health-based threshold concentration of lead in on-site soils.

The identification of a site-specific remedial cleanup goal for lead in soil will be submitted in the CAP to ACDEH for review and approval. The approved health-based threshold concentration for lead in on-site soils will be adopted as the "target cleanup level" for the Site.

4.7.3 Alternative Treatment Methods; Cost Effective Plan Which Adequately Protects Human Health, Safety and the Environment

The evaluation of alternative treatment methods is directly related to the identification of, "...a cost effective plan which adequately protect[s] human health, safety and the environment."[32] SOMA proposes to incorporate the intent of alternative treatment methods into a remedial approach that emphasizes risk management. Lead is a naturally occurring metal and can be found ubiquitously in most soils. Based upon the magnitude of the lateral and vertical distribution of lead in on-site soil, SOMA proposes to perform focused removal of soil that contains lead levels in exceedance of the target cleanup goal. Upon approval by ACDEH, lead-affected soil will be stockpiled on-site.

In consideration of the proposed redevelopment of the Site, which will result in the capping of the majority of the Site, SOMA proposes that the lead-affected soil be reburied under areas which will be covered by concrete building pads or asphalt. SOMA proposes that clean imported fill be used to replace the lead-affected soil. These proposed remediation measures are cost-effective alternative treatment methods which will result in the minimization of potential exposures to lead in on-site soils, thereby reducing risks to human health and the environment. The foregoing discussions will be detailed in the CAP.

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32 ACDEH 1996, p. 1.

5.0 PROPOSED SCHEDULE

The approximate estimated duration of each task and the proposed schedule of activities associated with the Proposed Scope of Work described in section 4.0 are presented below. The estimated durations and proposed schedule do not include work delays due to events beyond the control of the City of Emeryville, SOMA, and SOMA subcontractors.

Table 5. Estimated Duration of Activities Associated with the Proposed Scope of Work

Activity		Estimated Duration (Working Days)
Task 1:	Development of a Health and Safety Plan	2
Task 2:	Soil Sampling	3 - 5
Task 3:	Groundwater Sampling	Concurrent with Task 2
Task 4:	Evaluation of Groundwater Flow Direction	1
Task 5:	Laboratory Analyses	7 - 10
Task 6:	Presentation of Site Investigation Observations and Results	To be submitted as part of the CAP
Task 7:	Preparation of Corrective Action Plan (CAP)	10-15

The tentative schedule associated with the site investigation activities is based on a start date of October 1, 1996. The actual start date will be contingent upon ACDEH's approval of the Work Plan and the availability of qualified drillers and other subcontractors.

Table 6. Proposed Schedule of Activities Associated with the Proposed Scope of Work

Activity		Estimated Completion Date (1996)
Task 1:	Development of a Health and Safety Plan	Oct. 2
Task 2:	Soil Sampling	Oct. 9
Task 3:	Groundwater Sampling	Oct. 9
Task 4:	Evaluation of Groundwater Flow Direction	Oct. 10
Task 5:	Laboratory Analyses	Oct. 24
Task 6:	Presentation of Site Investigation Observations and Results	Submittal Date of the CAP
Task 7:	Preparation of Corrective Action Plan (CAP)	Nov. 17

6.0 REFERENCES

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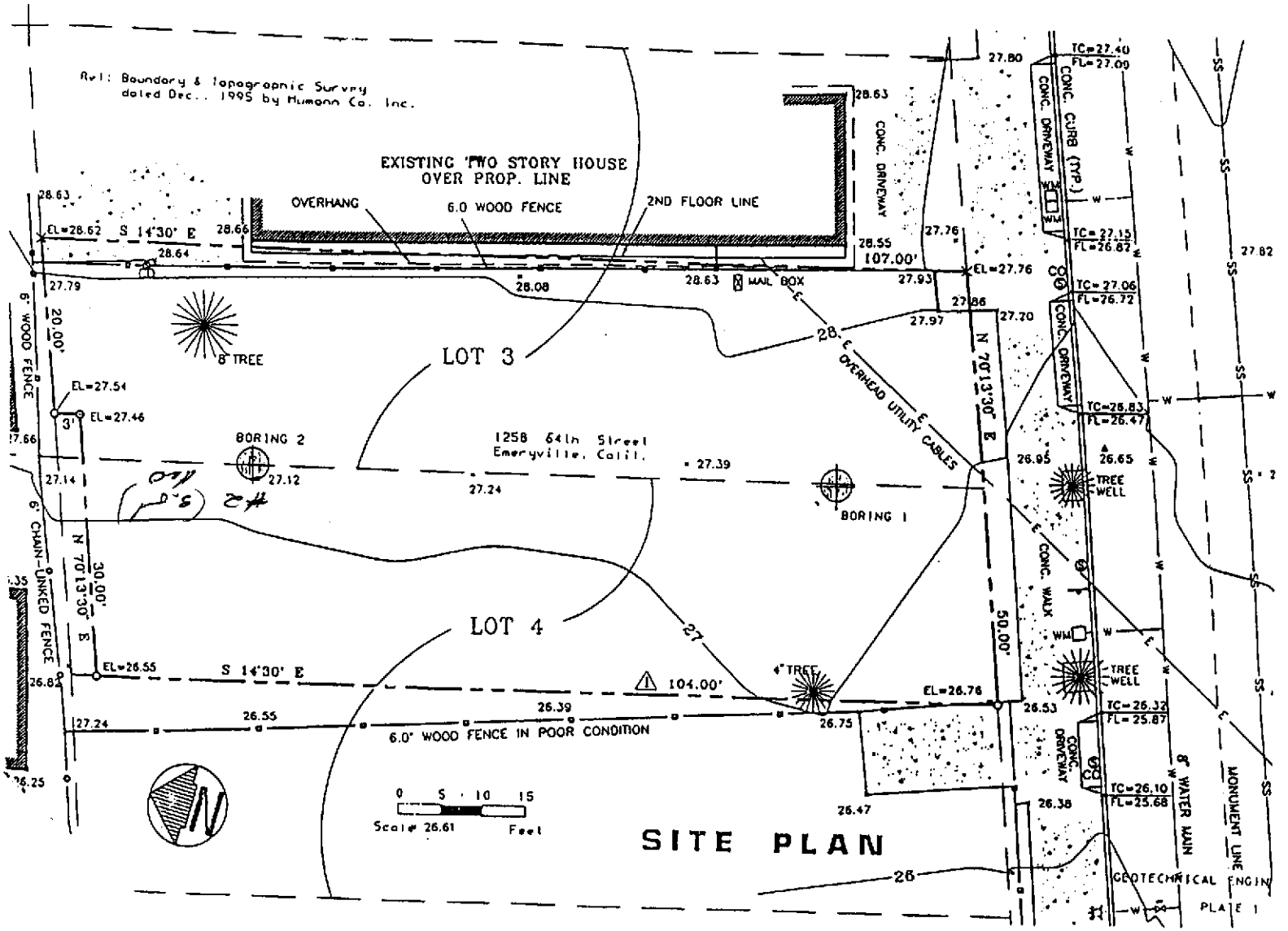
Site Location Map

Source: U.S.G.S. Map presented as Figure 2 in A R.E.A. 1996.

Scale: 1" = 2000'

SOMA CORPORATION

Project. No. 96-2079	August 1996	**Figure 1**



Site Plan

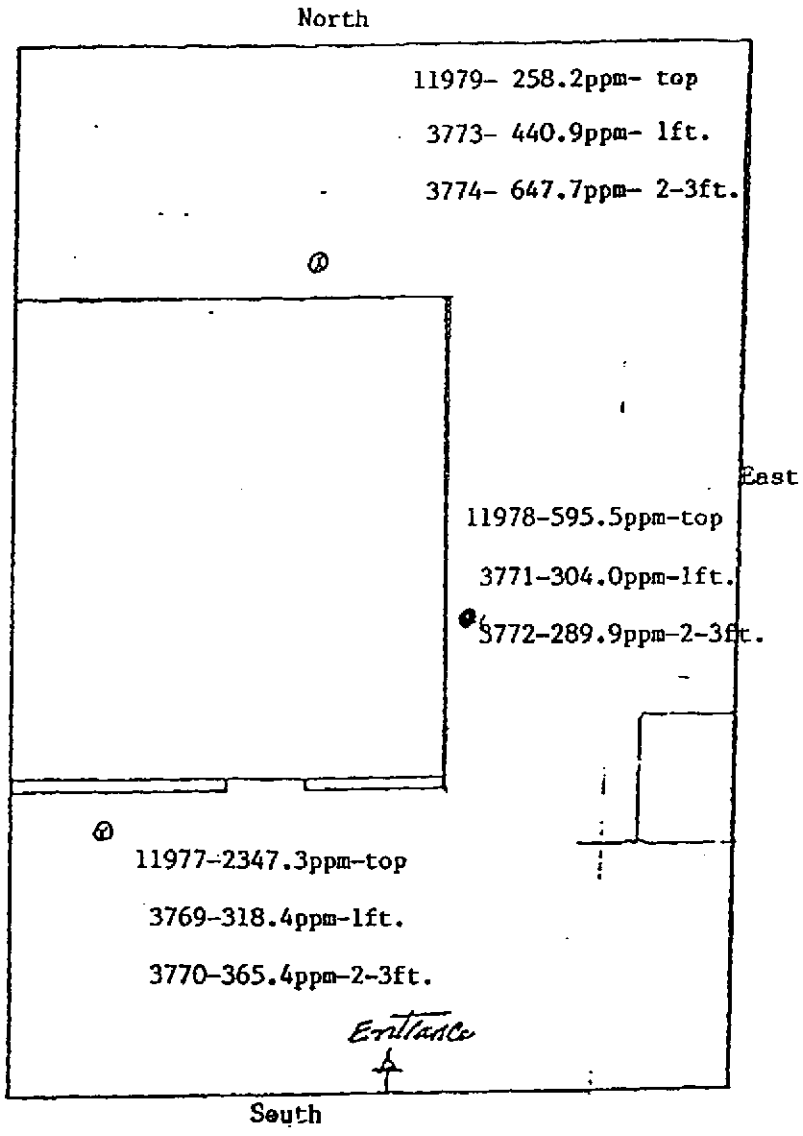
Source: Boundary & Topographic Survey by Humann Co., Inc presented in GEI 1995.
Scale: 1" = 20'

Project. No. 96-2079

August 1996

Figure 2

SOMA CORPORATION



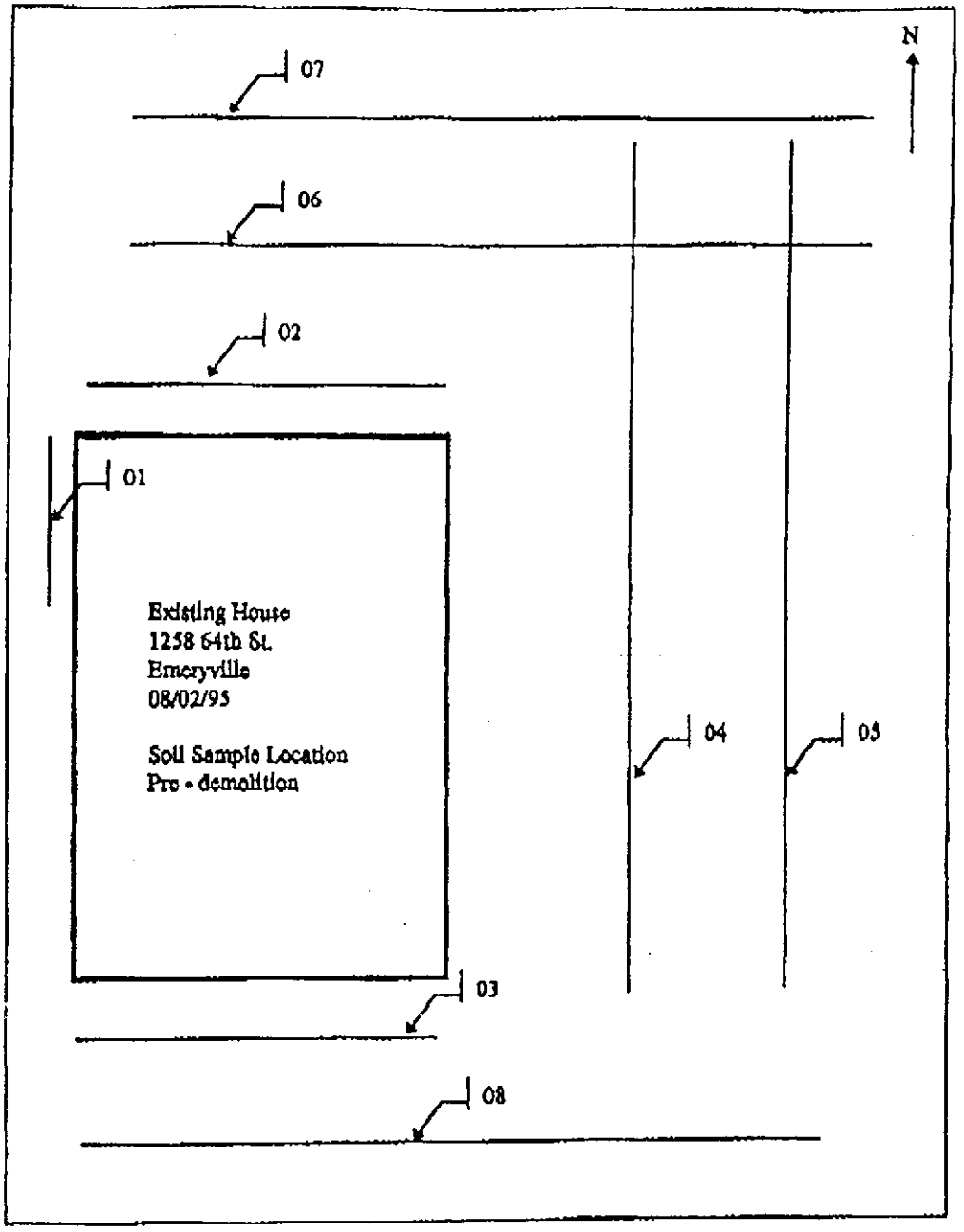
SOMA CORPORATION

Sampling Plan for EIC Soil Samples

Source: EIC 1995.

Not to Scale

Project. No. 96-2079	August 1996	**Figure 3**



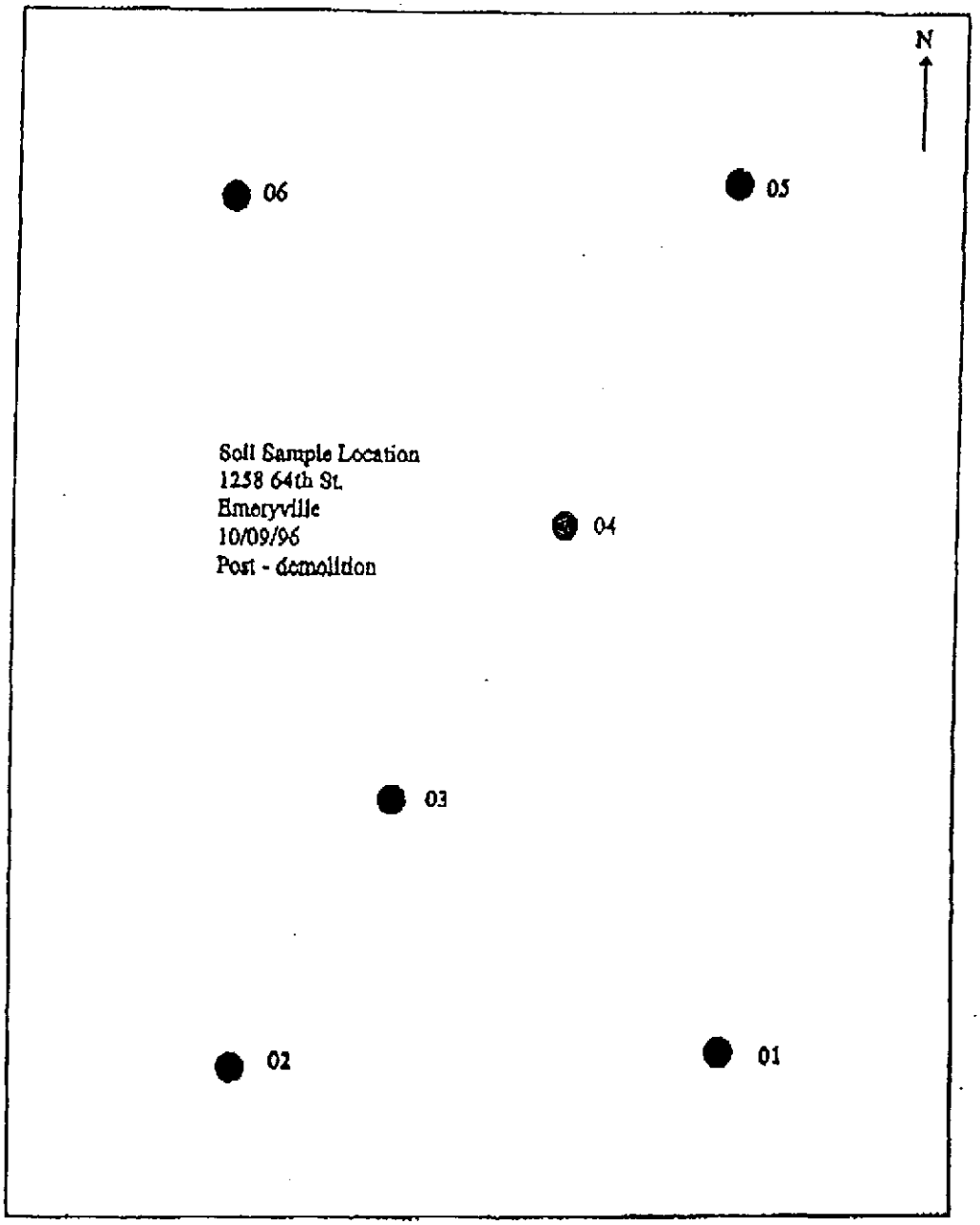
SOMA CORPORATION

Sampling Plan for KELLCO Pre-Demolition Soil Samples

Source: KELLCO 1995.

Not to Scale

Project. No. 96-2079	August 1996	**Figure 4**



SOMA CORPORATION

Sampling Plan for KELLCO Post-Demolition Soil Samples

Source: KELLCO 1995.

Not to Scale

Project. No. 96-2079	August 1996	**Figure 5**

SOMA CORPORATION

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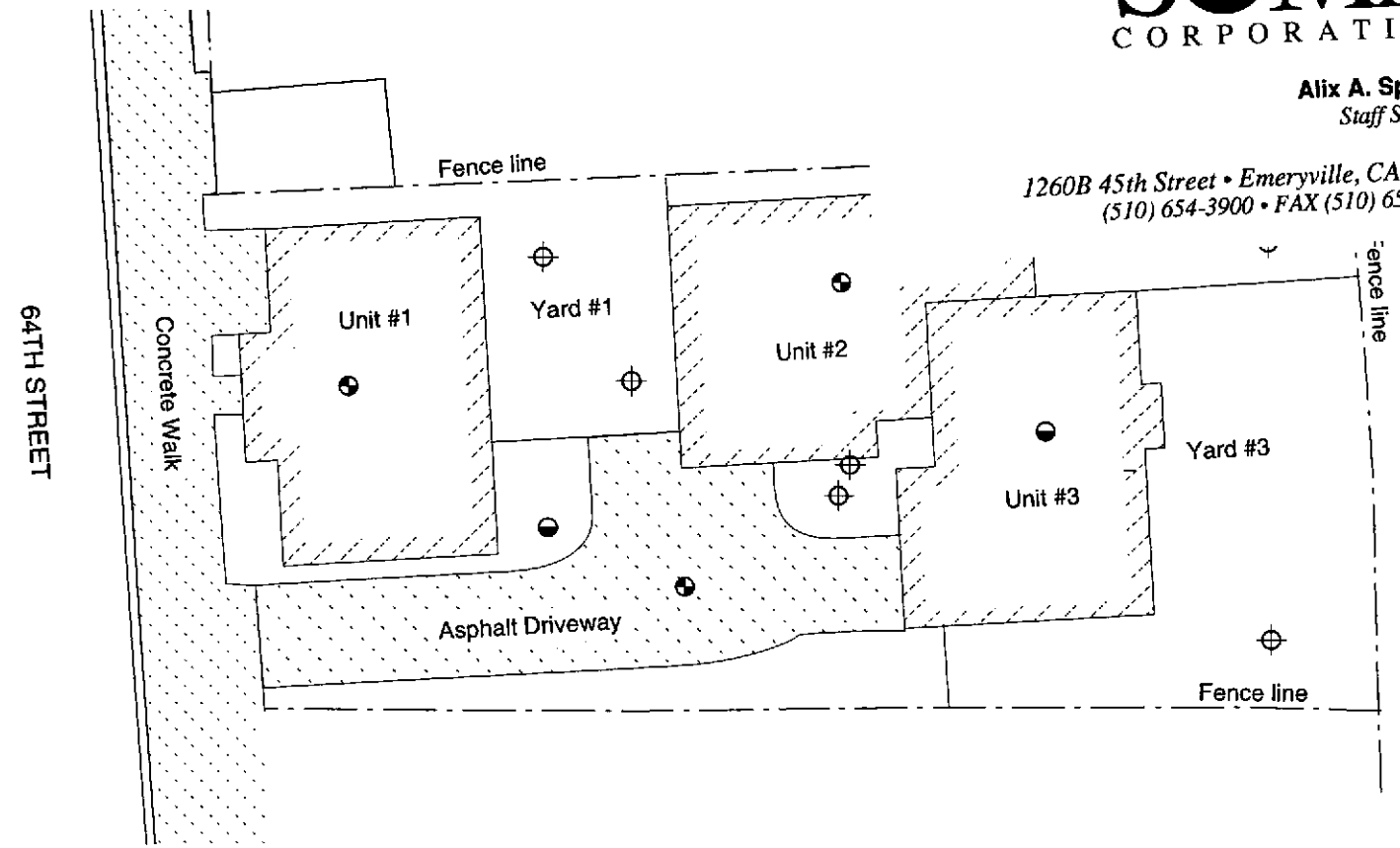

EXPLANATION

- Soil boring in exposed area
- Soil boring in capped/covered area (concrete building pad / asphalt)
- Groundwater sampling location (Hydropunch™)

Note: All building and sampling locations are approximate.

0 10 20
Approx. Scale in Feet

SOMA CORPORATION

Soil and Groundwater Sampling Plan
1258 64th Street, Emeryville, California
Source: Site Plan based on proposed redevelopment plan by Siegel&Strain, October 1995.

August 1996

Proj. No.96-2079

Figure 6

APPENDIX A

SAMPLE DOCUMENTATION AND CUSTODY PROCEDURES

APPENDIX A
SAMPLE DOCUMENTATION AND CUSTODY PROCEDURES

A-1.0 DOCUMENTATION

The following information will be entered on the sample collection data form at the time of sampling:

- Project name and number;
- Sampler's name;
- Time and date of sampling;
- Sampling location;
- Sampling method;
- Sample number;
- Sample condition (disturbed/undisturbed);
- Laboratory analyses requested; and
- Type of preservative, if any.

Each sample will be packaged and transported appropriately, in accordance with the following protocol:

- Collect samples in appropriately-sized and prepared containers.
- Properly seal and package sample containers.
- Fill out field sample log and chain of custody (COC) and analyses request forms.
- Separate and place samples into coolers according to laboratory destination. Samples will be packaged so that the potential for shipping damage is minimized.
- Chill samples to approximately 4°C. Blue ice or regular crushed ice used in the coolers will be sealed in a plastic bag other than the one in which it was purchased.
- Seal the top two copies of the COC form inside a zip-lock bag. Use strapping tape to hold the packet on the inside of the cooler.
- Seal cooler with several strips of strapping tape.

A-2.0 SAMPLE CUSTODY PROCEDURES

In order to check and link each reported datum with its associated sample, sample custody and documentation procedures have been established. Three separate, interlinking documentation and custody procedures for field, office, and laboratory can be described. The COC forms,

which are central to these procedures, are attached to all samples and their associated data throughout the tracking process.

A-3.0 FIELD CUSTODY PROCEDURES

Field documentation will include sample labels, daily field activities logbook, and COC and analyses request forms. These documents will be filled out in indelible ink. Any corrections to the documents will be made by drawing a line through the error and entering the correct value without obliterating the original entry. Persons correcting the original document will be expected to initial any changes made. The documents are as follows.

A-3.1 Sample Labels

Labels will be used to identify samples. The label is made of a waterproof material with a water-resistant adhesive. The sample label, to be filled out using waterproof ink, will contain at a minimum the following information: sampler's name, sample number, date, time, location, and preservative used.

A-3.2 Field Log of Daily Activities

A field log will be used to record daily field activities. The field geologist is responsible for making sure that a copy of the field log is sent to the project file as soon as each sampling round is completed. Field log entries will include the following:

- Field worker's name;
- Field log number;
- Date and time data are entered;
- Location of activity;
- Personnel present on-site;
- Sampling and measurement methods;
- Total number of samples collected;
- Sample numbers;
- Sample distribution (laboratory);
- Field observations, comments; and
- Sample preservation methods used, if any.

A-3.3 Chain of Custody (COC) and Analysis Request Form

The COC form is filled out for groups of samples collected at a given location on a given day. The COC will be filled out in triplicate form. Two copies will accompany the samples to the analytical laboratory. The third copy is kept in the SOMA QA/QC file. The COC makes provision for documenting sample integrity and the identity of any persons involved in sample transfer. Other information entered on the COC includes:

- Project name and number;
- Field logbook number;
- COC serial number;
- Project location;
- Sample number;
- Sampler's/recorder's signature;
- Date and time of collection;
- Collection location;
- Sample type;
- Number of sample containers for each sample;
- Analyses requested;
- Results of laboratory's inspection of the condition of each sample and the presence of headspace, upon receipt by the laboratory;
- Inclusive dates of possession;
- Name of person receiving the sample;
- Laboratory sample number;
- Date of sample receipt; and
- Address of analytical laboratory.