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SITE REMEDIAL PLAN
YERBA BUENA PROJECT SITE
EMERYVILLE AND OAKLAND, CALIFORNIA

February 11, 1991
LF 1649

Prepared for:

Catellus Development Corporation
201 Mission Street
San Francisco, California

LEVINE·FRICKE

LEVINE·FRICKE
CONSULTING ENGINEERS AND HYDROGEOLOGISTS

Letter of Transmittal

From Amanda Spencer Date 2/26/91

To Dennis Byrne Project No. 1649

Subject

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1900 Powell Street, 12th Floor
Emeryville, California 94608
(415) 652-4500

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1.0 INTRODUCTION

This report presents the proposed Remedial Plan for chemical-affected soil and ground water at the Yerba Buena Project Site ("the Site"), located in Oakland and Emeryville, California (Figure 1). This report has been prepared on behalf of Catellus Development Company (Catellus), formerly Santa Fe Pacific Realty Corporation.

The layout of the Site is presented in Figure 2. As illustrated in Figure 2, the Site has been divided into four quadrants (Areas A, B, C, and D) to aid in the organization of the sampling and analysis program previously conducted at the Site. The Site excludes Area D, currently occupied by the Markstein Beverage Company and the Oakland Terminal Railway, and the former Ransome Construction property in Area B.

1.1 Background

The Yerba Buena Project Site covers an area of approximately 51 acres. The Site has been used since the early 1900s for a variety of industrial and commercial businesses. These businesses included warehouse storage of predominantly dry goods and limited quantities of hazardous materials (oxides and acids [a complete record of materials stored at the Site is not available]); metal foundries; truck maintenance and repair; an auto storage and wrecking yard; a construction yard; and several rail transit lines for transporting passengers and freight.

Levine-Fricke conducted an environmental investigation of the Site in three phases between September 1989 and December 1990 on behalf of Catellus. Phase I of the Investigation consisted of a historical review of the Site and site usage; development of a sampling and chemical analysis work plan; sampling and chemical analysis of soil samples collected from areas targeted as potential environmental concerns during the historical review; sampling and chemical analysis of soil in

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non-targeted areas to characterize the general quality of shallow soil; and sampling and analysis of "grab" and monitoring well ground-water samples.

Phase II of the investigation consisted of conducting a soil-gas and shallow ground-water reconnaissance survey in Area A; collecting and analyzing additional soil samples for lead, zinc, polychlorinated biphenyls (PCBs), and/or volatile organic compounds (VOCs); and conducting a shallow ground-water quality survey in the vicinity of Phase I monitoring well LF-9. The results of Phase I and II of the Investigation are presented in detail in the Levine·Fricke report entitled "Phase I & II Environmental Investigation, Yerba Buena Project Site, Emeryville, California," dated August 15, 1990, and revised October 26, 1990.

Soil and ground-water sampling results from the first two phases of the Investigation were compared with available regulatory guidelines to aid in evaluating areas of potential environmental concern. A Conceptual Remedial Plan (Levine·Fricke, November 8, 1990) was developed to address areas of potential environmental concern and a third phase of Investigation was recommended to assess the extent and volume of affected soil and the lateral and vertical extent of affected ground water to aid in developing this Remedial Plan for the Site.

Phase III of the Investigation consisted of collecting and analyzing soil samples for lead, VOC or total petroleum hydrocarbons (TPH) (as oil); conducting a shallow reconnaissance ground-water quality survey in Area A; and collecting and analyzing additional ground-water samples from monitoring wells for VOCs, herbicides, and/or total dissolved solids (TDS). Results of this investigation will be presented in the Levine·Fricke report entitled "Phase III Environmental Investigation, Yerba Buena Project Site, Oakland and Emeryville, California," dated February 6, 1991.

The Phase I investigation included the former Ransome Company property in the north-central portion of the Site. Further investigations of this Ransome area are currently being conducted by Ransome and environmental consultants working on behalf of Ransome, and were not included in Phase II or Phase III of the Investigation conducted by Levine·Fricke. It is our understanding that any remedial work to be conducted at the Ransome site will be coordinated by the Ransome Company. Remedial alternatives for the Ransome area are therefore not discussed in this report.

A brief summary of the geologic findings and sampling and analysis results of the Phase I, II, and III Environmental Investigations is presented below. For a more detailed presentation of the results, refer to Levine·Fricke's "Phase I and II Environmental Investigation, Yerba Buena Project Site" report dated October 26, 1990, and Levine·Fricke's "Phase III Environmental Investigation, Yerba Buena Project site, Oakland and Emeryville, California" report which is currently being prepared.

1.1.1 GEOLOGY AND HYDROGEOLOGY

Subsurface materials encountered at the Site consisted predominantly of gravelly, silty clays with occasional sandy and/or gravelly interbeds (alluvial deposits). Fill sediments more than 2 feet thick were generally not encountered at the Site, with the exception of a 4- to 5-foot elevated soil platform in Area A.

The depth to shallow ground water beneath the Site ranged between 2.5 feet (well LF-11) and 12.2 feet (well LF-4) below grade during the latest round of ground-water measurements at the Site (April 23, 1990). Ground-water elevation data collected at the Site in both February and April 1990 indicated a westerly to southwesterly direction of ground-water flow, at an approximate gradient of 0.001 ft/ft to 0.003 ft/ft. Figure 3 presents the ground-water elevation contours for water level measurements collected on April 23, 1990.

Ground-water levels measured in one of two shallow (less than 25 feet deep)/intermediate (39 to 45 feet deep) well pairs (LF-5 and LF-5D) installed in Area A indicated a low to moderate upward vertical gradient (0.012 ft/ft). Ground-water levels measured in the second well pair (LF-4 and LF-4D) indicated an essentially equal vertical gradient. Ground-water levels measured in intermediate (39 feet deep) well LF-4D and deeper (62 feet deep) well LF-4Z also indicated an essentially equal vertical gradient. Approximately 8 to 10 feet of silty clay to gravelly sandy clay with an expected low permeability separates the screened intervals in the two shallow/intermediate well pairs (LF-4/LF-4D and LF-5/LF-5D); more than 10 feet of silty clay with an expected low permeability separates the screened intervals between wells LF-4D and LF-4Z.

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1.1.2 SOIL QUALITY

With the exception of a few localized areas, concentrations of compounds detected in soil at the Site would not be expected to adversely impact human health or the environment, given the current and intended use of the Site.

Lead was detected in shallow soils (depths of 3.5 feet or less) at concentrations greater than 1,000 parts per million (ppm) in two locations (A5 in Area A and C17 in Area C) (Figures 4 and 5). Additional sampling in these two areas during Phase II and III of the Investigation indicated that elevated lead concentrations are limited laterally and vertically to localized areas (areas of less than 40 feet by 40 feet laterally and apparently less than 3 feet [Area C] to 7 feet [Area A] below grade). Lead was not detected in ground-water samples collected in the vicinity of these two locations. An elevated concentration of zinc (47,000 ppm) was also detected in soil at location C17 (at a depth of 1.0 foot) in Area C; again, the affected area is of apparently limited lateral and vertical extent (approximately 20 feet by 20 feet laterally and 3.0 feet or less below grade) based on Phase II sampling in the immediate vicinity (Figure 5).

PCBs were detected in near-surface soils at one Phase I sampling location in Area A (A22, at 0.1 ppm) and at two locations in Area B (B25 and B26, at concentrations up to 5.4 ppm). Additional sampling was conducted in the vicinity of locations B25 and B26, and results indicated that the PCB-affected soils are associated with a localized area of visibly oil-stained soil (Figure 6). PCB concentrations ranged between 0.92 ppm and 7.5 ppm in this stained area. The vertical extent of the PCBs appears to be less than 3 feet in depth. PCBs were not detected in ground-water samples collected at the Site and analyzed for these compounds.

Heavy fraction total petroleum hydrocarbons (TPH) characterized as oil were detected in 39 of 101 samples collected at the Site during Phase I of the Investigation and in 16 of 21 samples collected during Phase III of the Investigation (soil samples were not analyzed for TPH during Phase II of the Investigation). Concentrations were generally below 500 ppm; however, concentrations greater than 5,000 ppm were detected in shallow soil samples (at depths of 4.5 feet or less) collected from five locations (A8, LF5, BB-32, BB-35, and BB-39) in Area A at the Site. Samples collected from seven additional locations (A13, A22, BB-31, BB-38, B7, and

C19) in Areas A, B, and C contained TPH as oil at concentrations between 1,000 ppm and 5,000 ppm at depths of 4.5 feet or less (Figures 7 and 8).

Low concentrations of pyrene (1 ppm or less) and VOCs (0.22 ppm or less) were detected in soils in Areas A and C. Herbicides were detected in Areas A, B, and C at concentrations up to 0.74 ppm at depths ranging from 1.5 to 4.0 feet below grade. Herbicides were not detected in ground-water samples collected at the Site from these areas.

Asbestos, chlorinated pesticides and semivolatile organic compounds (SVOCs) (excluding PCBs and pyrene) were not detected in soil samples collected at the Site which were analyzed for these compounds.

1.1.3 PERCHED GROUND WATER NEAR WELL LF-9

Perched ground water with an oily sheen and strong fuel odor was detected during Phase I of the Investigation in shallow sediments (less than 3 feet deep) near well LF-9. A grab ground-water sample collected from this zone during Phase I was characterized as containing TPH resembling oil and Stoddard solvent. The extent and type of hydrocarbons detected in the perched water were then more fully characterized during Phase II and III of the Investigation.

A perched water sample collected for fuel characterization during the Phase II Investigation indicated that the petroleum hydrocarbons consisted of a mixture of hydrocarbons resembling mineral spirits, polynuclear aromatic compounds, phenols, and fatty acids. Analysis results of a sample collected from well LF-9, which was screened below the perched zone, indicated that ground water underlying the perched water has only been marginally impacted (0.5 ppm TPH as oil) by the presence of the petroleum hydrocarbons in the perched zone. The hydrocarbons appear to be limited to the railroad track area, and extend approximately 30 feet east and west of well LF-9 and about 20 feet north (Figure 9). The perched zone appears to be limited vertically to about 4 feet.

1.1.4 GROUND-WATER QUALITY

Twenty-five monitoring well and grab ground-water samples were collected at the Site during Phase I of the Investigation. These samples were analyzed for SVOCs, 13 heavy metals, VOCs, and TPH (as gasoline and diesel/oil). Six additional monitoring wells were installed and sampled for VOC analysis during Phase II of the Investigation. Two monitoring wells

were installed and sampled for VOC analysis and ground-water samples were collected from selected Phase I monitoring wells for herbicide, VOC and/or TDS analysis during Phase III of the Investigation.

SVOCs and herbicides were not detected in ground-water samples collected from the Site, and metal concentrations detected in ground-water samples were below laboratory detection limits or State Maximum Contaminant Levels (MCLs) for drinking water.

One or more VOCs were detected in the samples collected from eight of the Phase I monitoring wells (LF-4, LF-5, LF-6, LF-8, LF-9, LF-10, LF-11, and LF-12). VOCs were not detected in samples collected from the remaining wells (LF-1, LF-2, LF-3, LF-7, and LF-16). Table 1 presents a summary of well construction details for each of the on-site monitoring wells.

Relatively low concentrations (0.021 ppm or less) of 1,1-dichloroethane (1,1-DCA) were detected in several locations in Area B and in monitoring wells LF-6 (Area A) and LF-8 (Area B; Levine•Fricke, October 26, 1990). These concentrations are slightly above the DHS Recommended Action Levels for drinking water. Well LF-8 also contained low concentrations (0.015 ppm or less) of 1,1,1-trichloroethane (1,1,1-TCA) and 1,1-dichloroethene (1,1-DCE). The concentrations of 1,1,1-TCA and 1,1-DCE detected in wells LF-6 and LF-8 were at or below the State MCLs for drinking water for these compounds.

Concentrations of 1,1-DCE, 1,1,1-TCA, and 1,1-DCA (up to 0.73 ppm) in excess of drinking water standards (MCLs or DHS Recommended Action Levels for drinking water) were detected in wells LF-4 (screened from 9.5 to 19.5 feet below grade) and LF-5 (screened from 10 to 25 feet below grade) located in Area A. The lateral extent of these compounds in the vicinity of these wells was characterized during Phase II and III of the Investigation to be approximately 1,000 feet southwest of well LF-5, and 250 to 300 feet northeast of well LF-5, in an area approximately 100 to 250 feet wide.

These compounds were not detected in samples from Phase II intermediate well LF-5D (screened from 34 to 44 feet below grade), but were detected in deeper well LF-4D (screened from 29 to 39 feet below grade) at concentrations similar to concentrations detected in well LF-4. Wells LF-4D and LF-5D were sampled a second time in fall 1990; results of the second sampling agreed with the first round. The confirmatory sample had similar concentrations as the previous LF-4D sample.

Ground-water samples collected from Phase III deep well LF-4Z (screened from 52 to 62 feet below grade) did not contain VOCs.

Ground-water samples collected from wells LF-4, LF-4D, and LF-4Z for TDS analysis contained TDS between 320 and 560 ppm, indicating that the water was of general domestic or municipal quality based on the guidelines of the State Water Resources Control Board, Resolution No. 88-63.

Several VOCs were detected in ground water collected from well LF-10, located on the upgradient (northern) boundary of Area C (notably, up to 7.6 ppm of trichloroethylene [TCE]). Some of the same compounds were also detected in wells LF-12, LF-11, and LF-9, in a grab sample collected at C29 (also located along the northern boundary of Area C), and in a grab sample collected from C15, located near the center of Area C. Based on the distribution of the concentrations of these compounds in Area C and the southwesterly ground-water gradient, these compounds most likely originated from an off-site source to the north.

2.0 SOIL REMEDIATION

Results of the Phase I through Phase III Environmental Investigation at the Site indicated that localized areas of soil had been impacted by lead and/or zinc, PCBs, or TPH at concentrations of possible environmental concern. This section presents the objectives of remediation and a proposed remediation plan for these affected soils. The remedial plan for TPH-affected perched water near well LF-9 and for VOC-affected ground-water in Area A are presented in Sections 3.0 and 4.0, respectively.

2.1 Objective of Remedial Plan for Soil

Lead, zinc, TPH, and PCBs detected in soil at the Site may have the potential to adversely affect human health or the environment depending upon the future land uses of the Site, the concentration of the compound(s), and the fate and transport properties of the subsurface materials and the chemical compound(s). In order to protect against potential adverse impacts to human health and the environment, soil containing elevated concentrations of lead and/or zinc, PCBs, or TPH at the Site should be remediated to the extent feasible. Also, while ground water beneath these affected

soils does not appear to have been impacted by the presence of lead, zinc, PCBs, or TPH, soil remediation will also aid in protecting ground water from possible future degradation.

Available regulatory guidelines were reviewed along with site specific data to determine appropriate cleanup levels for compounds detected at the Site to achieve the above stated objectives. The results of this review are presented below.

2.1.1 LEAD AND ZINC

Soils containing elevated concentrations of lead and/or zinc were first compared to DHS Total Threshold Limit Concentrations (TTLCs) which are used to classify hazardous waste in accordance with Title 22 of the California Administrative Code. Although TTLCs are not intended as cleanup levels, they do provide a basis for comparison. TTLCs for lead and zinc are 1,000 ppm and 5,000 ppm, respectively. Additionally, the U.S. Environmental Protection Agency (EPA) issued an interim guidance for establishing soil-lead cleanup levels at Superfund sites; the cleanup guidance levels established for total lead in soil are 500 to 1,000 ppm (U.S. EPA, 1989).

Based on these guidelines and the fact that the lead- and/or zinc-affected soil at the Site appears to be limited to shallow soil (less than 3 or 6 feet deep) and does not appear to have impacted shallow ground water, soil cleanup levels of 1,000 ppm and 5,000 ppm, respectively, for lead and zinc at the Site were selected to achieve the remedial objective. Soils above these criteria will be removed from the Site. To provide an additional measure of protection for human health and the environment, soil containing between 500 and 1,000 ppm lead will be contained and sealed with a low permeability cap.

2.1.2 PCBs

Although EPA's PCB Spill Cleanup Policy, Code of Federal Regulations (40CFR 761.125, April 2, 1987) indicates that a cleanup level of 10 ppm with a minimum 10-inch cap of clean material over the affected area is appropriate in residential/commercial areas, a more conservative cleanup goal of 1 ppm was selected for the Site to protect for potential future land uses in this area.

2.1.3 TPH IN SOIL

To assess the potential environmental concerns of TPH characterized as oil in soil in Area A and in Area C near location C19, the geology and hydrogeology at the Site as well as characteristics of the type of TPH were assessed. Based on this assessment, soil containing TPH as oil does not appear to be of significant environmental concern due to the following characteristics:

- the soils are not hazardous according to Title 22, California Code of Regulations (CCR), Article II
- the very low mobility of oil in soils
- the presence of underlying clays or silty clays to aid in inhibiting downward migration
- the apparent shallow vertical extent (approximately 6 feet or less) of TPH-affected soils with concentrations greater than 1,000 ppm
- the absence of other chemical compounds (specifically, VOCs) in soils where TPH was detected
- TPH was not detected in ground-water samples collected from the areas containing elevated TPH concentrations in soil (e.g., ground-water samples from well LF-5 [which contained some of the highest concentrations of TPH as oil in soil] did not contain TPH above laboratory detection limits of 0.1 ppm).

Because the TPH appears to be widespread in the shallow soil in Area A, a discrete cleanup level was not selected for the TPH-affected soils and a remedial option (containment and site capping for affected areas) was chosen to further minimize the risk of future impact to shallow ground water and limit possible exposure to the affected soil. Details of the remedial plan for TPH-affected soils are presented in Section 2.2.3.

2.2 Proposed Remedial Plan for Soil

The proposed Remedial Plan for soil affected by lead and/or zinc, PCBs, or TPH is presented in the following sections.

2.2.1 LEAD- AND/OR ZINC-AFFECTED SOIL

Figures 4 and 5 summarize the Phase I through Phase III sampling and analysis results for lead and/or zinc near Phase I locations A5 and C17, respectively, as well as the estimated areal extent of soil containing concentrations greater than the proposed cleanup levels of 1,000 ppm of lead and/or 5,000 ppm of zinc. Based on these results it is estimated that

approximately 550-650 cubic yards (cu. yds.) of soil contain lead at concentrations greater than 1,000 ppm near Phase I location A5 in Area A and that approximately 50 cu. yds. of soil contain lead at concentrations greater than 1,000 ppm and/or zinc at concentrations of 5,000 ppm near Phase I location C17 in Area C.

The recommended option for addressing the lead- and zinc-affected soils at the Site is excavation of affected soil, and off-site treatment and disposal. This remedial option will involve the following steps:

- Preparation of a health and safety plan to address potential concerns for workers at the Site during remediation activities. The plan will be submitted to Alameda County Health Care Services Agency (ACHA) for review and approval prior to soil excavation.

- Collection of representative samples of the affected soils for submittal to RCRA-permitted Class I hazardous waste treatment/landfill facilities (such as USPCI in Utah) for analysis. The landfill will accept or reject the waste based on the analytical results. If the soluble lead concentrations are greater than 5.0 milligrams per liter (mg/l), treatment prior to disposal will be required (discussed below). If the TCLP results for lead are below 5.0 mg/l, treatment of lead prior to disposal will not be required.

  The Class I facility may perform treatability studies to determine the most appropriate treatment method for the affected soil. (For example, USPCI uses a stabilization procedure to reduce leaching of lead from solid wastes. A treatability study would be performed prior to stabilization to evaluate whether the wastes can be treated to effectively meet the RCRA Land Disposal Requirements [LDR] treatment standard of 5 mg/l. Once wastes are treated, it is USPCI's policy to dispose of the stabilized wastes in its RCRA-approved waste disposal cells, which are engineered to isolate the wastes and prevent future leaching of waste constituents.)

- Excavation of lead- and/or zinc-affected soil which exceeds the proposed cleanup concentrations and transporting the soil to the selected Class I, RCRA-permitted hazardous waste treatment facility. The

excavated soil will be treated and/or disposed of at the Class I facility. The ACHA will be notified at least one week before excavation activities begin.

- Collection of confirmatory samples of the excavation floors and sidewalls following excavation to document that the approved cleanup levels were attained at the Site, and that no additional soil excavation will be required.

A report documenting the methods and results of the excavation, including location of confirmatory sampling points, the final extent of the excavation, and the volume of excavated soil, will be prepared upon completion of the remedial work.

2.2.2 PCB-AFFECTED SOIL

Figure 6 summarizes the Phase I and Phase II sampling and analysis results for PCBs near Phase I location B26 as well as the estimated areal extent of soil affected by PCBs. The PCBs detected near location B26 appear to be associated with a visibly oil-stained area; soil samples collected a few feet outside of this area contained 0.1 ppm of PCBs or less. Based on these results, it is estimated that approximately 450-650 cu. yds. of PCB-affected soil will require remediation. The recommended option for addressing the PCB-affected soil at the Site is excavation and off-site disposal at a Class I landfill. This remedial option will involve the following steps.

- Preparation of a health and safety plan to address potential concerns for workers at the Site during remediation activities. The plan will be submitted to ACHA for review and approval before soil excavation begins.

- Collection of representative samples of the affected soil for submittal to the Class I landfill facility for its analysis and approval.

- Excavation of soil with PCB concentrations greater than 0.1 ppm and transportation of the soil to the selected Class I landfill facility for disposal.

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- Confirmatory sampling of the excavation floors and sidewalls following excavation to document that the approved cleanup level was attained at the Site, and that no additional soil excavation will be required.

A report describing the methods and results of the excavation, including location of confirmatory sampling points, the final extent of the excavation and volume of excavated soil, will be prepared upon completion of the remedial work.

2.2.3 TPH-AFFECTED SOIL

Petroleum-affected soil in Area A (Figure 7) and near location C19 in Area C (Figure 8) will be contained under building foundations or low permeability asphalt paving. Subsequent landscaping in these areas will be above the low permeability cap. In addition, quarterly ground-water monitoring will be conducted in and downgradient of the affected areas to monitor that the TPH-affected soils are not impacting ground-water quality. A more detailed discussion of the proposed TPH monitoring program is presented in Section 5.0.

2.3 Erosion Control

As an added measure, to protect against potential impacts of chemical-affected soils on surface water quality through soil erosion, site capping measures will be incorporated into the site development plan to minimize surface soil erosion for areas containing residual concentrations of lead, zinc, and/or PCBs in surface soils that are elevated, but below the proposed cleanup goals and are not otherwise remediated. Such measures could include covering affected areas with soil, paving, or buildings.

Soils underlying landscaped areas within the completed commercial development with residual concentrations of lead, zinc, and/or PCBs below their respective cleanup levels should pose minimal health and environmental risks if capped with a minimum of 1 foot of soil covering. Similarly, soils underlying building footprints and paved areas should not present a public or environmental health risk.

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3.0 PERCHED WATER AND SOIL REMEDIATION NEAR WELL LF-9

3.1 Objective of Remedial Plan for Perched Water and Soil Near Well LF-9

Soil and perched ground-water near well LF-9 should be remediated to the extent feasible to protect underlying ground-water quality and other potential adverse impacts to human health and the environment. The perched zone appears to be limited in lateral extent and, where present, affected by TPH. Based on results of the Phase I through Phase III investigations in this area, elevated concentrations of TPH (greater than 500 ppm) in soil appear to be limited to the perched ground-water area. TPH analysis results from well LF-9 indicate that the underlying shallow ground-water does not appear to have been significantly impacted by the presence of the TPH-affected perched zone.

3.2 Remedial Plan for Soil and Perched Water Near LF-9

Figure 9 summarizes soil, perched water, and ground water analysis results for TPH near well LF-9. Based on these results, the estimated extent of TPH-affected perched water and soil is approximately 20 feet by 60 feet. The perched zone extends vertically to about 4 feet. The estimated volume of soil (containing the perched water) to be remediated in this area is approximately 200 cu. yds.

To remediate the affected area, the soil and perched water will be excavated and disposed of off site in a Class II landfill. This remedial option will follow the same steps as outlined for the PCB-affected soils discussed in Section 2.2.2.

4.0 GROUND-WATER REMEDIATION

As discussed in Section 1.3, SVOCs, metals, TPH, and herbicides have either not been detected in ground water or have been detected in extremely low concentrations which are below drinking water standards. Shallow ground water in Area A has been affected by VOCs at concentrations up to 0.73 ppm. In addition, VOCs were detected in well LF-10 located on the upgradient boundary of the Site at concentrations up to 7.3 ppm. Lower concentrations of VOCs (0.2 ppm or less) were detected in wells LF-9, LF-11, and LF-12, appear to be associated with the VOCs detected in well LF-10, and are

likely from an off-site, upgradient source. Therefore, this portion of the Site Remedial Plan addresses remediation of ground water which contains VOCs only in Area A.

4.1 Objective of Remedial Plan for Ground Water

Figure 10 summarizes sampling and VOC analysis results collected during the Phase I through Phase III investigation. The 0.01 ppm isocontour of 1,1-DCE, the VOC detected at the highest concentrations in this area, is presented on the figure to illustrate the estimated extent of affected ground water. As seen in the figure, the affected Area A ground-water is about 100 to 250 feet in width and extends approximately 1,000 feet southwest of well LF-5 and approximately 200 feet northeast of the well.

Geologic data collected at the Site indicate that the affected ground water may be contained laterally within buried stream channel deposits which appear to extend from well LF-4 to LF-5 and thin towards wells LF-17 and LF-19, located downgradient of well LF-4 (Levine•Fricke, October 26, 1990). The apparent stream channel deposits were not detected in downgradient well LF-18 nor in upgradient wells LF-20 and LF-21. As discussed in Section 1.1.1, an 8- to 10-foot layer of predominantly silty clay was observed below the apparent stream channel deposits in wells LF-5D and LF-4D.

At the present time, most of the VOC-affected ground water is found in the shallow ground-water zone (less than 25 feet below ground surface) in Area A. One intermediate-depth well, LF-4D, screened between depths of 29 to 39 feet, is also affected by VOCs. VOCs were not detected in well LF-4Z, located within 10 feet of well LF-4D and screened from 52 to 62 feet.

Although there is no known usage of ground water in the vicinity of the Site, TDS analysis results and expected well yield analysis indicate that the water beneath the Site is potentially suitable for domestic or municipal use according to State Water Resources Control Board Resolution No. 88-63. Therefore, the remedial program needs to protect against degradation of ground water in the Site vicinity.

The objective of the ground-water remedial program in Area A is to protect against further downgradient or vertical migration of the VOC-affected ground water. As described below, this objective will be met by hydraulically "capturing" and treating shallow affected ground water before it can migrate off site. Extraction from the intermediate-depth

sediments is not proposed at this time, since such remedial actions could enhance downward migration of VOC-affected ground-water. Shallow, intermediate, and deeper water in Area A will be monitored quarterly to allow early detection of potential vertical or lateral migration of VOC-affected ground water. If such migration is observed, additional remedial measures may be necessary.

4.2 Proposed Remedial Plan for VOC-Affected Ground Water in Area A

To protect against off-site migration of VOC-affected ground water, a shallow ground-water collection trench (i.e., french drain) will be installed along the Hollis Street property boundary to intercept VOC-affected ground water from Area A. Figure 10 presents the proposed location of the collection trench. The proposed trench location extends across the apparent width of the affected ground water pathway and would be designed to intercept the affected ground water before it migrates off site.

Shallow ground water entering the trench will be pumped and treated on site using a conventional treatment technology, most likely air stripping, liquid-phase carbon adsorption, or photolysis with chemical oxidation. The specific technology will be selected based upon the design system flow rate, chemical concentrations, discharge and emission limitations, and an economic evaluation. Treated water will either be discharged to the regional sanitary sewer for further treatment or discharged under National Pollution Discharge Elimination System (NPDES) permit to a storm drain.

Specific collection trench design and testing and treatment options are discussed below.

4.2.1 COLLECTION TRENCH DESIGN

This plan proposes to intercept ground water with a collector trench instead of pumping ground water from extraction wells because previous well development and ground-water sampling activities at the Site have indicated that the yield of the shallow water-bearing materials is extremely low. Therefore, wells may not capture or allow efficient extraction of ground water.

Since the hydraulic properties of a collector trench are difficult to predict and depend upon the characteristics of the subsurface material encountered, the collector trench will be installed prior to selection of a water treatment process.

Once the trench has been installed and tested through trial pumping, a design system flow rate can be established. Wastewater treatment processes will then be evaluated and the most applicable and cost-effective option selected.

The proposed trench will be approximately 120 feet long, 2 to 4 feet wide, and 18 to 25 feet deep. The trench will be excavated by backhoe. Once the trench has been excavated, a 4-inch-diameter perforated PVC collector pipe will be placed in the bottom of the trench. The trench will be backfilled with pea-gravel. Depending upon the subsurface materials encountered during excavation, a geotextile may also be placed in the trench to prevent siltation (clogging) of the collector pipe. The collector pipe will slope towards a sump. Water collecting in the sump will be pumped to a treatment system using a submersible or diaphragm pump.

4.2.2 TREATMENT SYSTEM DESIGN

As described above, preliminary water quality data indicate that air stripping, liquid-phase carbon adsorption, or photolysis with a chemical oxidation component would probably be the most appropriate treatment technologies to consider for treating the ground water removed from the trench. Other treatment technologies such as biological treatment methods or aeration are thought to be inappropriate for use at this Site for one or more of the following reasons: they are not suitable for treatment of chlorinated VOCs, are not cost effective for the anticipated small system flow rates, and/or will not reduce chemical concentrations sufficiently to meet anticipated effluent or air emission limitations.

Each of the potential treatment processes is described below. The discussion also includes potential constraints for their use at the Site and typical permitting requirements.

Air Stripping

With air stripping, extracted ground water would be distributed over a packed plastic medium while air is introduced counter-current through the treatment vessel. As the water trickles downward, organic compounds would volatilize from the water to the air. Air stripping has proved effective and highly reliable in achieving VOC removal from ground water at many treatment sites throughout the Bay Area. Air stripping is also relatively low in cost in comparison with other physical treatment methods. Initial estimates based upon estimated flow rates and water concentrations indicate that emissions from an air stripping

system would probably be less than 1/2 pound of total organics per day. Since the total air emissions would be so small, the Bay Area Air Quality Management District (BAAQMD), which provides exemptions for small volume dischargers, would probably allow discharge to the atmosphere without emission control devices. Alternatively, if the BAAQMD required emission control, then vapor phase carbon vessels would be used to treat the air discharge. After air stripping treatment, the water would be sufficiently reduced in chemical concentrations to allow discharge through the sanitary sewer to the East Bay Municipal Utility District (EBMUD) wastewater treatment facility or to allow discharge to the storm sewer under an NPDES permit.

Liquid Phase Carbon Adsorption

With this process, VOCs in extracted ground water would be adsorbed onto granular activated carbon (GAC). After the carbon became saturated, it would have to be transported and disposed, regenerated with steam, or incinerated at a licensed facility located off site. Carbon adsorption would be highly effective and reliable in removing VOCs from ground water. Air emissions would be virtually eliminated and regeneration/incineration of spent carbon would destroy the adsorbed VOCs. This option would likely be most cost effective at extremely low flow rates and low concentrations and less cost effective at higher flow rates and higher concentrations due to high carbon regeneration and disposal costs. After treatment, water would be discharged to the sanitary or storm sewer as described above.

Photolysis/Chemical Oxidation

This process would utilize ultraviolet (UV) light and ozone or hydrogen peroxide (Ox) to oxidize VOCs to carbon dioxide, water, and chlorine. The effectiveness of this process depends upon the degree of halogenation of each organic compound and the presence of other, nonhazardous impurities in the water (such as iron). Bench- or pilot-scale testing would be required to assess removal rates for individual compounds. If effective, the process would be generally reliable and have the advantage of being a completely destructive technology. This process should have virtually no ozone or VOC emissions. The capital equipment costs and ongoing energy costs for this technology would be relatively high.

4.2.3 STEPS TO COMPLETE INSTALLATION OF REMEDIAL METHOD

Installation and implementation of the ground-water extraction trench and design of the treatment system would involve the following steps:

- Installation of the collector trench and one or more hydraulic (e.g., water level) monitoring points
- Conducting a pumping test to determine system flow rate
- Selection of treatment process
- Process design and permit application
- System construction
- Ongoing system operations and maintenance
- System evaluation and optimization.

Once the system is operating, hydraulic and chemical data will be reviewed to verify that the system is adequately capturing the VOC-affected water. If capture does not provide sufficient hydraulic control, the system could be modified to include additional collection trenches, or extraction wells.

4.3 Proposed Ground-Water Monitoring

To monitor the effectiveness of the proposed extraction trench and to provide additional definition of the lateral and vertical extent of the VOC-affected ground-water, three to five additional shallow (less than 25 feet deep) monitoring wells and one to two intermediate-depth (40 to 45 feet deep) monitoring wells will be installed. Proposed locations of the additional wells are presented on Figure 10. These additional wells will be monitored quarterly, along with wells LF-4, LF-4D, LF-4Z, LF-5, LF-5D, LF-6, LF-17, LF-18, LF-19, LF-20, and LF-21 for the presence of VOCs using EPA Method 8010 for approximately 1 year. It is proposed that monitoring be reduced to semiannual after the first year.

To avoid encouraging downward migration of VOC-affected ground water, extraction from the intermediate-depth sediments is not proposed at this time. However, monitoring of intermediate-depth ground water will continue. If, at some point in the

future, it appears that VOC-affected ground water at the intermediate depth is beginning to migrate off site or downwards, extraction of intermediate-depth water may be proposed.

Additionally, to monitor ground-water quality in the vicinity of soils affected by TPH in Area A, wells LF-3, LF-4, LF-5, and LF-19 will be monitored semiannually for the presence of TPH as oil using modified EPA Method 8015.

Also, it is proposed that well LF-10, located on the upgradient boundary of the Site in Area C, be monitored quarterly for a period of one year to assess if the concentrations of VOCs detected in this area are decreasing or increasing. As discussed previously, VOCs detected in ground-water samples collected from this well appear to be from an upgradient source.

5.0 SUMMARY AND CONCLUSIONS

Results of the Phase I through Phase III Environmental Investigation at the Site indicated that localized areas of soil and/or perched water have been impacted by lead and/or zinc, PCBs, or TPH at concentrations of possible environmental concern and that concentrations up to 0.73 ppm of VOCs (1,1,1-TCA, 1,1-DCA, and 1,1-DCE) were detected in ground water beneath Area A of the Site. A remedial plan for each of these concerns is proposed in this report. A summary of the remedial plan for chemical-affected soil, perched water, and ground water follows.

- Lead- and/or zinc-affected soil will be excavated and disposed of at a Class I landfill.
- PCB-affected soil will be excavated and disposed of at a Class I landfill.
- TPH-affected perched water and shallow soil near well LF-9 in Area C will be excavated and disposed of at a Class II landfill.
- Oil-affected soil in Areas A and C will be contained on site and capped with a low permeability seal such as a low permeability asphalt cap or building foundation.

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- Ground water impacted by VOCs will be contained on site by installing a shallow ground-water collection trench in the area of the downgradient extent of the VOC-affected water. Ground water collected from the collection trench will be treated on site using air stripping, liquid-phase carbon adsorption, or photolysis with a chemical oxidation component. Treated water will be released to a nearby storm drain under an NPDES permit, or discharged to the EBMUD wastewater treatment facility.

- A ground-water monitoring program will be implemented in this area to evaluate the effectiveness of the french drain.

- Additionally, samples from selected wells in Area A (LF-3, LF-4, LF-5, LF-18, LF-6, and LF-19) will be collected semiannually for TPH analysis to monitor ground-water quality in the vicinity of TPH-affected soils.

The proposed schedule for implementing this Remedial Plan is presented in Tables 2a and 2b. It should be noted that the proposed schedule assumes that approval will be received from the lead agency (ACHA) within one month of submittal of this plan. The schedule may need adjustment if agency approval requires a longer period than anticipated.

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Ecology & Environment. 1985. FIT Site Inspection Report, Electro Coatings, Inc., by Steve Wisbaum, Ecology & Environment, June 1985. Prepared for the U.S. EPA.

Electro Coatings, Inc. 1986. Letter from Kathleen U. Poling, Electro Coatings, Inc., to Michael Amman, RWQCB, June 18, 1986.

Levine•Fricke, Inc. 1990. Phase I and II Environmental Investigation, Yerba Buena Project Site, Emeryville, California, August 15, 1990.

Regional Water Quality Control Board (RWQCB). 1986. Letter from Donald D. Dalke, RWQCB, to Kathleen Poling, Electro Coatings, Inc., April 8, 1986.

U.S. Environmental Protection Agency (U.S. EPA). 1989. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Interim final. EPA/540/1-89/002, December 1989.

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TABLE 1

WELL CONSTRUCTION AND
GROUND-WATER ELEVATION DATA
YERBA BUENA, EMERYVILLE, CALIFORNIA
(all elevations in feet above mean sea level)

WELL NO.	WELL ELEV.	WELL DEPTH (feet)	SCREENED INTERVAL (feet)	GROUND-WATER ELEVATION 23-Feb-90	GROUND-WATER ELEVATION 23-Apr-90
LF-1	29.74	21	11-21	20.85	20.17
LF-2	30.36	22	11.5-21.5	26.10	25.84
LF-3	25.29	25	14.5-24.5	15.19	13.79
LF-4	26.09	20	9.5-19.5	14.98	13.89
LF-4D	26.20	39	29-39	NI	13.82
LF-4Z	NS	62	52-62	NI	NI
LF-5	27.01	25	10-25	16.15	14.69
LF-5D	27.09	44	34-44	NI	16.48
LF-6	18.12	19.5	9.5-19.5	10.57	9.46
LF-7	37.94	22	8-18	30.73	29.72
LF-8	29.70	18	7.5-17.5	23.65	--
LF-9	14.59	15.5	5.5-15.5	11.77	11.49
LF-10	14.09	22.5	7.5-22.5	10.00	--
LF-11	10.06	20.5	10.5-20.5	8.18	7.56
LF-12	8.18	16	5.5-15.5	2.54	1.55
LF-13	9.19	20	5-20	5.09	2.99
LF-14	14.56	18	5.5-15.5	8.26	7.16
LF-16	17.56	20	5-20	11.58	--
LF-17	25.60	20.5	10-20	NI	11.89
LF-18	28.48	20.5	10-20	NI	12.85
LF-19	20.88	20.5	10-20	NI	9.70
LF-20	33.24	20.5	7-22	NI	22.06
LF-21	NS	25	10-15	NI	NI

Notes:

NI - Well not installed at time of water level measurement
NS - Well has not been surveyed for top-of-casing elevation.
-- - Well not accessible at time of water level measurement

TASKS	MONTHS IN 1991											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1 Prepare Health and Safety Plan (HSP)												
2 Agency Review and Approval of HSP												
3 Collect Soil Samples for Analysis for Landfill Acceptance												
4 Excavate and Dispose of Affected Soils												
5 Evaluate Data and Prepare Report												

Table 2a : PROPOSED SCHEDULE FOR SOIL REMEDIATION

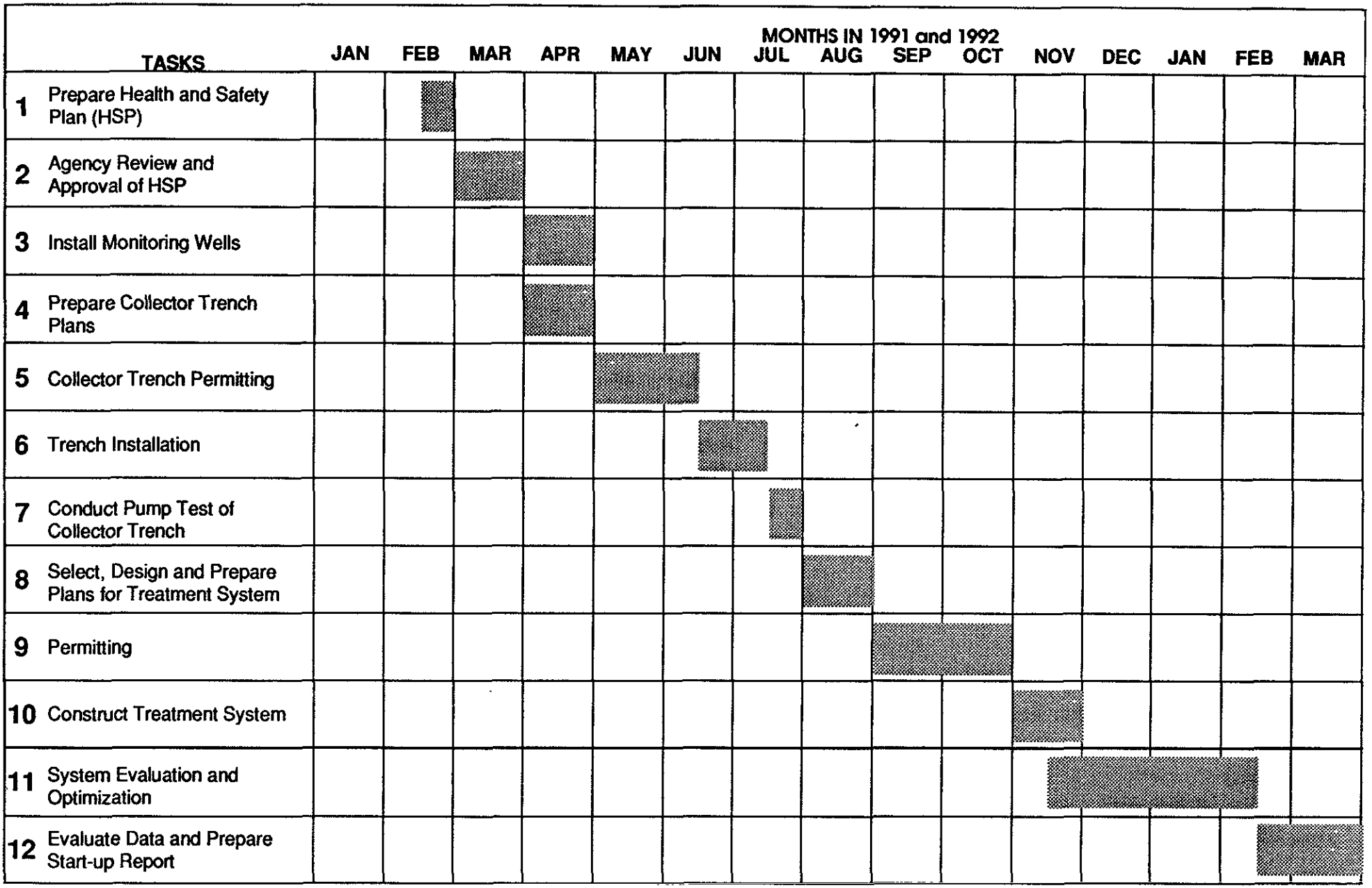
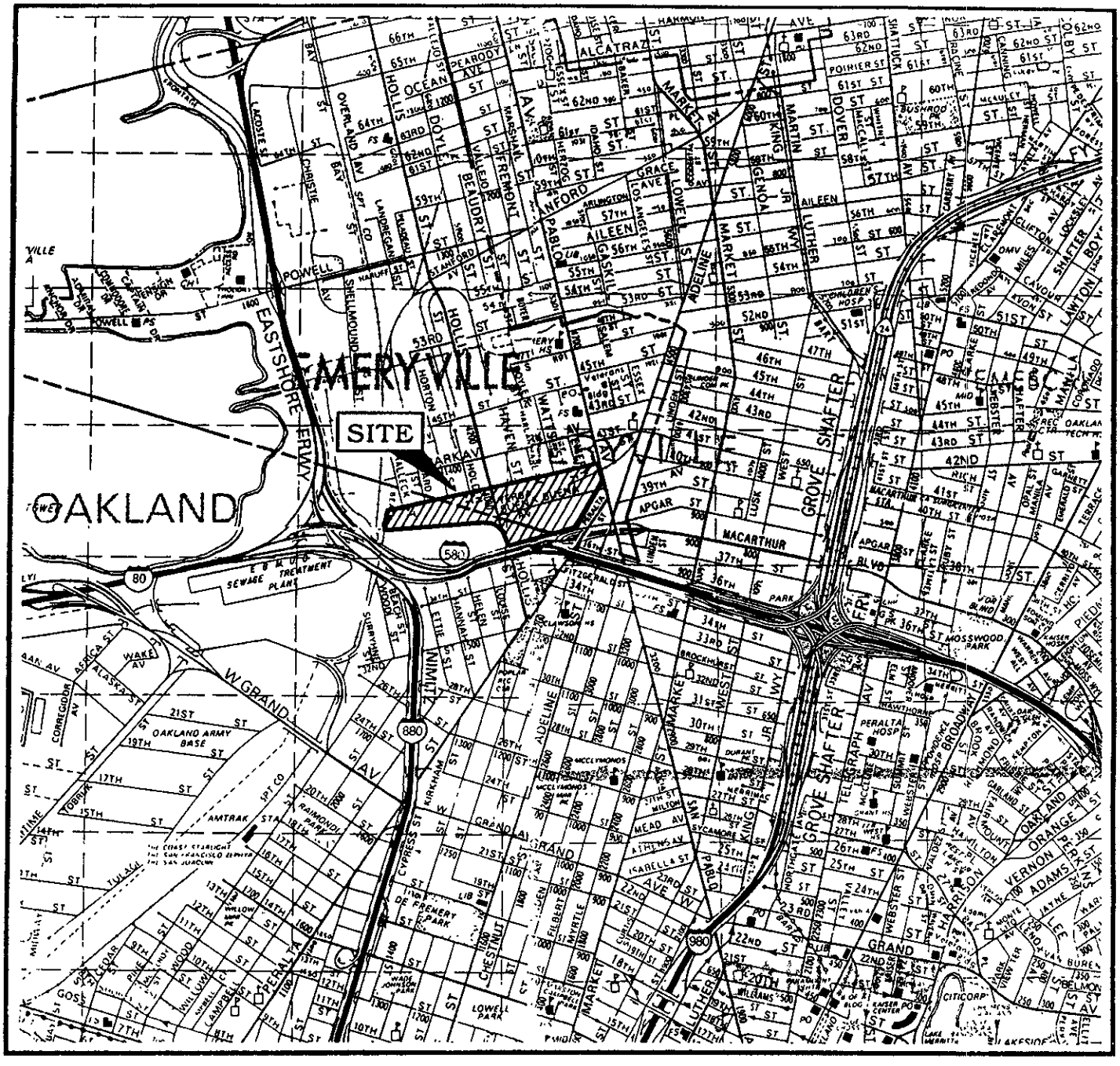


Table 2B : PROPOSED SCHEDULE FOR GROUND-WATER REMEDIATION



MAP SOURCE:
Alameda & Contra Costa Counties,
Thomas Bros map, 1990 Edition

Figure 1 : SITE LOCATION MAP
YERBA BUENA PROJECT SITE

Project No. 1649

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CONSULTING ENGINEERS AND HYDROGEOLOGISTS

1649ALS-SITEB91.eyz

Halleck Street
Hubbard Street
Horton Street
Holden Street
Haven Street
Hollis Street
Beach Street
RANSOME CONSTRUCT
BASHLAND
C
BAY AREA WAREHOUSE
M & N WAREHOUSE
OAKLAND TERMINAL RAILWAYS
MARKSTEIN BEVERAGE COMPANY
D
Yerba
LF-12
LF-11
LF-10
LF-9
LF-16
LF-6
C1
C2
C3
C4
C5
C6
C8
C9
C10
C11
C12
C13
C14
C15
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
C29
B1
B3
B4
B5
B15
B16
B17
B18
B19
B20
B21
B22
B23
B24
B25
B26
B27
B29
B30
B31
B32
B33
B35
A12
A13
A14
A15
A16
A17
A18
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A20
A21
A22
A23
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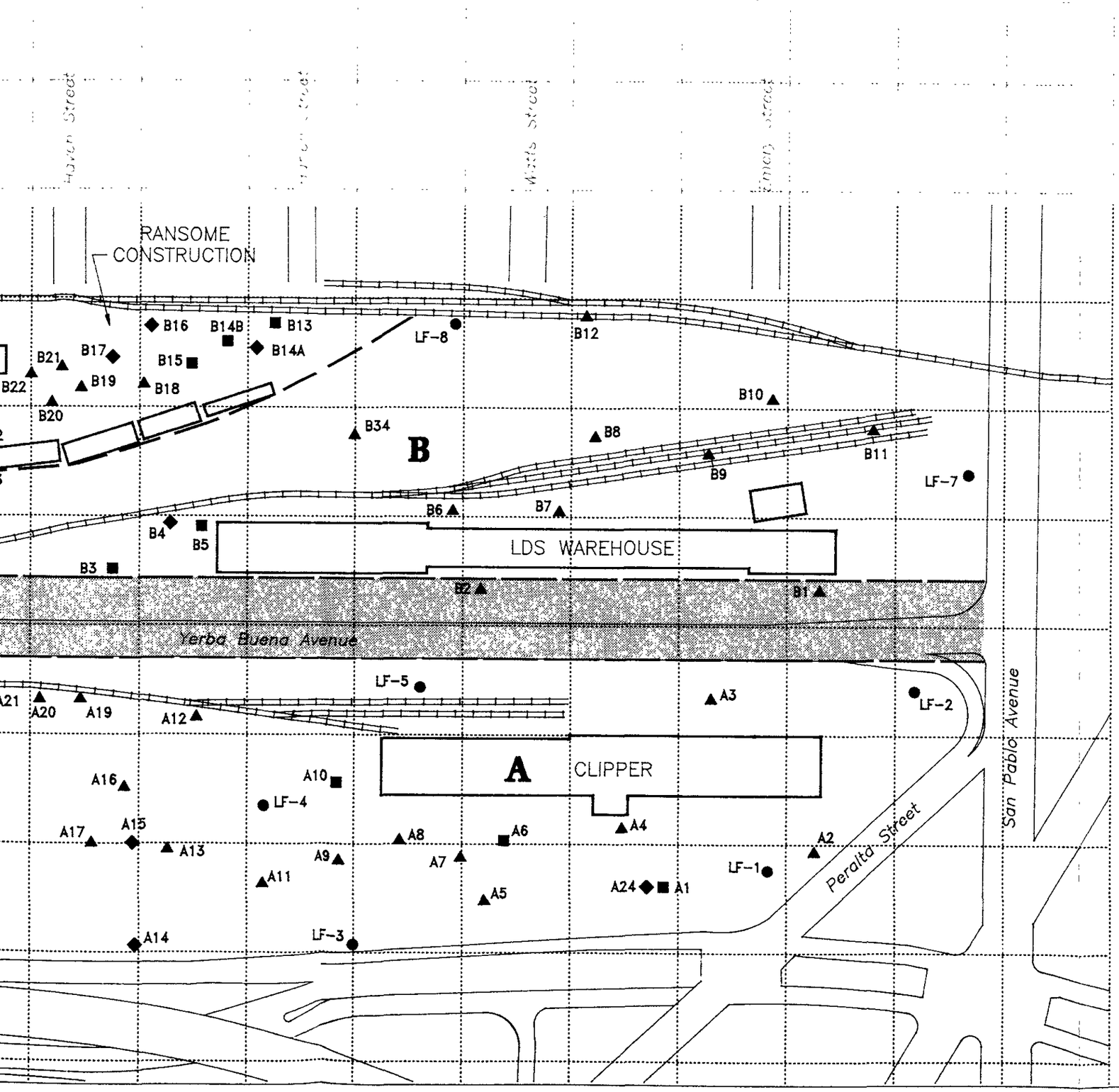

Figure 2:

SITE PLAN SHOWING CURRENT TENANTS OR FORMER TENANTS AND PHASE I SAMPLING LOCATIONS

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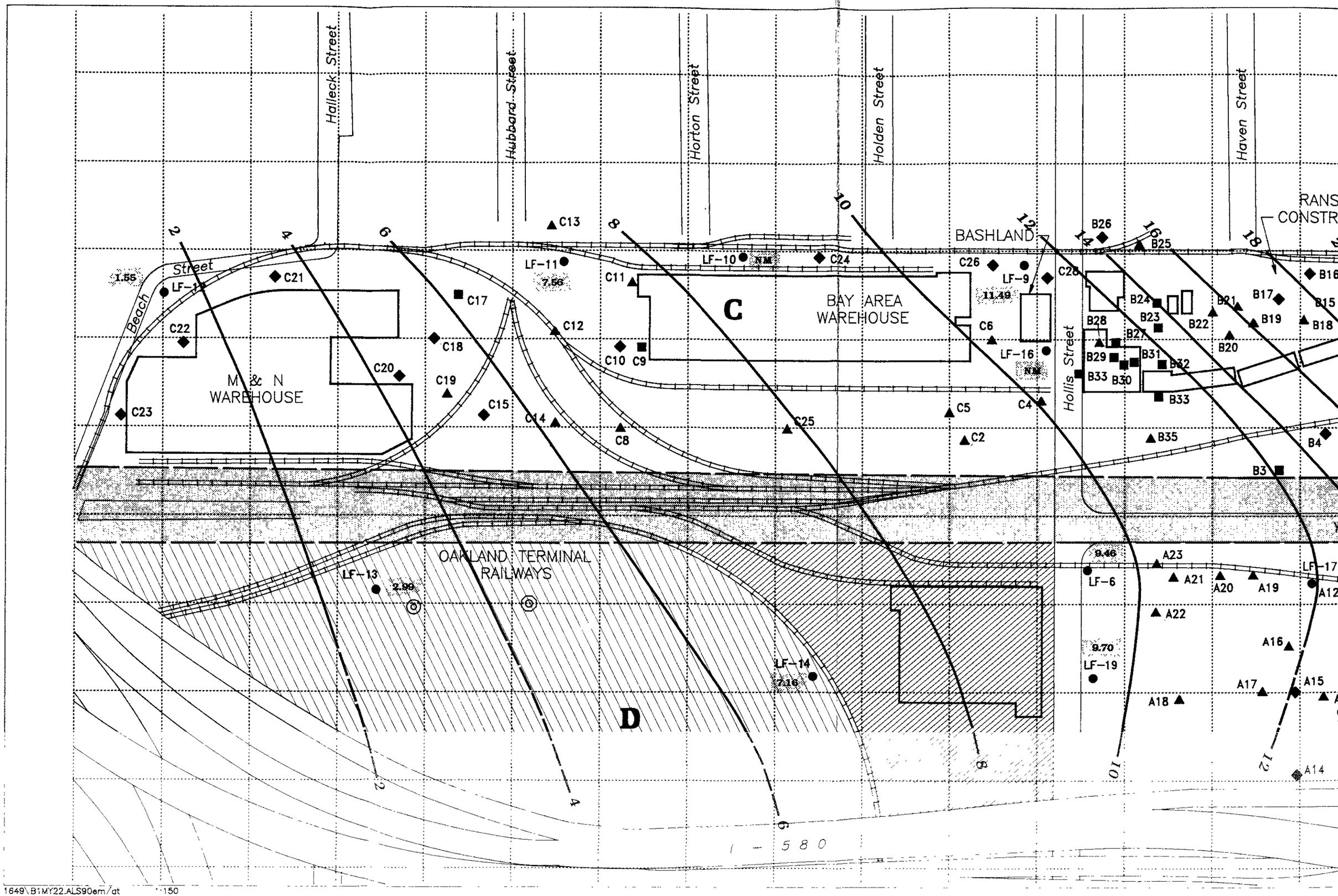
ALS26JAN91DT6



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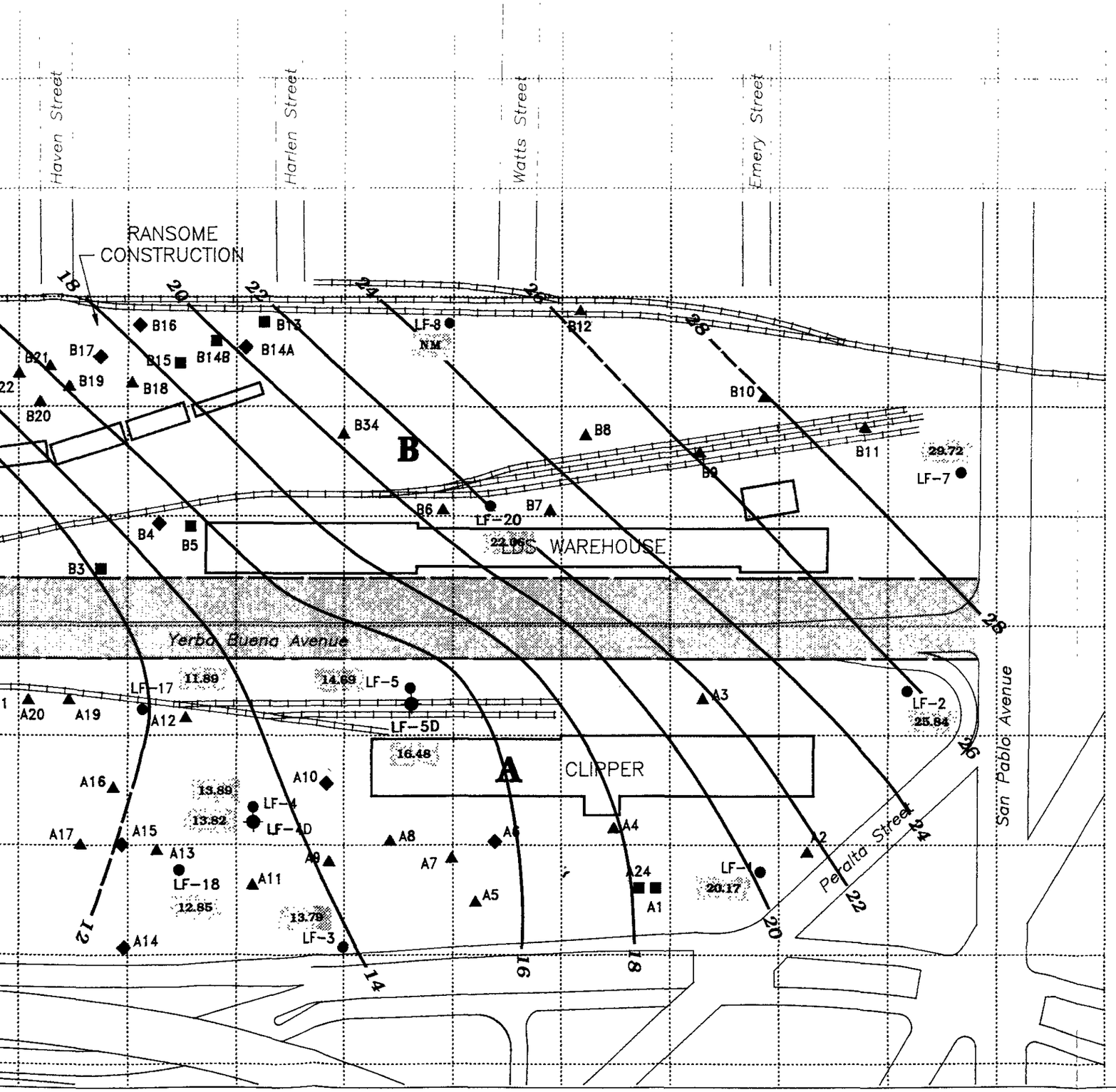

EXPLANATION

- SHALLOW MONITORING WELL (<25 FT)
- DEEP MONITORING WELL (35-45 FEET)
- PHASE I INVESTIGATION SHALLOW SOIL SAMPLING LOCATION (LESS THAN 5 FEET)
- PHASE I INVESTIGATION DEEPER SOIL SAMPLING LOCATION (6 TO 18 FEET)
- PHASE I INVESTIGATION DEEPER SOIL SAMPLING LOCATION (13 TO 18 FEET) AND GRAB GROUND-WATER SAMPLE LOCATION
- NON-ACCESSIBLE AREA
- YERBA BUENA RIGHT-OF-WAY
- OAKLAND TERMINAL RAILWAYS (NOT INCLUDED IN THIS INVESTIGATION)
- 20.85 GROUND-WATER ELEVATION
- 6 WATER TABLE CONTOURS (DASHED WHERE INFERRED)
- NM NOT MEASURED

0 150 300 FEET

Figure 3 :

GROUND-WATER ELEVATION CONTOURS APRIL 23, 1990

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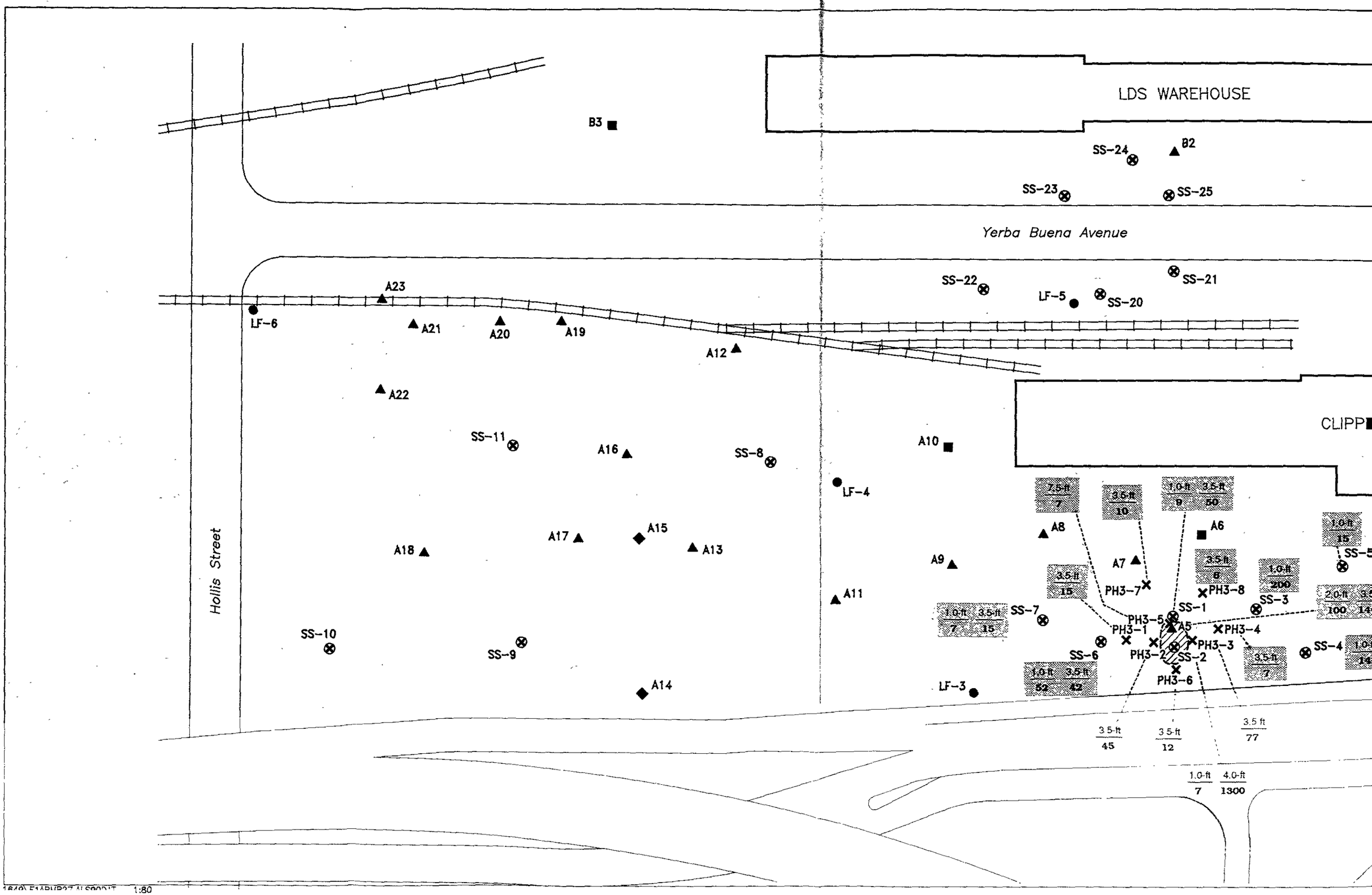
AS/BD


LDS WAREHOUSE
B3
SS-24
B2
SS-23
SS-25
Yerba Buena Avenue
SS-22
SS-21
LF-5
SS-20
A23
LF-6
A21
A20
A19
A12
A22
SS-11
A16
SS-8
A10
LF-4
A8
A6
A17
A15
A13
A18
A9
A7
A11
Hollis Street
PH3-7
PH3-8
SS-3
SS-7
SS-1
PH3-5
PH3-1
A5
PH3-4
SS-10
SS-9
SS-6
PH3-3
PH3-2
SS-2
SS-4
A14
LF-3
PH3-6
7.5-ft 7
3.5-ft 10
1.0-ft 9
3.5-ft 50
1.0-ft 15
3.5-ft 15
3.5-ft 6
1.0-ft 200
1.0-ft 7
3.5-ft 15
2.0-ft 100
1.0-ft 52
3.5-ft 42
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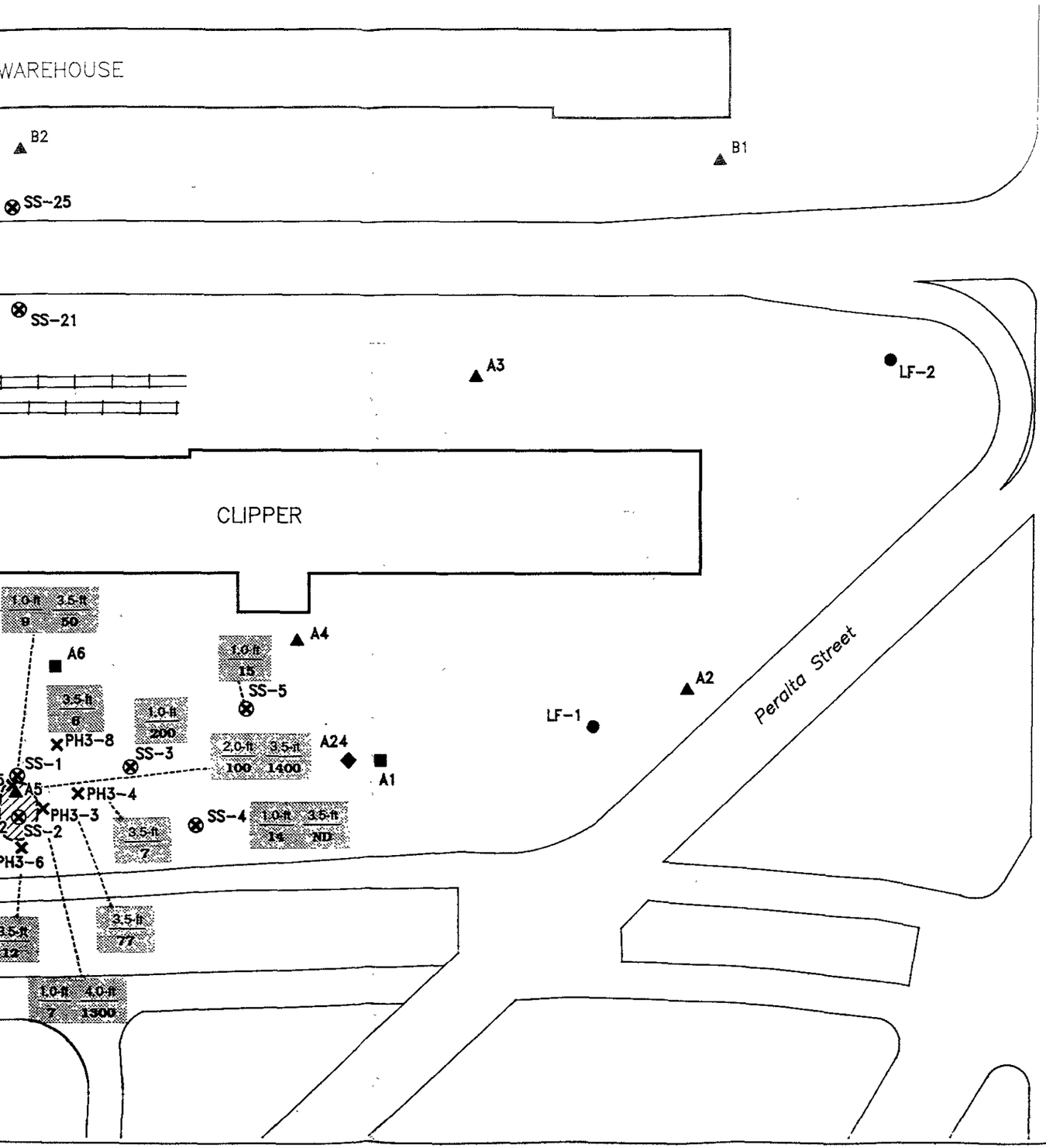
3.5-ft 45
3.5-ft 12
3.5 ft 77
1.0-ft 7
4.0-ft 1300

1:80



N

EXPLANATION

- MONITORING WELL LOCATION
- PHASE I INVESTIGATION SHALLOW SOIL SAMPLING LOCATION (LESS THAN 5 FEET)
- PHASE I INVESTIGATION DEEPER SOIL SAMPLING LOCATION (6 TO 18 FEET)
- PHASE I INVESTIGATION DEEPER SOIL SAMPLING LOCATION (13 TO 18 FEET) AND GRAB GROUND-WATER SAMPLE LOCATION
- PHASE II INVESTIGATION SOIL SAMPLING LOCATION FOR LEAD ANALYSIS
- PHASE III INVESTIGATION LOCATION FOR LEAD ANALYSIS

1.0-ft 3.5-ft
7 18 — DEPTH OF SAMPLE

CONCENTRATION DETECTED IN SOIL SAMPLES (mg/kg)

ND — NOT DETECTED

APPROXIMATE AREAL EXTENT OF SOILS AFFECTED BY ELEVATED (>1,000 PPM) CONCENTRATIONS OF LEAD

NOTES:
1) SAMPLE RESULTS PRESENTED FOR LOCATION A5 WERE COLLECTED DURING PHASE I OF THE INVESTIGATION.
2) PHASE III LOCATION PH3-5 IS LOCATED ADJACENT (WITHIN 5 FEET) OF PHASE I LOCATION A5.

0 40 80 120 160 FEET

Figure 4 :

LEAD DETECTED IN SHALLOW SOIL SAMPLES (mg/kg) NEAR LOCATION A5 AND APPROXIMATE EXTENT OF LEAD-AFFECTED SOILS IN AREA A

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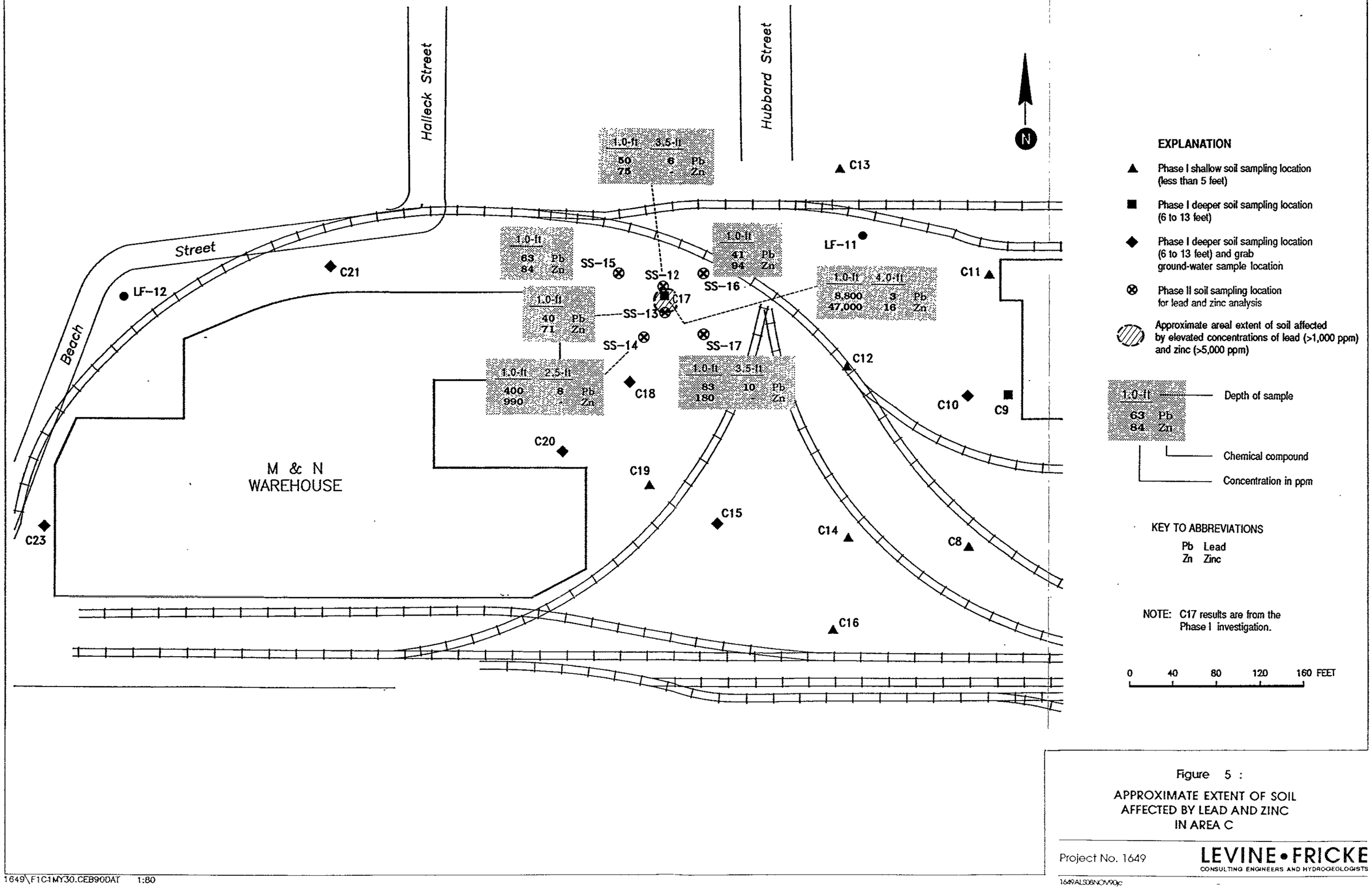

EXPLANATION

- ▲ Phase I shallow soil sampling location (less than 5 feet)
- ■ Phase I deeper soil sampling location (6 to 13 feet)
- ◆ Phase I deeper soil sampling location (6 to 13 feet) and grab ground-water sample location
- ⊗ Phase II soil sampling location for lead and zinc analysis
- ▨ Approximate areal extent of soil affected by elevated concentrations of lead (>1,000 ppm) and zinc (>5,000 ppm)

1.0-ft — Depth of sample
63 Pb
84 Zn
Pb Zn — Chemical compound
Concentration in ppm

KEY TO ABBREVIATIONS

Pb Lead
Zn Zinc

NOTE: C17 results are from the Phase I investigation.

0 40 80 120 160 FEET

Figure 5 :

APPROXIMATE EXTENT OF SOIL AFFECTED BY LEAD AND ZINC IN AREA C

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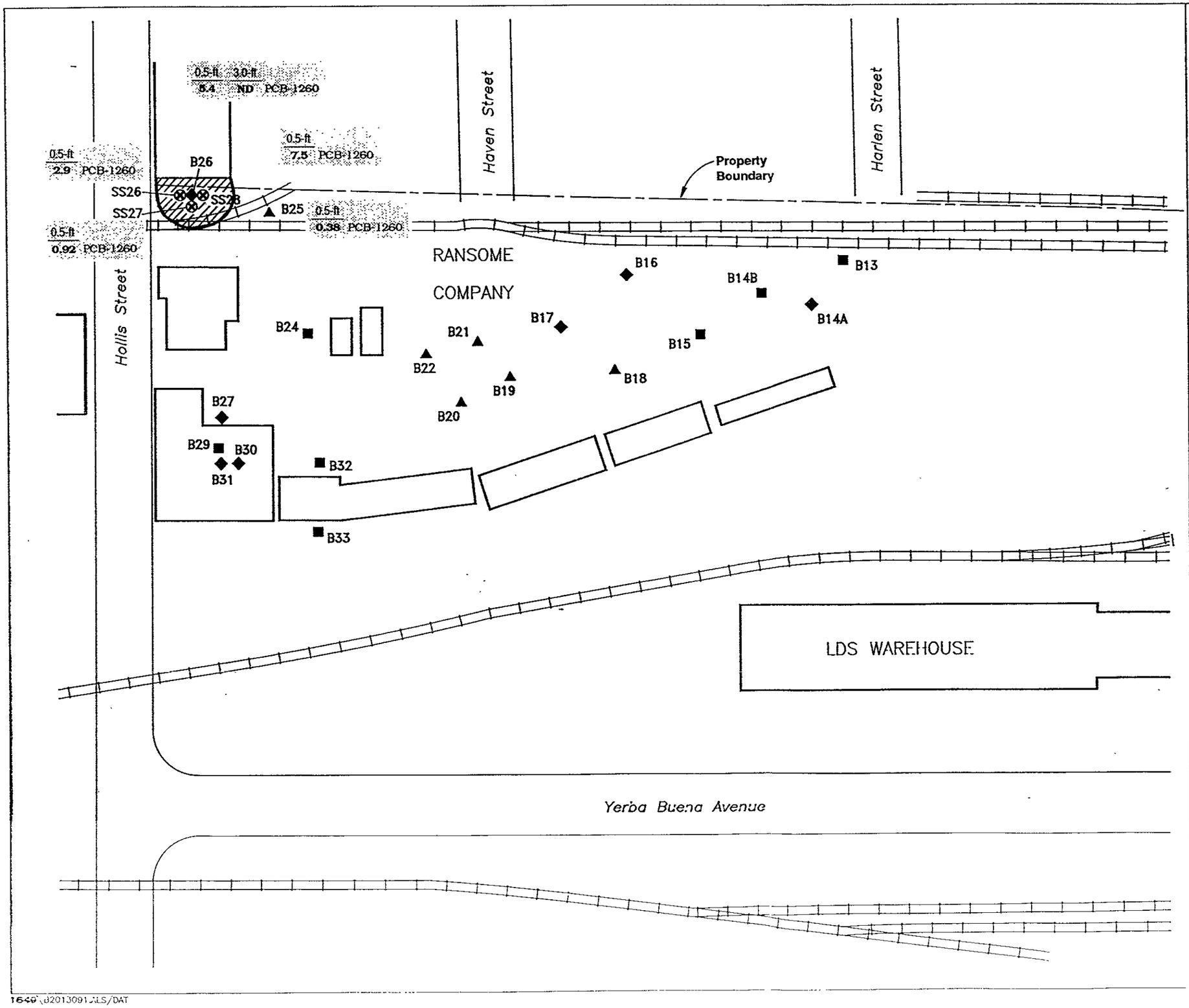

EXPLANATION

- ▲ Phase I shallow soil sampling location (less than 5 feet)
- ■ Phase I deeper soil sampling location (6 to 13 feet)
- ◆ Phase I deeper soil sampling location (6 to 13 feet) and grab ground—water sample location
- ⊗ Phase II soil sampling location for PCB analysis
- Approximate areal extent of visibly oil-stained soil
- 0.5-ft / 5.4 PCB-1260 — Depth of sample; Chemical compound; Concentration in mg/kg

NOTE: Estimated areal extent of PCB—affected soil was based on sampling results and visual observation of oil—stained soil.

0 40 80 FEET

Figure 6 :

PCB DETECTED IN SOIL SAMPLES (mg/kg) IN AREA B AND APPROXIMATE AREAL EXTENT OF VISIBLY OIL-STAINED SOIL

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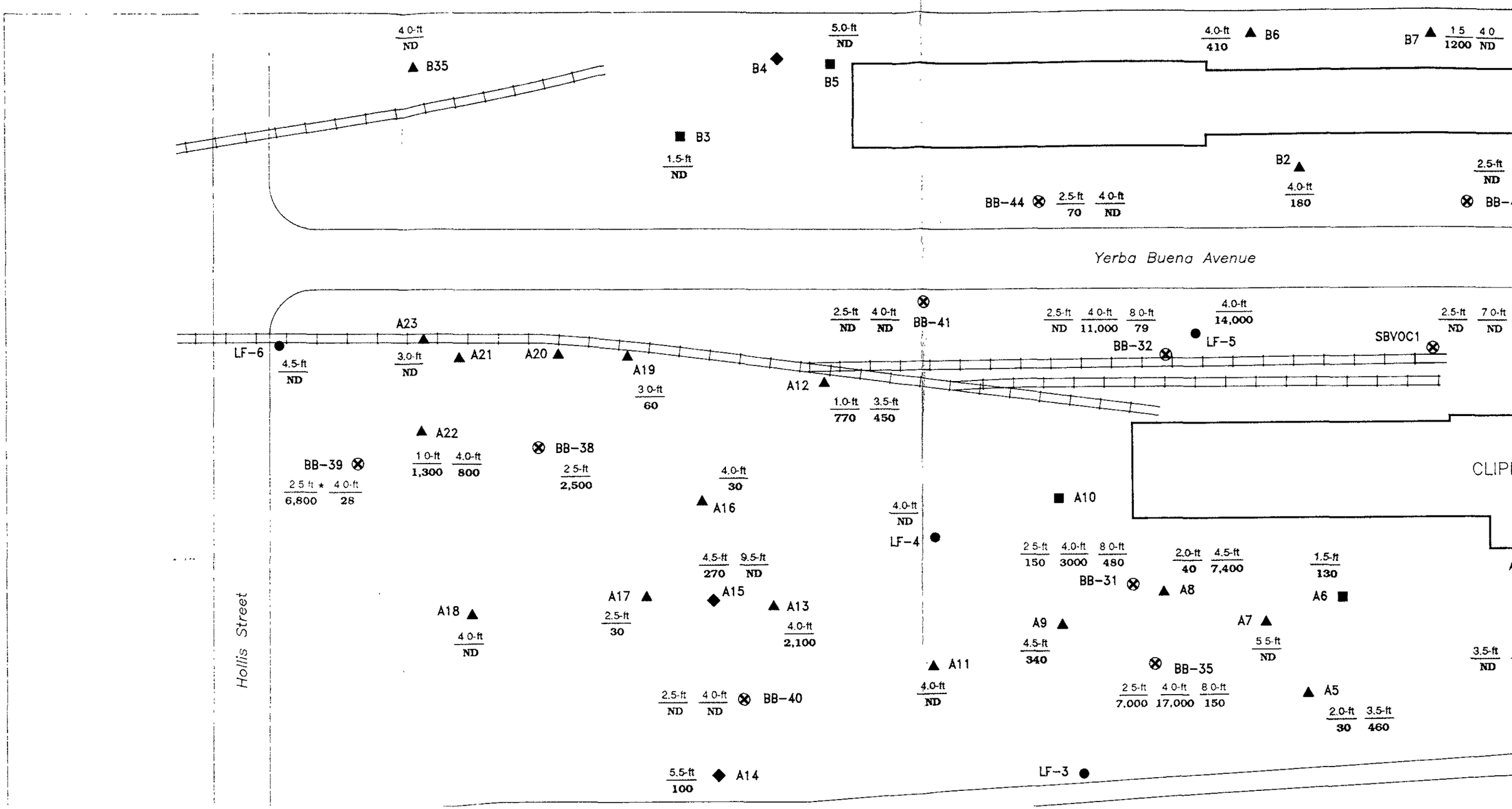
B35
4.0-ft
ND
B4
B5
5.0-ft
ND
B3
1.5-ft
ND
B6
4.0-ft
410
B7
1.5
1200
4.0
ND
B2
4.0-ft
180
2.5-ft
ND
BB-44
2.5-ft
70
4.0-ft
ND
Yerba Buena Avenue
LF-6
4.5-ft
ND
A23
3.0-ft
ND
A21
A20
A19
3.0-ft
60
A12
1.0-ft
770
3.5-ft
450
2.5-ft
ND
4.0-ft
ND
BB-41
2.5-ft
ND
4.0-ft
11,000
8.0-ft
79
4.0-ft
14,000
LF-5
BB-32
2.5-ft
ND
7.0-ft
ND
SBVOC1
CLIPI
A22
1.0-ft
1,300
4.0-ft
800
BB-38
2.5-ft
2,500
BB-39
2.5 ft * 4.0-ft
6,800 28
4.0-ft
30
A16
A10
4.0-ft
ND
LF-4
4.5-ft
270
9.5-ft
ND
A17
2.5-ft
30
A15
A13
4.0-ft
2,100
A18
4.0-ft
ND
2.5-ft
150
4.0-ft
3000
8.0-ft
480
BB-31
2.0-ft
40
4.5-ft
7,400
A8
1.5-ft
130
A6
A9
4.5-ft
340
A7
5.5-ft
ND
3.5-ft
ND
A11
4.0-ft
ND
BB-35
2.5-ft
7,000
4.0-ft
17,000
8.0-ft
150
A5
2.0-ft
30
3.5-ft
460
2.5-ft
ND
4.0-ft
ND
BB-40
Hollis Street
5.5-ft
100
A14
LF-3

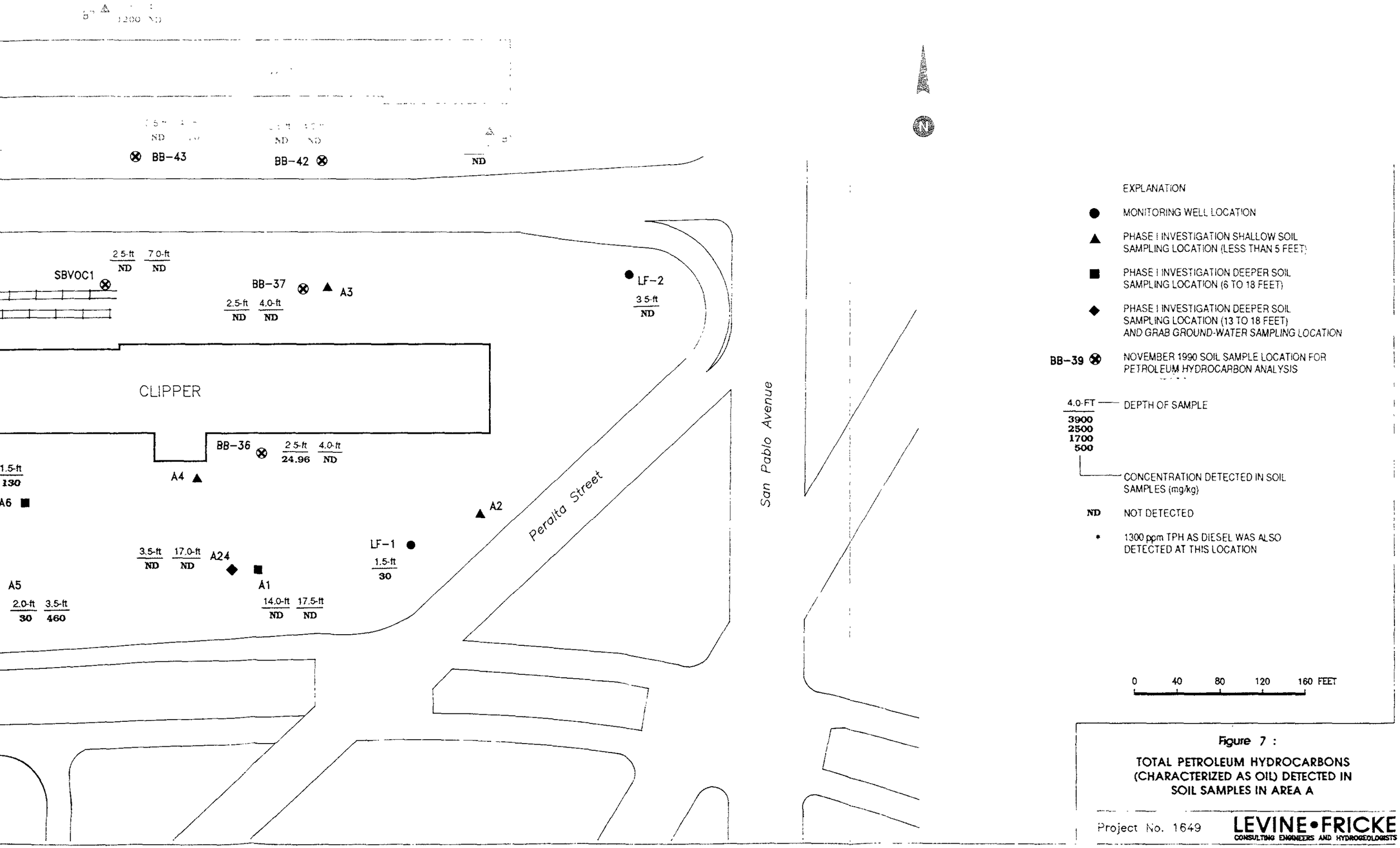

Figure 7 :

TOTAL PETROLEUM HYDROCARBONS (CHARACTERIZED AS OIL) DETECTED IN SOIL SAMPLES IN AREA A

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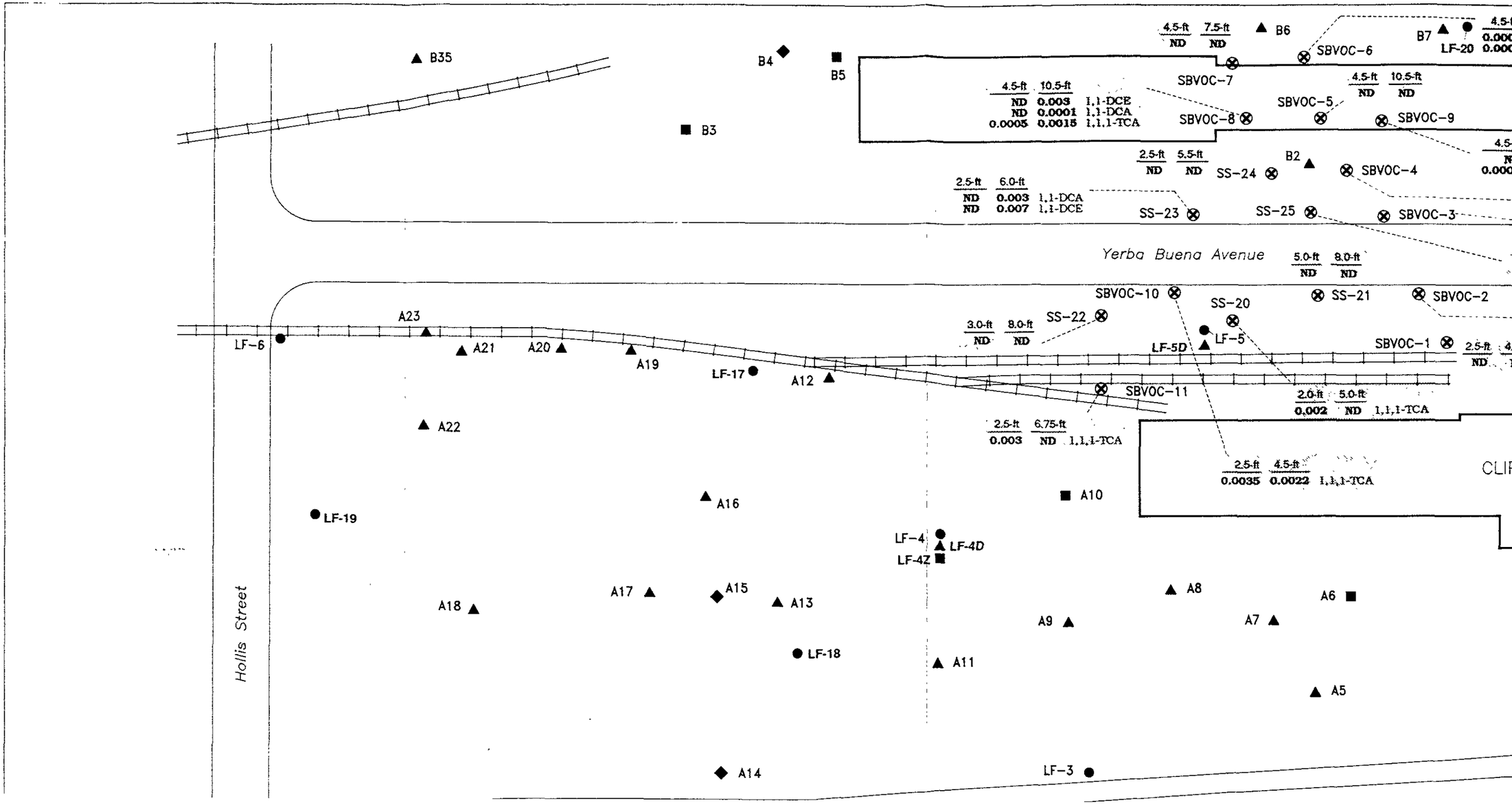

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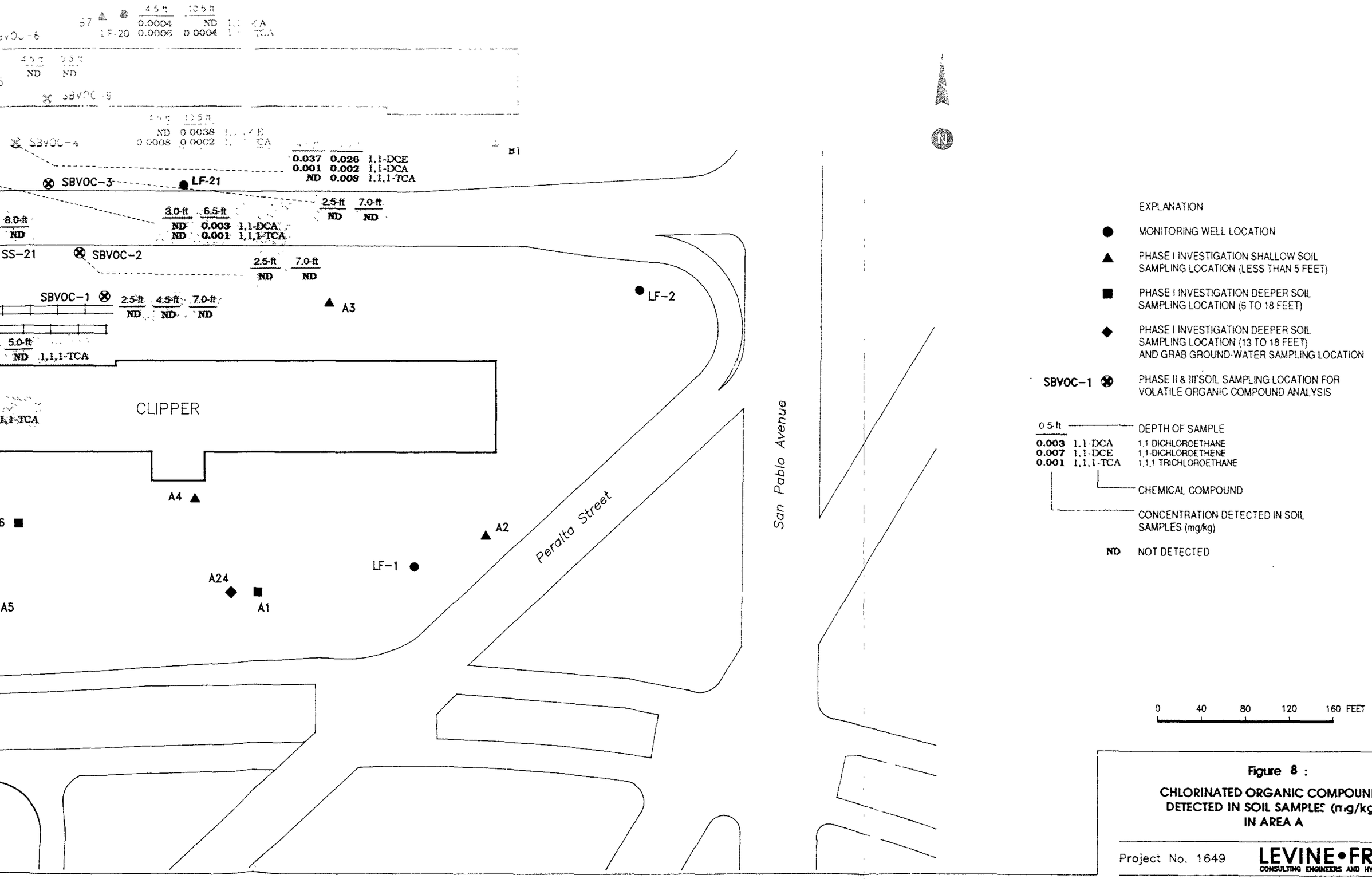

Figure 8 :

CHLORINATED ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES (mg/kg) IN AREA A

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EXPLANATION

- Phase II borehole location for perched ground-water sampling
- Phase III borehole location for soil sample collection
- Monitoring well location
- Phase I soil sampling and grab ground-water sampling location
- Property boundary
- Approximate areal extent of TPH-affected perched water and soil

Water — Water from perched zone
4 — Concentration (ppm)

Soil
4.75-ft | 7.5-ft — Depth
42.0 | 120.2 — Concentration (ppm)

NS Not sampled

ND Not detected

Notes
1) TPH (Total Petroleum Hydrocarbons) were characterized by Friedman & Bruya of Seattle, Washington, to be a mixture of hydrocarbons resembling mineral spirits, polynuclear aromatics, phenols and fatty acids
2) Perched water not detected in Phase III boreholes (BB9 - BB13)
3) Ground surface of Hollis Street is approximately 3 to 4 feet higher than railroad track area near LF-9

RAILROAD TRACKS

DRY BB5

DRY BB2

Water ND BB7 C26 Soil 3.0-ft ND

BB6 Water 4

Water NS BB4

Water 7.8 LF-9 Ground Water 0.5

BB3 Water 1

BB1 Water 3

Fence (property line between Catellus and Bashland properties)

APPROXIMATE LOCATION OF UNDERGROUND TANKS

Water ND BB8

Water ND C29

BASHLAND PROPERTY

DRY BB13 Soil 4.75-ft 42.0 | 7.5-ft 120.2

Soil 4.25-ft ND | 7.5-ft 154.9 BB10 DRY

Soil 4.75-ft 118.06 | 7.5-ft 55.0 BB12 DRY

DRY BB11 Soil 4.75-ft 42.7 | 7.0-ft 39.7

DRY BB9 Soil 4.75-ft 76.4 | 7.5-ft ND

HOLLIS STREET

N

0 4 8 FEET

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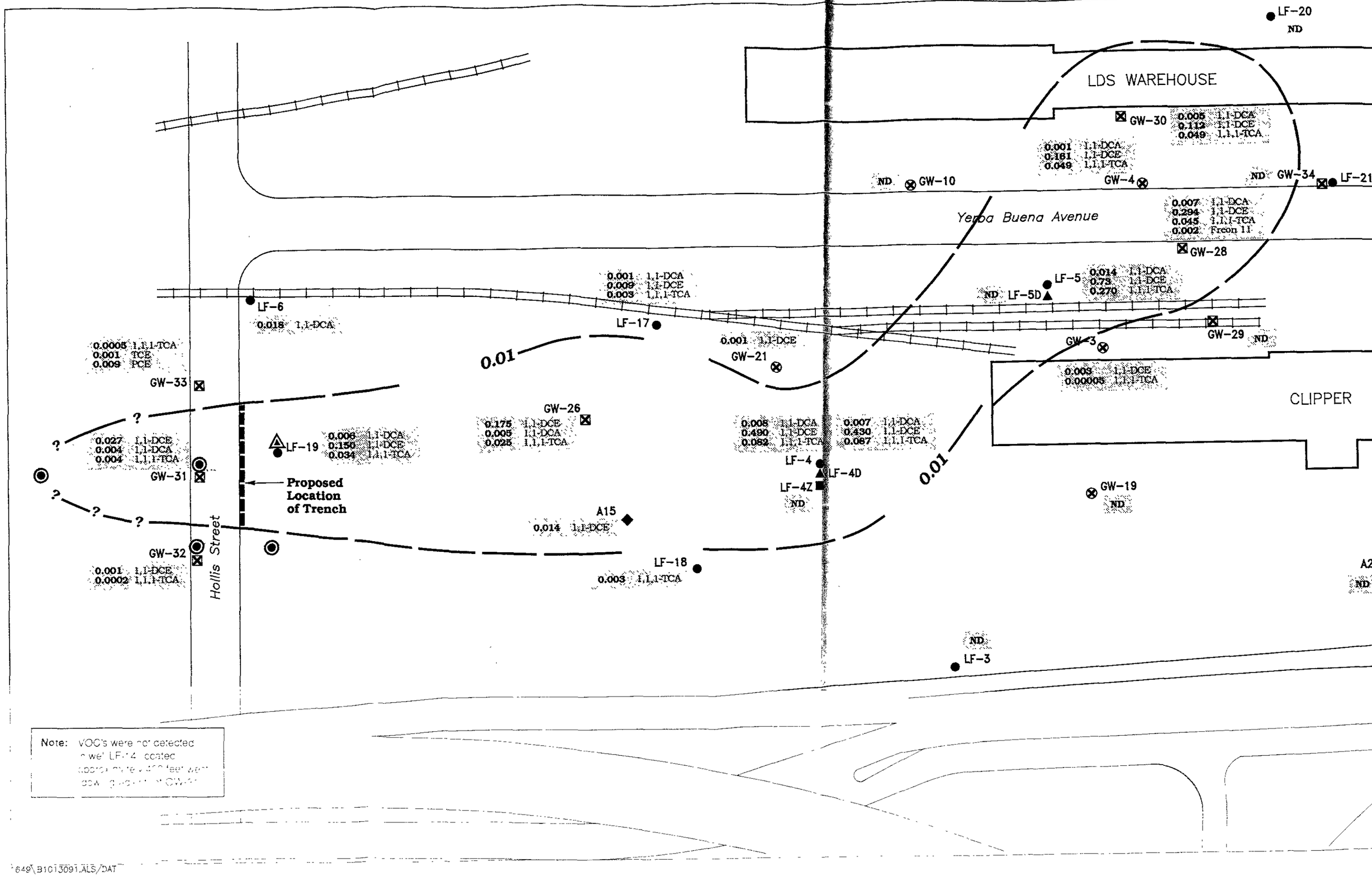
Figure 9 :
TOTAL PETROLEUM HYDROCARBONS (TPH) DETECTED IN PERCHED GROUND-WATER AND SOILS (ppm) NEAR LF-9 IN AREA C AND APPROXIMATE EXTENT OF TPH-AFFECTED PERCHED WATER AND SOIL

Project No. 1649

LEVINE•FRICKE
ENGINEERS, HYDROGEOLOGISTS & APPLIED SCIENTISTS

ALS 1/30/91



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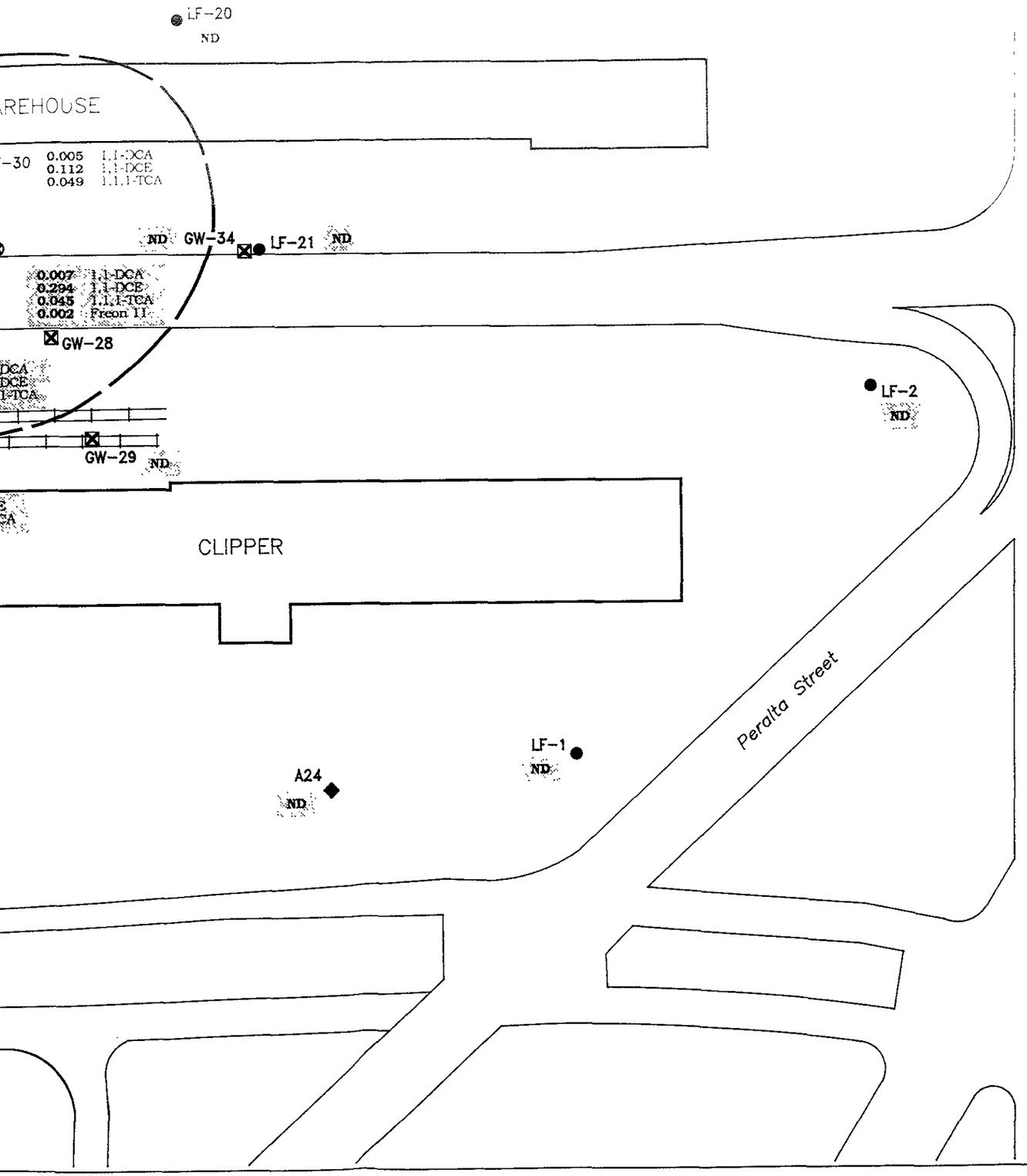

EXPLANATION

- SHALLOW (LESS THAN 25 FEET) MONITORING WELL LOCATION
- INTERMEDIATE (35 TO 45 FEET) MONITORING WELL LOCATION
- DEEPER (62 FEET) MONITORING WELL LOCATION
- PHASE I INVESTIGATION DEEPER SOIL SAMPLING LOCATION (13 TO 18 FEET) AND GRAB GROUND-WATER SAMPLE LOCATION
- SHALLOW GROUND-WATER RECONNAISSANCE SAMPLING LOCATION (PHASE II)
- SHALLOW GROUND-WATER RECONNAISSANCE SAMPLING LOCATION (PHASE III)
- PROPOSED SHALLOW (<25 FEET) MONITORING WELL LOCATION
- PROPOSED INTERMEDIATE-DEPTH (35 TO 45 FEET) MONITORING WELL LOCATION
- PROPOSED SHALLOW EXTRACTION TRENCH LOCATION
- ~0.01 0.01 ppm ISOCONTOUR LINE FOR 1,1-DCE

0.014 1,1-DCA
0.73 1,1-DCE
0.270 1,1,1-TCA

- CHEMICAL COMPOUND
- CONCENTRATION DETECTED IN GROUND-WATER SAMPLES (PPM)

ND NOT DETECTED

NOTES:

1. Monitoring well samples were submitted to Med-Tox Associates for volatile organic compounds analysis using EPA Method 8010.
2. Results indicated for wells LF-1, LF-2, LF-3, LF-4, LF-5, and LF-6 are from the Phase I investigation; results indicated for wells LF-17, LF-18, LF-19, and LF-20 are from Phase II investigation; results indicated for wells LF-21 and LF-4Z are from Phase III investigation.

KEY TO ABBREVIATIONS:

1,1-DCA	– 1,1-Dichloroethane
1,1-DCE	– 1,1-Dichloroethene
1,1,1-TCA	– 1,1,1-Trichloroethane
TCE	– Trichloroethene
PCE	– Tetrachloroethene

0 40 80 120 160 FEET

Figure 10 :
VOLATILE ORGANIC COMPOUNDS DETECTED IN SHALLOW GROUND-WATER SAMPLES (ppm) IN AREA A AND PROPOSED LOCATIONS FOR SHALLOW GROUND-EXTRACTION TRENCH AND ADDITIONAL MONITORING WELLS

Project No. 1649 LEVINE•FRICKE CONSULTING ENGINEERS AND HYDROGEOLOGISTS