Site Conceptual Model and Work Plan

UCSF Benioff Children's Hospital

747 52nd Street

Oakland, California

Site Cleanup Program Case RO0003211

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Ninyo & Moore
Geotechnical & Environmental Sciences Consultants

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747 52nd Street
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August 15, 2017 | Project No. 402654002

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UCSF Benioff Children's Hospital
Oakland

September 14, 2017

To: Ms. Tamami French
Alameda County Environmental Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Re: Perjury Statement
Site Conceptual Model
UCSF Children's Hospital Oakland Redevelopment
747 52nd Street
Oakland, California 94609
Cleanup Program Site No. RO0003211
Geotracker Global ID No. T10000009148

I declare, under penalty of perjury, that the information or recommendations contained in the attached report are true and correct to best of my knowledge.

Mr. Doug Nelson, MBA
Vice President Development, Construction, and Real Estate Services
747 52nd Street
Oakland, California 94609

CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

Ninyo & Moore was retained by UCSF Benioff Children's Hospital (UCSF) to prepare a Site Conceptual Model (SCM) and Work Plan for the property located at 747 52nd Street, Oakland, County of Alameda, California (Site). The SCM includes a chronology of previous environmental investigations, nature and distribution of impacts to soil and groundwater, analysis of receptors and exposure pathways for Site constituents of concern (COCs) and the recommended screening levels. The Work Plan recommends additional groundwater sampling to further evaluate the possible source and horizontal extent of volatile organic compounds (VOCs), including tetrachloroethene (PCE). PCE was reported during a prior groundwater sampling event on Site.

1.1 Site Background

The subject Site is located on the block bounded by 52nd Street to the south, Martin Luther King Jr. Way to the west, 53rd Street to the north and Dover Street to the east (Figure 1). All buildings on this block are owned by UCSF, except for the private residence located at 724 52nd Street (Figure 2). Table 1 describes the property uses. UCSF is currently redeveloping the property. Activities include constructing a 6-story outpatient clinic (OPC2) with parking on the ground floor and installing an underground storage tank (UST) in the service yard (Figure 2). The Site has been an open Site Cleanup Program case since July 2016.

Previous investigations included Phase I Environmental Site Assessments (ESAs) performed in 2008 and 2014. During 2015, Ninyo & Moore collected soil and/or groundwater samples from the OPC2 area, the service yard and a utility trench soil stockpile to classify the soil for off-Site reuse or disposal and to evaluate the groundwater for batch discharge. Table 2 presents the sampling rationale for the sampling and analysis plan (SAP) implemented during the 2015 investigation.

A description of the Site environmental investigations, including a summary of the findings and conclusions, are presented in the SCM section of this report.

1.2 Purpose

This SCM and Work Plan were requested by Alameda County Department of Environmental Health (ACDEH) during a May 15, 2017 meeting attended by UCSF; Cox, Castle & Nicholson; ACDEH and Ninyo & Moore.

2 SITE CONCEPTUAL MODEL

2.1 Prior Investigations

2.1.1 The Source Group, Inc. Phase I ESA

The Source Group, Inc. (SGI) completed a Phase I ESA prior to demolition and reconstruction at the in-patient hospital located south of 52nd Street in Oakland, California. They reported the following conclusions in their Phase I ESA report (SGI, 2008):

- No recognized environmental concerns (RECs) were identified.
- A UST was reportedly removed from Wing B of the in-patient hospital but no additional information was available.
- Several documented fuel or solvent releases were identified within one-eighth of a mile from the Site.
- SGI recommended that soil or water be further characterized prior to off-Site disposal.
- Buildings constructed prior to the 1980s may contain lead or asbestos.

2.1.2 Fugro Consultants, Inc. Phase I ESA

Fugro Consultants, Inc. (Fugro) completed a Phase I ESA prior to the OPC2 redevelopment. They reported the following conclusions in their Phase I ESA report (Fugro, 2014):

- No RECs were identified.
- Buildings constructed prior to the 1980s may contain asbestos containing materials or lead-based paint, and Fugro recommended surveys be conducted prior to redevelopment.
- Fugro noted a limited amount of hazardous materials for janitorial and maintenance uses and recommended that they be properly disposed of prior to redevelopment.

2.1.3 Ninyo & Moore Waste Characterization Investigations

During November 2015, Ninyo & Moore collected soil and groundwater samples to classify the soil for off-Site reuse or disposal and to evaluate whether groundwater would be acceptable for discharge into East Bay Municipal Utility District's (EBMUD's) sanitary sewer system.

On November 18, 2015, Ninyo & Moore collected four soil samples from a stockpile, which was generated by excavating a utility trench in the sidewalk adjacent to the Site along Martin Luther King Jr. Way, and advanced four soil borings (B-1 through B-4) within the

OPC2 building footprint and the service yard (Figure 2). The borings ranged from 16 to 30 feet below ground surface (bgs). Boring logs are included as Appendix A. Groundwater was encountered at 25 feet bgs in boring B-2 and at 21 feet bgs in B-3. Soil samples were collected from all four borings and groundwater samples were collected from borings B-2 and B-3. On November 19, 2015, Ninyo & Moore collected 16 soil samples from the OPC2 footprint and 4 soil samples in the service yard using a hand auger.

Soil samples were analyzed per the Department of Toxic Substances Control *Information Advisory – Clean Imported Fill Material*. As such, discrete samples were analyzed for total petroleum hydrocarbons as gasoline (TPHg), volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs); and composite samples were analyzed for total petroleum hydrocarbons as motor oil (TPHmo), total petroleum hydrocarbons as diesel (TPHd), California Title 22 metals, organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and asbestos. Additional metal solubility analyses were performed as-needed for waste classification. Groundwater samples were analyzed per EBMUD's *Wastewater Control Ordinance* for TPHd, TPHmo, TPHg, VOCs, SVOCs and California Title 22 dissolved metals. The sampling and analysis rationale is presented on Table 2, and results are shown on Tables 3 through 7. The analytical results are discussed in detail below in Section 2.2.

As detailed in Ninyo & Moore's January 13, 2016 *Soil Sampling and Characterization Report*, the soil from the utility trench stockpile and the service yard was classified as non-hazardous, and groundwater was deemed acceptable for discharge to the sanitary sewer under an EBMUD Special Discharge Permit. Because total lead concentrations and the resulting solubility analysis exceeded California Code of Regulations (CCR), Title 22 Division 4.5 Characterization of Hazardous Waste screening criteria (hazardous-waste screening criteria), soil in the northeastern portion of the OPC2 footprint (sample S-2-A-2) was classified as non-Resource Conservation and Recovery Act (RCRA) hazardous for off-Site disposal. Soil in the other areas of the OPC2 footprint was classified as non-hazardous.

On January 11, 2016, additional lead sampling (samples CSS-1, CSS-2 and CSS-3) was conducted to determine the western extent of the soil classified as hazardous for disposal. All three lead results were reported below hazardous-waste screening criteria, and on January 20, 2016, approximately 180 cubic yards were excavated and disposed of as non-RCRA hazardous waste. Based on discussions with field personnel, the locations of the excavation and confirmation samples presented on Figure 2 were corrected from those

submitted in previous reports. Following excavation, two confirmation samples (CSS-4 and CSS-5) were collected from the bottom of the excavation at 4 feet bgs. The remainder of the OPC2 footprint was excavated to approximately 1.5 feet bgs to facilitate construction, generating approximately 1,600 cubic yards of soil, which were disposed of off Site as non-hazardous waste. The service yard and UST were not excavated at this time.

2.2 Nature and Distribution of Impacts

An evaluation of COC occurrence is presented below.

2.2.1 TPH

TPHmo was detected in six composite soil samples collected from the OPC2 footprint, service yard and utility trench stockpiles at concentrations ranging from 85 to 870 milligrams per kilogram (mg/kg). TPHd was detected in eight composite samples collected from the OPC2 footprint, service yard and utility trench stockpiles at concentrations ranging from 1.3 to 170 mg/kg. TPHg was detected in one discrete sample from the service yard at 0.38 mg/kg. None of these detections exceed the Tier 1 soil San Francisco Bay Regional Water Quality Control Board environmental screening levels (ESLs). Results are presented on Table 3.

No TPH was detected in the groundwater sample from B-2, and the sample collected from B-3 contained 930 micrograms per liter (µg/L) of TPHmo, 220 µg/L of TPHd and 52 µg/L of TPHg. These detections do not exceed the Odor Nuisance level groundwater ESLs for non-drinking water. Results are presented on Table 4.

2.2.2 VOCs

Toluene was the only VOC detected in soil samples. It was detected two discrete samples from the service yard at 0.023 and 0.081 mg/kg; these detection are below the Tier 1 soil ESL. No naphthalene was detected in soil samples. Results are presented on Table 3.

Toluene was detected in both groundwater samples B-2 and B-3 at concentrations of 4.3 and 3.8 µg/L, respectively. PCE was detected in sample B-3 at 44 µg/L. These detections are below the vapor intrusion human health risk ESLs for sites with deep groundwater and fine to coarse soil types. Results are presented on Table 4 and PCE concentrations are shown on Figures 2 and 3.

2.2.3 SVOCs

No SVOCs, including naphthalene, were detected in soil or groundwater during these investigations.

2.2.4 Metals

Arsenic was detected in all the samples analyzed at concentrations ranging from 2.6 to 20 mg/kg. All these detections exceed the ESL, but all except composite sample S-2-A-2, S-2-B-1, S-2-C-2, S-2-D-1.5 are below the average background concentration for Bay Area soils (Duvergé, 2011). Due to the concentration in the composite sample, discrete samples S-2-A-2, S-2-B-1, S-2-C-2 and S-2-D-1.5 were analyzed for arsenic and concentrations ranged from 6.0 to 6.9 mg/kg, These are consistent with background levels and suggest that the detection in the composite sample was anomalous.

Barium, chromium, cobalt, copper, nickel, vanadium, zinc and mercury were detected in all ten soil composite samples collected at concentrations ranging from 97 to 290 mg/kg, 27 to 46 mg/kg, 4.4 to 12 mg/kg, 12 to 35 mg/kg, 26 to 61 mg/kg, 20 to 53 mg/kg, 24 to 190 mg/kg and 0.10 to 0.32 mg/kg, respectively. All detections were below the direct exposure human health risk ESLs for shallow soil at a commercial or industrial site.

Beryllium was detected in seven composite samples collected at concentrations ranging from 0.24 to 0.51 mg/kg. Cadmium was detected in seven samples collected at concentrations from 0.32 to 0.74 mg/kg. Molybdenum was detected in five samples from 0.44 to 1.6 mg/kg. All detections were below the direct exposure human health risk ESLs for shallow soil at a commercial or industrial site.

Lead was detected in all ten composite samples at concentrations ranging from 8.4 to 150 mg/kg. All detections were below the direct exposure human health risk ESLs for shallow soil at a commercial or industrial site. To classify soil for waste disposal, samples with total lead concentrations of 50 mg/kg or greater were analyzed using a waste extraction test (WET), and WET lead concentrations ranged from 0.62 to 9.8 milligrams per liter (mg/L). Based on the WET lead results, the composite sample S-2-A-2, S-2-B-1, S-2-C-2, S-2-D-1.5 was classified as non-RCRA hazardous, and the discrete samples were also analyzed for WET lead. The discrete samples contained 0.58 to 16 mg/L WET lead, with the highest concentration in sample S-2-A-2.

Discrete samples CSS-1, CSS-2 and CSS-3, collected to define the western extent of non-RCRA hazardous soil, contained 9.5 to 17 mg/kg total lead, and discrete confirmation samples CSS-4 and CSS-5, collected from the excavation bottom, contained 7.5 and 30 mg/kg lead, respectively. All metals in soil results are presented on Table 5.

Groundwater from boring B-2 contained 140 µg/L barium, 4.2 µg/L cobalt, 12 µg/L molybdenum and 23 µg/L zinc. Groundwater from B-3 contained 110 µg/L barium, 34 µg/L

molybdenum and 24 mg/L zinc. None of these detections exceed the maximum contaminant levels. Results are presented on Table 6.

2.2.5 PCBs

No PCBs were detected in soil, and groundwater samples were not analyzed for PCBs.

2.2.6 OCPs

4,4-Dichlorodiphenyldichloroethane (DDD) was detected in three soil samples at concentrations ranging from 0.0024 to 0.0078 mg/kg. 4,4-Dichlorodiphenyldichloroethylene (DDE) was detected in four soil samples at concentrations ranging from 0.0036 to 0.028 mg/kg. 4,4-Dichlorodiphenyltrichloroethane (DDT) was detected in seven soil samples at concentrations ranging from 0.0020 to 0.014 mg/kg. alpha-Chlordane was detected in two samples at 0.0032 and 0.0063 mg/kg. Chlordane (technical) was detected in one sample at 0.090 mg/kg. Dieldrin was also detected in one sample at 0.0025 mg/kg. gamma-Chlordane was detected in three samples from 0.0028 to 0.0059 mg/kg. None of these detections was above the direct exposure human health risk ESLs for shallow soil at a commercial or industrial site. Soil results are presented on Table 6. Groundwater samples were not analyzed for OCPs.

2.2.7 Asbestos

Asbestos was not detected in soil.

2.3 Nearby Cases and Groundwater Flow Directions

The Phase I ESAs identified several nearby open and former cases with petroleum and/or PCE releases and groundwater monitoring data. Ninyo & Moore reviewed these data to determine groundwater flow direction in the area and identify possible sources for the PCE present in groundwater beneath the Site. Based on this data review, while there is some variation of groundwater flow, the predominant regional direction appears to be westerly, toward San Francisco Bay. Former dry cleaning properties east of the subject Site are a possible source of PCE in groundwater beneath the Site.

Figure 1 identifies the nearby site locations and presents groundwater flow directions based on their monitoring data.

2.3.1 Property 1. Former BP Service Station, 5425 Martin Luther King Jr. Way, Oakland, California

Reports for this closed case indicate COCs consistent with a gasoline release and show a westerly groundwater flow direction (Broadbent, 2010b).

2.3.2 Property 2. Atlantic Richfield Company Station, 5131 Shattuck Avenue, Oakland, California

Reports for this closed case indicate COCs consistent with a gasoline release and show a southwesterly groundwater flow direction (Broadbent, 2010a).

2.3.3 Property 3. Children's Hospital Oakland, 4701 Martin Luther King Jr. Way, Oakland, California

West Environmental Services & Technology, Inc.'s 2015 *Supplemental No Further Action Request* documents investigations and groundwater monitoring associated with heating oil and gasoline USTs. The predominant groundwater flow direction is northwesterly.

2.3.4 Property 4. Berkeley Land Company, 51st & Telegraph Avenue, Oakland, California

Reports from this closed case indicate that the groundwater flow direction is west-northwest. Soil excavation and groundwater removal were conducted during 1993, and 360 µg/L PCE were detected in 1995. Kaprealian Engineering, Inc.'s April 12, 1995 *Quarterly Report* references two dry cleaners within 1000 feet of the site and a regional up-gradient VOC plume.

2.3.5 Property 5. Dollar Cleaners, 4860-4868 Telegraph Avenue, Oakland, California

This site was occupied by a dry cleaner from 1988 to 2008. The case was closed in 2016 with land use restrictions, following soil vapor extraction from 2013 to 2015. Up to 1,100 µg/L PCE was detected; 38 mg/L following remediation. Groundwater data show a southwesterly flow direction.

2.4 Receptor and Exposure Pathway Analysis

2.4.1 Potentially Exposed Populations

Possible human receptors include Site visitors, such as hospital patients and family members, hospital staff and construction workers. OPC2 is an outpatient facility, so there will not be residents. The service yard will be accessible to hospital and construction workers.

Plans for OPC2 show a 6-story building with parking on the ground floor. Utility rooms are present along the north wall of the ground floor and elevators are present in the northeastern corner (HDR, 2016). These are shown on Figure 2 and the cross section presented as Figure 3.

Adjacent buildings are hospital-owned and commercial in nature, with the exception of the private residence located at 724 52nd Street. None of the buildings have basements.

2.4.2 Exposure Pathways

The United States Environmental Protection Agency (EPA) has identified three basic exposure pathways in which a person may come into contact with a hazardous substance: inhalation, ingestion, and direct contact. Following is an evaluation of Site specific conditions with respect to the main exposure pathways.

Inhalation: Human inhalation of harmful chemicals could potentially originate from two sources: wind-blown dust and vapor consisting of volatilized chemicals. The subject Site is an unlikely source of wind blown dust because the majority is within a building and covered with concrete slab. The vapor inhalation pathway is potentially complete and will be evaluated below.

Ingestion: Typical sources of ingestion of harmful chemicals include consumption of contaminated drinking water, consumption of garden plants that have taken up chemicals from soil and groundwater and direct consumption of soil. Groundwater in the subject Site vicinity is not presently used for drinking water nor does the land use include garden plants. Direct consumption of contaminated soil is not likely because the majority of the Site is covered by buildings and a concrete slab. The groundwater consumption pathway is incomplete, and the soil consumption pathway is unlikely.

Direct Dermal Contact: Again, the majority of the site is covered by buildings and a concrete slab. However, the dermal contact exposure pathway is potentially completed, especially for construction workers who could potentially be exposed to contaminants in soil during redevelopment, and Site maintenance workers.

2.5 Environmental Screening Criteria

To evaluate the possible complete pathways identified above, COCs detected in soil and groundwater beneath the Site were compared to ESLs.

2.5.1 Soil

To address potentially complete inhalation, ingestion and direct dermal contact pathways, COCs detected in Site soils were compared to Tier 1 ESLs or direct exposure human health risk ESLs for shallow soil exposure at a commercial or industrial property and for construction workers.

TPHmo, TPHd, TPHg and toluene detections in soil were all below Tier 1 soil ESLs.

Barium, beryllium, cadmium, cobalt, copper, molybdenum, nickel, vanadium, zinc, and mercury were also below Tier 1 ESLs. There is no established ESL for total chromium. As discussed above, all arsenic detections exceed the ESLs; however, all but one were below typical background concentrations in Bay Area soils, and based on discrete samples, the elevated arsenic detection appears to be anomalous. One lead detection, from a composite sample in the service yard, exceeds the Tier 1 ESL but it is below the both the commercial and construction worker direct exposure ESLs (Table S-1).

DDD, DDE, DDT and chlordane were below Tier 1 ESLs. There is no established ESL for alpha-chlordane or gamma-chlordane. One dieldrin detection, from a composite sample in the OPC2 area, exceeds the Tier 1 ESL but it is below the both the commercial and construction worker direct exposure ESLs (Table S-1).

2.5.2 Groundwater

To address potentially complete inhalation pathway, COCs detected in Site groundwater were compared to groundwater vapor intrusion human health risk levels (Table GW-3), where possible.

TPHg and toluene detections in groundwater were below Tier 1 groundwater ESLs. The PCE detection in groundwater from boring B-3, in the service yard, exceeded the Tier 1 ESL but was below the groundwater vapor intrusion human health risk level for deep groundwater with fine to coarse soils at a commercial or industrial site (Table GW-3). The TPHmo and TPHd detections from boring B-3 also exceeded Tier 1 ESLs, and there are no vapor intrusion ESLs for TPH. The ESL tables note that TPHmo is not soluble and TPHmo detections in water most likely are petroleum degredates, and they advised adding the TPHmo and TPHd detections and comparing the result to the TPHd ESL. The total of the TPHmo and TPHd detections are below both the TPHd gross contamination level (Table GW-4) and the TPHd odor nuisance level for non-drinking water (Table GW-5).

Barium, molybdenum and zinc were below Tier 1 ESLs. The cobalt detection in boring B-2, in the OPC2 footprint, exceeds the Tier 1 ESL. There are no vapor intrusion ESLs for cobalt and this detection is below the maximum contaminant level and human health risk based ESL (Table GW-1).

2.6 Conclusions and Recommendations

Two Phase I ESAs have been completed, and an investigation was completed to characterize soil for off-Site disposal and groundwater for discharge into the sanitary sewer system. Following the investigation, the OPC2 area was excavated to 1.5 to 4 feet bgs and both non-

hazardous and non-RCRA hazardous soils were removed from the Site. The OPC2 building is under construction, and the UST will be installed in the service yard soon.

The residual COCs in Site soil and groundwater do not appear to pose a risk to the Site occupants. Additional soil sampling and soil vapor sampling are not warranted at this time. While we note that all COC concentrations in groundwater are below the appropriate ESLs, the source and extent of the PCE detected in boring B-3 are unknown, and groundwater conditions may have changed since samples were collected during 2015.

The following section proposes a groundwater investigation to fill this data gap.

3 WORK PLAN

This Work Plan will address the data gap identified above and provide further data regarding the possible source and extent of the PCE detected in groundwater from boring B-3. We note that groundwater from B-2, southwest and in the likely general down-gradient direction of B-3 did not contain PCE.

3.1 Scope of Work

The following Scope of Work for the Work Plan includes a discussion of sample locations and sampling methodologies, laboratory analytical methods and reporting procedures.

3.1.1 Soil and Groundwater Sampling Locations

Ninyo & Moore proposes to advance three borings at the locations shown on Figure 2. The borings are proposed on UCSF properties and are roughly north, east and south of boring B-3.

3.1.2 Project Setup and Pre-field Activities

Permits

Ninyo & Moore will obtain a drilling permit from the Alameda County Public Works Agency prior to sampling activities on Site.

Site Specific Health and Safety Plan

A Site Specific Health and Safety Plan (SSHSP) will be prepared by Ninyo & Moore and will be reviewed by field personnel prior to the start of each day of field work. Field personnel will sign the acknowledgement form attached to the SSHSP indicating that they understand and will abide by its provisions.

Boring Marking and Underground Service Alert Notification

Ninyo & Moore will conduct a Site reconnaissance to visually evaluate and mark boring locations. Ninyo & Moore will contact Underground Service Alert at least 3 working days prior to the start of drilling to identify subsurface utilities in the vicinity of the proposed borings. A private utility locating subcontractor will also be retained to clear the boring locations prior to subsurface activities.

3.1.3 Soil and Groundwater Sampling Procedures

Borings will be advanced using a direct push drill rig to first encountered groundwater. Based on the previous investigation, groundwater may be as deep at 20 to 25 feet bgs. Sampling equipment will be decontaminated between sample locations using a steam cleaner to minimize the likelihood of cross contamination. Each soil sample collected will be screened using a photo-ionization detection meter for organic vapors. The results will be included on boring logs prepared on Site. Soil samples will be collected in plastic sleeves or laboratory supplied glass jars, sealed, labeled, placed in a cooler on ice and transported to a NELAP certified environmental laboratory using standard chain-of-custody procedures. Groundwater samples for analysis of metals will be collected in containers preserved with hydrochloric acid.

3.1.4 Laboratory Analysis

Select soil samples and groundwater samples will be analyzed for VOCs using EPA Method 8260B.

3.1.5 Investigation Derived Waste

Soil cuttings and decontamination rinsate water resulting from boring and sampling activities will be contained in 55-gallon drums which will be stored at the Site until the waste has been characterized and can be transported for disposal.

3.1.6 Reporting

The results of the soil and groundwater testing will be presented in an Investigation Report. The Investigation Report will include the following:

a. Introduction/project description
b. Investigative methods
c. Investigative results and field observations
d. Conclusions and recommendations
e. Summarized laboratory data tables
f. Site Plans depicting boring locations
g. Figures depicting analytical results
h. Appendices including laboratory reports and chain-of-custody documentation

4 LIMITATIONS

The environmental services described in this report have been conducted in general accordance with current regulatory guidelines and the standard-of-care exercised by environmental consultants performing similar work in the project area. No warranty, expressed or implied, is made regarding the professional opinions presented in this report. Variations in Site conditions may exist and conditions not observed or described in this report may be encountered during subsequent activities.

The environmental interpretations and opinions contained in this report are based on the results of laboratory tests and analyses intended to detect the presence and concentration of specific chemical or physical constituents in samples collected from the subject Site. The testing and analyses have been conducted by an independent laboratory which is certified by the State of California to conduct such tests. Ninyo & Moore has no involvement in, or control over, such testing and analysis. Ninyo & Moore, therefore, disclaims responsibility for any inaccuracy in such laboratory results.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information, or has questions regarding content, interpretations presented, or completeness of this document.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

5. REFERENCES

Bureau Veritas North America, Inc., 2015, Semi-Annual Groundwater Monitoring Report—Second Quarter 2015, Dollar Cleaners, 4860-4868 Telegraph Avenue, Oakland, Alameda County, California (RWQCB File No. 01S0675), August 4.

Broadbent & Associates, Inc., 2010. Fourth Quarter 2009 Ground-Water Monitoring Report, Atlantic Richfield Company Station #6148, 5131 Shattuck Avenue, Oakland, California, ACEH Case #RO0000077, January 5.

Broadbent & Associates, Inc., 2010, Second Quarter 2010 Ground-Water Monitoring Report, Former BP Service Station #11127, 5425 Martin Luther King Jr. Way, Oakland, California, ACEH Case #RO0000241, July 27.

Department of Toxic Substances Control, 2001, Information Advisory – Clean Imported Fill Material, October.

Duvergé, 2011, Establishing Background Arsenic in Soil of the Urbanized San Francisco Bay Region, Master's Thesis, San Francisco State University, December.

East Bay Municipal Utility District, 2013, Wastewater Control Ordinance, August 22.

Fugro Consultants, Inc., 2014, Phase I Environmental Site Assessment Report, CHRCO Outpatient Center 2 (OPC2), Within Block Bounded by MLK Jr. Way, Dover Street, 52nd and 53rd Streets, Oakland, California, May 23.

HDR, 2016, Contract Drawings for Outpatient Clinic 2, UCSF Benioff Children's Hospital Oakland, June 16.

Kaprealian Engineering, Inc., 1995, Quarterly Report, Berkeley Land Company, 51st & Telegraph Avenue, Oakland, California, April 12.

Ninyo & Moore, 2016, Soil Sampling and Characterization Report, UCSF Benioff Children's Hospital Outpatient 2 Clinic, 747 52nd Street, Oakland, California, January 13.

Ninyo & Moore, 2016, Report of Soil Characterization and Confirmation Sampling Results, Outpatient 2 Clinic Building Area, UCSF Benioff Children's Hospital, 747 52nd Street, Oakland, California, 94609, June 14.

San Francisco Bay Regional Water Quality Control Board, 2016, ESL Summary Tables, Revision 3, February.

The Source Group, Inc., 2008, Draft Phase I Environmental Site Assessment Report, Children's Hospital & Research Center of Oakland, 747 52nd Street, Oakland, California, August 22.

West Environmental Services & Technology, Inc., 2015, Supplemental No Further Action Request, Regional Board Case No.: 01-1724, LOP Case No. RO0000028, 4701 Martin Luther King, Jr. Way, Oakland, California, April.

Table 1. Property Use				
Address	**Current Use**	**Previous Use**	**Basement**	**Ownership**
5204 Martin Luther King Jr. Way	Outpatient 2 Clinic (under construction)	Trama Services and Neonatal Pediatric Research Group	None	USCF Benioff Children's Hospital
unknown	Parking Structure	Parking Structure	None	USCF Benioff Children's Hospital
744 52nd Street	Children's Surgery Center	Children's Surgery Center	None	USCF Benioff Children's Hospital
715 53rd Street	Medical Office Facility	Residential	None (crawl space)	USCF Benioff Children's Hospital
707 53rd Street	Vacant House	Residential	None (crawl space)	USCF Benioff Children's Hospital
5225 Dover Street	Medical Office Facility	Residential	None (crawl space)	USCF Benioff Children's Hospital
5219 Dover Street	Sport Medicine Center for Young Athletes	Residential	None (crawl space)	USCF Benioff Children's Hospital
5203 Dover Street	Supply Chain Management	Residential	None (crawl space)	USCF Benioff Children's Hospital
724 52nd Street	Residential	Residential	None (crawl space)	Privately Owned

Table 2. Rationale for Sampling and Analysis Plan

Area	Sample Identification	Soil Sample Depth (ft bgs)	Soil Sample Type	Soil Sample Analyses	Depth Groundwater Encountered (ft bgs)	Groundwater Sample Analyses	Purpose
Clinic Excavation for foundation of proposed building to a minimum of 1.5 ft bgs that includes 83 piers	B-1	3	Discrete	TPHg, VOCs, SVOCs and OCPs	Not encountered	--	Discrete soil sample for evaluation against imported fill[a] and waste classification criteria
	B-2	3 and 15	Discrete	OCPs (3 ft bgs); TPHg, VOCs and SVOCs (15 ft bgs)	25	VOCs, TPHg, TPHd, TPHmo and California Title 22 Dissolved Metals	Discrete soil sample for evaluation against imported fill[a] and waste classification criteria; groundwater sample for evaluation against batch discharge criteria
	B-1-3, -7, -13 and -20	3, 7, 13 and 20	Composite (four depths in boring)	TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil sample (of multiple depths) for evaluation against imported fill[a] and waste classification criteria
	B-2-3, -7, -15 and -18	3, 7, 15 and 18	Composite (four depths in boring)	TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil sample (of multiple depths) for evaluation against imported fill[a] and waste classification criteria
	S-1-A-2	2	Discrete	TPHg, VOCs and SVOCs	Not encountered	--	Discrete soil sample in one of four quadrants for evaluation against imported fill[a] and waste classification criteria
	S-2-A-2	2	Discrete	TPHg, VOCs and SVOCs	Not encountered	--	Discrete soil sample in one of four quadrants for evaluation against imported fill[a] and waste classification criteria
	S-3-A-2	2	Discrete	TPHg, VOCs and SVOCs	Not encountered	--	Discrete soil sample in one of four quadrants for evaluation against imported fill[a] and waste classification criteria
	S-4-A-2	2	Discrete	TPHg, VOCs and SVOCs	Not encountered	--	Discrete soil sample in one of four quadrants for evaluation against imported fill[a] and waste classification criteria
	S-1-A-2, S-1-B-1, S-1-C-1 and S-1-D-1	1 and 2	Composite (four locations)	OCPs, PCBs, TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil sample (of multiple locations) for evaluation against imported fill[a] and waste classification criteria
	S-2-A-2, S-2-B-1, S-2-C-2 and S-2-D-1.5	1 and 2	Composite (four locations)	OCPs, PCBs, TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil sample (of multiple locations) for evaluation against imported fill[a] and waste classification criteria
	S-3-A-2, S-3-B-2, S-3-C-2 and S-3-D-1	1 and 2	Composite (four locations)	OCPs, PCBs, TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil sample (of multiple locations) for evaluation against imported fill[a] and waste classification criteria
	S-4-A-2, S-4-B-1.5, S-4-C-1.5 and S-4-D-1.5	1.5 and 2	Composite (four locations)	OCPs, PCBs, TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil sample (of multiple locations) for evaluation against imported fill[a] and waste classification criteria
	CSS-1	2	Discrete	Lead	Not encountered	--	Discrete soil sample to define western extent of non-RCRA hazardous soil
	CSS-2	2	Discrete	Lead	Not encountered	--	Discrete soil sample to define western extent of non-RCRA hazardous soil
	CSS-3	2	Discrete	Lead	Not encountered	--	Discrete soil sample to define western extent of non-RCRA hazardous soil
	CSS-4-4	4	Discrete	Lead	Not encountered	--	Discrete confirmation sample for lead at bottom of non-RCRA hazardous excavation
	CSS-5-4	4	Discrete	Lead	Not encountered	--	Discrete confirmation sample for lead at bottom of non-RCRA hazardous excavation

Table 2. Rationale for Sampling and Analysis Plan

Area	Sample Identification	Soil Sample Depth (ft bgs)	Soil Sample Type	Soil Sample Analyses	Depth Groundwater Encountered (ft bgs)	Groundwater Sample Analyses	Purpose
Service Yard and Proposed UST Excavation in Service Yard planned to 2 ft bgs; excavation for UST planned to 16 ft bgs in Service Yard	B-3	1 and 15	Discrete	OCPs and PCBs (1 ft bgs); TPHg, VOCs and SVOCs (15 ft bgs)	21	VOCs, TPHg, TPHd, TPHmo and California Title 22 Dissolved Metals	Discrete soil samples for evaluation against imported fill[a] and waste classification criteria; groundwater sample for evaluation against batch discharge criteria
	B-4	1	Discrete	TPHg, VOCs and SVOCs	Not encountered	--	Discrete soil sample for evaluation against imported fill[a] and waste classification criteria
	B-3-1, -7, -11 and -15	1, 7, 11 and 15	Composite (four depths in boring)	TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil sample (of multiple depths) for evaluation against imported fill[a] and waste classification criteria
	B-4-1, -5, -10 and -15	1, 5, 10 and 15	Composite (four depths in boring)	TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil sample (of multiple depths) for evaluation against imported fill[a] and waste classification criteria
	SY-1-1	1	Discrete	TPHg, VOCs and SVOCS	Not encountered	--	Discrete soil sample for evaluation against imported fill[a] and waste classification criteria
	SY-1-1, SY-2-1, SY-3-1 and SY-4-2	1 and 2	Composite (four locations)	OCPs, PCBs, TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil sample (of multiple locations) for evaluation against imported fill[a] and waste classification criteria
Utility Trench Excavation for Utility Trench along Martin Luther King Jr. Blvd.	SP-1D	--	Discrete	TPHg, VOCs and SVOCs	--	--	Discrete soil stockpile sample for evaluation against imported fill[a] and waste classification criteria
	SP-1A, -1B, -1C and -1D	--	Composite (four samples)	OCPs, PCBs, TPHd, TPHmo, California Title 22 Metals and Asbestos	--	--	Composite soil stockpile sample for evaluation against imported fill[a] and waste classification criteria

Notes:
ft bgs - feet below ground surface
UST - underground storage tank
RCRA - Resource Conservation and Recovery Act
USEPA - United States Environmental Protection Agency
-- - not applicable
TPHg - total petroleum hydrocarbons as gasoline analyzed using USEPA Method 8260B
TPHd - total petroleum hydrocarbons as diesel analyzed using USEPA Method 8015B
TPHmo - total petroleum hydrocarbons as motor oil analyzed using USEPA Method 8015B
VOCs - volatile organic compounds analyzed using USEPA Method 8260B
SVOCs - semivolatile organic compounds analyzed using USEPA Method 8270C
OCPs - organochlorine pesticides analyzed using USEPA Method 8081A
PCBs - polychlorinated biphenyls analyzed using USEPA Method 8082
California Title 22 Metals including lead analyzed using USEPA Method 6010B/7471A
Asbestos analyzed using California Air Resources Board Method 435

a = California Department of Toxic Substances Control *Information Advisory - Clean Imported Fill Material* states that " compositing samples for VOCs and SVOCs is not acceptable."

Table 3. Total Petroleum Hydrocarbons and Volatile Organic Compounds Soil Sample Analytical Results								
Sample Identification	Sample Date	Sample Type	Sample Depth	Analytical Results				
				TPHmo	TPHd	TPHg	Toluene	PCE
			ft bgs	mg/kg				
B-1-3	11/18/2015	Discrete	3	--	--	ND<0.25	ND<0.0049	ND<0.0049
B-1-3,-7,-13,-20	11/18/2015	Composite	3 to 20	ND<50	ND<1	--	--	--
B-2-15	11/18/2015	Discrete	15	--	--	ND<0.23	ND<0.0046	ND<0.0046
B-2-3,-7,-15,-18	11/18/2015	Composite	3 to 18	ND<49	1.3	--	--	--
B-3-15	11/18/2015	Discrete	15	--	--	ND<0.24	ND<0.0048	ND<0.0048
B-3-1,-7,-11,-15	11/18/2015	Composite	1 to 15	ND<50	ND<1	--	--	--
B-4-1	11/18/2015	Discrete	1	--	--	ND<0.24	0.023	ND<0.0048
B-4-1,-5,-10,-15	11/18/2015	Composite	1 to 15	630	110	--	--	--
S-1-A-2	11/19/2015	Discrete	2	--	--	ND<0.25	ND<0.0050	ND<0.0050
S-1-A-2, S-1-B-1, S-1-C-1, S-1-D-1	11/19/2015	Composite	1 to 2	350	110	--	--	--
S-2-A-2	11/19/2015	Discrete	2	--	--	ND<0.25	ND<0.0050	ND<0.0050
S-2-A-2, S-2-B-1, S-2-C-2, S-2-D-1.5	11/19/2015	Composite	1 to 2	85	36	--	--	--
S-3-A-2	11/19/2015	Discrete	2	--	--	ND<0.25	ND<0.0049	ND<0.0049
S-3-A-2, S-3-B-2, S-3-C-2, S-3-D-1	11/19/2015	Composite	1 to 2	ND<50	10	--	--	--
S-4-A-2	11/19/2015	Discrete	2	--	--	ND<0.25	ND<0.0050	ND<0.0050
S-4-A-2, S-4-B-1.5, S-4-C-1.5, S-4-D-1.5	11/19/2015	Composite	1.5 to 2	260	77	--	--	--
SY-1-1	11/19/2015	Discrete	1	--	--	0.38	0.081	ND<0.0049
SY-1-1, SY-2-1. SY-3-1, SY-4-2	11/19/2015	Composite	1 to 2	210	42	--	--	--
SP-1D	11/18/2015	Discrete	stockpile	--	--	ND<0.25	ND<0.0050	ND<0.0050
SP-1A,-1B,-1C,-1D	11/18/2015	Discrete	stockpile	870	170	--	--	--
			Tier 1 Soil ESL[a]	5,100	230	100	2.9	0.42

Notes:
ft bgs - feet below ground surface
TPHmo - total petroleum hydrocarbon as motor oil analyzed using United States Environmental Protection Agency (USEPA) Method 8015B with silica gel cleanup
TPHd - total petroleum hydrocarbon as diesel analyzed using USEPA Method 8015B with silica gel cleanup
TPHg - total petroleum hydrocarbon as gasoline analyzed using USEPA Method 8260B
Toluene analyzed using USEPA Method 8260B
PCE - tetrachloroethene analyzed using USEPA Method 8260B
mg/kg - milligrams per kilogram
-- not analyzed
ND<X - not detected at laboratory reporting limit X
Shading indicates soil was subsequently removed from site and does not represent residual site conditions
a. Tier 1 Soil ESL - San Francisco Bay Regional Water Quality Control Board environmental screening level; from ESL Summary Tables (February 2016, Revision 3)
All detected volatile organic compounds tablulated; see Ninyo & Moore January 13, 2016 *Soil Sampling and Characterization Report* for complete list of analytes

Table 4. Total Petroleum Hydrocarbons and Volatile Organic Compounds Groundwater Sample Analytical Results

Sample Identification	Sample Date	Analytical Results (µg/L)				
		TPHmo	TPHd	TPHg	Toluene	PCE
B-2-GW	11/18/2015	ND<110	ND<53	ND<50	4.3	ND<0.5
B-3-GW	11/18/2015	930	220	52	3.8	44
Commercial/Industrial Deep Groundwater ESL[a]		NE	NE	NE	37,000	880
Odor Nuisance Non-Drinking Water[b]		NE[c]	5,000	5,000	400	3,000

Notes:

µg/L - micrograms per liter

TPHmo - total petroleum hydrocarbon as motor oil analyzed using United States Environmental Protection Agency (USEPA) Method 8015B

TPHd - total petroleum hydrocarbon as diesel analyzed using USEPA Method 8015B

TPHg - total petroleum hydrocarbon as gasoline analyzed using USEPA Method 8260B

Toluene analyzed using USEPA Method 8260B

PCE - tetrachloroethene analyzed using USEPA Method 8260B

ND<X - not detected at laboratory reporting limit X

a. Commercial/Industrial Deep Groundwater ESL - San Francisco Bay Regional Water Quality Control Board Groundwater Vapor Intrusion Human Health Risk environmental screening level (Table GW-3) Deep Groundwater, Commercial/Industrial: Fine to Coarse Scenario ESL dated February 2016 Revision 3.

NE - not established

b. Commercial/Industrial Deep Groundwater ESL = Odor Nuisance Levels (Table GW-5) Non-Drinking Water ESL dated February 2016 Revision 3.

c. TPHmo is not soluble in water. Detections are likely petroleum degradates or less likely NAPL. If petroleum degradates, add the TPHd and mo and compare to TPHd screening criterion. See User Guide for additional information.

Table 5. California Title 22 Metals Soil Sample Analytical Results

Sample Identification	Sample Date	Sample Type	Sample Depth (ft bgs)	Analytical Results (mg/kg)																(mg/L)
				Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury	WET Lead
B-1-3,-7,-13,-20	11/18/2015	Composite	3 to 20	ND<1.7	6.9	210	0.51	ND<0.41	45	12	24	8.5	ND<1.7	61	ND<3.3	ND<0.83	ND<1.7	43	67	0.32	--
B-2-3,-7,-15,-18	11/18/2015	Composite	3 to 18	ND<1.6	8.7	150	0.40	ND<0.39	46	12	20	7.6	ND<1.6	57	ND<3.1	ND<0.78	ND<1.6	38	58	0.19	--
B-3-1,-7,-11,-15	11/18/2015	Composite	1 to 15	ND<0.33	2.6	97	0.24	ND<0.082	27	4.4	12	5.6	ND<0.33	26	ND<0.65	ND<0.16	ND<0.33	20	24	0.19	--
B-4-1,-5,-10,-15	11/18/2015	Composite	1 to 15	ND<0.16	7.4	180	0.37	ND<0.40	38	12	30	78	ND<1.6	43	ND<0.81	ND<1.6	ND<1.6	53	130	0.19	0.62
S-1-A-2, S-1-B-1, S-1-C-1, S-1-D-1	11/19/2015	Composite	1 to 2	ND<0.41	6.2	190	0.38	0.43	35	8.3	26	70	0.44	44	ND<0.83	ND<0.21	ND<0.41	30	130	0.16	3.6
S-2-A-2, S-2-B-1, S-2-C-2, S-2-D-1.5	11/19/2015	Composite	1 to 2	ND<1.6	**20**	200	ND<0.33	0.52	44	11	23	65	1.6	50	ND<3.3	ND<0.82	ND<1.6	30	140	0.12	**9.8**
S-2-A-2	11/19/2015	Discrete	2	--	6.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**16**
S-2-B-1	11/19/2015	Discrete	1	--	6.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.58
S-2-C-2	11/19/2015	Discrete	2	--	6.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.68
S-2-D-1.5	11/19/2015	Discrete	1.5	--	6.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.95
S-3-A-2, S-3-B-2, S-3-C-2, S-3-D-1	11/19/2015	Composite	1 to 2	ND<0.41	7.9	97	ND<0.33	0.43	36	10	20	20	0.96	50	ND<0.83	ND<0.21	ND<0.41	31	77	0.11	--
S-4-A-2, S-4-B-1.5, S-4-C-1.5, S-4-D-1.5	11/19/2015	Composite	1.5 to 2	ND<0.50	7.3	110	ND<0.10	0.40	37	9.5	24	52	0.62	48	ND<1	ND<0.25	ND<0.5	32	90	0.29	1.6
SY-1-1, SY-2-1, SY-3-1, SY-4-2	11/19/2015	Composite	1 to 2	ND<1.4	8.6	290	0.46	0.74	41	9.8	35	150	ND<1.4	44	ND<2.9	ND<0.71	ND<1.4	36	190	0.10	4.9
SP-1A,-1B,-1C,-1D	11/18/2015	Composite	stockpile	ND<0.46	5.7	130	0.43	0.32	38	12	20	8.4	0.50	49	ND<0.93	ND<0.23	ND<0.46	29	58	0.15	--
CSS-1	1/11/2016	Discrete	2	--	--	--	--	--	--	--	--	17	--	--	--	--	--	--	--	--	--
CSS-2	1/11/2016	Discrete	2	--	--	--	--	--	--	--	--	9.5	--	--	--	--	--	--	--	--	--
CSS-3	1/11/2016	Discrete	2	--	--	--	--	--	--	--	--	10	--	--	--	--	--	--	--	--	--
CSS-4-4	1/20/2016	Discrete	4	--	--	--	--	--	--	--	--	7.5	--	--	--	--	--	--	--	--	--
CSS-5-4	1/20/2016	Discrete	4	--	--	--	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--
Direct Health Exposure Commercial/Industrial Shallow Soil ESL[a]				470	11[b]	220,000	2,200	580	NE	350	47,000	320	5,800	11,000	5,800	5,800	12	5,800	350,000	190	5.0[c]

Notes:
ft bgs - feet below ground surface
mg/kg - milligrams per kilogram
mg/L - milligrams per liter
Metals analyzed by United States Environmental Protection Agency Methods 6010B and 7471A
WET - waste extraction test
ND<X = not detected at laboratory reporting limit X
-- not analyzed
Bold indicates exceedance of environmental screening level (ESL)
Shading indicates soil was subsequently removed from site and does not represent residual site conditions
a. Direct Health Exposure Commercial/Industrial Shallow Soil ESL - San Francisco Bay Regional Water Quality Control Board ESL; Table S-1 from ESL Summary Tables (February 2016, Revision 3)
b. Arsenic background concentration from Duvergé, *Establishing Background Arsenic in Soil of the Urbanized San Francisco Bay Region* , Master's Thesis, San Francisco State University, December 2011
c. California Title 22 soluble threshold limit concentration
NE - ESL not established

Table 6. California Title 22 Dissolved Metals Groundwater Sample Analytical Results

Sample Identification	Date	Analytical Results (µg/L)																
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
B-2-GW	11/18/2015	ND<10	ND<10	140	ND<2	ND<2	ND<10	4.2	ND<20	ND<5	ND<2	12	ND<10	ND<20	ND<5	ND<10	ND<10	23
B-3-GW	11/18/2015	ND<10	ND<10	110	ND<2	ND<2	ND<10	ND<2	ND<20	ND<5	ND<2	34	ND<10	ND<20	ND<5	ND<10	ND<10	24
MCL		6.0	10	1,000	4.0	5.0	50	6.0	1,000	15	2.0	100	100	50	100	2.0	50	5,000

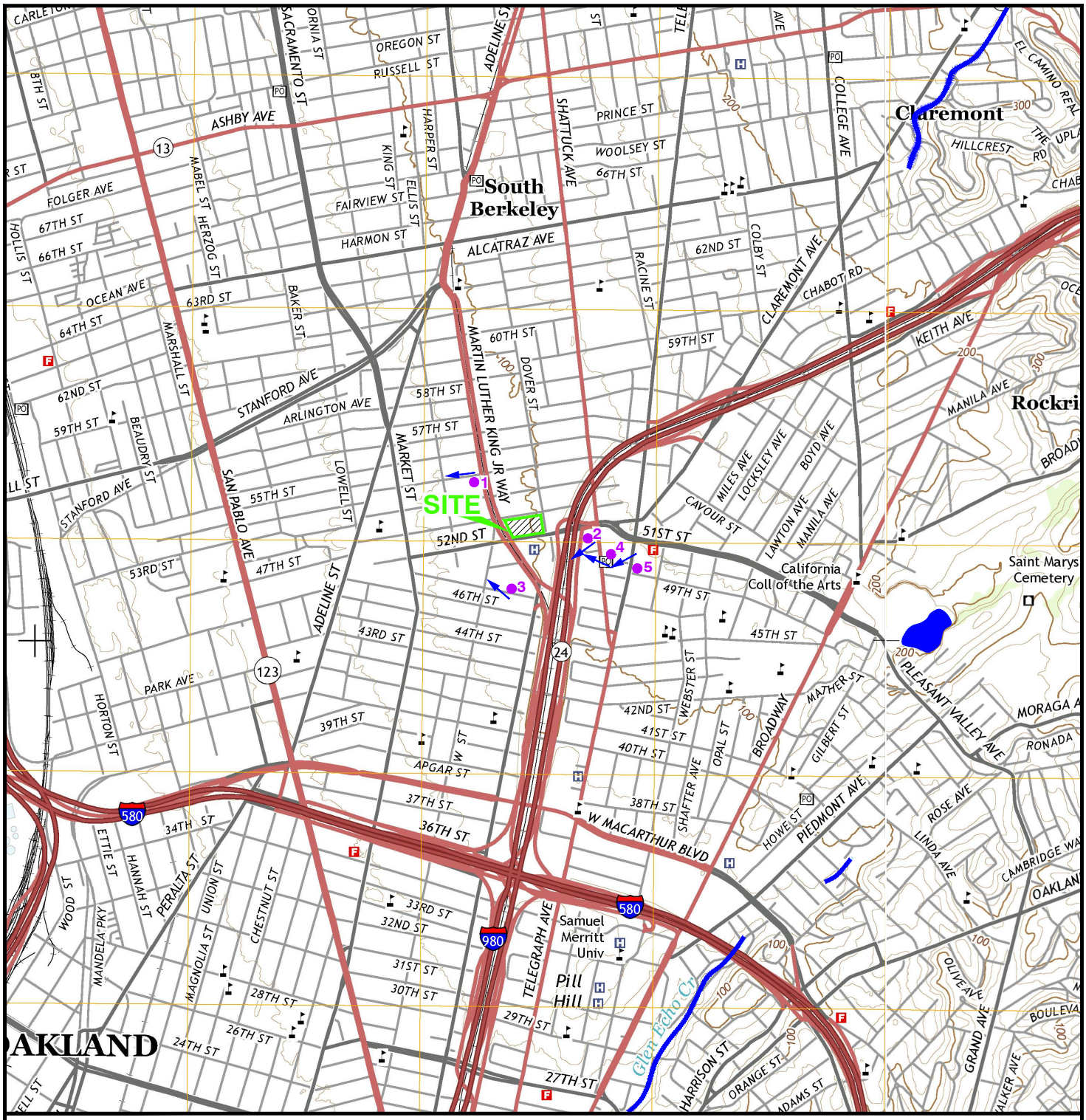
Notes:
µg/L - micrograms per liter
Metals analyzed by United States Environmental Protection Agency Methods 6010B and 7471A
ND<X - not detected at laboratory reporting limit X
MCL - maximum contaminant level

Table 7. Organochlorine Pesticides Soil Sample Analytical Results

Sample Identification	Sample Date	Sample Type	Sample Depth (ft bgs)	Analytical Results (mg/kg)						
				DDD	DDE	DDT	alpha-Chlordane	Chlordane (technical)	Dieldrin	gamma-Chlordane
B-1-3	11/18/2015	Discrete	3	0.0078	0.028	0.012	ND<0.002	ND<0.040	ND<0.002	ND<0.002
B-2-3	11/18/2015	Discrete	3	ND<0.002	ND<0.002	ND<0.002	ND<0.002	ND<0.040	ND<0.002	ND<.002
B-3-1	11/18/2015	Discrete	1	ND<0.0019	ND<0.0019	ND<0.0019	ND<0.0019	ND<0.039	ND<0.0019	ND<0.0019
SP-1A,-1B,-1C,-1D	11/18/2015	Composite	stockpile	ND<0.04	ND<0.04	0.0090	ND<0.04	ND<0.079	ND<0.04	ND<0.04
S-1-A-2, S-1-B-1, S-1-C-1, S-1-D-1	11/19/2015	Composite	1 to 2	0.0029	0.0036	0.0064	0.0032	ND<0.040	0.0025	0.0028
S-2-A-2, S-2-B-1, S-2-C-2, S-2-D-1.5	11/19/2015	Composite	1 to 2	ND<0.002	ND<0.002	0.0020	ND<0.002	ND<0.039	ND<0.002	ND<0.002
S-3-A-2, S-3-B-2, S-3-C-2, S-3-D-1	11/19/2015	Composite	1 to 2	ND<0.002	ND<0.002	0.0031	ND<0.002	ND<0.039	ND<0.002	ND<0.002
S-4-A-2, S-4-B-1.5, S-4-C-1.5, S-4-D-1.5	11/19/2015	Composite	1.5 to 2	ND<0.002	0.0048	0.0043	ND<0.002	ND<0.039	ND<0.002	0.0035
SY-1-1, SY-2-1. SY-3-1, SY-4-2	11/19/2015	Composite	1 to 2	0.0024	0.0077	0.014	0.0063	0.090	ND<0.002	0.0059
Direct Health Exposure Commercial/Industrial Shallow Soil ESL[a]				120	8.5	8.5	NE	2.2	0.17	NE

Notes:
mg/kg - milligrams per kilogram
ft bgs - feet below ground surface
DDD = dichlorodiphenyldichloroethane analyzed using United States Environmental Protection Agency (USEPA) Method 8081A
DDE = dichlorodiphenyldichloroethylene analyzed using USEPA Method 8081A
DDT = dichlorodiphenyltrichloroethane analyzed using USEPA Method 8081A
Chlordane and dieldrin analyzed using USEPA Method 8081A
ND<X = not detected at laboratory reporting limit X
Shading indicates soil was subsequently removed from site and does not represent residual site conditions
a. Direct Health Exposure Commercial/Industrial Shallow Soil ESL - San Francisco Bay Regional Water Quality Control Board ESL; Table S-1 from ESL Summary Tables (February 2016, Revision 3)
NE - ESL not established

FIGURES



REFERENCE: 7.5 MINUTE USGS TOPOGRAPHIC MAP OF OAKLAND WEST AND OAKLAND EAST, CALIFORNIA QUADRANGLES, DATED 2015, SCALE 1:24000.

SCALE IN FEET

0 2,000 4,000

N

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND

- SURFACE WATER BODY
- 5 ADJACENT SITE
- GROUNDWATER FLOW DIRECTION

Ninyo & Moore

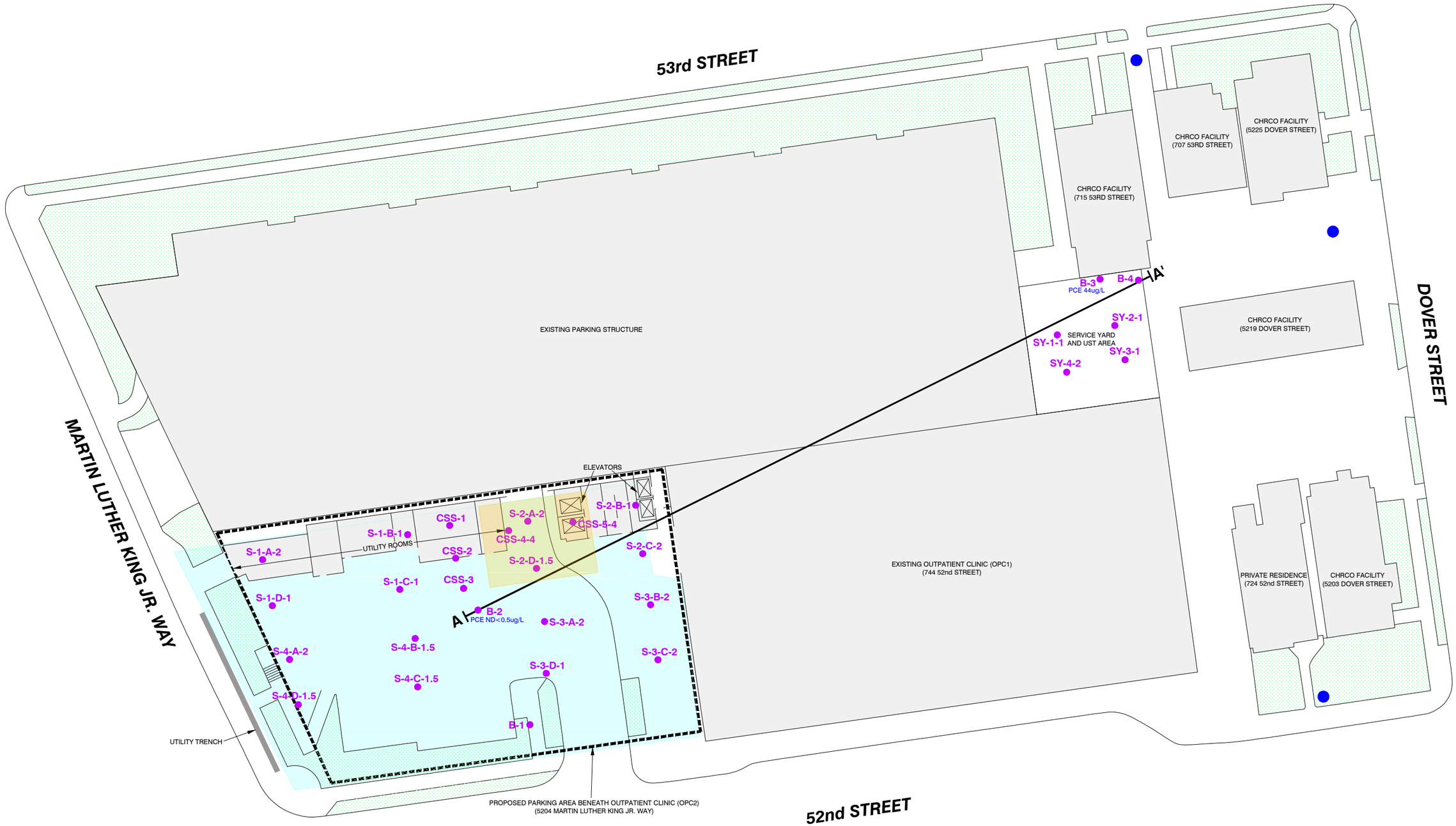
SITE LOCATION

FIGURE 1

PROJECT NO.	DATE
402654002	8/17

UCSF BENIOFF CHILDREN'S HOSPITAL
747 52ND STREET
OAKLAND, CALIFORNIA

402654002_SL.dwg 08/15/2017 JP



N

SCALE IN FEET

0 40 80

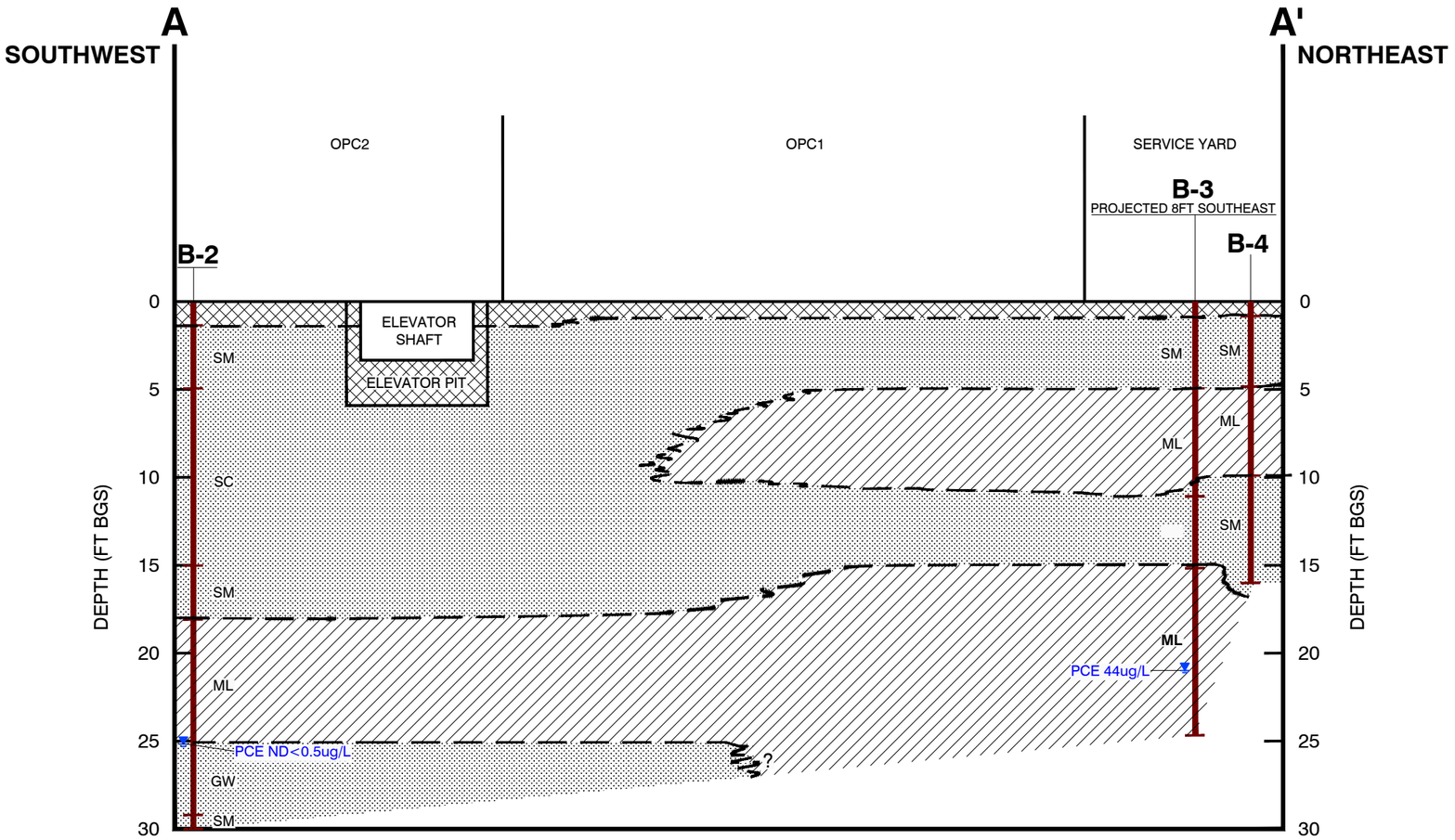
NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND

B-4 SOIL BORING	LANDSCAPE AREAS
PROPOSED SOIL BORING	PCE TETRACHLOROETHENE CONCENTRATION IN GROUNDWATER ON 11/18/2015
EXCAVATION TO 4 FEET BELOW GROUND SURFACE	ug/L MICROGRAMS PER LITER
EXCAVATION TO A MINIMUM OF 1.5 FEET BELOW GROUND SURFACE	ND NOT DETECTED

Ninyo & Moore	SITE PLAN	FIGURE
PROJECT NO. 402654002 / DATE 8/17	UCSF BENIOFF CHILDREN'S HOSPITAL 747 52ND STREET OAKLAND, CALIFORNIA	2

402654002_HBL.dwg 08/15/2017 JP



LEGEND

	FILL	PCE	TETRACHLOROETHENE CONCENTRATION IN GROUNDWATER ON 11/18/2015
	FINE GRAINED (SILTS AND CLAYS)		
	COARSE GRAINED (SANDS)	ug/L	MICROGRAMS PER LITER
B-4	BORING	ND	NOT DETECTED
	DEPTH TO GROUNDWATER ON 11/18/2015		
FT BGS	FEET BELOW GROUND SURFACE		

SCALE IN FEET (VERTICAL)

0 8 16

SCALE IN FEET (HORIZONTAL)

0 40 80

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

402654002_CSA.dwg 08/11/2017 JP

Ninyo & Moore

CONCEPTUALIZED CROSS SECTION A-A'

PROJECT NO.	DATE
402654002	8/17

UCSF BENIOFF CHILDREN'S HOSPITAL
747 52ND STREET
OAKLAND, CALIFORNIA

FIGURE

3

APPENDIX A

Boring Logs

APPENDIX A

BORING LOGS

Field Procedure for the Collection of Disturbed Samples

Disturbed soil samples were obtained in the field using the following method.

Bulk Samples

Bulk samples of representative earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler

The sampler, with an external diameter of 3 inches, was lined with 1-inch-long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a hammer in general accordance with ASTM D 3550-01. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

BORING LOG EXPLANATION SHEET

DEPTH (feet)	SAMPLES: Bulk	SAMPLES: Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	
0	■							Bulk sample.
		■						Modified split-barrel drive sampler.
		⊠						2-inch inner diameter split-barrel drive sampler.
		⊠						No recovery with modified split-barrel drive sampler, or 2-inch inner diameter split-barrel drive sampler.
		▮						Sample retained by others.
5		◪						Standard Penetration Test (SPT).
		⁄						No recovery with a SPT.
		▯	XX/XX					Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.
		⁄						No recovery with Shelby tube sampler.
		▯						Continuous Push Sample.
10				⚲				Seepage.
				▽				Groundwater encountered during drilling.
				▼				Groundwater measured after drilling.
						▨	SM	MAJOR MATERIAL TYPE (SOIL): Solid line denotes unit change.
						▨	CL	Dashed line denotes material change.
15						▨		Attitudes: Strike/Dip b: Bedding c: Contact j: Joint f: Fracture F: Fault cs: Clay Seam s: Shear bss: Basal Slide Surface sf: Shear Fracture sz: Shear Zone sbs: Shear Bedding Surface
								The total depth line is a solid line that is drawn at the bottom of the boring.
20								

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BORING LOG

Explanation of Boring Log Symbols

PROJECT NO.	DATE	FIGURE

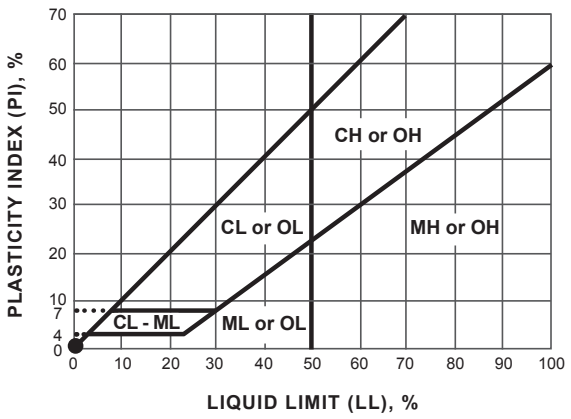
SOIL CLASSIFICATION CHART PER ASTM D 2488

PRIMARY DIVISIONS			SECONDARY DIVISIONS	
			GROUP SYMBOL	GROUP NAME
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	**GRAVEL** more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
			GP	poorly graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly graded GRAVEL with clay
		GRAVEL with FINES more than 12% fines	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND 50% or more of coarse fraction passes No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
			SP	poorly graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly graded SAND with clay
		SAND with FINES more than 12% fines	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	**SILT and CLAY** liquid limit less than 50%	INORGANIC	CL	lean CLAY
			ML	SILT
			CL-ML	silty CLAY
		ORGANIC	OL (PI > 4)	organic CLAY
			OL (PI < 4)	organic SILT
	SILT and CLAY liquid limit 50% or more	INORGANIC	CH	fat CLAY
			MH	elastic SILT
		ORGANIC	OH (plots on or above "A"-line)	organic CLAY
			OH (plots below "A"-line)	organic SILT
	Highly Organic Soils		PT	Peat

GRAIN SIZE

DESCRIPTION		SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders		> 12"	> 12"	Larger than basketball-sized
Cobbles		3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	0.079 - 0.19"	Rock-salt-sized to pea-sized
	Medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	< 0.0029"	Flour-sized and smaller

PLASTICITY CHART



APPARENT DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPOOLING CABLE OR CATHEAD		AUTOMATIC TRIP HAMMER	
	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

CONSISTENCY - FINE-GRAINED SOIL

CONSIS-TENCY	SPOOLING CABLE OR CATHEAD		AUTOMATIC TRIP HAMMER	
	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

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USCS METHOD OF SOIL CLASSIFICATION

Explanation of USCS Method of Soil Classification

PROJECT NO.	DATE	FIGURE

DATE DRILLED 11/18/15 BORING NO. B-1

GROUND ELEVATION NA SHEET 1 OF 1

METHOD OF DRILLING Penecore - Direct Push Technology

DRIVE WEIGHT NA DROP NA

SAMPLED BY FSM LOGGED BY FSM REVIEWED BY LEB

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	SAMPLE ID	ORGANIC VAPORS (ppm)	MOISTURE	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								FILL: Soil found on top of old ground surface from stockpile FILL.
			B-1-3	0.1			SM	Dark brown, silty SAND with gravel.
			B-1-7	0.3			ML	Dark yellowish brown, moist, stiff, Sandy SILT.
10								
			B-1-13	0.2			SM	Light olive brown, moist, dense, silty SAND.
20			B-1-20	0.2				Dark yellowish brown, moist, dense, silty SAND.
								Bottom of boring @ 20'
								Groundwater not encountered.
30								
40								

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BORING LOG

UCSF BENIOFF CHILDREN'S HOSPITAL
744 52ND STREET, OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
402654002	6/17	A-1

DATE DRILLED 11/18/15 BORING NO. B-2

GROUND ELEVATION NA SHEET 1 OF 1

METHOD OF DRILLING Penecore - Direct Push Technology

DRIVE WEIGHT NA DROP NA

SAMPLED BY FSM LOGGED BY FSM REVIEWED BY LEB

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	SAMPLE ID	ORGANIC VAPORS (ppm)	MOISTURE	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								FILL: Soil found on top of old surface as stockpile, FILL.
	Driven		B-2-3	14.7			SM	Brown, dry, loose, well graded SAND with silt.
							SC	Grades, dark yellowish brown, moist, dense, clayey SAND.
	Driven		B-2-7	0.3				As above, yellowish brown.
10								
	Driven		B-2-18	0.2			SM	Light olive brown, moist, dense, silty SAND.
				0.3			ML	Yellowish brown, moist, stiff, sandy SILT.
20								
				0.4	▽		GW	Yellowish brown, wet, dense, well graded GRAVEL with silt.
				0.4			SM	Dark yellowish brown, moist, dense, silty SAND.
30								Bottom of boring @ 30'
								Groundwater @ 25'
40								

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BORING LOG

UCSF BENIOFF CHILDREN'S HOSPITAL
744 52ND STREET, OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
402654002	6/17	A-2

DATE DRILLED 11/18/15 BORING NO. B-3

GROUND ELEVATION NA SHEET 1 OF 1

METHOD OF DRILLING Penecore - Direct Push Technology

DRIVE WEIGHT NA DROP NA

SAMPLED BY FSM LOGGED BY FSM REVIEWED BY LEB

DEPTH (feet)	SAMPLES (Bulk / Driven)	BLOWS/FOOT	SAMPLE ID	ORGANIC VAPORS (ppm)	MOISTURE	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								FILL:
	■		B-3-1	0.1			SM	FILL from stockpile. Dark brown, moist, loose, silty SAND.
							ML	Dark brown, moist, stiff, sandy SILT.
	■		B-3-7	0.2				Brown, moist, stiff, sandy SILT.
10								
	■		B-3-11	0.2			SM	Light olive brown, silty SAND.
	■		B-3-15	0.2			ML	Yellowish brown, moist, stiff, sandy SILT.
				1.6	▽			
20								
				2.3				Light olive brown, wet, stiff, sandy SILT.
								Bottom of boring @ 24.5'
								Groundwater @ 21'
30								
40								

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BORING LOG

UCSF BENIOFF CHILDREN'S HOSPITAL
744 52ND STREET, OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
402654002	6/17	A-3

DATE DRILLED 11/18/15 BORING NO. B-4

GROUND ELEVATION NA SHEET 1 OF 1

METHOD OF DRILLING Penecore - Direct Push Technology

DRIVE WEIGHT NA DROP NA

SAMPLED BY FSM LOGGED BY FSM REVIEWED BY LEB

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	SAMPLE ID	ORGANIC VAPORS (ppm)	MOISTURE	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0									FILL:
		■		B-4-1	4.2			SM	Fill from stockpile, FILL. Dark brown, moist, medium dense, silty SAND.
		■		B-4-5	2.3			ML	Dark brown, moist, stiff, sandy SILT.
10		■		B-4-10	2.5			SM	Dark yellowish brown, moist, dense, silty SAND.
		■		B-4-15	2.1				
									Bottom of boring @ 16'
									Groundwater not encountered.
20									
30									
40									

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BORING LOG

UCSF BENIOFF CHILDREN'S HOSPITAL
744 52ND STREET, OAKLAND, CALIFORNIA

PROJECT NO.	DATE	FIGURE
402654002	6/17	A-4

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