EAST BAY ASIAN LOCAL
DEVELOPMENT CORPORATION
EBALDC
BUILDING HEALTHY, VIBRANT AND SAFE NEIGHBORHOODS

12 October 2017
Project 750622604

Mr. Keith Nowell, PG
Alameda County Health Care Services Agency
Environmental Health Department
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Subject:
Work Plan for Supplemental Environmental Site Assessment
1110 Jackson Street
Oakland, California 94607
Alameda County SCP Case No. RO0003232
Langan Project: 7506220604

Dear Mr. Nowell:

I have read and acknowledge the content, recommendations, and/or conclusions contained in the attached document submitted on my behalf to ACDEH's FTP server and the SWRCB's Geotracker website.

Sincerely yours,

Everett Cleveland
East Bay Asian Local Development Company

WORK PLAN FOR SUPPLEMENTAL ENVIRONMENTAL SITE ASSESSMENT

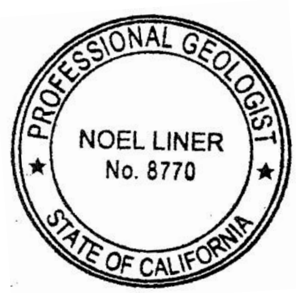
1110 Jackson Street
Oakland, California 94612

Prepared For:
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, California 94502

Prepared By:

Langan Engineering and Environmental Services, Inc.
501 14th Street, 3rd Floor
Oakland, California 94612

Joshua Osborne
Senior Staff Geologist



Noel Liner, PG
Project Geologist

Joshua Graber
Associate

12 October 2017
Langan Project: 750620604

12 October 2017

Mr. Keith Nowell, PG
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, California 94502

Re: Work Plan for Supplemental Environmental Site Assessment
1110 Jackson Street
Oakland, California
Langan Project No.: 750622604

Dear Mr. Nowell,

Langan Engineering and Environmental Services, Inc. (Langan), on behalf of the East Bay Asian Local Development Corporation (EBALDC), is pleased to submit this *Work Plan for Supplemental Environmental Site Assessment* (Work Plan) associated with the Alameda County Department of Environmental Health's (ACDEH) open fuel leak case RO0003232 located at 1110 Jackson Street in Oakland, California.

If you have any questions or need any information clarified, please call Joshua Graber at (510) 874-7086.

Sincerely yours,
Langan Engineering and Environmental Services, Inc.

Joshua Osborne, GIT
Senior Staff Geologist

Noel Liner, PG
Project Geologist

Joshua Graber
Associate

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1110 Jackson Street
Oakland, California

1.0 INTRODUCTION

Langan Engineering and Environmental Services, Inc. (Langan), on behalf of the East Bay Asian Local Development Corporation (EBALDC), has prepared this *Work Plan for Supplemental Environmental Site Assessment* (Work Plan) for the 1110 Jackson Street development in Oakland, California (site - Figure 1) to satisfy the request for additional data by Alameda County Department of Environmental Health (ACDEH). During construction, a total of four underground storage tanks (USTs) were discovered in the sidewalk of Jackson Street, adjacent to the development (Figure 2). The three northern-most USTs (USTs #1, #2, and #3) contained gasoline and the one southern-most UST (UST #4) contained diesel. Soil and groundwater samples collected from the areas surrounding and down gradient of the former gasoline USTs indicate the soil and groundwater has been impacted by petroleum and petroleum related compounds.

Our proposed scope of environmental investigation, sampling and analytical testing methods presented in this Work Plan is intended to further characterize horizontal and vertical impacts to soil and groundwater related to the former USTs and specifically UST #4. The purpose of the proposed work is to collect sufficient total petroleum hydrocarbons (TPH) as gasoline, diesel and motor oil (TPH-g, -d and -mo) and volatile organic compound (VOCs) data to support regulatory site closure under the State Water Resources Control Board's Low-Threat Underground Storage Tank Case Closure Policy (LTCP).

Per the request of ACDEH (during a meeting on 7 July 2017), we have compiled boring logs (including borings completed by others), tabulated environmental sampling results to date for this site, and developed a tabular Conceptual Site Model (CSM) to help identify data gaps and propose actions to close the identified data gaps for this site. Following the completion of the investigation, we will prepare a technical memorandum presenting our sampling methods, analytical results and recommendations and discuss the results of our investigation with ACDEH.

1.1 Site Description and History

The site is located at 1110 Jackson Street in Oakland, California (Figure 1). The site is bound by 12th Street to the north, Jackson Street to the west, 11th Street to the south and the American Indian Model School, Family Bridges (a non-profit community service) and two three-story apartment buildings to the east. The site is L-shaped, with long dimensions measuring approximately 190 feet by 200 feet, along 11th and Jackson Streets, respectively.

A detailed site history was provided in the Phase I Environmental Site Assessment completed by Essel Environmental Consulting in 2015. The site history was traceable back to 1889 when the land was developed with a hospital. By 1903, the hospital had been replaced by residences. Two automobile repair garages operated in the northern portion of the site (including two USTs beneath Jackson Street) between 1911 and 1946, while the southern portion of the site was developed for residential use. By 1939, the site was fully developed with two auto repair garages in the northern portion of the site, residences in the southern portion of the site, and a new commercial building at the southern corner of the site. One of the automobile repair garages was removed in 1946 and the residences were removed by 1950, when both became parking lots. The second auto repair garage was converted to a store, a glass works business, and a parking lot through the 1950's. In the 1960's, a store was constructed in the southwest corner of the site and a small shed was constructed near the glass works facility. The site remained in this state until 2007 when all the buildings were demolished. The site was vacant until construction of the current apartment building.

EBALDC recently completed construction of an at-grade, 5-story mixed use building that occupies the entire footprint of the L-shaped lot. The ground floor is comprised primarily of openly ventilated parking with a small portion of retail (commercial) space located in the southwestern portion of the building (Figure 2). The remaining floors are residential units.

1.2 Subsurface Conditions

Based on the results of previous field investigations, the subsurface profile generally consists of three to five feet of fill underlain by layers of fine to coarse sands with varying amounts of silts and clays to depths of at least 27 feet below ground surface (bgs). The sand is generally underlain by 4 to 13 feet of stiff to hard clay with varying amounts of sand. The clay is underlain by a mix of dense to very dense clayey sand with varying amounts of gravel and dense gravel with varying amounts of sand and clay (Langan Treadwell Rollo, 2014). Groundwater, measured in November 2016, was encountered at approximately 20 feet bgs. Groundwater predominantly flows east towards Lake Merritt, based on groundwater monitoring well data from the Alcopark Garage site located at 165 13th Street in Oakland, which is directly north of the site across 12th Street (PSI, 2009). Lake Merritt is located approximately ¼ mile east of the site (Langan, 2016).

2.0 PREVIOUS INVESTIGATIONS

The following environmental reports document soil and groundwater sampling and analytical testing conducted at the site and are referenced as part of this Work Plan.

- *Limited Phase II Environmental Site Assessment, Jackson Tower, Oakland, California* dated 18 January 2006, prepared by Tetra Tech EM, Inc. (Tetra Tech);
- *Underground Storage Tank Closure Report, 1110 Jackson Street, Oakland, California* dated 23 June 2016, prepared by Golden Gate Tank Removal (GGTR);
- *Underground Storage Tank Closure Investigation Report, 1110 Jackson Street, Oakland California* dated 13 September 2016, prepared by Langan,
- *Additional Environmental Site Assessment Report, 1110 Jackson Street, Oakland, California* dated 1 December 2016, prepared by Langan; and
- *Underground Storage Tank Closure Report (T4), 1110 Jackson Street, Oakland, California* dated 13 January 2017, prepared by GGTR.

2.1 2006 Limited Phase II Environmental Site Assessment

In December 2005, Tetra Tech conducted a limited Phase II Environmental Site Assessment to evaluate if petroleum impacts associated with the Alcopark Garage site were impacting the site. The Alcopark Garage site is about 260 feet to the north of the project site.

Tetra Tech advanced three borings (SB-1, SB-2, and SB-3, Appendix A) at the site. Borings SB-1 and SB-2 were located approximately 50 to 60 feet from the former gasoline UST locations in both the northeast and southeast directions, respectively (Figure 2). Borings SB-2 and SB-3 were located approximately 45 feet east (downgradient) and 145 feet southeast of the diesel UST #4, respectively. Soil samples were collected at approximately 12 feet bgs from each boring. Groundwater was encountered at depths ranging between 20 to 22 feet bgs. One groundwater sample was collected from each boring. Soil and groundwater samples were analyzed for TPH-g, TPH-d, TPH-mo, VOCs and metals. TPHg, TPHd and TPHmo were not detected in any of the samples collected. Metals results were within normal background ranges reported for Bay Area soils (Table 2). No VOCs were detected in any soil samples collected. No VOCs were detected at concentrations above their respective maximum contaminant level (San Francisco Regional Water Quality Control Board's [SFRWQCB], February 2016 MCL Priority Environmental Screening Levels [ESLs]) in any groundwater samples collected; however, low levels of trichloroethene (TCE) and tetrachloroethene (PCE) were detected in groundwater collected from boring SB-3. Based on the data collected, Tetra Tech recommended no further assessment of the site was necessary (Tetra Tech, 2006). Soil and groundwater analytical results are presented in Tables 1, 2, and 3.

2.2 UST Removal (USTs 1-3)

In April 2016, three USTs were discovered in the sidewalk of Jackson Street during site development activities. The USTs, designated as USTs #1, #2 and #3, all contained gasoline and were approximately 265-, 265- and 110-gallons, respectively. The locations of USTs #1, #2 and #3 are shown on Figure 2. Based on a review of Sanborn Fire Insurance maps, the USTs were likely in place prior to 1911. The three USTs were found to be in generally poor condition. Golden Gate Tank Removal (GGTR) removed the three USTs from beneath the sidewalk and conducted soil excavation and soil sampling activities on 15 April 2016. UST removal activities were completed under the observation of Langan personnel and a representative from the ACDEH's Certified Unified Program Agency (CUPA). After the USTs and associated piping were removed, GGTR collected confirmation soil samples from excavation sidewalls and bottoms. Soil samples collected from soil beneath the former USTs had elevated concentrations of TPH-g, ranging between 391 and 2,480 milligrams per kilogram (mg/kg), exceeding the SFRWQCBs February 2016 Tier I ESLs.

Based on the elevated confirmation sample results and a recommendation by ACDEH, GGTR returned to the site on 4 May 2016 to perform over-excavation and additional confirmation sampling activities. GGTR over-excavated from the north side of UST#1 to the south side of UST#2 and UST#3 to a depth of 12 feet below bgs. Following the over-excavation, additional confirmation samples were collected from the new bottom of the excavation and from the sidewalls. TPHg was detected at concentrations ranging from 6.96 to 6,320 mg/kg in soil collected from over-excavation sidewalls and bottoms.

Following over-excavation and additional confirmation sampling activities, ACDEH requested collection of groundwater samples near the former UST locations to evaluate potential impacts of petroleum and petroleum related compounds to groundwater. Analytical results for this removal effort are presented in Tables 1, 2 and 4.

2.3 UST Investigation

On 11 August 2016, Gregg Drilling & Testing, Inc. (Gregg Drilling) of Martinez, California, a California C-57-licensed drilling company advanced four borings (EB-1 through EB-4; Figure 2) to depths of 28 feet bgs. The borings were advanced to facilitate the collection of groundwater in order to evaluate potential impacts related to the former USTs. Soil samples were only collected from boring EB-2 at depths below the soil samples collected during UST removal.

Borings EB-1 through EB-3 were advanced within or adjacent to footprints of the former USTs #1, #2 and #3 and EB-4 was advanced approximately 12 feet east of and downgradient of former UST #2. All borings were hydraulically driven direct push boings advanced by a truck-mounted drill rig operated by Gregg Drilling and observed by Langan. Groundwater was encountered at about 20 feet bgs in each borehole and grab groundwater samples were collected through temporary 1-inch diameter polyvinyl chloride (PVC) well casings with ten feet of well screen to the bottom of each boring. The slotted screen extended above the water table and no free product or sheen was observed on any of the samples.

Benzene was detected in the EB-2 groundwater sample (320 µg/L) above the commercial vapor intrusion San Francisco Bay Regional Water Quality Control Board ESLs (260 µg/L), but not in the EB-4 sample (110 µg/L) closest to the existing building. Concentrations of TPHg and TPHd exceeding the MCL Priority ESLs were also detected in groundwater from borings EB-1, EB-2 and EB-4. TPHg, TPHd, and TPHmo were not detected above laboratory reporting limits in groundwater from boring EB-3.

Langan collected three soil samples from depths of 13, 15.5 and 22.5 feet bgs from environmental boring EB-2 at the former UST #2 location. Soil samples were also collected during the removal of UST #2 at depths of 9 and 12.5 feet bgs. Samples were collected based on field observations including visual and olfactory contamination and organic vapor measurement using a photoionization detector (PID). TPHg and TPHd concentrations exceeding the Tier I ESLs were detected in soil greater than 10 feet bgs beneath former UST #2.

Soil and groundwater samples collected during this environmental investigation indicate that petroleum hydrocarbons and related compounds are present in subsurface soil and groundwater. Sampling results from this investigation can be found in Tables 1 through 3. Boring logs are provided in Appendix A and are shown on Figure 2.

2.4 2016 Additional Environmental Site Assessment

In November 2016, Langan conducted an additional site assessment consisting of soil, groundwater, soil gas, and sub-slab vapor sample collection to determine the potential extent of petroleum impacted soil in groundwater, and evaluate the site for potential vapor intrusion risks. Four environmental borings (EB-5 through EB-8) were advanced using direct push techniques by Gregg Drilling for soil and groundwater collection, five temporary soil gas wells (SG-1 through SG-5) were installed to collect soil gas samples, and five temporary Vapor Pins™ were installed in the slab to facilitate collection of sub-slab samples (SS-1 through SS-5). Soil samples were collected at 4.5 and 8.5 feet bgs. All sampling points are shown on Figure 2 and boring logs are provided in Appendix A. Analytical results associated with this subsurface investigation (Tables 1, 2, 4, and 5) indicate that soil, soil gas, and sub-slab vapor beneath the building are not significantly impacted by the releases associated with the former USTs and do not exceed their respective Tier 1 ESLs. Groundwater beneath the site in borings EB-5 through EB-8 downgradient of the former USTs had detected concentrations of TPHd and/or TPHmo exceeding the Tier I ESLs; however, impacts beneath the building appeared to be limited. A sub-slab sampling point (SS-6) was added to the sampling scope, due to the discovery of UST #4. The SS-6 sub-slab sample was collected on 30 November 2016 about 15 feet east of UST #4 in the commercial space, as illustrated on Figure 2. No VOCs were detected above their respective Tier 1 ESLs in this or any other sub-slab samples at the site.

On the basis of the investigation and previous remedial activities, Langan concluded that the primary source of site contamination had been removed and remediated to the extent practically feasible during site development and that petroleum hydrocarbons detected in groundwater would likely naturally attenuate over time. Additionally, based on the lack of VOCs detected in sub-slab and soil gas samples and a depth to groundwater of over 20 feet, vapor intrusion was not recognized as a significant concern at the site. Boring logs from the investigation are provided in Appendix A.

2.5 UST Removal (UST 4)

In November 2016, a fourth UST was discovered beneath the sidewalk of Jackson Street, south of the three former USTs removed early that year during construction of the sidewalk. The UST, designated as UST #4, contained diesel fuel and had a capacity of approximately 750-

gallons. The top of UST #4 was approximately 5 feet bgs and the bottom was approximately 8 feet bgs. Figure 2 shows the location of the former UST. GGTR removed UST #4 from beneath the sidewalk and conducted the corresponding soil excavation and soil sampling activities on 23 November 2016. UST removal activities were completed under the observation of Langan personnel and a representative from CUPA/ACDEH. After the UST and associated piping were removed, GGTR collected two soil samples at 10 feet bgs from below the southern and northern ends of the UST (9669-S-10 and 9669-N-10, respectively), which was approximately two feet below the UST bottom. Soil samples collected from soil beneath the former UST had elevated concentrations of TPHd exceeding the Tier I ESLs.

Based on the elevated confirmation sample results and a recommendation by ACDEH, GGTR returned to the site on 2 December 2016 to perform over-excavation and additional confirmation sampling activities. GGTR over-excavated the tank pit to a depth of 14 feet below bgs, as witnessed by ACDEH and Langan representatives. Following over-excavation, soil samples were collected of the sidewalls and the excavation bottom. One soil sample was collected from the excavation bottom at 14 feet bgs and two additional soil samples were collected at depths of 17.5 and 18.5 feet bgs from below the UST bottom. TPHd was detected at concentrations of 10,000 and 11,000 mg/kg in the samples collected from 14 and 17.5 feet below the former UST and TPHd was detected at a much lower concentration of 1,100 mg/kg at a depth of 18.5 mg/kg. Sidewall samples all had TPHd detected with concentrations ranging from 1.7 to 4,4000 mg/kg. Analytical results for this removal effort are presented in Tables 1 and 4.

3.0 CONCEPTUAL SITE MODEL

3.1 Overview

Langan has prepared a tabular CSM for the site (Appendix B). The purpose of the CSM is to identify any data gaps for the site. The CSM describes the site and potential receptors, including surface water bodies and the results of a well search, regional and site geology and hydrology, depth to groundwater and groundwater flow direction, potential preferential pathways for petroleum migration in the subsurface, UST (source) releases, contaminants of concern, impacts to soil, groundwater and soil vapor, and source removal and remediation actions.

3.2 Data Gaps

Based on a review of all available data for the site, the CSM has identified data gaps that require additional investigation in order to apply for closure under the LTCP. The identified data gaps are listed below, and the proposed work is described in Section 4.0.

Groundwater Elevation near Utility Conduits

Groundwater was measured at depths between 20 and 23 feet bgs in August and November 2016. Additional groundwater sampling and stabilized depth measurements are proposed in the area of the utility conduits to confirm the conduits are not preferential pathways for groundwater migration.

Extent of Petroleum Impacts Adjacent to UST #4

No soil or groundwater sampling has been performed near the UST #4 excavation. Soil and groundwater samples are proposed east of the UST #4 excavation and beneath the building in the easterly direction to evaluate the extent of impacts.

Contaminant Plume Delineation

Groundwater sampling has been performed at the site as discussed in Section 2.0; however, the distribution of sample points throughout the site does not adequately delineate the horizontal and vertical extent of the plume. Additional groundwater samples are proposed near and downgradient of former UST #4 and on the eastern portion of the site to define the horizontal extent of the plume. The vertical extent of contamination has not been delineated and therefore, additional deep groundwater samples are proposed for collection near the former USTs and along the eastern portion of the site.

Light Non-Aqueous Phase Liquid (LNAPL) near UST #4

Groundwater sampling will be performed at near UST #4 to confirm that LNAPL is not present in this area. No LNAPL was observed in borings advanced near former USTs #1, #2, and #3.

Identification of Bioattenuation Zone near Elevator

Soil samples near the elevator have not been collected to confirm a bioattenuation zone between the groundwater table and the surface currently exists at the site. Soil samples will be collected on five foot intervals between the surface and the groundwater table to confirm TPH and VOC results are acceptable. The lack of significant concentrations detected in sub-slab and soil gas samples suggests that there is not a current vapor intrusion risk but the addition of soil samples will indicated whether a bioattenuation zone is present at the site for future vapor intrusion potential.

4.0 SAMPLING WORK PLAN AND METHODOLOGY

4.1 Site Specific Health and Safety Plan

A site-specific *Health and Safety Plan* has been prepared by Langan as required by the Occupational Health and Safety Administration Standard "Hazardous Waste Operations and Emergency Response" guidelines (29 CFR 1910.120). The *Health and Safety Plan* will be reviewed and signed by Langan personnel and subcontractors performing work at the site before field operations begin and is presented in Appendix C.

4.2 Pre-investigation Tasks

We will coordinate site access as needed with the EBALDC prior to sampling. At least 72 hours before beginning field work, we will visit the site to mark out the sample locations and to notify the Underground Service Alert One-Call Notification Center. In addition, we will engage the services of a private utility locator to provide clearance around the proposed sample locations. As required, Langan will procure a drilling permit from Alameda County Public Works Agency-Water Resources Department, in advance of drilling.

4.3 Proposed Sampling Activities

This section outlines the proposed soil and groundwater sampling activities. Four boring locations have been identified to facilitate soil and groundwater sample collection. Boring locations are shown on Figure 2 as EB-9 through EB-12 and are proposed at locations east and downgradient of the former USTs. Borings will be advanced to 5 feet bgs with a hand auger to clear the location for buried utilities, where utilities potentially exist. Borings will be advanced using a limited access track-mounted direct-push drill rig operated by Gregg Drilling. Borings will be drilled to a maximum depth of 45 feet bgs, utilizing a dual-tube sampling system to obtain accurate lithological information and discreet deeper groundwater samples. Dual-tube sampling will be performed in accordance with the Geoprobe® DT325 Dual Tube Sampling System Standard Operating Procedure provided in Appendix D. Final boring depths will be based on headspace readings collected every vertical foot. The Sample Analysis Plan is presented in Table 6.

To avoid cross contamination, all sampling equipment used during the investigation activities will be thoroughly cleaned or replaced between sample locations. All borings will be backfilled with neat cement grout and the surface cover will be restored in accordance with the Alameda County Public Works Agency's requirements.

4.3.1. Soil Sampling

Soil materials encountered during drilling activities will be logged in the field by a Langan geologist or engineer following the Unified Soil Classification System. Soils will be examined in the field for evidence of contamination (including visible staining, odors, and elevated readings on a PID). Soil samples will be collected about every 5 feet until groundwater is encountered. Soil samples will be collected into acetate liners or stainless steel tubes with tight-fitting end caps and immediately placed on ice for delivery under chain-of-custody procedures to McCampbell Analytical, a State of California-certified analytical laboratory in Pittsburgh, California.

4.3.2. Groundwater Sampling

Two groundwater samples will be collected from each proposed boring location. Final boring depths will be determined in the field based on the following field observation. Once two consecutive "clean" headspace readings (zero parts per million [PPM]) are recorded, the boring will be advanced an additional five feet to collect a "deep" groundwater sample. Groundwater will be collected from a five foot screen placed below the "clean" zone. A second borehole will be advanced within a 3 foot radius of the original borehole to collect a "shallow" groundwater sample. The "shallow" groundwater sample will be collected within the first 10 feet of encountered groundwater from a 10-foot screen. Shallow groundwater will be observed for the presence of LNAPL. Groundwater collection will be completed using a low flow pump or disposable bailer. Groundwater samples will be collected into laboratory provided bottles and preservative and immediately placed on ice for delivery under chain-of-custody (COC) procedures to McCampbell Analytical, a State of California-certified analytical laboratory in Pittsburgh, California.

Following the shallow groundwater sample collection, groundwater will be allowed to equilibrate within the boring and the water level will be measured using a clean water level meter to determine if groundwater has risen significantly since the last groundwater measurements were collected in December 2016.

4.4 Laboratory Analyses

Soil and groundwater samples will be analyzed for VOCs (including naphthalene) by United States Environmental Protection Agency (EPA) method 8260 and TPH-g, TPH-d and TPH-mo by EPA method 8015B. Table 6 summarizes the Sample Analysis Plan for this work plan.

4.5 Sample Identification

Sample nomenclature shall be assigned, as follows:

- Soil samples shall be identified as EB-(boring location)-bottom depth of sample (i.e. a sample collected at boring location EB-9 at a depth of 4.5 to 5 feet bgs will be labeled as EB-9-5).
- Groundwater samples shall be identified as EB-(boring location)-GW-bottom of screened depth (i.e. a groundwater sample collected at boring EB-9 with a screen bottom depth of 20 feet would be labeled EB-9-GW-20).

Duplicate sample nomenclature is sequentially assigned as DUP-(sample number)--year-month-date (e.g., DUP1-2016-11-04). The primary sample and duplicate sample ID pairs will be recorded in the field logs.

4.6 Field Documentation

Field activity logs will be completed for each site visit. Field activity logs shall identify the following: site name and address, date and time onsite, onsite field personnel, general weather conditions, purpose of site visit, a summary of field activities, and any other important details.

Photographs will be taken at each sampling location. A photographic log will be completed to identify the contents of each photo. The field documentation will be kept in the project files.

4.7 Chain of Custody

Samples will be collected and transported to the analytical laboratory following COC procedures. The COC documents the identity and integrity of the sample from the time of collection through receipt at the laboratory. The COC will be completed as samples are collected, and will include the following information: sample ID, date of sample collection, time of sample collection, sample type, and sampler name(s).

4.8 Sample Packing and Shipping

Samples will be packed on ice in coolers and transported by courier to the analytical laboratory. Each sample will be individually labeled and will be accompanied by the COC. All samples will be transported to the analytical laboratory within 24 hours of sample collection. Sample delivery will be coordinated with the laboratory 48 hours in advance to ensure timely and safe delivery. The COC will be signed by the sampler and relinquished to the sample custodian.

4.9 Investigation Derived Waste

Investigation derived waste including soil cuttings, used sampling equipment and decontamination rinsate will be placed in 55-gallon drums, sealed and labeled. The drums will be stored onsite, pending analytical profiling and proper disposal.

5.0 DATA EVALUATION AND REPORTING

Upon the completion of the field activities and analytical testing, Langan will prepare a letter report summarizing the data collected. The report will include boring locations and logs and sampling and analytical methodologies. The report will compare the analytical data to appropriate screening levels and describe the nature and extent of petroleum compounds and VOCs. The report will indicate whether any potential health impacts to the existing users of the redeveloped site related to the petroleum related impacts are present. If no significant risks are identified and data gaps have been sufficiently addressed, a case closure request will be prepared.

6.0 PROJECT SCHEDULE AND CONCLUSION

We are requesting your review and approval of this work plan for completion of field activities that are anticipated to require up to two work days. The work will be scheduled once approval is obtained. Laboratory analyses are expected to be completed within one week after sample collection. The letter report is anticipated to be complete within four weeks of receipt of the analytical data from the laboratory.

REFERENCES

Essel Environmental Consulting, 2015. *Phase I Environmental Site Assessment, 176 and 198 11th Street/1110 Jackson Street, Oakland, California 94607.* 13 February.

Tetra Tech EM, Inc., 2006, *Limited Phase II Environmental Site Assessment, Jackson Tower, Oakland, California*. 18 January.

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GGTR, 2017. *Underground Storage Tank Closure Report (T4), 1110 Jackson Street, Oakland, California.* 13 January.

Langan Engineering & Environmental Services, Inc. (Langan), 2016a. *Underground Storage Tank Closure Investigation Report, 1110 Jackson Street, Oakland, California. 13 September.*

Langan, 2016b. *Additional Environmental Site Assessment Report, 1110 Jackson Street, Oakland, California.* 1 December.

Langan Treadwell Rollo, 2014. *Geotechnical Investigation, 1110 Jackson Street, Oakland, California.* 13 October.

Professional Service Industries (PSI), 2009. *Third Quarter 2009, Groundwater Monitoring Report, Alcopark Fueling Facility, Oakland, California.* 13 October.

TABLES

Table 1
TPH and VOC Results in Soil
1110 Jackson Street
Oakland, California

Sample ID	Depth	Date Sampled	Sample Location	TPHg	TPHd	TPHmo	VOCs															
							Benzene	n-Butyl-benzene	sec-Butyl-benzene	Ethyl-benzene	Isopropyl-benzene	p-Isopropyl-toulune	Methylene chloride	Naph-thalene	n-Propyl-benzene	PCE	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	Toulene	Xylenes	MTBE	All Other VOCs
	(feet)			(mg/kg)																		
Tank Pit Samples																						
~~9669-T1-C-9~~	~~9~~	~~04/15/16~~	~~T1 Bottom~~	~~**394**~~	~~3.24~~	~~6.90~~	~~<4.6~~	~~0.479~~	~~<4.6~~	~~<4.6~~	~~<4.6~~	~~<4.6~~	~~<4.6~~	~~<4.6~~	~~0.532~~	~~<4.6~~	~~<4.6~~	~~<4.6~~	~~<4.6~~	~~<9.20~~	~~<4.6~~	~~<4.6-<37~~
9669-T1-C-12	12	05/04/16	T1 Bottom	**315**	<3.3	41.80	<2.7	<2.7	0.273	0.293	0.350	<2.7	<11	**0.900**	0.559	0.32	0.735	<2.7	0.449	1.33	<2.7	<0.270-<5.6
9669-T1-EW-8	8	05/04/16	T1 Sidewall	**370**	<1.70	8.98	<3	0.318	<3	0.624	<3	<3	<12	<3	0.362	<3	0.758	<3	0.805	**3.05**	<3	<0.300-<6
9669-T1-WW-8	8	05/04/16	T1 Sidewall	**471**	<6.6	26.0	0.643	<2.8	0.417	0.392	<2.8	0.555	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	0.75	1.46	<2.8	<0.280 -<2.8
9669-T1-NW-8	8	05/04/16	T1 Sidewall	**661**	<13	135	<4.7	0.530	0.744	<4.7	<4.7	<4.7	<19	<4.7	0.659	<4.7	<4.7	<4.7	<4.7	<9.4	<4.7	<4.7-<38
9669-P1-4	4	04/22/16	T1 Pipe Trench	<0.10	<3.3	<6.6	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050-<0.100
~~9669-T2-C-9~~	~~9~~	~~04/15/16~~	~~T2 Bottom~~	~~**491**~~	~~19.0~~	~~4.04~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<9.20~~	~~<18~~	~~<9.20~~	~~<9.20-<73~~
9669-T2-C-12.5	12.5	05/04/16	T2 Bottom	**6320**	<3.3	34.4	<23	5.64	6.25	<23	10.7	2.62	<91	**7.77**	13	<23	5.41	<23	<23	<46	<23	<23-<180
9669-T2-EW-6	6	05/04/16	T2 Sidewall	**788**	<3.3	<6.6	<2.30	0.244	<2.3	<2.3	<2.3	<2.3	<9.2	**0.626**	<2.3	<2.3	<2.3	<2.3	<2.3	<4.6	<2.3	<2.3-<4.6
9669-T2-WW-8	8	05/04/16	T2 Sidewall	**178**	<3.3	<6.6	<2.20	<2.20	<2.20	<2.20	<2.20	<2.20	<8.8	<2.20	0.261	<2.20	<2.20	<2.20	<2.20	<4.4	<2.20	<2.2-18
9669-T2-SW-8	8	05/04/16	T2 Sidewall	**144**	<3.3	4.19	<2.30	<2.30	<2.30	<2.30	<2.30	<2.30	<9.3	<2.30	0.236	<2.30	<2.30	<2.30	<2.30	<4.6	<2.30	<2.3-<19
9669-P2-3.3	3.3	04/22/16	T2 Pipe Trench	<0.099	<3.3	<6.6	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0065	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0099	<0.0050	<0.0050-<0.040
~~9669-T3-C-8~~	~~8~~	~~04/15/16~~	~~T3 Bottom~~	~~**2480**~~	~~<66~~	~~<130~~	~~<22~~	~~4.03~~	~~<22~~	~~**2.50**~~	~~<22~~	~~2.87~~	~~<90~~	~~**4.59**~~	~~3.54~~	~~<22~~	~~<22~~	~~6.17~~	~~<22~~	~~**9.28**~~	~~<22~~	~~<22-<180~~
9669-T3-C-12	12	05/04/16	T3 Bottom	67.80	<3.3	<6.6	<0.240	<0.240	0.0639	<0.240	<0.240	0.0868	<0.960	0.0743	0.0361	<0.240	0.106	0.157	<0.240	0.062	<0.240	<0.240-<19
9669-T3-WW-8	8	05/04/16	T3 Sidewall	<4.90	<3.3	<6.6	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.980	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.490	<0.250	<0.250-2
9669-T3-SW-6.5	6.5	05/04/16	T3 Sidewall	**1330**	<330	<670	<23	<23	10.1	<23	2.55	18.6	<91	**9.0**	5.4	<23	78.6	36.9	<23	**6.64**	<23	<23-<180
9669-T3-NW-8	8	05/04/16	T3 Sidewall	6.96	<3.3	<6.6	<0.210	0.0243	<0.210	<0.210	<0.210	<0.210	<0.860	<0.210	<0.210	<0.210	0.0617	<0.210	<0.210	<0.430	<0.210	<0.21-<1.7
9669-T3-EW-9	9	05/04/16	T3 Sidewall	<4.5	<3.3	<6.6	<0.230	<0.230	<0.230	<0.230	<0.230	<0.0230	<0.910	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.0230	<0.450	<0.0230	<0.0230-<18
9669-P3-4	4	04/22/16	T3 Pipe Trench	<0.10	<3.3	<6.70	<40	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0050-<0.040
~~9669-S-10~~	~~10~~	~~11/23/16~~	~~T4 Bottom~~	--	~~**2800**~~	--	~~<0.250~~	--	--	~~<0.250~~	--	--	--	~~3.1~~	--	--	--	--	~~<.250~~	~~<0.250-<0.30~~	~~<0.250~~	--
~~9669-N-10~~	~~10~~	~~11/23/16~~	~~T4 Bottom~~	--	~~**1400**~~	--	~~<0.046~~	--	--	~~<.046~~	--	--	--	~~0.71~~	--	--	--	--	~~<.046~~	~~<0.046~~	~~<0.046~~	--
9669-C-14	14	12/02/16	T4 Bottom	--	**10000**	--	<.5	--	--	<0.500	--	--	--	**6.9**	--	--	--	--	<.5	<0.500-<0.580	<0.500	--
9669-C-17.5	17.5	12/02/16	T4 Bottom	--	**11000**	--	<0.0097	--	--	<0.0097	--	--	--	<0.010	--	--	--	--	<0.0097	<0.0097	<0.0097	--
9669-C-18.5	18.5	12/02/16	T4 Bottom	--	**1100**	--	<0.0097	--	--	<0.0097	--	--	--	<0.340	--	--	--	--	<0.0097	<0.0097	<0.0097	--
9669-SW-9	9	12/02/16	T4 Sidewall	--	8.9	--	<0.0049	--	--	<0.0049	--	--	--	<0.0049	--	--	--	--	<.0049	<0.0049	<0.0049	--
9669-EW-9	9	12/02/16	T4 Sidewall	--	1.7	--	<0.0049	--	--	<0.0049	--	--	--	<0.0049	--	--	--	--	<.0049	<0.0049	<0.0049	--
9669-WW-8.5	8.5	12/02/16	T4 Sidewall	--	**610**	--	<0.500	--	--	<0.500	--	--	--	**6.4**	--	--	--	--	<0.500	<0.500-<0.530	<0.500	--
9669-NW-9	9	12/02/16	T4 Sidewall	--	**4400**	--	<1	--	--	<1	--	--	--	**16**	--	--	--	--	<1	<1-<1.2	<1	--
Boring Samples																						
SB-1-12	12	12/30/05	Boring	<10	<10	<10	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004-<0.002	<0.005	<0.002-<0.020
SB-2-12	12	12/30/05	Boring	<10	<10	<10	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004-<0.002	<0.005	<0.002-<0.020
SB-3-12	12	12/30/05	Boring	<10	<10	<10	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004-<0.002	<0.005	<0.002-<0.020
EB-2-13	13	08/11/16	Boring	**200**	18	5.50	<0.10	0.14	0.13	<0.10	0.14	--	<0.10	**0.39**	0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
EB-2-15.5	15.5	08/11/16	Boring	**5,000**	**830**	13.0	<2.0	2.3	2.5	<2.0	4.2	--	<2.0	**5.3**	5.1	<2.0	<2.0	<2.0	<2	<2.0	<2	<2
EB-2-22.5	22.5	08/11/16	Boring	**2,100**	**370**	14.0	<0.10	0.12	0.18	0.52	0.33	--	<0.10	**0.12**	0.33	<0.10	0.55	0.25	<0.10	0.31	<0.10	<0.10
EB-5-4.5	4.5	11/16/16	Boring	< 1.0	< 1.0	< 5.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	--	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0040 - < 0.10
EB-5-8.5	8.5	11/16/16	Boring	< 1.0	< 1.0	< 5.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	--	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0040 - < 0.10
EB-6-4.5	4.5	11/16/16	Boring	< 1.0	15	160	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	--	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0040 - < 0.10
EB-6-8.5	8.5	11/16/16	Boring	< 1.0	< 1.0	< 5.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	--	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0040 - < 0.10
EB-7-4.5	4.5	11/16/16	Boring	< 1.0	< 1.0	< 5.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	--	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0040 - < 0.10

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Table 1
TPH and VOC Results in Soil
1110 Jackson Street
Oakland, California

Sample ID	Depth	Date Sampled	Sample Location	TPHg	TPHd	TPHmo	VOCs															
							Benzene	n-Butyl-benzene	sec-Butyl-benzene	Ethyl-benzene	Isopropyl-benzene	p-Isopropyl-toulune	Methylene chloride	Naph-thalene	n-Propyl-benzene	PCE	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	Toulene	Xylenes	MTBE	All Other VOCs
EB-7-8.5	8.5	11/16/16	Boring	< 1.0	< 1.0	< 5.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	--	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0040 - < 0.10
EB-8-4.5	4.5	11/16/16	Boring	< 1.0	< 1.0	5.1	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	--	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0040 - < 0.10
EB-8-8.5	8.5	11/16/16	Boring	< 1.0	< 1.0	< 5.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	--	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0040 - < 0.10
Tier 1 ESLs				100	230	5,100	0.044	NE	NE	1.4	NE	NE	0.077	0.033	NE	0.42	NE	NE	2.9	2.3	0.023	Various

Notes:

TPHg - Total petroleum hydrocarbons as gasoline
TPHd - Total petroleum hydrocarbons as diesel
TPHmo - Total petroleum hydrocarbons as motor oil
NE - Environmental Screening Level not established
NA - Not analyzed
VOCs - Volatile organic compounds
mg/kg - Milligrams per kilogram
< 1.0 - Analyte was not detected above the laboratory reporting limit (1.0 mg/kg)
Bold values indicate an exceedance of the Tier 1 ESL
~~394~~ - sample over-excavated
-- - Not available
Various - Analysis of multiple compounds with various Tier 1 ESLs
Tier 1 ESLs - RWQCB Environmental Soil Screening Levels based on a generic conceptual site model designed for use at most sites. The Tier 1 ESL summary table is generally derived from the most conservative ESL for each compound (February 2016 [Rev.3])

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Table 2
Metal Analytical Results in Soil
1110 Jackson Street
Oakland, California

Sample ID	Depth	Date Sampled	Sample Location	Cadmium	Chromium	Lead	Nickel	Zinc
	(feet)			(mg/kg)				
Tank Pit Samples								
~~9669-T1-C-9~~	~~9~~	~~04/15/16~~	~~T1 Bottom~~	~~<0.93~~	~~67.3~~	~~3.9~~	~~40.1~~	~~34.9~~
9669-T1-C-12	12	05/04/16	T1 Bottom	<0.83	69.4	1.7	0.83	1.7
9669-T1-EW-9	9	05/04/16	T1 Sidewall	<0.91	47.9	3.7	32.5	31.1
9669-T1-WW-8	8	05/04/16	T1 Sidewall	<.88	45.7	3.3	32.5	27.2
9669-T1-NW-8	8	05/04/16	T1 Sidewall	<0.93	49.3	3.34	32.1	26.5
9669-P1-4	4	04/22/16	T1 Pipe Trench	<0.99	41.4	2.4	23.2	20.4
~~9669-T2-C-9~~	~~9~~	~~04/15/16~~	~~T2 Bottom~~	~~<0.83~~	~~58.1~~	~~7.9~~	~~35.4~~	~~52.6~~
9669-T2-C-12.5	12.5	05/04/16	T2 Bottom	<0.87	61.6	2.4	47.2	22.5
9669-T2-EW-6	6	05/04/16	T2 Sidewall	<0.93	69.3	4.0	42.5	26.9
9669-T2-WW-8	8	05/04/16	T2 Sidewall	<0.88	46.4	3.2	32.2	26.0
9669-T2-SW-8	8	05/04/16	T2 Sidewall	<0.94	63.0	1.9	0.94	25.3
9669-P2-3.3	3.3	04/22/16	T2 Pipe Trench	<1.0	36.4	2.4	15.7	20.6
~~9669-T3-C-8~~	~~8~~	~~04/15/16~~	~~T3 Bottom~~	~~<0.88~~	~~62.5~~	~~3.7~~	~~40.0~~	~~30.5~~
9669-T3-C-12	12	05/04/16	T3 Bottom	<0.82	58.7	2.9	40.4	21
9669-T3-WW-8	8	05/04/16	T3 Sidewall	<0.90	56.7	4	32.8	28
9669-T3-SW-6.5	6.5	05/04/16	T3 Sidewall	<0.83	46.8	17.1	30.0	32
9669-T3-NW-8	8	05/04/16	T3 Sidewall	<.97	57.1	3.7	34.9	28.0
9669-T3-EW-9	9	05/04/16	T3 Sidewall	<0.91	51.9	3.3	33.4	30.4
9669-P3-4	4	04/22/16	T3 Pipe Trench	<0.97	37.0	4.2	16.6	25.8
Boring Samples								
SB-1-12	12	12/30/05	Boring	<2	63	3	40	20
SB-2-12	12	12/30/05	Boring	<2	48	<3	35	18
SB-3-12	12	12/30/05	Boring	<2	66	<3	33	20
EB-2-13	13	08/11/16	Boring	<0.25	55	2.4	48	24
EB-2-15.5	15.5	08/11/16	Boring	<0.25	45	1.9	36	22
EB-2-22.5	22.5	08/11/16	Boring	<0.25	110	2.3	44	26
EB-5-4.5	4.5	11/16/16	Boring	< 0.25	38	3	19	18
EB-5-8.5	8.5	11/16/16	Boring	< 0.25	50	3.7	38	30
EB-6-4.5	4.5	11/16/16	Boring	< 0.25	36	**150**	37	78
EB-6-8.5	8.5	11/16/16	Boring	< 0.25	49	3.3	34	26
EB-7-4.5	4.5	11/16/16	Boring	< 0.25	36	9.4	18	18
EB-7-8.5	8.5	11/16/16	Boring	< 0.25	69	4.4	48	34
EB-8-4.5	4.5	11/16/16	Boring	< 0.25	38	**97**	20	98
EB-8-8.5	8.5	11/16/16	Boring	< 0.25	70	4.2	49	32
Background [Metal] in Bay Area Soils*				0.27-3.3	10-142	4.8-65	16-144	33-282
Tier 1 ESLs				39	NE	80	86	2,300
ESL - Residential Land Use[1]				750	4.0	23	6.7	0.78

Notes:
mg/kg - Milligrams per kilogram
< 0.93 - Analyte was not detected above the laboratory reporting limit (0.93 mg/kg)
Bold values indicate an exceedance of the Tier 1 ESL
~~<0.93~~ - sample over-excavated
*Background concentration ranges of metals in Bay Area soils, Appendix A, Table A-2 from Environmental Resources Management. *Feasibility Study, Hookston Station, Pleasant Hill, California.* July 2006
NE - Environmental screening level not established
Tier 1 ESLs - RWQCB Environmental Soil Screening Levels based on a generic conceptual site model designed for use at most sites. The Tier 1 ESLs Residential [1] - Water Board Environmental Screening Level from Regional Water Quality Control Board Screening for Environmental Concerns at Contaminated Sites (Table A-1) December 2013.

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Table 3
Non-Metal Analytical Results in Grab-Groundwater
1110 Jackson Street
Oakland, California

					VOCs																		PAHs				
Sample ID	**Date Sampled**	**TPHg**	**TPHd**	**TPHmo**	**Acetone**	**Benzene**	**2-Butanone**	**sec-Butyl benzene**	**t-Butyl Alcohol (TBA)**	**cis-1,2-Dichloro-propane**	**Ethyl-benzene**	**Isopropyl-benzene**	**4-Isopropyl toluene**	**Naph-thalene**	**n-Propyl benzene**	**PCE**	**TCE**	**1,2,4-Trimethy lbenzene**	**1,3,5-Trimethy lbenzene**	**Toluene**	**Xylenes, Total**	**All Other VOCs**	**Acena-phthylene**	**Benzo (b) flouranthene**	**Benzo (k) flouranthene**	**Dibenzo (a,h) anthracene**	**All Other PAHs [1]**
		(µg/L)																									
SB-1-GW1	12/30/05	<0.050	<0.050	<0.10	--	<0.50	--	<1.0	<10	--	<0.50	<1.0	--	**<1.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	--	<0.50-<2	--	--	--	--	--
SB-2-GW2	12/30/05	<0.050	<0.050	<0.10	--	<0.50	--	<1.0	<10	--	<0.50	<1.0	--	**<1.0**	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	--	<0.50-<2	--	--	--	--	--
SB-3-GW3	12/30/05	<0.050	<0.050	<0.10	--	<0.50	--	<1.0	<10	--	<0.50	<1.0	--	**<1.0**	<1.0	4.1	4.1	<1.0	<1.0	<0.50	--	<0.50-<2	--	--	--	--	--
EB-1-GW	08/11/16	**1,600**	**3,200**	**250**	<50	**<2.5**	<10	<2.5	<10	<2.5	<2.5	<2.5	<2.5	**<2.5**	<2.5	<2.5	<2.5	<2.5	<2.5	--	<2.5	<1.0 - <10	--	--	--	--	--
EB-2-GW	08/11/16	**30,000**	**55,000**	**<2,500**	630	**320**	81	23	**<50**	<12	**740**	150	<12	**100**	110	**<12**	**<12**	290	92	--	**430**	<5.0 - <50	--	--	--	--	--
EB-3-GW	08/11/16	<50	<100	**<500**	<10	<0.50	<2.0	<0.50	<2.0	<0.50	<0.50	<0.50	<0.50	**<0.50**	<0.50	<0.50	<0.50	<0.50	<0.50	--	<0.50	<0.50 - <10	--	--	--	--	--
EB-4-GW	08/11/16	**16,000**	**2,300**	**520**	<100	**110**	<20	14	**<20**	5.5	**250**	100	8.3	**7.9**	64	<5.0	<5.0	19	<5.0	--	**27**	<2.0 - <100	--	--	--	--	--
EB-5-GW	11/17/16	< 50	< 50	**420**	<10	<0.50	<2.0	<0.50	< 2.0	<0.50	<0.50	<0.50	<0.50	**<0.50**	<0.50	< 0.50	<0.50	<0.50	<0.50	--	<0.50	< 0.50 - < 10	< 0.0050	**<0.0250**	**<0.0250**	**<0.0500**	< 0.0250 - < 0.0500
EB-6-GW	11/17/16	< 50	**290**	**2,800**	<10	<0.50	<2.0	<0.50	2.0	<0.50	<0.50	<0.50	<0.50	**<0.50**	<0.50	< 0.50	<0.50	<0.50	<0.50	--	<0.50	< 0.50 - < 10	0.607	**<0.0250**	**<0.0250**	**<0.0500**	< 0.0250 - < 0.0500
EB-7-GW	11/17/16	< 50	< 100	**520**	<10	<0.50	<2.0	<0.50	< 2.0	<0.50	<0.50	<0.50	<0.50	**<0.50**	<0.50	0.68	<0.50	<0.50	<0.50	--	<0.50	< 0.50 - < 10	0.161	**<0.0250**	**<0.0250**	**<0.0500**	< 0.0250 - < 0.0500
EB-8-GW	11/17/16	< 50	70	**100**	<10	<0.50	<2.0	<0.50	< 2.0	<0.50	<0.50	<0.50	<0.50	**<0.50**	<0.50	< 0.50	<0.50	<0.50	<0.50	--	<0.50	< 0.50 - < 10	0.133	**<0.0250**	**<0.0250**	**<0.0500**	< 0.0250 - < 0.0500
ESLs MCL Priority		220	150	Note 2	14,000	1.0	NE	NE	12	NE	30	NE	NE	0.17	NE	5.0	5.0	NE	NE	40	20	Various	20	0.012	0.017	0.0034	Various

Notes:
1 - Reporting limits for "All Other PAHs" are below their respective MCL Priority ESLs, where established.
2- TPH motor oil is not soluble. TPH motor oil detections in water most likely are petroleum degredates or less likely non-aqueous phase liquids. Results of TPH motor oil and TPH diesel results have been added together and compared to the TPH diesel criterion.
ESLs - Environmental Screening Levles
TPHg - Total petroleum hydrocarbons as gasoline
TPHd - Total petroleum hydrocarbons as diesel
TPHmo - Total petroleum hydrocarbons as motor oil
TPHk - Total petroleum hydrocarbons as kerosene
MCL - Maximum Contaminant Level
NE - Environmental Screening Level not established
PCE - Tetrachloroethene
TCE - Trichloroethene
VOCs - Volatile organic compounds
PAHs - Polynuclear aromatic hydrocarbons
µg/L - Micrograms per liter
< 50 - Analyte was not detected above the laboratory reporting limit (50 µg/L)
Bold - Detected concentration is at or above the established regulatory environmental screening level
Various - Analysis of multiple compounds with various MCL Priority ESLs
-- - Not available/analyzed
MCL Prioroty - San Francisco Bay Regional Water Quality Control Board, Environmental Screening Levels, Summary of Groundwater Environmental Screening Levels. (February 2016 [Rev.3])

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Table 4
PAH Results in Soil
1110 Jackson Street
Oakland, California

Sample ID	Depth	Date Sampled	Sample Location	Acenaphthylene	Acenaphthene	Anthracene	Benzo (a) Anthracene	Benzo (a) Pyrene	Benzo (b) fluoranthene	Benzo (g,h,i) perlyene	Benzo (k) fluoranthene	Chrysene	Dibenz (a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	1-Methyl-naphthalene	2-Methyl-naphthalene	Naphthalene	Phenanthrene	Pyrene
				PAHs																	
	(feet)			mg/kg																	
Tank Pit Samples																					
~~9669-T1-C-9~~	~~9~~	~~04/15/16~~	T1 Bottom	~~<0.0089~~	~~<0.0660~~	~~<0.0660~~	~~<0.0660~~	**<0.0660**	~~<0.0660~~	~~<0.0660~~	~~<0.0660~~	~~<0.0660~~	~~<0.014~~	~~<0.0660~~	~~<0.0660~~	~~<0.014~~	~~0.220~~	~~**0.356**~~	~~**0.0335**~~	~~<0.0660~~	~~<0.0660~~
9669-P1-4	4	04/22/16	T1 Pipe Trench	<0.0033	<0.0033	<0.0033	0.00037	0.00031	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.0033	<0.0033	<0.0033
9669-T1-EW-8	8	05/04/16	T1 Sidewall	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.00063	<0.0033	0.0259	0.0133	0.0257	0.00056	<0.0033
9669-T1-C-12	12	05/04/16	T1 Bottom	<0.0033	0.00097	<0.0033	0.0016	0.00069	0.00058	<0.0033	0.00057	0.0024	<0.0033	0.00087	0.003	<0.0033	0.342	**0.701**	**0.426**	0.0037	0.0021
9669-T1-WW-8	8	05/04/16	T1 Sidewall	<0.0033	0.0027	0.00077	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.00086	<0.0033	0.00091	0.0064	<0.0033	0.125	0.0389	**0.121**	0.0034	0.0013
9669-T1-NW-8	8	05/04/16	T1 Sidewall	<0.0033	0.0056	0.00096	0.0044	0.0033	0.0033	0.0008	<0.0033	0.0067	<0.0033	0.0036	0.0129	<0.0033	0.154	0.154	**0.068**	0.0193	0.0069
~~9669-T2-C-9~~	~~9~~	~~04/15/16~~	T2 Bottom	~~<0.066~~	~~<0.0660~~	~~<0.0660~~	~~<0.0660~~	**<0.0660**	~~<0.0660~~	~~<0.0660~~	~~<0.0660~~	~~<0.0660~~	**<0.0660**	~~<0.0660~~	~~<0.0660~~	~~<0.0660~~	~~0.132~~	~~0.238~~	~~**0.220**~~	~~<0.0660~~	~~<0.0660~~
9669-P2-3.3	3.3	04/22/16	T2 Pipe Trench	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033
9669-T2-EW-6	6	05/04/16	T2 Sidewall	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.0155	0.0285	0.0142	<0.0033	<0.0033
9669-T2-C-12.5	12.5	05/04/16	T2 Bottom	<0.0033	0.0062	<0.0033	0.001	<0.0033	<0.0033	<0.0033	<0.0033	0.0013	<0.0033	0.0011	0.0191	<0.0033	1.86	**3.56**	**2.58**	0.007	0.0016
9669-T2-WW-8	8	05/04/16	T2 Sidewall	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.0357	0.0642	**0.0333**	0.00047	<0.0033
9669-T2-SW-8	8	05/04/16	T2 Sidewall	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.00061	<0.0033	0.0524	0.0956	**0.0538**	0.00041	<0.0033
~~9669-T3-C-8~~	~~8~~	~~04/15/16~~	T3 Bottom	~~<0.066~~	~~0.0242~~	~~<0.0660~~	~~<0.0660~~	**<0.0660**	~~<0.0660~~	~~<0.0660~~	~~<0.0660~~	~~<0.0660~~	**<0.066**	~~<0.0660~~	~~0.0728~~	~~<0.066~~	~~2.280~~	~~**4.130**~~	~~**1.960**~~	~~0.0346~~	~~<0.0660~~
9669-P3-4	4	04/22/16	T3 Pipe Trench	<0.0033	<0.0033	<0.0033	<0.0033	0.00038	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033
9669-T3-WW-8	8	05/04/16	T3 Sidewall	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.00050	<0.0033	<0.0033	<0.0033
9669-T3-C-12	12	05/04/16	T3 Bottom	<0.0033	0.0037	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.0121	<0.0033	0.124	0.242	**0.0913**	0.0065	<0.0033
9669-T3-SW-6.5	6.5	05/04/16	T3 Sidewall	<0.066	0.0245	<0.066	<0.066	**<0.066**	<0.066	<0.066	<0.066	<0.066	**<0.066**	<0.066	0.0969	<0.066	1.97	**3.33**	**0.724**	0.0389	<0.066
9669-T3-NW-8	8	05/04/16	T3 Sidewall	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.0041	0.0066	0.0018	<0.0033	<0.0033
9669-T3-EW-9	9	05/04/16	T3 Sidewall	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	<0.0033	0.00082	0.0014	0.00058	<0.0033	<0.0033
9669-C-17.5	17.5	12/02/16	T4 Bottom	<0.670	<0.340	0.068	**0.800**	**0.100**	**0.280**	0.260	0.049	0.045	**0.130**	0.830	0.110	**0.170**	--	--	**<0.34**	0.290	1
9669-C-18.5	18.5	12/02/16	T4 Bottom	<0.670	<0.340	0.078	**0.170**	**0.078**	**0.200**	<0.067	0.170	<0.034	**0.160**	0.710	<0.067	<0.034	--	--	**<0.34**	.190	1
Boring Samples																					
EB-5-4.5	4.5	11/16/16	Boring	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	<0.0050	<0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
EB-5-8.5	8.5	11/16/16	Boring	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	<0.0050	<0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
EB-6-4.5	4.5	11/16/16	Boring	<0.10	<0.10	<0.10	0.10	**< 0.10**	<0.10	<0.10	<0.10	< 0.10	**<0.10**	0.31	<0.10	<0.10	<0.10	0.24	<0.0050	0.58	0.26
EB-6-8.5	8.5	11/16/16	Boring	<0.0050	<0.0050	<0.0050	< 0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	< 0.0050
EB-7-4.5	4.5	11/16/16	Boring	<0.0050	<0.0050	<0.0050	< 0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	< 0.0050
EB-7-8.5	8.5	11/16/16	Boring	<0.0050	<0.0050	<0.0050	< 0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	< 0.0050
EB-8-4.5	4.5	11/16/16	Boring	<0.0050	<0.0050	<0.0050	0.0078	0.0061	<0.0050	<0.0050	<0.0050	0.0081	<0.0050	0.011	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	0.0056	0.013
EB-8-8.5	8.5	11/16/16	Boring	<0.0050	<0.0050	<0.0050	< 0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	< 0.0050
Tier 1 ESLs				13	3	2.8	0.16	0.016	0.16	2.5	1.6	3.8	0.016	60	8.9	0.16	NE	0.25	0.033	11	85

Notes:
NE - Environmental Screening Level not established
NA - Not applicable
mg/kg - Milligrams per kilogram
PAHs - Polycyclic aromatic hydrocarbons
<0.0033 - Analyte was not detected above the laboratory reporting limit (0.0033 mg/kg)
~~<0.0089~~ - sample over-excavated
Bold - Detected concentration is at or above the established regulatory environmental screening level
-- - Not available/analyzed
Tier 1 ESLs - RWQCB Environmental Soil Screening Levels based on a generic conceptual site model designed for use at most sites. The Tier 1 ESL summary table is generally derived from the most conservative ESL for each compound (February 2016 [Rev.3])

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Table 5
Volatile Organic Compound Results in Vapor
1110 Jackson Street
Oakland, California

Sample ID	Date Sampled	Depth	Acetone	Benzene	2-Butanone (MEK)	Carbon Disulfide	Cyclo-hexane	Dichlorodi-fluoro-methane (Freon 12)	Trichlorotri-fluoroethane (Freon 113)	Ethylbenzene	n-Hexane	Isopropanol	Naphthalene	PCE	TCE	Toluene	Trichloro-fluoro-methane	Xylenes	All Other VOCs	Methane	Helium
		(feet)	(µg/m³)																	%v	
Sub-slab Vapor Samples																					
SS-1	11/08/16	–	370	9.4	32	31	38	< 5.3	< 8.2	< 4.7	7.3	16	< 23	<1.1	<1.1	16	10	8.5	< 2.2 - < 11	< 0.22	< 0.22
SS-2	11/08/16	–	160	< 3.0	5.3	< 3.0	< 3.3	< 4.7	< 7.3	< 4.1	< 3.3	12	< 20	<0.95	<0.95	< 3.6	15	< 4.1	< 2.0 - < 10	< 0.19	< 0.19
SS-3	11/08/16	–	610	< 3.4	11	< 3.3	< 3.7	< 5.3	< 8.2	< 4.6	< 3.8	15	< 22	<1.1	<1.1	< 4.0	7.8	< 4.6	< 2.2 - < 11	< 0.21	< 0.21
SS-4	11/08/16	–	330	< 3.3	30	< 3.3	< 3.6	7.2	< 8.0	< 4.5	< 3.7	17	< 22	<1.0	<1.0	4.5	19	< 4.5	< 2.2 - < 11	< 0.21	< 0.21
SS-5	11/08/16	–	230	< 4.9	11	< 4.8	< 5.3	< 7.6	< 12	< 6.6	< 5.4	< 15	< 32	<1.5	<1.5	< 5.8	12	< 6.6	< 3.2 - < 16	< 0.31	< 0.31
SS-6	11/30/16	–	230	< 3.0	8.7	< 2.9	3.9	< 4.6	12	< 4.0	< 3.3	< 9.1	< 20	<0.93	<0.93	< 3.5	23	< 4.0	< 1.9 - < 9.9	< 0.19	0.41
Soil Gas Samples																					
SG1-2016-11-17	11/17/16	5.0	70.2	14.2	12.6	< 6.23	14.1	30.4	< 7.66	< 4.34	9.27	< 2.46	< 5.24	<6.78	<5.37	28.3	13.6	17.41	< 2.07 - < 10.7	< 0.100	< 0.100
SG2-2016-11-17	11/17/16	5.0	60.2	5.05	< 5.9	23.2	6.92	38.3	< 7.66	< 4.34	< 7.05	< 2.46	< 5.24	<6.78	<5.37	10.8	13.1	< 4.34	< 2.07 - < 10.7	< 0.100	< 0.100
SG3-2016-11-17	11/17/16	15.0	94.6	22.3	23.5	8.22	59.9	6.38	< 7.66	6.12	114	< 2.46	< 5.24	<6.78	<5.37	35.8	7.59	31.6	< 2.07 - < 10.7	1.22	< 0.100
SG4-2016-11-17	11/17/16	5.0	53.1	17.2	16	9.12	24	7.67	< 7.66	< 4.34	17.4	< 2.46	< 5.24	<6.78	<5.37	28.6	9.44	15.93	< 2.07 - < 10.7	< 0.100	< 0.100
SG5-2016-11-17	11/17/16	5.0	< 4.74	< 3.19	< 5.9	< 6.23	< 6.88	7.81	< 7.66	< 4.34	< 7.05	< 2.46	< 5.24	<6.78	<5.37	< 3.77	< 5.62	< 4.34	< 2.07 - < 10.7	1.21	< 0.100
Tier 1 ESLs			15,000,000	48	2,600,000	NE	NE	NE	NE	560	NE	NE	41	240	240	160,000	NE	52,000	Various	5*	--

Notes:
MEK - Methyl ethyl ketone
VOCs - Volatile organic compounds
PCE - Tetrachloroethene
TCE - Trichloroethene
µg/m³- Micrograms per cubic meter
%v - Percent by volume
< 5.3 - Analyte was not detected above the laboratory reporting limit (5.3 µg/m³)
NE - Environmental screening level not established
Various - Analysis of multiple compounds with various Tier 1 ESLs
***** - Lower Explosive Limit (LEL) and not Tier 1 ESL
-- - Not applicable
Tier 1 ESLs - RWQCB Environmental Sub-slab and Soil Gas Screening Levels based on a generic conceptual site model designed for use at most sites. The Tier 1 ESL summary table is generally derived from the most conservative ESL for each compound (February 2016 [Rev.3])

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Table 6
Sampling Analysis Plan
1110 Jackson
Oakland, California

Sample ID	TPH - gasoline, diesel and motor oil	VOCs
	EPA Method 8015	EPA Method 8260
Soil		
EB-9-5	X	X
EB-9-10	X	X
EB-9-15	X	X
EB-10-5	X	X
EB-10-10	X	X
EB-10-15	X	X
EB-11-5	X	X
EB-11-10	X	X
EB-11-15	X	X
EB-12-5	X	X
EB-12-10	X	X
EB-12-15	X	X
Groundwater		
EB-9-GW-(Screen Depth)	X	X
EB-9-GW-(Screen Depth)	X	X
EB-10-GW-(Screen Depth)	X	X
EB-10-GW-(Screen Depth)	X	X
EB-11-GW-(Screen Depth)	X	X
EB-11-GW-(Screen Depth)	X	X
EB-12-GW-(Screen Depth)	X	X
EB-12-GW-(Screen Depth)	X	X

Notes:
EPA - Environmental protection agency
GW - Groundwater
SL - Soil
TBD - To be determined
TPH - Total petroleum hydrocarbons
VOCs - Volatile organic compounds

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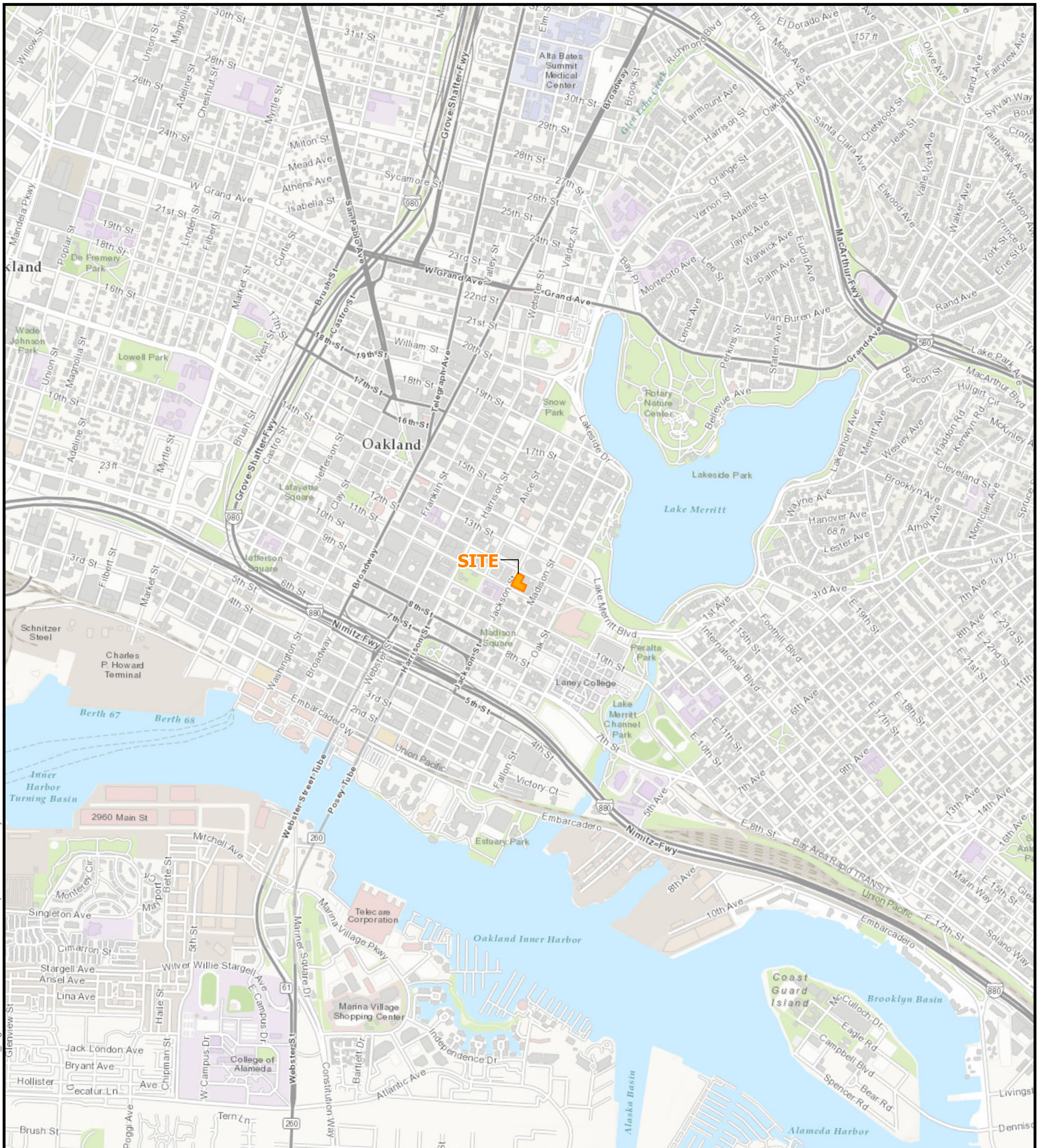
FIGURES



Legend

Site Boundary

0 1,000 2,000 4,000

Feet

N

Notes:

1. Topographic basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online © 2011 National Geographic Society, i-cubed.
2. All features shown are to be considered approximate.

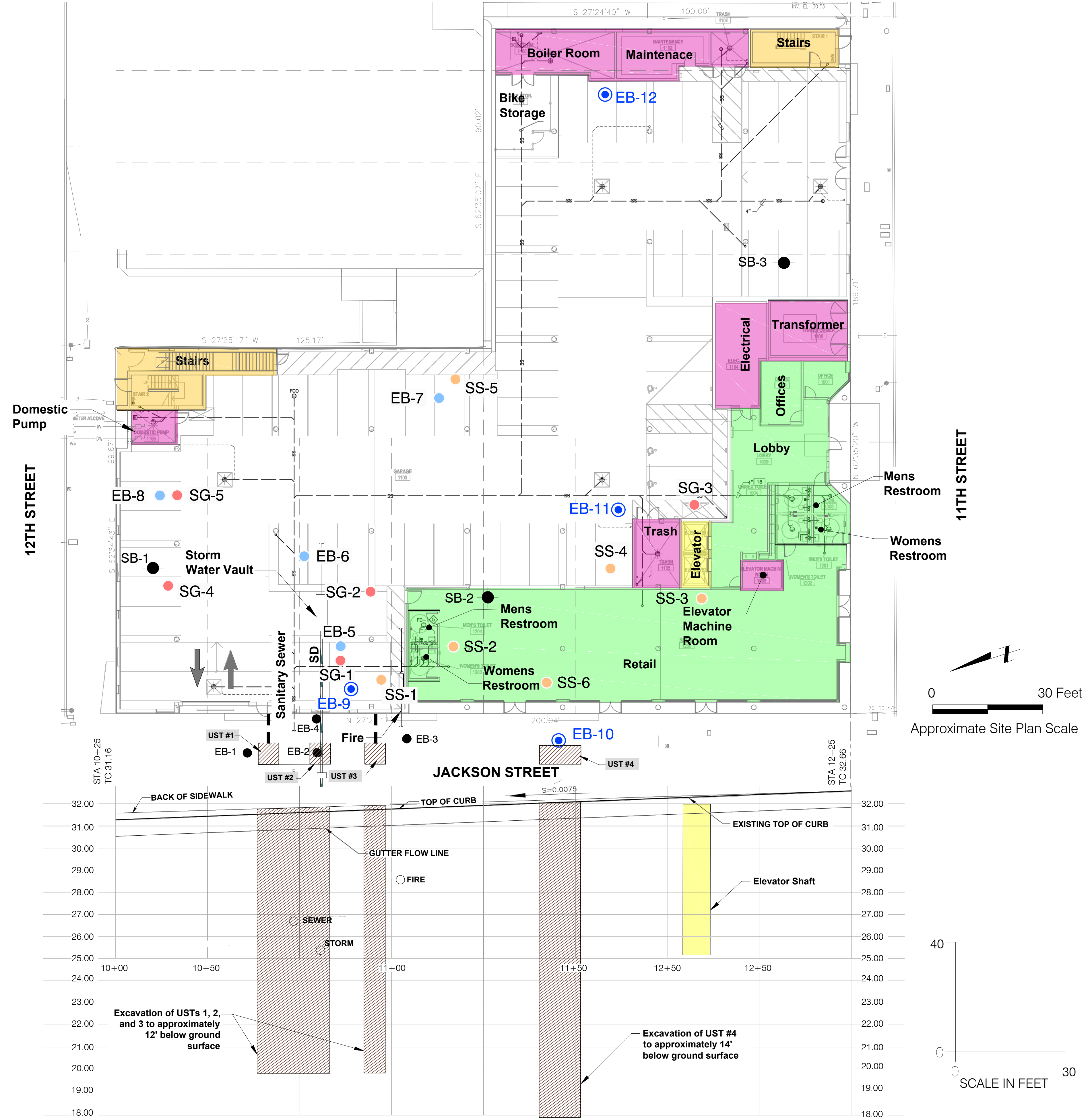
1110 JACKSON STREETT
Oakland, California

LANGAN

SITE LOCATION MAP

Date 7/26/2017	Project 750622604	Figure 1

\\langan.com\data\OAK\data6\750622603\ArcGIS\ArcMap_Documents\Environmental_Figures\Phase2\Site Location Map.mxd User: bsaylor



EXPLANATION

- Stair
- Machine rooms, utility rooms, trash, and storage
- Elevator
- Retail lobby/ offices
- Approximate location of former USTs
- SS-1 — Approximate location of sub-slab sample by Langan, November 2016
- SG-1 — Approximate location of soil gas sample by Langan, November 2016
- EB-5 — Approximate location of soil and groundwater sample by Langan, November 2016
- Capped in-place former product pipeline
- EB-1 — Appproximate location of grab groundwater sample by Langan, August 2016
- SB-1 — Approximate location of boring conducted by Tetra Tech, 2005
- EB-9 — Proposed location of soil and groundwater sample

Notes:
1. Fire and water supply lines are located above ground in building footprint.
2. Elevator pit constructed with waterproof concrete walls and flooring. The bottom of the elevator pit is approximately 7 feet below ground surface.
3. UST piping does not extend beneath building, as it was removed during foundation work. Samples collected beneath former product pipelines during tank removal were non-detect for petroleum hydrocarbons.
4. Soil gas from SG-3 was be collected approximately 15 feet below bottom of slab elevation. Soil gas sample collection was attempted at 8, 10, and 12 feet below ground surface but due to a lack of vapor, no samples were collected.

1110 JACKSON STREET
Oakland, California

SITE PLAN

Date 10/12/17 | Project No. 750622604 | Figure 2

LANGAN

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APPENDIX A

BORING LOGS

LANGAN

PROJECT:	1110 JACKSON STREET Oakland, California	Log of Boring EB-1

Boring location: See Figure 2

Date started: 8/11/16 | Date finished: 8/11/16

Drilling method: Direct Push

Hammer weight/drop: NA | Hammer type: NA

Sampler: Continuous

Logged by: J.S.
Drilled By: Gregg Drilling Co.

DEPTH (feet)	Sample Number	Sample	Water Level	Recovery (Inches)	OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
0							3 inches Concrete
1						SM	SILTY SAND (SM) dark brown, moist, loose, 85% sand, 15% fines
2							CLAYEY SILTY SAND (SC-SM) red-brown, moist, loose
3							
4							
5							
6				36/ 36"			CLAYEY SILTY SAND (SC-SM) yellow-brown, moist, brown mottling, medium-grained
7					1.2	SC-SM	
8							
9				48/ 48"			
10							
11					0.9		
12				48/ 48"			CLAYEY SILTY SAND (SC-SM) yellow-brown, moist, mottling, dense, 85% sand, 15% fines
13							SILTY SAND (SM) yellow-brown, moist, medium dense, 85% sand, 15% fines
14							
15					1.1	SM	dense, mottled, 90% sand, 10% fines
16							
17					1.2	SP	SAND (SP) olive-gray, moist, loose, fine to medium-grained, 95% sand, 5% fines
18				24/ 24"			SILTY SAND (SM) yellow-brown, moist, dense, mottled
19							
20			▽	24/ 24"		SM	SILTY SAND (SM) gray-brown, moist, medium-grained
21							
22				24/ 24"			CLAYEY SAND (SC) yellow-brown, moist, low plasticity, very stiff
23						SC	
24				24/ 24"		SM	SILTY SAND (SM) gray-brown, moist, dense, 85% sand, 15% fines
25					1.2		SAND (SP) gray, moist, dense, 95% sand, 5% fines
26							
27				24/ 24"		SP	
28							wet
29							
30							

Boring terminated at a depth of 27 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 20 feet below ground surface during drilling.

LANGAN TREADWELL ROLLO

Project No.: 750622602 | Figure: A-1

PROJECT: **1110 JACKSON STREET**
Oakland, California

Log of Boring EB-2

Boring location: See Figure 2
Date started: 8/11/16 | Date finished: 8/11/16
Drilling method: Direct Push
Hammer weight/drop: NA | Hammer type: NA
Sampler: Continuous
Logged by: T. Houghton
Drilled By: Gregg Drilling Co.

DEPTH (feet)	Sample Number	Water Level	Recovery (Inches)	OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
0						4 inches asphalt
0.3–2.5					GP	SANDY GRAVEL (GP) dark brown, moist, loose
2.5–5					GM	GRAVELY SAND (GW) dark brown, moist, loose, 80% sand, 15% gravel, 5% fines
5–10.5			36/ 36” (5–8); 48/ 48” (8–12)	16.3 (6)	SM	SILTY SAND with GRAVEL (SM) dark brown, moist, loose, medium-grained
10.5–12.5					SC	CLAYEY SAND (SC) yellow-brown to dark brown, moist, medium- to fine-grained
12.5–13.5	EB-2-13			135	SM	SILTY SAND with GRAVEL (SM) dark brown, moist, loose, gravel <.5 inches, medium- to fine-grained
13.5–22	EB-2-15.5	▽ (20)	4/ 48” (16–20)	235 (15); 282 (21)	SM	SILTY SAND (SM) gray, moist, fine- to medium-grained unable to remove the 16 to 20 feet sample from tube switching to 2 feet runs SILTY SAND (SM) gray-brown, moist, mottled, medium-grained,
22–23	EB-2-22.5		24/ 24" (22–24)	1300	SM	SILTY SAND (SM) gray-brown, moist, mottled, medium-grained, petroleum odor
23–24					SM	SILTY SAND (SM) gray, wet, dense, fine-grained, petroleum odor
24–26			24/ 24" (24–26)	1040	SP	SAND (SP) gray, wet, fine-grained gravel layer at 24.5 feet, bottom 3 inches color brown
26–28			24/ 24" (26–28)	1905	SP	SAND (SP) brown, wet, fine-grained, stong petroleum odor, bottom 5 inches brown

Boring terminated at a depth of 28 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 19.95 feet below ground surface during drilling.

LANGAN TREADWELL ROLLO

Project No.: 750622602 | Figure: A-2

PROJECT:	1110 JACKSON STREET Oakland, California	Log of Boring EB-3 PAGE 1 OF 1

Boring location: See Figure 2
Date started: 8/11/16 | Date finished: 8/11/16
Drilling method: Direct Push
Hammer weight/drop: NA | Hammer type: NA
Sampler: Continuous

Logged by: T. Houghton
Drilled By: Gregg Drilling Co.

DEPTH (feet)	Sample Number	Sample	Water Level	Recovery (Inches)	OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
0							1.5 inches concrete
1						SM	SILTY SAND (SM) yellow-brown, moist, loose, 90% sand, 10% fines
4						SC	CLAYEY SAND (SC) yellow-brown, moist, brown mottling, medium plasticity
5				36/ 36"		SC-SM	CLAYEY SILTY SAND (SC-SM) yellow-brown, moist, brown mottling, low plasticity
7					1.7		
8				48/ 48"			
9							moist, brown mottling, medium dense, 90% sand, 10% fines
12				48/ 48"			
13							moist, mottling, medium dense, 90% sand, 10% fines
14					1.2		
15				24/ 24"	3.1		
16.5						SP	SAND (SP) red-brown, moist, loose, 95% sand, 5% fines
17.5					1.5	SM	SILTY SAND (SM) brown, moist, dense, 85% sand, 15% fines
19				24/ 24"			
19.5						SC	CLAYEY SAND (SC) brown, moist, low plasticity
20			∇				
20.5					1.5	SM	SILTY SAND (SM) yellow-brown, moist, mottling, dense, , 90% sand, 10% fines
22				24/ 24"	1.8	SC-SM	CLAYEY SILTY SAND (SM) yellow-brown, moist, dense, 95% sand, 5% fines
24				24/ 24"	2.1	SP	SAND (SP) brown, wet, dense, no odor, 95% sand, 5% fines
26					2.1		SAND (SP) brown, wet, dense, 95% sand, 5% fines lamination at 26.5 feet
28–30							

Boring terminated at a depth of 28 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 20.35 feet below ground surface during drilling.

LANGAN TREADWELL ROLLO

Project No.: 750622602 | Figure: A-3

PROJECT: **1110 JACKSON STREET**
Oakland, California

Log of Boring EB-4

Boring location: See Figure 2
Date started: 8/11/16 | Date finished: 8/11/16
Drilling method: Direct Push
Hammer weight/drop: NA | Hammer type: NA
Sampler: Continuous
Logged by: T. Houghton
Drilled By: Gregg Drilling Co.

DEPTH (feet)	Sample Number	Sample	Water Level	Recovery (Inches)	OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
0–5						SM	SILTY SAND (SM) brown, moist, loose, medium-grained, gravel less than 1-inch, gravel subrounded to subangular, 80% sand, 10% gravel, 10% fines
5				36/ 36”		SP-SC	SAND with CLAY (SP-SC) yellow-brown, moist, brown mottling, medium plasticity, 85% sand, 15% fines
7					3	SC	CLAYEY SAND (SC) yellow-brown, moist, soft, low plasticity
10				48/ 48”			
11					6.1	SM	SILTY SAND (SM) yellow-brown, moist, mottled, medium dense, 85% sand, 15% silt
12				24/ 24"		SC-SM	CLAYEY SILTY SAND (SC-SM) yellow-brown, moist, dense, fine-grained
13					9.0		
15				24/ 24"	24.3	SM	SILTY SAND (SM) gray-brown, moist, medium dense, fine-grained
17				24/ 24"	253	SP	SAND (SP) gray-brown, moist, medium dense, fine-grained, 95% sand, 5% fines
19				24/ 24"			moist, dense, medium-grained, petroleum odor, 95% sand, 5%fine
20			∇				
21				24/ 24"	84		moist, dense, fine- to medium-grained, mild petroleum odor, 95% sand, 5% fines
22–23				24/ 24"	106		moist, dense, brown mottling, fine- to medium-grained, petroleum odor,
25				24/ 24"	961		wet, loose, medium-grained, 95% sand, 5% fines
27				24/ 24"			SAND (SP) gray, wet, dense, medium-grained, 95% sand, 5% fines
28					1482		
29					1274		
30							

Boring terminated at a depth of 28 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 20.1 feet below ground surface during drilling.

LANGAN TREADWELL ROLLO

Project No.: 750622602 | Figure: A-4

PROJECT:	1110 JACKSON STREET Oakland, California	Log of Boring EB-5 PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Logged by: K. Staehlin

Date started: 11/16/16

Date finished: 11/16/16

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Continuous

DEPTH (feet)	Sample Number	Sample	Blow Count	Recovery (Inches)	PID (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
0–0.5							6-inch thick concrete slab
0.5–3				36/48	0.3, 0.2	SP	GRAVELLY SAND (SP) brown, loose to medium dense, moist, subangular gravel less than 0.75-inches in diameter, trace brick and concrete debris, no odor
3–6	EB-5-4.5				0	SP	SAND (SP) dark brown, medium dense, moist, no odor; brown
6–12	EB-5-8.5			36/48, 42/48	0.1, 0, 0	SC	CLAYEY SAND (SC) orange-brown with gray mottling, medium dense to dense, moist, no odor
12–26.5				42/48, 24/24, 24/24, 24/24, 24/24, 24/24	0, 0, 0.1, 0.1, 0.2, 0.3, 0.1, 0, 0	SP	SAND (SP) orangish-brown, medium dense, moist, no odor; brown, dense (15); reddish-brown to orangish-brown (18); grayish-brown to brown (20); ▽ (11/16/16) (21.5); saturated (24)

Boring terminated at a depth of 26.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 21.5 feet below ground surface during drilling.

LANGAN

Project No.: 750622603

Figure: A-5

Log of Boring EB-6

PAGE 1 OF 1

PROJECT:	**1110 JACKSON STREET** Oakland, California
Boring location:	See Site Plan, Figure 2
Logged by:	K. Staehlin
Date started:	11/16/16
Date finished:	11/16/16
Drilling method:	Direct Push
Hammer weight/drop:	NA
Hammer type:	NA
Sampler:	Continuous

DEPTH (feet)	Sample Number	Recovery (Inches)	PID (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
0					6-inch thick concrete slab
1			0.1	SM	SILTY SAND with GRAVEL (SM) brown, loose to medium dense, dry, no odor
2		48/48			moist
4	EB-6-4.5		0.6		increasing sand
5.5			0.2	CL	SANDY CLAY (CL) orangish-brown with gray mottling, medium stiff, slighly-plastic, moist, no odor
6.5		48/48			
7.5				SP	SAND with CLAY (SP) orangish-brown, medium dense, moist, no odor
8	EB-6-8.5		0		
10		48/48	0		
12			0		dense
13					gray-brown
14		48/48	0		
14.5				SP	SAND (SP) brown, dense, moist, no odor increasing moisture
16			0		
17.5		24/24	0		
19.5		24/24			
20			0		
21			0		
21.5					⊻ (11/16/16)
22.5		36/48			
24			0		
25			0		
25.5		16/24			
26			0		
26.5			0		
27					Hydropunch at 28.5 feet bgs.
28.5					

Boring terminated at a depth of 28.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 21.5 feet below ground surface during drilling.

LANGAN

Project No.: 750622603

Figure: A-6

TEST ENVIRONMENTAL INCHES 750622603.GPJ T&R.GDT 12/2/16

PROJECT:	1110 JACKSON STREET Oakland, California	Log of Boring EB-7 PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Logged by: K. Staehlin

Date started: 11/16/16 | Date finished: 11/16/16

Drilling method: Direct Push

Hammer weight/drop: NA | Hammer type: NA

Sampler: Continuous

DEPTH (feet)	Sample Number	Recovery (Inches)	PID (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
0–0.5					6-inch thick concrete slab
1			0	SP	SAND with GRAVEL (SP) brown, loose to medium dense, moist, trace brick debris, no odor
2.5		36/48			
3			0.3		
4.5	EB-7-4.5		0.1		
6			0		orange-brown
6.5		46/48		SC	CLAYEY SAND (SC) orangish-brown with gray mottling, medium dense, moist, trace brick debris, no odor
8			0		
8.5	EB-7-8.5				
9.5			0		increasing fines
10				SP	SAND with trace CLAY (SP) orangish-brown with gray mottling, medium dense to dense, moist, no odor
10.5		48/48			
11			0		
12			0		
13		24/24		SP	SAND (SP) orangish-brown to brown, dense, moist, no odor
14			0		
15		24/24			
16			0		
17		24/24	0		
18					grayish-brown, varying amounts clay
19		24/24			
21		24/24	0		
21.5					∇ (11/16/16)
23		24/24	0		
25		24/24	0		
26.5			0		

Boring terminated at a depth of 26.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 21.5 feet below ground surface during drilling.

LANGAN

Project No.: 750622603 | Figure: A-7

PROJECT:	1110 JACKSON STREET Oakland, California	**Log of Boring EB-8** PAGE 1 OF 1

Boring location: See Site Plan, Figure 2	Logged by: K. Staehlin
Date started: 11/16/16	Date finished: 11/16/16
Drilling method: Direct Push	
Hammer weight/drop: NA	Hammer type: NA
Sampler: Continuous	

DEPTH (feet)	SAMPLES: Sample Number	Blow Count	Recovery (Inches)	PID (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
0						6-inch thick concrete slab
1				0.3	GP	SANDY GRAVEL with concrete (GP) light brown to gray-brown, loose, dry, subangular gravel less than 0.75-inches in diameter, trace brick debris, no odor
2			36/48			
3				0.2		SAND (SP) dark brown, medium dense, moist, no odor
4	EB-8-4.5			0.1		
5						
6			36/48	0	SP	orangish-brown varying levels of clay, dense
7						
8	EB-8-8.5			0		
9						
10			48/48	0		CLAYEY SAND (SC) orangish-brown, medium dense, moist, no odor
11						
12					SC	
13				0		dark brown to brown
14			40/48			
15						SAND (SP) orangish-brown, dense, moist, no odor
16				0		
17			24/24			
18				0		
19			24/24			brown, occasional seams of clay
20				0		
21					SP	▽ (11/16/16)
22			24/24	0		
23						saturated
24			24/24	0		
25			24/24			
26				0		
27						
28						
29						
30						

Boring terminated at a depth of 26.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 21.5 feet below ground surface during drilling.

LANGAN

Project No.: 750622603 | Figure: A-8

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		Symbols	Typical Names
Coarse-Grained Soils (more than half of soil > no. 200 sieve size	**Gravels** (More than half of coarse fraction > no. 4 sieve size)	**GW**	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (More than half of coarse fraction < no. 4 sieve size)	**SW**	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
Fine -Grained Soils (more than half of soil < no. 200 sieve size)	**Silts and Clays** LL = < 50	**ML**	Inorganic silts and clayey silts of low plasticity, sandy silts, gravelly silts
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	Silts and Clays LL = > 50	**MH**	Inorganic silts of high plasticity
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic silts and clays of high plasticity
Highly Organic Soils		**PT**	Peat and other highly organic soils

GRAIN SIZE CHART

Classification	**Range of Grain Sizes**	
	U.S. Standard Sieve Size	**Grain Size in Millimeters**
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel	3" to No. 4	76.2 to 4.76
coarse	3" to 3/4"	76.2 to 19.1
fine	3/4" to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.075
coarse	No. 4 to No. 10	4.76 to 2.00
medium	No. 10 to No. 40	2.00 to 0.420
fine	No. 40 to No. 200	0.420 to 0.075
Silt and Clay	Below No. 200	Below 0.075

Unstabilized groundwater level

Stabilized groundwater level

SAMPLE DESIGNATIONS/SYMBOLS

Sample taken with Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter. Darkened area indicates soil recovered

Classification sample taken with Standard Penetration Test sampler

Undisturbed sample taken with thin-walled tube

Disturbed sample

Sampling attempted with no recovery

Hydropuch sample

Analytical laboratory sample

Sample taken with Direct Push or Drive sampler

SAMPLER TYPE

C	Core barrel
CA	California split-barrel sampler with 2.5-inch outside diameter and a 1.93-inch inside diameter
D&M	Dames & Moore piston sampler using 2.5-inch outside diameter, thin-walled tube
O	Osterberg piston sampler using 3.0-inch outside diameter, thin-walled Shelby tube
PT	Pitcher tube sampler using 3.0-inch outside diameter, thin-walled Shelby tube
S&H	Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter
SPT	Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside diameter and a 1.5-inch inside diameter
ST	Shelby Tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure

1110 JACKSON STREET
Oakland, California

LANGAN

CLASSIFICATION CHART

Date 11/21/16 | Project No. 750622603 | Figure A-9

BORING LOG

Tetra Tech EM Inc.
10670 White Rock Road, Suite 100
Rancho Cordova, California 95670
(916) 852-8300

BORING NO.: SB-1

SHEET 1 OF

PROJECT NAME: Jackson Towers
PROJECT NUMBER: P2261.06.1BAD0.0030.2C
SOIL BORING [X] MONITORING WELL [ ] [ ]

PROJECT LOCATION: 1110 Jackson Street, Oakland, Alameda County, CA		START DATE: 12-27-05	COMPLETION DATE: 12-27-05
		COMPLETED DEPTH (FEET): 25'	GROUNDWATER DEPTH (FEET): 19' @ 1105
DRILLING CONTRACTOR: PSI	DRILLER: Roberto Estrada	WELL CONSTRUCTION	
DRILLING EQUIPMENT: Geoprobe XD-1 Dual wall	BORING DIAMETER: outer = 2 1/2" Inner = 1 3/4"	TYPE AND DIAMETER OF WELL CASING: Temporary 1" Sched 40 PVC	
SAMPLING METHOD: California Modified [ ] Hand Auger [ ] DP [X]		SLOT SIZE: 0.010	FILTER MATERIAL: None
LOGGED BY: Bob Azam	BACKFILL MATERIAL: Grouted To surface by tremie	WELL DEPTH: 25'	PERFORATED INTERVAL: 20-25'

TIME	DESCRIPTION	% Recovery / BLOW COUNTS	DEPTH (FEET)	SAMPLE	UCSC SOIL TYPE	LITHOLOGY	WELL	PID/FID READINGS OVA (ppm)	REMARKS
0830	Asphalt surface								
	Sand with trace silt, dark brown, very moist, loose, no odor. Very fine sand. 3' = color changes to light brown. Wet at 3'	100%			SM			Ø Ø	▽ Perched water 3.5'-4'
0850	Clay with 5-10% very fine sand, light brown, very moist, stiff, high plasticity, no odor	100	5		CL			Ø	
	7'-10': same as above, increasing moisture. Trace orange mottles	100						Ø ↓ Ø	No odor No free water
0905	10-13': Decrease in moisture to moist / very moist; hard; increase in sand 15-20%.	100	10					Ø Ø	No odor
	Increasing sand 13-14.5': To 30%. Low plasticity from 13'			SB-1-12'				Ø	Hard drilling 13'-16'
	SAND with CLAY, brown, very moist to wet (not saturated), moderately dense, no odor. 30-40% clay, some plasticity. Increasing moisture at 15'	100	15		SC			Ø Ø Ø	Very moist to wet from 13'. Increasing moisture Fine-med, subangular to subrounded sand no odor
0940	16'-19': decreasing clay to 25%, some silt							Ø Ø	Hard drilling from 19' Increasing moisture
	Clay with sand, brown to orange-brown, wet, high plasticity, soft, no odor. 10-15% very fine sand	100	20		CL			0.2	19-22' = slough
1010	Sand with silt, brown to light brown, wet (saturated), moderately dense, no odor. Dense at 24', trace clay	80			SM			0.7 Ø Ø	no free water. Hard drilling fine, subrounded sand
1055			25						SB-1-GW1 @ 1110 DTW @ 1210 = 18.2'

Tetra Tech EM Inc.
10670 White Rock Road, Suite 100
Rancho Cordova, California 95670
(916) 852-8300

BORING LOG

PROJECT NAME: Jackson Towers

PROJECT NUMBER: P2261.06.1.BAD0.0030.2C

SOIL BORING ☒ MONITORING WELL ☐ ☐

BORING NO.: SB-2

SHEET 1 OF 1

PROJECT LOCATION	1110 Jackson Street, Oakland, Alameda County, CA
START DATE	12-27-05
COMPLETION DATE	12-27-05
COMPLETED DEPTH (FEET)	25'
GROUNDWATER DEPTH (FEET)	~~25'~~ 21' @ 1245
DRILLING CONTRACTOR	PSI
DRILLER	Roberto Estrada
DRILLING EQUIPMENT	Geoprobe XD-1 Dual wall
BORING DIAMETER	Outer = 2 1/2" Inner = 1 3/4"
SAMPLING METHOD	California Modified ☐ Hand Auger ☐ DP ☒
LOGGED BY	Bob Azam
BACKFILL MATERIAL	Grouted to surface by tremie

WELL CONSTRUCTION

TYPE AND DIAMETER OF WELL CASING	Temporary 1" sched 40 PVC
SLOT SIZE	0.010"
FILTER MATERIAL	None
WELL DEPTH	25'
PERFORATED INTERVAL	20-25'

TIME	DESCRIPTION	~~BLOW COUNTS~~	DEPTH (FEET)	SAMPLE	UCSC SOIL TYPE	LITHOLOGY	WELL	PID/FID READINGS OVA (ppm)	REMARKS
1125	Asphalt surface (~4")								
	2" layer of concrete. Silty Sand, brown, loose, moist, no odor. Changes color to light brown to brown at 3'	5%			SM	∇		∅ ∅	0-4': material fell out of sleeve, sand catcher did not catch material. wet 3-4': perched water
	Clay with sand, light brown to brown, moist to very moist, stiff, med plasticity, no odor, trace silt	100%	5		CL			∅	very fine sand to 30%
	changes color to orange brown at 8', increase in moisture to very moist	100%						∅	
	increasing sand and moisture		10					∅	
1150	Silty sand with clay, light brown to orange brown, very moist, loose to slightly dense, no odor	100	11 12 13	☒	SM/SC			∅ ∅	11.5-12.5': very moist to wet. SB-2-12' @ 1155
	12.5': Clay with silt and sand, light brown to orange brown, very moist, slightly stiff, low to medium plasticity	100						∅ ∅	Increasing moisture
	SAND with clay, orange-brown, very moist, slightly loose, no odor, 35-40% clay, some plasticity. Changes color to brown-light brown at 17'. Trace silt; 15-20% clay from 17'	100	15					∅ ∅	fine grained sand. ~~Slightly~~ moist 16-17.5' (Decrease in moisture 16-17.5')
1215	Very moist to wet from 19': No odor		19 20					∅ ∅	not enough moisture to produce water
	orange brown at 21', decreasing clay to 10%	100						∅	No odor
1235	Sand with silt, trace clay, light grayish brown, wet (saturated), loose, no odor	100'	25					∅ ∅	very fine to fine sand

SB-2-GW2 @ 1250

DTW @ 1310 = 19.07

APPENDIX B

CONCEPTUAL SITE MODEL

APPENDIX B
CONCEPTUAL SITE MODEL
1110 JACKSON STREET, OAKLAND, CALIFORNIA

NO.	CSM ELEMENT	DESCRIPTION	EXHIBITS	REFERENCES	DATA GAPS	RESOLUTION
1	Site Description	The property, 1110 Jackson Street (site), is located to on Jackson Street and occupies the length of the block from 11th Street to 12th Street in Oakland, California, in a fully developed area known as "Chinatown", characterized primarily by commercial and high density residential buildings. The site is bounded by multiple buildings to the east. The site is L-shaped, with long dimensions measuring approximately 190 feet by 200 feet, along 11th and Jackson Streets, respectively. The L-shaped site is bound by Jackson Street to the west, 12th Street to the north, 11th Street to the south, and a school (the American Indian Model School, 171 12th Street) and residential buildings (1115 and 1109 Madison, and 150 and 168 11th Street) to the east. Based on historical research and supporting documentation (Essel Environmental Consulting, 2015), the site was developed with a hospital in 1889. By 1903, the hospital had been replaced by residences. Two automobile repair garages operated in the northern portion of the site (including two USTs beneath Jackson Street) between 1911 and 1946, while the southern portion of the site was developed for residential use. By 1939, the site was fully developed with two auto repair garages in the northern portion of the site, residences in the southern portion of the site, and a new commercial building at the southern corner of the site. One of the automobile repair garages was removed in 1946 and the residences were removed by 1950, when both became parking lots. The second auto repair garage was converted to a store, a glass works business, and a parking lot through the 1950's. In the 1960's, a store was constructed in the southwest corner of the site and a small shed was constructed near the glass works facility. The site remained in this state until 2007 when all the buildings were demolished. The site was vacant until construction of the current apartment building. The site is currently occupied by a 5-story residential building with an openly ventilated parking garage and a commercial space on the ground floor. The building is currently occupied.	Figure 1 – Site Location Map Figure 2 – Site Plan	EMG, *Phase I Environmental Site Assessment, 176 and 198 11th Street/1110 Jackson Street, Oakland, California* dated 15 September 2005. Essel Environmental Consulting, *Phase I Environmental Site Assessment, 176 and 198 11th Street/1110 Jackson Street, Oakland, California 94607* dated 13 February 2015. Langan, *Underground Storage Tank Closure Investigation Report, 1110 Jackson Street, Oakland, California* dated 13 September 2016. Langan, *Additional Environmental Site Assessment Report, 1110 Jackson Street, Oakland, California* dated 1 December 2016.	None	Not Applicable
2	Surface Water Bodies	The nearest surface water body is Lake Merritt located approximately 1,200 feet to the east of the site. The San Francisco Bay is approximately 0.7 miles southwest of the site. Lake Merritt is a tidal water body that discharges through a narrow channel at its southern terminus point into the inner Oakland Harbor of the San Francisco Bay.	Figures 3 – Nearby Surface Water Bodies Figures 4 – Regional Geology and Hydrologic Features Map	None	None	Not Applicable
3	Nearby Wells	The State Water Resources Quality Control Board's (RWQCB) Geotracker GAMA website provides the locations of water supply wells. Langan reviewed the GAMA website in July 2017 and no municipal supply wells were shown within 1,000 feet of the site. Langan requested information from the California Department of Water Resources	Well Search included in Appendix B	*RWQCB Geotracker GAMA, Results of Well Search* website accessed 19 July 2017.	None	Not Applicable

NO.	CSM ELEMENT	DESCRIPTION	EXHIBITS	REFERENCES	DATA GAPS	RESOLUTION
		(DRW) for permitted wells and borings in the area, however, DWR responded to the request noting a three month delay for the requested information.				
4	Regional Geology and Hydrogeology	Regional Geology Regional physiographic conditions are reflective of and affected by the tectonic framework, regional faulting, and geologic units that comprise the site and surrounding area. The regional topography is characterized by northwest to southeast oriented coastal hills and intervening valleys, developed as a consequence of plate motions at the boundary of the North American and Pacific lithospheric plates. Under the current tectonic framework, compressive and shearing forces from the plate motions are distributed regionally across several active, sub-parallel, northwest to southeast trending fault zones. Horizontal motion is distributed across the major active strike-slip faults. Within the East Bay, these faults include the Hayward, Calaveras and Concord Faults, which comprise the East Bay Fault System (EBFS) (Sloan, 2006). Compressive deformation is distributed across northwest to southeast trending thrust and reverse faults parallel to the major strike-slip faults of the EBFS (Graymer, 2000). Regional uplift of the East Bay hills was coincident with a change in tectonic forces to a component of compression beginning approximately 3.5 million years ago (Sloan, 2006); current measurements indicate uplift is occurring at a rate of as much as one millimeter per year (Graymer, 2000). Regionally, bedrock is composed of the Mesozoic Franciscan Assemblage (complexly faulted and folded marine sedimentary and volcanic rocks) and is overlain by Quaternary to modern sedimentary formations which include alluvial fans, and basin and stream valley deposits, amongst others (Graymer, 2000). These Quaternary sedimentary formations were deposited during regional uplift. Regional Hydrogeology The San Francisco Bay hydrologic region has 28 identified groundwater basins underlying approximately 30 percent of the entire San Francisco Bay region (DWR, 2003). Alameda County is within the East Bay Plain sub-basin of the Santa Clara Valley groundwater basin. The East Bay Plain sub-basin is bounded to the north by San Pablo Bay, to the east by Franciscan bedrock, to the south by the Niles Cone groundwater basin, and extends to the west below the San Francisco Bay. The East Bay Plain is formed in an alluvial plain; the main water bearing units consist of unconsolidated Quaternary sedimentary formations, including the Pleistocene Santa Clara and Alameda Formations, and the Holocene Temescal Formation as well as artificial fill. With the exception of artificial fill, these main water-bearing formations were deposited as alluvial fans. Total groundwater storage capacity within the East Bay Plain was estimated to be 2,670,0000 acre feet, of which, approximately 2,500,000 acre feet is in storage to a depth of 1,000 feet below mean sea level; adjusting for potential sea water intrusion reduces the groundwater is storage to approximately 80,000 acre feet (storage above mean sea level). The San Francisco Bay Regional Water Quality Control Board identified 13 areas of major groundwater pollution in the East Bay Plain; contamination was most commonly associated with release of fuels and solvents, and was generally found within	Figure 4 – Regional Geology and Key Hydrologic Features	Sloan, Doris. *Geology of the San Francisco Bay Region, California Natural History Guides,* University of California Press; First Printing edition. (360 pages), 27 June 2006. Graymer, R.W. *Geologic Map and Map Database of the Oakland metropolitan area, Alameda, Contra Costa, and San Francisco Counties, California.* Miscellaneous Field Studies MF-2342, 2000. California Department of Water Resources (DWR). *Bulletin 118, Update,* October 2003. DWR. *San Francisco Bay Hydrologic Region, California's Groundwater Bulletin 118, Santa Clara Valley Groundwater Basin, East Bay Plain Subbasin,* Last update 27 February 2004.	None	Not Applicable

NO.	CSM ELEMENT	DESCRIPTION	EXHIBITS	REFERENCES	DATA GAPS	RESOLUTION
		the upper 50 feet (DWR, 2004).				
5	Site Geology	The site rests on the Merritt Sand, approximately ¼ mile west of the current shoreline of Lake Merritt. The site's surficial geology is mapped as Holocene and Pleistocene aged Quaternary eolian deposits described as fine-grained, very well sorted, well-drained sand (Graymer, 2000). The subsurface has been explored to a depth up to 27 feet below ground surface (bgs). The subsurface soil at the site reportedly consists of three to five feet of fill underlain by varying amounts of silts and clays. The site is located within the Coast Ranges geomorphic province, which is characterized by a series of parallel, northwesterly trending, folded and faulted mountain chains and valleys. In central California, these ranges are separated by a geologic depression that formed mainly by Franciscan Formation rock series, consisting of Jurassic Franciscan melanges. The East Bay ranges forms the eastern boundary of the Bay and consist of Late Mesozoic shelf and slope sedimentary rocks. Situated between the East Bay ranges and San Francisco Bay is the Easy Bay Plain. This plain measures approximately 25 miles long and two to seven miles wide. Prior to urban development, the plain consisted of tidal flats, estuaries and alluvial plains.	Figure 2 – Site Plan Figure 6 – Cross Section A – A' Appendix A. Boring Logs	California Geological Survey, *State of California Seismic Hazard Zones, Oakland West Quadrangle, Official Map* dated 14 February 2003. Graymer, R.W. *Geologic Map and Map Database of the Oakland metropolitan area, Alameda, Contra Costa, and San Francisco Counties, California.* Miscellaneous Field Studies MF-2342, 2000. Langan, *Additional Environmental Site Assessment Report, 1110 Jackson Street, Oakland, California* dated 1 December 2016.	None	Not Applicable
6	Site Groundwater Depth and Flow	Groundwater was generally measured between approximately 20 to 23 feet bgs with the potential for seasonal rainfall to influence groundwater levels by several feet. The groundwater flow direction at the site, based on groundwater investigations performed at a nearby site (165 13th Street, Oakland, California), is anticipated to flow in an easterly direction towards Lake Merritt.	Figure 2 – Site Plan	*None*	None	Not Applicable
7	Preferential Pathways	Utility conduits (storm water, sanitary sewer and water supply lines) enter the property from Jackson Street near the former UST #1, #2, and #2 locations. Utility conduits adjacent to or within the site boundaries are not potential preferential pathways for groundwater migration due to the depth to groundwater beneath the site. However, this will be confirmed with additional groundwater level measurement near the utility conduits. Additionally, one elevator bank is located near the commercial space along Jackson and 11th Streets. The elevator pit extends about 6 feet below the slab and is constructed of water-proofed concrete. Elevator pits and shafts can act as conduits for vapor intrusion. Sub-slab and soil gas samples were collected in the vicinity of the subsurface utility	Figure 2 – Site Plan	Langan, *Additional Environmental Site Assessment Report, Fuel Leak Case RO0003232, 1110 Jackson Street, Oakland, California* dated 1 December 2016.	Confirm groundwater depth near utility conduits	Advancement of a boring near the utility conduits for groundwater elevation measurements

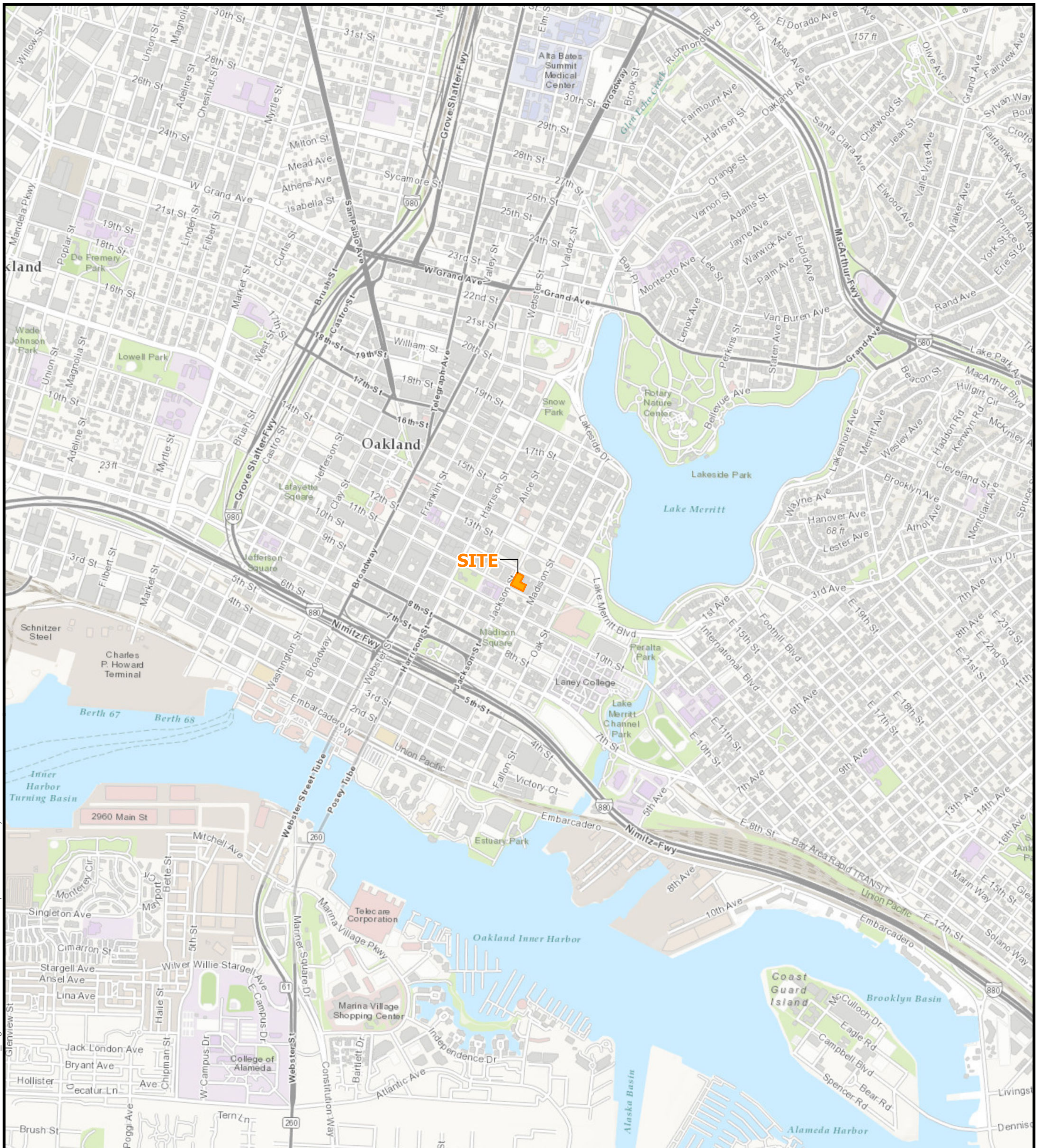
NO.	CSM ELEMENT	DESCRIPTION	EXHIBITS	REFERENCES	DATA GAPS	RESOLUTION
		trenches and the elevator pit in November 2016. No sub-slab or soil gas samples had detected concentrations in excess of their respective Regional Water Quality Control Board Tier 1 Environmental Screening Levels (ESLs), which indicates that vapor intrusion is not a significant concern at the site.				
8	UST Systems or Release Source	The site formerly housed four underground storage tanks (USTs) consisting of two 265-gallon gasoline USTs, one 110-gallon gasoline UST, and one 750-gallon diesel UST. All tanks were located underneath the Jackson Street sidewalk along the eastern side of the site. The three gasoline USTs were removed in April 2016 and the diesel UST was removed in November 2016 by Golden Gate Tank Removal (GGTR). Over-excavation was performed for each of the USTs as part of the removal and sidewall and bottom samples were collected by GGTR following excavation. Two environmental site assessments, performed in August 2016 and November 2016, were completed to evaluate the extent of soil, soil gas, and groundwater impacts related to the release of petroleum products from the USTs at the site. A total of eight borings (EB-1 through EB-8)_for soil and/or groundwater collection, five soil gas borings, and six sub-slab sample points were completed to facilitate the collection of environmental samples to delineate the potential contaminant impacts since the discovery and removal of the first three USTs. The analytical results collected to date indicate contaminant impacts at the site are attributable to the former USTs and generally limited to soil immediately surrounding the former USTs and groundwater extending slightly beneath the existing building.	Figure 2 – Site Plan	Golden Gate Tank Removal (GGTR), *Underground Storage Tank Closure Report, 1110 Jackson Street, Oakland, California* dated 23 June 2016. GGTR, *Underground Storage Tank (T4) Closure Report, 1110 Jackson Street, Oakland, California* dated 13 January 2017. Langan, *Underground Storage Tank Closure Investigation Report, 1110 Jackson Street, Oakland, California* dated 13 September 2016.	Extent of petroleum impacts adjacent to UST #4	Collection of soil and groundwater samples immediately east of UST #4 and additional borings for soil and groundwater collection beneath the building.
	LNAPL	Based on previous investigations conducted by others and Langan, there is no evidence and/or documentation of free product. However, no groundwater samples have been collected adjacent to UST #4 to evaluate the potential of light non-aqueous phase liquid (LNAPL).	None	None	Need data adjacent to UST #4 to evaluate the potential of LNAPL	Groundwater samples are proposed east of UST #4 and downgradient beneath the building to evaluate the potential presence of LNAPL
9	Contaminants of Concern	Chemicals currently or historically detected in site soil and/or groundwater at concentrations greater than ESLs presented in Tables 1 through 5 include: • <u>Petroleum Hydrocarbons and TPH constituents: </u>total petroleum hydrocarbons as gasoline (TPHg), diesel (TPHd), and motor oil (TPHmo) • <u>Polycyclic aromatic hydrocarbons (PAHs): benzo (a) Anthracene, benzo (a) Pyrene, benzo (b) fluoranthene, dibenz (a,h) anthracene, indeno (1,2,3-cd) pyrene, 2-methyl-naphthalene, naphthalene,</u> • <u>Volatile Organic Compounds (VOCs):</u> benzene, t-Butyl benzene, ethylbenzene,	Table 1—TPH and VOC Results in Soil Table 2—Metal Analytical Results in Soil Table 3—Non-Metal Analytical Results in Grab-Groundwater Table 4—PAH Results	Langan, *Underground Storage Tank Closure Investigation Report, 1110 Jackson Street, Oakland, California* dated 13 September 2016.	None	Not applicable

NO.	CSM ELEMENT	DESCRIPTION	EXHIBITS	REFERENCES	DATA GAPS	RESOLUTION
		naphthalene, and xylenes • Metals: Lead (in soil)	in Soil			
10	Soil Impacts	In 2006, Tetra Tech advanced three borings in an effort to assess the potential petroleum impacts associated with an adjacent property. Soil samples were collected at approximately 12 feet bgs and analytical results yielded no detections of TPH, VOCs, or metals above their respective ESLs. In 2016, after discovery of USTs in the Jackson Street sidewalk adjacent to the site, and subsequent removal of the USTs and the associated over-excavation, soil contamination was visually observed and soil samples collected from beneath all USTs. The ACEH recommended over-excavation of contaminated soil and additional bottom wall soil sampling. The recommended over-excavation and additional sampling was completed by GGTR in May 2016. TPHg contamination was detected beneath all three initial UST excavations at concentrations ranging between 67.8 mg/kg (beneath UST 3) and 6,320 mg/kg (beneath UST 2). The ACEH requested collection of groundwater samples near the former tanks to assess the impact of petroleum and petroleum related compounds to groundwater. In August 2016, Langan performed additional soil sampling in conjunction with the requested groundwater sampling at four locations near the former USTs (EB-1 through 4). Soil sample results collected from beneath UST 2 indicated that petroleum hydrocarbons and related compounds have impacted subsurface soils at the site. Following the additional soil and groundwater sampling, Langan collected soil and groundwater samples from four additional borings (EB-5 through EB-8) at the site. Soil samples were collected at approximately 4.5 and 8.5 feet bgs. Soil samples collected and analyzed for TPH and VOCs were generally non-detect, except TPHd and TPHmo detected at concentrations of 15 and 160 mg/kg in sample EB-6-4.5 and TPHmo detected at 5.1 mg/kg in sample EB-8-4.5, which are below current ESLs.	Table 1—TPH and VOC Results in Soil Table 2—Metal Analytical Results in Soil Table 3—Non-Metal Analytical Results in Grab-Groundwater Table 4—PAH Results in Soil	Langan, *Underground Storage Tank Closure Investigation Report, 1110 Jackson Street, Oakland, California* dated 13 September 2016. Langan, Additional *Environmental Site Assessment Report, 1110 Jackson Street, Oakland, California* dated 1 December 2016. Tetra Tech EM, Inc., *Limited Phase II Environmental Site Assessment, Jackson Tower, Oakland, California* dated 18 January 2006.	Confirmation of bioattenuation zone near elevator and assessment of soil conditions near and downgradient of UST #4.	Soil sampling every five vertical feet down to groundwater in borings immediately down gradient of the former UST #4 location and near the elevator (proposed borings EB-10 and EB-11).
11	Groundwater Impacts	Groundwater samples were first collected at the site in 2006 and subsequent to the removal of USTs #1, #2, and #3. No TPH was detected in any of the groundwater samples collected by Tetra Tech from borings SB-1, SB-2 or SB-3 in 2006. The only VOCs detected were trichloroethene (TCE) and tetrachloroethene (PCE) in boring SB-3 at concentrations of 4.1 µg/L, which are both below their maximum contaminant level (MCL) of 5 µg/L. Boring SB-3 was located in the southeast portion of the site.. In August 2016, Langan advanced three borings (EB-1 through EB-3) in the vicinity of the former USTs and one boring (EB-4) downgradient of the former USTs. Analytical results from this investigation revealed the highest concentrations of TPH and related compounds in groundwater was directly below UST #2, which had the highest concentrations in soil beneath the USTs and immediately downgradient of the UST #2. Contaminants detected above their MCL priority ESLs were reported as follows:	Table 3—Non-Metal Analytical Results in Grab-Groundwater Figure 2 – Site Plan	GGTR, *Underground Storage Tank Closure Report, 1110 Jackson Street, Oakland, California* dated 23 June 2016. GGTR, *Underground Storage Tank (T4) Closure Report, 1110 Jackson Street, Oakland, California* dated 13 January 2017.	Vertical and horizontal delineation of the plume.	Deep and shallow groundwater samples will be collected

NO.	CSM ELEMENT	DESCRIPTION	EXHIBITS	REFERENCES	DATA GAPS	RESOLUTION
		• TPHg and TPHd in EB-2 at 30,000 and 55,000 µg/L, respectively; • TPHg, TPHd, and TPHmo in EB-1 at 1,600, 3,200, and 250 µg/L, respectively; • TPHg, TPHd, and TPHmo in EB-4 at 16,000, 2,300, and 520 µg/L, respectively; • Benzene in EB-2 and EB-4 at 320 and 110 µg/L, respectively; • Ethylbenzene EB-2 and EB-4 at 740 and 250 µg/L, respectively; • Naphthalene in EB-2 and EB-4 at 100 and 7.9 µg/L, respectively; • Xylenes in EB-2 and EB-4 at 430 and 27 µg/L, respectively. Based on elevated concentrations downgradient of the USTs, additional groundwater sampling was performed by Langan in November 2016. Four borings (EB-5 through EB-8) were advanced to a maximum depth of 26.5 feet bgs downgradient of the former USTs to determine the extent of the groundwater contamination at the site. TPHd and TPHmo were the only compounds detected above their ESLs. Groundwater sample results yielded the following maximum detections: • TPHd in EB-6 at 290 µg/L • TPHmo in EB-6 at 2,800 µg/L Based on the groundwater investigation to this point, it has been confirmed that groundwater beneath the site has been impacted by TPHd and TPHmo downgradient of the former USTs; however, significant impacts beneath the building appear to be limited.		Langan, *Underground Storage Tank Closure Investigation Report, 1110 Jackson Street, Oakland, California* dated 13 September 2016. Langan, *Additional Environmental Site Assessment Report, 1110 Jackson Street, Oakland, California* dated 1 December 2016. Tetra Tech EM, Inc., *Limited Phase II Environmental Site Assessment, Jackson Tower, Oakland, California* dated 18 January 2006.		
12	Soil Vapor Impacts	Langan has conducted soil vapor sampling in areas closest to the former USTs, including six sub-slab vapor samples (SS-1 through SS-6) and five soil gas samples (SG-1 through SG-5), including soil gas near the elevator at a depth below the bottom of the elevator pit. Samples were collected from within both the first floor parking garage and commercial spaces. All sub-slab and soil vapor samples with reported VOC detections were at concentrations below current ESLs, where established. Based on the soil vapor analytical data, soil vapor does not pose a vapor intrusion concern at the site.	Table 5—Volatile Organic Compound Results in Vapor Figure 2 – Site Plan	Langan, *Underground Storage Tank Closure Investigation Report, 1110 Jackson Street, Oakland, California* dated 13 September 2016.	Confirmation of bioattenuation zone near elevator	Soil sampling every five vertical feet down to groundwater in a boring near elevator
13	Source Removal and Remediation	Source removal consisted of excavation of the former USTs (two 265-gallon gasoline USTs, one 110-gallon gasoline UST, and one 750-gallon diesel UST) performed by Golden Gate Tank Removal in April 2016 (USTs 1 through 3) and November 2016 (UST 4). All four former USTs were removed from beneath the Jackson Street sidewalk adjacent to the site. Remediation consisted of removal of visibly contaminated soil to the extent practical without compromising the structures surrounding the pits by over-	Figure 2 – Site Plan	Golden Gate Tank Removal (GGTR), *Underground Storage Tank Closure Report, 1110 Jackson Street, Oakland, California* dated	None	Not applicable

NO.	CSM ELEMENT	DESCRIPTION	EXHIBITS	REFERENCES	DATA GAPS	RESOLUTION
		excavation and backfill with imported fill material.		23 June 2016. GGTR, *Underground Storage Tank (T4) Closure Report, 1110 Jackson Street, Oakland, California* dated 13 January 2017.		

Figures



Legend

Site Boundary

Notes:
1. Topographic basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online © 2011 National Geographic Society, i-cubed.
2. All features shown are to be considered approximate.

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1110 JACKSON STREETT
Oakland, California

LANGAN

SITE LOCATION MAP

Date 7/26/2017 | Project 750622604 | Figure 1

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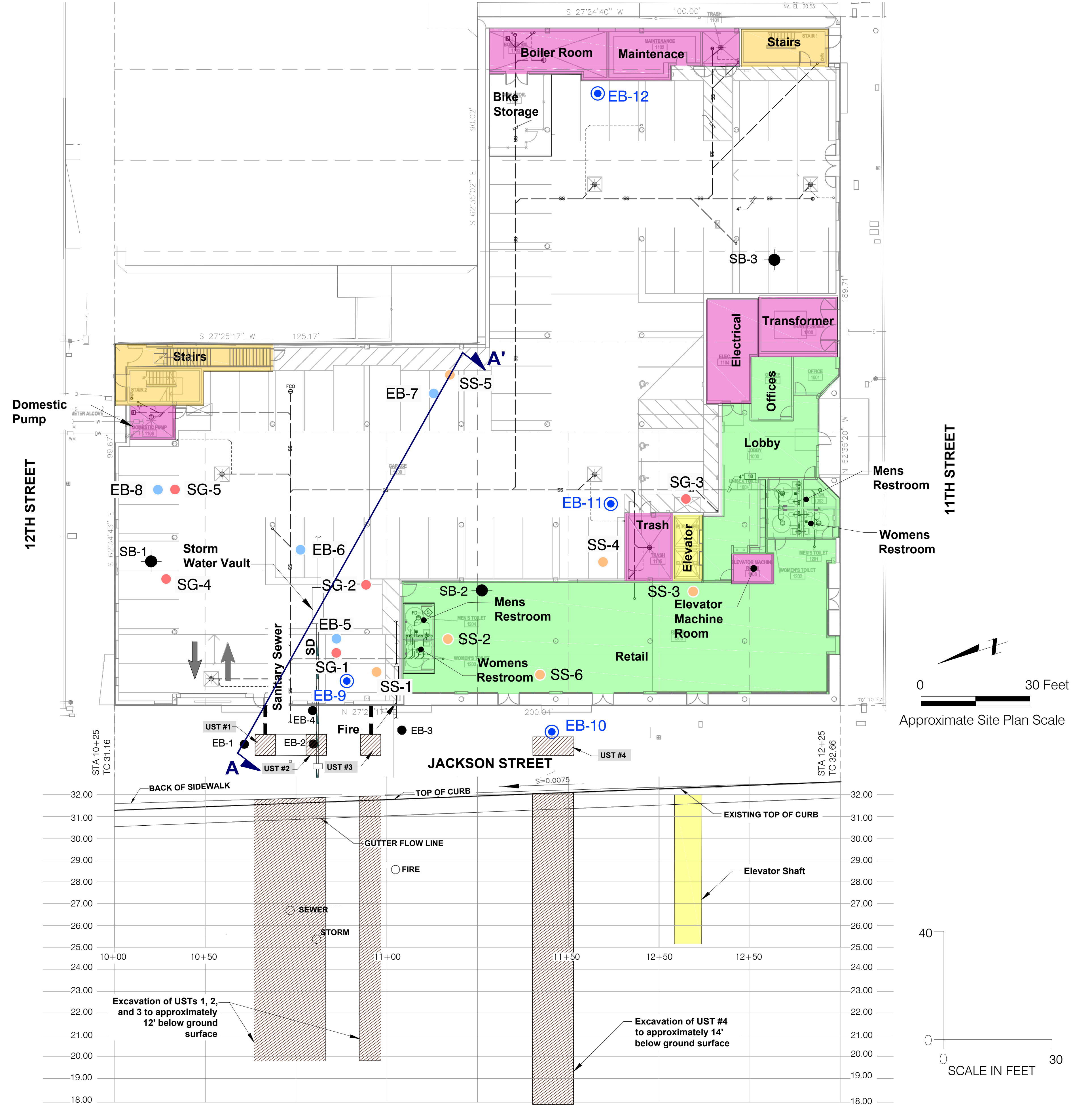

EXPLANATION

- Stair
- Machine rooms, utility rooms, trash, and storage
- Elevator
- Retail lobby/ offices
- Approximate location of former USTs
- SS-1 — Approximate location of sub-slab sample by Langan, November 2016
- SG-1 — Approximate location of soil gas sample by Langan, November 2016
- EB-5 — Approximate location of soil and groundwater sample by Langan, November 2016
- Capped in-place former product pipeline
- EB-1 — Appproximate location of grab groundwater sample by Langan, August 2016
- SB-1 — Approximate location of boring conducted by Tetra Tech, 2005
- EB-9 — Proposed location of soil and groundwater sample
- A — A' — Approximate location of idealized subsurface profile

Notes:
1. Fire and water supply lines are located above ground in building footprint.
2. Elevator pit constructed with waterproof concrete walls and flooring. The bottom of the elevator pit is approximately 7 feet below ground surface.
3. UST piping does not extend beneath building, as it was removed during foundation work. Samples collected beneath former product pipelines during tank removal were non-detect for petroleum hydrocarbons.
4. Soil gas from SG-3 was be collected approximately 15 feet below bottom of slab elevation. Soil gas sample collection was attempted at 8, 10, and 12 feet below ground surface but due to a lack of vapor, no samples were collected.

1110 JACKSON STREET
Oakland, California

SITE PLAN

Date 10/12/17	Project No. 750622604	Figure 2

LANGAN

\\langan.com\data\OAK\data6\750622604\Project Data\CAD\04\2D-DesignFiles\Environmental\750622604-N-SP0101-W CrossSection.dwg

Notes:
1. Aerial imagery provided through Langan's contract with Near Map.
Aerial imagery flown on 3/9/2017.
2. Stream data provided by the National Hydrologic dataset, 2017.
(no strems in current map extent)

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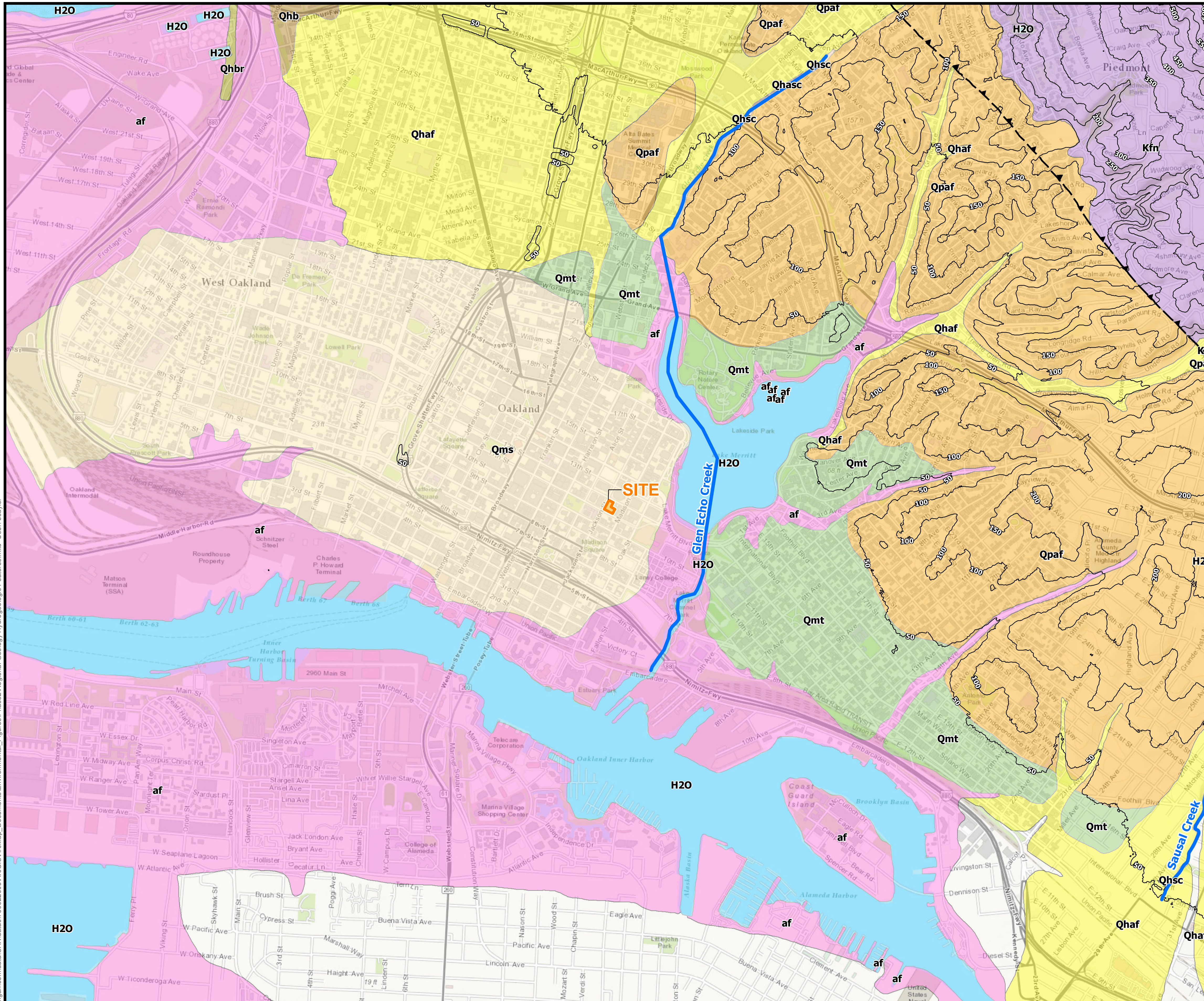
1110 JACKSON STREETT
Oakland, California

LANGAN

NEARBY SURFACE WATER BODIES

Date 7/26/2017	Project 750622604	Figure 3



Legend

- Site Boundary
- Glenn Echo Creek
- 50ft Contour Interval
- Inferred Thrust Fault

Bedrock Geology

- Kfn – Sandstone of the Novato Quarry terrane of Blake and others (1984) (Late Cretaceous)

Surficial Geology

- Qhaf – Alluvial fan and fluvial deposits (Holocene)
- Qhasc – Artificial stream channels (Historic)
- Qhb – Basin deposits (Holocene)
- Qhbr – (Beach ridge deposits (Holocene)
- Qhsc – Stream channel deposits (Holocene)
- Qms – Merritt sand (Holocene)
- Qmt – Marine terrace deposits (Pleistocene)
- Qpaf – Alluvial fan and fluvial deposits (Pleistocene)
- Af – Artificial fill
- Water

Notes:
1. Geologic units based on the Geologic Map of the Oakland Metropolitan Area, Alameda County, California; R.W. Graymer, 2000.
2. Topographic basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online
Copyright: © 2011 National Geographic Society, i-cubed.
3. Stream data provided by the National Hydrologic dataset, 2017.

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1110 JACKSON STREETT
Oakland, California

REGIONAL GEOLOGY AND KEY HYDROLOGIC FEATURES MAP

Date 7/26/2017	Project 750622603	Figure 4

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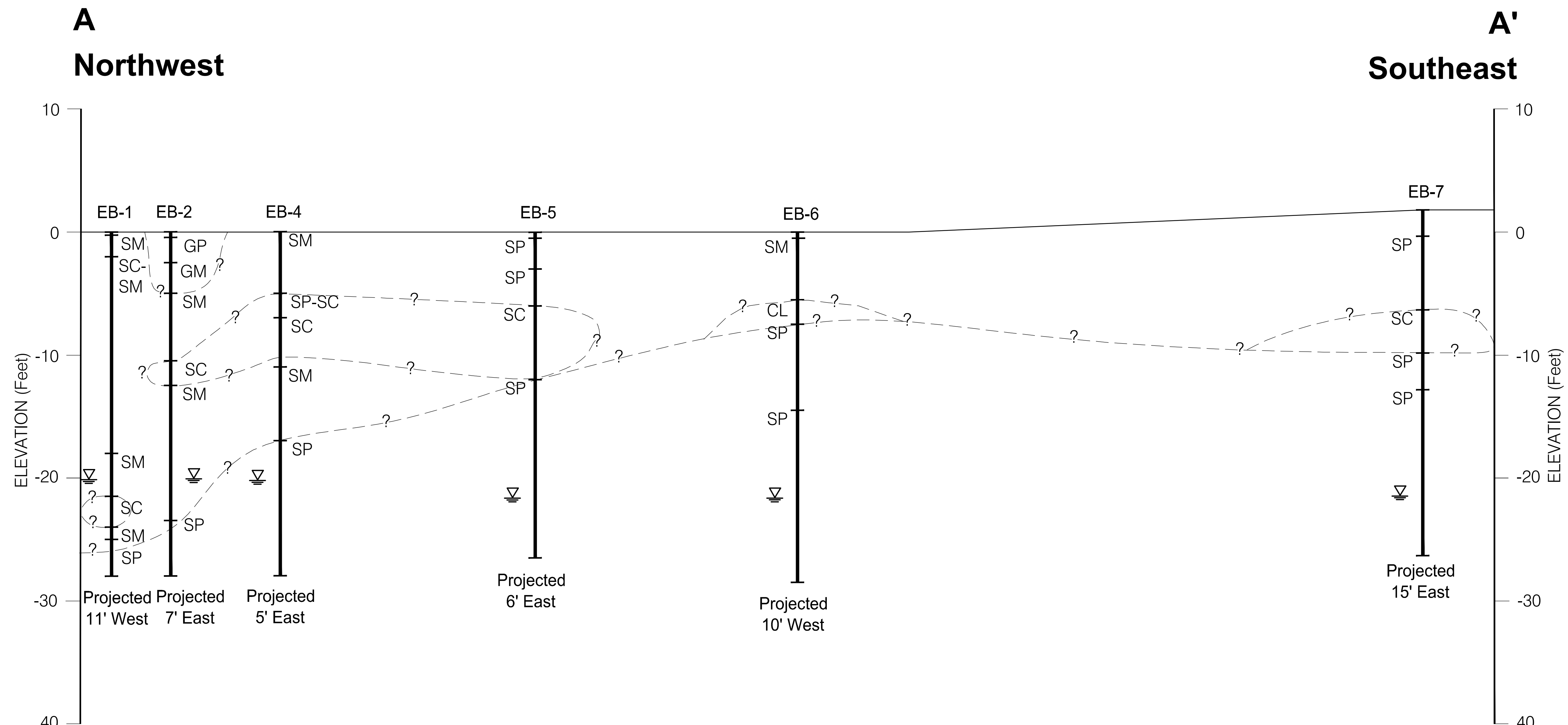
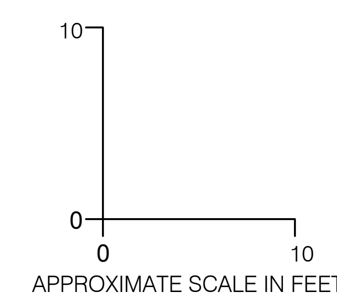


EXPLANATION

SM	SILTY SAND
SC-SM	CLAYEY to SILTY SAND
SP-SM	SAND and SAND with SILT
SC	CLAYEY SAND
GP	GRAVEL
SP	SAND
∇	Water level at time of drilling

Note:
The above profile represents a generalized subsurface cross section interpreted from widely spaced borings. Soil and bedrock deposits may vary in type, strength, and other important properties between points of exploration.



1110 JACKSON STREET
Oakland, California

IDEALIZED SUBSURFACE PROFILE A-A'

Date 09/08/17	Project No. 750622603	Figure 5

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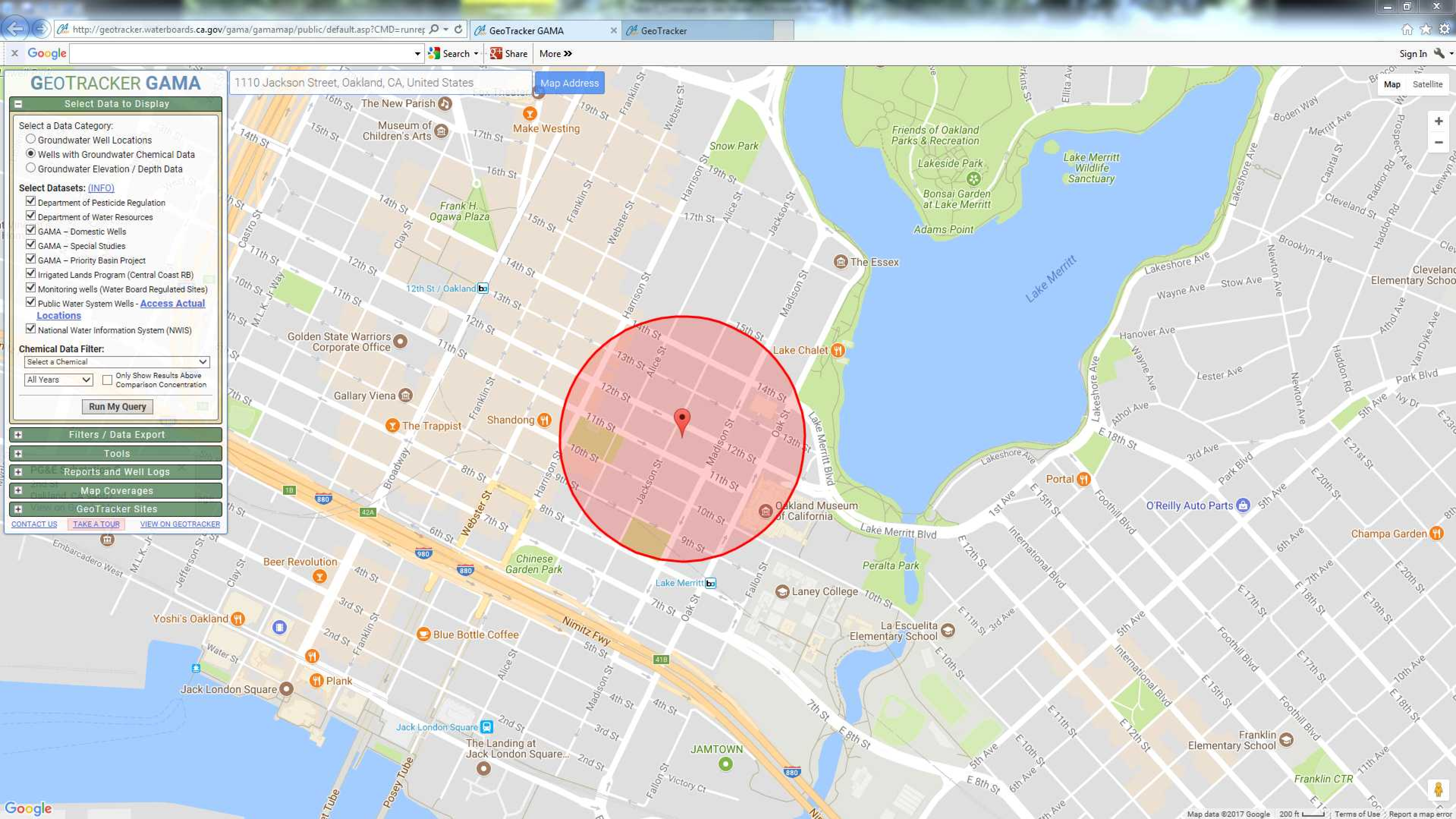
Well Search



http://geotracker.waterboards.ca.gov/gama/gamamap/public/default.asp?CMD=runrep
GeoTracker GAMA
GeoTracker
Google
Search
Share
More
Sign In
GEOTRACKER GAMA
1110 Jackson Street, Oakland, CA, United States
Map Address
Map
Satellite
Select Data to Display
Select a Data Category:
Groundwater Well Locations
Wells with Groundwater Chemical Data
Groundwater Elevation / Depth Data
Select Datasets: (INFO)
Department of Pesticide Regulation
Department of Water Resources
GAMA – Domestic Wells
GAMA – Special Studies
GAMA – Priority Basin Project
Irrigated Lands Program (Central Coast RB)
Monitoring wells (Water Board Regulated Sites)
Public Water System Wells - Access Actual Locations
National Water Information System (NWIS)
Chemical Data Filter:
Select a Chemical
All Years
Only Show Results Above Comparison Concentration
Run My Query
Filters / Data Export
Tools
Reports and Well Logs
Map Coverages
GeoTracker Sites
CONTACT US
TAKE A TOUR
VIEW ON GEOTRACKER
The New Parish
Museum of Children's Arts
Make Westing
Frank H. Ogawa Plaza
Snow Park
Friends of Oakland Parks & Recreation
Lakeside Park
Bonsai Garden at Lake Merritt
Lake Merritt Wildlife Sanctuary
Adams Point
The Essex
Lake Merritt
12th St / Oakland
Golden State Warriors Corporate Office
Gallary Viena
The Trappist
Shandong
Lake Chalet
Oakland Museum of California
Lake Merritt Blvd
Peralta Park
Portal
O'Reilly Auto Parts
Champa Garden
Chinese Garden Park
Beer Revolution
Lake Merritt
Laney College
La Escuelita Elementary School
Yoshi's Oakland
Blue Bottle Coffee
Plank
Jack London Square
The Landing at Jack London Square...
JAMTOWN
Nimitz Fwy
Franklin Elementary School
Franklin CTR
Cleveland Elementary School
Map data ©2017 Google
200 ft
Terms of Use
Report a map error

APPENDIX C

HEALTH AND SAFETY PLAN

SITE SPECIFIC SAFETY PLAN
Limited Phase II Environmental Site Assessment
1110 Jackson Street, Oakland, California

Background Information

Project Name:	1110 Jackson Street
Job Number:	750622603
Project Manager:	Joshua Graber Langan Engineering and Environmental Services
Site Safety Officer (SSO):	Elizabeth Kimbrel Langan Engineering and Environmental Services
Client Contact:	Mr. Everett Cleveland East Bay Asian Local Development Corporation
Site Address:	1110 Jackson Street Oakland, California

Overall Objective of Site Work:

Drill 4 soil and groundwater borings up to 45 feet bgs for the collection of soil and groundwater samples.

Site Description: Residential building at the intersection of Jackson Street and 12th Street in Oakland, CA. Site comprised of a residential building with parking garage and commercial spaces on the ground floor.

Current Status: Inhabited residential building.

Hazardous Materials Handled, Disposed, or Stored: Potential petroleum hydrocarbons, volatile organic compounds and heavy metals in soil and groundwater.

Potential Degradation Products: Potential petroleum hydrocarbons.

Potential Environmental Hazards: Potential petroleum hydrocarbons, volatile organic compounds and heavy metals in soil and groundwater.

Potential Worker Hazards Due to Environmental Hazards: Potential petroleum hydrocarbons, volatile organic compounds and heavy metals in soil and groundwater.

Potential Physical Hazards On-Site: Proper clothing, hard hat, shoes, and ear protection should be worn while the drill rig is operating, be careful of slips, trips, falls, and overhead machinery. Use caution working around heavy equipment.

Overall Hazard Estimation: Low.

Required Personal Safety Training: Per the California Code of Regulations (CCR) Title 8, Section 5192 all onsite personnel participating in field activities are required to be 40 hour HAZWOPER trained.

Level of Protection: "Level D" including steel-toed boots, safety glasses, and hard hats. If petroleum hydrocarbons are encountered, gloves will be required when handling and contaminated soil and/or groundwater.

Location(s) to be used: All people must wear "Level D" protection whether working or visiting the site.

Disposal of Contaminated Materials or Equipment: If contaminated soil and/or groundwater is encountered, it will be contained in 55-gallons drums, separately, with lids and will remain on-site until tested for proper disposal.

Monitoring for Contaminated Material: Monitoring using a photo-ionization detector.

Medical Monitoring: Langan employees undergo medical screening and monitoring.

ON-SITE ORGANIZATION AND COORDINATION

General: The following personnel are designated to carry out the stated job functions on-site:

Project Manager: Josh Graber (510) 874-7086

Langan Health and Safety: Anthony J. Moffa, Jr. (215) 491-6599 Ext 6545

Langan SSO: Joshua Osborne (209) 658-4326

Contractor on-site (state function):

Gregg Drilling & Testing
950 Howe Rd.
Martinez, CA 94553
CA-57 485165
Phone: (925) 313-5800

TEG
11350 Monier Park Place
Rancho Cordova, CA 95742
Phone: (916) 853-8010

Agency Representatives: Alameda County Environmental Health

The Project Manager and SSO are responsible for on-site organization and coordination of the field activities. The SSO onsite is responsible for implementation of this Site Specific Safety Plan.

Site Access Control: The site is currently unoccupied by building tenants. An exclusion zone with a radius of 20 feet will be set up surrounding the drill rig, while in operation, such that no unauthorized person enters during field activities.

Safety Briefings: Project personnel will be given briefings by the site health and safety officer on a daily or as-needed basis to further assist site personnel in conducting their activities safely. Briefings will include the review of a daily health and safety tailgate meeting and review of applicable Job Safety Analysis (JSA), which provide a step-by-step evaluation of the hazards associated with the tasks covered under this HASP. A hand auger soil sampling JSA is included as an attachment to this HASP.

Safety briefings will be provided when new activities are to be conducted, changes in work practices must be implemented due to new information made available, or if site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safe practices when performance deficiencies are identified during routine daily activities or as a result of jobsite safety inspections.

EMERGENCY MEDICAL CARE AND PROCEDURES

Nearest emergency medical facility: Kaiser Permanente Oakland Medical Center

Facility Name: Kaiser Permanente Oakland Medical Center

Address: 3600 Broadway Street
Oakland, California

Telephone: (510) 752-1000

Directions to Hospital: See map attached

Emergency Telephone Numbers:

Fire: 911

Police: 911

Ambulance: 911

Poison Control Center: (800) 662-9886

Emergency First Aid for Possible Substances Present:

Petroleum Hydrocarbons	Eye splash	Rinse with fresh water for 15 min. - take to doctor if irritation continues
	Ingestion	Do not induce vomiting - contact doctor

First Aid Equipment On-Site

To provide first line assistance to field personnel in the case of a sickness or injury, the SSO shall have the following items immediately available:

First aid kit - containing supplies for initial treatment of minor cuts and abrasions, severe lacerations, shock, heat stress, eye injuries, skin irritation, thermal and chemical burns, snake and insect bites, and for immobilization of fractures.

Supply of clean water for flooding exposed skin areas or treatment of heat stroke

Soap or hand cleaner and towels

If suitable water supplies are not immediately available, or where water use is inappropriate for fire suppression, a ten pound ABC fire extinguisher will be available.

On-Site Emergency Procedures

1. Personal injury or illness:

   If an emergency involving actual or suspected personal injury occurs, the SSO shall follow these steps:

   - Remove the exposed or injured person(s) from immediate danger.
   - Render First Aid if necessary.
   - Obtain paramedic services or ambulance transport to local hospital. This procedure shall be followed even if there is no visible injury.
   - Other personnel in the work area shall be evacuated to a safe distance until the SSO determines that it is safe for work to resume. If there is any doubt regarding the condition of the area, work shall not commence until all hazard control issues are resolved.
   - At the earliest time practicable, the SSO shall contact the Project Manager, or their designees, giving details of the incident, and the steps taken to prevent its recurrence.

2. Fire or Explosion: Turn off all motorized equipment; evacuate working area; meet at designated upwind location.

3. Earthquake: Turn off all motorized equipment; evacuate working area; meet at designated upwind location.

4. Hazardous Material Spill or Release: Turn off all motorized equipment; evacuate work area in an upwind direction of the spill or release; meet at designated upwind location.

5. Personal Protective Equipment Failure: If any site worker experiences a failure or alteration of protective equipment that affects the protection factor that person and his/her buddy shall immediately leave the Exclusion Zone. Reentry shall not be permitted until the equipment has been repaired or replaced.

6. Other Equipment Failure: If any other equipment on-site fails to operate properly, the project team leader and SSO shall be notified and then shall determine the effect of this failure on continuing operations on-site. If the failure affects the safety of personnel or prevents completion of the work plan tasks, all personnel shall leave the Exclusion Zone until the situation is evaluated and appropriate actions taken.

Prepared By: ______________________________ **9/8/2017**
Joshua Graber, Senior Project Manager **Date**

On-Site Personnel

I have read and reviewed this Site Safety Plan and will comply with the requirements stated herein and directions from the site safety officers.

Name	Signature
______________________________	__________________________________
______________________________	__________________________________
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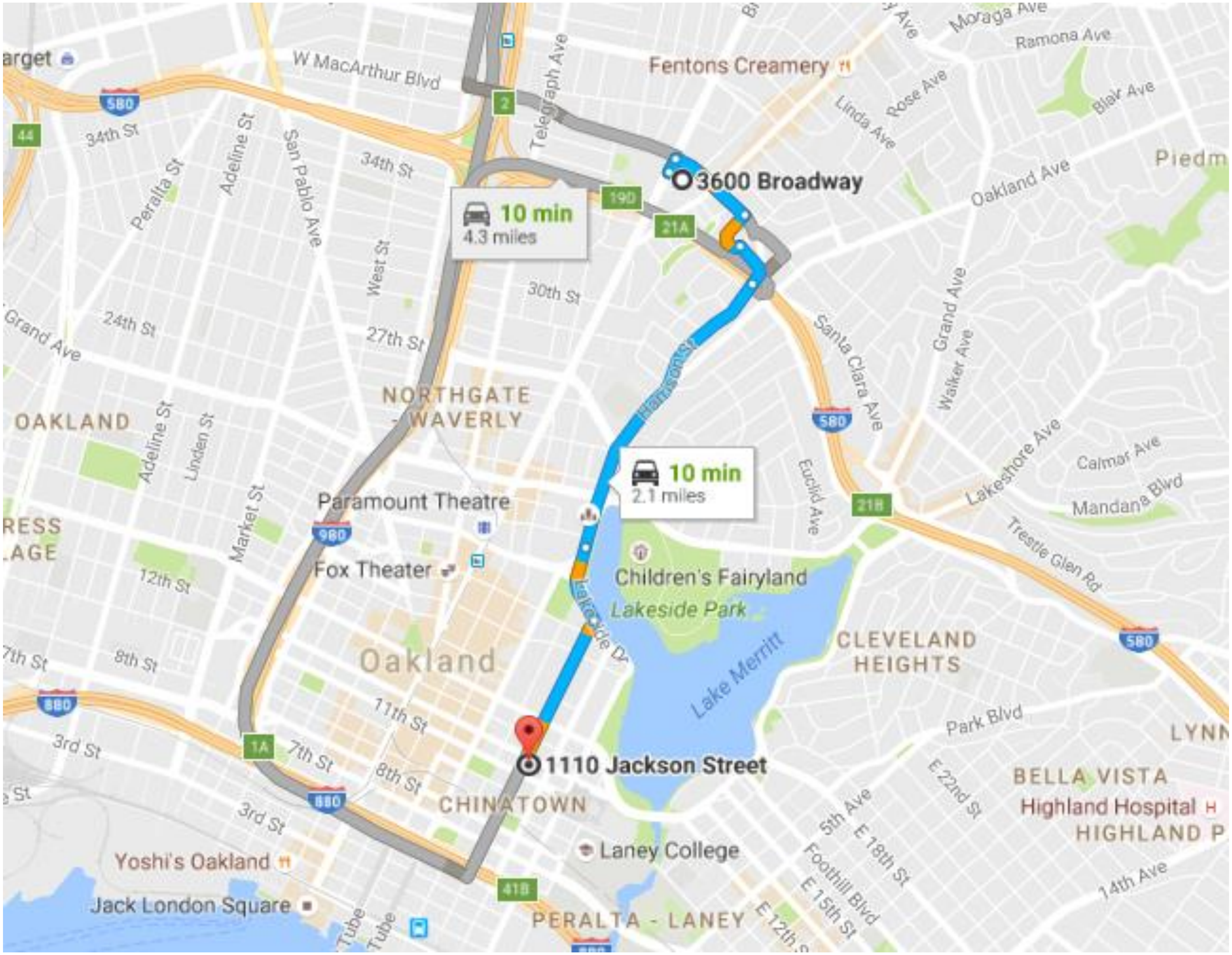
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10 min
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Fentons Creamery
Moraga Ave
Ramona Ave
Rose Ave
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Blair Ave
Piedm
Oakland Ave
34th St
Peralta St
Adeline St
San Pablo Ave
Telegraph Ave
West St
30th St
27th St
24th St
Grand Ave
NORTHGATE - WAVERLY
OAKLAND
Linden St
Market St
Harrison St
Santa Clara Ave
Grand Ave
Walker Ave
Euclid Ave
Lakeshore Ave
Calmar Ave
Mandana Blvd
Trestle Glen Rd
Paramount Theatre
Fox Theater
12th St
Children's Fairyland
Lakeside Park
Lakeside Dr
Lake Merritt
CLEVELAND HEIGHTS
Oakland
8th St
7th St
11th St
3rd St
8th St
CHINATOWN
Park Blvd
LYNN
E 22nd St
BELLA VISTA
Highland Hospital
HIGHLAND P
5th Ave
E 18th St
Foothill Blvd
E 15th St
E 12th St
14th Ave
Laney College
Yoshi's Oakland
Jack London Square
PERALTA - LANEY
Tube
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APPENDIX D

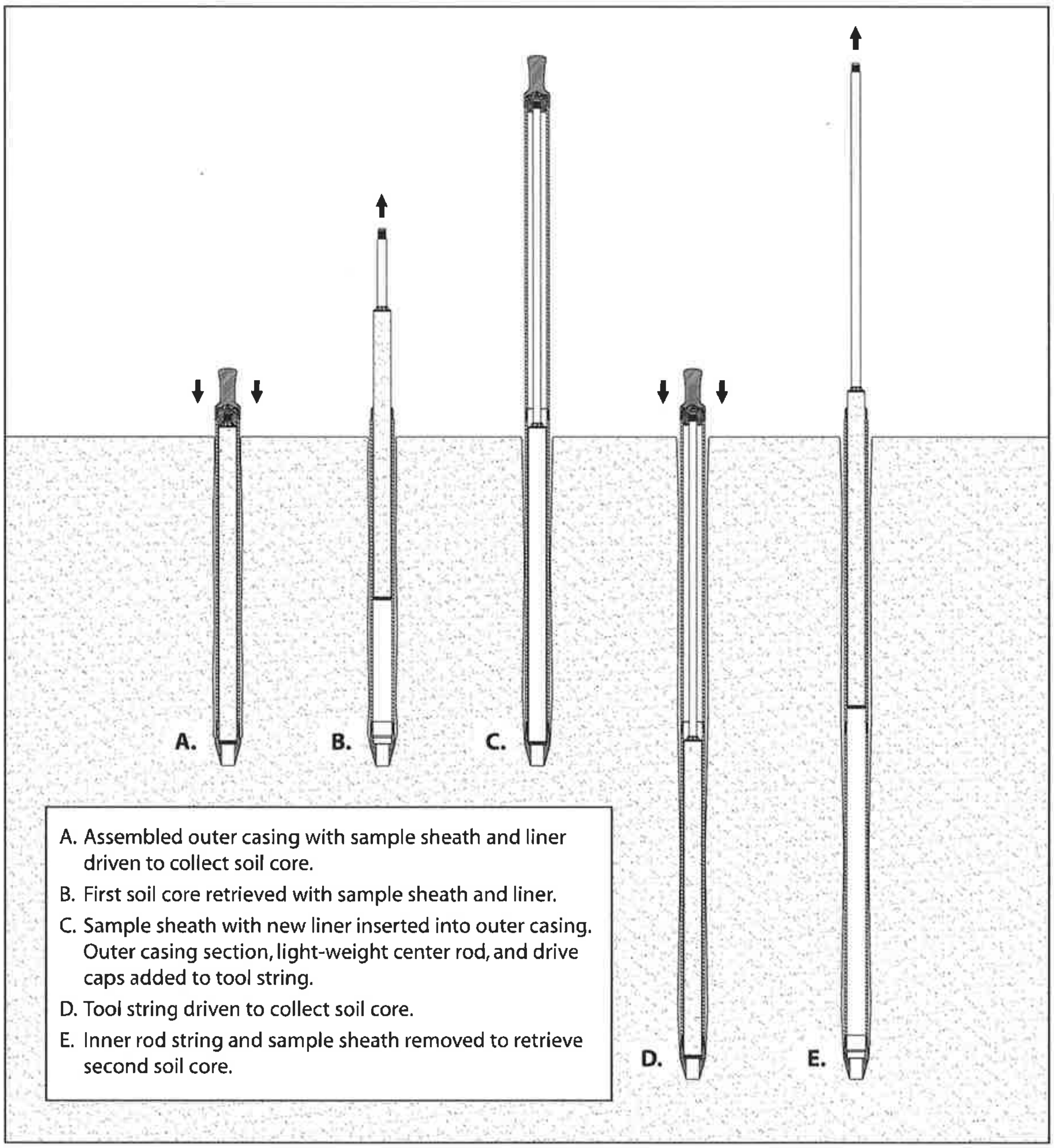
GEOPROBE® DT325 DUAL TUBE SAMPLING SYSTEM STANDARD OPERATING PROCEDURE

GEOPROBE® DT325 DUAL TUBE SAMPLING SYSTEM

STANDARD OPERATING PROCEDURE

Technical Bulletin No. MK3138

PREPARED: November, 2006
REVISED: January, 2011



Collecting soil cores with the DT325 Dual Tube Sampling System.

Geoprobe® and Geoprobe Systems®, Macro-Core®, and Direct Image®
are Registered Trademarks of Kejr, Inc., Salina, Kansas

Geoprobe® Prepacked Screens are manufactured under
U.S. Patent No. 7,735,553B2.

1.0 Objective

The objective of this procedure is to collect a representative soil sample at depth through an enclosed casing and recover it for visual inspection and/or chemical analysis.

2.0 Background

2.1 Definitions

Geoprobe®*: A brand name of high quality, hydraulically-powered machines that utilize both static force and percussion to advance sampling and logging tools into the subsurface. The Geoprobe® brand name refers to both machines and tools manufactured by Geoprobe Systems®, Salina, Kansas. Geoprobe® tools are used to perform soil core and soil gas sampling, groundwater sampling and testing, soil conductivity and contaminant logging, grouting, and materials injection.

**Geoprobe® and Geoprobe Systems® are registered trademarks of Kejr, Inc., Salina, Kansas.*

DT325 Dual Tube Sampling System: A direct push system for collecting continuous core samples of unconsolidated materials from within a sealed casing of Geoprobe® 3.25-inch (83 mm) OD probe rods. Samples are collected and retrieved within a sample sheath and liner that is threaded onto the leading end of a string of Geoprobe® 1.25-inch (32 mm) OD light-weight center rods and inserted to the bottom of the outer casing. Collected samples measure up to approximately 2,600 ml in volume in the form of a 1.85-inch x 59-inch (47 mm x 1499 mm) core when using common equipment options.

Liner: A 2.1-inch (53 mm) OD thin-walled, PVC tube that is placed within a steel sheath and then inserted into the outer casing on the leading end of the inner rod string for the purpose of containing and retrieving core samples. Liners are available in two configurations; a simple open tube or a tube with a core catcher permanently attached to the leading end. Nominal liner lengths include 1 meter, 48 inches, and 60 inches.

***Nominal liner length identifies the length of tools with which the liner is used. The actual end-to-end lengths of the various DT325 liners will differ from the specified nominal lengths.*

Core Catcher: A dome-shaped device positioned at the leading end of a liner to prevent loss of collected soil during retrieval of the liner and soil core. Flexible fingers at the top of the core catcher are pushed outward by soil entering the liner during advancement of the tool string. As the filled liner is subsequently retrieved, the fingers of the core catcher move back inward, effectively closing off the end of the liner and limiting soil loss. The core catcher designed for the DT325 system is permanently fused to the liner.

2.2 Discussion

Dual tube sampling gets its name from the fact that two sets of probe rods are used to retrieve continuous soil core samples from the subsurface. One set of rods is driven into the ground as an outer casing (Fig. 2.1). These rods receive the driving force from the hammer and provide a sealed casing through which soil samples may be recovered. The second, smaller set of rods are placed inside the outer casing with a sample liner attached to the leading end of the rod string (Fig. 2.1). These smaller rods hold the liner in place as the outer casing is driven to fill the liner with soil. The inner rods are then retracted to retrieve the full liner.

Standard Geoprobe® 3.25-inch OD probe rods provide the outer casing for the DT325 Dual Tube Soil Sampling System. A cutting shoe is threaded into the leading end of the rod string. When driven into the subsurface, the cutting shoe shears a 1.75- or 1.85-inch OD soil core (depending on cutting shoe option) which is collected inside the casing in a PVC liner.

The second set of rods in the DT325 dual tube system are Geoprobe® 1.25-inch OD light-weight center rods. A sample sheath with PVC liner is attached to the end of these smaller rods and then inserted into the casing. The 1.25-inch light-weight center rods hold the sample sheath tight against the cutting shoe as the outer casing is driven to collect the soil core. Once filled with soil, the sample sheath and liner are removed from the bottom of the outer casing by lifting out the 1.25-inch center rod string.

The outer, 3.25-inch probe rods provide a cased hole through which to sample. The main advantage of sampling through a cased hole is that there is no side slough to contend with. In addition, the outer casing effectively seals the probe hole when sampling through perched water tables. These factors mean that sample cross-contamination is eliminated. The DT325 sampling system is therefore ideal for continuous coring in both saturated and unsaturated zones.

Solid Drive Tip

A Solid Drive Tip (28509 or 27763) can be placed on the leading end of the inner 1.25-inch rod string in place of a sample sheath and liner (Fig. 2.2). When installed in the outer casing, the drive tip firmly seats within the cutting shoe and effectively seals the tool string as it is driven into the subsurface. This enables the operator to advance the outer casing to the bottom of a pre-cored hole or through undisturbed soil to reach the top of the sampling interval.

Grouting

The DT325 system allows bottom-up grouting through the primary tool string. This means that a cement or bentonite grout mix can be pumped through the outer casing as it is withdrawn from the ground. This is in contrast to most other soil samplers which require driving a second set of tools back down the probe hole in order to deliver the grout mix.

Monitoring Well Installation

An expendable cutting shoe enables the operator to install a Geoprobe® prepacked screen monitoring well through the outer casing of the DT325 Dual Tube System. After the collection of continuous soil cores to the desired depth, prepacked screens can be inserted to the bottom of the outer casing on the leading end of a PVC riser string. The well is finished, complete with grout barrier, bentonite well seal, and a high-solids bentonite slurry/neat cement grout, during retrieval of the outer casing.

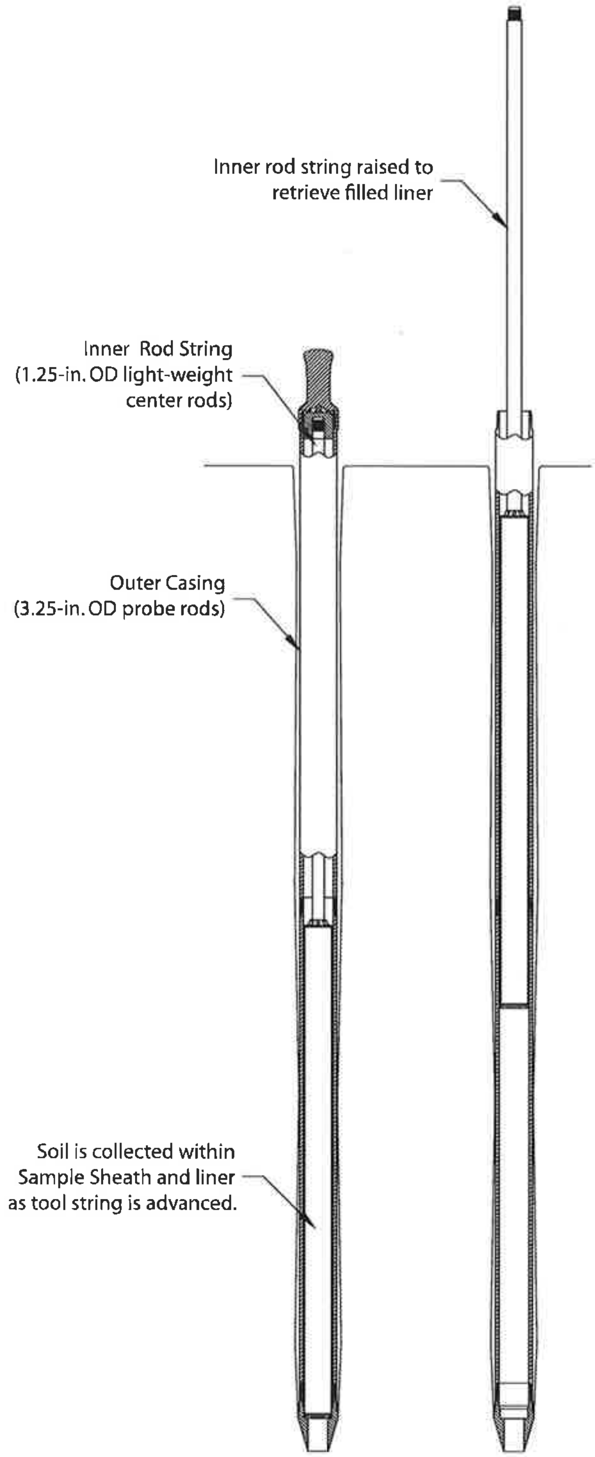


Figure 2.1
Outer casing driven with sample sheath and liner.

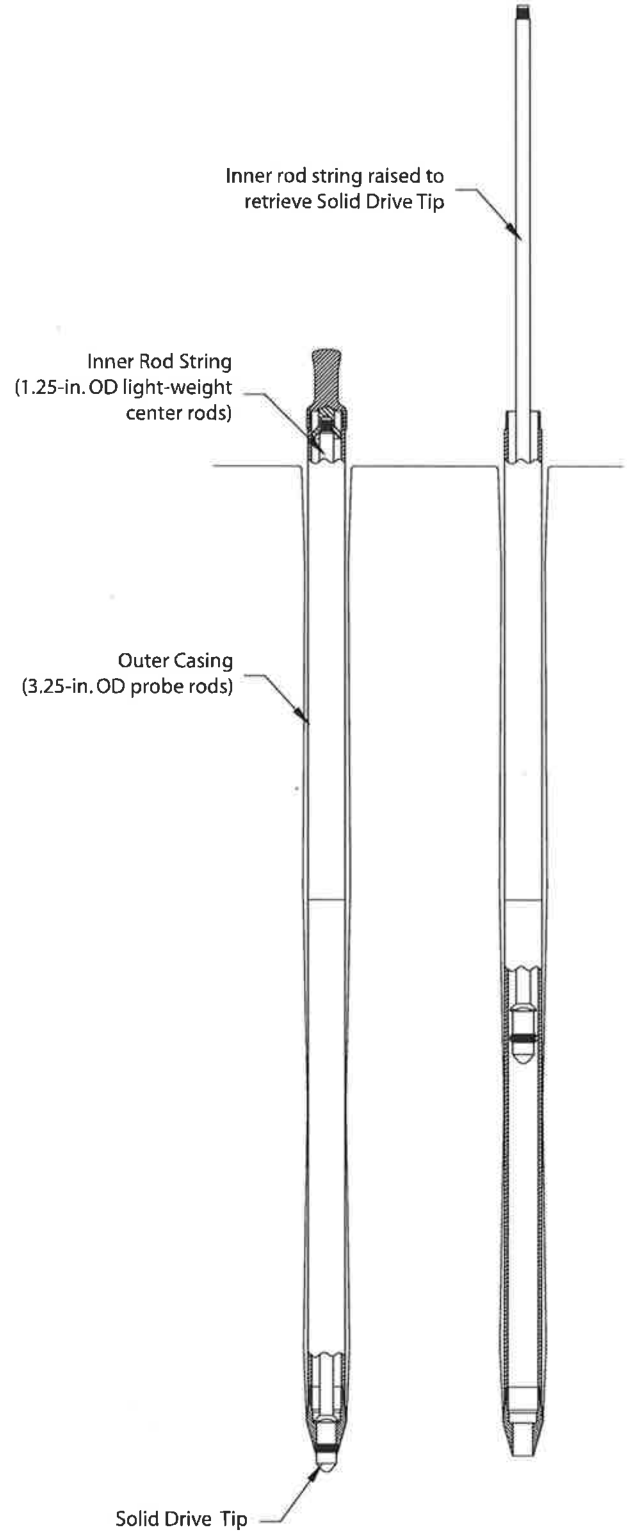


Figure 2.2
Outer casing driven with solid drive tip.

3.0 Tools and Equipment

The following equipment is required to operate the DT325 Dual Tube Sampling System. Refer to Figure 3.1 for identification of the specified parts.

DT325 Sampler Parts*	Quantity	Part Number
DT325 Sheath Drive Head	-1-	10212
DT325 Sample Sheath, 72-in. length	-1-	26805
DT325 Sample Sheath, 60-in. length	-1-	26719
DT325 Sample Sheath, 48-in. length	-1-	27711
DT325 Sample Sheath, 1-m length	-1-	27712
DT325 Centering Drive Cap, 1.25-in. rods	-1-	12943
DT325 Buffering Centering Drive Cap, 1.25-in rods	-1-	37708
DT325 Cutting Shoe, standard, 1.85-in. ID	-1-	28508
DT325 Cutting Shoe, optional, 1.75-in. ID	-1-	26720
DT325 Expendable Cutting Shoe Holder	-1-	28339
DT325 Expendable Cutting Shoe, 1.75-in. ID	-1-	28341
DT325 Solid Drive Tip, for standard (28508) cutting shoe	-1-	28509
DT325 Solid Drive Tip, for optional cutting shoe (28341) and expendable cutting shoe (26720)	-1-	27763
Replacement O-rings, for DT325 solid drive tips (28509 and 27763), pkg. of 25	Variable	13942
DT325 Liner Retainer	-1-	26718
O-rings, for DT325 liner retainer (26718), pkg. of 25	Variable	28379
DT325 Liner Retainer, without O-ring groove	-1-	39011
DT325 Liner Retainer Wrench	-1-	27838

DT325 Liners and Accessories	Quantity	Part Number
DT325 Liner Spacer	Variable	29609
DT325 Liner Spacer Head	-1-	29358
DT325 PVC Liner, 60-in. length, box of 43	Variable	DT3260K
DT325 PVC Liner, 48-in. length, box of 43	Variable	DT3248K
DT325 PVC Liner, 1-m length, box of 43	Variable	DT3239K
DT325 PVC Liner with Core Catcher, 60-in. length, box of 43	Variable	27813
DT325 PVC Liner with Core Catcher, 48-in. length, box of 43	Variable	27814
DT325 PVC Liner with Core Catcher, 1-m length, box of 43	Variable	27815
DT325 Vinyl End Caps, pkg. of 84 (42 pair)	Variable	17762
DT325 Liner Cutter	-1-	26155
Universal Liner Holder	-1-	22734

Probe Rods and Accessories*	Quantity	Part Number
GH60 Threadless Drive Cap, 3.25-in. rods**	-1-	9742
Pull Cap, 3.25-in. rods	-1-	13257
Rod Grip Handle, GH60 Hammer, 3.25-in. rods	-1-	9757
Probe Rod, 3.25-in. OD x 60-in. length	Variable	9040
Probe Rod, 3.25-in. OD x 48-in. length	Variable	10594
Probe Rod, 3.25-in. OD x 1-m length	Variable	13925
Replacement O-rings, for 3.25-in. probe rods, pkg. of 25	Variable	9960
Pull Cap, 1.25-in. rods	-1-	AT1204
Rod Grip Handle, GH60 Hammer, 1.5-in. and 1.25-in. rods	-1-	15554
Light-Weight Center Rod, 1.25-in. OD x 60-in. Length***	Variable	27600
Light-Weight Center Rod, 1.25-in. OD x 48-in. Length***	Variable	21900
Light-Weight Center Rod, 1.25-in. OD x 1-meter Length***	Variable	32318
1.25-inch Leaf Puller	-1-	31499
Adjustable Rod Clamp	-1-	27216

Optional Accessories	Quantity	Part Number
DT325 Adapter for Hydraulic Liner Extruder	-1-	24959
DT325 Plunger for Hydraulic Liner Extruder	-1-	23977
Rod Wiper Donuts, 3.25-in. Rods	-1-	27194
Rod Wiper Weldment	-1-	23633

* Select DT325 Sample Sheath and liner lengths to match length of probe rods.
** A 3.25-inch probe rod drive cap is also available for use with GH40 Series hammers.
*** 1.25-inch OD probe rods may be substituted for Light-Weight Center Rods.

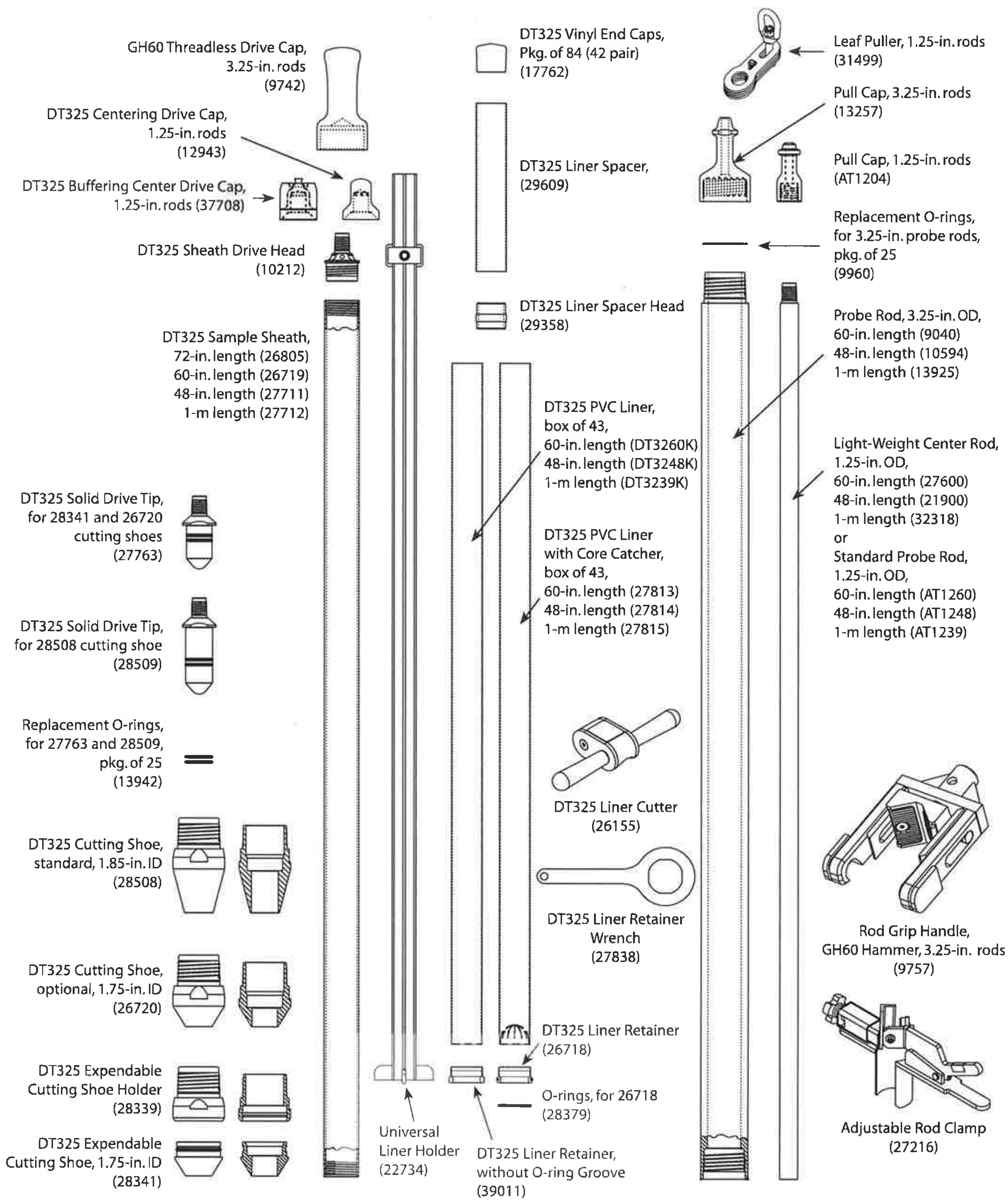


Figure 3.1
DT325 parts and accessories.

3.1 Tool Options

This section identifies the specific tool options available for use with the DT325 Dual Tube System. Refer to Figure 3.1 for illustrations of the specified parts.

Probe Rods

Standard Geoprobe® 3.25-inch (83-mm) OD probe rods are utilized for the outer casing of the DT325 Sampling System. Nominal rod lengths include 1 meter, 48 inches, and 60 inches. The specific length of rods may be selected by the operator and will determine the length of tooling for the rest of the DT325 system.

1.25-inch Light-Weight Center Rods

1.25-inch Light-weight center rods (1.25-inch / 32-mm OD) are recommended for the inner rod string of the DT325 system when utilizing an outer casing of 48- or 60-inch long rods. Choose the light-weight rod length that matches the length of rods used for the outer casing (48-inch light-weight rods with 48-inch outer casing, etc.).

A weight reduction of up to 64% is provided by the 1.25-inch light-weight center rods over standard 1.25-inch probe rods. As a result, considerably less energy is expended when retrieving the light-weight center rods from within the outer casing during operation of the DT325 Dual Tube System.

Sample Sheaths

A steel sample sheath supports the weight of the inner rods to protect the sample liner from damage while advancing the DT325 tool string. The liner is placed within the sheath and secured with a drive head at the top of the sheath and a liner retainer at the bottom. The assembled sheath with liner is inserted to the bottom of the outer casing on the leading end of the inner rod string (light-weight rods). After advancing the entire tool string one sample interval, the inner rods and sample sheath are retrieved to recover the soil core.

Sample sheaths are available in nominal lengths of 1 meter, 48 inches, 60 inches, and 72 inches. Sample sheath length is generally matched to the length of the probe rods selected for the outer casing. However, a DT325 Liner Spacer (29609) and DT325 Liner Spacer Head (29358) allow use of 48-inch liners with a 60-inch Sample Sheath (26719) and 60-inch liners with a 72-inch Sample Sheath (26805).

Sample Liners

Sample liners are made of a heavy-duty clear PVC for convenient inspection of the soil sample. Liners are available either as a simple, open tube or with an intergral core catcher. Utilize the core catcher liners when sampling flowing sands, noncohesive soils, extremely dry soils, or any other materials that fall from the liner during retrieval.

Nominal liner lengths include 1 meter, 48 inches, and 60 inches with an OD of 2.1 inches (53 mm). Under "normal" sampling conditions, liner length should correspond to the length of probe rods used for the outer casing. Certain sampling conditions can cause over-filled liners which may lead to problems removing the liner and soil core from the sample sheath. For these special conditions, utilize a Liner Spacer (29609) and DT325 Liner Spacer Head (29358) to provide additional room above the liner for the excess soil (Fig. 3.2). The liner spacer and liner spacer head must be used with either a 48-inch liner in a 60-inch Sample Sheath (26719) or a 60-inch liner in a 72-inch Sampler Sheath (26805). With the tool string only advanced the length of the liner, the liner spacer remains free to accept excess soil that may otherwise overfill the liner.

Cutting Shoes

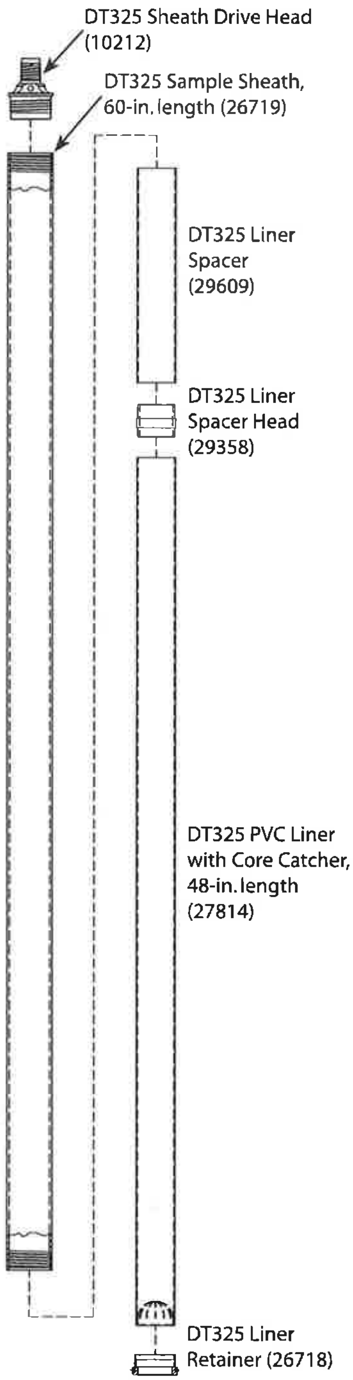


Figure 3.2
Common tooling configuration for use of DT325 Liner Spacer.

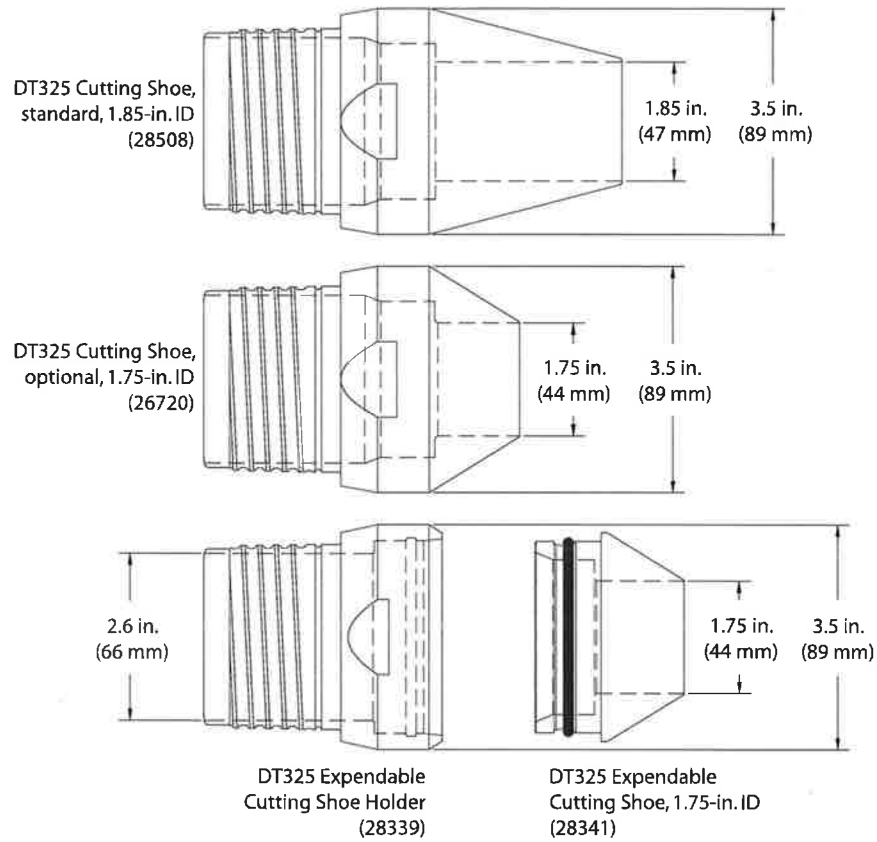


Figure 3.3
Cutting shoe options for the DT325 Dual Tube Sampling System.

Three cutting shoes are available for use with the DT325 Dual Tube System (Fig. 3.3). The DT325 Standard Cutting Shoe (28508) and DT325 Optional Cutting Shoe (26720) thread into the leading end of the 3.25-inch probe rods and are recovered after sampling. Dimensions for the standard cutting shoe are 1.85 inches (47 mm) ID and 3.5 inches (89 mm) OD. The optional cutting shoe also has an OD of 3.5 inches (89 mm), but the ID is only 1.75 inches (44 mm). The standard cutting shoe is ideal for sampling plastic clays and saturated sands while the optional cutting shoe is designed for use in formations where a smaller-diameter soil core is beneficial to sample recovery.

The DT325 sampling system may also employ an expendable cutting shoe (Fig. 3.3). In this arrangement, a DT325 Expendable Cutting Shoe Holder (28339) is threaded into the leading end of the outer casing. A DT325 Expendable Cutting Shoe (28341) is then inserted into the holder. Upon completion of soil sampling, the outer casing is withdrawn slightly. The expendable cutting shoe is knocked from the holder, leaving an open casing through which a prepacked screen monitoring well may be installed. Dimensions for the expendable cutting shoe are the same as the optional cutting shoe (ID = 1.75 in. (44 mm) and OD = 3.5 in. (89 mm)).

4.0 Operation

4.1 Decontamination

Before and after each use, thoroughly clean all parts of the soil sampling system according to project requirements. Parts should also be inspected for wear or damage at this time. During sampling, a clean new liner is used for each soil core.

4.2 Operational Overview

The DT325 Soil Sampling System is designed to collect continuous soil cores. Sampling may begin either from ground surface or a predetermined depth below ground. Once sampling begins, consecutive soil cores are removed as the outer casing is advanced to greater depths

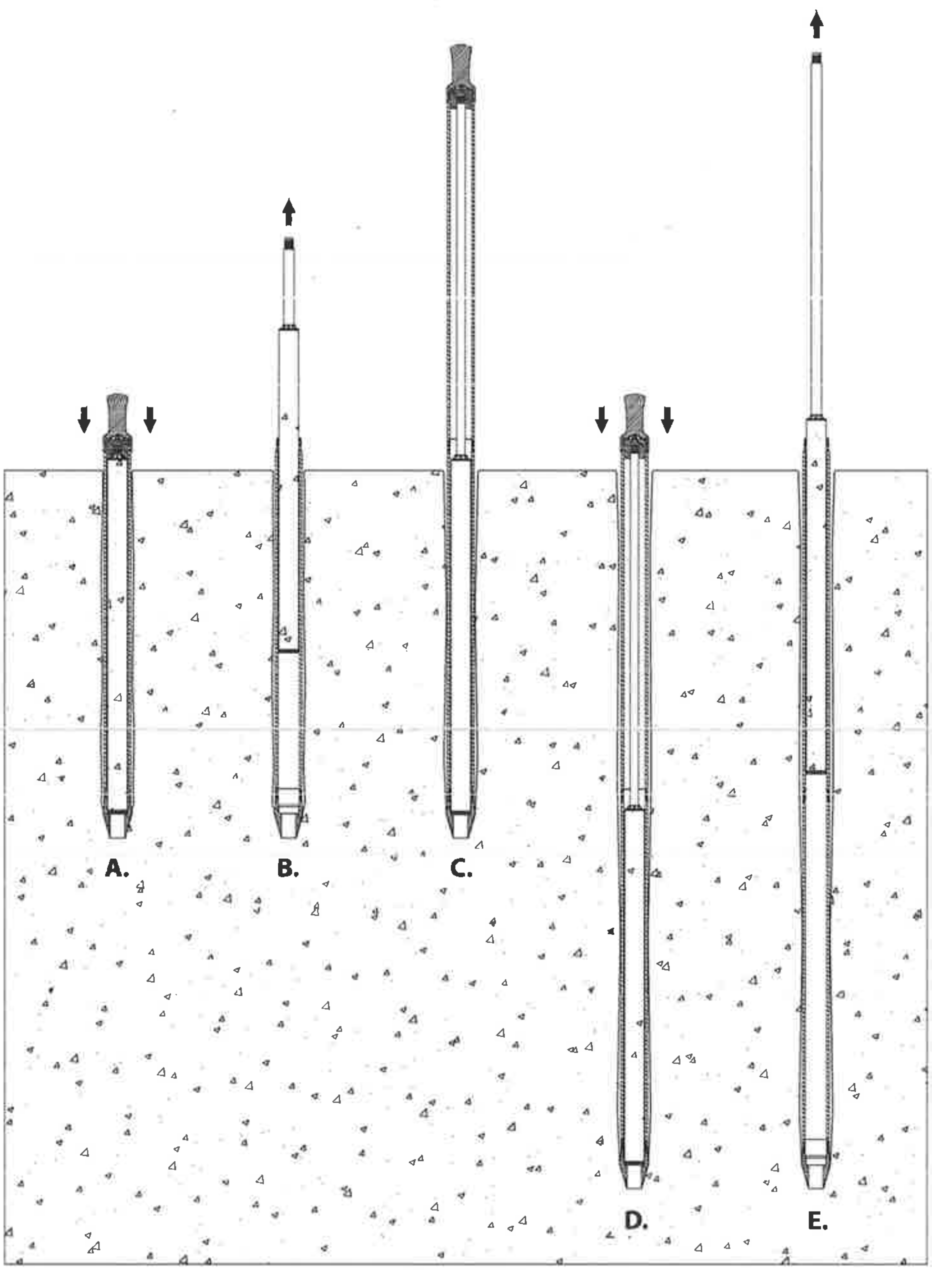


Figure 4.1
Continuous core sampling from ground surface with the DT325 system.

When sampling is to begin at the ground surface, the first soil core is generally collected using a liner with core catcher to maximize sample recovery (Fig. 4.1-A). This is especially true when the first core is composed of dry, loose soil. Upon retrieval of the first liner and soil core (Fig. 4.1-B), a new liner is loaded into the sample sheath and inserted to the bottom of the outer casing on the end of an inner rod. A section of outer casing is added to the tool string (Fig. 4.1-C) and the entire tool string is driven to fill the liner with soil (Fig. 4.1-D). The sample sheath and filled liner are removed from the outer casing to retrieve the second soil core (Fig. 4.1-E). A new liner is placed in the sample sheath and the process is repeated for the entire sampling interval.

When the sampling interval begins at some depth below ground surface, a DT325 Solid Drive Tip is installed in the outer casing and the entire assembly is driven from ground surface directly through undisturbed soil using the DT325 Centering Drive Cap (12943) (Fig. 4.2-A). This enables the operator to reach the top of the sampling interval without stopping to remove unwanted soil cores. Once the interval is reached, the solid drive tip is removed (Fig 4.2-B) and sampling continues using the Buffering Center Drive Cap (37708) as described in the preceding paragraphs (Fig. 4.2-C, Fig. 4.2-D, and Fig. 4.2-E).

Specific instructions for assembly and operation of the DT325 Sampling System are given in the following sections.

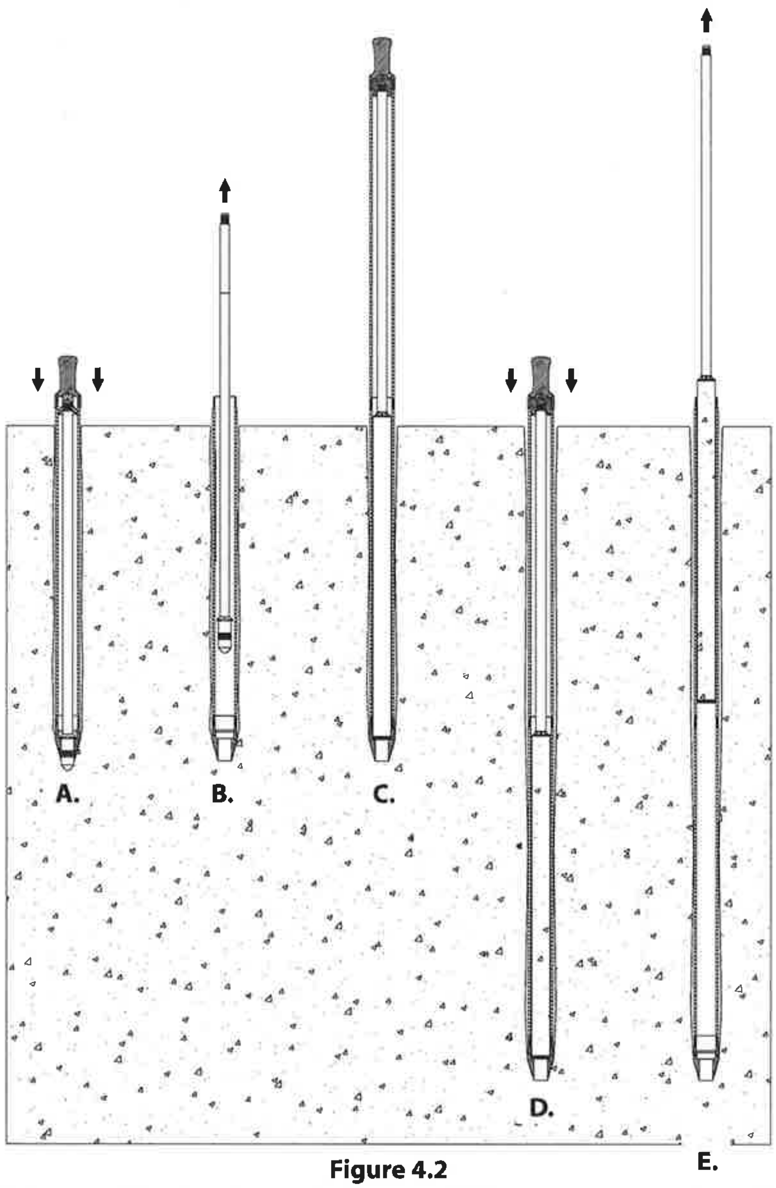


Figure 4.2

Using a solid drive tip to advance the DT325 outer casing through undisturbed soil before collecing soil cores.

4.3 Assembling and Driving the Outer Casing Using a DT325 Solid Drive Tip

A solid drive tip enables the operator to advance the outer casing to the bottom of a pre-cored hole or through undisturbed soil to reach the top of the sampling interval. The outer casing is assembled first, followed by the 1.25 in. light weight center rod system with a solid drive tip. Step by step instructions are listed below.

1. When using a DT325 Standard (28508) or Optional (26720) Cutting Shoe, install an O-ring (9960) at the base of the theads as shown in Figure 4.3. If using an expendable cutting shoe, install an O-ring (9960) on the DT325 Expendable Cutting Shoe Holder (28339) and one o-ring (6834) on the DT325 Expendable Cutting Shoe (28341).

2. Thread the DT325 Cutting Shoe or DT325 Expendable Point Holder onto the leading end of a 3.25-inch OD Probe Rod. Completely tighten the cutting shoe or cutting shoe holder using a pipe wrench.

3. Install an O-ring (13942) in both grooves of the DT325 Solid Drive Point (27763 or 28509).

4. Thread the solid drive point into the female end of a 1.25-inch light-weight center rod.

5. Lubricate the O-rings on the solid drive point with a small amount of deionized water. Insert the point and probe rod into the outer casing until the point partially extends from the bottom of the cutting shoe.

6. Place a DT325 Centering Drive Cap (12943) on top of the 1.25-inch light-weight center rod and a GH60 Threadless Drive Cap (9742) onto the 3.25-inch probe rod (outer casing) as shown in Figure 4.5.

7. Raise the probe unit hammer assembly to its highest position by fully extending the probe cylinder.

8. Position the assembled outer casing section directly under the hammer with the cutting shoe centered between the toes of the probe foot. The assembled outer casing section should now be parallel to the probe derrick. Step back from the unit and visually check sampler alignment. A magnetic level can be placed on the assembly to check level.

9. Apply static weight and hammer percussion to advance the assembled outer casing until the drive head reaches the ground surface.

   NOTE: Activate hammer percussion whenever collecting soil. Percussion helps shear the soil at the leading end of the sampler so that it moves into the sample tube for increased recovery.

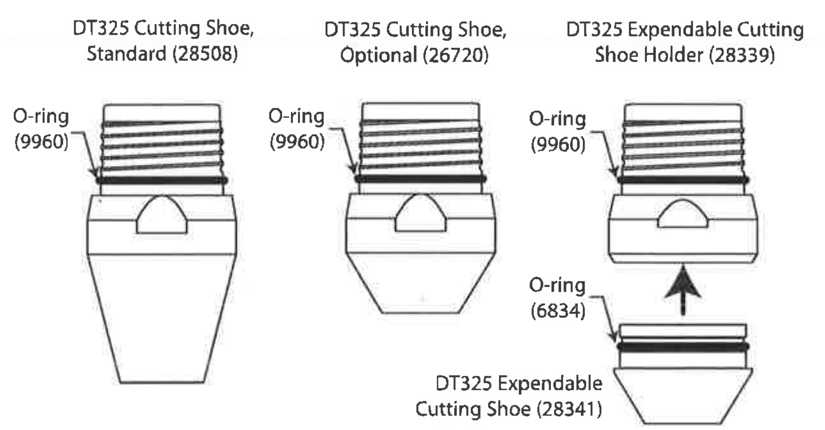


Figure 4.3
DT325 Cutting Shoes Utilize O-ring Seals

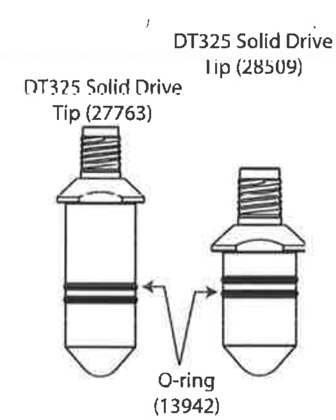


Figure 4.4
Solid Drive Points Utilize Two O-rings

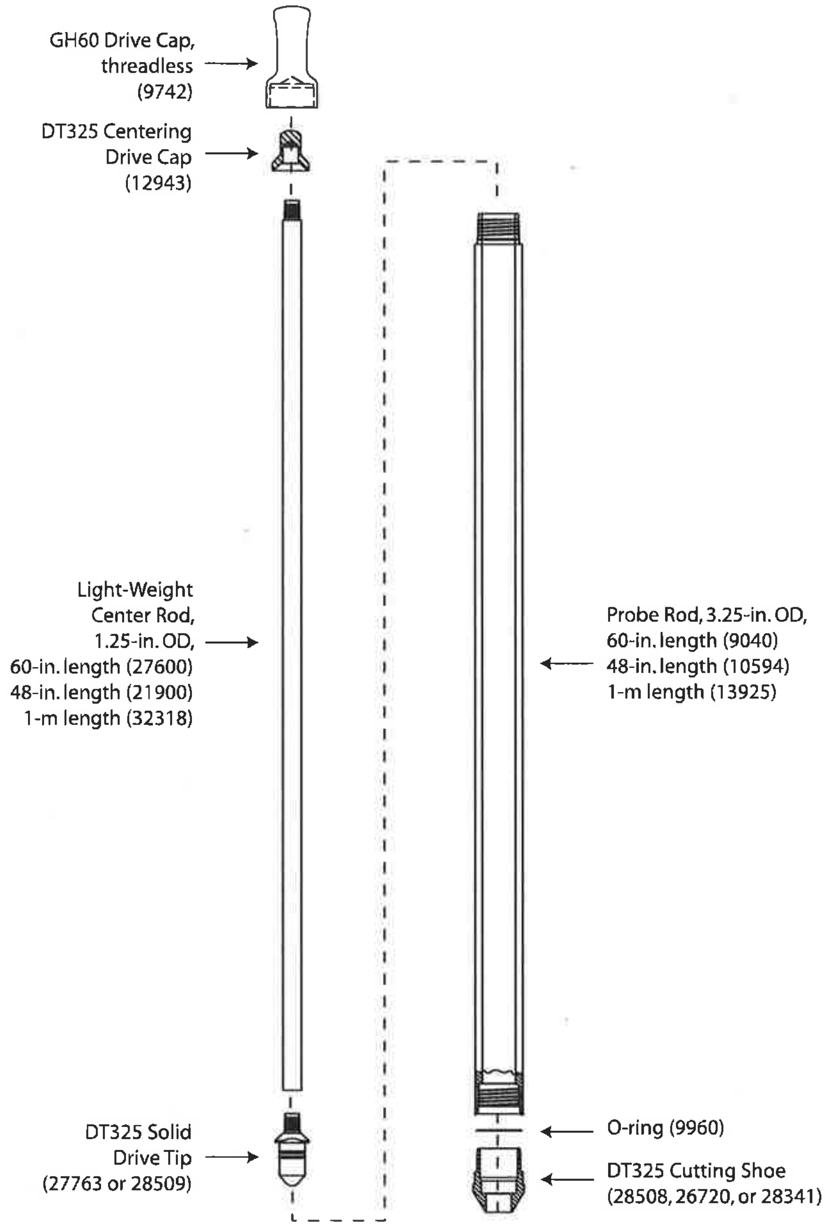


Figure 4.5
Assembly Using the DT325 Solid Drive Tip

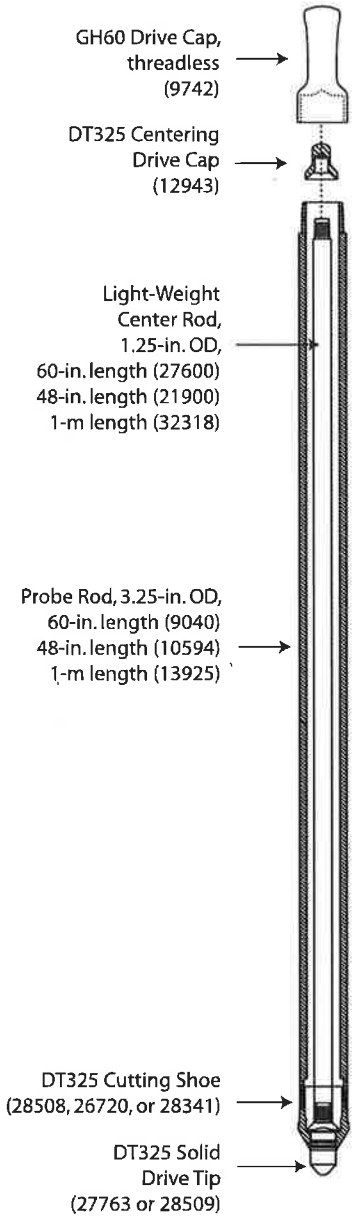


Figure 4.6
Completed Assembly

10. Raise the hammer assembly a few feet and retract the unit to provide access to the top of the outer casing assembly.

11. Remove the centering drive cap and 3.25-inch drive cap.

12. Add additional 1.25-inch light-weight center rods and 3.25-in. probe rods until the sampling interval is reached. At this point, the inner rods can be removed and an assembled sample sheath can be added (See Section 4.4)

4.4 Assembling the Sample Sheath

The sample sheath is used to support the weight of the 1.25-inch light-weight center rods and to protect the liner from damage while advancing the DT325 tool string. The process of assembling the sheath to collect soil samples is given below.

1. Place an O-ring onto the DT325 Liner Retainer. Note: No O-ring is needed for retainer 39011.
2. Slide the retainer ring onto the leading end of the liner. (Fig. 4.7).
3. Place the liner and retainer ring into either end of the sampler sheath (Fig. 4.8).
4. Thread the retainer ring onto the sample sheath. If the tools are clean, it should easily thread on easily by hand (Fig. 4.9).
5. On the opposite end of the sheath, thread on the DT325 Sheath Drive Head. The drive head will connect the sheath to the 1.25-inch light-weight center rods.

Figure 4.7. The retainer ring is placed on the end of the liner.

Figure 4.8. The liner and spacer ring are slid into the sample sheath.

Figure 4.9. Tighten the retainer ring by hand.

The sample sheath is now ready for soil core collection (Section 4.5).

4.5 Soil Core Collection

This section describes collection of continuous soil core samples from within the sealed outer casing of the DT325 Dual Tube Sampling System. The procedure is written for a sampling series that begins at the ground surface. Refer to Figure 4.10 for an illustration of the assembled sampler.

1. When using a DT325 Standard (28508) or Optional (26720) Cutting Shoe, install an O-ring (9960) at the base of the theads as shown in Figure 4.3. If using an expendable cutting shoe, install an O-ring (9960) on the DT325 Expendable Cutting Shoe Holder (28339) and one o-rings (6834) on the DT325 Expendable Cutting Shoe (28341).
2. Thread the DT325 Cutting Shoe or DT325 Expendable Point Holder onto the leading end of a 3.25-inch OD Probe Rod (Fig. 4.11). Completely tighten the cutting shoe or cutting shoe holder using a pipe wrench.
3. Insert the sample sheath assembly into the 3.25-inch OD probe rod.

4. Place a DT325 Buffering Centering Drive Cap (37708) on top of the DT325 Drive Head (Fig. 4.12) and a GH60 Threadless Drive Cap (9742) onto the 3.25-inch probe rod (outer casing, Fig. 4.13).

5. Raise the hydraulic hammer to its highest position by fully extending the probe cylinder.

6. Position the DT325 Sampler directly under the hammer with the cutting shoe centered between the toes of the probe foot (Fig. 4.14). The sampler should now be parallel to the probe derrick. Step back from the unit and visually check sampler alignment. A magnetic level can be placed on the assembly to check level.

7. Apply static weight and hammer percussion to advance the sampler unit until the drive head reaches the ground surface.

   NOTE: Activate hammer percussion whenever collecting soil. Percussion helps shear the soil at the leading end of the sampler so that it moves into the sample tube for increased recovery.

8. Raise the hammer assembly a few feet and retract the unit to provide access to the top of the sampler.

9. Remove the drive cap and thread an additional 1.25-inch light-weight center rod onto the center string. Place the adjustable rod clamp on the top of the 3.25-inch rods to keep the center rods from falling when they are removed (Fig. 4.15).

10. Pull up the 1.25-inch light-weight center rod string along with the sample tube (Fig. 4.16). When available, the 1.25-in. Leaf Puller can be used with overhead winch.

    To sample consecutive soil cores, advance a clean sample sheath and liner down the previously opened hole to the top of the next sampling interval. Add 1.25-inch light-weight center rods as the sample sheath is lowered into the opened hole. An additional 1.25-inch light-weight center rod and 3.25-inch probe rod should be added. Drive the tool string the length of the sampler to collect the next soil core. Proceed to Section 4.6 for instructions on recovering the soil core from the sample sheath.

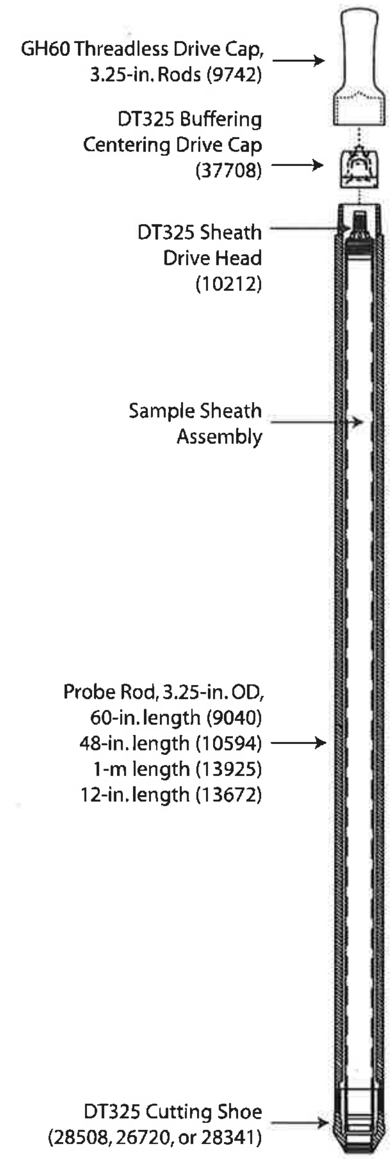


Figure 4.10
Assembled DT325 Sampler

Figure 4.11. The cutting shoe is threaded onto the 3.25-inch probe rod.

Figure 4.12. A DT325 Buffering Centering Drive Cap (37708) is placed on the DT325 Drive Head.

Figure 4.13. Place the threadless drive cap on the 3.25-inch probe rod.

Figure 4.14. The probe rod should be centered between the toes of the probe foot.

Figure 4.15. The adjustable rod clamp can be used when retrieving the sample.

Figure 4.16. The 1.25-inch light-weight center rods are pulled along with the sample tube.

4.6 Removing Filled Liner from the Sample Sheath

Place the sample tube into the vise. The liner retainer wrench can be used to remove the DT325 Liner Retainer and liner from the sample sheath. If possible, the retainer can be removed by hand (Fig. 4.17). The wrench can be used to gently knock off the retainer if necessary (Fig. 4.17). With the retainer removed, the liner and core can be withdrawn from the sample tube. A Hydraulic Liner Extruder is also available for mounting on your machine to remove liners (Fig. 4.19).

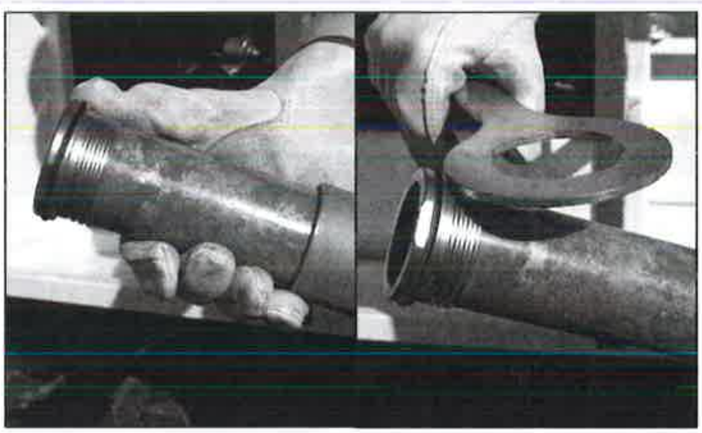


Figure 4.17. The retainer is removed from the sheath, either by hand or with the retainer wrench. Gently tap the retainer with the wrench to remove it from the liner.

Figure 4.18. The Hydraulic Liner Extruder helps remove the liner.

4.7 Removing a Section of Liner with a DT325 Liner Cutter

The liner and core can be placed on the Universal Liner Holder. Use the DT325 Liner Cutter to safely expose the sample. Begin the cut at the opposite end of the core catcher (Fig. 4.19). It is a little thinner plastic, which makes it easier to begin the cut. Using both hands, smoothly pull the cutter through the liner. The slit liner can be removed and the core is exposed (Fig. 4.20).

Figure 4.19. The DT325 Liner Cutter is used to safely make a longitudinal cut on the sample.

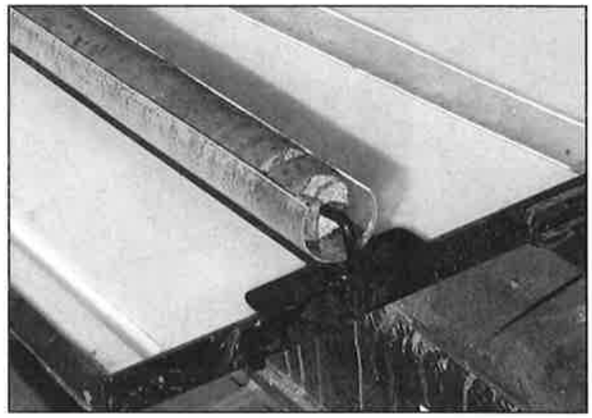


Figure 4.20. The core is exposed by the DT325 Liner Cutter.

4.8 Dual Tube Soil Sampling Tips

Saturated sands are the most difficult formations to sample with the DT325 system. Saturated conditions place positive pressure on the soil outside of the outer casing. When sampling in noncohesive formations (e.g. sands) below the water table, it may be necessary to add water to the outer casing to prevent formation heave. Adding water to the probe rods puts a positive head on the system and may keep formation material from flowing into the rods as the liner and soil sample are retracted. If a small amount of formation material is still drawn into the outer casing as the soil core is retrieved, the material may be displaced by slightly raising the outer casing while lowering the next new liner to depth. Water must be maintained within the outer casing during this process to overcome the hydraulic head imparted by the formation fluid. When retrieving, pull back the sample slowly.

DT325 core catcher liners will help considerably with sample recovery in non-cohesive soils and other materials that do not fill the liner diameter. Core catcher liners are not recommended for cohesive or extruding soils as the core catchers may actually inhibit soil movement into the liner. Also, using a shorter sample interval may improve sample recovery by minimizing wall friction as the material is sampled.

Certain soils have a tendency to exhibit plastic flow or extrusion characteristics. Allowing additional space for these materials will increase the speed of sampling because less time is spent cleaning overfilled sample sheaths. This will also yield a more representative sample. Using a sheath that is a foot or two longer than the sampling interval or using a shorter sample interval (under driving) can create a buffer zone. The DT325 Liner Spacer and Spacer Head were designed for these situations.

Some clay materials will extrude during sampling. Under these conditions, using a shorter sample interval (24-inch liners) may improve sample recovery by minimizing the wall friction as the material is sampled.

It is recommended that an O-ring be used on the liner retainer when sampling in clays. If an O-ring is not used, clay may build up between the sample sheath and the outer casing. It is not necessary to use retainer o-rings in saturated sands and anytime water is present.

It may be helpful to mark the first 1.25-inch light-weight center rod attached to the sheath as an indicator that the sheath is next in line.

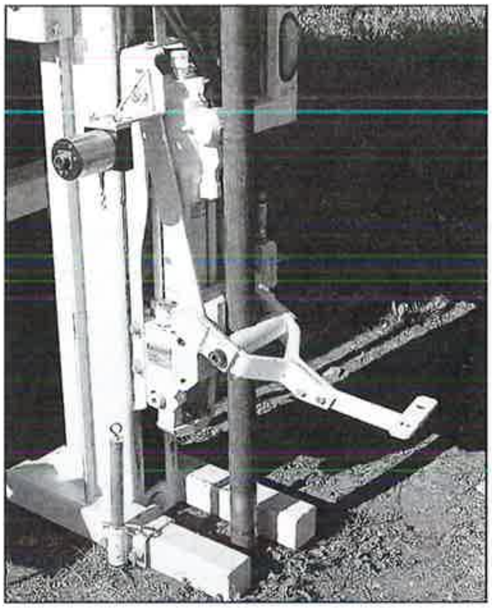


Figure 4.21. Outer casing may be retrieved with a pull cap or rod grip pull system if the probe hole is sealed with granular bentonite.

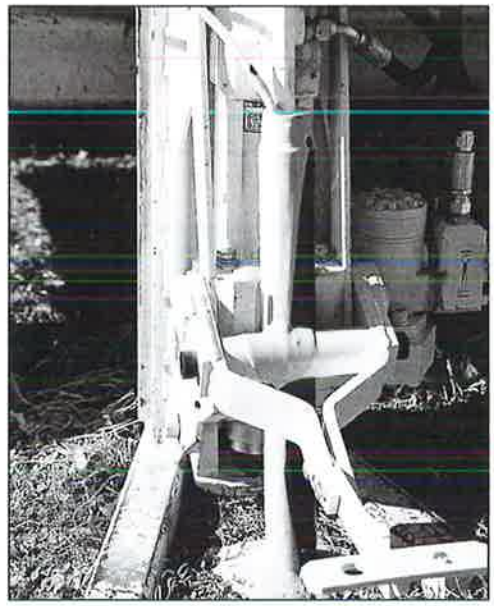


Figure 4.22. A grout machine and flexible tubing allow bottom-up grouting as the outer casing is retrieved.

4.9 Outer Casing Retrieval

The outer casing of the DT325 Dual Tube System may be retrieved in one of three ways:

1. Casing pulled then probe hole sealed from ground surface with granular bentonite.

   The outer casing may be pulled from the ground with the probe machine and a Pull Cap (13257) or a Rod Grip Pull System (for GH40 Hammers [12235] or for GH60 Hammers [44688]) if the probe hole is to be sealed with granular bentonite from the ground surface (Fig. 4.21). This method is used for shallow probe holes in stable formations only. Such conditions allow the entire probe hole to be sealed with granular bentonite.

2. Casing pulled with probe hole sealed from bottom-up during retrieval.

   Bottom-up grouting should be performed during casing retrieval in unstable formations where side slough is probable. Such conditions create void spaces in the probe hole if granular bentonite is installed from the ground surface. (Fig. 4.22)

3. Casing pulled with Geoprobe Prepacked Screen Well installed during retrieval.

   The final option is to install a 2.5-inch OD Geoprobe® Prepacked Screen Monitoring Well in the probe hole during retrieval of the outer casing. A DT325 Expendable Cutting Shoe Holder (28339) and a DT325 Expendable Cutting Shoe (28341) allow the operator to collect continuous soil cores as the outer casing is driven to depth.

   When sampling is complete, the outer rods are raised a few inches, and the expendable cutting shoe is deployed from the holder. This leaves an open casing through which a set of prepacked screens is lowered on the leading end of a PVC riser string. The well is finished, complete with grout barrier, bentonite well seal, and a high-solids bentonite slurry/neat cement grout, during retrieval of the outer casing.

Figure 4.23. Geoprobe® prepacked screens may be installed through the outer casing when an expendable cutting shoe is used.

Refer to Geoprobe® 1.0-in. x 2.5-in. OD and 1.5-in. x 2.5-in. OD Prepacked Screen Monitoring Wells Standard Operating Procedure (Geoprobe® Technical Bulletin No. 992500) for specific information on well installation.

5.0 References

Geoprobe Systems®, 2003. *Tools Catalog, V. 6.*

Geoprobe Systems®, 2005. *Standard Operating Procedure. Geoprobe@ Pneumatic Slug Test Kit. Technical Bulletin No. 19344.*

Geoprobe Systems®, 2010. *Standard Operating Procedure. 1.0-in. x 2.5-in. OD and 1.5-in. x 2.5-in. OD Prepacked Screen Monitoring Wells. Geoprobe® Technical Bulletin No. 992500.*

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