

C A M B R I A

STID 4070  
LS

ENVIRONMENTAL PROTECTION November 11, 1998

98 NOV 13 PM 3:05

Mr. Thomas Peacock  
Alameda County Department of Environmental Health  
UST Local Oversight Program  
1131 Harbor Bay Parkway, 2nd Floor  
Alameda, CA 94502

STID # 4070

Re: **Remedial Work Plan**  
1721 Webster Street  
Oakland, CA  
STID 4070



Dear Mr. Peacock:

Cambria Environmental Technology (Cambria) is pleased to submit this remedial work plan for the site referenced above. The objective of this work plan is to perform additional hydrocarbon source remediation to expedite site closure. Mr. Peacock of the Alameda County Department of Environmental Health (ACDEH) requested this work plan to help expedite case closure during a project discussion with Mr. Bob Clark-Riddell of Cambria in September 1998. Presented below is the site background, the hydrocarbon distribution in soil and ground water, and Cambria's proposed scope of work for the site.

### SITE BACKGROUND

**Site Location:** The site is located on 1721 Webster Street between 17th and 19th Streets in downtown Oakland, California (Figure 1). The site is located approximately five miles east of the San Francisco Bay and one half-mile west of Lake Merritt. The site is currently being utilized as a parking garage and is surrounded by other commercially-zoned parcels.

**1992 Tank Removal:** On August 3 and 6, 1992, Parker Environmental Services of Pittsburg, California removed one 1,000-gallon and two 500-gallon gasoline underground storage tanks (USTs). Up to 1,500 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg) and up to 12 ppm benzene were detected in tank excavation and sidewall samples.


**1994 Subsurface Investigation:** On July 8 and September 8, 1994, Gen Tech/Piers Environmental, Inc. (Gen Tech) of San Jose, California drilled six exploratory borings (EB-1 through EB-6) and installed three ground water monitoring wells (MW-1 through MW-3). Up to 650 ppm TPHg and 0.2 ppm benzene were detected at 20 ft depth in soil near the former USTs. Up to 350,000 parts per billion (ppb) TPHg and 10,000 ppb benzene were detected near and immediately downgradient of the former USTs (Attachment A).

Oakland, CA  
Sonoma, CA  
Portland, OR  
Seattle, WA

**Cambria  
Environmental  
Technology, Inc.**

1144 65th Street  
Suite B  
Oakland, CA 94608  
Tel (510) 420-0700  
Fax (510) 420-9170

**1996 Subsurface Investigation:** In February and May, 1996, Cambria Environmental, Inc. of Oakland, California drilled seven geoprobe™ soil borings (SB-A through SB-G) and installed two ground water monitoring wells (MW-4 and MW-5). Up to 660 ppm TPHg and <0.005 ppm benzene were detected at 20.5 ft depth in soil boring SB-D located down gradient from the former USTs. Up to 63,000 parts per billion (ppb) TPHg and 7,400 ppb benzene were detected in ground water from MW-2 immediately down gradient of the former USTs (Attachment A).



**Oxygen Releasing Compound (ORC) Update:** To enhance the natural bioattenuation of dissolved hydrocarbons, Cambria installed a string of six one-foot ORC socks in well MW-2 on January 8, 1998. Well MW-2 is not purged during ground water monitoring to maintain the effectiveness of the oxygenated well water. Dissolved Oxygen (DO) concentrations have been monitored in MW-2 and in the remaining wells prior to purging. DO concentrations have been significantly higher in well MW-2 compared to other wells.

**Ground Water Monitoring:** Since 1994, the depth to ground water has ranged from 16.78 to 22.15 feet below grade surface (bgs), with ground water consistently flowing towards the northeast (Table 1). Ground water elevation contours for the third quarter of 1998 are shown on Figure 1, and indicate at an approximate gradient of 0.004 ft/ft. Cambria currently monitors ground water quality on a semi-annual basis.

## HYDROCARBON DISTRIBUTION IN SOIL

Soil analytic results from previous UST removal and soil boring activities in 1992 and 1994 indicate that hydrocarbon-impacted soil exists primarily beneath the southernmost USTs and extends down to ground water. Maximum hydrocarbon concentrations in soil of 1,500 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg) and 12 ppm benzene were detected at depths ranging from 8 to 12 ft bgs beneath the former USTs (Attachment A). The lateral extent of hydrocarbons appears to be limited to the immediately vicinity of the former USTs.

## HYDROCARBON DISTRIBUTION IN GROUND WATER

Ground water sampling data indicates that hydrocarbon concentrations are highest in well MW-2, which is located immediately down gradient of the former UST area. Well MW-2 is the only well containing benzene, with 1,200 ppb benzene detected during the third quarter of 1998. TPHg concentrations are present in upgradient well MW-3 and down gradient well MW-4, but again, no benzene concentrations were detected in these wells. The extent of hydrocarbons in ground water is defined to below method reporting limits in the northern crossgradient direction by well MW-1

and in the downgradient direction by well MW-5. MTBE does not seem to be a significant issue for this site, with the maximum detected MTBE being 300 ppb in well MW-2, although this has not been confirmed by EPA Method 8260. Historical ground water elevation and analytic data is presented in Table 1.

Most importantly, hydrocarbon concentrations continue to exhibit an overall decreasing trend in source area well MW-2 and in upgradient well MW-3. In these wells, the hydrocarbon concentrations remain at or near their historic low concentration. The decline in concentrations in well MW-2 may be attributable to due enhanced dissolved oxygen levels resulting from the installation of ORCs in January 1998.



## EVALUATION OF REMEDIAL ALTERNATIVES

During discussions with ACDEH, Tom Peacock agreed that a cost-effective solution for improving ground water quality would expedite the ACDEH's ability to consider case closure for the subject site. And if cost-effective remediation resulted in earlier case closure, the life-cycle project costs would be lower than continued monitoring for several years. Mr. Peacock requested that Cambria prepare a remedial work plan proposing a cost-effective remedial alternative for their review.


To identify a cost-effective remedial approach, Cambria evaluated several remedial alternatives including natural attenuation, hydrogen peroxide injection, biosparging, air sparging, soil vapor extraction, and combined soil vapor extraction/air sparging. Table A below presents different remedial approaches, estimated duration to closure using each approach, and associated estimated costs. Subsurface conditions and well construction details, which influence our evaluation of the effectiveness and recommended approach for the different remedial techniques, are shown in Attachment B.

**Table A**  
**Evaluation of Remedial Approaches and Estimated Costs**

Potentially Applicable Technology	Remedial Approach	Estimated Duration Until Closure (years)	Estimated Costs		
			Ground Water Monitoring (Annual)	Remedial Action	Total Project Cost
Natural Attenuation	Allow hydrocarbons to attenuate naturally. Assume 10 years until closure granted without active remediation.	10	4,000	0	40,000
Hydrogen Peroxide Injection	Inject H <sub>2</sub> O <sub>2</sub> over 6-week period into wells MW-2 & MW-3, re-equilibrate for 6 weeks. (Upper cost range assumes another 6 week period of injection). Two total years of ground water monitoring before closure.	2	4,000	5,000 to 10,000	13,000 to 18,000
Biosparge	Convert well MW-2 for low-flow air injection, install air compressor, 1 year biosparge system operation, 2 total years of ground water monitoring.	2	4,000	19,000	27,000
AS	Convert wells MW-2 and MW-3 for air injection, install new air sparge well, 1 year air sparge operation, 2 total years of ground water monitoring.	2	4,000	34,000	42,000
SVE	Because the existing well screens are submerged, a new well is needed for SVE. Approach includes installation of one well, blower with activated carbon, SVE permit, 6 months SVE operation, 2 total years of ground water monitoring.	2	4,000	32,000	40,000
SVE/AS	Combine above SVE and AS approaches with 6 months operation, 2 total years of ground water monitoring.	2	4,000	42,000	50,000

AS = Air Sparging  
SVE = Soil Vapor Extraction

## PROPOSED REMEDIAL ACTION



Based on the extent of the remaining hydrocarbons, the fairly permeable water-bearing zone, and the favorable results from ORC installation, hydrogen peroxide injection appears to be the most cost-effective approach for remediating the site and achieving case closure. The addition of hydrogen peroxide would significantly increase the levels of dissolved oxygen, and is a more aggressive remedial approach than using ORCs. The addition of hydrogen peroxide would chemically oxidize residual hydrocarbons within the immediate vicinity of the former USTs, and would facilitate the biodegradation of hydrocarbons further away from the source area. **Cambria proposes to inject hydrogen peroxide into wells MW-2 and MW-3** located in the vicinity of the former USTs. The proposed remedial scope of work is specified below.

**Site Health and Safety Plan:** Cambria will prepare a comprehensive site safety plan to protect site workers. The plan will be kept on site during field activities and signed by each site worker.

**Approval/Permits:** Cambria will contact the ACDEH and the Regional Water Quality Control Board (RWQCB) to determine if any permit or approvals are required to add hydrogen peroxide into the subsurface.

**Hydrogen Peroxide Injection:** Cambria will add an approximate 10% solution of hydrogen peroxide (diluted from a 35% solution) into two onsite wells (MW-2 and MW-3), which have the highest dissolved-phase hydrocarbon concentrations at the site. The hydrogen peroxide solution will be slowly added into each well to approximately 5 ft below top of casing (approximately 20 gallons) and allowed to infiltrate. Following the addition of the hydrogen peroxide, a slug of tap water may be added to the well to help facilitate the infiltration of the hydrogen peroxide into the aquifer. The amount of hydrogen peroxide and tap water added to each well will be based on the diameter of the well, depth to ground water, and the permeability of the soil. **Hydrogen peroxide will added on a weekly basis for a period of 6 weeks. Dissolved oxygen measurements will be collected each week, prior to the addition of the hydrogen peroxide, and again during ground water monitoring.** The wells will be allowed to re-equilibrate for 6 weeks, prior to the collection of ground water samples for the subsequent semi-annual monitoring event. Depending on the results of ground water sampling, a second phase of hydrogen peroxide addition may be performed for a period of 6 weeks following the monitoring event. **If requested, groundwater sampling could be performed quarterly during this remedial action rather than semi-annually to expedite evaluation of the remedial effectiveness.**

**Reporting:** Reporting for the remedial action activities will be incorporated into the semi-annual monitoring reports. The remedial evaluation section of the monitoring report will contain, at a minimum:

- Descriptions of field activities, including the volume of hydrogen peroxide added,
- Tabulated dissolved oxygen and ground water analytic data, and
- A summary of the effectiveness of the remedial action.



### SCHEDULE

Upon work plan approval, Cambria will assist Douglas Parking with Cleanup Fund pre-approval and will commence work plan implementation if authorized.

Please call us (510) 420-0700 if you have any questions regarding this proposed work plan.

Sincerely,  
**Cambria Environmental Technology, Inc.**

Ron Scheele  
Project Geologist

Bob Clark-Riddell PE  
Principal Engineer

Figure: 1 - Benzene Concentration and Ground Water Elevation Contours from August 11, 1998

Table: 1 - Ground Water Elevation and Analytic Data

Attachments: A - Soil Sampling Results from Previous Investigations  
B - Soil Boring Logs and Well Construction Details

cc: Mr. Lee Douglas, Douglas Parking, 1721 Webster Street, Oakland, California 94612

**EXPLANATION**

- Ground Water Monitoring Well
- SB-A ● Soil Boring Location

<b>MW-1</b>	Well ID
<b>8.90</b>	Ground Water Elevation
<b>NS</b>	Benzene Conc. in Ground Water

- NS Not Sampled
- ND Not Detected

— 8.8 Ground Water Elevation Contour (ft)

→ Ground Water Flow Direction and Gradient (ft/ft)

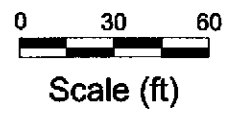
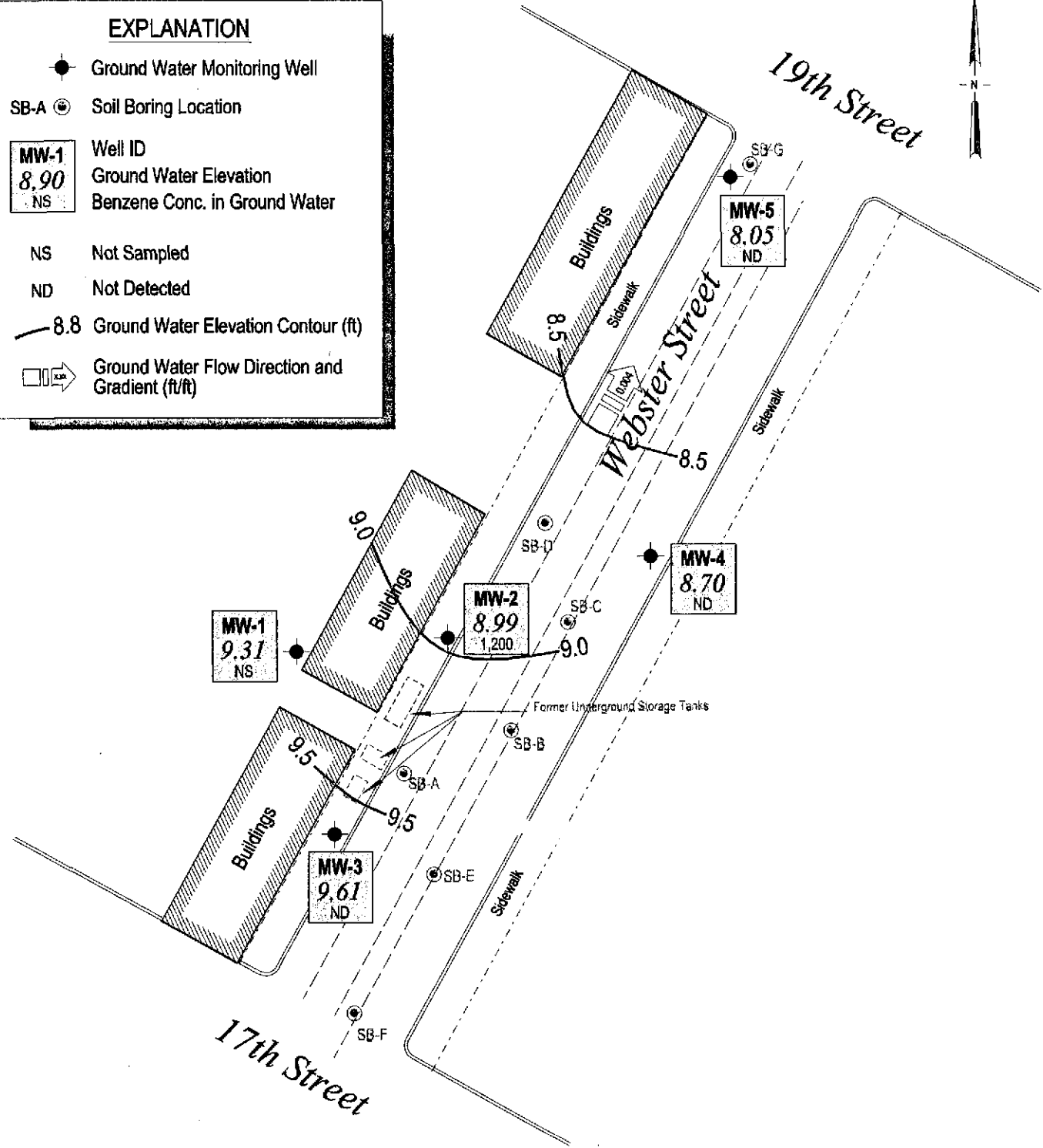
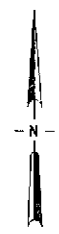


FIGURE  
**1**

HYDROGEOLOGY/GEOPHYSICS/MF/DWG

Base map from Piers Environmental Services

**Douglas Parking Facility**  
1721 Webster Street  
Oakland, California



**Ground Water Elevation  
Contours**  
August 11, 1998

**Table 1. Ground Water Elevation and Analytical Data - Douglas Parking Company, 1721 Webster Street, Oakland, CA**

Well ID	Date	Well Elev. (ft)	G W Depth (ft)	G W Elev. (ft)	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	DO (mg/L)	Notes
MW-1	12/02/94	29.25	19.42	9.83	nd	nd	nd	nd	nd	-	-	1
	03/06/95	29.73	20.69	9.04	nd	nd	nd	nd	nd	-	-	1
	07/11/95	29.81	20.65	9.16	nd	nd	nd	nd	nd	-	-	
	05/10/96	29.81	20.80	9.01	nd	nd	nd	nd	nd	-	-	
	10/02/96	29.81	21.35	8.46	-	-	-	-	-	-	-	2
	02/28/97	29.81	20.57	9.24	-	-	-	-	-	-	-	2
	09/16/97	29.81	21.50	8.31	-	-	-	-	-	-	-	2
	02/05/98	29.81	20.91	8.90	-	-	-	-	-	-	1.9	2
	<b>08/11/98</b>	<b>29.81</b>	<b>20.50</b>	<b>9.31</b>	-	-	-	-	-	-	<b>0.06</b>	2
MW-2	12/02/94	27.10	19.50	7.60	61,300	3,000	3,900	160	4,500	-	-	1
	03/06/95	27.10	18.49	8.61	98,000	8,400	16,000	2,000	2,600	-	-	1
	07/11/95	27.40	18.45	8.95	38,000	3,100	7,500	940	3,700	-	-	
	05/10/96	27.40	18.56	8.84	63,000	7,400	16,000	1,500	6,000	-	-	
	10/02/96	27.40	19.15	8.25	21,000	2,200	3,400	430	1,600	-	-	
	02/28/97	27.40	18.43	8.97	39,000	4,700	9,600	950	4,200	nd	-	
	09/16/97	27.40	19.26	8.14	29,000	3,300	5,800	690	2,900	<620	-	
	02/05/98	27.40	18.66	8.74	10,000	1,000	2,000	170	860	<330	7.9	
	<b>08/11/98</b>	<b>27.40</b>	<b>18.41</b>	<b>8.99</b>	<b>12,000</b>	<b>1,200</b>	<b>2,300</b>	<b>260</b>	<b>1,400</b>	<b>300</b>	<b>5.4</b>	a
MW-3	12/02/94	29.50	22.15	7.35	394,000	1,200	nd	1,800	4,000	-	-	1
	03/06/95	29.25	20.09	9.16	21,000	400	150	24	62	-	-	1
	07/11/95	29.56	19.99	9.57	12,000	nd	10	16	99	-	-	
	05/10/96	29.56	20.24	9.32	8,600	nd	7.6	16	84	-	-	
	10/02/96	29.56	20.90	8.66	11,000	nd	7.4	19	92	-	-	
	02/28/97	29.56	20.12	9.44	6,000	nd	4.4	17	88	50	-	
	09/16/97	29.56	20.97	8.59	6,500	<0.5	1	1	7	<5.0	-	
	02/05/98	29.56	20.39	9.17	5,400	<0.5	6.3	15	86	<63	1.9	
	<b>08/11/98</b>	<b>29.56</b>	<b>19.95</b>	<b>9.61</b>	<b>2,700</b>	<b>&lt;0.5</b>	<b>3.5</b>	<b>3.2</b>	<b>12</b>	<b>&lt;10</b>	<b>0.05</b>	b,j
MW-4	05/10/96	25.29	16.98	8.31	14,000	nd	1,200	720	3,100	-	-	



**Table 1. Ground Water Elevation and Analytical Data - Douglas Parking Company, 1721 Webster Street, Oakland, CA**

Well ID	Date	Well	G W	G W	TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	DO	Notes
		Elev. (ft)	Depth (ft)	Elev. (ft)								
	10/02/96	25.29	17.65	7.64	12,000	nd	650	580	2,200	-	-	
	02/28/97	25.29	16.80	8.49	13,000	nd	1,100	750	2,700	110	-	
	09/17/97	25.29	17.93	7.36	13,000	<2.5	820	750	2,900	<190	-	
	02/05/98	25.29	16.78	8.51	13,000	<1.0	690	690	2,900	<170	2.1	
	08/11/98	25.29	16.59	8.70	15,000	<5	360	520	1,900	280	2.8	b,j
MW-5												
	05/10/96	21.97	14.60	7.37	nd	nd	nd	nd	nd	-	-	
	10/02/96	21.97	15.25	6.72	nd	nd	nd	nd	nd	-	-	
	02/28/97	21.97	14.31	7.66	nd	nd	nd	nd	nd	nd	-	
	09/17/97	21.97	15.18	6.79	<0.5	<0.5	<0.5	<0.5	<0.5	<5.0	-	
	02/05/98	21.97	13.64	8.33	<50	<0.5	<0.5	<0.5	<0.5	<5.0	2.8	
	08/11/98	21.97	13.92	8.05	<50	<0.5	<0.5	<0.5	<0.5	<5.0	0.05	

**Notes and Abbreviations:**

Benzene, Toluene, Ethylbenzene, and Xylenes by EPA Method 8020.

G W = Ground water

TPHg = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015.

MTBE = methyl tertiary butyl ether per EPA Method 8020.

Elev. = Elevation

µg/L = micrograms per liter

mg/L = milligrams per liter

1 = Data prior to 7/11/95 from Gen Tech and Piers Environmental Quarterly Groundwater Monitoring Reports dated December 2, 1994 and March 6, 1995, respectively.

2 = Per letter dated September 17, 1996 to Douglas Parking from ACDEH, sampling no longer required in well MW-1.

nd = not detected

DO = dissolved oxygen

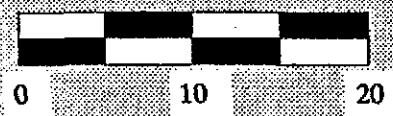
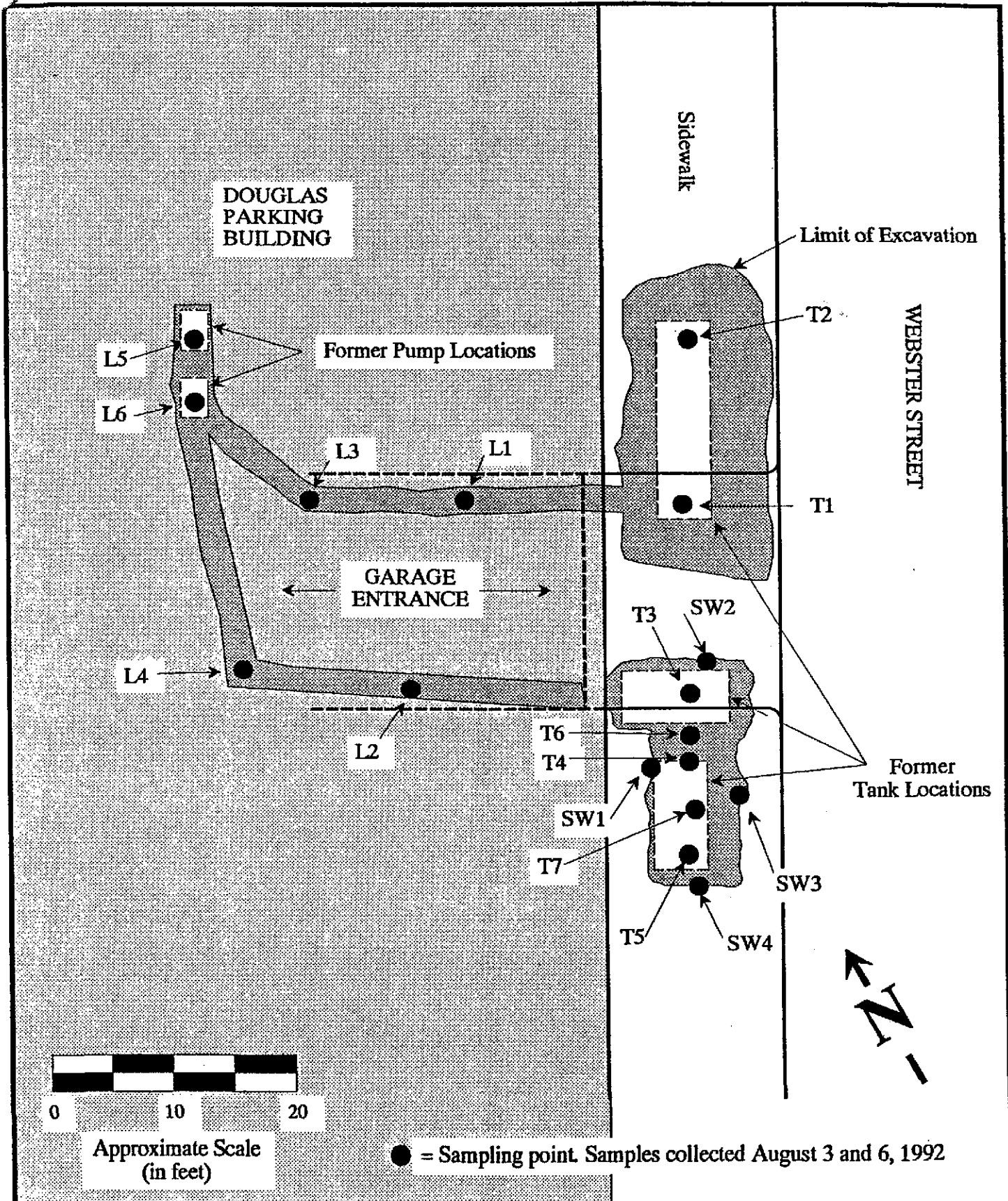
**ATTACHMENT A**

**Soil Sampling Results from Previous Investigations**

Douglas Parking  
 1721 Webster Street, Oakland, California  
 Soil Sample Analysis Results\*  
 Samples Collected on August 3 and 6, 1992

Sample Number	Depth	TPH-g	Benzene	Toluene	Ethylbenzene	Xylenes
<b>Samples From Beneath the Tanks</b>						
T-1	9'	150				
T-2	9'	120	2.2	2.9	1.8	13
T-3	8'	580	0.62	0.56	0.87	2.2
T-4	8'	1,500	1.7	5.9	5.6	43
T-5	8'	410	11	140	48	280
T-6	12'	1,400	6.7	22	6.2	35
T-7	14'	2.3	12	71	29	150
			0.11	0.19	0.050	0.31
<b>Samples from the south excavation side walls</b>						
SW1	9.5'	280				
SW2	7'	1,500	2.9	5.8	3.2	15
SW3	8'	400	5.7	40	18	150
SW4	9'	2.3	2.7	5.8	4.0	21
			0.42	0.028	0.077	0.18
<b>Composited Sample from the soil pile</b>						
C1	1.5'	560	ND<0.1	5.0	3.1	24
<b>Samples from the line and pump trenches</b>						
L-1	1.5'	2.6	ND			
L-2	1.5'	ND	ND	0.010	ND	0.030
L-3	1.5'	ND	ND	ND	ND	ND
L-4	1.5'	ND	ND	ND	ND	ND
L-5	2.0'	8.2	ND	ND	ND	ND
L-6	2.0'	ND	0.010	0.020	0.012	0.092
			ND	0.007	ND	0.034

\* TPH (as gasoline) and BTEX are in parts per million. ND = Not Detected



Approximate Scale  
(in feet)

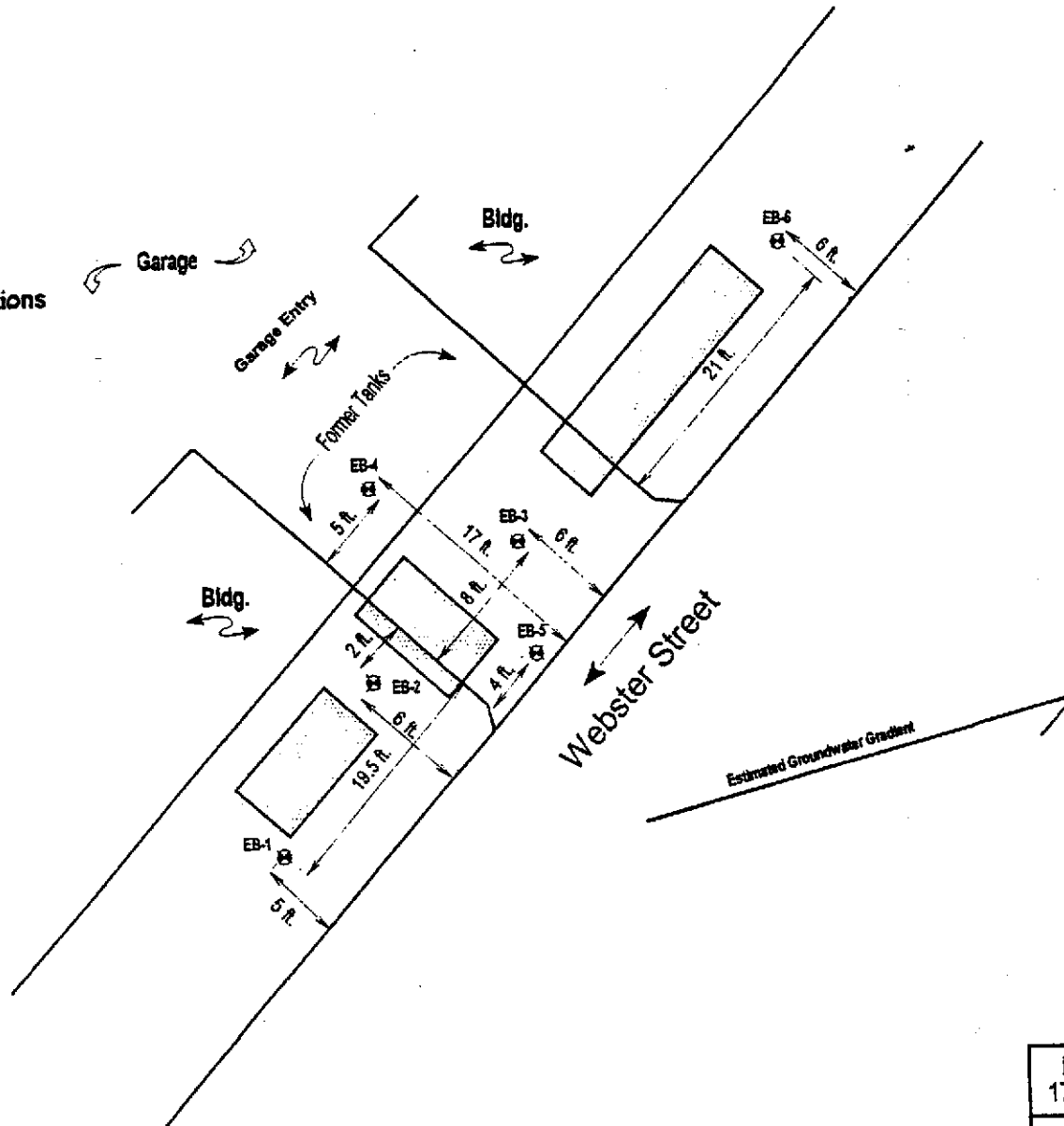
● = Sampling point. Samples collected August 3 and 6, 1992

<p><b>PARKER</b> Environmental Services</p> <p>Project 128-6</p>	<p>4185 Rialto Court Pittsburg, CA 94565 (510) 439-1024</p>	<p>DOUGLAS PARKING 1721 Webster Street, Oakland, California Tank Removal Soil Sampling</p> <p>8/92</p>
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# Douglas Parking - Webster St.

## Legend:

⊗ Exploratory Borings Locations

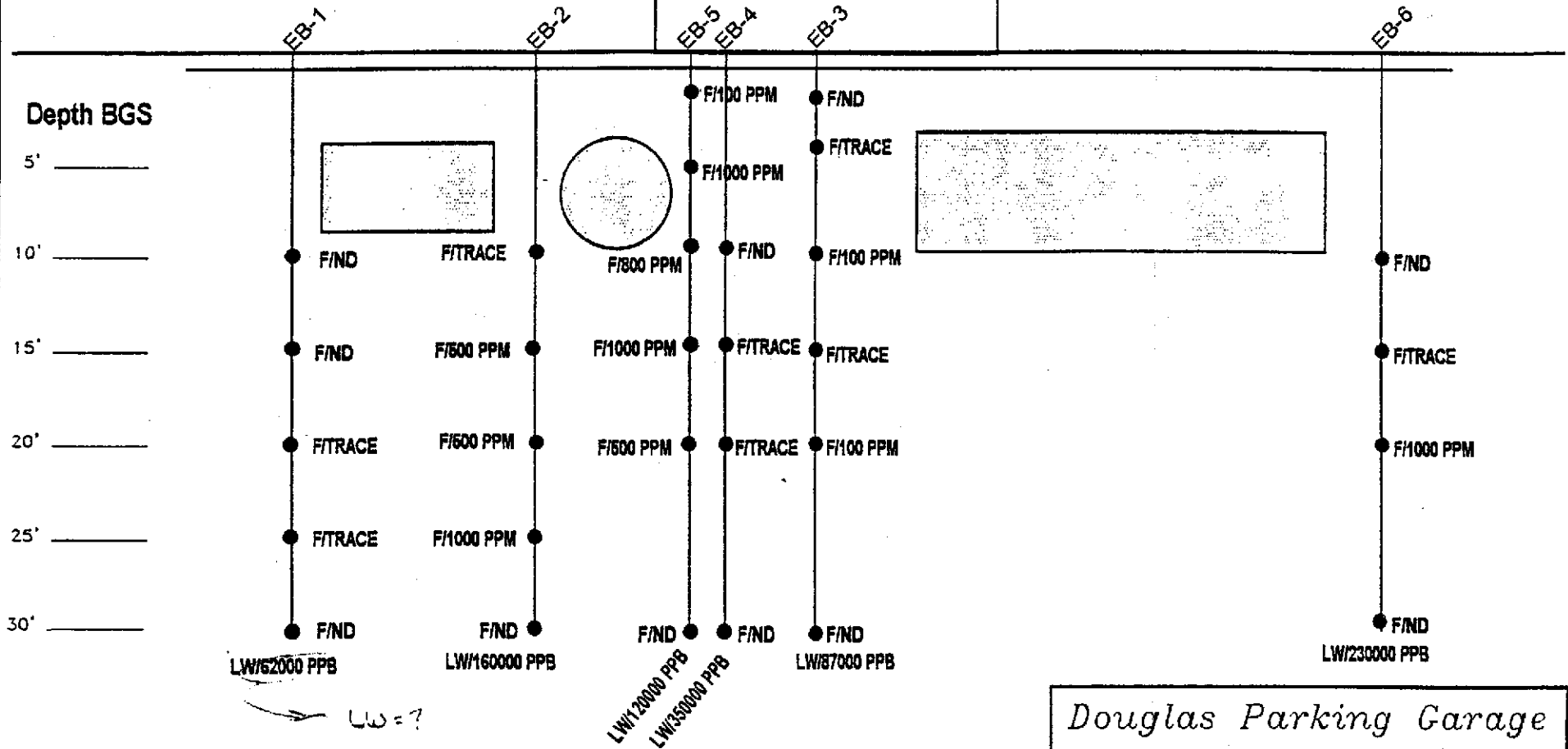


Douglas Parking Garage 1721 Webster Street, Oakland, CA	
Figure 1-A	Exploratory Boring Locations
Scale: 1" = 10 ft.	Date: July 19, 1994

# Douglas Parking

Garage Entrance

Webster Street



Douglas Parking Garage  
1721 Webster Street, Oakland, CA

Exploratory Boring  
Soil Sampling Results

Figure 2-A

July 19, 1994

**Table 1. Soil Analytic Data - Douglas Parking Company, 1721 Webster Street, Oakland, California**

Boring/Well ID	Date	Sample Depth (ft)	TPHg	Benzene	(concentrations in mg/kg)			Xylenes	Notes
					Toluene	Ethylbenzene			
SB-A	02/22/96	19.5	nd	nd	0.007	nd	nd		
SB-B	02/22/96	20.5	580	nd	1.3	1.8	4.2	b,d	
SB-C	02/22/96	19.5	1.4	nd	0.013	0.027	0.12	b,d	
SB-D	02/22/96	20.5	660	nd	2.3	nd	5.2	d	
SB-E	02/23/96	20.5	nd	nd	0.009	nd	nd		
SB-F	02/23/96	20.0	nd	nd	0.006	nd	nd		
SB-G	02/23/96	20.0	nd	nd	0.009	nd	nd		
SB-H	05/03/96	20.5	1.2	nd	0.006	0.025	0.038	b,d	
(MW-4)	05/03/96	31.0	nd	nd	nd	nd	nd		
SB-I	05/03/96	15.5	nd	nd	nd	nd	nd		
(MW-5)	05/03/96	26.0	nd	nd	nd	nd	nd		

**Notes and Abbreviations**

a - Unmodified or weakly modified gasoline is significant

b - Analytic laboratory reports that heavier gasoline range compounds are significant (possible aged gasoline)

c - Analytic laboratory reports that lighter gasoline range compounds (the most mobile fraction) are significant

d - Analytic laboratory reports that gasoline range compounds having broad chromatographic peaks are significant; possible biologically altered gasoline

e - One to a few isolated peaks present

TPHg = Total petroleum hydrocarbons as gasoline per Modified EPA Method 8015.

**ATTACHMENT B**

Soil Boring Logs and Well Construction Details



Project No. 9432 Boring/Well No. EB-1  
 Client: Douglas Parking Date Drilled: July 8, 1994  
 Location: 1721 Webster St., Oakland, CA Logged by: EL  
 Drilling Method: Hollowstem Permit: Zone 7 borings  
 Water Levels: 1st Enc: 24' Static: 21.5'

Borehole Completion  
 Well Installed: No  
 Total Depth: 30.5 feet  
 Grout Seal: 30' to surface

Sample No.	Blow Count	Depth	Lithology Log	Well Detail/Backfill
			Concrete and subgrade	
EB-1 @ 5'	grab	5	SM - Silty SAND, very dark grayish brown 10YR(3/2), up to 5% fine gravel to coarse sand, drills dense, damp.  color change to dark yellowish brown 10YR4/6, 15% clay, 20% silt, drills dense, damp.  driller calls change at 8 feet.	
EB-1 @ 10'	50 for 6"	10	CL - Sandy CLAY, dark yellowish brown 10YR(4/6), 15% silt 25% sand, low-med. plasticity, rare burrows, oxidation mottling, hard, damp.	
EB-1 @ 15'	82	15	SP - SAND, light olive brown 2.5Y(5/4), very fine to med. grained, very dense, damp to moist.	
EB-1 @ 20'	50 for 6"	20	color change to dark greenish gray discoloration 2.5Y(5/4), slight petroleum odor, very dense, moist.  driller calls water at 24 feet.	
EB-1 @ 25'	60	25	same as above, sheen on water, very dense, saturated.	
EB-1 @ 30'	24/50 for 6"	30	same as above, flowing conditions.  CL - Silty CLAY, light olive brown 2.5Y(5/4), 15% silt, 20% fine to med grained sand, low-med. plasticity, contaminants not observed, hard, damp.	
			Bottom of Boring = 30.5 feet, sand flows into lower 0.5 feet.	

QUMP CEL 126 2

Project No. 9432 Boring/Well No. EB-2  
 Client: Douglas Parking Date Drilled: July 8, 1994  
 Location: 1721 Webster St., Oakland, CA Logged by: EL  
 Drilling Method: Hollowstem Permit: Zone 7 borings  
 Water Levels: 1st Enc: 24' Static: 22'

Borehole Completion  
 Well Installed: No  
 Total Depth: 30'  
 Cement Grout Seal: 27' to surface

Sample No.	Blow Han	Count	Sample	Depth	Lithology Log	Well Detail/ Backfill
EB-2 @ 5'	-	grab	⊗	5	Concrete and subgrade	
EB-2 @ 10'	-	83	▨	10	GW - Artificial FILL, base material.	
EB-2 @ 15'	500 ppm	22/50 for 8"	▨	15	artificial fill, dense, damp.	
EB-2 @ 20'	500+ ppm	17/50 for 3"	▨	20	SP - SAND, light olive brown 2.5Y(5/4), rare burrows or root holes, petroleum odor, very dense, damp.	
EB-2 @ 25'	1000 ppm	59	▨	25	same as above, very dense, moist.	
EB-2 @ 30'	-	63	▨	30	same as above, color change to dark greenish gray 5GY(4/1), strong petroleum odor, dense, saturated.	
					flowing conditions, clay on drill bit when withdrawn from borehole.	
					Bottom of Boring = 30 feet, flowing sand fills lower 3 feet	
					Han- hanby Field Analytical Chemical colormetric Test for petroleum hydrocarbons in parts per million.	
					CAMP CEG1262	

Project No. 9432 Boring/Well No. EB-3  
 Client: Douglas Parking Date Drilled: July 8, 1994  
 Location: 1721 Webster St., Oakland, CA Logged by: EL  
 Drilling Method: Hollowstem Permit: Zone 7 borings  
 Water Levels: 1st Enc: 24' Static: 22'

Borehole Completion  
 Well Installed: No  
 Total Depth: 30'  
 Cement Grout Seal: 26' to surface

Sample No.	Blow Han	Count	Sample	Depth	Lithology Log	Well Detail/ Backfill
					Concrete and subgrade	
EB-3 @ 5'	-	grab	⊗	5	CL - Sandy CLAY, olive 5Y(4/4), low plasticity, slight petroleum odor, drills soft, damp.	
EB-3 @ 10'	-	46	▨	10	sand interbed, 1.5' thick, slight petroleum odor,	
EB-3 @ 15'	-	54	▨	15	SP - SAND, dark yellowish brown 10YR(4/6), fine to med. grained, fines < 5%, dense, moist.	
EB-3 @ 20'	100 ppm	76	▨	20	same as above, moderate petroleum odor, dense, moist.	
EB-3 @ 25'	-	70	▨	25	same as above, sheen on water, very dense, saturated.	
EB-3 @ 30'	-	53	▨	30	CL - Silty CLAY, light olive brown 2.5Y(5/4), 40% silt, < 5% sand, med. plasticity, laminated, some burrows, hard, damp.	
					Bottom of Boring = 30 feet, flowing sand fills lower 4 feet	
					Han- Hanby Field Analytical Chemical Colormetric Test for petroleum hydrocarbons in parts per million.	
					QUMD CCL 1262	

Project No. 9432 Boring/Well No. EB-4  
 Client: Douglas Parking Date Drilled: July 8, 1994  
 Location: 1721 Webster St., Oakland, CA Logged by: EL  
 Drilling Method: Hollowstem Permit: Zone 7 borings  
 Water Levels: 1st Enc: 24' Static: 20'

Borehole Completion  
 Well Installed: No  
 Total Depth: 30'  
 Cement Grout Seal: 29' to surface

Sample No.	OV	Blow Count	Sample	Depth	Lithology Log	Well Detail/Backfill
					Concrete and subgrade	
EB-4 @ 5'	-	grab	⊗	5	SC-CL - Clayey SAND to Sandy CLAY, dark yellowish brown 10YR(4/3), 30-55% fine sand, low plasticity, rare burrows, drills dense to hard, damp.	
EB-4 @ 10'	-	29/50 for 2'	▨	10	same as above but sand content increasing, very dense, damp.	
EB-4 @ 15'	-	24/50 for 5'	▨	15	SP - SAND, olive brown 2.5Y(4/4) to greenish gray 5GY(5/1), fine to medium grained, <5% fines, very dense, damp to slightly moist.	
EB-4 @ 20'	-	51	▨	20	same as above, dense, slightly moist to moist.	▼
EB-4 @ 25'	-	65	▨	25	same as above, dense, saturated.	▼
EB-4 @ 30'	-	26	▨	30	CL - Silty CLAY, light greenish brown, 5Y(4/2), laminated, <15% fine sand, 20% silt, low to med. plasticity, few burrows, oxidized mottles, very stiff, damp.	
					Bottom of Boring = 30 feet, flowing sand fills lower 1 foot.	
					EMP CEG 126 L	

Project No. 9432 Boring/Well No. EB-5  
 Client: Douglas Parking Date Drilled: July 8, 1994  
 Location: 1721 Webster St., Oakland, CA Logged by: EL  
 Drilling Method: Hollowstem Permit: Zone 7 borings  
 Water Levels: 1st Enc: 24' Static: 18'

Borehole Completion  
 Well Installed: No  
 Total Depth: 30'  
 Cement Grout Seal: 29' to surface

Sample No.	Blow Han Count	Sample	Depth	Lithology Log	Well Detail/Backfill
				Concrete and subgrade	
EB-5 @ 5'	1000 ppm	grab	5	CL - Sandy CLAY, dark yellowish brown 10YR(3/6), 15% silt, 20% sand, low to med. plasticity, drills firm, damp.  same as above, moderate petroleum odor, damp.	
EB-5 @ 10'	800 ppm	50	10	same as above, 15% coarse sand, hard, slightly moist.	
EB-5 @ 15'	1000 ppm	80 for 6"	15	SP - SAND, olive brown 2.5Y(4/4), fine to medium grained, strong petroleum odor, very dense, moist.	
EB-5 @ 20'	500 ppm	24/50 for 5"	20	same as above, dark greenish gray 5GY(4/2), clay up to 35% disseminated, very dense, moist.	
EB-5 @ 25'	-	33	25	same as above, clay <5%, strong petroleum hydrocarbon, dense, saturated.	
EB-5 @ 30'	-	32	30	CL - Silty CLAY, light olive brown 5Y(6/2), 30% silt, med. to highly plastic, hard, damp.	
				Bottom of Boring = 30 feet, flowing sand fills lower 1 foot	
				Han- Hanby Field Analytical Chemical Colormetric Test for petroleum hydrocarbons in parts per million.	
				(11/11) CEG 1262	

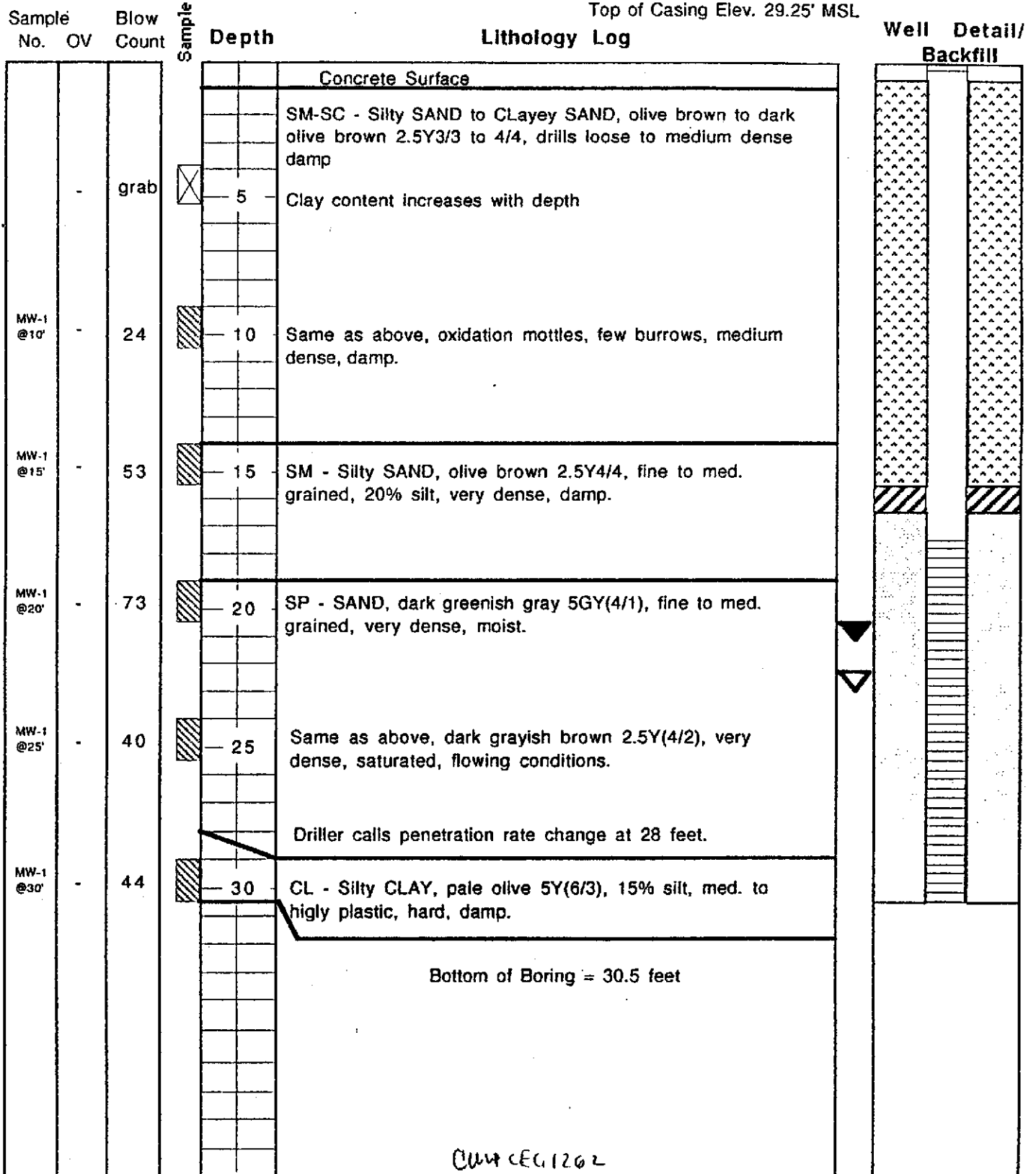
Project No. 9432 Boring/Well No. EB-6  
 Client: Douglas Parking Date Drilled: July 8, 1994  
 Location: 1721 Webster St., Oakland, CA Logged by: EL  
 Drilling Method: Hollowstem Permit: Zone 7 borings  
 Water Levels: 1st Enc: 24' Static: 21.50'

Borehole Completion  
 Well Installed: No  
 Total Depth: 30'  
 Cement Grout Seal: 28' to surface

Sample No.	Blow Han	Count	Sample	Depth	Lithology Log	Well Detail/Backfill
EB-6 @ 5'	-	grab	⊗	5	Concrete and subgrade	
EB-6 @ 10'	-	42/50 for 3"	▨	10	CL - Sandy CLAY, dark yellowish brown 10YR(4/4), 35% sand, med. plasticity, drills firm, damp.	
EB-6 @ 15'	-	50	▨	15	SP - SAND, olive 5Y(4/3), fine to med. grained, slight petroleum odor, dense to very dense, damp.	
EB-6 @ 20'	1000 ppm	57/50 for 5"	▨	20	same as above, stained dark bluish gray, strong petroleum odor, very dense, moist.	
EB-6 @ 25'	-	48	▨	25	same as above, strong petroleum odor, dense, saturated, flowing conditions.	▼
EB-6 @ 30'	-	51	▨	30	CL - Silty CLAY, pale olive, 5Y(6/3), laminated, 15% silt, highly plastic, hard, damp.	▼
					Bottom of Boring = 30 feet, flowing sand fills lower 2 feet	
					Han-Hanby Field Analytical Chemical Colometric Test for petroleum hydrocarbons in parts per million.	
					UMP REG 1262	

Project No. 9432 Boring/Well No. MW-1  
 Client: Douglas Parking Date Drilled: Sept. 8, 1994  
 Location: 1721 Webster St., Oakland, CA Logged by: EL  
 Drilling Method: Hollowstem Permit: Zone 7 #94501  
 Water Levels: 1st Enc: 23' Static: 21.7

**Borehole Completion**  
 Well Installed: 2" dia. Sch 40 PVC  
 Total Depth: 30.5' Casing Depth: 30.5'  
 Screen Length: 10' 0.020" Blank Length: 20.5'  
 Top Sand Pack: 16.5' Top Bentonite: 15.5'  
 Grout Seal: 15.5" to 0.5' vault box  
 Top of Casing Elev. 29.25' MSL



Project No. 9432 Boring/Well No. MW-2  
 Client: Douglas Parking Date Drilled: Sept. 8, 1994  
 Location: 1721 Webster St., Oakland, CA Logged by: EL  
 Drilling Method: Hollowstem Permit: Zone 7 #94501  
 Water Levels: 1st Enc: 24' Static: 20.1'

Borehole Completion  
 Well Installed: 2" dia. Sch 40 PVC  
 Total Depth: 30.5 Casing Depth: 29.5  
 Screen Length: 10' 0.020" Blank Length: 19.5  
 Top Sand Pack: 18.5' Top Bentonite: 17.5'  
 Grout Seal: 17.5' to 0.5' vault box  
 Top of Casing Elev. 27.10' MSL

Sample No.	Blow Han	Count	Sample	Depth	Lithology Log	Well Detail/Backfill
					Concrete	
MW-2 @5'	-	grab	⊗	5	SM - Silty SAND, very dark grayish brown 2.5Y(3/2), sand med. to fine grained, 15% silt, drills loose, damp.	
MW-2 @10'	-	27	▨	10	SC - Clayey SAND, 10YR (4/3), clay 35-40%, silt 10% fines show low plasticity, medium dense, moist.	
					SM - Silty SAND, light olive brown 2.5Y(4/4), 15-20% silt, dense, moist.	
MW-2 @15'	500 ppm	31	▨	15	SP - SAND, dark grayish brown, 5GY (4/1), silt < 5%, petroleum odor, dense, moist.	
MW-2 @20'	-	34	▨	20	Same as above, dense, moist.	
MW-2 @25'	-	38	▨	25	Same as above, dense nearly saturated.	
MW-2 @30'	-	44	▨	30	Same as above, dense nearly saturated, flowing conditions.	
					CL - Silty CLAY, pale olive brown, 5Y(6/3), 20% silt, highly plastic, hard, damp.	
					Bottom of Boring = 30.5 feet	
					Han- Hanby Field Analytical Chemical Colometric Test, in parts per million	
					GWMP CEG 1262	



Project No. 9432 Boring/Well No. MW-3  
 Client: Douglas Parking Date Drilled: Sept. 8, 1994  
 Location: 1721 Webster St., Oakland, CA Logged by: EL  
 Drilling Method: Hollowstem Permit: Zone 7 #94501  
 Water Levels: 1st Enc: 28.20' Static: 21.60'

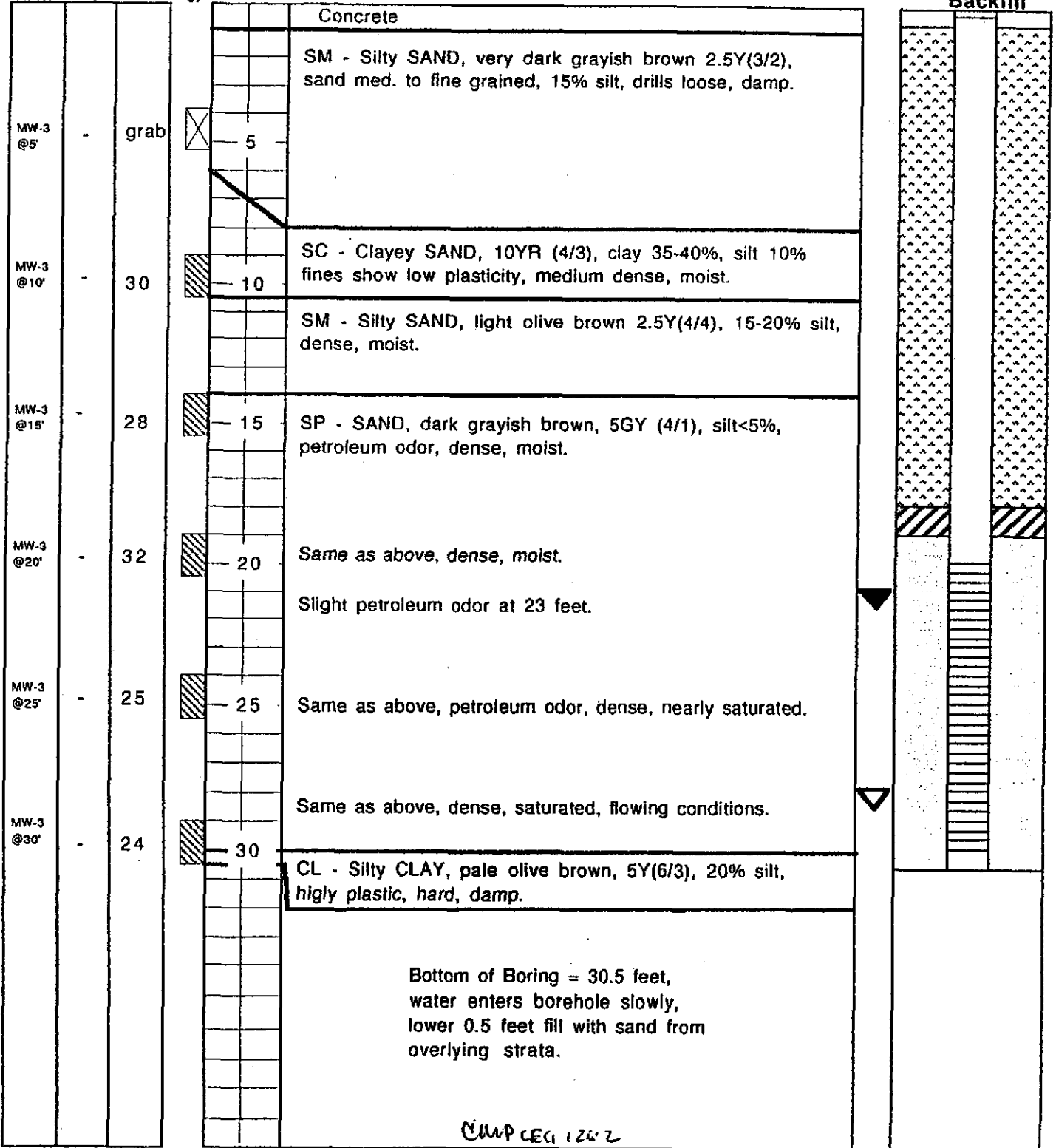
Borehole Completion  
 Well Installed: 2" dia. Sch 40 PVC  
 Total Depth: 30.5' Casing Depth: 30'  
 Screen Length: 10' 0.020" Blank Length: 20'  
 Top Sand Pack: 19' Top Bentonite: 18'  
 Grout Seal: 18' to 0.5' vault box  
 Top of Casing Elev. 29.50' MSL

Sample Blow  
 No. OV Count

Sample Depth

Lithology Log

Well Detail/  
 Backfill



**BORING LOG**

Client: **Douglas Parking Company**

Project No: **58-197**

Phase

Task **02**

Boring ID

**SB-A**

Location **1721 Webster Street**

Surface Elev. **NA ft,**

Page **1** of **1**

Depth Feet	Blow Count	Sample Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth Feet	Additional Comments
0	Ground Surface		<b>ASPHALT</b>				0	
5			<b>Silty SAND; (SM);</b> grey to brown; damp to moist; 30% silt, 70% fine to medium grained sand; moderate estimated permeability				5	
10							10	
15			<b>SAND; (SP);</b> grey to brown; moist; 10% silt, 90% medium grained sand; high estimated permeability				15	
20				nd			20	
25							25	Bottom of boring
30							30	

Driller **Vironex**

Drilling Started **2/22/96**

Notes: **Webster Street in #4 lane**

Logged By **JME**

Drilling Completed **2/22/96**

**near site entrance**

Water-Bearing Zones **NA**

Grout Type **Portland Type I/II**

**BORING LOG**

Client: **Douglas Parking Company**

Project No: **58-197**

Phase

Task **02**




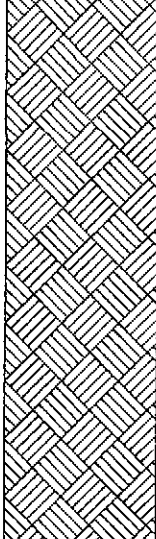
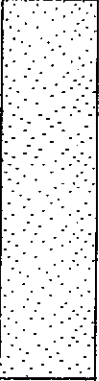
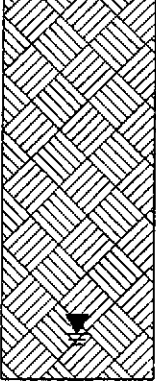

Boring ID

**SB-B**

Location **1721 Webster Street**

Surface Elev. **NA ft,**

Page **1** of **1**

Depth Feet	Blow Count	Sample Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth Feet	Additional Comments
0	Ground Surface						0	
			<b>ASPHALT</b>					
			<b>Silty SAND: (SM); brown; damp; 30% silt, 70% fine to medium grained sand; moderate estimated permeability</b>					
5							5	
			moist					
10							10	
			<b>SAND: (SP); brown; damp; 10% silt, 90% medium grained sand; high estimated permeability</b>					
15							15	
			grey; wet					
20				580.00			20	
								Bottom of boring
25							25	
30							30	

Driller <b>Vironex</b>	Drilling Started <b>2/22/96</b>	Notes: <b>Webster Street in #2 lane</b>
Logged By <b>JME</b>	Drilling Completed <b>2/22/96</b>	<b>near site entrance</b>
Water-Bearing Zones <b>NA</b>	Grout Type <b>Portland Type I/II</b>	

BOR 58197 5/21/96

**BORING LOG**

Boring ID

**SB-C**

Client: **Douglas Parking Company**

Location **1721 Webster Street**

Project No: **58-197**

Phase

Task **02**

Surface Elev. **NA** ft,

Page **1** of **1**

Depth Feet	Blow Count	Sample Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth Feet	Additional Comments
0	Ground Surface		<b>ASPHALT</b>				0	
5			<b>Silty SAND; (SM);</b> brown; moist; 30% silt, 70% fine to medium grained sand; moderate estimated permeability				5	
10			wet				10	
15			<b>SAND; (SP);</b> brown; moist; 10% silt, 90% medium grained sand; high estimated permeability				15	
20			grey; wet	1.40			20	
25							25	
30							30	Bottom of boring

Driller <b>Vironex</b>	Drilling Started <b>2/22/96</b>	Notes: <b>Webster Street in #4 lane,</b>
Logged By <b>JME</b>	Drilling Completed <b>2/22/96</b>	<b>34' northeast of MW-2</b>
Water-Bearing Zones <b>NA</b>	Grout Type <b>Portland Type I/II</b>	

BOR 58197 5/21/96

**BORING LOG**

Client: **Douglas Parking Company**

Project No: **58-197**

Phase

Task **02**

Boring ID

**SB-D**

Location **1721 Webster Street**

Surface Elev. **NA ft,**

Page **1** of **1**

Depth Feet	Blow Count	Sample Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth Feet	Additional Comments
0	Ground Surface		<b>ASPHALT</b>				0	
5			<b>Silty SAND; (SM); brown; damp; 30% silt, 70% fine to medium grained sand; moderate estimated permeability</b>				5	
10							10	
15			<b>SAND; (SP); brown; damp; 10% silt, 90% medium grained sand; high estimated permeability</b>				15	
20			grey; wet	560.00			20	
25							25	
30							30	Bottom of boring

Driller **Vironex**

Drilling Started **2/22/96**

Notes: **Webster Street in #4 lane,**

Logged By **JME**

Drilling Completed **2/22/96**

**62' northeast of MW-2**

Water-Bearing Zones **NA**

Grout Type **Portland Type I/II**

**BORING LOG**

Client: **Douglas Parking Company**

Project No: **58-197**

Phase

Task **02**

Boring ID

**SB-E**

Location **1721 Webster Street**

Surface Elev. **NA** ft,

Page **1** of **1**

Depth Feet	Blow Count	Sample Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth Feet	Additional Comments
0			Ground Surface				0	
			ASPHALT					
5			<b>Silty SAND:</b> (SM); brown; damp; 30% silt, 70% fine to medium grained sand; moderate estimated permeability				5	
10							10	
15			<b>SAND:</b> (SP); brown; damp; 10% silt, 90% medium grained sand; high estimated permeability				15	
20			grey; wet	nd			20	
25							25	Bottom of boring
30							30	

Driller **Vironex**

Drilling Started **2/23/96**

Notes: **Webster Street in #4 lane,**

Logged By **JME**

Drilling Completed **2/23/96**

**62' northeast of MW-2**

Water-Bearing Zones **NA**

Grout Type **Portland Type I/II**

**BORING LOG**

Boring ID

**SB-F**

Client: **Douglas Parking Company**

Location **1721 Webster Street**

Project No: **58-197**

Phase

Task **02**

Surface Elev. **NA ft,**

Page **1** of **1**

Depth Feet	Blow Count	Sample Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth Feet	Additional Comments
0	Ground Surface		ASPHALT				0	
5			<b>Silty SAND:</b> (SM); brown; moist; 30% silt, 70% fine to medium grained sand; moderate estimated permeability				5	
10							10	
15			<b>SAND:</b> (SP); brown; moist; 10% silt, 90% medium grained sand; high estimated permeability				15	
20			wet	nd			20	
25							25	Bottom of boring
30							30	

Driller **Vironex**

Drilling Started **2/23/96**

Notes: **Webster Street in #2 lane**

Logged By **JME**

Drilling Completed **2/23/96**

**near 17th Street crosswalk**

Water-Bearing Zones **NA**

Grout Type **Portland Type I/II**

BORING LOG				Boring ID		SB-G		
Client: <b>Douglas Parking Company</b>				Location <b>1721 Webster Street</b>		Page <b>1</b> of <b>1</b>		
Project No: <b>58-197</b>		Phase	Task <b>02</b>	Surface Elev. <b>NA</b> ft.				
Depth Feet	Blow Count	Sample Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Boring Completion Graphics	Depth Feet	Additional Comments
0	Ground Surface		ASPHALT				0	
5			<b>Silty SAND; (SM); brown; damp; 20% silt, 80% fine to medium grained sand; moderate to high estimated permeability</b>				5	
10			<b>SAND; (SP); brown; moist; 10% silt, 90% medium grained sand; high estimated permeability</b>				10	
15			wet				15	
20			wet	nd			20	
25							25	Bottom of boring
30							30	

Driller <u>Vironex</u>	Drilling Started <u>2/23/96</u>	Notes: <u>Webster Street in #4 lane</u>
Logged By <u>JME</u>	Drilling Completed <u>2/23/96</u>	<u>near 19th Street crosswalk</u>
Water-Bearing Zones <u>NA</u>	Grout Type <u>Portland Type I/II</u>	



**DRILLING LOG**

Client: **Douglas Parking Company**

Project No: **58-197**

Phase

Task02

Well ID **MW-4**

Boring ID

**SB-H**

Location **1721 Webster Street**

Surface Elev. **25.64 ft.**

Page **1** of **1**

Depth (feet)	Blow Count	Sample Interval	Lithologic Description	TPH <sub>g</sub> (ppm)	Graphic Log	Well Construction Graphics	Depth (feet)	Well Construction Details
0	Ground Surface		<b>ASPHALT</b> <b>CONCRETE</b>				0	T.O.C. Elev. 25.29
5			<b>FILL</b> : (ML); light brown; damp; 10% clay, 60% silt, 30% fine to medium grained sand; low plasticity; low estimated permeability				5	
10	2 4 11		<b>Silty SAND</b> : (SM); brown; medium dense; damp; 30% silt, 70% fine to medium grained sand; moderate estimated permeability				10	
15	6 11		<b>SAND</b> : (SP); brown; medium dense; damp; 5% silt, 95% medium grained sand; high estimated permeability				15	
20	12 24		grey; wet	1			20	
25	3 6		loose				25	
30	6 12 10		<b>Clayey SILT</b> : (ML); grey; very stiff; wet; 20% clay, 50% silt, 30% medium grained sand; medium plasticity; low estimated permeability	nd			30	
35							35	Bottom of well

Driller **SES, Inc.**  
 Logged By **JME**  
 Drilling Started **5/3/96**  
 Drilling Completed **5/3/96**  
 Construction Completed **5/3/96**  
 Development Completed **5/6/96**  
 Water Bearing Zones **NA**

Development Yield **010**  
 Well Casing **0.39 gpm/Dia. 0'** to **15'**  
 Casing Type **Schedule 40 PVC**  
 Well Screen **2"** Dia. **15'** to **30'**  
 Screen Type **Schedule 40 PVC**  
 Slot Size **0.010"**  
 Drilling Mud **NA**  
 Grout Type **Portland Type I/II**

Bentonite Seal **8' to 9'**  
 Sand Pack **Monterey Sand**  
 Sand Pack Type **#2/16**  
 Static Water Level **16.98** ft Depth  
 Date **5/10/96**  
 Notes: **Webster Street in #1 lane**  
**62' northeast of MW-2**

**DRILLING LOG**

Client: **Douglas Parking Company**

Project No: **58-197**

Phase

Task02

Well ID **MW-5**

Boring ID

**SB-I**

Location **1721 Webster Street**

Surface Elev. **22.22 ft.**

Page **1** of **1**

Depth (feet)	Blow Count	Sample Interval	Lithologic Description	TPHg (ppm)	Graphic Log	Well Construction Graphics	Depth (feet)	Well Construction Details
0	Ground Surface						0	T.O.C. Elev. 21.97
0-1			ASPHALT					
1-2			CONCRETE					
2-5			FILL: (ML); light brown; damp; 10% clay, 60% silt, 30% fine to medium grained sand; low plasticity; low estimated permeability				5	
5-10			SAND: (SP); brown; very dense; damp; 6% silt, 95% fine to medium grained sand; high estimated permeability				10	
10-15	6 26 26						15	
15-20	8 26 28		moist to wet	nd			20	
20-25	3 4 4						25	
25-28	6 10 18		Clayey SILT: (ML); grey to brown; medium stiff; wet; 20% clay; 50% silt, 30% medium grained sand; medium plasticity; low estimated permeability	nd			30	Bottom of well

Driller <b>SES, Inc.</b>	Development Yield <b>010</b>	Bentonite Seal <b>8' to 9'</b>
Logged By <b>JME</b>	Well Casing <b>0.52 gpmDia. 0' to 10'</b>	Sand Pack <b>Monterey Sand</b>
Drilling Started <b>5/3/96</b>	Casing Type <b>Schedule 40 PVC</b>	Sand Pack Type <b>#2/16</b>
Drilling Completed <b>5/3/96</b>	Well Screen <b>2" Dia. 10' to 25'</b>	Static Water Level <b>14.60</b> ft Depth
Construction Completed <b>5/3/96</b>	Screen Type <b>Schedule 40 PVC</b>	Date <b>5/10/96</b>
Development Completed <b>5/6/96</b>	Slot Size <b>0.010"</b>	Notes: <b>Webster Street in #4 lane near 19th Street crosswalk</b>
Water Bearing Zones <b>NA</b>	Drilling Mud <b>NA</b>	
	Grout Type <b>Portland Type I/II</b>	

WELL 58197 6/27/96