DRILLING COMPANY: Hokkaido D&B, Inc.
DRILLING METHOD: Speed Star 15, 6 in. Air Rotary
SURFACE ELEVATION: ± Feet

LOCATION: East Portal
DATE COMPLETED: 5/13/98
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES
0		SM								3-ft stickup monument. Cement surface seal.
5			Grayish brown, gravelly, silty, fine to medium SAND, moist.		S-1					
10					S-2					Bentonite seal.
15			Decrease in silt and gravel content.		S-3					
20		SP SM	Gray-brown, fine, silty SAND, moist.		S-4					
25			Increase in medium sand content, addition of trace gravel.		S-5					
		SM	Brown-gray, gravelly, silty, fine to medium SAND, moist.		S-6					
30										6-in ID, steel casing in native formation.
35			Becomes gray.		S-7					
40					S-8					

DRAFT

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract A
Seattle, Washington

PUMPING WELL: PW-4

PAGE: 1 of 2

H.1-B1

PROJECT NO.: 97061

FIGURE: 3

PWELL 97061 8/27/98

DRILLING COMPANY: Hokkaido D&B, Inc.
DRILLING METHOD: Speed Star 15, 6 in. Air Rotary
SURFACE ELEVATION: ± Feet

DATE COMPLETED: 5/13/98
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH
40											40
45		ML	Gray, sandy SILT with trace gravel, moist.								45
		GM	Driller added water. Gray, silty, sandy GRAVEL		S-9, S-10						
50					S-11					5-ft of stainless steel, wire wrapped, 0.060-in screen. Native backfill.	50
					S-12						
55		GW	Gray, sandy GRAVEL, wet, clean.		S-13, S-14, S-15		GS, GS				55
60			Bottom of boring at 56.5 ft.								60
65											65
70											70
75											75
80											80

DRAFT

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract A
Seattle, Washington

PUMPING WELL: PW-4

PAGE: 2 of 2

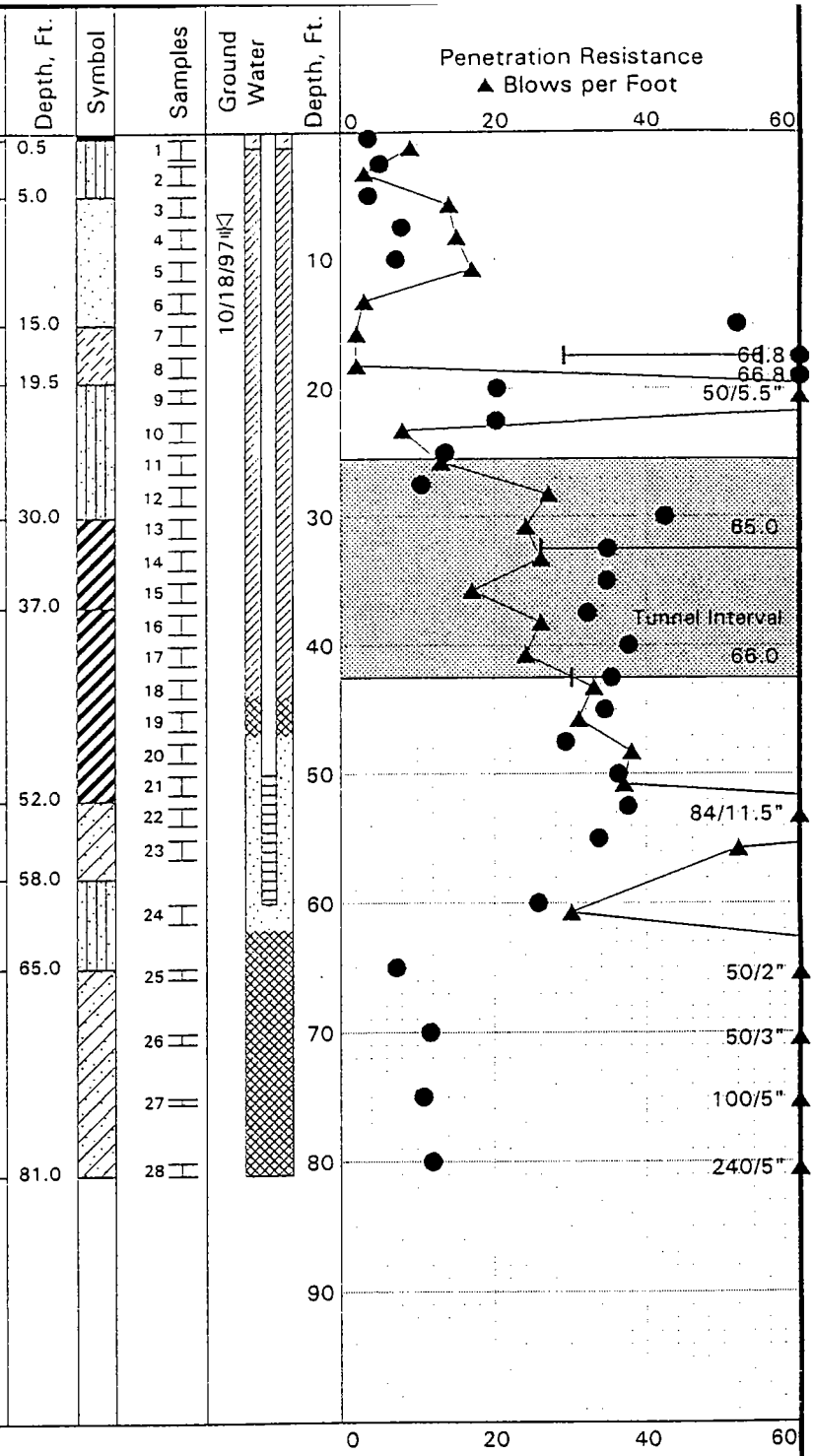
PROJECT NO.: 97061

FIGURE: H.1-B1

SOIL DESCRIPTION Surface Elevation: 116 Feet	Depth, Ft.
Asphalt.	0.5
Very loose to loose, orange-brown, silty fine SAND, trace of medium to coarse sand; dry to moist; (Hf) SM.	5.0
Very loose to medium dense, gray, gravelly SAND, trace of silt; wet; some scattered shell fragments; (Hf) SP.	15.0
Soft, dark gray, sandy, organic silty CLAY; wet; scattered wood debris; (Hm) OH/CH.	19.5
Loose to medium dense, gray to dark gray, slightly silty to silty, gravelly SAND; wet; some scattered shell fragments; (Hb) SM/SP-SM.	30.0
Very stiff, dark gray to gray, silty CLAY; moist; 1/4 to 1/2-inch layers of disturbed sand zones; slickensides; (Disturbed Ql) CH.	37.0
Very stiff to hard, dark gray to gray, silty CLAY; moist some slickensides; (Ql) CH.	52.0
Very dense, gray, slightly gravelly, silty, slightly clayey to clayey SAND to hard, silty CLAY, trace of sand; moist; very disturbed at 55 feet; (Qgm) SC/CH.	58.0
Dense, gray, gravelly, silty fine SAND, trace of clay; wet; (Qgm) SM.	65.0
Very dense, gray, slightly gravelly, silty, slightly clayey to clayey SAND; moist; (Qgm) SC.	81.0

BOTTOM OF BORING
COMPLETED 6/26/97

Groundwater was initially encountered at 7.5 feet during drilling.



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- 3" O.D. Split Spoon Sample
- P Pitcher Barrel Sampler
- G Grab Sample
- Vibrating Wire Piezometer (VWP)
- VWP groundwater level
- Piezometer Screen
- Groundwater Level
- Annular Sealant
- Grout

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit
Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USC letter symbol based on visual classification.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

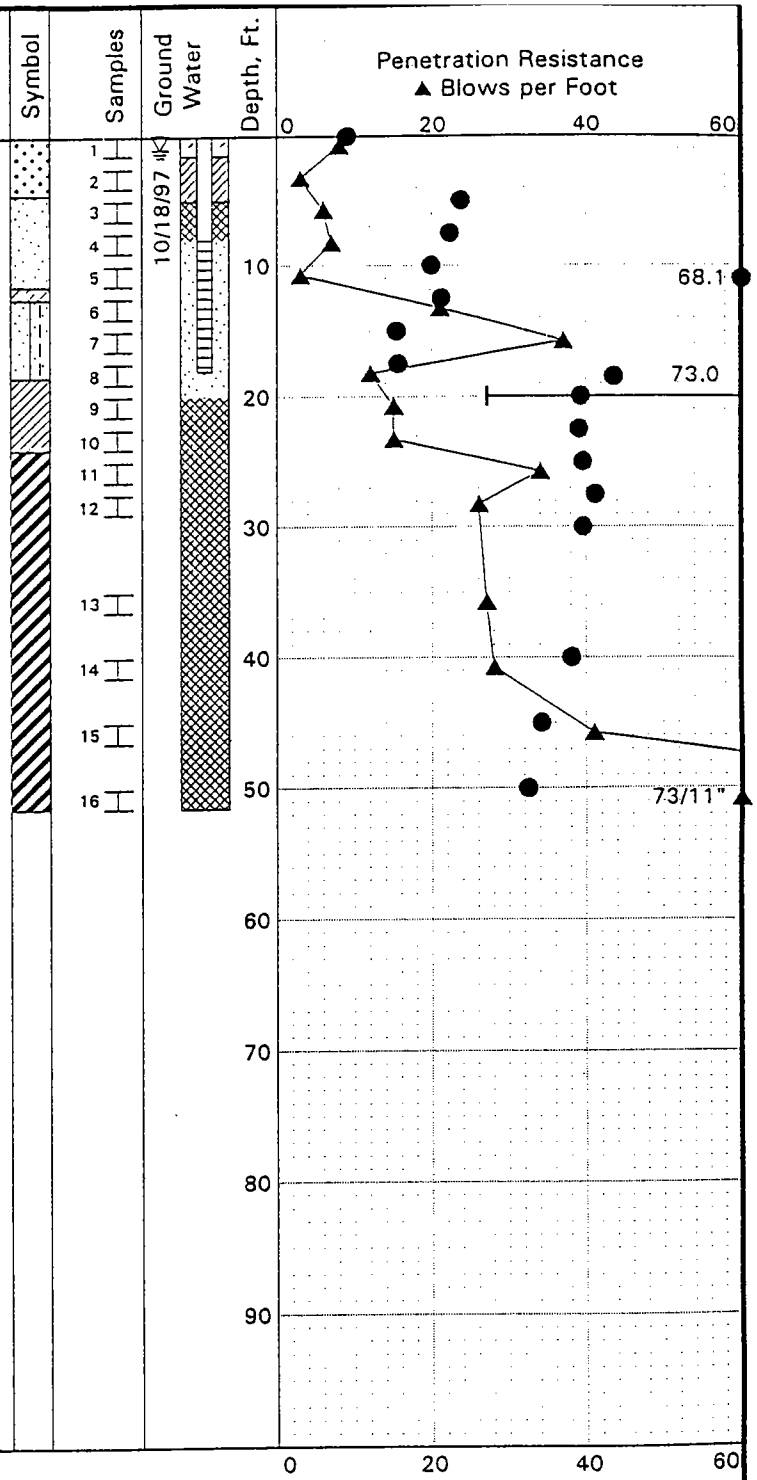
LOG OF BORING CB-1

October 1997 W-7808-11

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-2
Sheet 1 of 1

SOIL DESCRIPTION Surface Elevation: 109 Feet	Depth, Ft.
Very loose to loose, gray-brown, gravelly SAND, trace of silt; wet; scattered roots; (Hf) SW.	4.5
Very loose to loose, fine to medium SAND, trace of coarse sand and gravel; wet; scattered shell fragments and roots; (Hf) SP.	11.5 12.5
Soft, gray, organic silty CLAY; wet; scattered organics; (Hm) OH/CH.	18.5
Medium dense to dense, gray, slightly silty, gravelly SAND; wet; scattered shell fragments; scattered organics to 15 feet; (Hb) SP-SM.	24.0
Stiff to hard, gray, silty CLAY, trace of fine sand; scattered shell fragments; moist to wet; laminated; (Disturbed Ql) CH.	
Stiff to hard, gray, silty CLAY, trace of fine sand; moist; (Ql) CH.	51.5
BOTTOM OF BORING COMPLETED 6/23/97 Groundwater was initially encountered at 5 feet during drilling.	



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- P Pitcher Barrel Sampler
- 3" O.D. Split Spoon Sample
- G Grab Sample
- Vibrating Wire Piezometer (VWP)
- VWP groundwater level
- Piezometer Screen
- Groundwater Level
- Annular Sealant
- Grout

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit

Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USC letter symbol based on visual classification.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF BORING CB-2

October 1997 W-7808-11

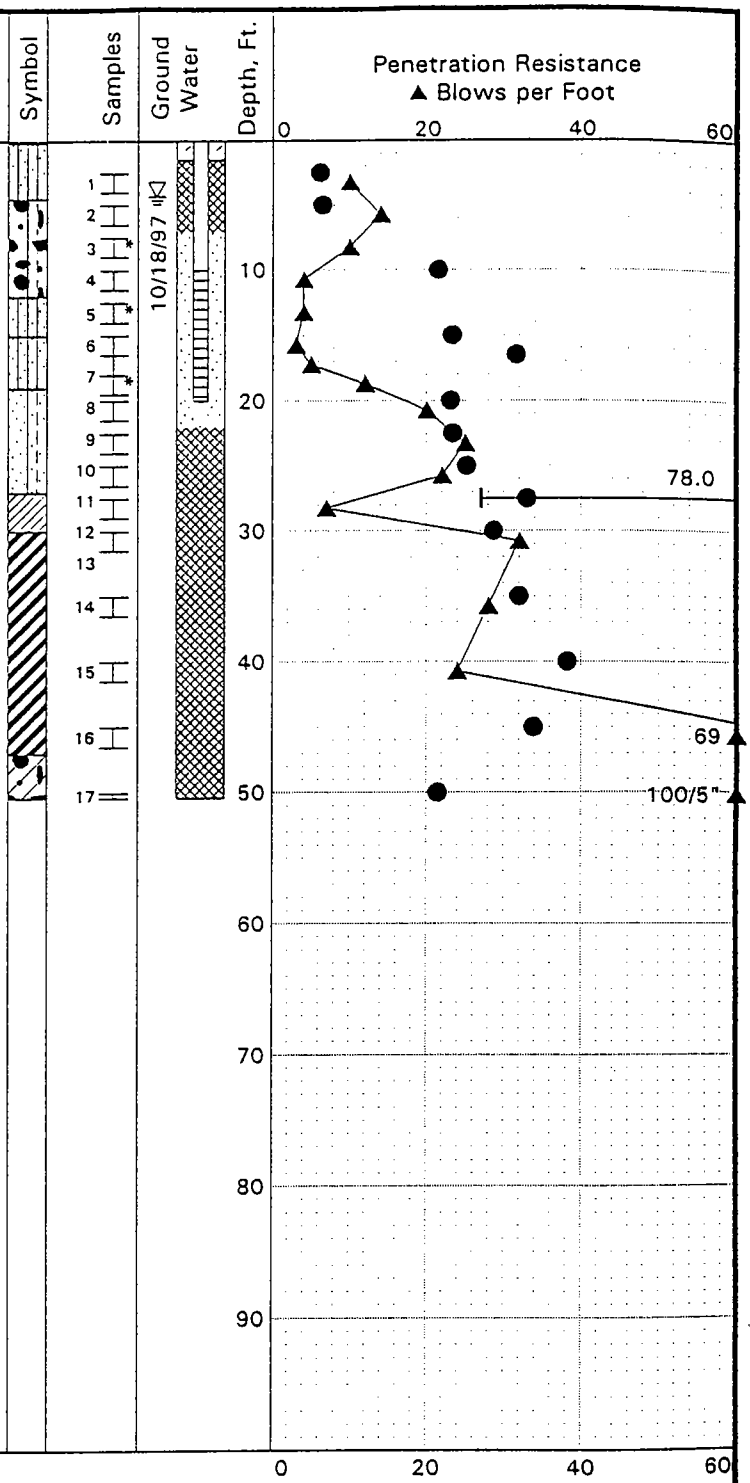
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3

SOIL DESCRIPTION Surface Elevation: 112 Feet	Depth, Ft.
Asphalt.	0.2
Medium dense, brown, silty, gravelly SAND, trace of clay; moist; scattered wood debris; (Hf) SM.	4.5
Medium dense, brown, slightly silty, sandy GRAVEL; wet; (Hf) GP-GM.	12.0
Very loose, gray, silty SAND; wet; scattered wood debris and organics; (Hm) SM.	15.0
Very loose to loose, brown-gray, slighlty silty to silty, slighlty gravelly to gravelly SAND; wet; sand becomes finer with depth; scattered wood debris; (Hb) sm.	19.0
Medium dense, gray, trace to slightly silty, fine SAND; wet; scattered shell fragments, gravel and wood debris; (Hb); SP-SM.	27.0
Medium stiff to hard, gray, silty CLAY; moist; (Disturbed Ql) CH.	30.0
Medium stiff to hard, gray, silty CLAY; moist (Ql) CH.	47.0
Very dense, gray, slightly silty, slightly clayey, sandy GRAVEL; wet; (Qgm); GC.	50.4

BOTTOM OF BORING
COMPLETED 6/24/97

Groundwater was initially encountered at 2 feet during drilling.



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- P Pitcher Barrel Sampler
- 3" O.D. Split Spoon Sample
- G Grab Sample
- Vibrating Wire Piezometer (VWP)
- VWP groundwater level
- Piezometer Screen
- Groundwater Level
- Annular Sealant
- Grout

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit

Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USC letter symbol based on visual classification.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF BORING CB-3

October 1997 W-7808-11

SHANNON & WILSON, INC.
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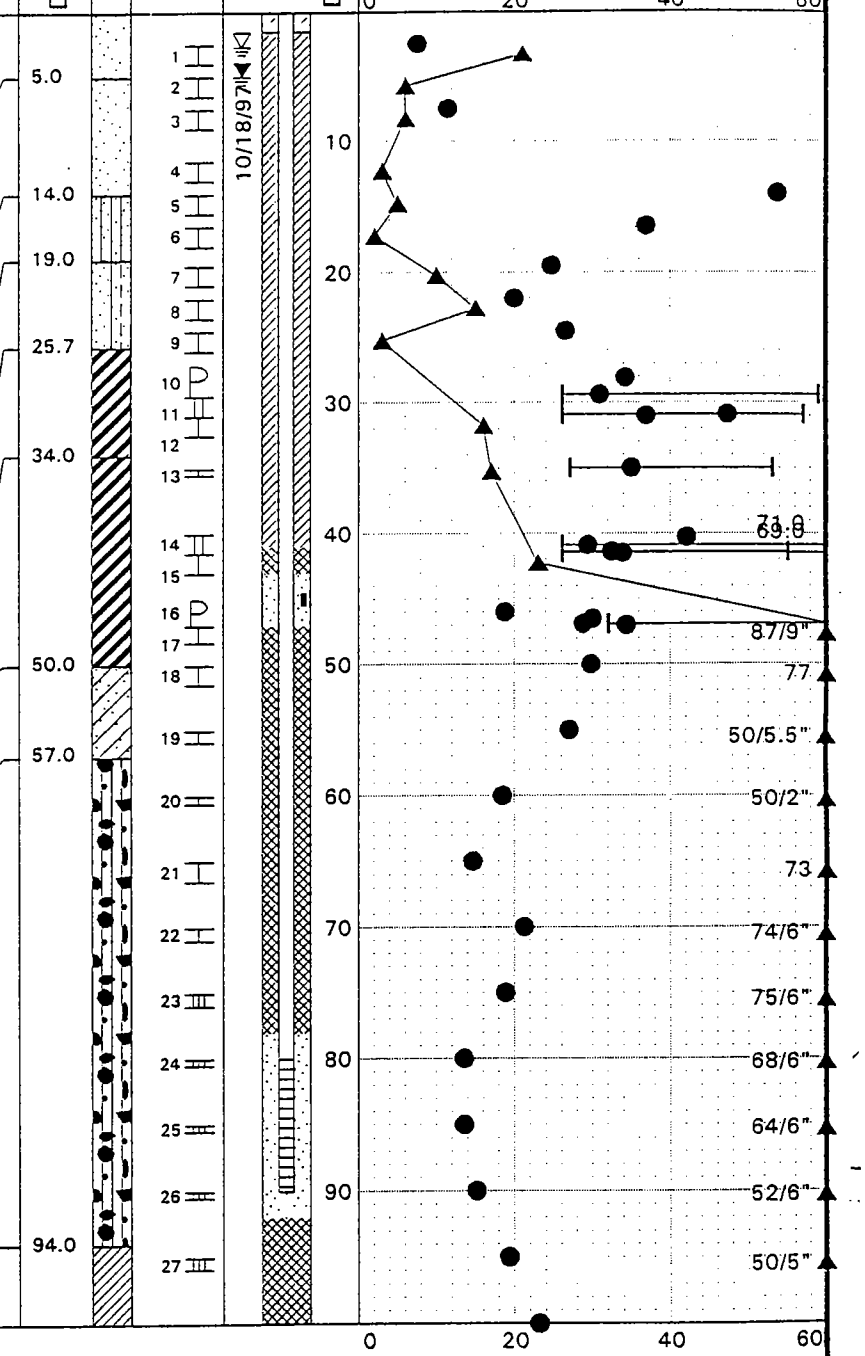
FIG. A-4

SOIL DESCRIPTION Surface Elevation: 111 Feet	Depth, Ft.
Loose to medium dense, gray, gravelly SAND, trace silt; wet; scattered shell fragments; (Hf) SP.	5.0
Very loose to loose, gray, slightly gravelly to gravelly SAND, trace silt; wet; scattered shell fragments; occasional organics; (Hf) SP.	14.0
Very loose to loose, gray, fine sandy SILT to silty fine SAND; wet; abundant organics; (Hm) ML/SM.	19.0
Medium dense, gray, trace to slighlty silty, fine SAND; wet; scattered wood debris and shells; (Hb) SP-SM.	25.7
Soft, gray, silty CLAY; wet; occasional sand lenses and shell fragments; laminated; (Disturbed Ql) CH.	34.0
Medium stiff to hard; gray, silty CLAY trace of sand; moist to wet; some blocky structure at 40 to 48 ft.; (Ql) CH/MH. - clayey SILT, trace of sand	50.0
Very dense, gray, gravelly, silty, clayey SAND to slightly clayey, gravelly SILT, trace sand; moist; (Qgm) SC/ML.	57.0
Very dense, gray, alternating layers of; gray, clayey, silty, sandy GRAVEL, and slightly clayey, sandy SILT, trace of gravel; (Qgm) GM/ML.	94.0
Very dense, gray, slighlty sandy to sandy,silty CLAY; moist to dry; (Ql) CL.	

CONTINUED NEXT PAGE



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- P Pitcher Barrel Sampler
- 3" O.D. Split Spoon Sample
- G Grab Sample
- Vibrating Wire Piezometer (VWP)
- VWP groundwater level
- Piezometer Screen
- Groundwater Level
- Annular Sealant
- Grout

● % Water Content

Plastic Limit |—●—| Liquid Limit

Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USC letter symbol based on visual classification.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF BORING CB-4

October 1997 W-7808-11

SHANNON & WILSON, INC.
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FIG. A-5
Sheet 1 of 2

SOIL DESCRIPTION Surface Elevation: 111 Feet	Depth, Ft.	Symbol	Samples	Ground Water	Depth, Ft.	Penetration Resistance ▲ Blows per Foot (0 20 40 60)
BOTTOM OF BORING COMPLETED 7-30-97 Groundwater was initially encountered at 2.5 feet during drilling. NOTE: This boring was moved twice owing to an obstruction encountered during drilling. This log is a compilation of two of these explorations.	100.6		28		110 120 130 140 150 160 170 180 190	50/2"

LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- P Pitcher Barrel Sampler
- 3" O.D. Split Spoon Sample
- G Grab Sample
- Vibrating Wire Piezometer (VWP)
- VWP groundwater level
- Piezometer Screen
- Groundwater Level
- Annular Sealant
- Grout

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit

Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
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Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF BORING CB-4

October 1997 W-7808-11

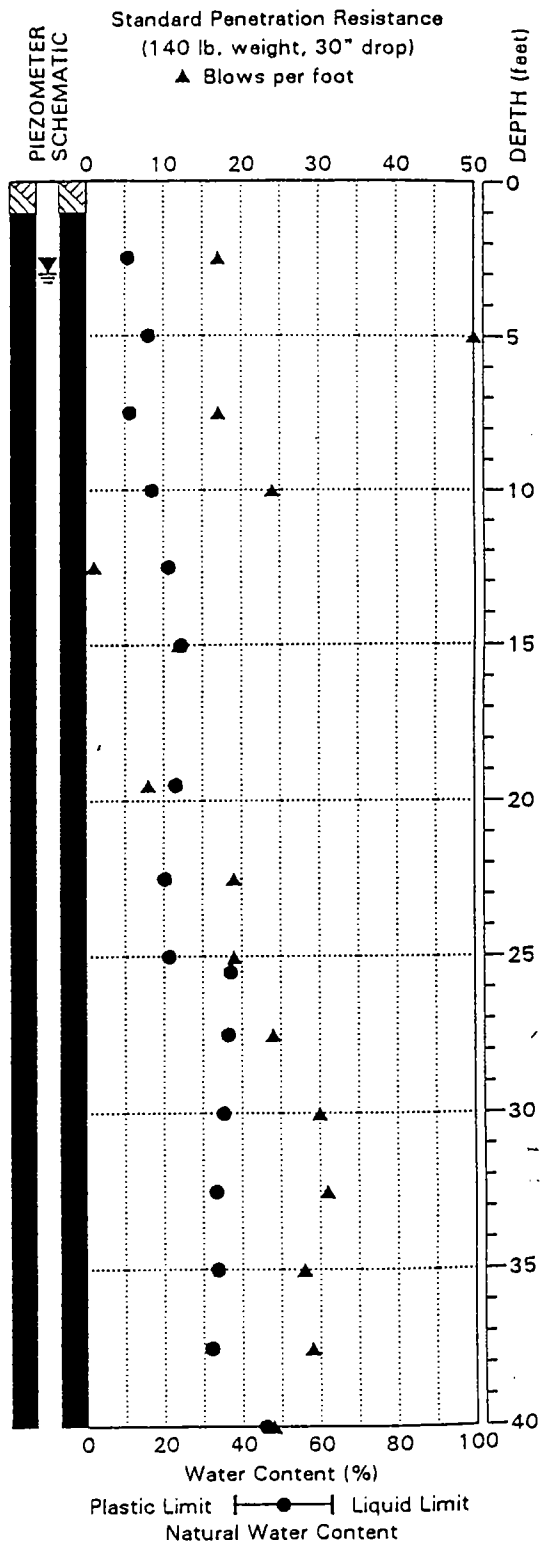
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-5
Sheet 2 of 2

DRILLING COMPANY: Charters
DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 110.2 ± Feet

DATE COMPLETED: 3/10/98
LOGGED BY: MB

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	SP	Medium dense to dense, gray, slightly gravelly, fine to coarse SAND, wet. 1" minus subrounded gravel. Trace shell fragments. (FILL)	S-1	10-9-8	
5		At 5 feet, trace wood fragments.	S-2	6-30-20	
			S-3	4-4-3	
10		At 10 feet, sand becomes medium grained.	S-4	0-6-18	
		At 12.5 feet, very loose, no gravel.	S-5	1/6"-1/12"	GS
15			S-6	1-3-9	
	ML	Soft, gray, SILT, wet. Some wood fragments. (LAGOON/MARSH DEPOSITS)			
	SP SM	Loose to medium dense, gray, slightly silty fine SAND, wet. Trace shell fragments. (BEACH DEPOSITS)	S-7	N/A	
20		At 20 feet, trace wood fragments.	S-8	4-2-6	GS
		At 22.5 feet, becomes slightly gravelly. 1/2" minus subrounded gravel.	S-9	7-9-10	
25			S-10A, S-10B	2-5-14	
	CL	Very stiff, gray, silty CLAY, moist. (GLACIOLACUSTRINE DEPOSITS)	S-11	6-11-13	
30		At 30 feet, becomes hard. Few fine sand lenses.	S-12	9-11-19	
			S-13	9-15-16	
35		At 35 feet, becomes very stiff.	S-14	7-13-15	
		At 37.5 feet, becomes slightly fissured.	S-15	11-14-15	
40	CH	Very stiff, gray, plastic CLAY, moist.			



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: CB- 5

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract A
Seattle, Washington

PAGE: 1 of 3

PROJECT NO.: 97061 FIGURE: A-2

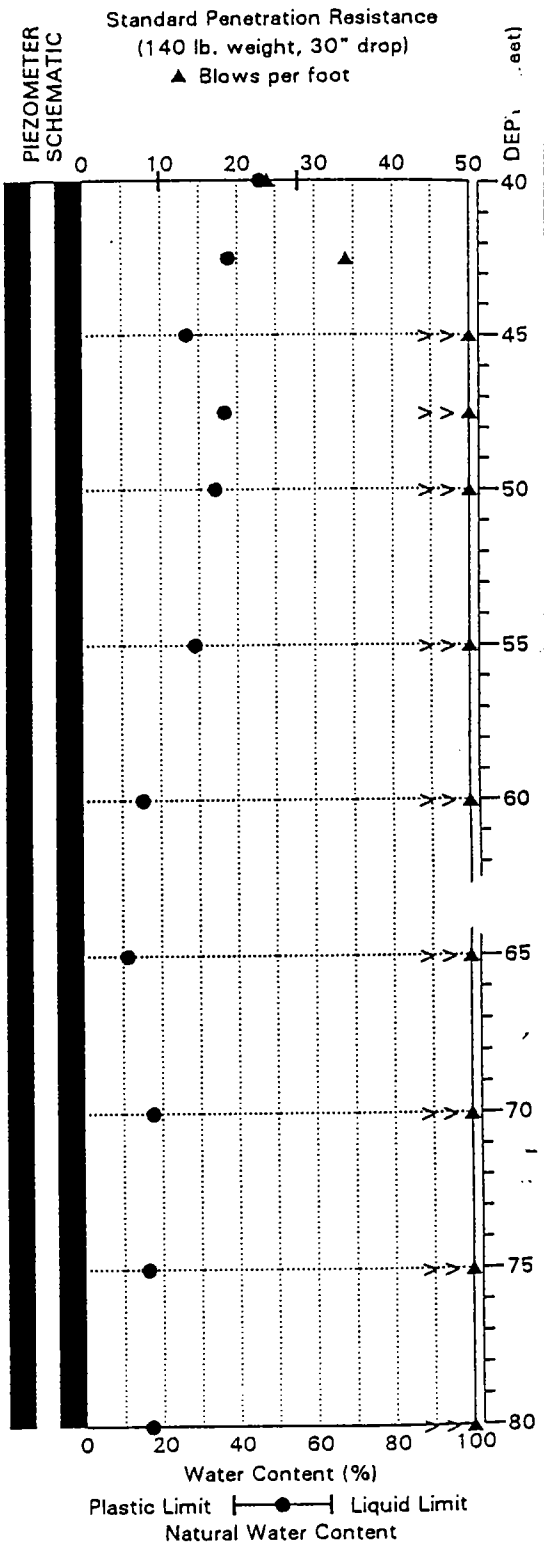
PZO DWA 6/12/98

DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 110.2 ± Feet

LOGGED BY: MB

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		Very stiff, gray, plastic CLAY, moist. (GLACIOLACUSTRINE DEPOSITS) At 42.5 feet, becomes hard, no apparent fissures.	S-16	7-10-14	AL
			S-17	8-15-19	
45			S-18	10-18-33	
	SC	Very dense, gray, fine to coarse, clayey SAND, moist.			
	CL	Hard, gray, sandy lean CLAY, moist. Fine to medium sand. (GLACIOMARINE DRIFT)	S-19	17-39 50/4"	
50		At 50 feet, becomes slightly sandy.	S-20	13-35 50/5"	%F
55			S-21	50/0"	
	SC	Very dark gray, slightly gravelly, clayey SAND, very moist. 1" minus subangular gravel.			
60			S-22	50/4"	
65			S-23	50/5"	%F
	CL	Hard, gray, sandy lean CLAY, very moist.			
70			S-24	20-45 50/3"	
75		At 75 feet, sand becomes fine to coarse. Few fine sand lenses.	S-25	26-50/4"	
80					

PIEZOMETER SCHEMATIC



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: CB- 5

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract A
Seattle, Washington

PAGE: 2 of 3

PROJECT NO.: 97061

FIGURE: A-2

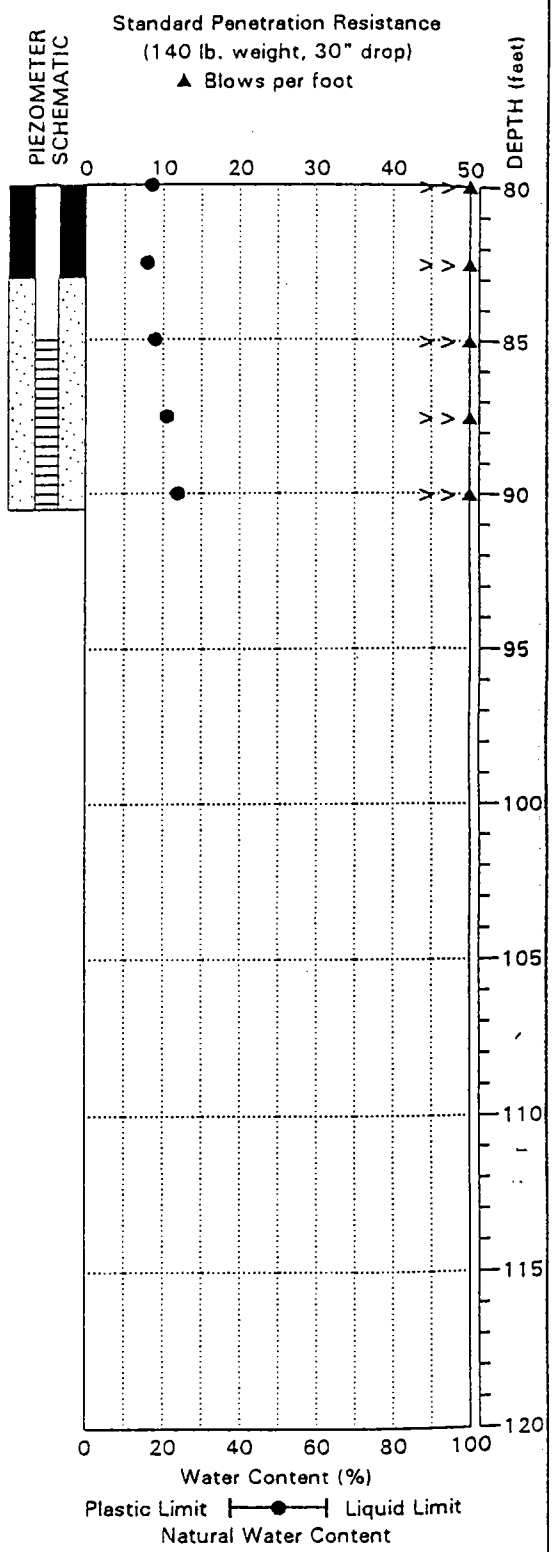
PZO DWA 6/16/98

DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 110.2 ± Feet

DATE COMPLETED: 5/10/98
LOGGED BY: MB

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
80			At 82.5 feet, sand becomes fine grained.		S-26	39-50/3"	
					S-27	50/4"	
85					S-28	42-50/4"	
		SM	Very dense, gray, silty fine to medium SAND, wet. (OUTWASH)		S-29	50/6"	
90					S-30	50/6"	GS

Total depth = 90.5 feet.



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BORING: CB- 5

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract A
Seattle, Washington

PAGE: 3 of 3

PROJECT NO.: 97061 FIGURE: A-2

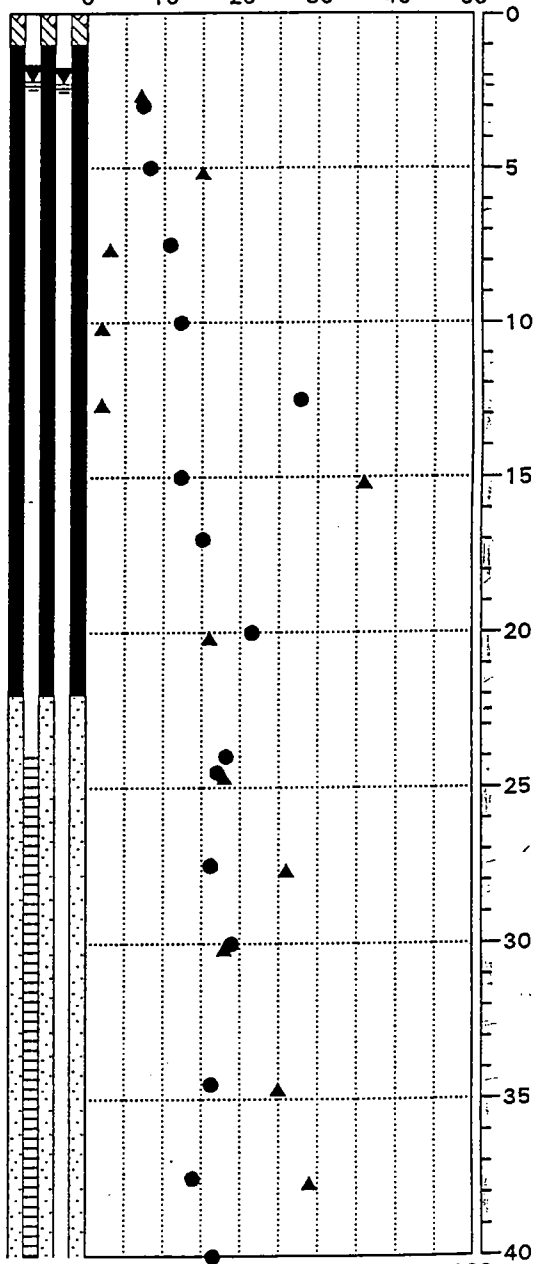
PZO DWA 6/12/98

DRILLING COMPANY: Cherokee
DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 110.0 ± Feet

LOCATION:
DATE COMPLETED: 3/6/98
LOGGED BY: AS/MB

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0		SM	Loose to medium dense, brown, silty and gravelly fine to medium SAND, wet. (FILL) At 2 feet, cobble encountered.		S-1	2-3-4	
5			At 5 feet, becomes gray, gravel is coarse.		S-2	5-7-8	
			At 7.5 feet becomes very loose, no gravel.		S-3	1-2-1	
10					S-4	0/12"-1/6"	
					S-5	1-1-1	
		CL	Very soft, gray, lean CLAY, moist. (MARSH?)				
15		SM	Loose, gray, silty fine SAND, wet.		S-6	14-16-20	
			At 17 feet, 18" SPT sample is single piece of wood, with grain oriented vertically. Possibly piling.		S-7		
20			Wood shavings from 20 to 20.4 feet.		S-8	6-6-10	
		CL	Medium stiff to very stiff, gray, lean CLAY, moist. (GLACIOLACUSTRINE DEPOSITS)		S-9	N/A	
25					S-10	4-8-10	
			At 27.5 feet, becomes slightly fissured. One slickenside and one 1-1/2" layer of medium sand with 3/4" minus subrounded gravel.		S-11	5-12-14	
30					S-12	5-7-11	
					S-13	N/A	
35			At 34.5 feet, no longer fissured.		S-14	6-10-15	
40					S-15	7-12-19	

PIEZOMETER SCHEMATIC



PRELIMINARY

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: CB- 7

GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract A
Seattle, Washington

PAGE: 1 of 3

PROJECT NO.: 97061 FIGURE: A-

PZODUAL DWA 4/2/98

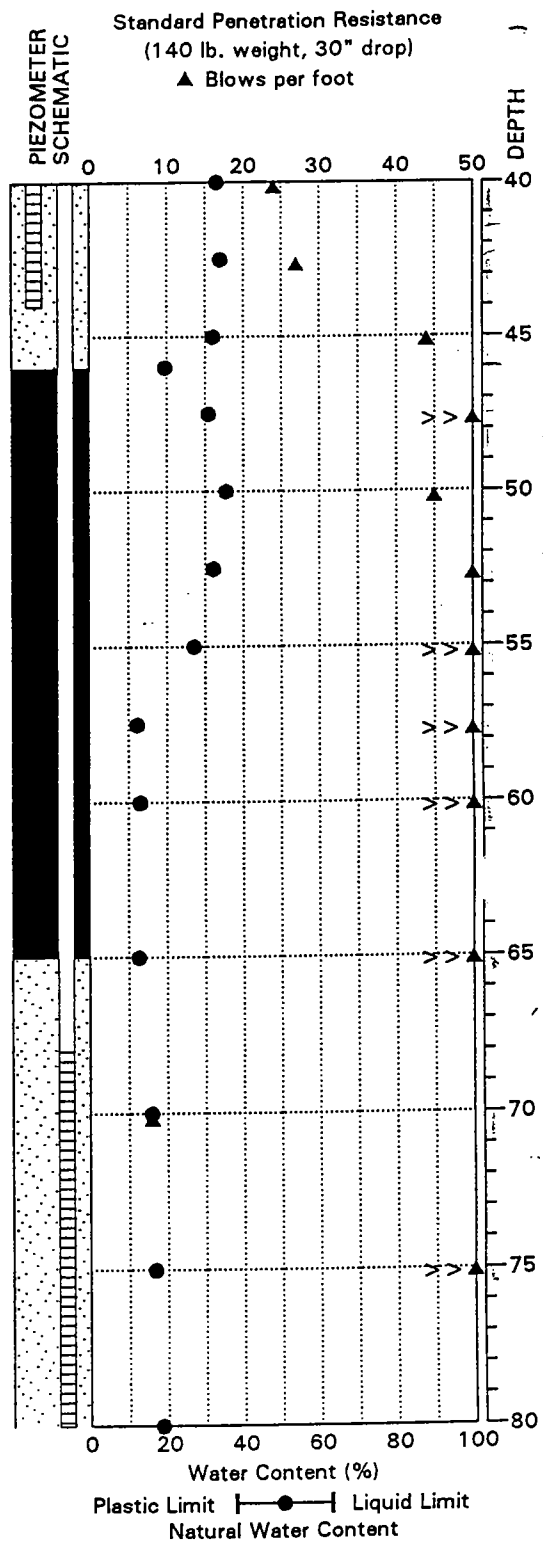
DRILLING COMPANY: Cherokee
DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 110.0 ± Feet

DATE COMPLETED: 3/6/98
LOGGED BY: AS/MB

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)
		At 42.5 feet, becomes slightly fissured. One thin fine sand lense.	S-16	6-10-14
			S-17	6-12-15
			S-18A	9-17-27
			S-18B	
	SM	Dense, gray, silty fine to medium SAND, moist to wet.		
	CL	Hard, gray, lean CLAY, moist. Three 1" thick layers of fine sand.	S-19	11-23-37
			S-20	9-20-25
			S-21	9-25-25
	SM ML	Very dense to hard, gray, fine to medium silty SAND to sandy SILT, moist.	S-22	14-26 60/5"
		(GLACIOMARINE DRIFT) At 57.5 feet, sand becomes fine to coarse.	S-23	10-25-46
		At 60 feet, some 3/8" minus subrounded gravel.	S-24	40-50/3"
	SC	Very dense, gray, clayey fine to medium SAND, moist. Some 1/4" minus subrounded gravel.	S-25	50/6"
	SP	Loose, gray, fine to medium clean SAND, moist to wet. Some 1" minus subrounded gravel.	S-26	2-2-6
		(OUTWASH) At 74.5 feet, driller noted end of loose layer.		
	SM	Very dense, gray, silty fine to medium SAND, wet.	S-27	50/5"

OTHER TESTS

PIEZOMETER SCHEMATIC



PRELIMINARY

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BORING: CB- 7

DWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract A
Seattle, Washington

PAGE: 2 of 3

PROJECT NO.: 97061 FIGURE: A-

PZODUAL DWA 4/2/98

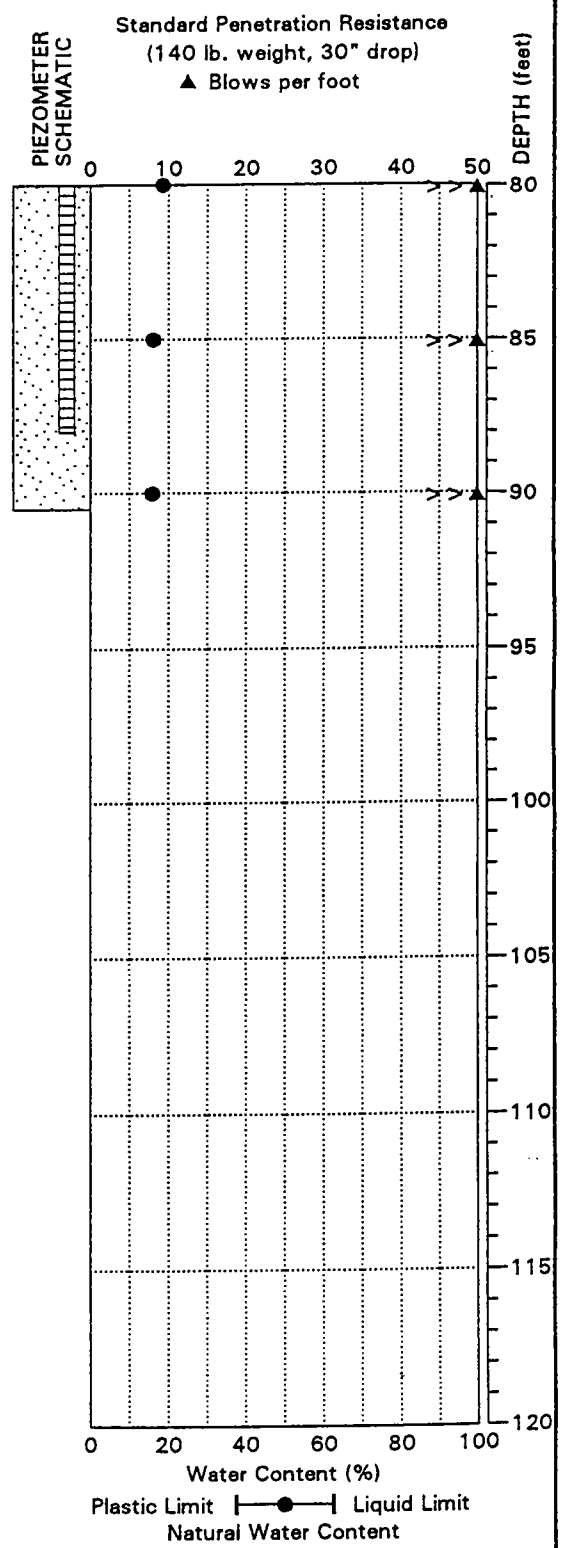
DRILLING COMPANY: Cherokee
DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 110.0 ± Feet

DATE COMPLETED: 3/6/98
LOGGED BY: AS/MB

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
80				S-28	50/6"	
85				S-29	50/6"	
90		CL	Hard, gray, sandy lean CLAY, moist. Fine sand.	S-30	50/6"	

Total depth = 90.5 feet.

PIEZOMETER SCHEMATIC



PRELIMINARY

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: CB- 7

DWA GEOSCIENCES INC.

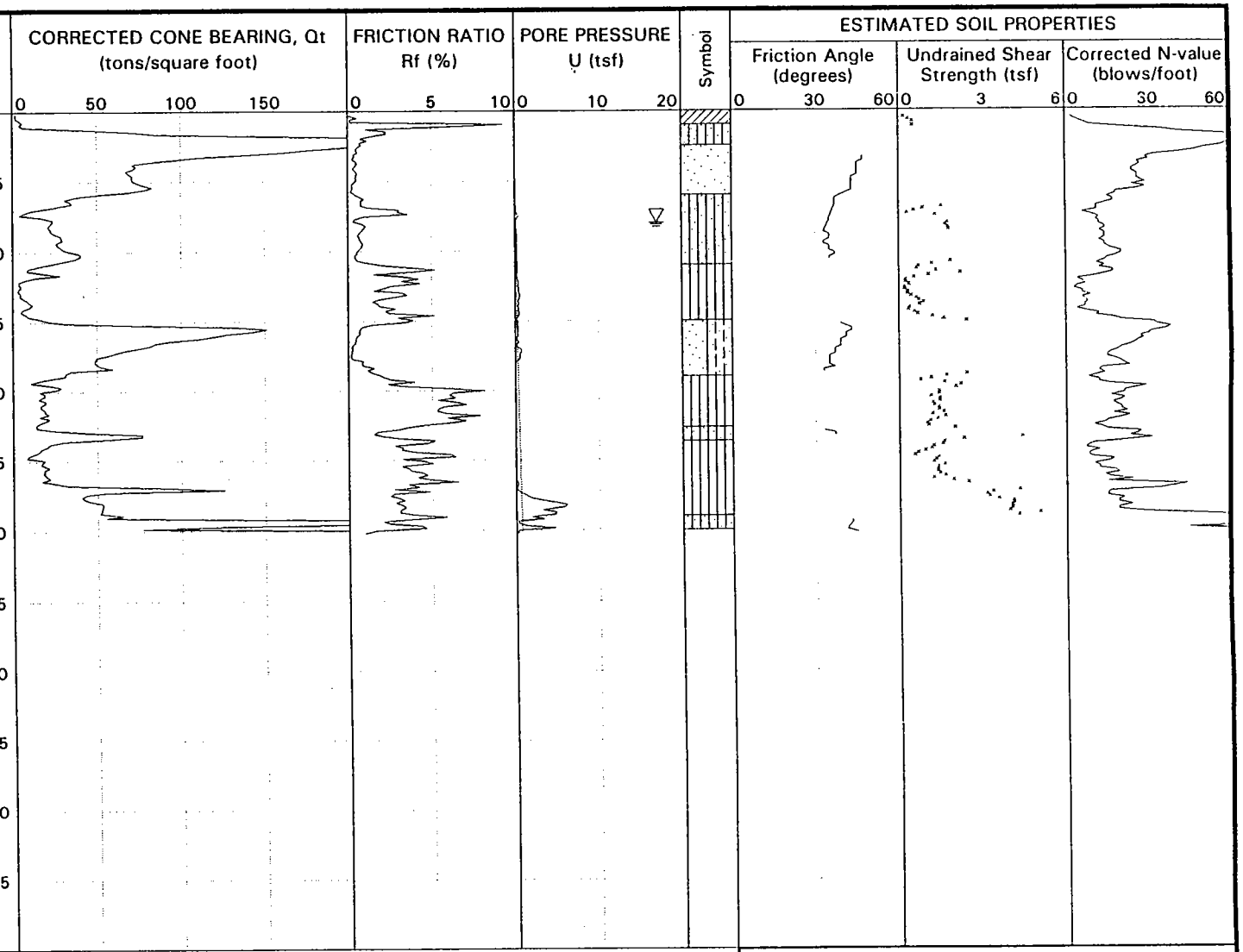
Denny Way / Lake Union CSO, Contract A
Seattle, Washington

PAGE: 3 of 3

PROJECT NO.: 97061 FIGURE: A-

PZODUAL DWA 4/2/98

ESTIMATED SOIL PROFILE Surface Elev.: Approx. 110.0 Feet	Depth (ft)
Soft to medium stiff, silty CLAY; (Hf) CL.	1.0
Medium dense to very dense, silty, gravelly, SAND; (Hf).	2.5
Medium dense to very dense SAND; (Hf).	6.0
Medium dense, silty SAND with scattered loose, sandy to clayey silt layers; (Hf).	11.0
Soft to very stiff, slightly sandy, clayey SILT; (Hm).	15.0
Medium dense to dense, clean to silty, SAND; (Hb).	19.0
Stiff to very stiff, clayey, sandy, SILT with scattered silty sand layers; (Disturbed Ql)	22.7
Medium dense, silty SAND; (Hb).	23.7
Very dense, silty, gravelly SAND; (Ql).	29.0
BOTTOM OF PROBE COMPLETED 8-1-97	30.0



Notes:

1. The stratification lines represent the approximate boundaries between soil types; the transition may be gradual.
2. The estimated soil properties are based on analyses performed using the computer program CPTINT (version 4.2). The method used for estimating the properties listed above are:

Property	Method
Friction Angle	Durgunoglu & Mitchell
Corrected N-Value (N1-60)	Robertson & Campanella (1989)
Undrained Shear Strength	$(Qt-\sigma v)/Nk$ where: Qt = Corrected Cone Bearing, Nk = 12.5

3. Log of probe is based on piezocone probe data provided by Northwest Cone Exploration.
4. The pore pressure readings (U2) were measured behind the tip of the penetrometer.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF PROBE CP-1

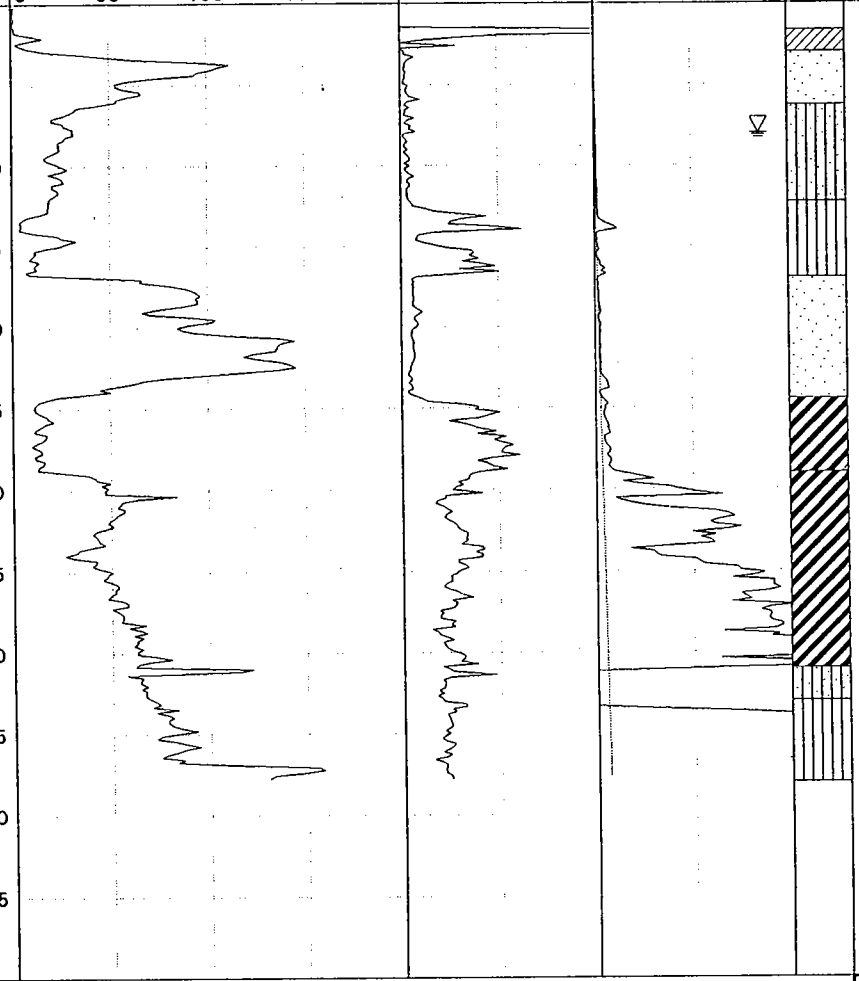
October 1997 W-7808-11

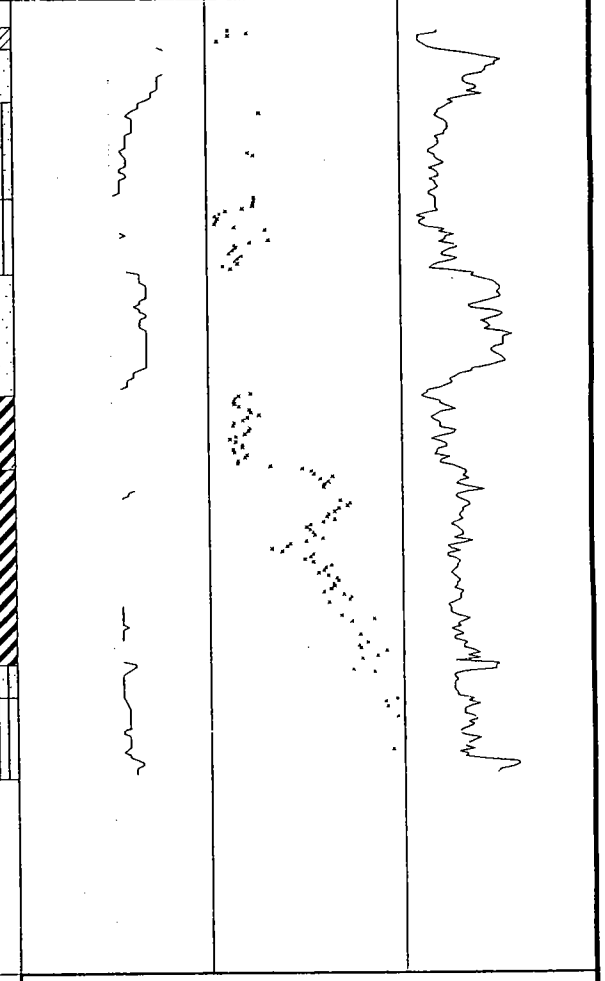
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-19
Sheet 1 of 1

FIG. A-19
Sheet 1 of 1

ESTIMATED SOIL PROFILE Surface Elev.: Approx. 110.5 Feet	Depth (ft)
Unknown	1.7
Soft to stiff, silty, sandy CLAY; (Hf).	3.0
Medium dense SAND; (Hf).	6.3
Loose to medium dense, silty SAND with scattered sandy silt layers; (Hf).	12.3
Medium stiff to stiff, sandy, clayey SILT with scattered silty sand layers; (Hm).	17.0
Medium dense to dense SAND; (Hb).	24.5
Medium stiff to very stiff, sandy, clayey SILT to silty CLAY; (Disturbed Ql).	29.0
Stiff to very stiff, sandy, clayey SILT to silty CLAY; (Ql).	41.0
Medium dense, silty SAND; (Ql).	43.0
Stiff to very stiff, sandy, clayey SILT; (Qgm).	48.0
BOTTOM OF PROBE COMPLETED 8-1-97	





Notes:

1. The stratification lines represent the approximate boundaries between soil types; the transition may be gradual.
2. The estimated soil properties are based on analyses performed using the computer program CPTINT (version 4.2). The method used for estimating the properties listed above are:

Property	Method
Friction Angle	Durgunoglu & Mitchell
Corrected N-Value (N1-60)	Robertson & Campanella (1989)
Undrained Shear Strength	$(Qt-\sigma v)/Nk$ where: Qt = Corrected Cone Bearing, Nk = 12.5

3. Log of probe is based on piezocone probe data provided by Northwest Cone Exploration.
4. The pore pressure readings (U2) were measured behind the tip of the penetrometer.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF PROBE CP-2

October 1997 W-7808-11

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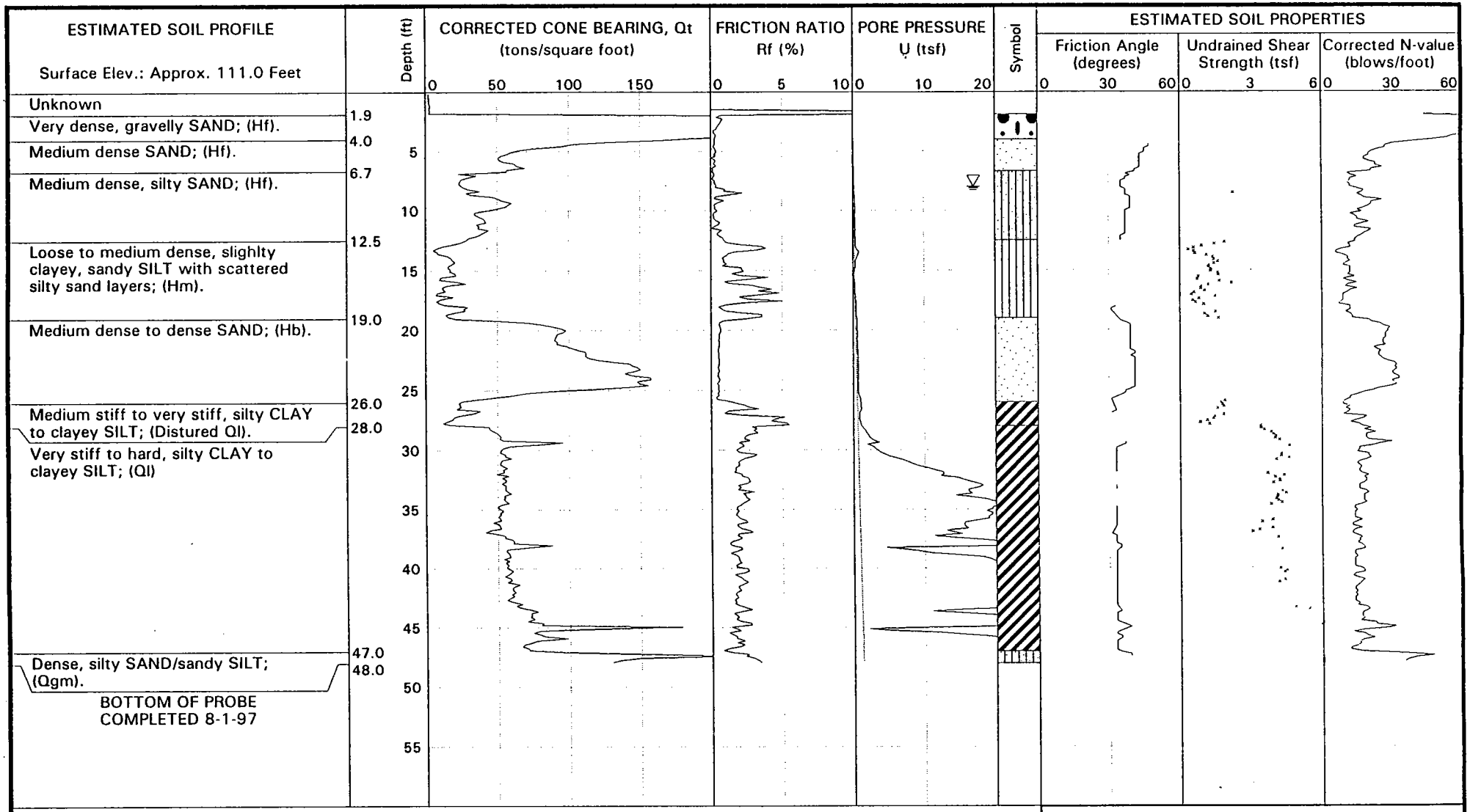
FIG. A-20
Sheet 1 of 1

FIG. A-20
Sheet 1 of 1



Notes:

1. The stratification lines represent the approximate boundaries between soil types; the transition may be gradual.
2. The estimated soil properties are based on analyses performed using the computer program CPTINT (version 4.2). The method used for estimating the properties listed above are:

Property	Method
Friction Angle	Durgunoglu & Mitchell
Corrected N-Value (N1-60)	Robertson & Campanella (1989)
Undrained Shear Strength	$(Qt-\sigma v)/Nk$ where: Qt = Corrected Cone Bearing, Nk = 12.5

3. Log of probe is based on piezocone probe data provided by Northwest Cone Exploration.
4. The pore pressure readings (U2) were measured behind the tip of the penetrometer.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF PROBE CP-3

October 1997 W-7808-11

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FIG. A-21
Sheet 1 of 1

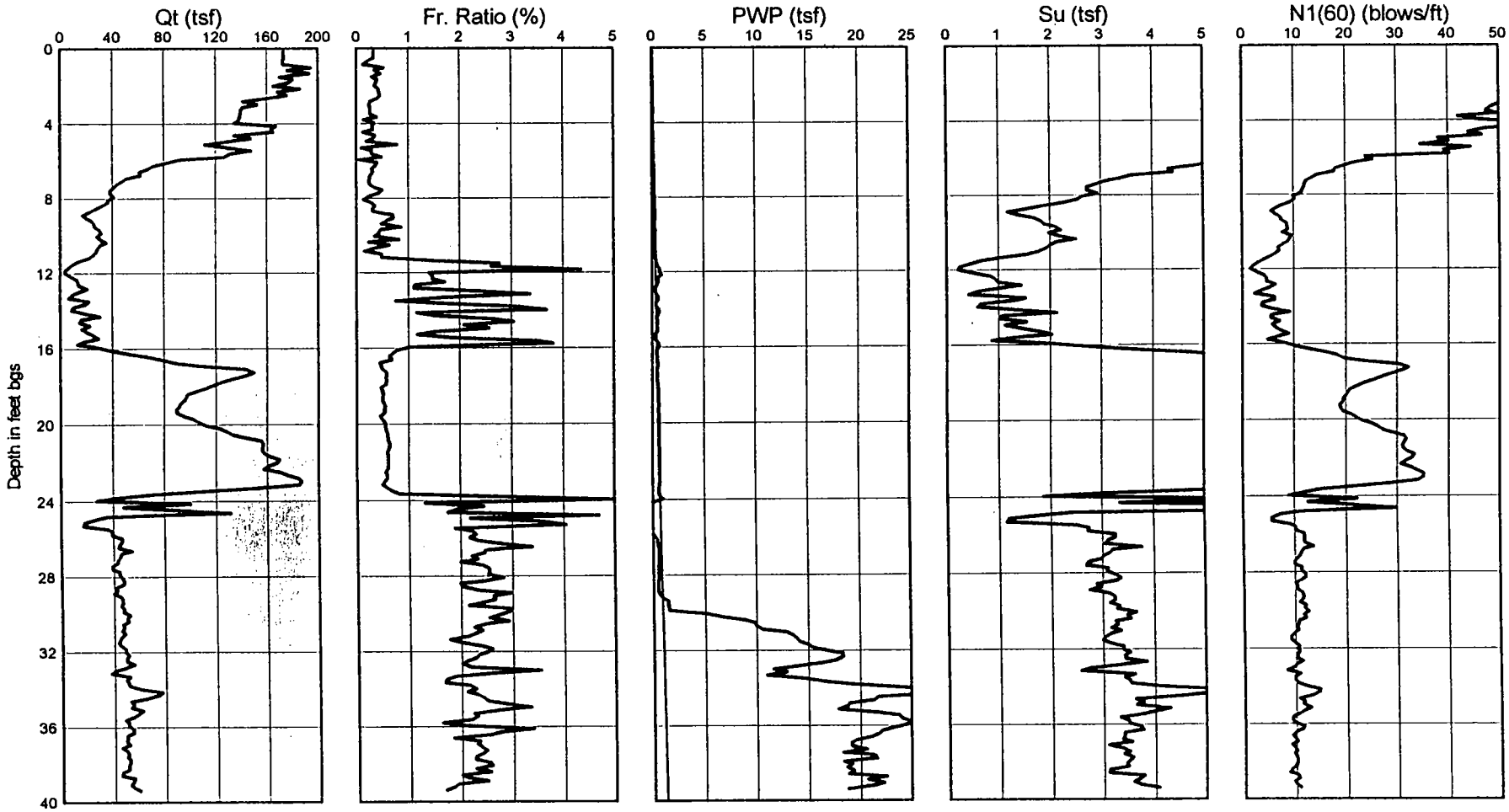
FIG. A-21
Sheet 1 of 1

Cone Penetration Test - CPT-4

Test Date : Apr 02, 1998
Location : Denny Way / Lake Union CSO Project

Operator : Northwest Cone Exploration

Ground Surf. Elev. : 0.00
Water Table Depth : 2.00



Qt normalized for
unequal end area effects

Fr Ratio = 100*F/(Qt-Sigmav)
Gamma = 115.2 pcf

Su = (Qt - SigmaV) / Nk
Nk = 14
Gamma = 115.2 pcf

After Jefferies and Davies (1993)

PROJECT NO. 97061 DATE: April 8, 1998 DRAWN BY: Keith Brown

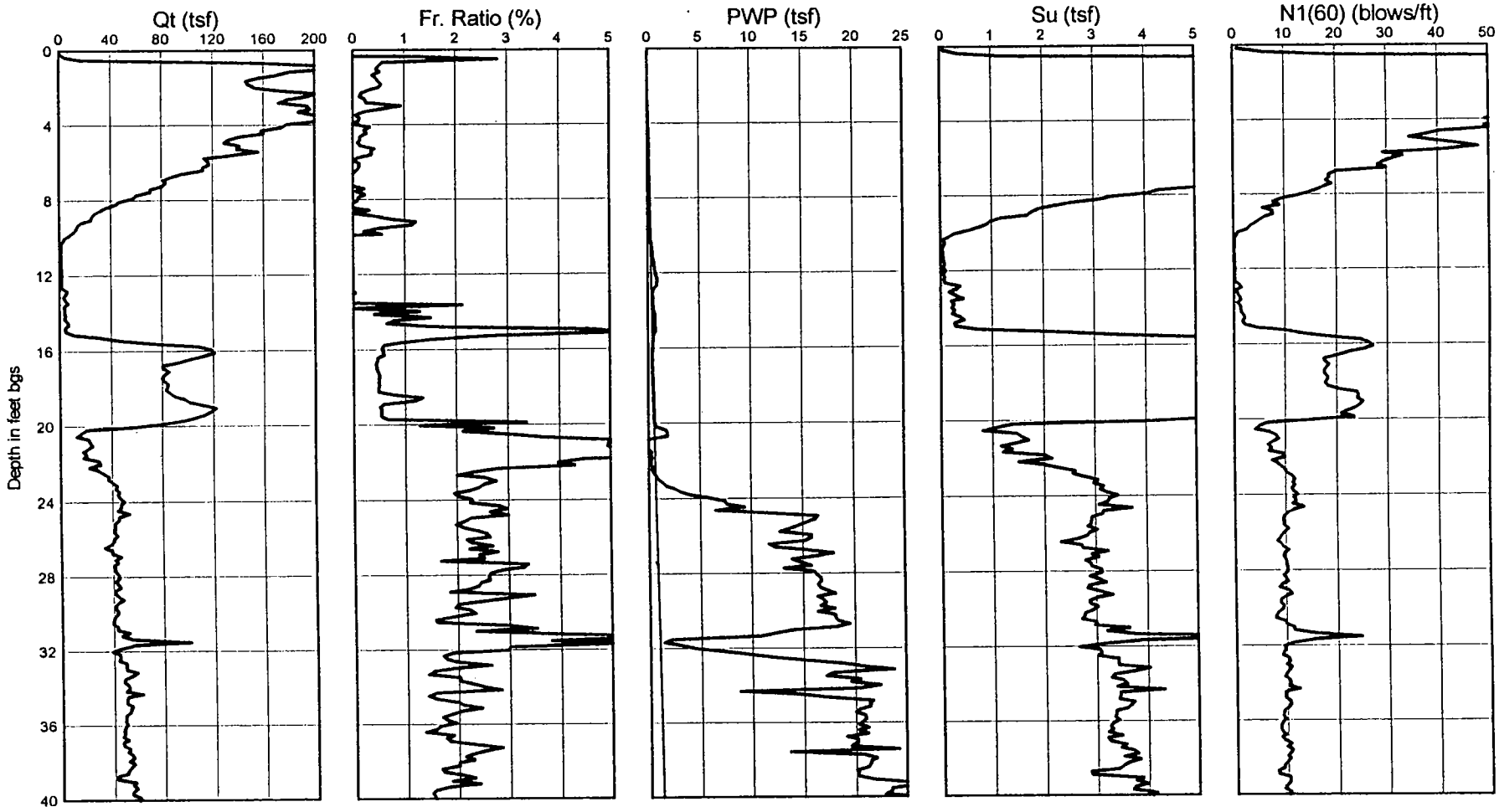
HWA GeoSciences, Inc.

Cone Penetration Test - CPT-5

Test Date : Apr 02, 1998
Location : Denny Way / Lake Union CSO Project

Operator : Northwest Cone Exploration

Ground Surf. Elev. : 0.00
Water Table Depth : 2.00



Qt normalized for unequal end area effects

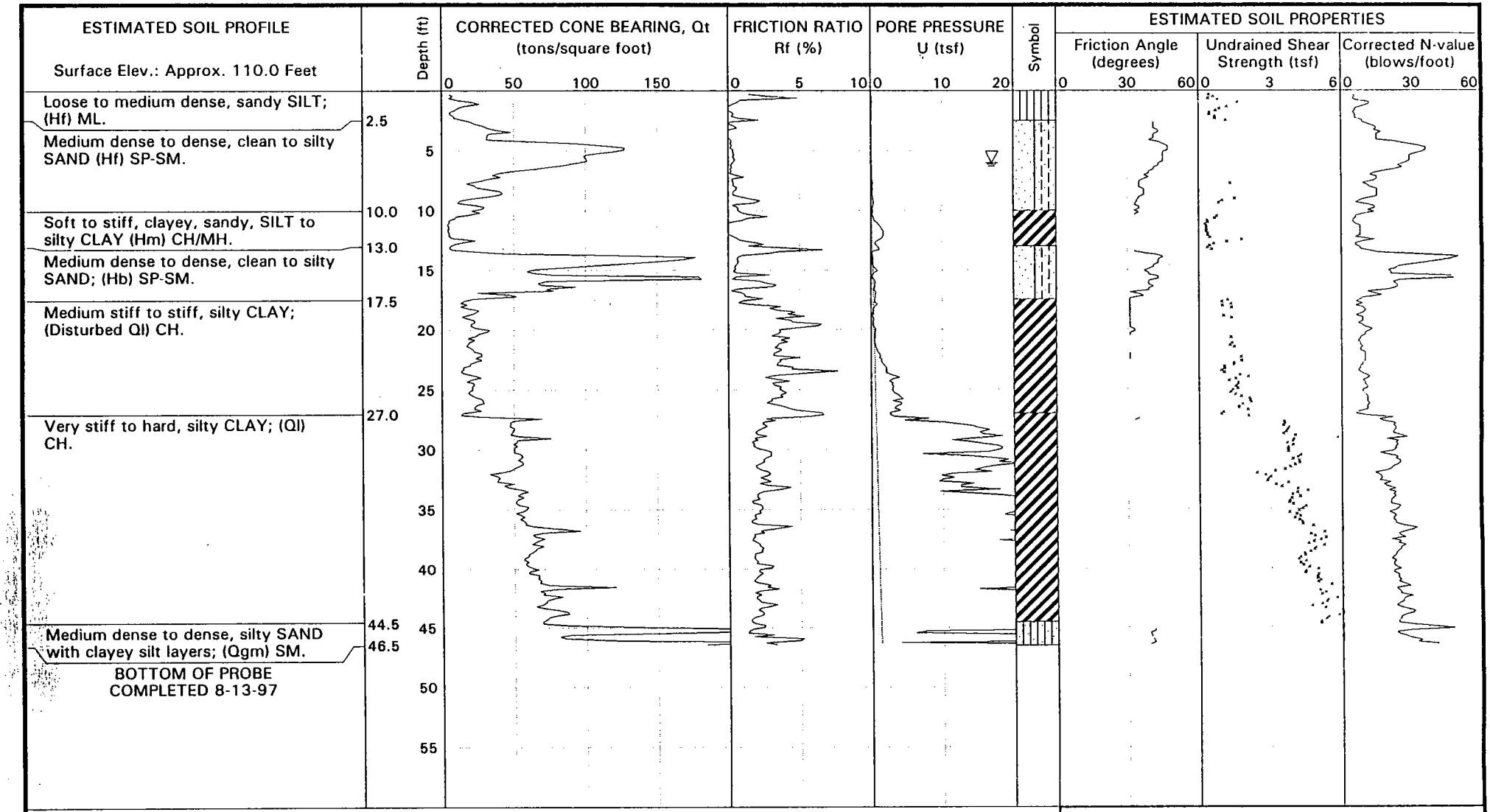
Fr Ratio = 100*F/(Qt-Sigmav)
Gamma = 115.2 pcf

Su = (Qt - SigmaV) / Nk
Nk = 14
Gamma = 115.2 pcf

After Jefferies and Davies (1993)

PROJECT NO. 97061 DATE: aPRIL 8, 1998 DRAWN BY: keith Brown

HWA GeoSciences, Inc.



Notes:

1. The stratification lines represent the approximate boundaries between soil types; the transition may be gradual.
2. The estimated soil properties are based on analyses performed using the computer program CPTINT (version 4.2). The method used for estimating the properties listed above are:

Property	Method
Friction Angle	Durgunoglu & Mitchell
Corrected N-Value (N1-60)	Robertson & Campanella (1989)
Undrained Shear Strength	$(Qt-\sigma v)/Nk$ where: Qt = Corrected Cone Bearing, Nk = 12.5

3. Log of probe is based on piezocone probe data provided by Northwest Cone Exploration.
4. The pore pressure readings (U2) were measured behind the tip of the penetrometer.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF PROBE CSP-1

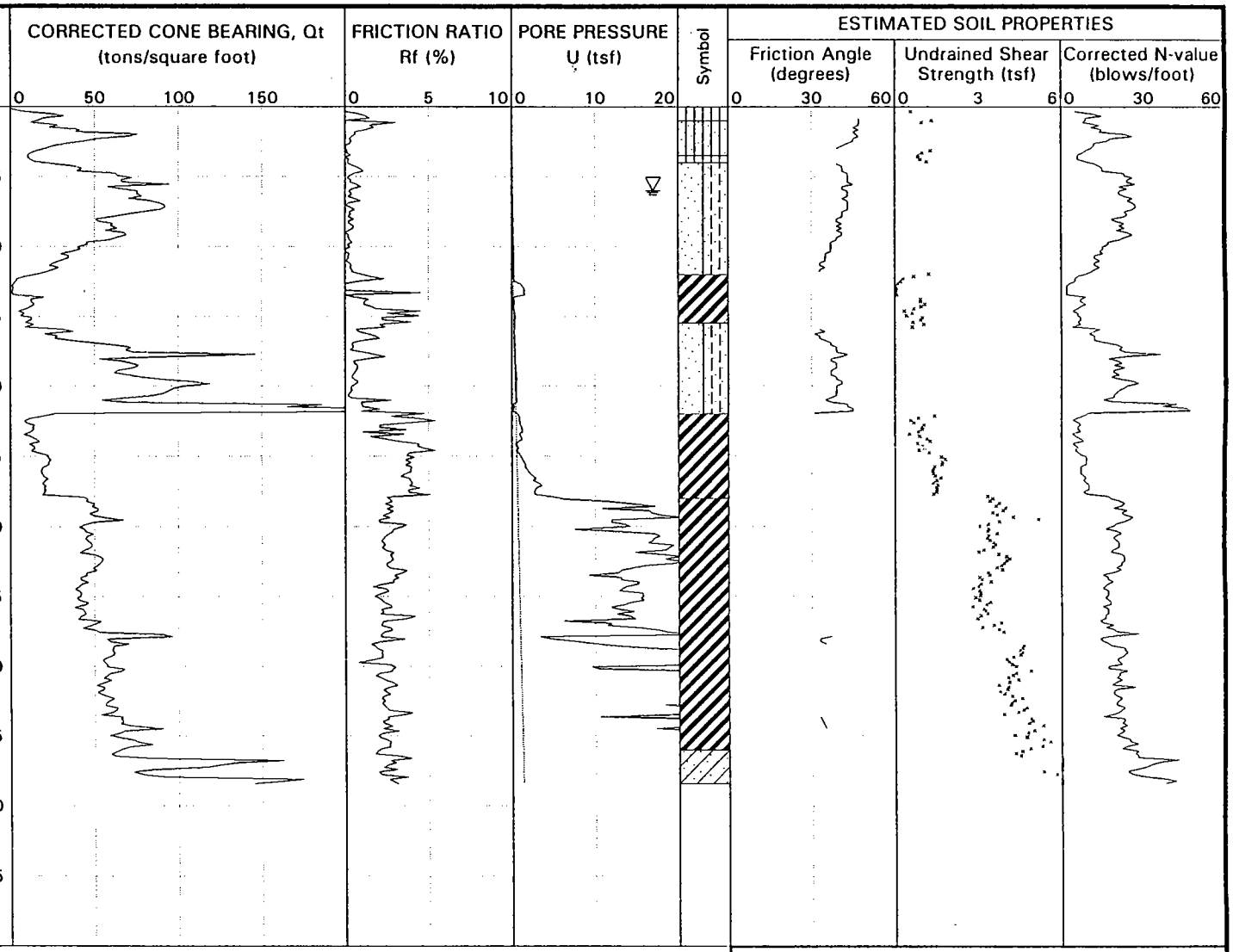
October 1997 W-7808-11

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-22
Sheet 1 of 1

FIG. A-22
Sheet 1 of 1

ESTIMATED SOIL PROFILE Surface Elev.: Approx. 110.0 Feet	Depth (ft)
Loose, sandy SILT; (Hf) ML.	1.0
Medium dense, silty SAND; (Hf).	3.5
Loose to medium dense, sandy SILT; (Hf).	4.0
Medium dense, clean to silty SAND; (Hf).	
Very soft to medium stiff, silty CLAY to clayey, sandy SILT; (Hm).	12.0
Medium dense to dense, clean to silty SAND; (Hb).	15.5
Medium stiff, sandy, clayey SILT to silty CLAY; (Disturbed Ql).	22.0
Very stiff, clayey SILT to silty CLAY with scattered sand layers; (Ql).	28.0
Very dense, silty, clayey SAND to sandy SILT; (Qgm).	46.0
BOTTOM OF PROBE COMPLETED 8-13-97	48.4



Notes:

1. The stratification lines represent the approximate boundaries between soil types; the transition may be gradual.
2. The estimated soil properties are based on analyses performed using the computer program CPTINT (version 4.2). The method used for estimating the properties listed above are:

Property	Method
Friction Angle	Durgunoglu & Mitchell
Corrected N-Value (N1-60)	Robertson & Campanella (1989)
Undrained Shear Strength	$(Qt-\sigma v)/Nk$ where: Qt = Corrected Cone Bearing Nk = 12.5

3. Log of probe is based on piezocone probe data provided by Northwest Cone Exploration.
4. The pore pressure readings (U2) were measured behind the tip of the penetrometer.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF PROBE CSP-2

October 1997 W-7808-11

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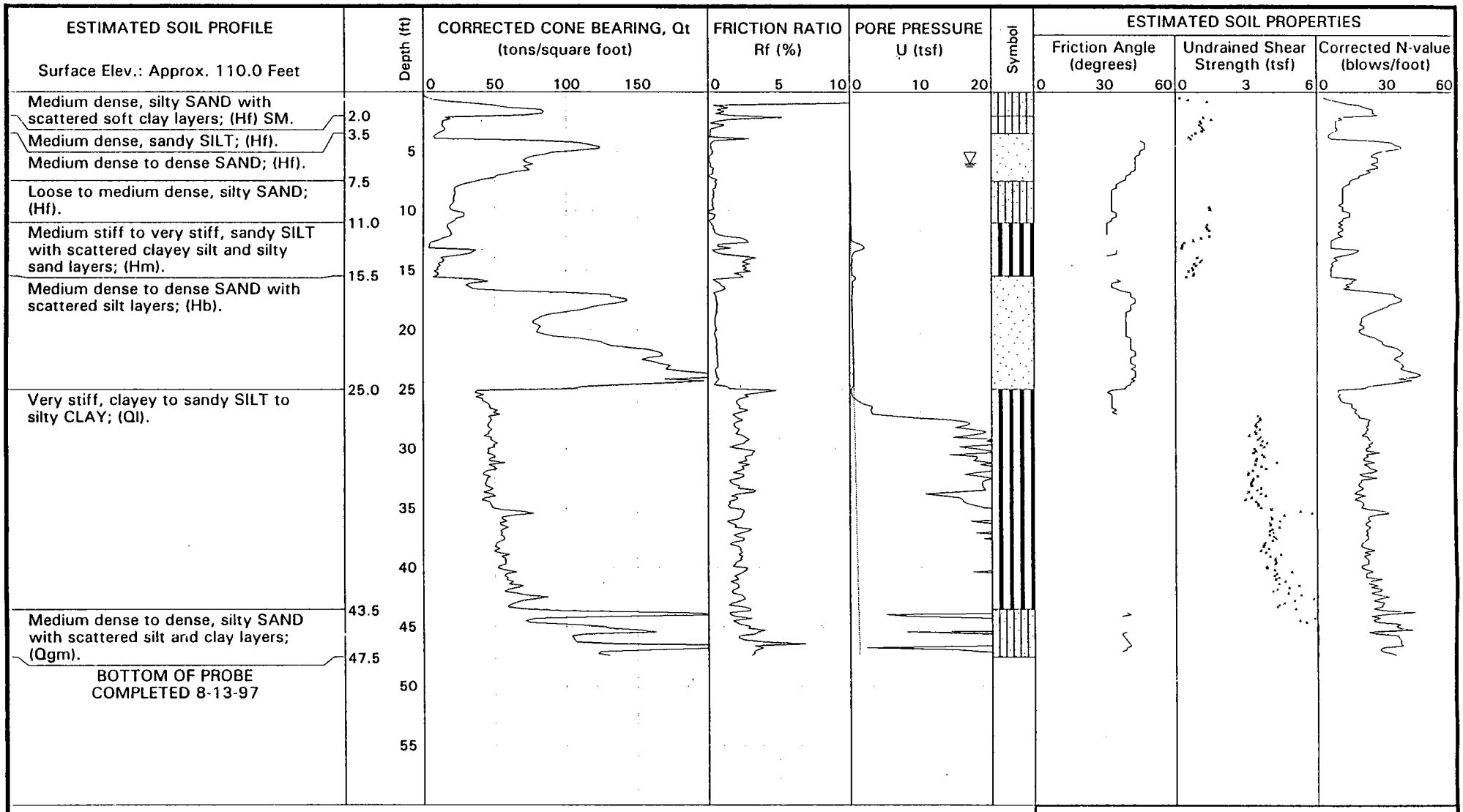
FIG. A-23
Sheet 1 of 1

FIG. A-23
Sheet 1 of 1



Notes:

1. The stratification lines represent the approximate boundaries between soil types; the transition may be gradual.
2. The estimated soil properties are based on analyses performed using the computer program CPTINT (version 4.2). The method used for estimating the properties listed above are:

Property	Method
Friction Angle	Durgunoglu & Mitchell
Corrected N-Value (N1-60)	Robertson & Campanella (1989)
Undrained Shear Strength	$(Qt-\sigma v)/Nk$ where: Qt = Corrected Cone Bearing, Nk = 12.5

3. Log of probe is based on piezocone probe data provided by Northwest Cone Exploration.
4. The pore pressure readings (U2) were measured behind the tip of the penetrometer.

Denny Way/Lake Union CSO Project
Elliott West CSO Control Project
Seattle, Washington

LOG OF PROBE CSP-3

October 1997 W-7808-11

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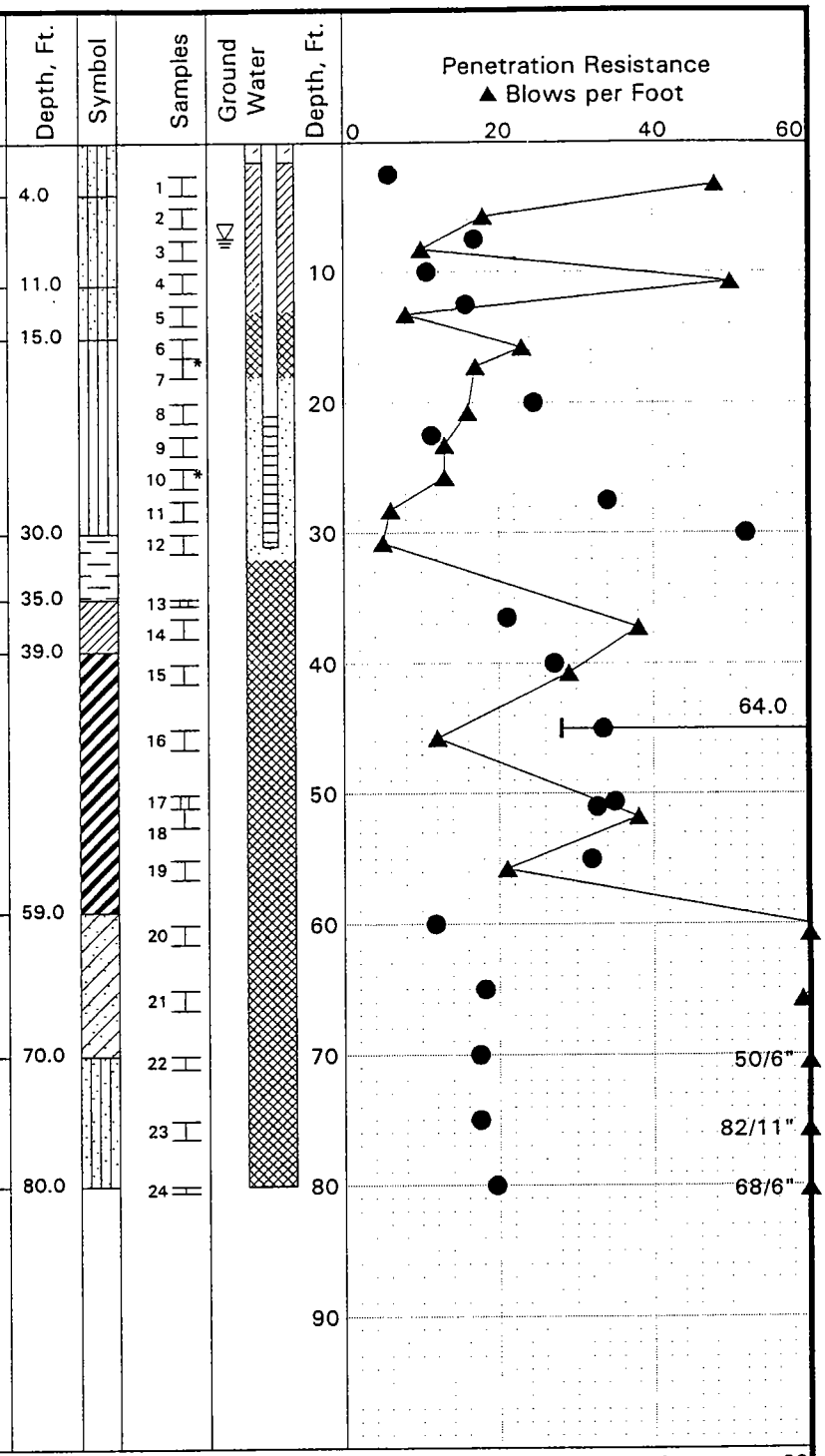
FIG. A-24
Sheet 1 of 1

FIG. A-24
Sheet 1 of 1

SOIL DESCRIPTION Surface Elevation: Approx. 17 Feet MLLW	Depth, Ft.
Dense, gray to brown, silty, gravelly, fine to medium SAND; moist to dry; angular cherts; (Hf) SM.	4.0
Loose, gray, gravelly, clayey, silty SAND; moist to wet; disturbed and scattered organics; (Hf) SM-SC.	11.0
Loose to dense, gray, slightly silty sandy GRAVEL to silty, clayey, sandy GRAVEL; moist to wet; scattered organics; (Hf) SM.	15.0
Medium stiff to very stiff, gray gravelly, sandy, clayey SILT to sandy SILT, trace gravel; moist to wet; scattered organics; (Hf) ML.	30.0
Medium stiff, dark gray to black, clayey, organic SILT; wet; scattered organics, coal fragments;(Hm) OL.	35.0
Dense, gray, silty gravelly SAND; wet; scattered shells; (Hb) SM.	39.0
Very stiff to hard, gray silty CLAY; moist; occasional slickensides, occasional drop stones; (Ql) CH.	59.0
Very Dense, gray, slightly gravelly, clayey silty SAND grading to gravelly, sandy, silty CLAY; moist; (Qgm) SC.	70.0
Very dense, tan, slighlty silty, fine to medium SAND, trace gravel; wet; (Qow) SM.	80.0
BOTTOM OF BORING COMPLETED 7/16/97 Groundwater was initially encountered at 7.5 feet during drilling.	



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- P Pitcher Barrel Sampler
- 3" O.D. Split Spoon Sample
- G Grab Sample
- Vibrating Wire Piezometer (VWP)
- VWP groundwater level
- Piezometer Screen
- Groundwater Level
- Annular Sealant
- Grout

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit

Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USC letter symbol based on visual classification.

Denny Way/Lake Union CSO Project
Elliott West Outfall
Seattle, Washington

LOG OF BORING OB-1

October 1997 W-7808-31

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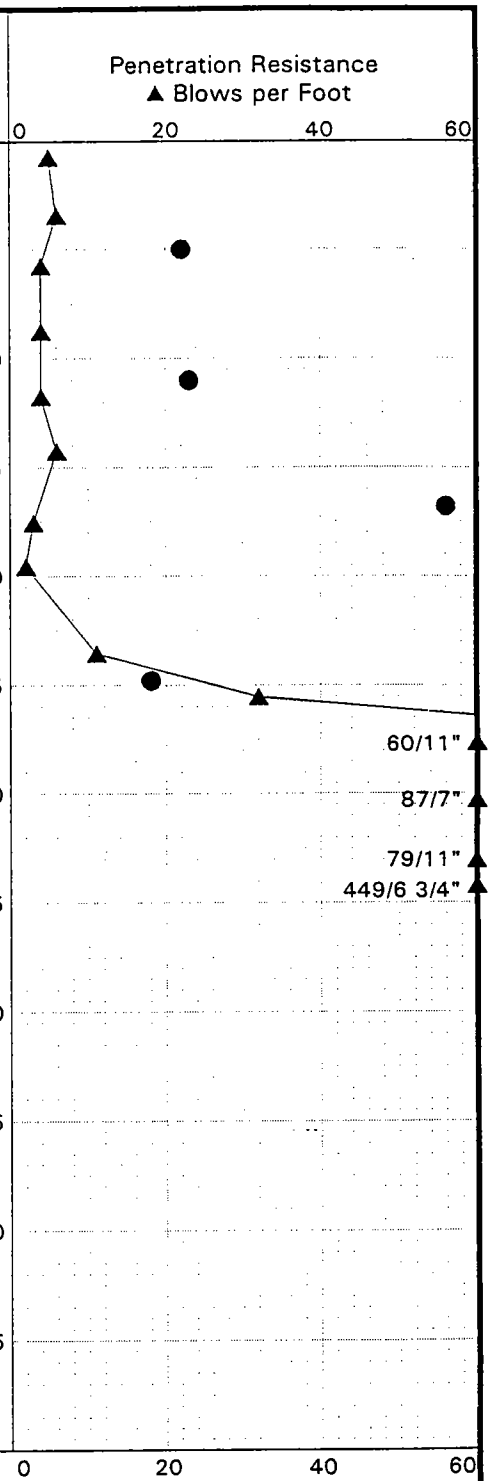
FIG. A-2
Sheet 1 of 1

SOIL DESCRIPTION Surface Elevation: Approx. -4 Feet MLLW	Depth, Ft.	Geology	Samples	Ground Water
Very loose to medium dense, dark gray, silty, fine to coarse SAND; scattered organics, shell and wood fragments; (Hf) SM.			1, 2, 3, 4, 5, 1C	
Soft, dark gray, fine sandy organic SILT; wet; scattered organics; (Hm) OL.	15.0			
Very loose to very dense, dark gray, silty fine SAND, trace clay; wet; numerous shell fragments; (Hb) SM.	17.0		2C, 3C, 4C, 5C, 6C	
Very Dense, gray, gravelly, silty SAND; moist to wet; (Qgm) SM.	29.0		7C	
Very dense, gray silty fine SAND; wet; (Qow) SM.	31.0		8C, 9C	
Very dense, gray silty, gravelly SAND, trace clay; moist to wet; (Qgm/Qt) SM.	34.0			
BOTTOM OF BORING COMPLETED 6/16/97 NOTE: The boring location was moved two times owing to obstructions encountered during drilling. This log is a compilation of these three explorations.	40.0		10C G	



● % Water Content

Plastic Limit ├─●─┤ Liquid Limit
Natural Water Content

LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- P Pitcher Barrel Sampler
- 3" O.D. Split Spoon Sample
- G Grab Sample
- Vibrating Wire Piezometer (VWP)
- VWP groundwater level
- Piezometer Screen
- Groundwater Level
- Annular Sealant
- Grout

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USC letter symbol based on visual classification.

Denny Way/Lake Union CSO Project
Elliott West Outfall
Seattle, Washington

LOG OF BORING OB-2

August 1998 W-7808-43

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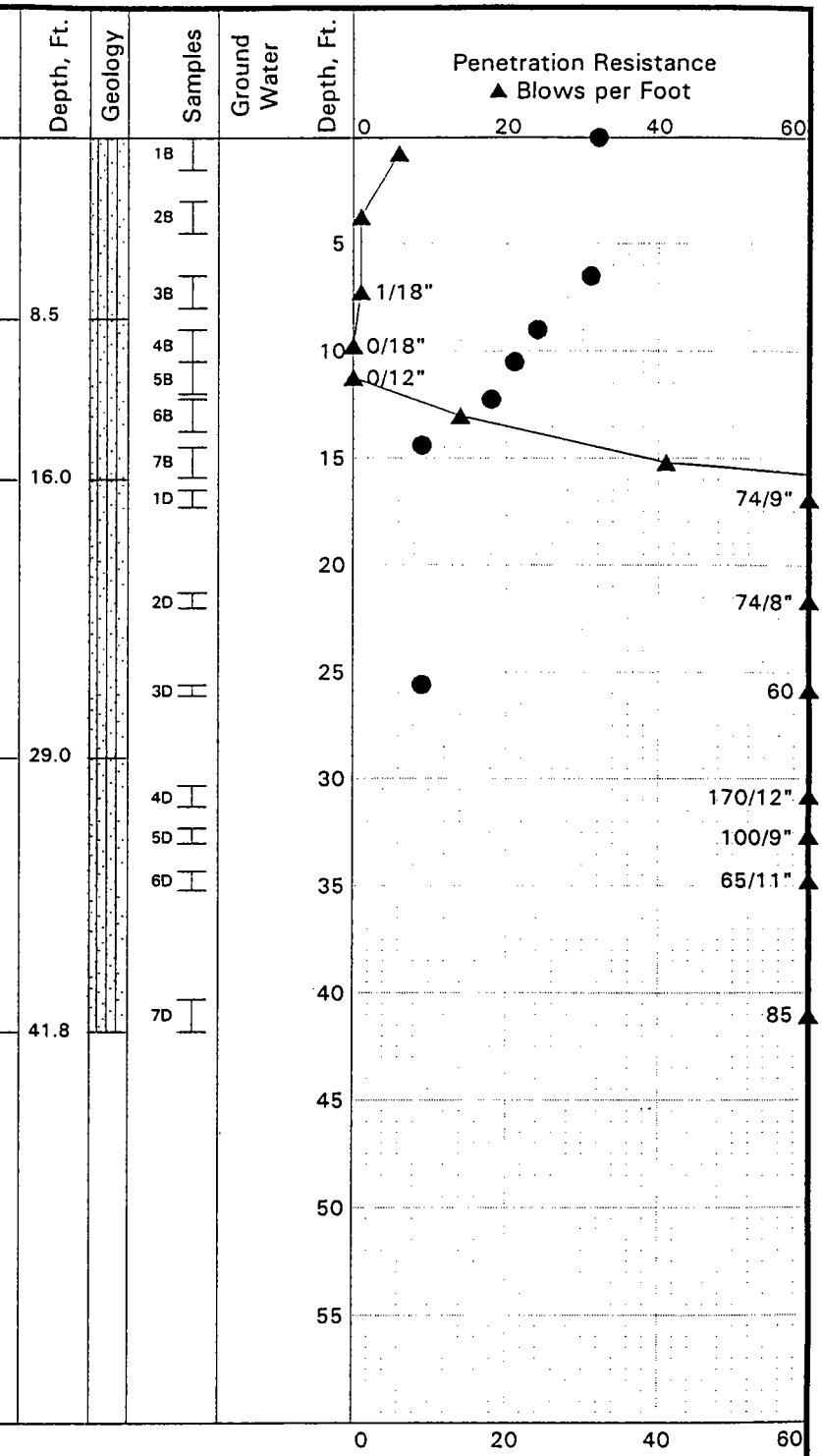
FIG. A-3

SOIL DESCRIPTION Surface Elevation: Approx. -44 Feet MLLW	Depth, Ft.
Loose to very loose, black to dark gray, silty, fine to medium SAND; wet; scattered organics and shell fragments; (Hf) SM/SP.	8.5
Very loose, gray, silty fine SAND grading to silty gravelly SAND; wet; numerous shell fragments; (Hb) SM.	16.0
Very dense, gray gravelly, silty SAND, trace clay; moist to wet; (Qgm) SM.	29.0
Very dense, green-brown, silty fine SAND; moist to wet; (Qow) SM.	41.8
BOTTOM OF BORING COMPLETED 6/18/97 NOTE: The boring location was moved three times owing to obstructions encountered during drilling. This log is a compilation of these four explorations.	



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- P Pitcher Barrel Sampler
- 3" O.D. Split Spoon Sample
- G Grab Sample
- Vibrating Wire Piezometer (VWP)
- VWP groundwater level
- Piezometer Screen
- Groundwater Level
- Annular Sealant
- Grout

● % Water Content

Plastic Limit ├─●─┤ Liquid Limit

Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USC letter symbol based on visual classification.

Denny Way/Lake Union CSO Project
Elliott West Outfall
Seattle, Washington

LOG OF BORING OB-3

August 1998 W-7808-43

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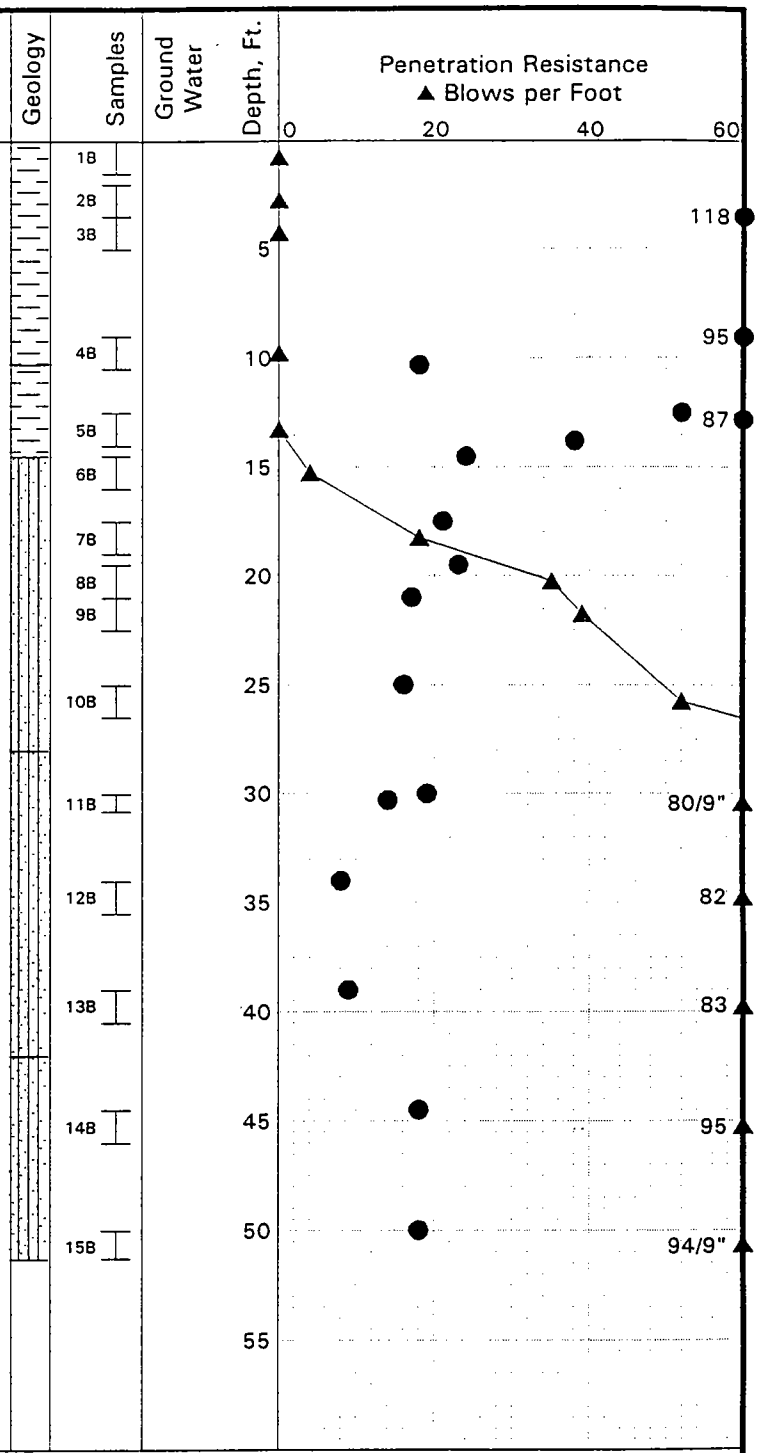
FIG. A-4

SOIL DESCRIPTION Surface Elevation: Approx. -59 Feet MLLW	Depth, Ft.
Very soft, dark gray to black, organic SILT, trace fine sand, trace gravel; wet; scattered organics; (Hf) OL.	10.3
Soft, black to brown, sandy organic SILT; wet; numerous organics; (Hm) OL.	14.5
Loose to very dense, gray to brown, silty fine to medium SAND, trace fine gravel; wet; trace shell fragments; (Hb) SM.	28.0
Very dense, dark gray to orange-brown, slightly silty, gravelly SAND grading to gravelly medium to coarse SAND; (Qow) SM.	42.0
Very dense, orange-brown to gray, silty, fine to medium SAND; moist to wet; occasional clay balls; (Qow) SM.	51.3
BOTTOM OF BORING COMPLETED 6/13/97 NOTE: This boring location was moved once owing to an obstruction encountered during drilling.	



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- P Pitcher Barrel Sampler
- 3" O.D. Split Spoon Sample
- G Grab Sample
- Vibrating Wire Piezometer (VWP)
- VWP groundwater level
- Piezometer Screen
- Groundwater Level
- Annular Sealant
- Grout

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USC letter symbol based on visual classification.

Denny Way/Lake Union CSO Project
Elliott West Outfall
Seattle, Washington

LOG OF BORING OB-4

August 1998 W-7808-43

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

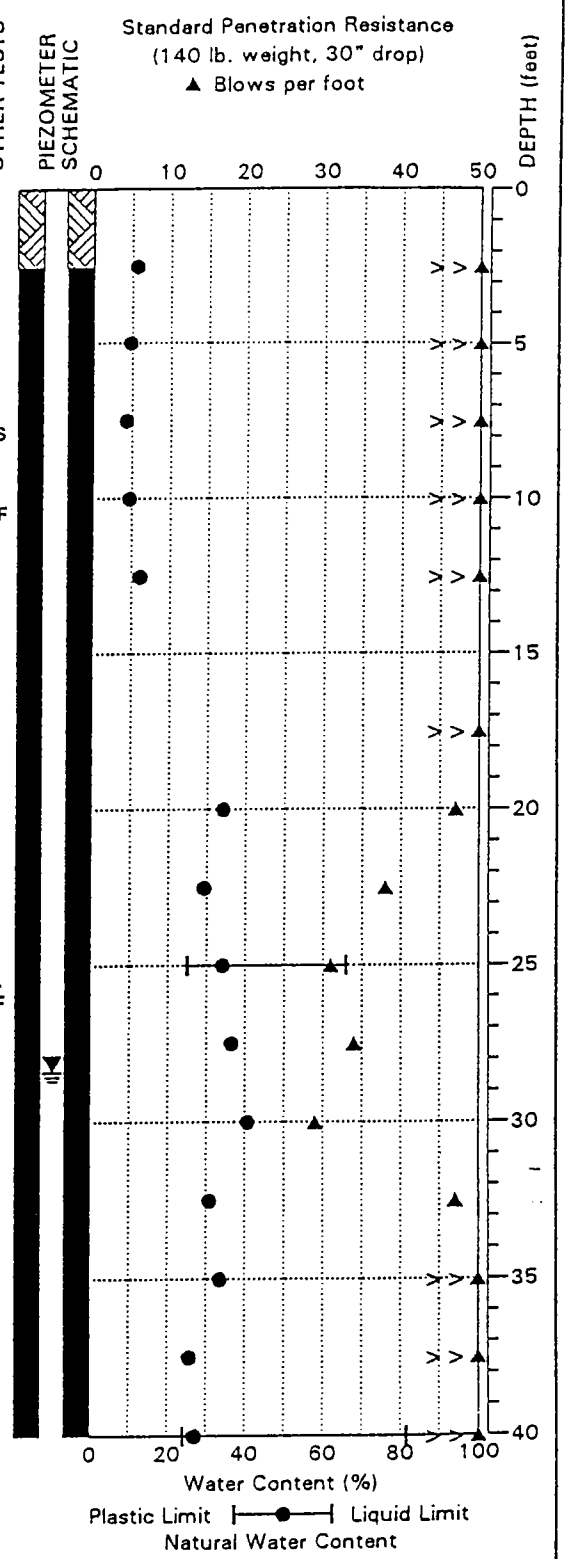
FIG. A-5

Contract B

DRILLING METHOD: 8-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 154 ± Feet

DATE COMPLETED: 8/21/97
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0			9 inches concrete pavement.				
		GM	Dense, brown, silty GRAVEL with sand, moist. (ROAD BASE)				
		ML	Hard, dark olive to greenish gray, sandy SILT, dry to moist. Slightly plastic. Some embedded gravel. (till-like)				
			(GLACIOMARINE DRIFT)				
					S-1	15-44-10/1"	
					S-2	31-125	
					S-3	19-88	GS
					S-4	12-25-39	%F
			At 13 feet, 1 inch lens of fine sand.		S-5	8-38-65/3"	
			Gravel/cobble layer at approximately 14 to 16 feet. No sample recovery.		S-6		
					S-7	84/6"	
		CH	Stiff to hard, dark olive to very dark gray, plastic CLAY with trace sand, moist. Occasional slickensides.		S-8	8-20-27	
			(GLACIOLACUSTRINE DEPOSITS)		S-9	9-17-21	
			At 26 feet, several flakes of wood.		S-10	6-12-19	AL %F
			At 27 feet, becomes gray. Occasional slickensides.		S-11	7-17-17	
					S-12	7-11-18	
					S-13	11-21-26	
					S-14	11-41-36	
			At 39 feet, fine silty SAND in lower 2 inches of sampler.		S-15	15-31-50	



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: BB- 1

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061

FIGURE: A-2

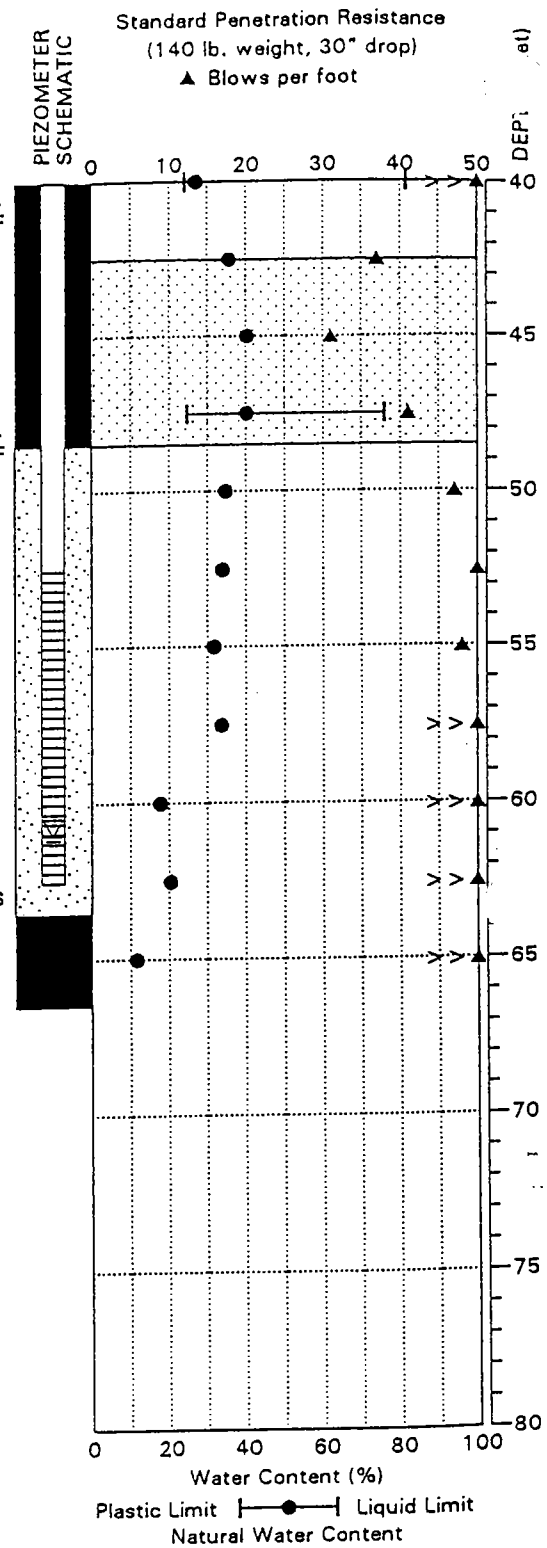
PZO DWB 5/1/98

DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 154 ± Feet

DATE COMPLETED: 5/21/97
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		CH	Hard, dark olive to very dark gray, plastic CLAY with trace sand, moist. Occasional slickensides. (GLACIOLACUSTRINE DEPOSITS)		S-16	13-26-30	AL %F
					S-17	5-14-23	
45					S-18	7-15-16	
					S-19	13-19-22	AL %F
50		CH	Hard, dark gray, plastic CLAY with lenses of fine sand, wet. Trace organics. (LACUSTRINE DEPOSITS) At 50.5 feet, 1/8" lense of fine sand and trace organics. At 53 feet, 2-1/2" layer of silty fine to medium sand. 1/2" layer of organics (peat) in sample.		S-20	10-21-26	
					S-21	12-21-29	
55					S-22	9-20-28	
					S-23	13-26-30	
60		SM	Very dense, gray, fine to medium silty SAND, moist to wet.		S-24	13-24-28	
		SM GM	Very dense, gray, interbedded fine slightly silty SAND with gravel, wet. Woody organics. (OUTWASH / ALLUVIUM DEPOSITS)		S-25	32-50/4"	GS
65					S-26	43-65/2"	
70							
75							
80							

Total Depth = 66.5 feet.
Refusal on cobble/boulder.
2" PVC piezometer installed to 62.5 feet.



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: BB- 1

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

PROJECT NO.: 97061 FIGURE: A-2

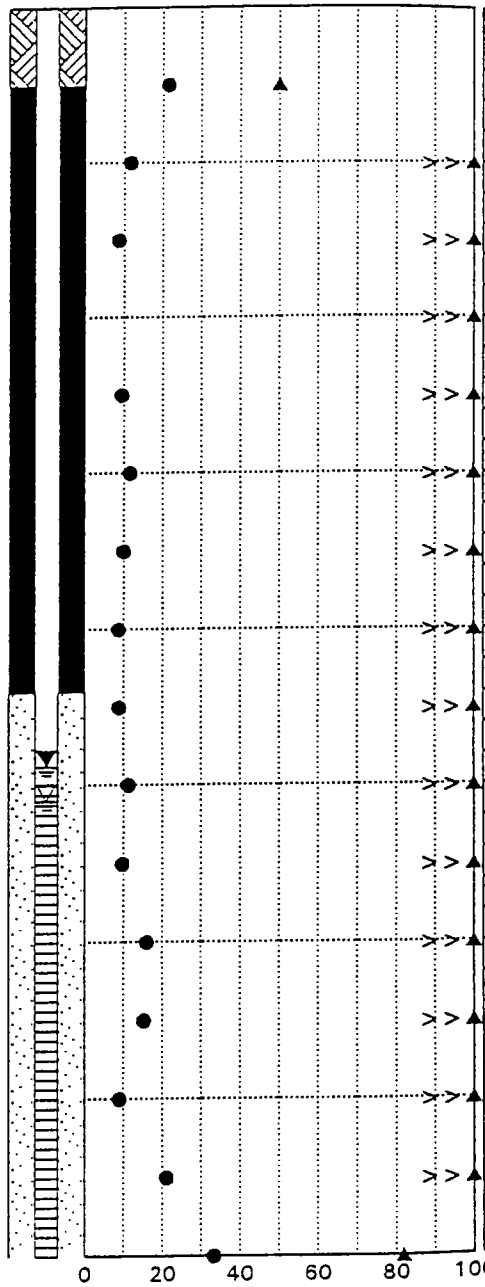
PZO DWB 5/1/98

DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 152 ± Feet

DATE COMPLETED: 8/23/97
LOGGED BY: GWE

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0		9 inches concrete pavement.			
	ML	Very stiff, light brown, SILT with scattered gravel, moist. (FILL)	S-1	14-11-14	
5	SM	Very dense, grayish brown, silty fine SAND with embedded round gravel, moist. Few silt laminae. Weathered. Low permeability. (GLACIOMARINE DRIFT)	S-2	18-23-31	
			S-3	41-28-47	
10		Sampler on cobble; no recovery.	S-4	21-46-38	
			S-5	13-23-44	GS
		At 14 feet, more abundant gravel.			
15	SM ML	Very dense, grayish brown mottled reddish brown, SILT, bedded with fine SAND and silty fine SAND, moist. Some gravel. (Till-like).	S-6	41-50/3"	
			S-7	28-50/4"	
20			S-8	40-50/3"	
			S-9	50-50/3"	
25	SM	Very dense, brownish gray, silty fine to medium SAND, wet. Some fine gravel. (Till-like)	S-10	14-31-50	GS
			S-11	42-50/5"	
30	SM	Very dense, gray, silty fine to medium SAND with scattered coarse sand and gravel to SILT with sand and gravel, wet. (ADVANCE OUTWASH)	S-12	22-50/5"	GS
			S-13	50/5"	
35	SM	Very dense, gray, silty fine SAND with embedded pebbles, wet. (Till-like) (GLACIOMARINE DRIFT)	S-14	50/5"	
	ML CL	Hard, greenish gray, SILT/CLAY with fine sand lenses, very moist. Massive to laminated.	S-15	17-41-40	
40					

PIEZOMETER SCHEMATIC



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BORING: BB- 2

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-3

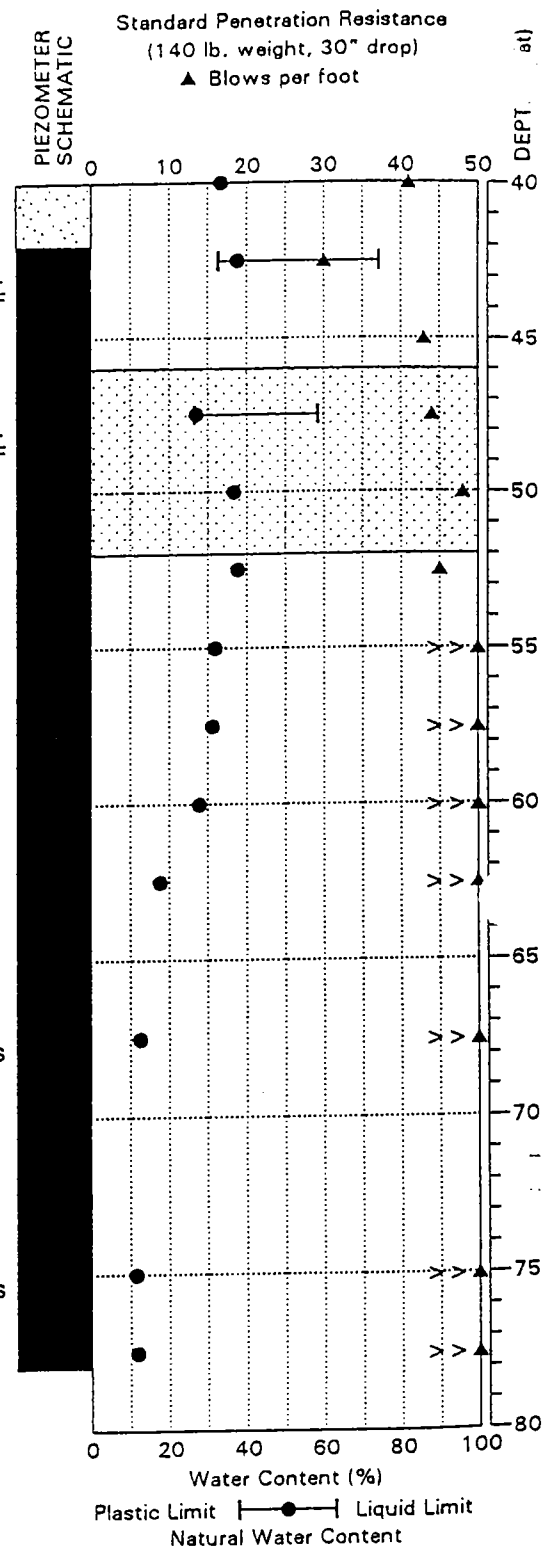
PZO DWB 5/1/98

DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 152 ± Feet

DATE COMPLETED: 8/23/97
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		CH	Hard, greenish gray, fat CLAY, moist. Slickensides. Massive. (GLACIOLACUSTRINE DEPOSITS)	S-16	9-16-25	
				S-17	8-13-17	AL %F
45				S-18	13-23-20	
		CH	Hard, greenish gray, sandy CLAY/SILT with embedded coarse sand and gravel, moist. (GLACIOMARINE DRIFT)	S-19	14-18-26	AL %F
50		MH CH	Hard, gray, clayey SILT/ silty CLAY with scattered woody organics, wet. Occasional slickensides and lenses of white silt, possibly volcanic ash. (GLACIOLACUSTRINE DEPOSITS)	S-20	12-18-30	
				S-21	9-18-27	
55		CH	Very dense, greenish gray, sandy CLAY, wet. Occassional slickensides. Faint layering.	S-22	11-22-35	
				S-23	15-30-45	
60		SW SM	Very dense, gray, fine to coarse SAND with silt and gravel, wet. Thin layer of organics near contact with silt above. (ADVANCE OUTWASH)	S-24	26-45-50/3"	
				S-25	15-50/2"	
65			Thin layer of clay / silt.	S-27	8-41-50	GS
70			Sampler on cobble; no recovery.	S-28		
			Sampler on cobble; no recovery.	S-29		
75		GP	Very dense, gray, GRAVEL with sand and trace silt to sand with gravel, wet.	S-30	12-50	GS
				S-31	50/4"	
80			Total Depth = 78 feet. 2" PVC piezometer installed to 40 feet.			

PIEZOMETER SCHEMATIC



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BORING: BB- 2

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

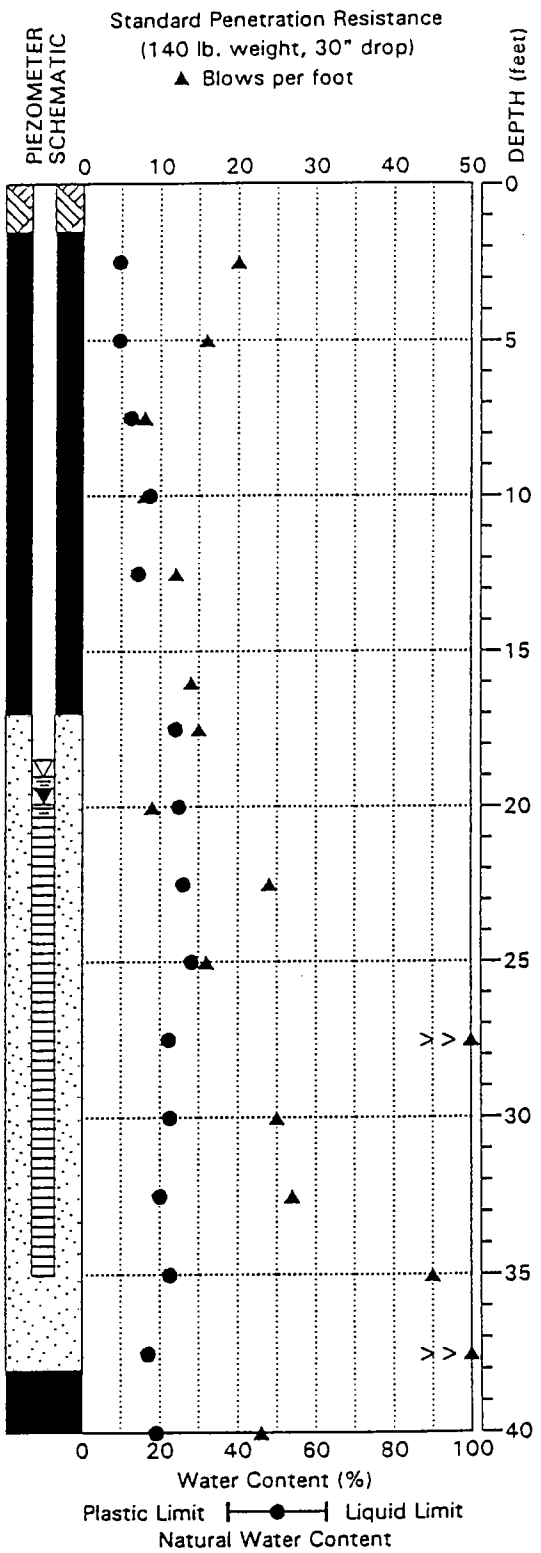
PROJECT NO.: 97061 FIGURE: A-3

PZO DWB 5/1/98

DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 137 ± Feet

DATE COMPLETED: 6/2/97
LOGGED BY: ST/AS

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0			7 inches asphalt over 7 inches concrete pavement.				
		SP	Medium dense, olive, fine to medium SAND, dry to moist. (FILL)		S-1	7-11-19	
5					S-2	5-7-9	
			Becomes loose.		S-3	4-3-5	
10		SP ML	Loose, gray, SAND, with layers of medium stiff, olive, SILT, moist. Wood fragments.		S-4	7-4-4	
		ML	Stiff to medium stiff, gray to greenish gray, sandy SILT, moist. Fragments of wood and charcoal.		S-5	7-5-2/2"	
15			Sampler on rock.		S-6	50/3"	
			No recovery - Samples S-6 and S-7 (possible lumber/logs).		S-7	11-7-7	
					S-8	5-5-10	
20		SM	Loose to medium dense, gray, silty fine to medium SAND, wet.		S-9	4-4-5	
					S-10	7-12-12	
25					S-11	8-8-8	
			Wood fragments in sample.		S-12	23-22-50/5"	
30		SP	Medium dense, grayish brown, fine to medium SAND, wet. (RECESSIONAL OUTWASH DEPOSITS)		S-13	4-8-17	GS
					S-14	3-6-21	
35			Becomes dense.		S-15	10-15-30	
		SP	Very dense, olive brown, fine to medium SAND with gravel, wet.		S-16	18-25-40	
40							



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BORING: BB- 3

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-4

PZO DWB 4/27/98

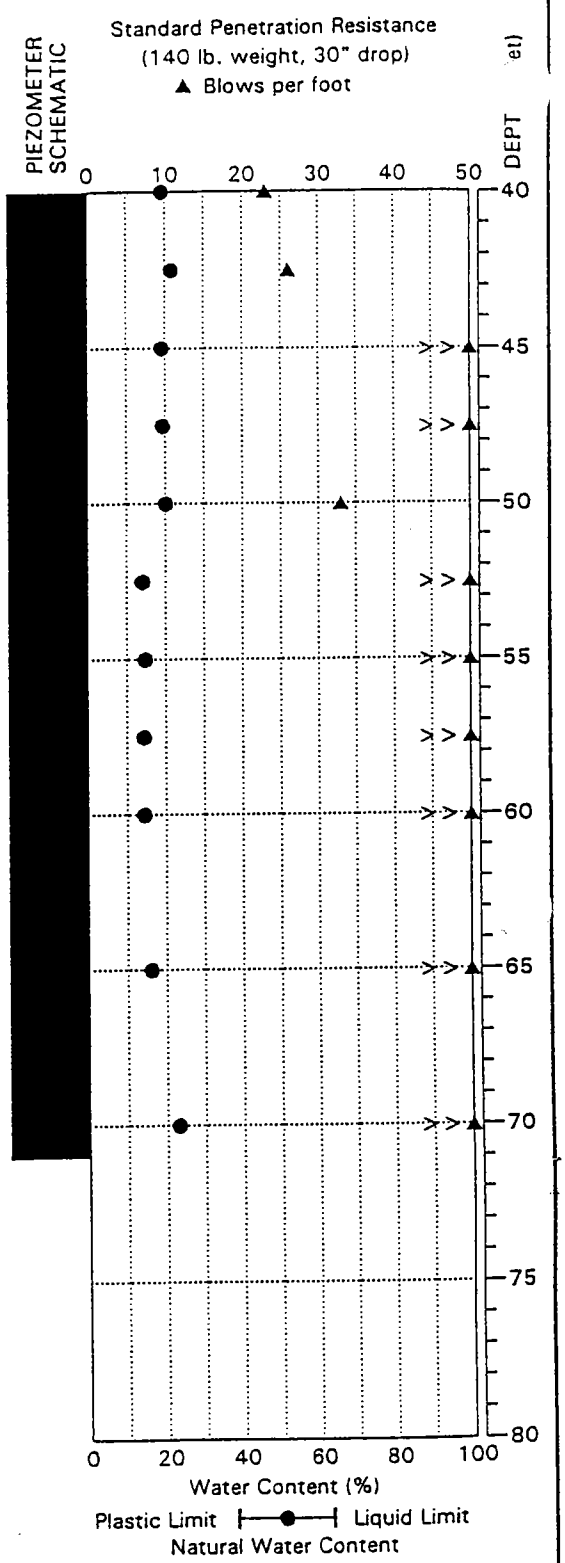
DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 137 ± Feet

DATE COMPLETED: 6/2/97
LOGGED BY: ST/AS

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		SP	Medium dense, olive, medium SAND, wet. (RECESSIONAL OUTWASH DEPOSITS)		S-17	3-5-18	
					S-18	5-9-17	
45		SP	Dense to very dense, olive, fine to medium SAND, wet. Some gravel. (OUTWASH / ALLUVIUM DEPOSITS)		S-19	31-50/3"	
					S-20	33-50/3"	
50					S-21	7-12-21	
			Becomes fine to coarse grained.		S-22	32-50/4"	
55					S-23	28-50/3"	
			Becomes dark gray.		S-24	31-50/4"	
60					S-25	9-31-40	
65					S-26	30-50/3"	
70					S-27	7-14-50/2"	
75							
80							

Total Depth = 71 feet.
2" PVC piezometer installed to 35 feet.

PIEZOMETER SCHEMATIC



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BORING: BB- 3

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

PROJECT NO.: 97061 FIGURE: A-4

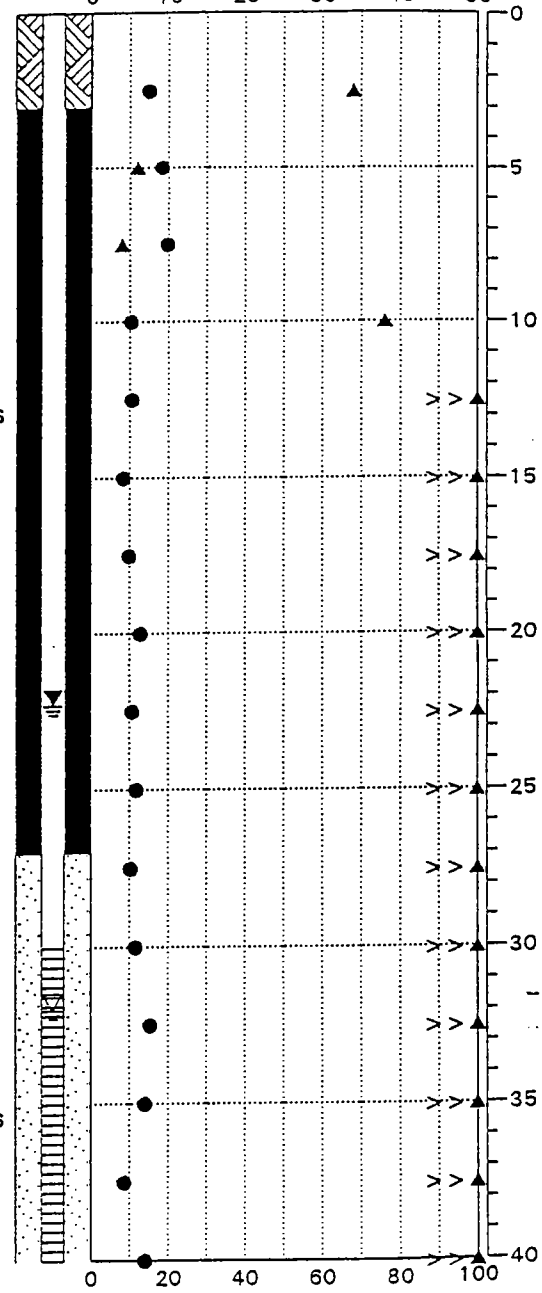
PZO OWB 4/27/98

DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 148 ± Feet

DATE COMPLETED: 6/27/97
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0			9 inches concrete pavement.				
		ML	Hard, greenish gray, sandy SILT, moist. Trace gravel. (FILL)		S-1	1-8-26	
5			Becomes soft to medium stiff, brown. Some organic silt in sample S-2. Roots in S-3. Mottled reddish brown.		S-2	2-3-3	
					S-3	1-1-3	
10		SM	Dense to very dense, grayish brown, silty fine SAND with scattered gravel, moist. Weathered. (Till-like) (GLACIOMARINE DRIFT)		S-4	13-19-19	
					S-5	23-40-50	GS
15		SM	Very dense, grayish brown, silty fine to medium SAND, wet. (ADVANCE OUTWASH)		S-6	18-50/3"	
					S-7	31-50/5"	
20			Thin silt layers. Becomes greenish gray.		S-8	16-50/5"	
					S-9	41-50/3"	
25			S-11 sample refusal on cobble.		S-10	64-50/2"	
					S-11	50/1"	
30					S-12	40-50/5"	
					S-13	30-54	
35		SM	Very dense, gray, silty fine to coarse SAND with scattered gravel. Non-plastic fines. (Till-like) (GLACIOMARINE DRIFT)		S-14	57-50/2"	GS
					S-15	40/1"	
40							

PIEZOMETER SCHEMATIC



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BORING: BB- 4

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-5

PZO OWB 5/1/98

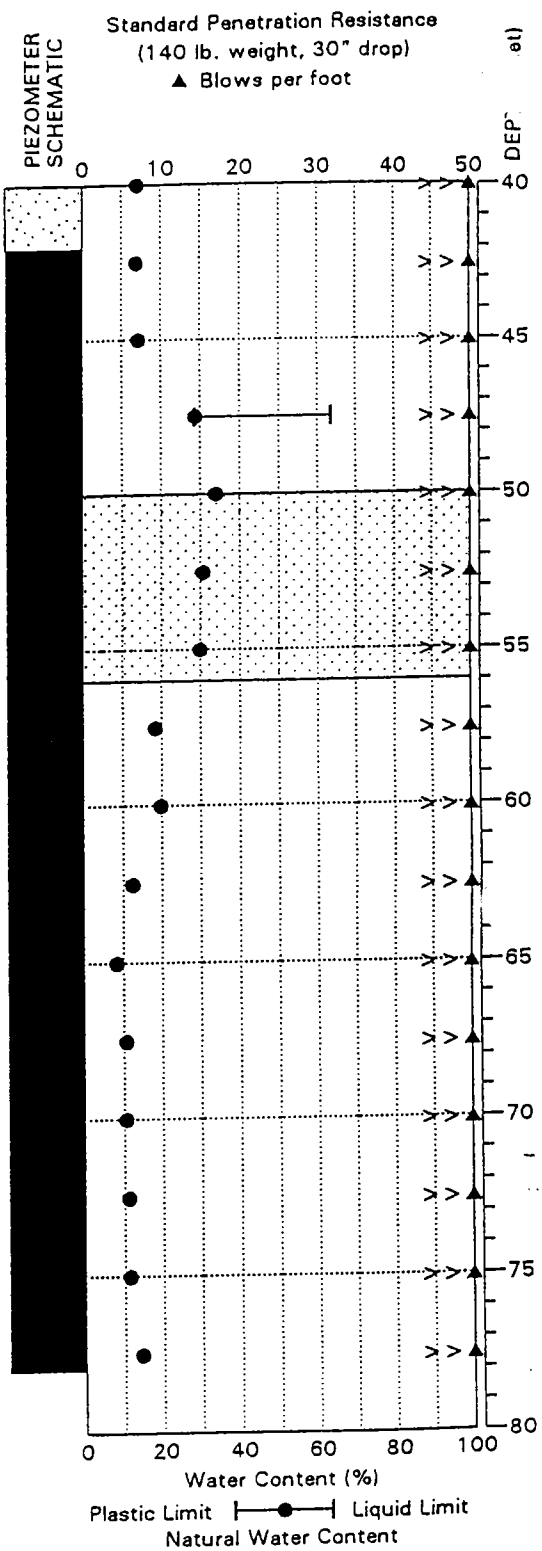
DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 148 ± Feet

DATE COMPLETED: [illegible]
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		SM	Very dense, gray, silty fine to coarse SAND with scattered gravel. Non-plastic fines. (Till-like)	S-16	53/6"	GS
			(GLACIOMARINE DRIFT)	S-17	50/6"	
45		ML	Hard, gray, SILT, wet. Embedded pebbles, laminated.	S-18	50/4"	
		CH	Hard, gray, elastic CLAY, moist. (GLACIOLACUSTRINE DEPOSITS)	S-19	22-37-49	AL %F
50			Few flakes of wood in sample. White silt chunks and laminations (ash?)	S-20	32-22-38	
				S-21	23-36-50/5"	
55		ML	Hard, gray, SILT, moist. Numerous woody organics and pockets of coarse sand and fine gravel. (LACUSTRINE DEPOSITS) At 57.5 feet, layer of silty fine sand.	S-22	22-35-50/4"	
				S-23	26-48-50/3"	GS
60				S-24	16-25-32	
		SM	Very dense, gray, silty SAND with gravel, moist. Becomes coarser with depth, and more silt/clay layers. (OUTWASH / ALLUVIUM DEPOSITS)	S-25	40-50/2"	
65				S-26	50/5"	
			At 67.5 feet, layer of silty gravel with sand.	S-27	50/6"	GS
70				S-28	50/6"	
				S-29	50/6"	
75			Sampler refusal on cobble.	S-30	50/3"	GS
				S-31	50/5"	
80						

Total Depth = 78 feet.
2" PVC piezometer installed to 40 feet.

PIEZOMETER SCHEMATIC



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BORING: BB- 4

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

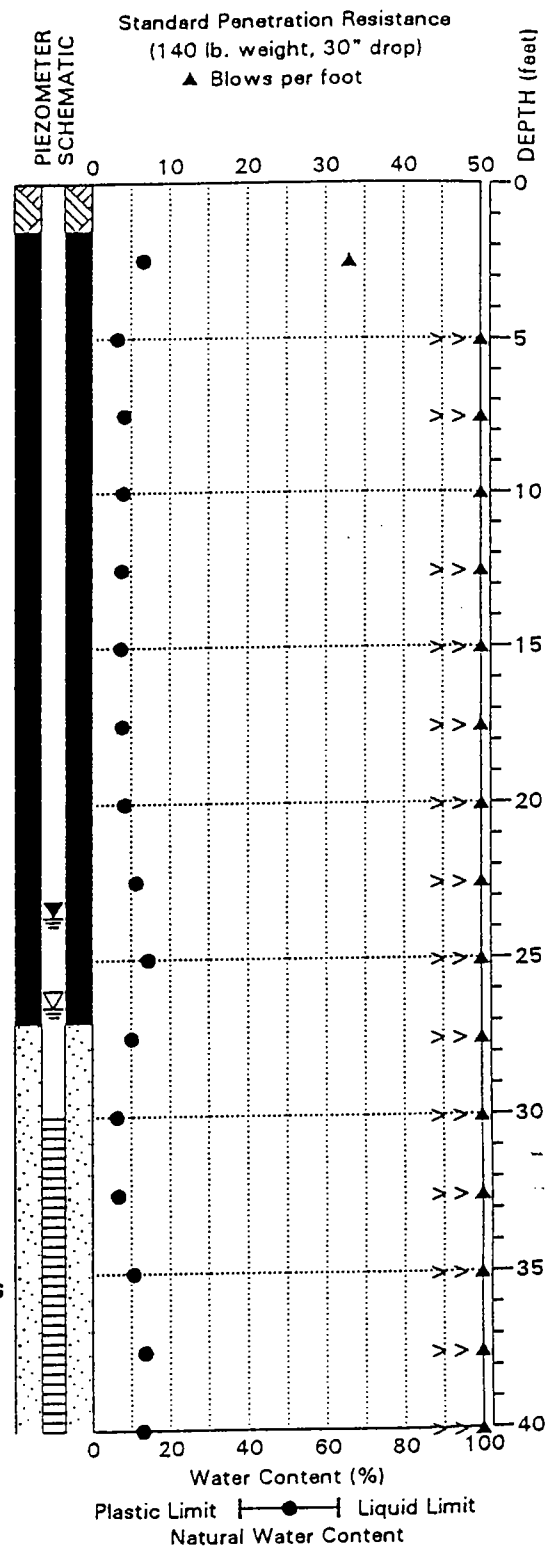
PROJECT NO.: 97061 FIGURE: A-5

PZO OWB 5/1/98

DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 146 ± Feet

DATE COMPLETED: 9/3/97
LOGGED BY: GWE

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0		8 inches concrete pavement.			
	SM	Dense, brown, silty fine SAND, moist. Scattered gravel. (FILL)	S-1	7-17-16	
5			S-2	23-50/4"	
	SM	Very dense, gray to brown, silty fine SAND with occasional embedded gravel, moist. (Till-like) (GLACIOMARINE DRIFT)	S-3	27-50/4"	
10			S-4	50/6"	
			S-5	50/5"	
15			S-6	49-50/2"	
			S-7	50/3"	
20			S-8	34-50/2"	
			S-9	50/5"	
25			S-10	37-50/4"	
	ML	Very dense, gray, sandy SILT with embedded gravel, wet.	S-11	50/5"	
30			S-12	50/5"	
		Sampler refusal on cobble.	S-13	30/1"	
35	SM	Very dense, gray, silty SAND, moist. (ADVANCE OUTWASH)	S-14	22-50/2"	GS
			S-15	34-50/4"	
40					



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BORING: BB- 5

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-6

PZO DWB 5/1/98

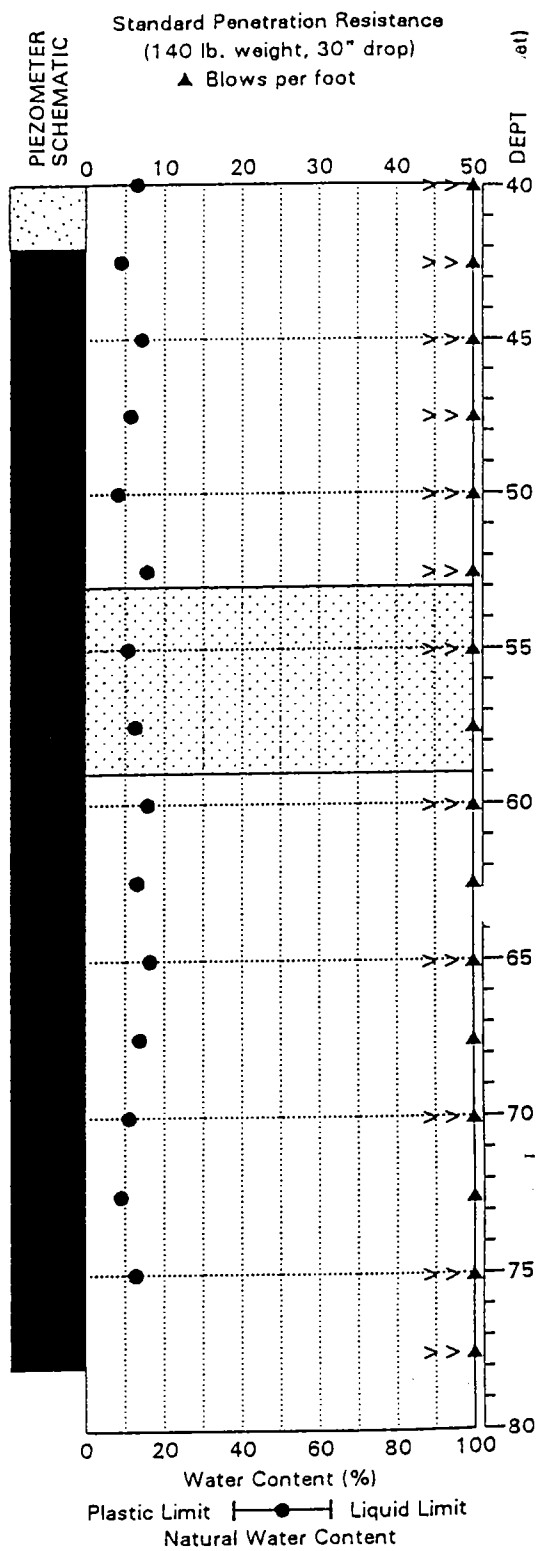
DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 146 ± Feet

DATE COMPLETED: 9/3/97
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		SM	Very dense, gray, silty fine SAND with embedded coarse sand and gravel, moist. Fines are occasionally plastic. (Till-like) (GLACIOMARINE DRIFT)		S-16	50/5"	
					S-17	50/4"	GS
45					S-18	57/6"	
					S-19	51/6"	
50					S-20	50/5"	GS
					S-21	50/5"	
55		SM ML	Very dense, gray, silty fine SAND to fine sandy SILT with trace gravel, moist. (Till-like)		S-22	42-50/3"	
					S-23	50/6"	
		SP	Very dense, gray, fine to medium SAND, wet. Some gravel. Layered. (OUTWASH / ALLUVIUM DEPOSITS)		S-24	26-50	
60					S-25	50/6"	
65					S-26	30-50/5"	
					S-27	50/6"	
70		SM	Very dense, gray, silty SAND with gravel, wet. Driller notes cobbles/boulders at 72 feet.		S-28	50/4"	
		SC	Very dense, gray, clayey SAND with gravel, wet. (GLACIOMARINE DRIFT)		S-29	50/6"	
75					S-30	50/5"	
					S-31	50/5"	
80							

Total Depth = 78 feet.
2" PVC piezometer installed to 40 feet.

PIEZOMETER SCHEMATIC



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BORING: BB- 5

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

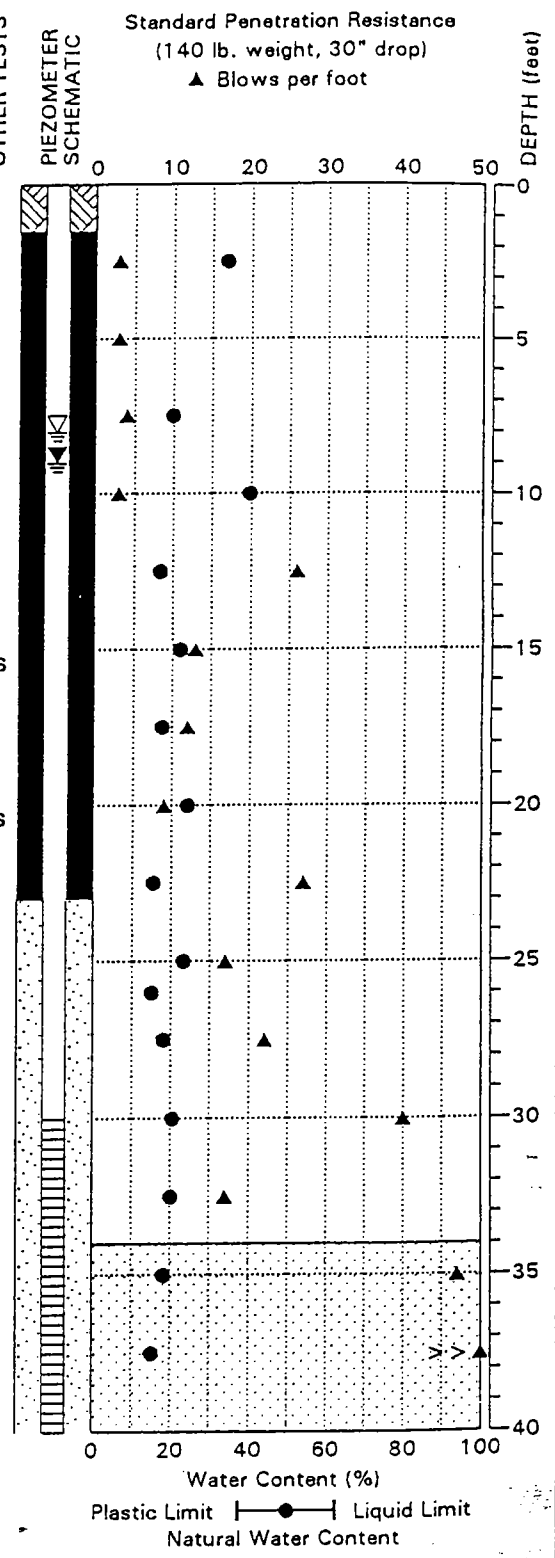
PROJECT NO.: 97061 FIGURE: A-6

PZO OW8 5/1/98

DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 125 ± Feet

DATE COMPLETED: 10/15/97
LOGGED BY: ADM/MLR

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	SM	Railroad tie over very loose, dark brown, silty SAND, very moist. Petroleum odor. (FILL)	S-1	1-1-2	
5	ML	Soft, very dark brown, sandy SILT, very moist.	S-2	1-1-2	
	SM	Loose to medium dense, gray, olive and dark brown mottled, silty fine to medium SAND, very moist to wet. Some gravel. Few silt layers. Trace wood chips / organics. Chunks of slickensided clay.	S-3	2-2-2	
10			S-4	1-1-1	
			S-5	4-12-14	
15	SM ML	Medium dense, gray silty SAND to sandy SILT, wet. At 19', brick fragments.	S-6	5-6-7	GS
			S-7	6-5-7	
20	SM	Loose to medium dense, mottled gray and dark brown, silty SAND, wet. Occasional small fragment of brick. Some wood chips/sawdust, gravel, and pockets of gray silt.	S-8	3-3-6	GS
			S-9	10-12-15	
25	SP	Medium dense to dense, gray, fine to coarse SAND, wet. At 33', pieces of glass, string and brick.	S-10 / S-10B	6-8-9	
			S-11	6-10-12	
30			S-12	10-15-25	
			S-13	6-7-10	
35	SP	Dense to very dense, gray, fine to medium SAND, wet. Some coarse gravel. (RECESSIONAL OUTWASH)	S-14	20-21-26	
40			S-15	30-32-36	



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BORING: BB- 6

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-7

PZO DWB 5/1/98

DRILLING COMPANY: [illegible]
DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 125 ± Feet

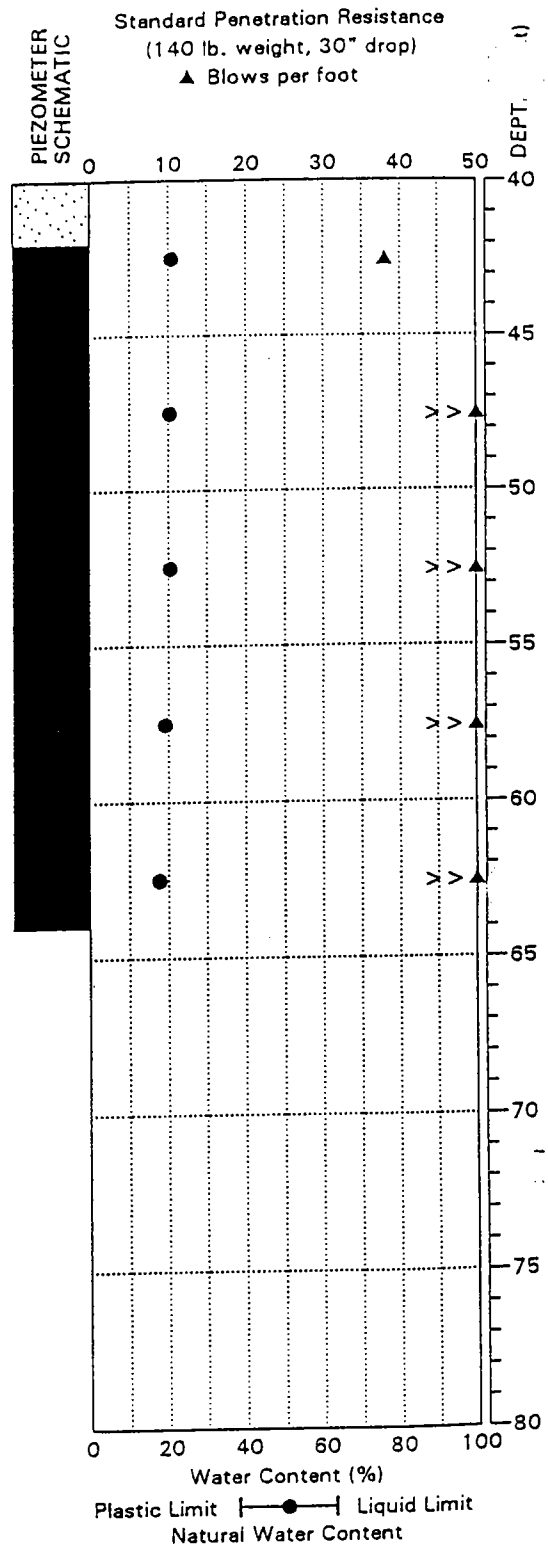
DATE COMPLETED: 10/15/97
LOGGED BY: ADM/MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)
40			Dense to very dense, fine to medium SAND, wet. Some coarse gravel.		
			(RECESSIONAL OUTWASH) Occasional nodule of silt.	S-16	16-18-20
45				S-17	20-50/5"
50				S-18	42-50/5"
55			Lenses of gray silt.	S-19	25-30-36
60		SP SM	Very dense, gray, fine to medium SAND with silt, wet.	S-20	36-50/4"
65					
70					
75					
80					

Total Depth = 64 feet.
2" PVC piezometer installed to 40 feet.

OTHER TESTS

PIEZOMETER SCHEMATIC



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BORING: BB- 6

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PROJECT NO.: 97061

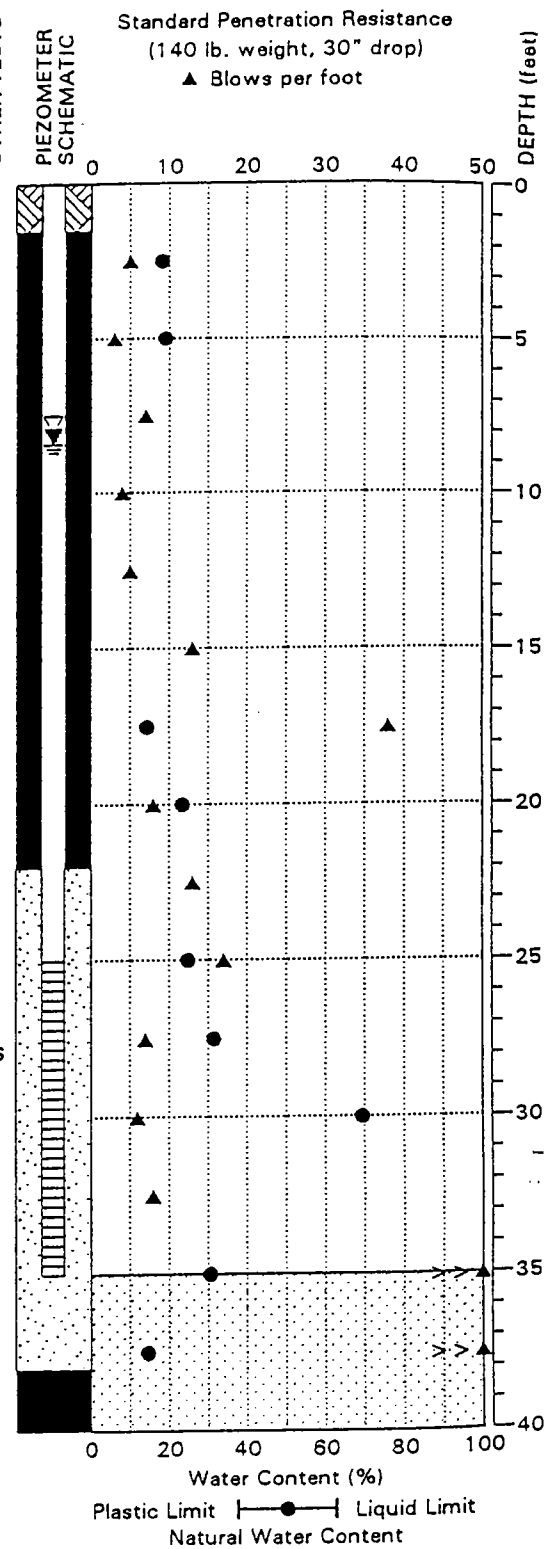
FIGURE: A-7

PZO DWB 5/1/98

DRILLING COMPANY: Hokkaido Drilling
DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 125 ± Feet

DATE COMPLETED: 6/4/97
LOGGED BY: ADM/RCD

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0		4 inches asphalt pavement.			
	SM SC	Loose to very loose, gray brown mottled, silty/clayey SAND, moist. Some gravel. (FILL)	S-1	5-2-3	
5			S-2	1-1-2	
			S-3	3-2-5	
10	SM	Loose, brownish gray, silty SAND, wet. Wood fibers. Some gravel.	S-4	1-1-3	
			S-5	5-1-4	
15	SM	Medium dense to dense, brownish gray, silty fine to coarse SAND with gravel, wet. Abundant wood fragments (lumber). Piece of wire in sample S-7.	S-6	6-6-7	
			S-7	5-13-25	
20	SM SC	Loose to medium dense, gray mottled light brown, silty/clayey SAND with gravel, wet. Minor wood.	S-8	2-1-7	
			S-9	8-5-8	
25	SM	Loose to medium dense, gray, silty SAND, wet. Few layers /inclusions of gray silt.	S-10	11-8-9	
			S-11	6-4-3	GS
30	SP	Loose, dark gray to black, medium to coarse SAND with gravel, wet. Possible ash. Becomes fine to coarse. No gravel. At 35 feet, piece of 1/4" diameter wire.	S-12	1-2-4	
			S-13	1-4-4	
35	SM	Very dense, brownish gray, silty fine SAND, wet. (RECESSIONAL OUTWASH)	S-14	25-50	
	SP	Dense to very dense, gray, fine to medium SAND with scattered gravel, wet.	S-15	43-50/4"	
40					



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: BB- 7

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061

FIGURE: A-8

PZO OWB 5/1/98

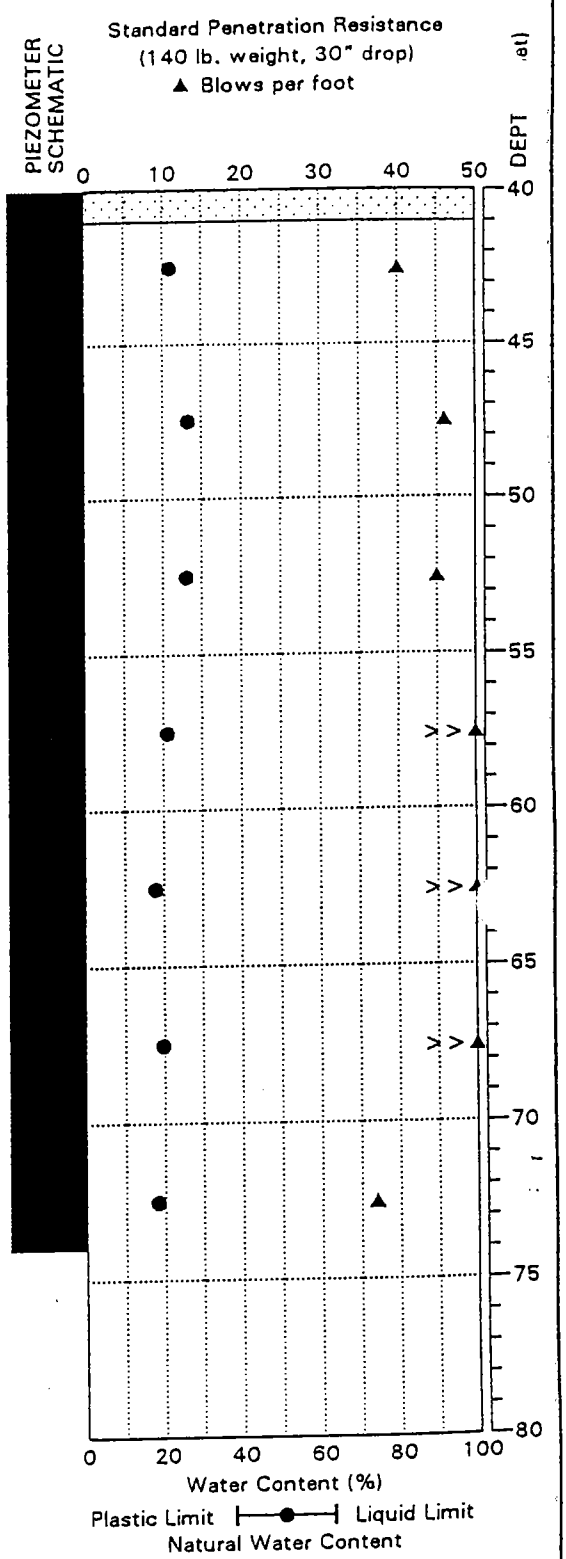
DRILLING COMPANY: [illegible]
DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 125 ± Feet

DATE COMPLETED: 6/4/97
LOGGED BY: ADM/RCD

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		SP	Dense to very dense, gray, fine to medium SAND with scattered gravel, wet. (RECESSIONAL OUTWASH)		S-16	9-9-31	
45		SP ML	Hard, gray non-plastic SILT with layers of very dense, gray, fine to medium SAND, wet.		S-17	6-14-32	
50					S-18	9-21-24	
55					S-19	20-38-50	
60							
		SP	Dense to very dense, gray, fine SAND with trace silt, wet. (ADVANCE OUTWASH)		S-20	16-27-28	
65					S-21	16-40-45	
70							
					S-22	7-9-28	
75							
80							

Total Depth = 74 feet.
2" PVC piezometer installed to 35 feet.

PIEZOMETER SCHEMATIC



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BORING: BB- 7

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

PROJECT NO.: 97061

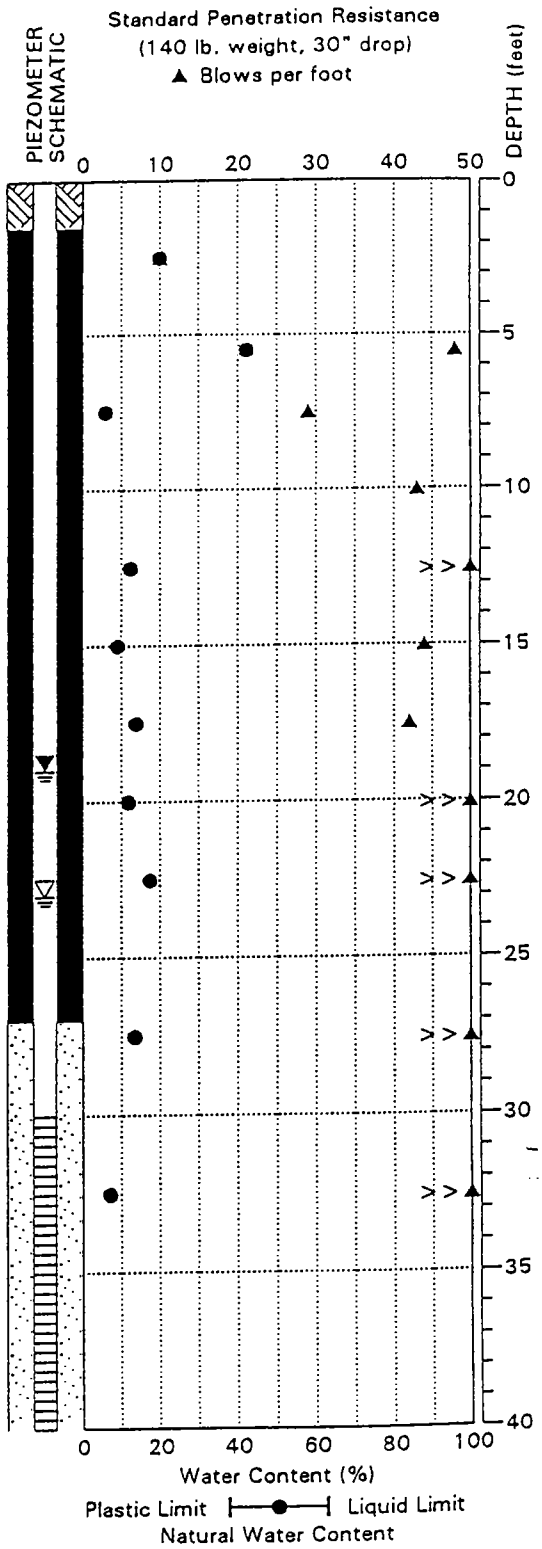
FIGURE: A-8

PZO DWB 5/1/98

DRILLING COMPANY: Hokkaido Drilling
DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 142 ± Feet

DATE COMPLETED: 6/6/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0			4 inches asphalt over 6 inches concrete pavement.			
		ML	Loose, very dark brown, sandy SILT with gravel, moist. (FILL)	S-1	2-5-5	
5		SM	Medium dense to dense, dark brown to black, silty fine to coarse SAND with gravel, moist. Few cobbles.	S-2	9-18-30	
				S-3	10-14-15	
10			Rock in tip of sampler.	S-4	9-18-25	
		SP SM	Very dense, brown, SAND with silt and gravel, very moist. Slightly weathered. (Till-like) (GLACIOMARINE DRIFT)	S-5	15-31-50/4"	
15		SM	Dense to very dense, grayish brown, silty fine SAND with embedded pebbles, very moist. Faint layering. (Till-like)	S-6	23-20-24	
				S-7	8-12-30	GS
20				S-8	36-50-50	
				S-9	37-31-50	
		SP	Very dense, grayish brown, medium to coarse SAND, wet. Some gravel.			
25		SM	Very dense, grayish brown, silty fine to coarse SAND with embedded gravel, wet.	S-10	28-50/3"	
30		SP SM	Very dense, gray, SAND with silt and gravel, wet. (ADVANCE OUTWASH)	S-11	50/3"-50/3"	GS
35		SP	Very dense, gray, SAND, wet. Sand heaved approximately 12 feet into augers prior to sampling. Unable to remove soil plug. Soil type (SP) is inferred.			
40						



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BORING: BB- 8

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061

FIGURE: A-9

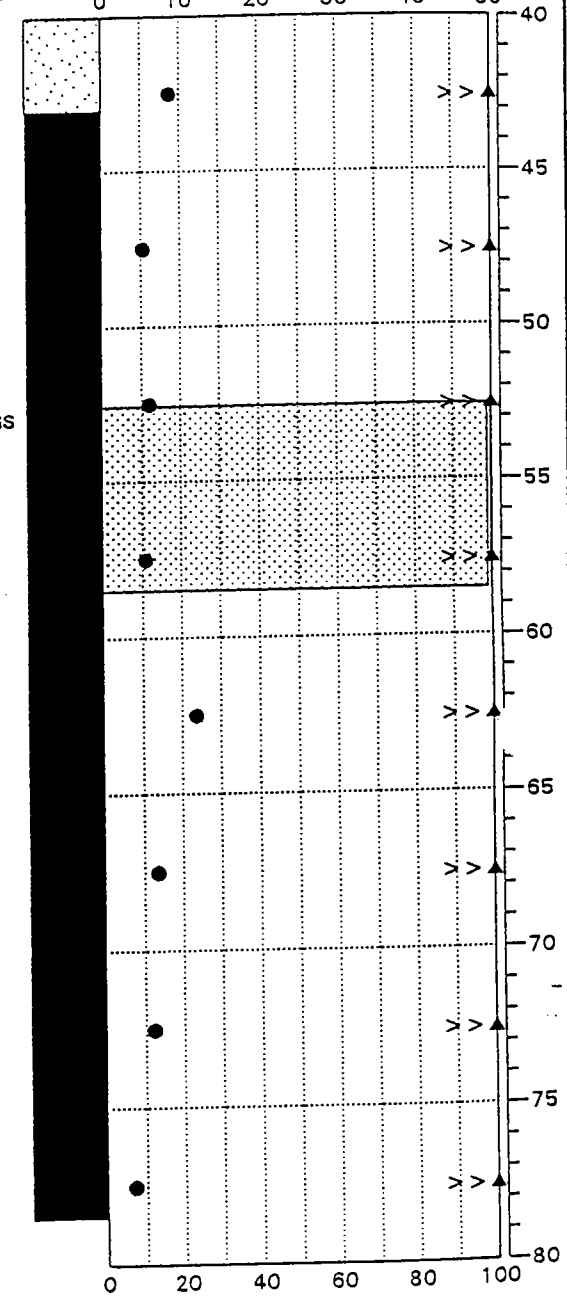
PZO DWB 4/24/98

DRILLING COMPANY: [illegible]
DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 142 ± Feet

DATE COMPLETED: 6/6/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		SM	Very dense, gray, silty fine to coarse SAND, wet. Few fine gravel. (GLACIOMARINE DRIFT)	S-12	50/2"-50/1"	
45				S-13	50/3"-50/2"	
50			Becomes fine grained.	S-14	50/4"-50/2"	GS
			Becomes silty sand.			
55		ML	Hard, gray, fine sandy SILT with embedded fine gravel, wet. Slightly plastic fines. (Till-like)	S-15	50/5"-40/1"	
60		ML	Very hard, gray, SILT, wet. (GLACIOLACUSTRINE DEPOSITS)	S-16	30-50/5"	
65			Trace of fine gravel.	S-17	14-49-50/3"	
70		SC	Very dense, olive gray, clayey SAND with gravel, wet. (GLACIOMARINE DRIFT)	S-18	19-50/4"	
75		GC	Very dense, greenish gray to grayish green, clayey GRAVEL with sand, wet. Some coarse gravel to 1".	S-19	70-150	
80			Total Depth = 78.5 feet. 2" PVC piezometer installed to 40 feet.			

PIEZOMETER SCHEMATIC



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BORING: BB- 8

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PROJECT NO.: 97061 FIGURE: A-9

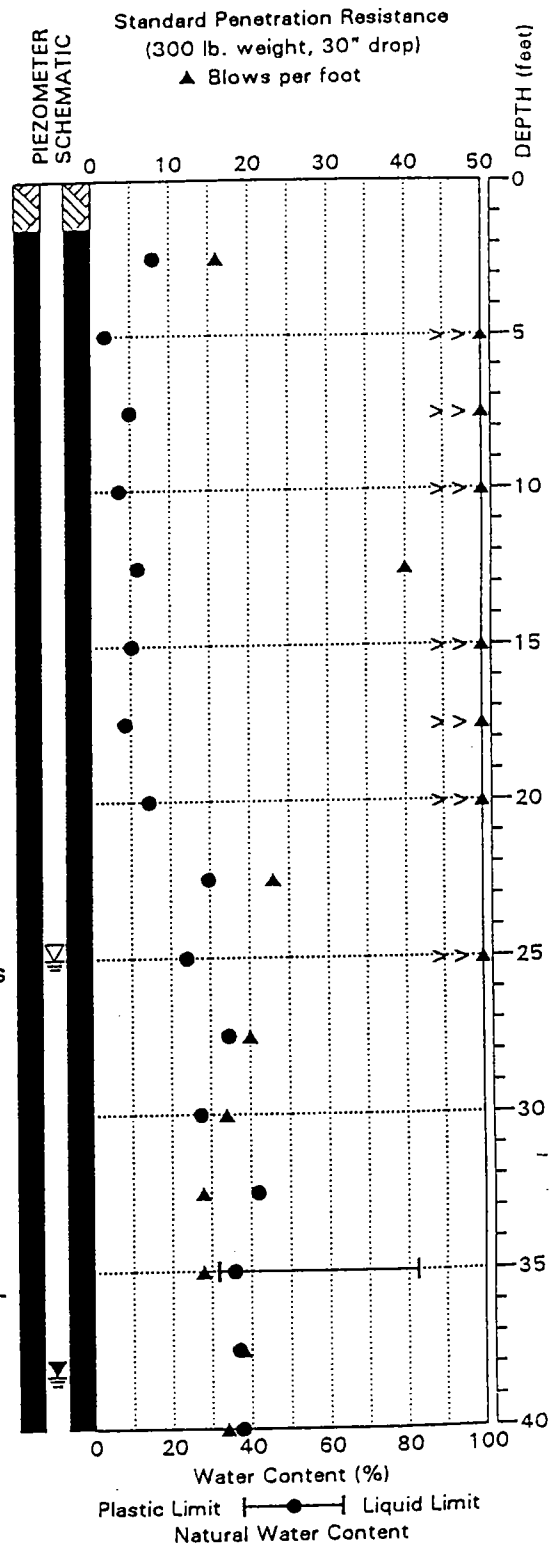
PZO DWB 4/24/98

DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 156 ± Feet

DATE COMPLETED: [illegible]
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0			10 inches concrete pavement.				
		SM	Medium dense, olive, silty fine to medium SAND with gravel, moist. Several 2-4" layers of silt with gravel. (GLACIOMARINE DRIFT)		S-1	4-8-8	
5		GP	Very dense, grayish brown, slightly silty sandy fine to coarse GRAVEL, moist. Gravel 2" minus. Sand fine to coarse.		S-2	14-24-40	
		ML	Hard, gray, sandy SILT with gravel, moist. Embedded 2" minus gravel.		S-3	22-34 50/4"	
10			At 10 feet, gray and brown mottled.		S-4	50/6"	
			At 12.5 feet, dark gray speckled black. Embedded 1/2" minus gravel.		S-5	8-18-22	
15					S-6	11-40-45	
					S-7	32-50/2"	
20			At 20 feet, becomes gravelly.		S-8	26-28-28	
		CL	Hard, dark gray, lean CLAY, moist. (GLACIOLACUSTRINE DEPOSITS)		S-9	6-10-13	
25		SM	Very dense, dark gray, fine silty SAND, wet. Massive.		S-10	22-34-40	GS
		CH	Very stiff to hard, dark gray, fat CLAY, moist.		S-11	6-9-11	
30					S-12	3-11-6	
			At 32.5 feet, few chips of decomposed wood.		S-13	3-5-9	
35			At 35 feet, becomes streaked with light brown and light gray fine sand and ash.		S-14	3-4-10	AL
					S-15	3-6-13	
40							

PIEZOMETER SCHEMATIC



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BORING: BB- 9

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 3

PROJECT NO.: 97061

FIGURE: A-10

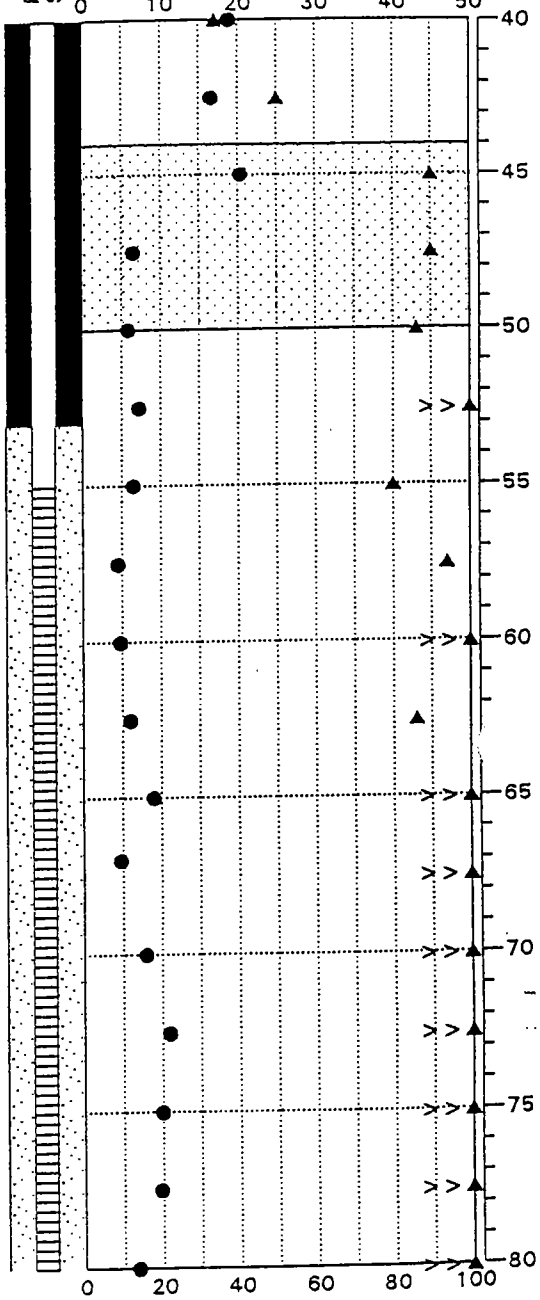
PZ0300 DWB 5/1/98

DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 156 ± Feet

LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40				S-16	5-6-11	
		CH	Hard, dark gray, lean CLAY, moist. Abundant organics (decomposed wood). (LACUSTRINE DEPOSITS)	S-17	4-9-16	
45		SP SM	Dense, greenish gray to brown, slightly silty, gravelly, fine to coarse SAND, very moist. Abundant wood fragments. (GLACIOMARINE DRIFT)	S-18	9-16-29	
		SC	Dense, olive gray, gravelly clayey fine to coarse SAND, moist. Some organics (wood fragments).	S-19	6-16-29	
50				S-20	7-14-29	GS
			At 52.5 feet, 2" minus pieces of partially decomposed granite.	S-21	9-17-38	GS
55			At 55 feet, sand becomes fine to coarse, wet.	S-22	8-16-24	
		SM	Dense to very dense, greenish gray, gravelly, silty fine to coarse SAND, wet.	S-23	6-21-26	
60				S-24	12-25-48	GS
				S-25	11-18-25	
65		SP SM	Very dense, dark gray, slightly gravelly, slightly silty fine to coarse SAND, wet. (OUTWASH DEPOSITS)	S-26	28-23-50	GS
			At 67.5 feet, slightly silty and gravelly. Fine gravel.	S-27	6-50/5"	
70			At 70 feet, sand becomes fine to medium grained.	S-28	21-48 50/1"	
			At 72.5 feet, becomes yellowish brown.	S-29	21-50/3"	
75				S-30	28-50/3"	
			At 77.5 feet, few silt laminae.	S-31	28-50/3"	
80		SM	See next page for description.			

PIEZOMETER SCHEMATIC



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BORING: BB- 9

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 3

PROJECT NO.: 97061 FIGURE: A-10

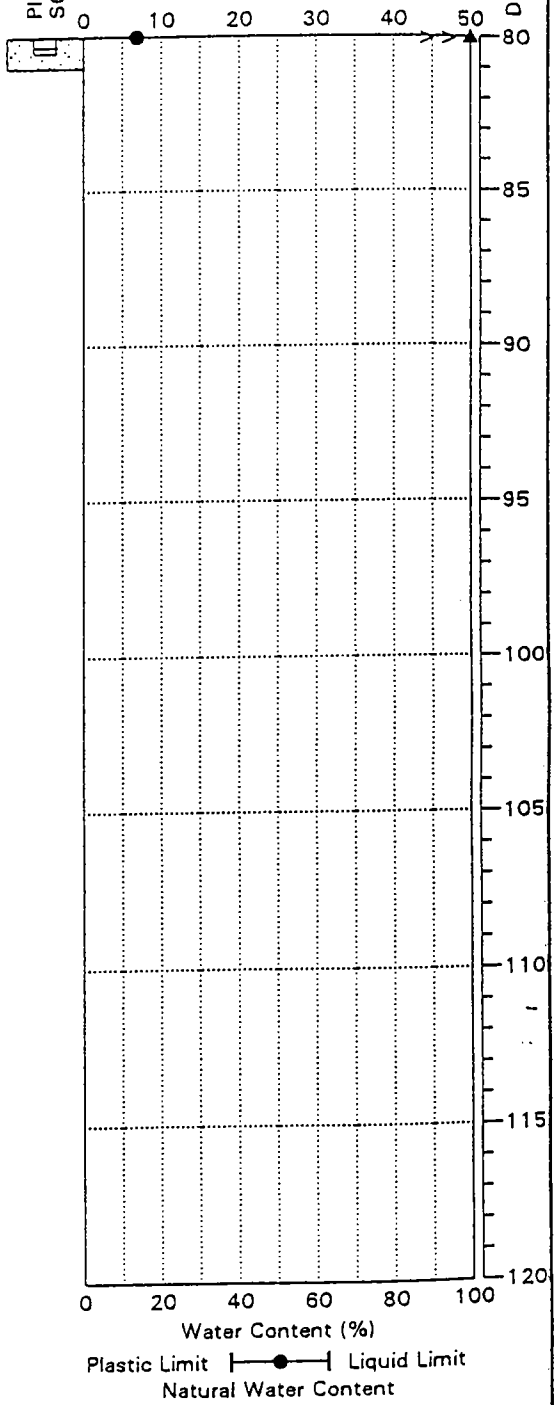
PZO300 DWB 5/1/98

DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 156 ± Feet

DATE COMPLETED: 5/12/98
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PIEZOMETER SCHEMATIC
80			Very dense, dark greenish gray, silty gravelly SAND, wet.		S-32	40-50/2"		
			Total depth = 81 feet.					
85								
90								
95								
100								
105								
110								
115								
120								

Standard Penetration Resistance
(300 lb. weight, 30" drop)
▲ Blows per foot



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BORING: BB- 9

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

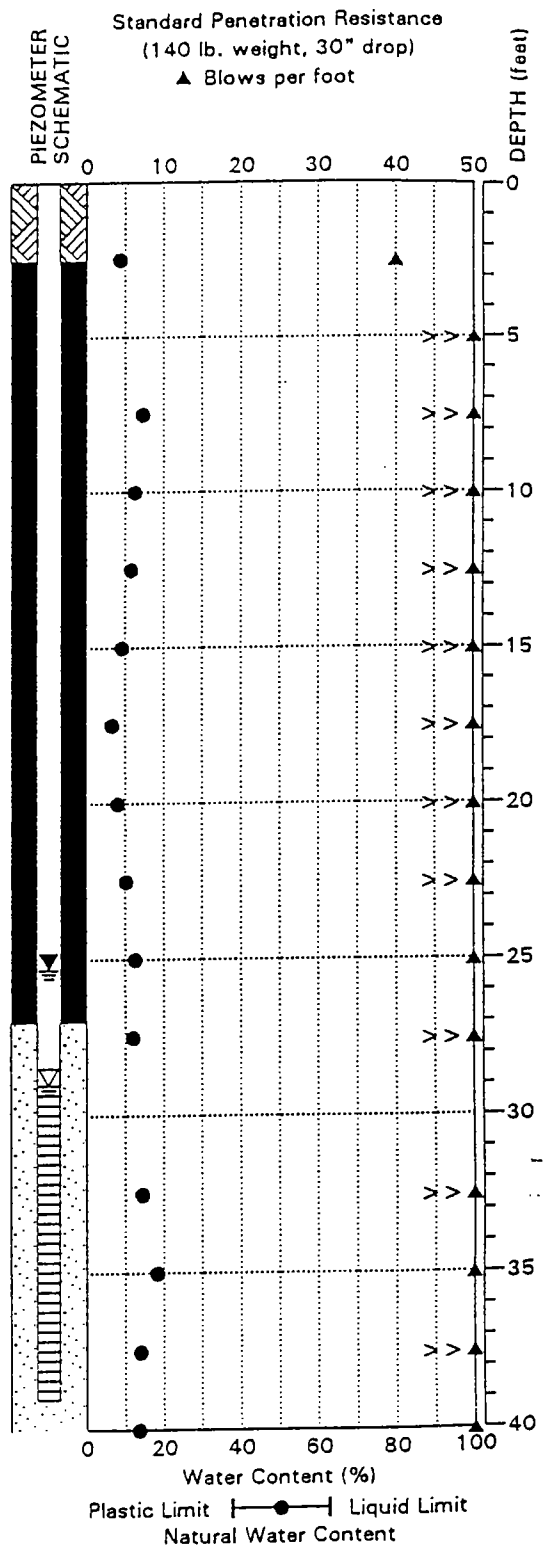
PROJECT NO.: 97061 FIGURE: A-10

PZO300 DWB 5/1/98

DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 153 ± Feet

DATE COMPLETED: 8/29/97
LOGGED BY: GWE

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0		8 inches asphalt over 7 inches concrete pavement.			
	SM	Dense to very dense, brownish gray, silty fine SAND, moist. Some embedded gravel.	S-1	14-26	
		(GLACIOMARINE DRIFT)			
5		Sampler refusal on cobble.	S-2	16-19-50/5"	
		Reddish brown vertical striations in sample.	S-3	22-50/5"	GS
10		At 10 feet, faint layering starts.	S-4	19-50/4"	
			S-5	28-50/4"	
15			S-6	36-50/3"	
			S-7	50/5"	GS
20		At 20 feet, possible ash layer.	S-8	45-50/4"	
			S-9	31-50/3"	
25			S-10	50/6"	
		Sample mottled reddish brown.	S-11	41-50/4"	
30		Sampler refusal on cobble.			
	ML	Hard, brownish gray, sandy SILT with embedded pebbles, moist.	S-13	50/6"	
35	SP ML	Very dense, gray, fine to medium SAND, wet. Some fine gravel. Interbeds of gray SILT.	S-14	32-36 50/4	
		(OUTWASH / ALLUVIUM DEPOSITS)	S-15	50/6"	
40	SM ML	See next page for description.			



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BORING: BB-10

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061

FIGURE: A-10

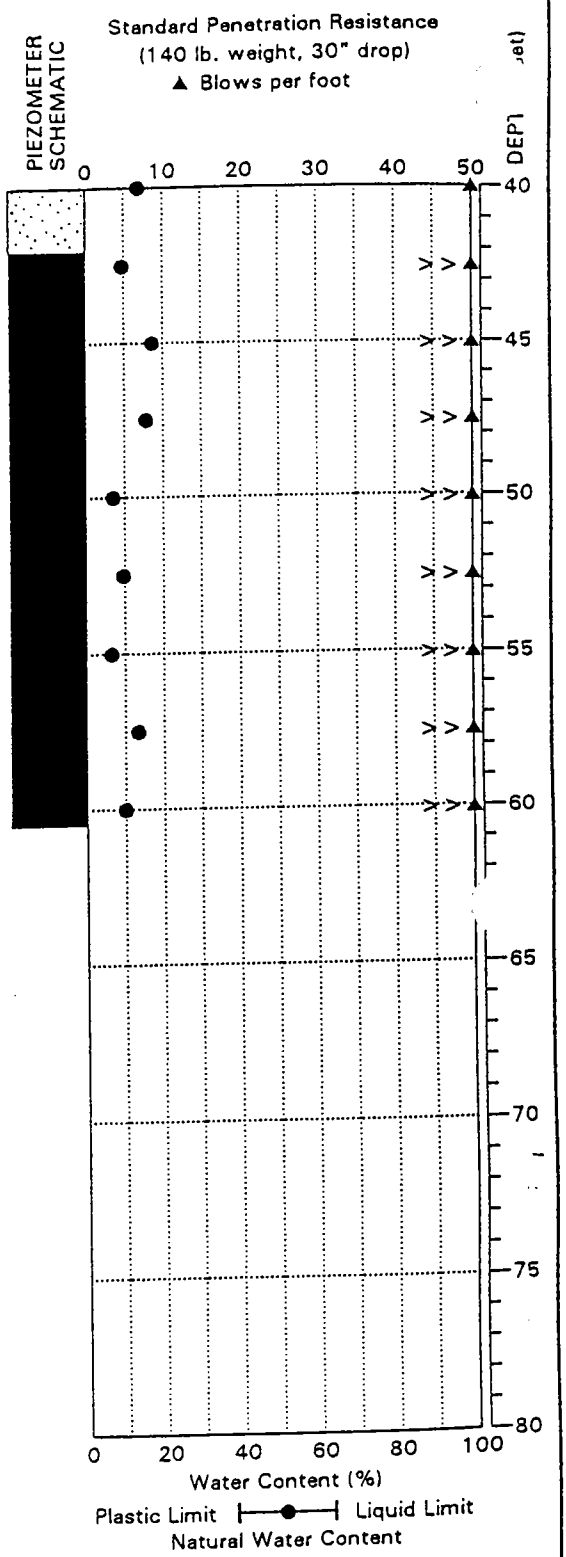
PZO DWB 5/1/98

DRILLING COMPANY: [illegible]
DRILLING METHOD: B-61 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 153 ± Feet

DATE COMPLETED: 8/29/97
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			Very dense, greenish gray, silty fine SAND to sandy SILT, moist. Some embedded gravel.		S-16	50/5"	%F
			(GLACIOMARINE DRIFT)		S-17	50/4"	
45			At 45 feet, faint layering.		S-18	50/5"	
					S-19	50/5"	
50					S-20	50/4"	GS
					S-21	50/4"	
55					S-22	50/3"	
					S-23	50/5"	
60					S-24	50/4"	

Total Depth = 60.5 feet.
2" PVC piezometer installed to 39 feet.



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BORING: BB-10

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

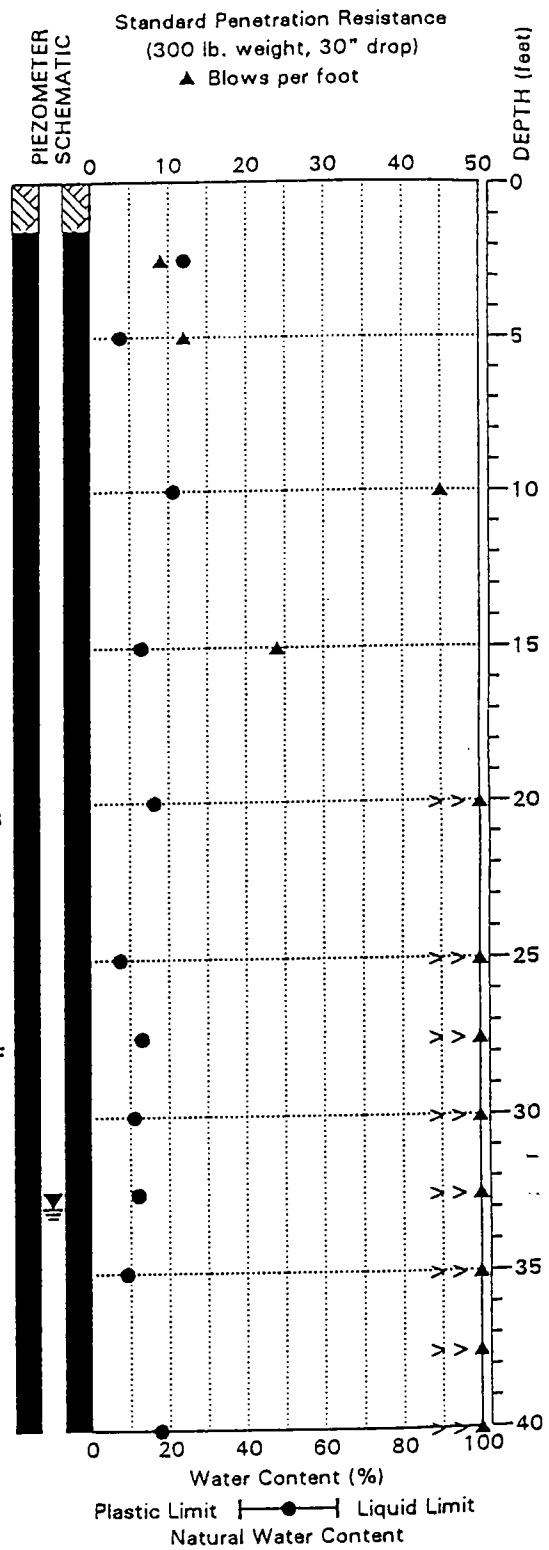
PROJECT NO.: 97061 FIGURE: A-10

PZO DWB 5/1/98

DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 150 ± Feet

DATE COMPLETED: 5/15/98
LOGGED BY: SG

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	ML	Medium stiff to stiff, grayish brown, sandy SILT, very moist to wet. Minor organics. (FILL)	S-1	3-4-5	
5			S-2	5-6-6	
10			S-3	6-7-38	
15	SM	Medium dense, olive brown, silty fine to coarse SAND, wet. Some fine gravel. (GLACIOMARINE DRIFT)	S-4	7-11-13	
20		Becomes very dense.	S-5	4-7-50/3"	GS
25		Becomes dark gray, fine grained.	S-6	41-50	
	ML	Hard, gray, slightly gravelly sandy SILT, very moist.	S-7	3-42-50/4"	%F
30	SM	Very dense, dark gray, silty fine to medium SAND, moist. Some fine embedded gravel.	S-8	31-50/3"	
		Becomes very moist. Sampler on rock.	S-9	41-50/3"	
35	SP SM	Very dense, gray, slightly silty fine to medium SAND, wet. Interbeds of silty fine sand. (OUTWASH DEPOSITS)	S-10	50/4"	
		No Sample Recovery.	S-11	50/5"	
40					



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BORING: BB-11

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 3

PROJECT NO.: 97061

FIGURE: A-12

PZO300 DWB 5/1/98

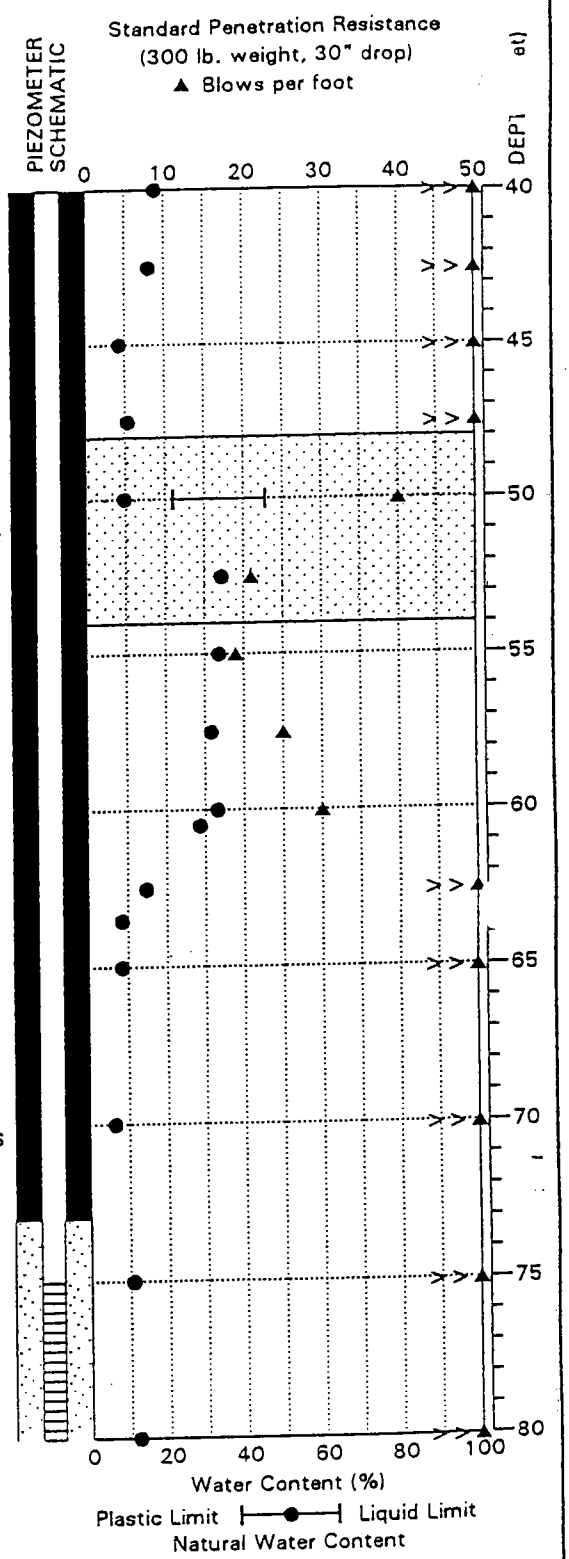
DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 150 ± Feet

DATE COMPLETED: 3/13/98
LOGGED BY: SG

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION
40			(OUTWASH DEPOSITS)
		SM	Very dense, dark gray, very silty fine SAND, moist. Laminated. Trace fine gravel. 'Till-Like' (GLACIOMARINE DRIFT)
45			
50		CL	Hard, dark gray, lean CLAY, moist. Laminated with occasional fine sand. (GLACIOLACUSTRINE DEPOSITS)
55			At 55 feet, few wood fragments.
		ML	Hard, dark gray, clayey SILT, moist. Laminated.
60		ML	Hard, dark olive brown, fine sandy SILT, very moist. Laminated. Abundant wood fragments. (LACUSTRINE DEPOSITS)
65		SW SM	Very dense, dark gray, gravelly, slightly silty SAND, very moist. Well graded. Fine gravel. (OUTWASH DEPOSITS)
70			
75			
80			

SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
	S-12	37-50/3"	GS
	S-13	50/3"	
	S-14	50/4"	GS
	S-15	50/3"	
	S-16	18-19-21	AL %F
	S-17	7-8-13	
	S-18	6-7-12	
	S-19	4-10-15	
	S-20	10-12-18	
	S-21	8-10-50/4"	
	S-22	7-50/4"	
	S-23	50/4"	GS
	S-24	31-50/3"	

PIEZOMETER SCHEMATIC



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BORING: BB-11

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

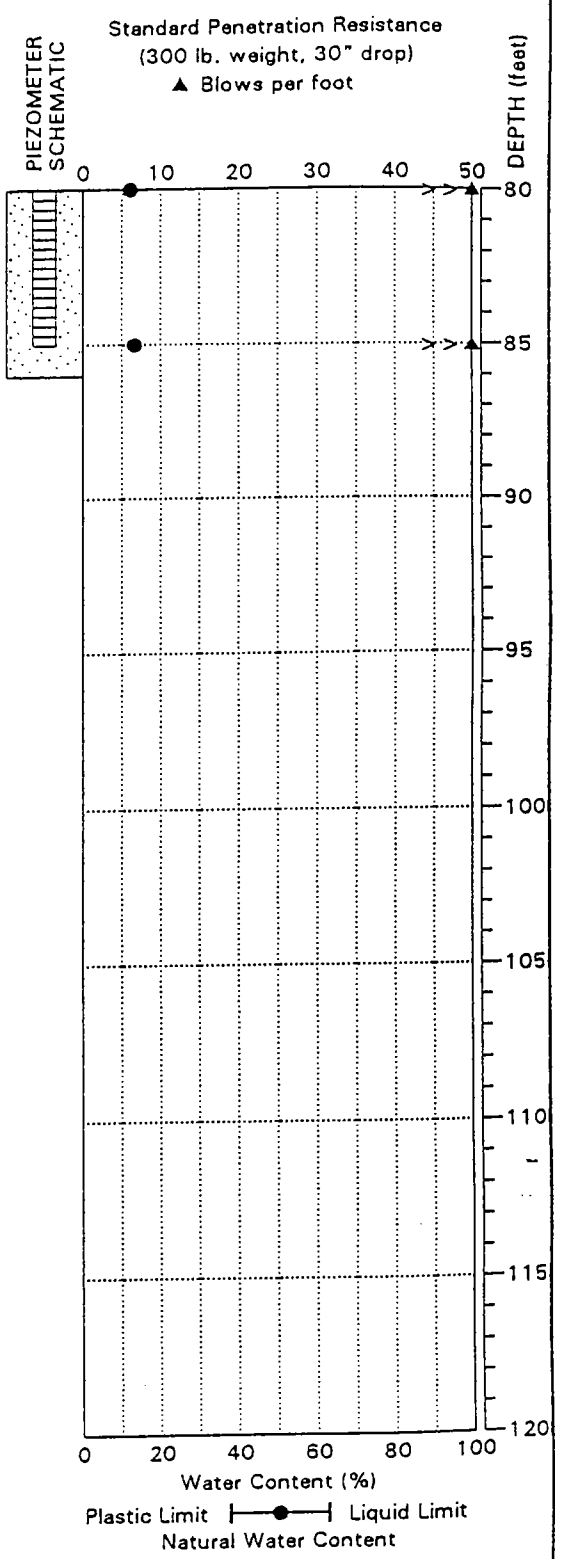
PROJECT NO.: 97061 FIGURE: A-12

PZ0300 DWB 5/1/98

DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 150 ± Feet

DATE COMPLETED: 5/13/98
LOGGED BY: SG

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PIEZOMETER SCHEMATIC
80			Few 1" thick lenses of fine to medium clean sand.		S-25	31-50/6"		
85					S-26	10-50/4"		
			Total Depth = 86 feet.					
90								
95								
100								
105								
110								
115								
120								



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BORING: BB-11

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 3 of 3

PROJECT NO.: 97061 FIGURE: A-12

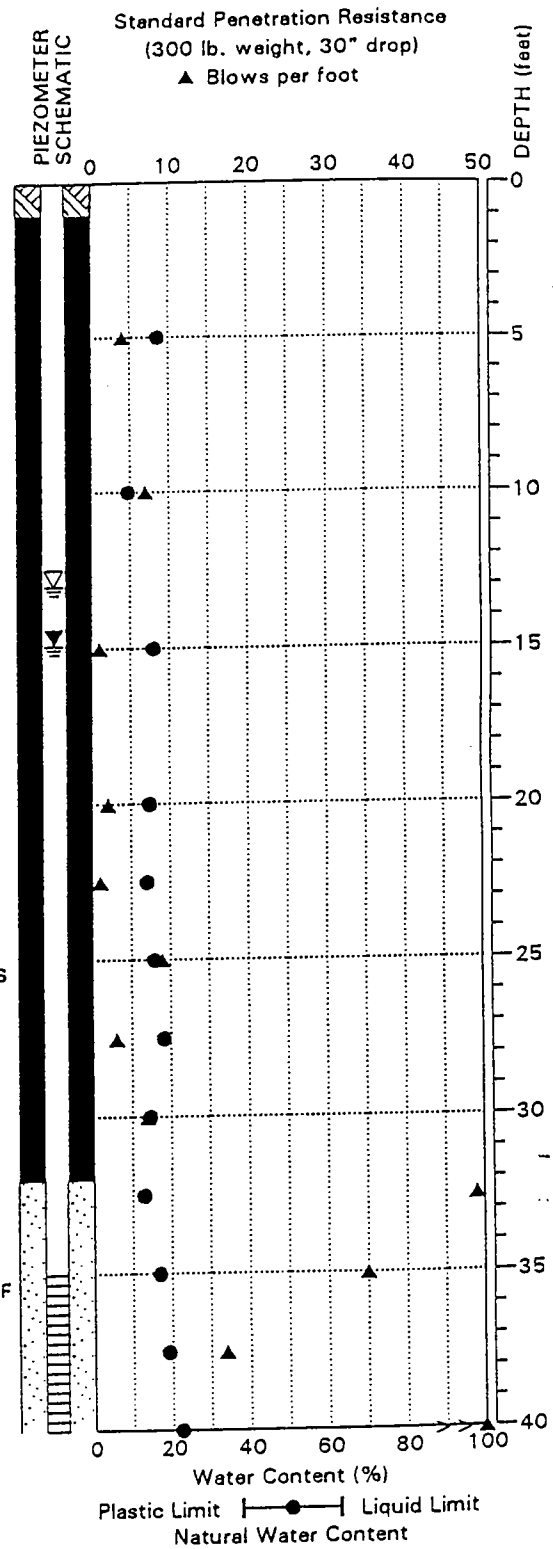
PZO300 DWB 5/1/98

DRILLING METHOD: B-53 Mobile, 10 10 HSA

SURFACE ELEVATION: 131 ± Feet

LOGGED BY: GWE

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	SM	Loose, olive brown mottled, slightly gravelly, silty fine to medium SAND, moist. Some iron oxide staining. Fine to coarse gravel. (FILL)			
5			S-1	2-2-2	
10			S-2	4-3-4	
15		At 15 feet, sand becomes very loose, fine to coarse, wet.	S-3	1-1	
20		becomes dark grayish brown.	S-4	1-2	
			S-5	2-1	
25	SM	Loose, gray, gravelly, silty fine to medium SAND, wet. Fine to coarse gravel.	S-6	2-4-5	GS
			S-7	2-3	
30			S-8	2-3-4	
	SM	Dense, dark gray, silty gravelly fine to medium SAND, wet. Coarse gravel. Silt interbeds. (RECESSIONAL OUTWASH)	S-9	7-22-27	
35	ML	Hard, dark gray, very sandy SILT, moist to wet. Fine sand.	S-10	3-3-32	%F
		Thin layers of silty fine SAND.	S-11	7-6-11	
40					



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BORING: BB-12

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061

FIGURE: A-13

PZ0300 DWB 5/1/98

DRILLING METHOD: B-53 Mobile, HS 10 Hole

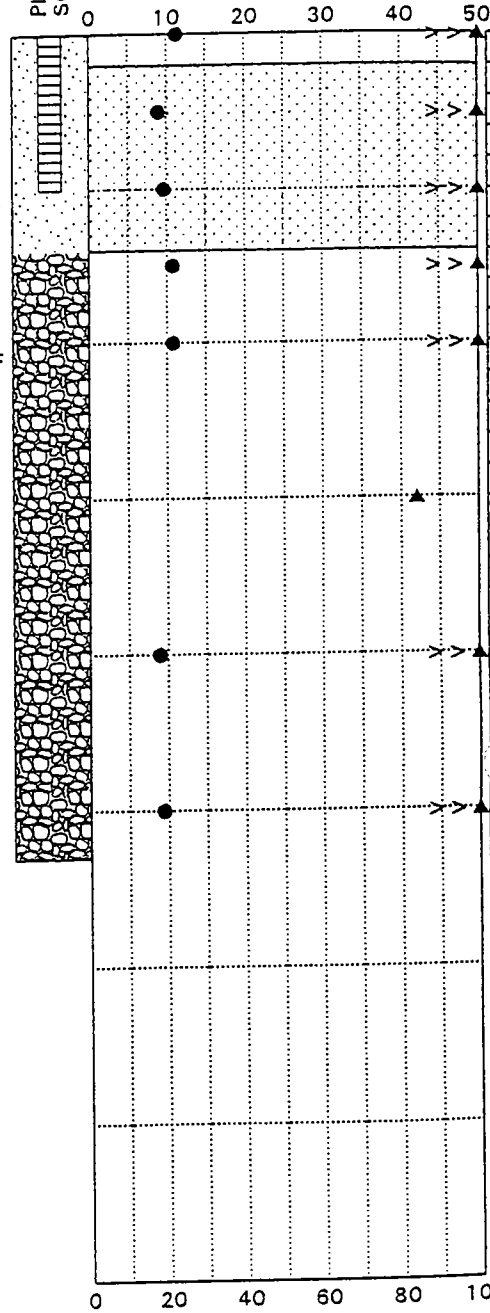
SURFACE ELEVATION: 131 ± Feet

LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			(RECESSIONAL OUTWASH)		S-12	22-20-35	GS
					S-13	6-25 50/5.5"	
45		SP SM	Very dense, gray, slightly silty to silty fine SAND, wet.		S-14	12-33 50/5.5"	GS
			(ADVANCE OUTWASH)		S-15	6-20-32	
50					S-16	6-22-50	%F
55			No Sample Recovery.		S-17	7-17-25	
60					S-18	14-21 50/5"	
65					S-19	4-22-40	
70							
75							
80							

Total depth = 66.5 feet.

PIEZOMETER SCHEMATIC



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BORING: BB-12

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

PROJECT NO.: 97061

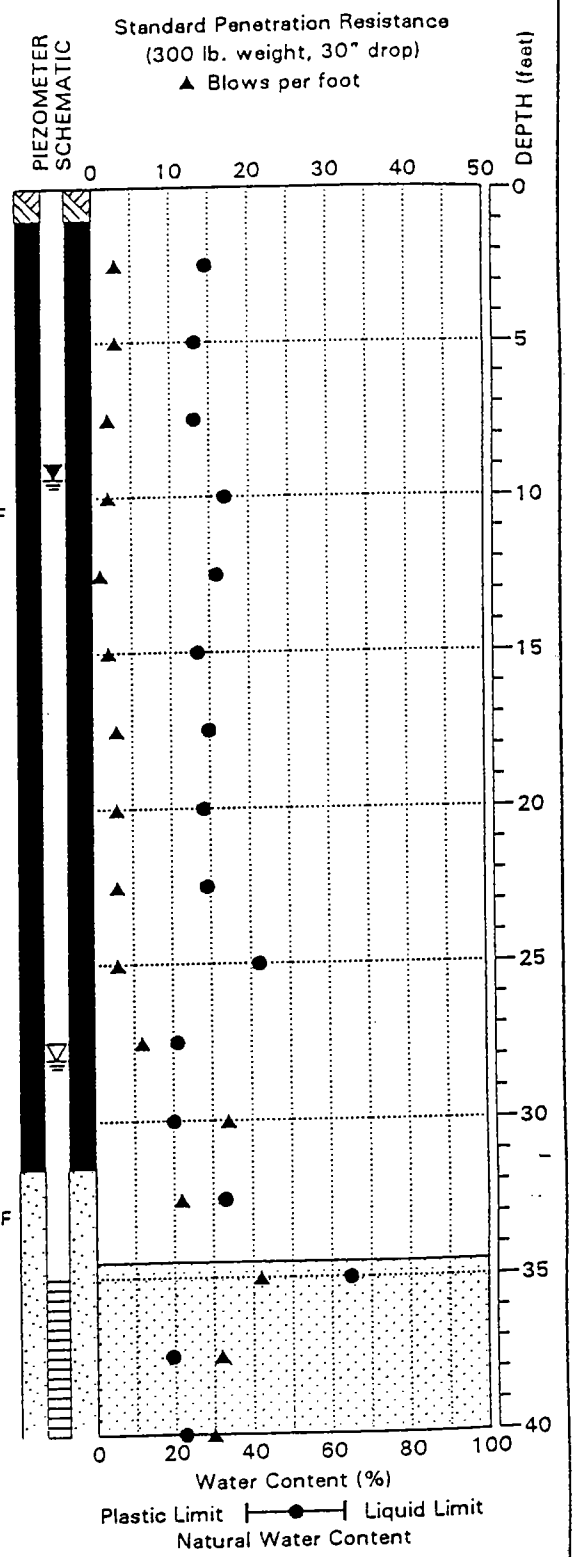
FIGURE: A-13

PZO300 DWB 5/1/98

DRILLING COMPANY: Underkofler
DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 125 ± Feet

DATE COMPLETED: 3/19/98
LOGGED BY: GWE

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	ML	Soft, mottled olive brown ,SILT, moist. (FILL)	S-1	1-1-2	
5		At 5 feet, becomes slightly sandy. Fine sand.	S-2	1-2-1	
		At 7.5 feet, becomes olive brown to gray. Iron oxide staining.	S-3	1-1-1	
10	ML	Very soft to soft, mottled dark gray to olive gray, slightly sandy SILT, moist. Fine to coarse sand.	S-4	1-1-1	%F
			S-5	1/12"-1	
15			S-6	1-1-1	
		At 17.5 feet, wood debris.	S-7	1-2-1	
20		At 20 feet, trace organics.	S-8	1-2-1	
			S-9	1-2-1	
25	OL	Soft, mottled brown to gray, organic SILT with coarse organic debris, wet.	S-10	1-2-1	
	SM	Loose to medium dense, gray, silty fine to medium SAND, wet. Silt interbeds. Trace fine gravel. (RECESSIONAL OUTWASH)	S-11	1-2-4	
30			S-12	4-10-7	
	ML	Stiff to very stiff, dark gray, sandy SILT, wet. Lenses of fine to medium sand.	S-13	2-4-7	%F
35			S-14	4-14-7	
			S-15	1-9-7	
40					



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BORING: BB-13

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061

FIGURE: A-14

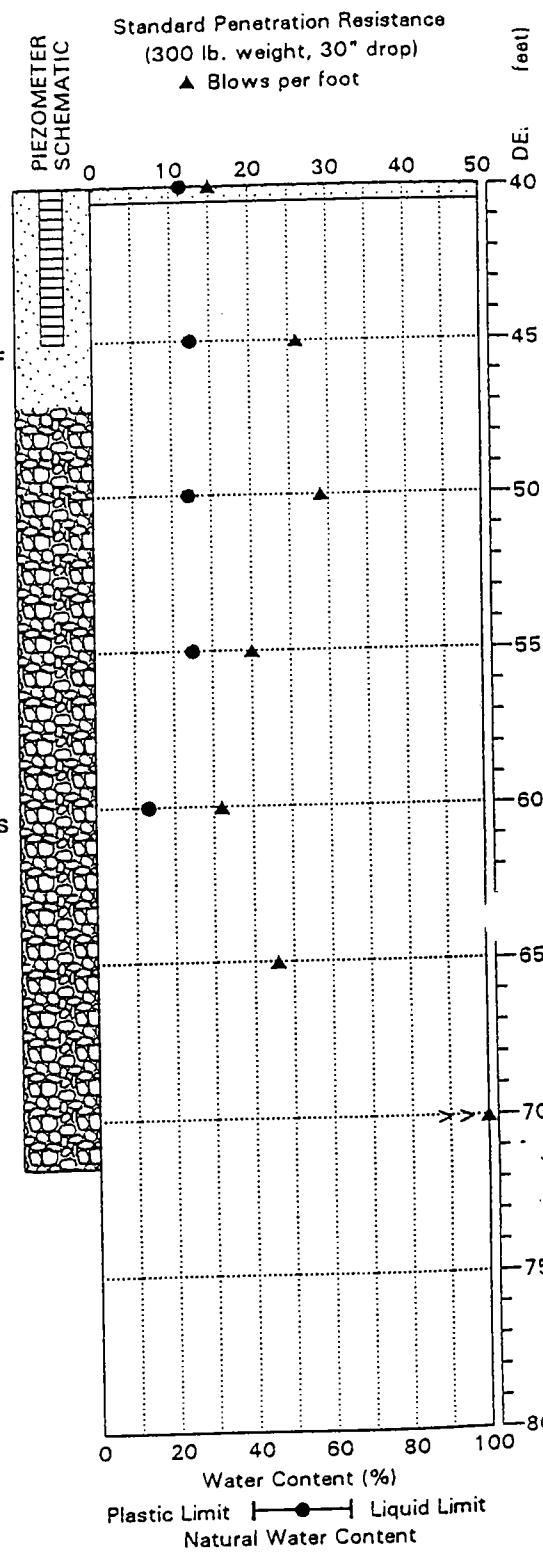
PZ0300 DWB 5/1/98

DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 125 ± Feet

LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			At 40 feet, trace fine gravel and fine sand.		S-16	4-8-7	GS
45		SM ML	Hard, dark gray, sandy SILT / silty fine SAND, wet.		S-17	7-13-13	%F
50					S-18	14-14-15	
55					S-19	4-7-13	
60		SM	Medium dense to very dense, dark gray, silty fine to medium SAND, wet. (ADVANCE OUTWASH)		S-20	1-9-7	GS
65			No Sample Recovery.		S-21	3-7-16	
70			No Sample Recovery.		S-22	7-16 50/5.5"	
75							
80							

Total depth = 71.5 feet.



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BORING: BB-13

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

PROJECT NO.: 97061

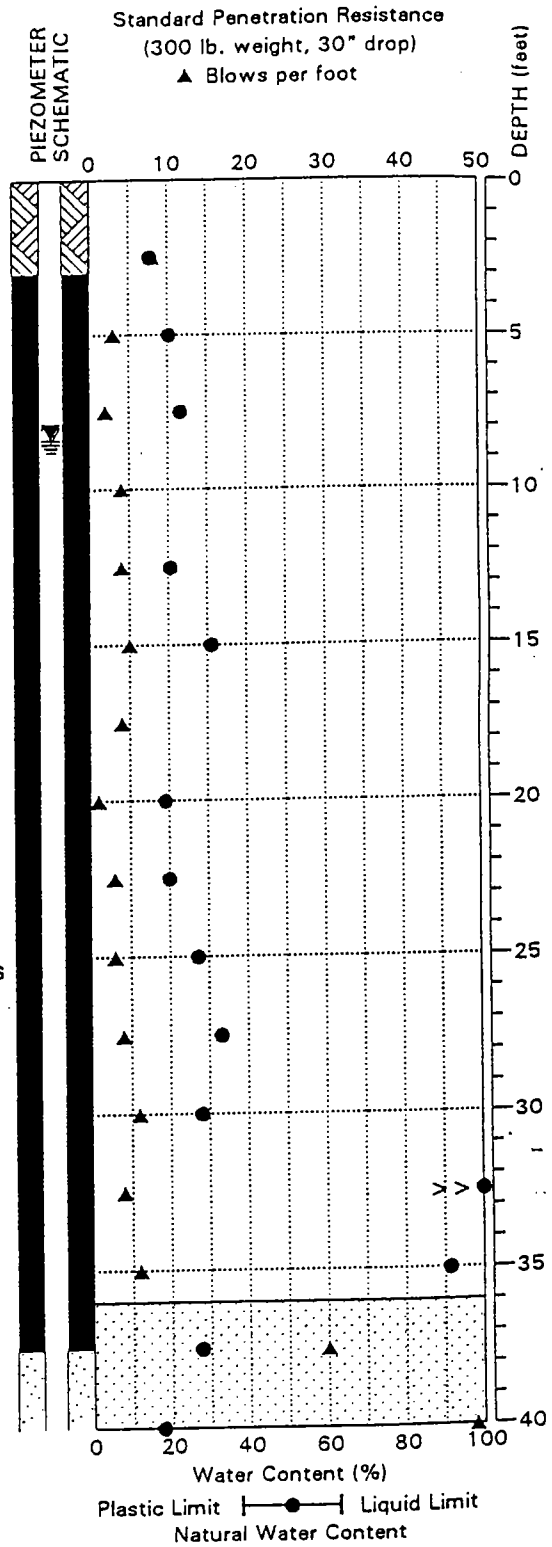
FIGURE: A-14

PZ0300 DWB 5/1/98

DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 125 ± Feet

DATE COMPLETED:
LOGGED BY: MB

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	SM	Loose, dark gray, slightly gravelly, silty fine SAND, moist. Trace wood (organics). (FILL)	S-1	3-3-5	
5		At 5 feet, becomes very loose; few brick fragments.	S-2	2-1-2	
	ML	Very soft, dark gray, slightly gravelly, sandy SILT, moist to wet. Some fine gravel and coarse sand.	S-3	1-1-1	
10		No sample recovery	S-4	1-2-2	
	SM	Loose, dark gray, silty fine SAND, wet. Brick fragment.	S-5	1-2-2	
15	ML	Soft, dark gray, slightly sandy SILT, wet. Two 2"-thick layers of stiff dark grayish green clay.	S-6	1-2-3	
	SC	Very loose, olive gray, clayey fine SAND, wet. Some gravel to 1" diameter. Few silt lenses.	S-7	3-2-2	
20		No sample recovery at 17.5 feet.	S-8	2-1/12"	
			S-9	1-2-1	
25		At 25 feet, 12" layer of saw dust and wood chips.	S-10	2-2-1	GS
		At 27.5 feet, becomes fine to medium grained. Wood chips.	S-11	3-1-1	
30		At 30 feet, wood fragments.	S-12	1-2-4	
	PT	Very soft, dark brown PEAT, wet, interbedded with layers of dark gray fine sand to silt. Trace wood chips.	S-13	1-2-2	
35	PT SM	Loose, dark gray, silty fine SAND, wet, interbedded with soft, dark brown PEAT.	S-14	1-2-4	
	SP SM	Medium dense to dense, dark gray, slightly silty fine to medium SAND, wet. Trace wood. (RECESSIONAL OUTWASH)	S-15	8-16-14	
40					



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BORING: BB-14

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PROJECT NO.: 97061 FIGURE: A-15

PZO300 DWB 5/1/98

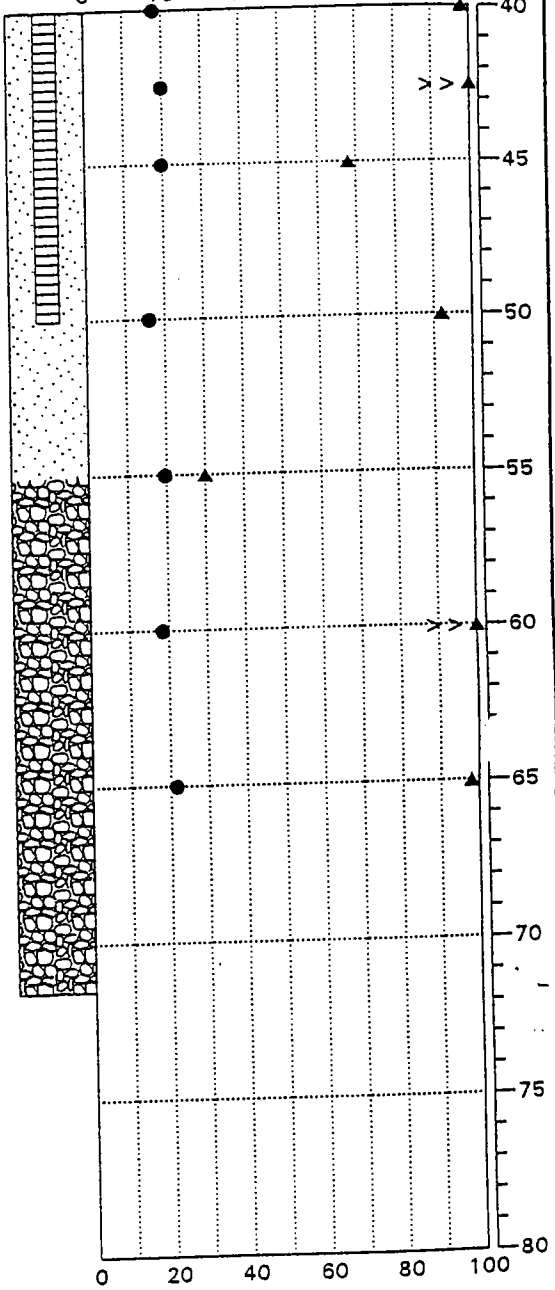
DRILLING METHOD: B-59 Mobile, 4.5" ID HSA
SURFACE ELEVATION: 125 ± Feet

LOGGED BY: MB

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			At 40 feet, becomes dense, slightly silty, slightly gravelly. 3/8" minus subrounded gravel. (RECESSIONAL OUTWASH)		S-16	5-23-26	GS
					S-17	4-18-35	
45		SM	Dense, dark gray, silty fine to medium SAND, wet.		S-18	5-12-20	GS
50		SP SM	Dense, dark gray, slightly silty fine SAND, wet.		S-19	9-18-28	
55			At 55 feet, becomes medium dense. 2" thick layer of gray silt.		S-20	2-6-9	
60		SP	Very dense, dark gray, fine to medium SAND, wet. (ADVANCE OUTWASH)		S-21	18-25-35	
65			At 65 feet, becomes medium grained.		S-22	9-19-30	
70			At 70 feet, some heave. No sample recovery.		S-23		
75							
80							

Total Depth = 71.5 feet.
2" PVC piezometer installed to 50 feet.

PIEZOMETER SCHEMATIC



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BORING: BB-14

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PAGE: 2 of 2

PROJECT NO.: 97061

FIGURE: A-15

PZO300 DWB 5/1/98

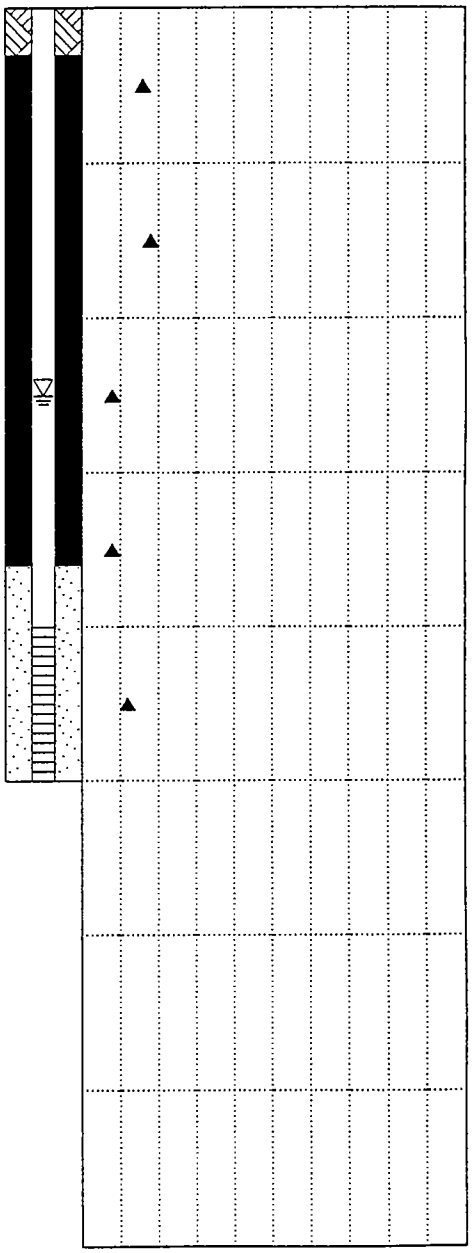
DRILLING COMPANY: Hokkaido Drilling
DRILLING METHOD: 4 1/4", Hollow Stem Auger
SURFACE ELEVATION: ± Feet

LOCATION: See Site Plan
DATE COMPLETED: 5/27/98
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)
0		ML	Stiff, tan, fine sandy SILT, moist. Upper 6" of sampler is brown silt with organics.	S-1	3-4-4
5					
		ML	Stiff, olive gray, fine sandy SILT with gravel, moist.	S-2	6-5-4
10			Harder drilling.		
		SM	Very loose, gray, silty fine to medium SAND with gravel and wood debris, wet.	S-3	7-2-2
15					
				S-4	2-2-2
20					
		SM	Loose, greensih gray to gray, gravelly silty SAND with wood debris, wet.	S-5	1-2-4
25					
30			Bottom of boring at 25 feet. Groundwater observed at 12.5 feet.		
35					
40					

OTHER TESTS

PIEZOMETER SCHEMATIC



Standard Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot

0 10 20 30 40 50

DEPTH (feet)

0 20 40 60 80 100

Water Content (%)

Plastic Limit ⊢—●—⊣ Liquid Limit
Natural Water Content

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

BORING: OW-1

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract A

PAGE: 1 of 1

PROJECT NO.: 97061 FIGURE:

PZO DWA 7/31/98

DRILLING COMPANY: Hokkaido D&D, Inc.
DRILLING METHOD: 16 in. Cable Tool,
SURFACE ELEVATION: ± Feet

DATE COMPLETED: 5/22/98
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES
0		ML	Dark, grayish brown, gravelly sandy SILT, moist.							3-ft high, stickup monument. Cement surface seal.
5			Drillers added water.		S-1					
10			Wood debris on bit. Drillers added water.		S-2					Bentonite surface seal to 36 ft.
15			Drillers added water. Wood debris at 16 ft. Gravels at 17 ft.		S-3					
20		SM	Grayish brown, gravelly, silty SAND. Gravel is fine to coarse.		S-4					
25		GM	Gray, sandy, silty, fine to coarse GRAVEL		S-5					
			Cobbles 12 in. cobble at 28 ft.							
30		SM	Brownish gray, silty, fine SAND, interbedded with reddish brown peat and wood debris.		S-6					
35		OL	Reddish brown ORGANIC SILT and olive gray, sandy SILT, wet.		S-7					
40										

DRAFT

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HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PUMPING WELL: PW-1

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE:

PWELL 97061 8/26/98

DRILLING METHOD: 16 in. Cable Tool,
SURFACE ELEVATION: ± Feet

DATE COMPLETED: 5/22/98
LOGGED BY: GWE

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES
40		SM	Gray, silty, fine to medium SAND, moist. Hard drilling at 41 ft. Drillers adding water.		S-8					
45			Addition of trace gravel.		S-9					0.040 in slotted stainless-steel screen set in 10-20 silica sand.
50		SP	Clean, fine to medium, poorly graded SAND, wet.		S-10					
55		SM	Gray, silty, fine SAND with some medium sand, wet.		S-11					
60		ML	Hard, gray, fine sandy SILT, moist.		S-12					
			Bottom of boring = 61.5 ft.							
65										
70										
75										
80										

DRAFT

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HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract B
Seattle, Washington

PUMPING WELL: PW-1

PAGE: 2 of 2

PROJECT NO.: 97061 FIGURE:

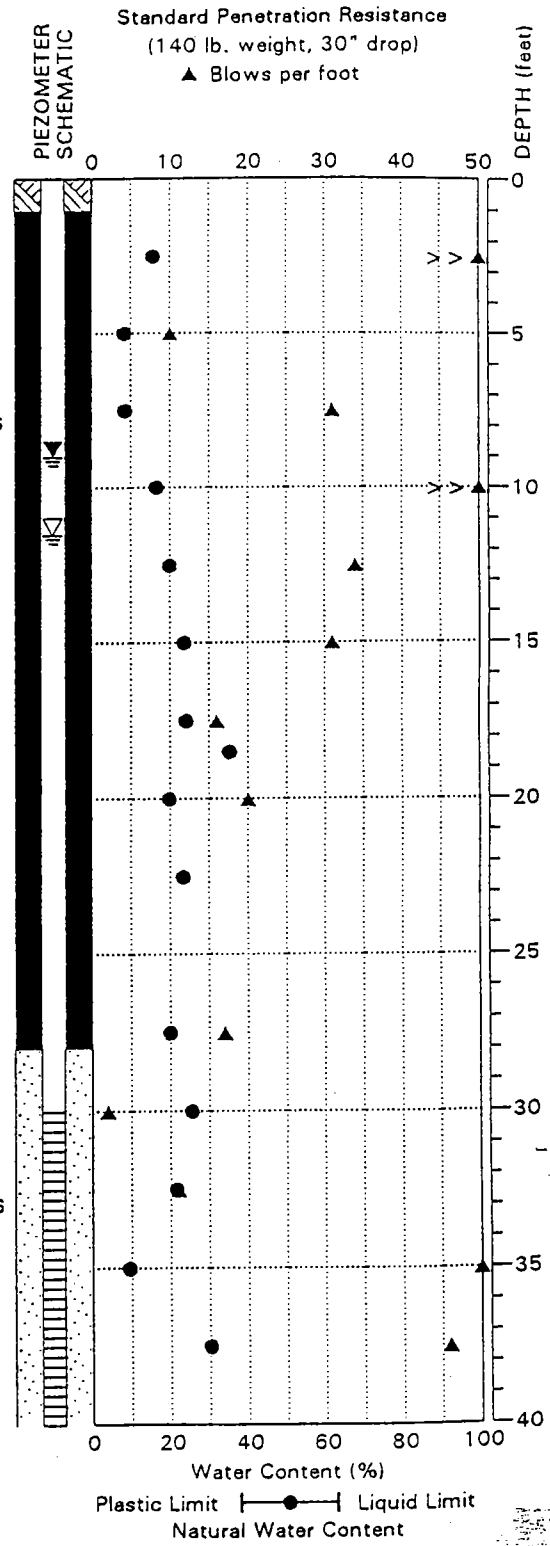
PWELL 97061 8/26/98

Contract C

DRILLING COMPANY: Tessco Pump & Drill
DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.8 ± Feet

DATE COMPLETED: 10/20/97
LOGGED BY: ADM/MLR

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	ML	Hard, very dark brown to gray, sandy SILT with gravel, dry to moist. Some brick, cobbles, wood fibers and asphalt. (FILL)	S-1	14-50/5"	
5			S-2	3-4-6	
	GM	Dense, gray, silty GRAVEL with sand, moist.	S-3	6-21-10	GS
10	SM	Dense, brown mottled black, silty SAND with gravel, very moist. Wood/roots.	S-4	16-50/5"	
	GW	Dense, dark gray, sandy GRAVEL, wet. Wood/twigs.	S-5	17-14-20	
15	SM	Dense, gray mottled dark brown, silty SAND, wet. Some wood and gravel.	S-6	19-17-14	
	SM	Medium dense, silty fine SAND with black charcoal, wet. Layer of very stiff, gray, CLAY with fine sand (sample S-7B)	S-7 / S-7B	18-10-6	
20		Oil sheen and odor in sample at 20'.	S-8	9-10-10	
		No sample recovery at 23 feet.	S-9		
25	ML	Very stiff, very dark gray, sandy SILT, wet. Some organics - charcoal, with creosote odor. Layer of fine sand.	S-10	8-9-8	
30	SM ML	Loose to medium dense, gray to dark olive gray, sandy SILT to silty SAND, wet. Shell fragments and occasional piece of wood. (BEACH DEPOSITS)	S-11	2-1-1	
			S-12	4-5-6	GS
35	GP GM	Very dense, dark gray, GRAVEL with silt and sand, wet. Shell fragments.	S-13	50/5"	
	CL	Hard, blue-gray, lean CLAY, wet. Laminae, slickensides. (GLACIOLACUSTRINE DEP.)	S-14 / S-14B	8-16-30	
40					



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BORING: CC- 1

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-21

PZO DWC 5/16/98

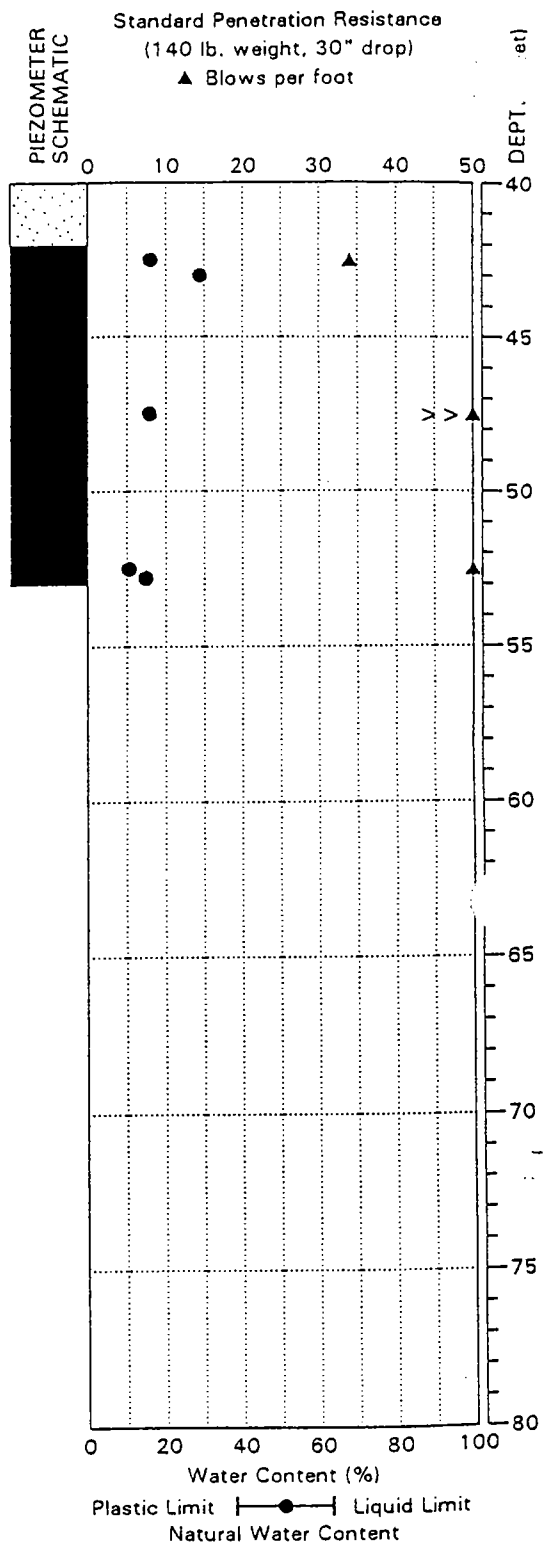
DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.8 ± Feet

DATE COMPLETED: 10/20/97
LOGGED BY: ADM/MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)
40			Hard, blue-gray, lean CLAY, moist to wet. Laminations, slickensides. Interbeds of GRAVEL with silt, sand and shell fragments. (GLACIOLACUSTRINE DEPOSITS)	S-15 / S-15B	8-14-20
45		SM	Very dense, brownish gray to dark gray, silty SAND, wet. Some gravel. (GLACIO-MARINE DRIFT)	S-16	17-50/3"
50		SM	Very dense, dark gray, silty SAND, wet. Embedded pebbles. (Till-like)	S-17 / S-17B	50/4"
55			Total Depth = 53 feet. 2" Piezometer installed to 40 feet.		
60					
65					
70					
75					
80					

OTHER TESTS

PIEZOMETER SCHEMATIC



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BORING: CC- 1

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PROJECT NO.: 97061 FIGURE: A-21

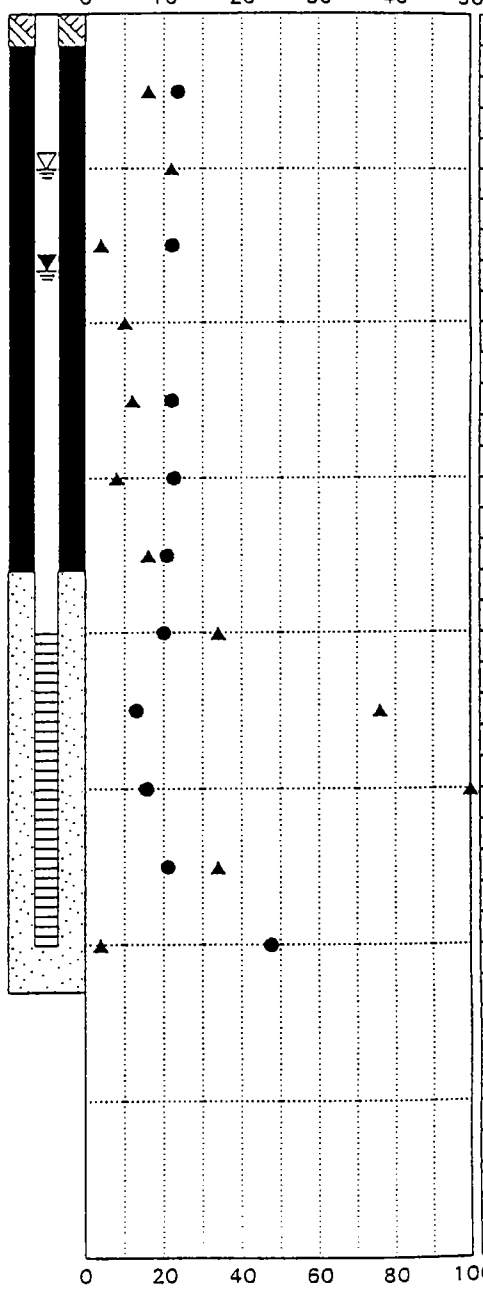
PZO DWC 6/16/98

DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.8 ± Feet

DATE COMPLETED: 10/21/97
LOGGED BY: ADM/MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0		SM	Loose, medium brown, silty SAND, moist. Layer of black fine gravel. (FILL)		S-1	4-5-3	
5		GM	Medium dense, medium brown, silty GRAVEL, wet.		S-2	5-8-3	
		ML	Soft, brownish gray, sandy SILT with gravel, wet.		S-3	1-1-1	
10		SP SM	Loose, dark gray, SAND with silt, wet. Occasional gravel, shell fragments, brick fragments and wood. Few layers of sandy silt and clean sand. Refusal twice on concrete/rock at 10'. 3rd try successful.		S-4	3-3-2	
					S-5	1-3-3	
15					S-6	3-1-3	GS
					S-7	3-5-3	
20		SM	Medium dense to dense, dark olive gray, silty SAND with trace gravel, wet. Wood, shells, brick fragments.		S-8	8-8-9	
					S-9	16-18-20	
25			At 25 feet, piece of charcoal.		S-10	10-25-25	GS
					S-11	6-9-8	
30		CL	Very soft, black, fine sandy CLAY with some wood / vegetation pieces, wet.		S-12	1-1-1	
35			Total Depth = 31.5 feet. 2" Piezometer installed to 30 feet.				
40							

PIEZOMETER SCHEMATIC



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BORING: CC- 2

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 1

PROJECT NO.: 97061 FIGURE: A-22

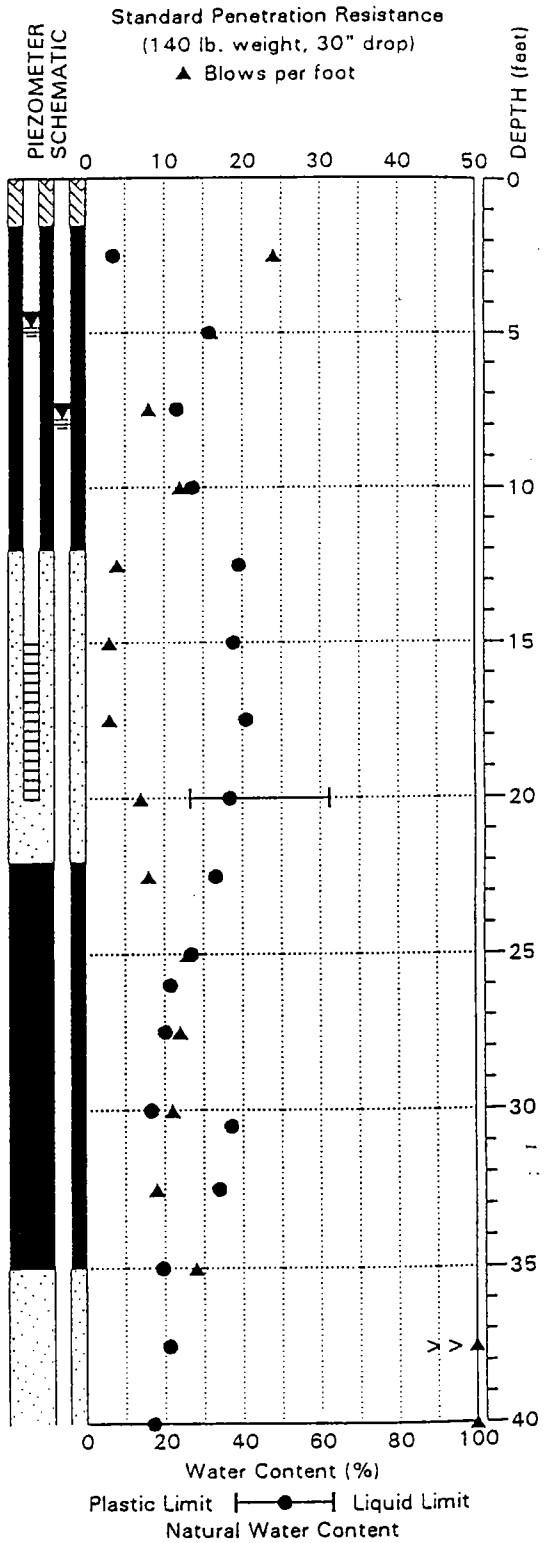
PZO DWC 6/16/98

DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.3 ± Feet

DATE COMPLETED: 10/22/97
LOGGED BY: MLR

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION
0	SP SM	Medium dense, brown-gray mottled, SAND with silt and gravel, dry to moist. Layer of sandy CLAY at 4 feet. (FILL)
5	ML	Soft to stiff, dark gray, gravelly SILT with fine sand, wet. Pockets of dark gray clay. At 8 feet, piece of glass. At 18 ft.: no gravel.
20	CH	Soft to stiff, gray to mottled brown/gray, sandy fat CLAY with occasional fine gravel, wet.
25	SM ML	Loose to medium dense, dark gray to black, silty SAND and sandy SILT, wet. Fragments of brick and wood. Sawdust. Hydrocarbon odor.
35	SP SM	Dense to very dense, gray, fine to medium SAND to silty fine to medium SAND with shell fragments. (BEACH DEPOSITS)

SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
S-1	12-12-12	
S-2	3-7-9	
S-3	4-4-4	
S-4	4-4-8	GS
S-5	2-2-2	
S-6	1-1-2	
S-7	1-1-2	GS
S-8	2-3-4	AL
S-9	3-4-4	
S-10	4-4-9	
S-10B		
S-11	4-5-7	
S-12	3-5-6	
S-12A		
S-13	4-4-5	
S-14	4-5-9	
S-15	9-18-33	



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BORING: CC- 3

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-23

PZODUAL DWC 8/16/98

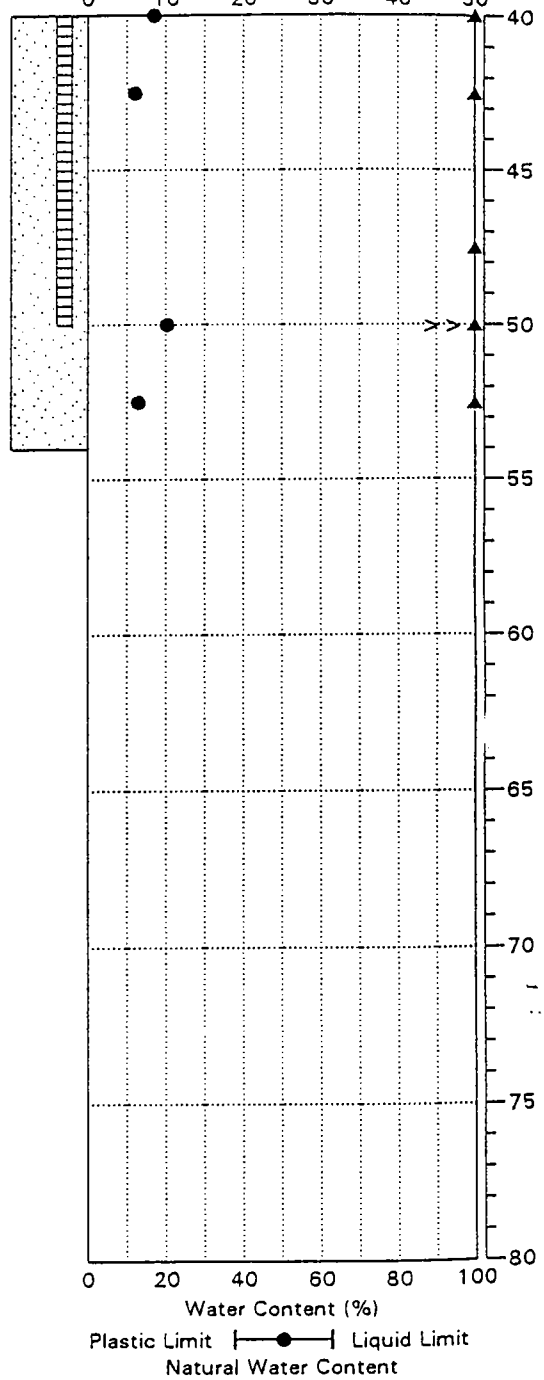
DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.3 ± Feet

DATE COMPLETED: 10/22/97
LOGGED BY: MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40					S-16	50/4"	
42		SP	Very dense, gray, SAND with gravel, wet. Shell fragments. (BEACH DEPOSITS)		S-17	50/5"	
45					S-18	50/3"	
50		ML	Very dense, gray, gravelly SILT with sand, wet. (GLACIO-MARINE DRIFT)		S-19	15-50/4"	
					S-20	50/6"	

Total Depth = 53 feet.
2" PVC piezometers installed:
No. CC-3A to 50 feet
No. CC-3B to 20 feet.

PIEZOMETER SCHEMATIC



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BORING: CC- 3

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

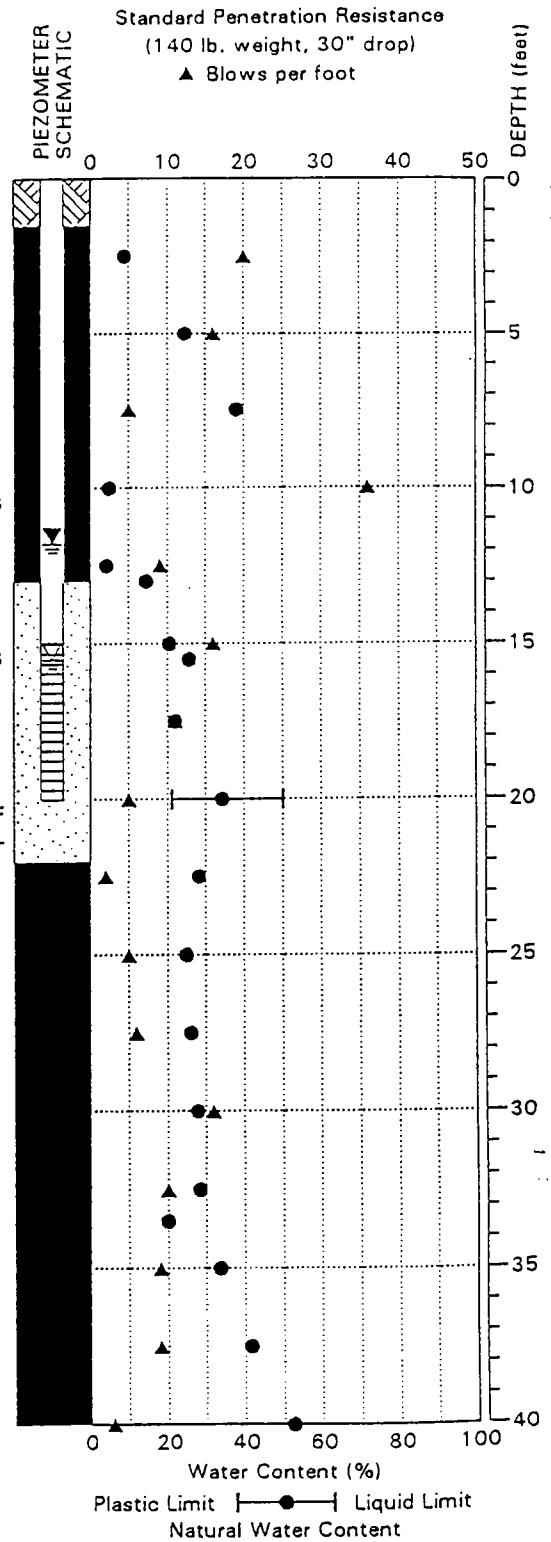
PROJECT NO.: 97061 FIGURE: A-23

PZOOUAL DWC 6/18/98

DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 114.1 ± Feet

DATE COMPLETED: 10/24/97
LOGGED BY: MLR

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	SP	Medium dense, gray, fine to medium SAND, moist. (FILL)	S-1	8-10-10	
5	SM	Loose to medium dense, brown-gray to gray, silty fine to medium SAND, moist.	S-2	6-8-8	
			S-3	2-2-3	
10	SP	Loose to dense, dark gray, medium to coarse SAND, moist. Trace fine gravel.	S-4	11-18-18	GS
			S-5	6-6-3	
	ML CL	Stiff to very stiff, brown gray mottled, SILT with sand to sandy CLAY with fine gravel, wet.	S-5B		
15		At 15 ft, layer of soft, gray CLAY with fine sand, wet.	S-6	1-2-14	GS
			S-6B		
	SP	Medium dense, gray, gravelly SAND, wet. Thin layers of silt.	S-7	4-5-6	
20	CH	Very soft to medium stiff, dark gray, fat CLAY with sand and some fine gravel, wet.	S-8	4-2-3	%F AL
			S-9	1-1-1	
25	ML	Medium stiff to very stiff, gray, SILT with some fine gravel to fine sandy SILT, wet. Occasional reddish brown discoloration.	S-10	1-2-3	
			S-11	2-3-3	
30			S-12	2-8-8	
			S-13	2-5-5	
			S-13B		
35		At 35 ft., Small chunks of dark gray SILT and small pieces of wood.	S-14	3-4-5	
	CH	Stiff, gray, fine sandy plastic CLAY, wet. Some fine gravel. Brick fragment.	S-15	3-4-5	
40	ML	Soft to medium dense, dark gray to black, fine			



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BORING: CC- 4

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-24

PZO DWC 6/16/98

DRILLING COMPANY: Pacific Pump

DRILLING METHOD: Acker Soil Sampler, HSA

SURFACE ELEVATION: 114.1 ± Feet

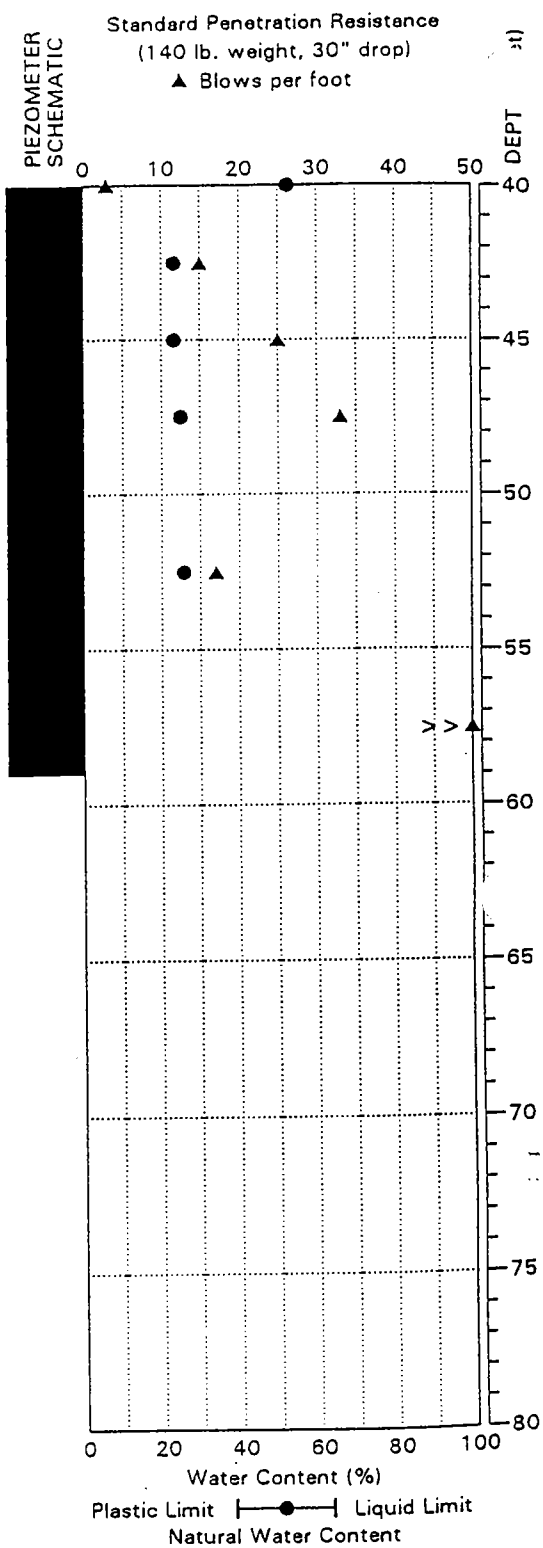
DATE COMPLETED: 10/24/97

LOGGED BY: MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			sandy SILT, wet. Pieces of wood and shell fragments. Layers of fine sand. (BEACH DEPOSITS)	S-16	1-1-2	
		SP SM	Medium dense to dense, gray to dark gray, fine to medium SAND with silt and many shell fragments, wet. Occasional piece of wood.	S-17	5-7-8	
45				S-18	1-8-17	
				S-19	1-11-22	
50		SP	Medium dense, gray, fine to medium SAND with fine gravel and shell fragments, wet.	S-20	12-8-9	
55		ML	Very dense, gray, SILT with fine gravel, wet. Laminations. (Till-like) (GLACIO-MARINE DRIFT)	S-21	22-50/5	
60						
65						
70						
75						
80						

Total depth = 58.5 feet.
2" PVC piezometer installed to 20 feet.

PIEZOMETER SCHEMATIC



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BORING: CC- 4

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PROJECT NO.: 97061

FIGURE: A-24

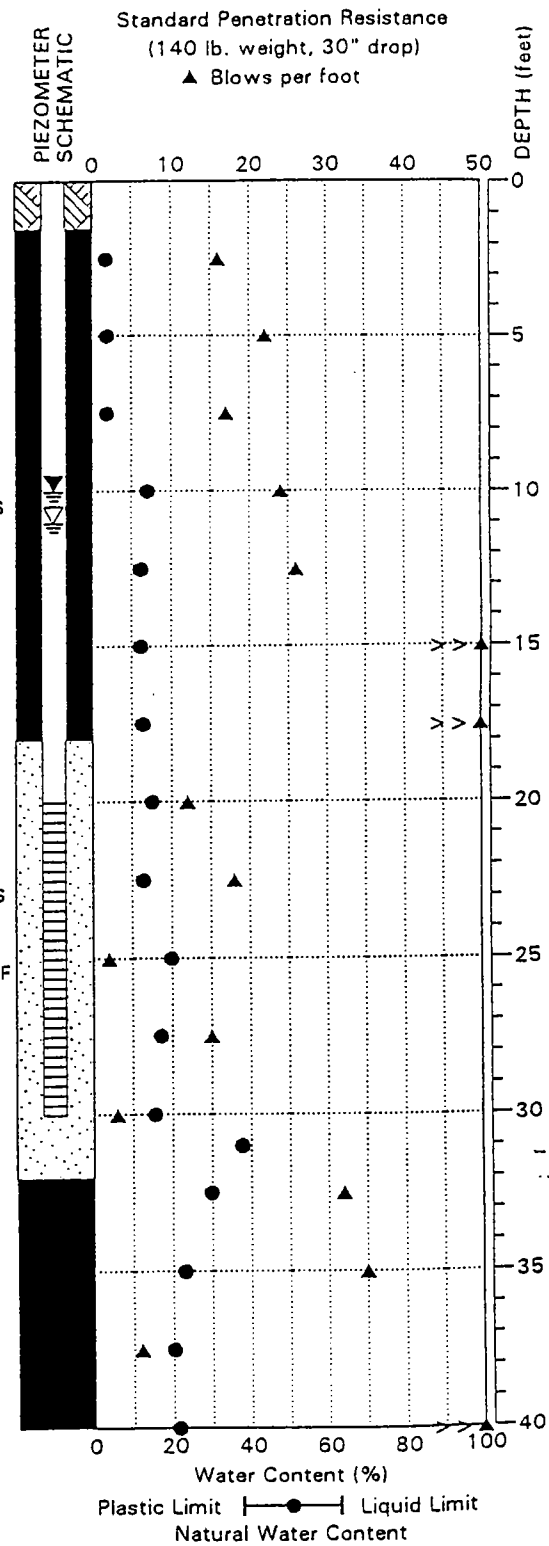
PZO DWC 6/16/98

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.0 ± Feet

DATE COMPLETED: 10/27/97
LOGGED BY: MLR

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION
0	SP	Medium dense to very dense, dark grayish brown, medium to coarse SAND with gravel, moist to wet. (FILL)
15		At 16 feet, 1.5" piece of gravel in shoe of sampler.
20		At 21 feet, layer of silty fine SAND. Becomes slightly silty.
25	SM	Loose, dark gray, silty fine to medium SAND with trace fine gravel, wet.
27	SP GP	Loose to medium dense, gray, medium to coarse SAND with gravel to sandy GRAVEL, wet.
30	ML	Soft to very stiff, dark brown to black, sandy SILT with woodchips, sawdust and shell fragments.
37	SP SM	Loose to very dense, gray, fine to medium SAND with shell fragments, wet. (BEACH DEPOSITS)

SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
S-1	6-8-8	
S-2	7-11-11	
S-3	5-7-10	
S-4	10-12-12	GS
S-5	10-11-15	
S-6	11-20-40	
S-7	12-28-38	
S-8	3-5-7	
S-9	3-9-9	GS
S-10	2-1-1	% F
S-11	5-8-7	
S-12	3-2-1	
S-12B		
S-13	1-12-20	
S-14	10-15-20	
S-15	1-1-5	



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BORING: CC- 5

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-25

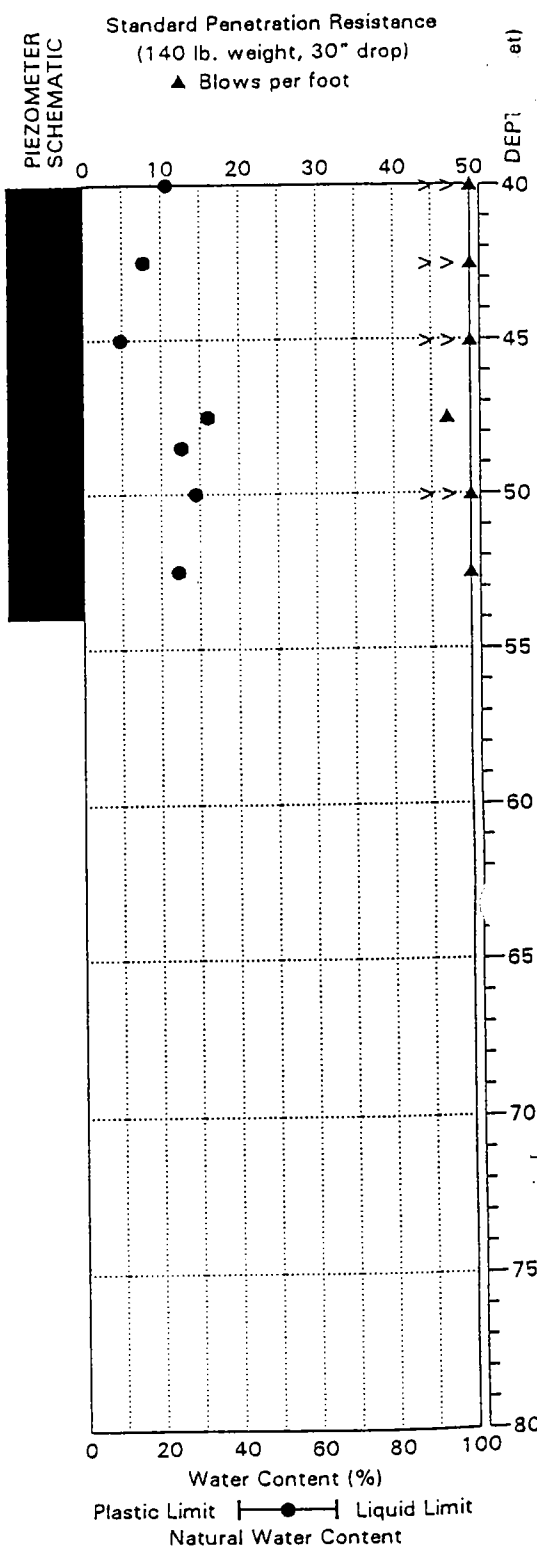
PZO DWC 6/16/98

DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.0 ± Feet

DATE COMPLETED: 10/27/97
LOGGED BY: MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			At 40 feet, becomes slightly silty.	S-16	16-30-38	
				S-17	18-29-28	
45		SP GP	Very dense, gray, sandy GRAVEL to gravelly SAND, wet. Shell fragments. Occasional wood fibers. (BEACH DEPOSITS)	S-18	16-32-49	
		ML CL	Very stiff, gray, silty CLAY / clayey SILT, wet. Laminations. (GLACIOLACUSTRINE DEPOSITS)	S-19	8-16-31	
				S-19B		
50		ML	Very dense, gray sandy SILT with embedded gravel. Laminations. (Till-like) (GLACIO MARINE DRIFT) At 50 feet, 1" layer of fine SAND. At 52 feet, nodules of tan medium SAND.	S-20	18-32-50/4"	
				S-21	50/5"	
55			Total Depth = 53 feet. 2" PVC piezometer installed to 30 feet.			
60						
65						
70						
75						
80						

PIEZOMETER SCHEMATIC



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BORING: CC- 5

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PROJECT NO.: 97061 FIGURE: A-25

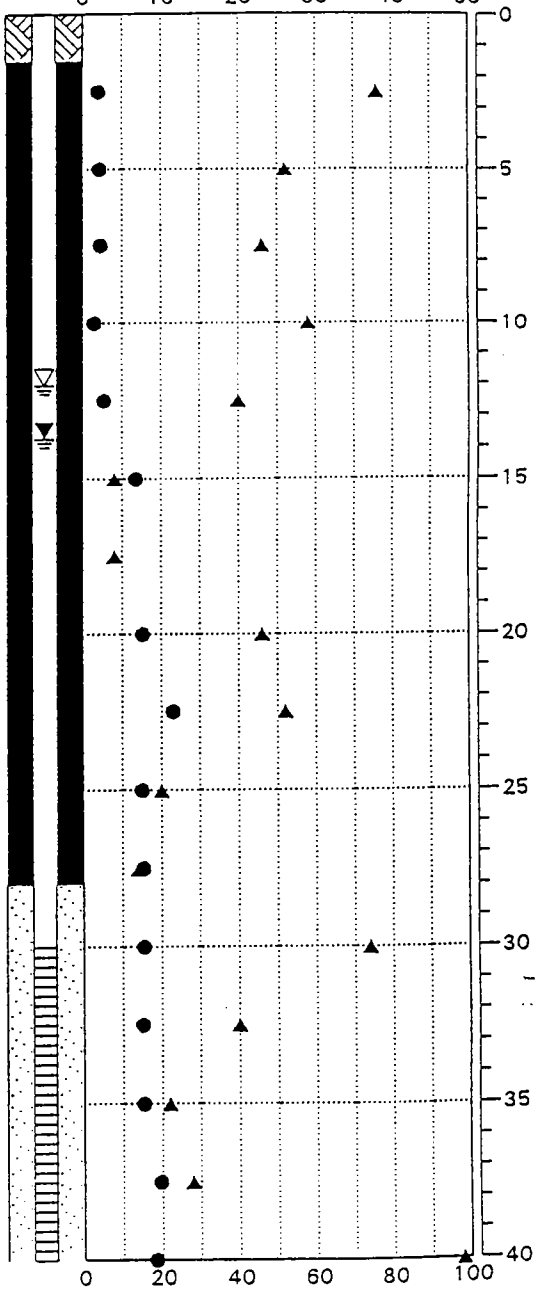
PZO DWC 6/16/98

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 113.2 ± Feet

LOCATION:
DATE COMPLETED: 10/28/97
LOGGED BY: MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0		SP	Loose to dense, brown to gray, medium to coarse SAND with fine gravel, moist to wet. (FILL)				
					S-1	11-16-22	
5					S-2	8-13-13	
					S-3	8-11-12	
10					S-4	8-11-18	
					S-5	10-10-10	
15			At 15 feet, reddish brown discoloration.		S-6	2-2-2	GS
			17.5-19.0 feet, No sample recovery.		S-7	2-2-2	
20					S-8	6-11-12	
					S-9	15-12-14	
25			At 26 feet, 3" layer of fine gravel.		S-10	6-7-3	
			At 28 feet, pieces of wood.		S-11	3-4-3	
30			At 31 feet, 5" layer of fine gravel and occasional wood fibers.		S-12	3-7-30	
					S-13	5-8-12	GS
35			At 36 feet, layer of fine gravel with silt nodules and some wood pieces.		S-14	3-4-7	
40		SP SM	Medium dense, gray, fine SAND to SAND with silt, wet. Fine gravel and shell fragments. (BEACH DEPOSITS)		S-15	1-6-8	

PIEZOMETER SCHEMATIC



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BORING: CC- 6

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-26

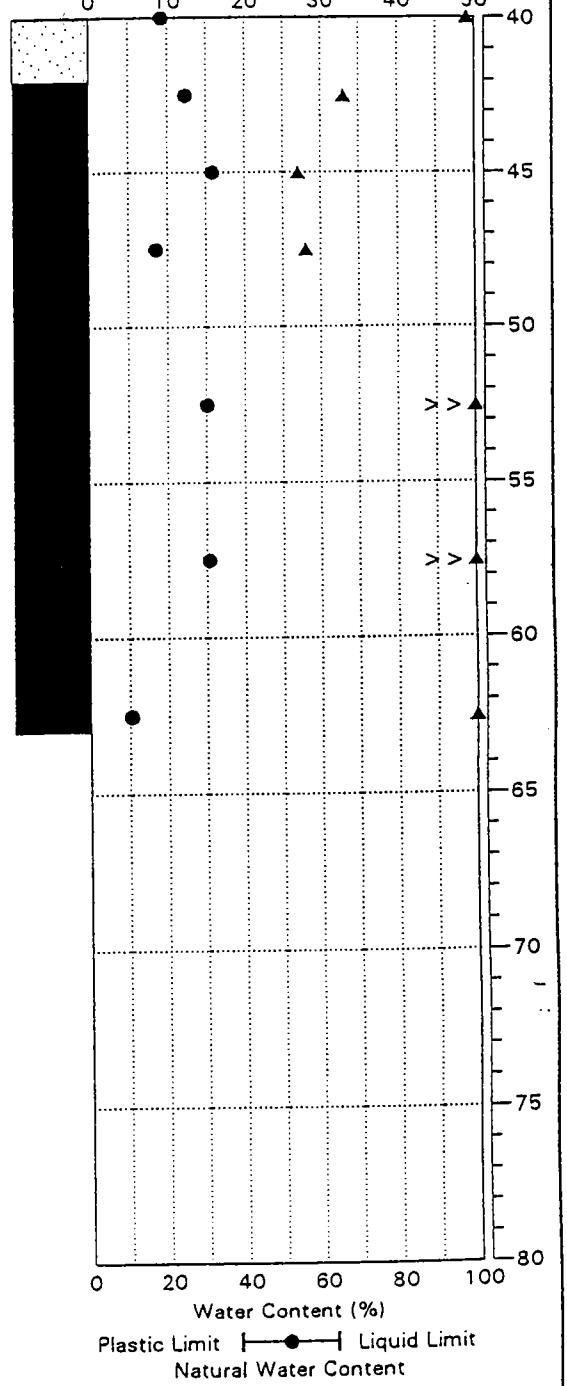
PZO DWC 8/12/98

DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 113.2 ± Feet

DATE COMPLETED: 10/23/97
LOGGED BY: MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			Medium dense, gray, fine SAND to SAND with silt, wet. Fine gravel and shell fragments. (BEACH DEPOSITS)		S-16	4-14-35	
					S-17	14-16-17	GS
45					S-18	4-8-19	
		CL	Very stiff to hard, gray to bluish gray, CLAY with occasional gravel, wet. Faint laminations. Slickensides. (GLACIOLACUSTRINE DEPOSITS)		S-19	9-12-16	
50			At 53 feet, layer of fine sandy SILT (possibly ash) with occasional fine gravel and nodule of tan sand.		S-20	30-50/5"	
55					S-21	20-50/5"	
60		ML	Very dense, gray, sandy SILT with embedded gravel, wet. (Till-like) (GLACIO-MARINE DRIFT)		S-22	50/5"	
65			Total Depth = 63 feet. 2" PVC piezometer installed to 40 feet.				
70							
75							
80							

PIEZOMETER SCHEMATIC



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BORING: CC- 6

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 2 of 2

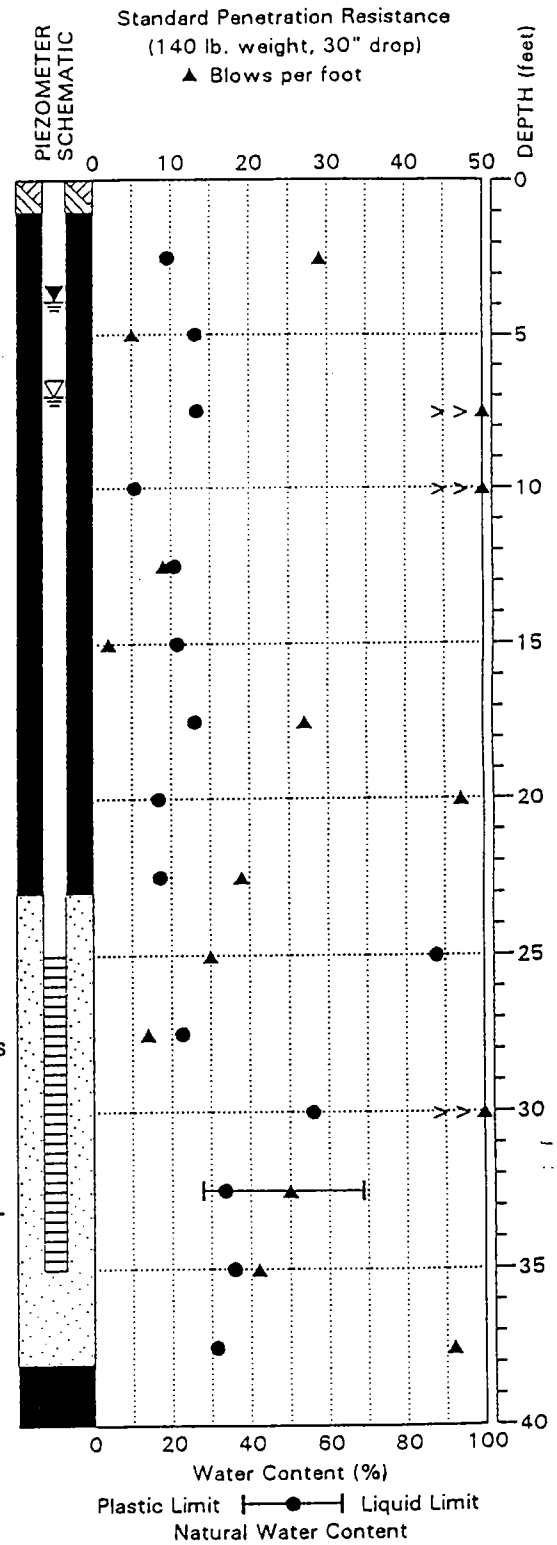
PROJECT NO.: 97061 FIGURE: A-26

PZO DWC 8/12/98

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.4 ± Feet

LOCATION:
DATE COMPLETED: 10/16/97
LOGGED BY: ADM/MLR

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	SM ML	Loose to medium dense, greenish gray, silty fine to medium SAND, moist. Pockets of gray sandy silt, silt and clay. (FILL)	S-1	10-17-12	
5			S-2	2-2-3	
	CL	Very soft, gray, lean CLAY with sand, wet. Some fine gravel.	S-3	1-1-50/1"	
10	GP GM	Very dense, medium-dark brown, sandy GRAVEL w/ silt, wet. (Angular gravel) *Refusal 3 times on rock/concrete between 8.5' and 12.5'. 4th try successful.	S-4	4-30-50/3"	
	SM	Very loose to loose, gray, silty fine to coarse SAND, wet. Some gravel and concrete fragments.	S-5	4-5-4	
15			S-6	1-1-1	
		Becomes gravelly SILT with sand.	S-7	4-12-15	
	GP SM	Medium dense to dense, dark gray to black, sandy GRAVEL grading to fine to medium SAND grading to silty SAND with gravel, wet.	S-8	19-23-24	
20			S-9	7-9-10	
25	OL	Loose to medium dense, reddish brown organics (woodchips and sawdust) with layers of gray silt.	S-10	4-6-9	
			S-11	4-3-4	GS
	SM	Loose to very dense, dark gray, silty fine SAND with shells, wet. Some gravel. Reddish brown wood fibers (natural wood). (BEACH DEPOSITS)	S-12	9-28-25	
30			S-13	5-10-15	AL
	CH	Very stiff to hard, gray, plastic silty CLAY, moist. Laminated. Slickensides. At 33', 1/4" layer of wood fibers. (GLACIOLACUSTRINE DEPOSITS)	S-14	6-8-12	
35			S-15	12-22-24	
40					



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BORING: CC- 7

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE: A-27

PZO DWC 6/16/98

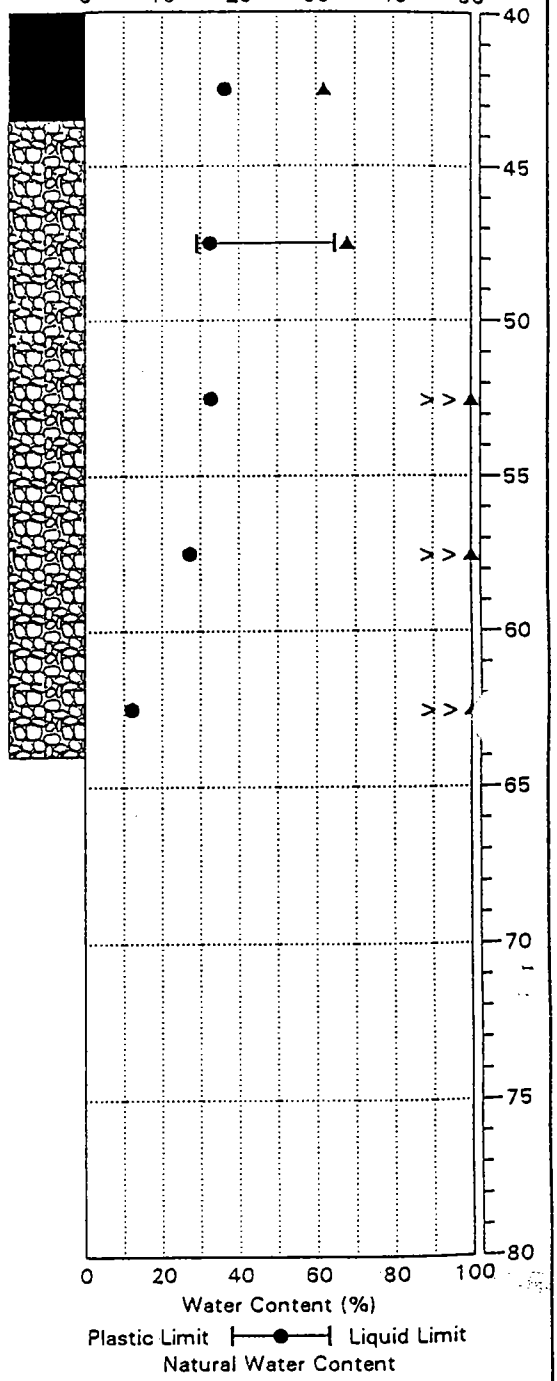
DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.4 ± Feet

DATE COMPLETED: 10/16/97
LOGGED BY: ADM/MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		CH	Very stiff to hard, gray, plastic silty CLAY, moist. Laminations. (GLACIOLACUSTRINE DEPOSITS)	S-16	11-15-16	
45			Occasional nodule of clean medium sand (possibly ash).	S-17	6-12-22	AL
50				S-18	22-33-50/3"	
55				S-19	33-50/3"	
60		CL	Hard, gray, silty CLAY with lenses of silty SAND, moist. Slickensides.			
65		SM	Very dense, gray, silty SAND with embedded gravel, moist. Faint laminations. (Till-like) (GLACIO-MARINE DRIFT)	S-20	36-50/3"	
70						
75						
80						

Total Depth = 64 feet.
2" PVC piezometer installed to 35 feet.

PIEZOMETER SCHEMATIC



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BORING: CC- 7

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 2 of 2

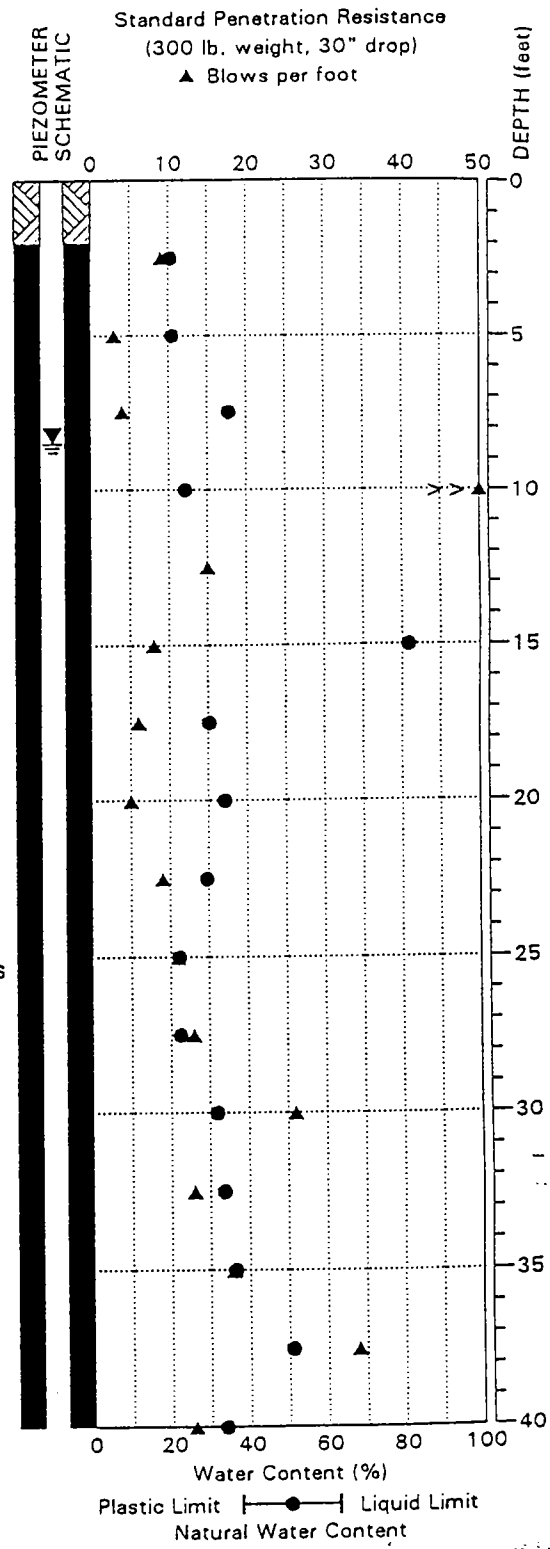
PROJECT NO.: 97061 FIGURE: A-27

PZO DWC 6/16/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 112.4 ± Feet

DATE COMPLETED: 5/3/98
LOGGED BY: MB/RCD/MLR

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	SM	Loose, very dark grayish brown, gravelly, silty fine to coarse SAND, moist. Fine to coarse gravel. Some wood. (FILL)	S-1	14-6-3	
5	CL	Soft, dark gray, slightly sandy, gravelly CLAY, wet. Fine to coarse, angular to subrounded gravel. Wood in sample at 7.5 feet.	S-2	1-2-1	
			S-3	2-1-3	
10		RIP-RAP SHORELINE Sampler bouncing on rock at 10 feet. Difficult drilling from 10.5 feet to 12 feet. Boulder causing drill rods to move out of alignment. Drillers realigned hole and stabilized boulder(s) by casing with augers to 15 feet. No sample recovery at 12.5 feet.	S-4	100/3"	
			S-5	7-7-8	
15	SM	Loose, gray, silty fine SAND, very moist. 2"-thick layer of twigs (reeds). Becomes gravelly, with pockets of silt and clay, and wood (reeds).	S-6	5-5-3	
			S-7	3-3-3	
20	ML	Medium stiff, dark gray, SILT, very moist. Pockets of sandy silt. Wood and marsh reeds collecting on driller's mud screen.	S-8	1-2-3	
	SM	Loose, gray, silty fine to medium SAND, wet. Shell fragments. Occasional wood chips and sawdust. (BEACH DEPOSITS)	S-9	2-4-5	
25			S-10	5-5-6	GS
			S-11	7-5-8	
30	CH	Stiff to very stiff, gray, plastic CLAY, very moist. Massive. (GLACIOLACUSTRINE DEPOSITS) Occasional wood chips from 32.5 feet to 41.5 feet.	S-12	11-15-11	
			S-13	4-6-7	
35			S-14	3-7-11	
			S-15	11-17-17	
40					



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BORING: CC- 8

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 3

PROJECT NO.: 97061

FIGURE: A-28

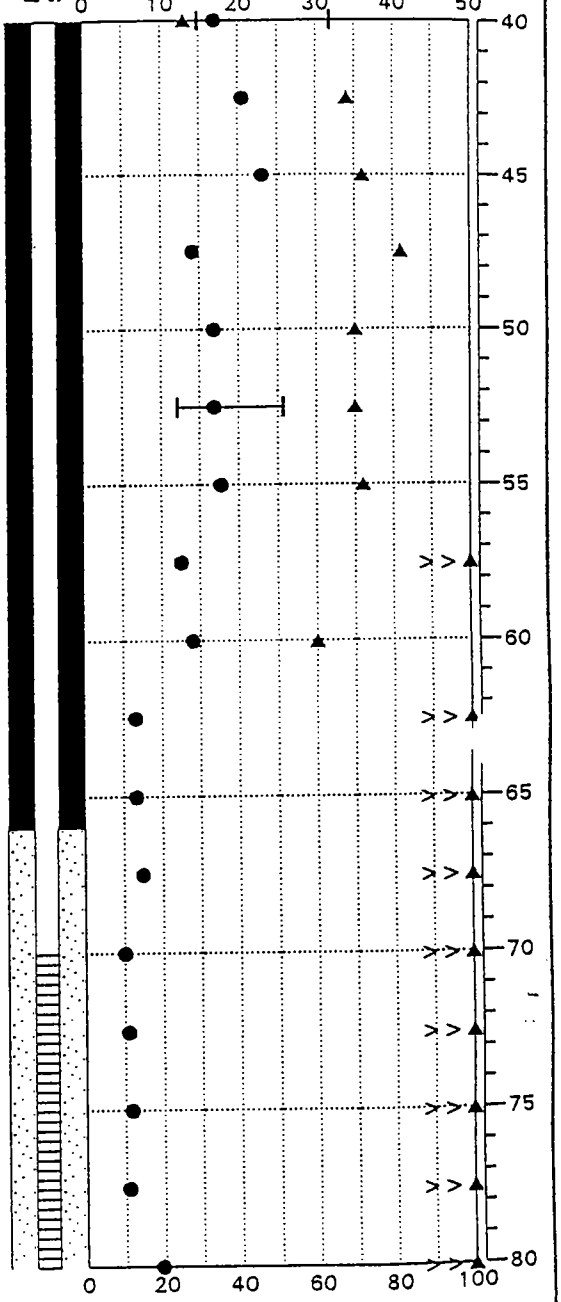
PZO300 DWC 8/12/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 112.4 ± Feet

LOGGED BY: MB/RCD/MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			Hard, gray, plastic CLAY, very moist. (GLACIOLACUSTRINE DEPOSITS)		S-16	3-5-8	AL
					S-17	15-17-17	
45					S-18	8-20-16	
			Below 47.5 feet, laminated and occasional interbeds of fine sand.		S-19	9-19-22	
50					S-20	8-22-13	
					S-21	11-20-15	AL
55					S-22	5-18-18	
		SP	Very dense, gray, slightly gravelly, medium to coarse SAND, wet. 4-inch thick layer of gray clay in middle of sample. (OUTWASH)		S-23	18-35-51	
60		CL	Hard, dark gray, CLAY, very moist. Laminated with fine sandy silt. (GLACIOLACUSTRINE DEPOSITS)		S-24	5-12-18	
		SC	Hard, dark gray, gravelly, clayey SAND, very moist. (GLACIOMARINE DRIFT)		S-25	15-40-53	
65					S-26	30-100/6"	GS
					S-27	45-100/6"	
70					S-28	15-66-50/3"	
		SC	Very dense, gray, slightly gravelly, clayey SAND, very moist. Fine to coarse gravel. Fine to coarse sand. (OUTWASH)		S-29	26-100/6"	
75		SP GP	Very dense, gray, slightly silty, sandy GRAVEL to gravelly SAND, wet.		S-30	26-100/5"	GS
					S-31	100/6"	GS
80							

PIEZOMETER SCHEMATIC



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BORING: CC- 8

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

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PROJECT NO.: 97061

FIGURE: A-28

PZ0300 DWC 8/12/98

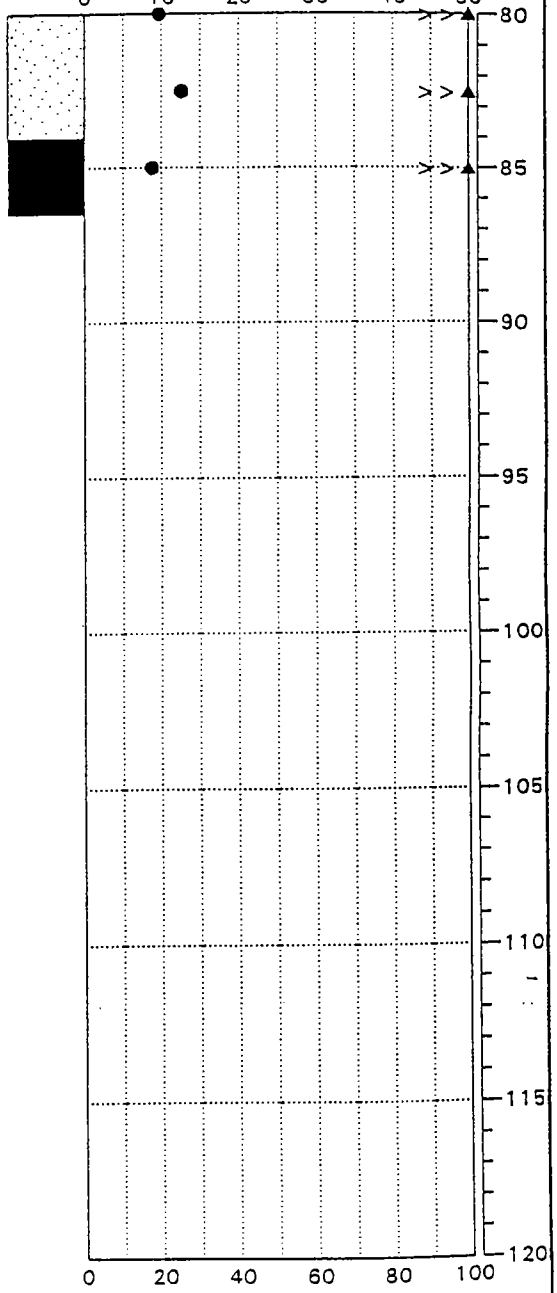
DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 112.4 ± Feet

DATE COMPLETED: 5/3/98
LOGGED BY: MB/RCD/MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
80		GP GM	Very dense, gray, slightly silty fine GRAVEL, wet. (OUTWASH)		S-32	100/4"	
85		CL	Very hard, gray, gravelly, sandy CLAY, very moist. Blocky. Sand filled joints. (GLACIOMARINE DRIFT)		S-33	22-38-33	
					S-34	19-37-50/4"	

Total Depth = 86.5 feet.

PIEZOMETER SCHEMATIC



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BORING: CC- 8

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

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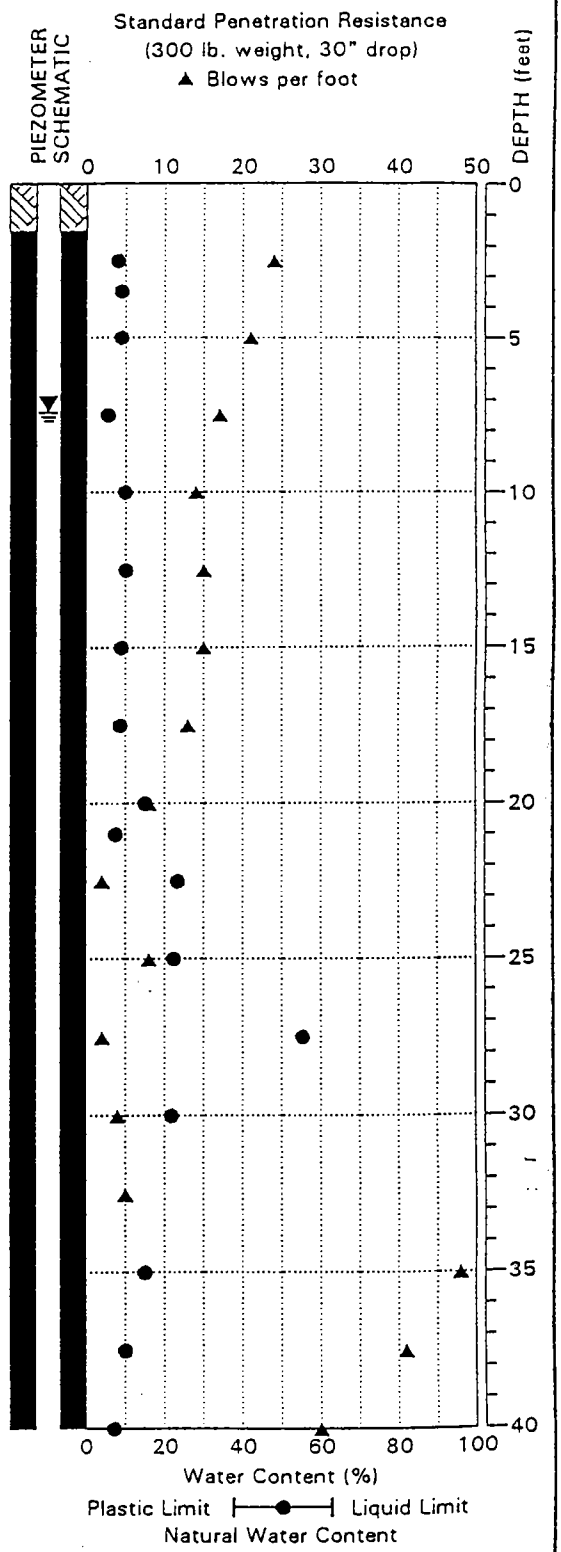
PROJECT NO.: 97061 FIGURE: A-28

PZO300 DWC 6/12/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 111.8 ± Feet

DATE COMPLETED: 4/28/98
LOGGED BY: SEG/RCD

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	GP	Medium dense, gray, coarse GRAVEL with sand, moist. (RAILROAD BALLAST)	S-1	8-11-13	
3	SP	Medium dense, grayish brown, very gravelly SAND, moist. Fine gravel. (FILL)	S-2	3-8-13	
5			S-3	9-9-8	GS
10	GP	Medium dense, grayish brown, slightly sandy fine GRAVEL, moist. Trace silt.	S-4	7-7-7	
12	GW	Medium dense, grayish brown, slightly sandy GRAVEL, moist. Well graded.	S-5	9-9-6	
15	GP	Medium dense, gray, slightly sandy fine gravel, wet.	S-6	7-8-7	
			S-7	7-7-6	
20		Becomes loose.	S-8	7-6-2	
22	ML	Soft to medium stiff, gray, SILT, very moist. Fragments of till, dark organics and lenses of sand. (FILL)	S-9	2-1-1	
25			S-10	2-3-5	
		At 27.5 feet, laminated and slightly mottled. Some rootlets and organics.	S-11	2-1-1	
30	SM	Loose, dark gray, silty SAND, wet. Shell fragments. (BEACH DEPOSITS)	S-12	3-2-2	GS
		No Sample Recovery.	S-13	3-3-2	
35		Becomes dense, with some fine gravel and abundant shell fragments.	S-14	16-26-22	
37	SM	Very dense, dark gray, slightly gravelly, silty SAND, moist. (GLACIAL TILL)	S-15	31-21-20	
40					



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BORING: CC- 9

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 3

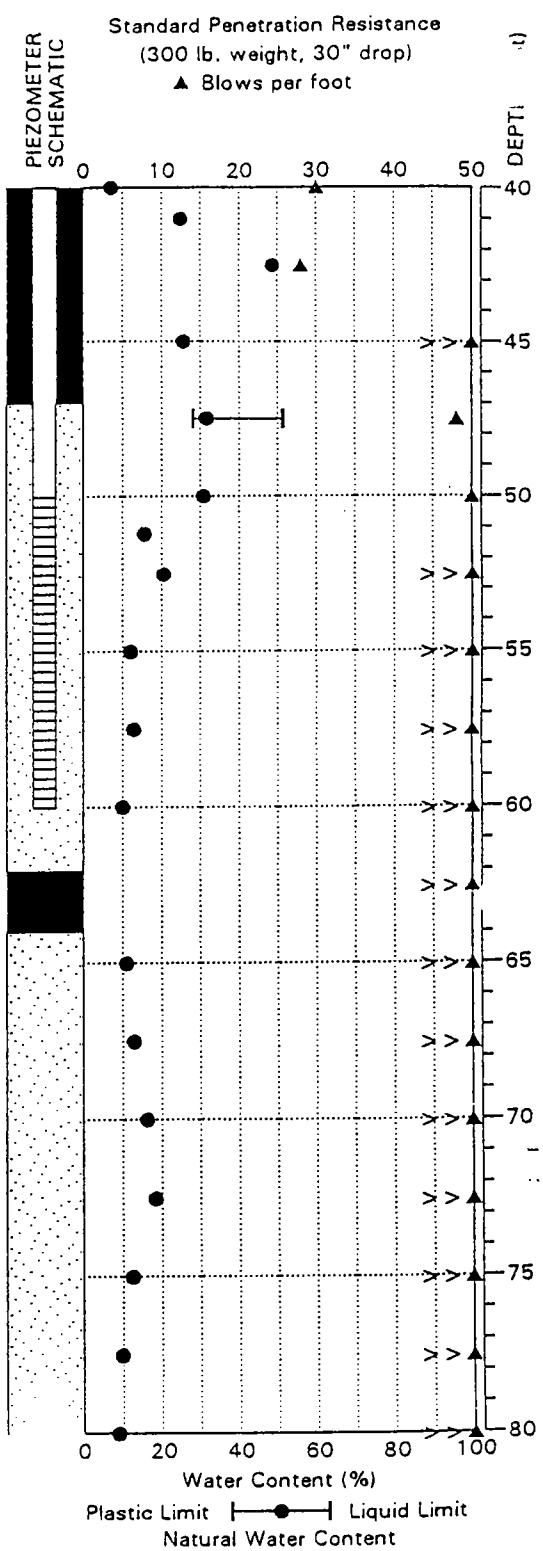
PROJECT NO.: 97061 FIGURE: A-29

PZO300 DWC 8/12/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 111.8 ± Feet

DATE COMPLETED: 4/28/98
LOGGED BY: SEG/RCD

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40	CH	Hard, gray, plastic CLAY, moist. Massive. (GLACIOLACUSTRINE DEPOSITS)	S-16	20-18-12	
			S-17	10-13-15	
45		At 45.5 feet, rounded embedded gravel. Becomes laminated.	S-18	5-21-50/5"	
		At 48.5 feet, thin ash layer.	S-19	10-18-30	AL
50			S-20	12-18-32	
		Below 51.4 feet, occasional thin fine sand lenses.	S-21	12-24-31	
55	SP	Very dense, dark gray, fine to coarse SAND with trace fine gravel, wet. (OUTWASH)	S-22	10-40-50/4"	GS
			S-23	12-40-50/4"	
60	SC	Hard, dark greenish gray, gravelly clayey SAND, very moist. Fine gravel. (GLACIOMARINE DRIFT)	S-24	21-50/6"	
		No recovery. Sampler on rock.	S-25	50/4"	
65			S-26	50/4"	GS
			S-27	50/4"	
70	SM	Very dense, dark greenish gray, gravelly, slightly silty SAND, very moist.	S-28	50/5"	
	SC	Hard, dark gray, gravelly clayey sand, very moist.	S-29	50/3"	
75		Driller comment: cobbles below 73 feet. At 75 feet, sampler bouncing on rock.	S-30	85/3"	
			S-31	75/4"	
80					



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BORING: CC- 9

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

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PROJECT NO.: 97061 FIGURE: A-29

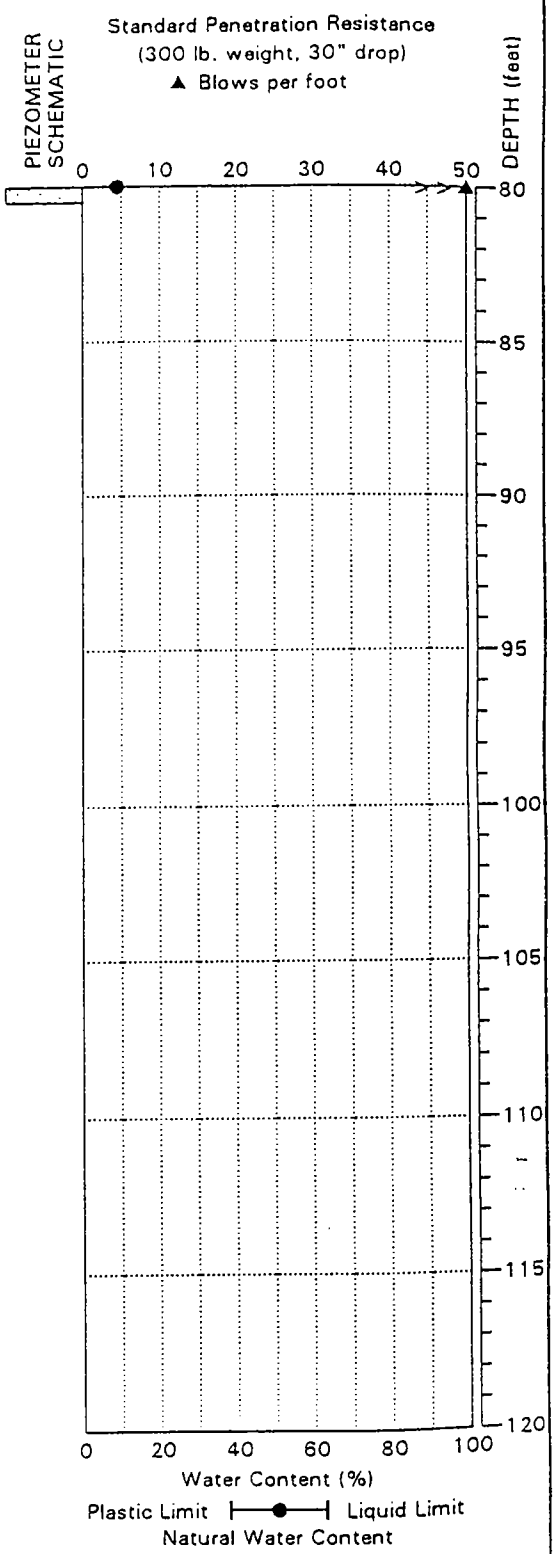
PZO300 DWC 6/12/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 111.8 ± Feet

DATE COMPLETED: 4/28/98
LOGGED BY: SEG/RCD

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PIEZOMETER SCHEMATIC
80					S-32	60/5"		

Total Depth = 80.5 feet.
2" PVC Piezometer installed to 60 feet.



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BORING: CC- 9

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

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PROJECT NO.: 97061

FIGURE: A-29

PZO300 DWC 6/12/98

DRILLING COMPANY: Shoreline

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"

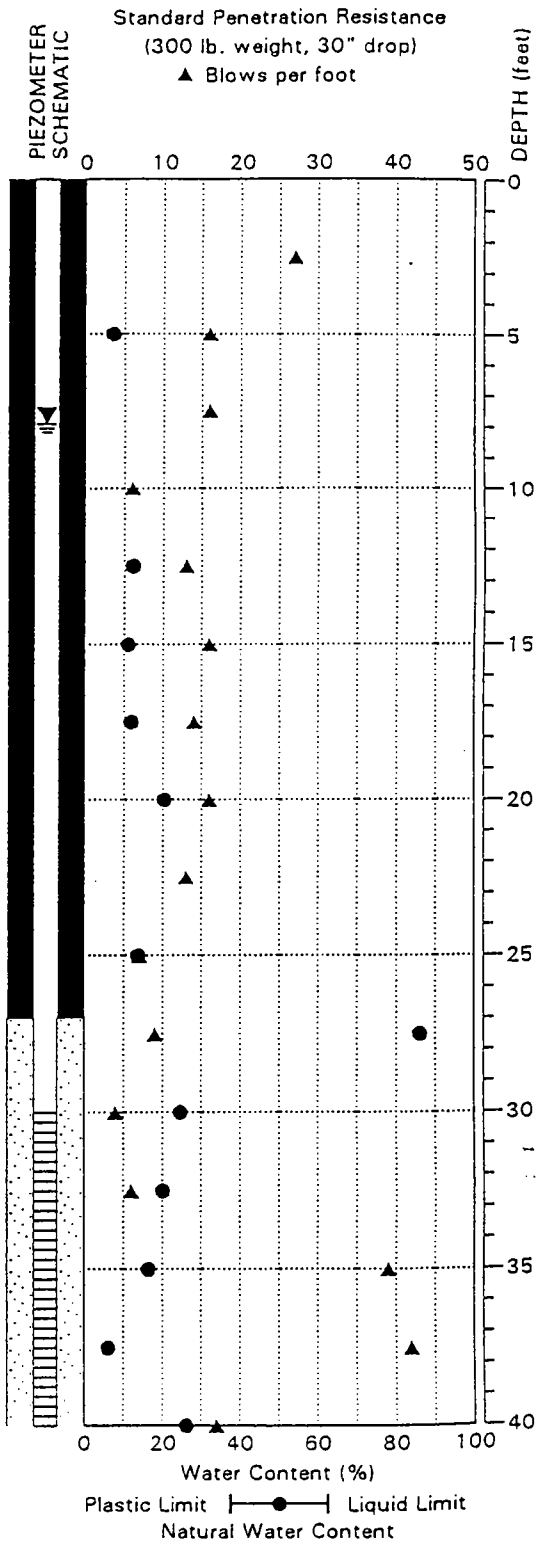
SURFACE ELEVATION: 111.6 ± Feet

DATE COMPLETED: 4/29/98

LOGGED BY: RCD

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION
0	SP	Medium dense, greenish gray, gravelly, fine to coarse SAND, moist. (FILL)
5	GP	Medium dense, light gray, fine GRAVEL, wet.
	SP	Medium dense, greenish gray, SAND, wet.
10	GP	Medium dense, gray, slightly sandy fine gravel, wet.
20	SP	Medium dense, greenish gray, fine to coarse SAND, wet.
		No Sample Recovery.
25	SC	Loose, dark greenish gray, gravelly, clayey SAND, wet. (FILL)
		Wood at base of layer.
30	SM	Loose to medium dense, gray, slightly silty to silty fine to medium SAND, wet. Numerous shells. (BEACH DEPOSITS)
35		Becomes dense.
40	GP	Dense, light gray, clean GRAVEL, wet. Few cobbles.

SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
S-1	9-12-15	
S-2	3-7-9	
S-3	8-9-7	
S-3B	4-3-3	
S-4	3-8-5	
S-5	3-7-9	GS
S-6	4-7-7	
S-7	5-7-9	
S-7B	14-8-5	
S-8	3-3-4	
S-9	3-5-4	
S-10	2-2-2	
S-11	13-3-3	GS
S-12	11-19-20	GS
S-13	10-30-12	



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BORING: CC-10

HWA GEOSCIENCES INC.

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Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061

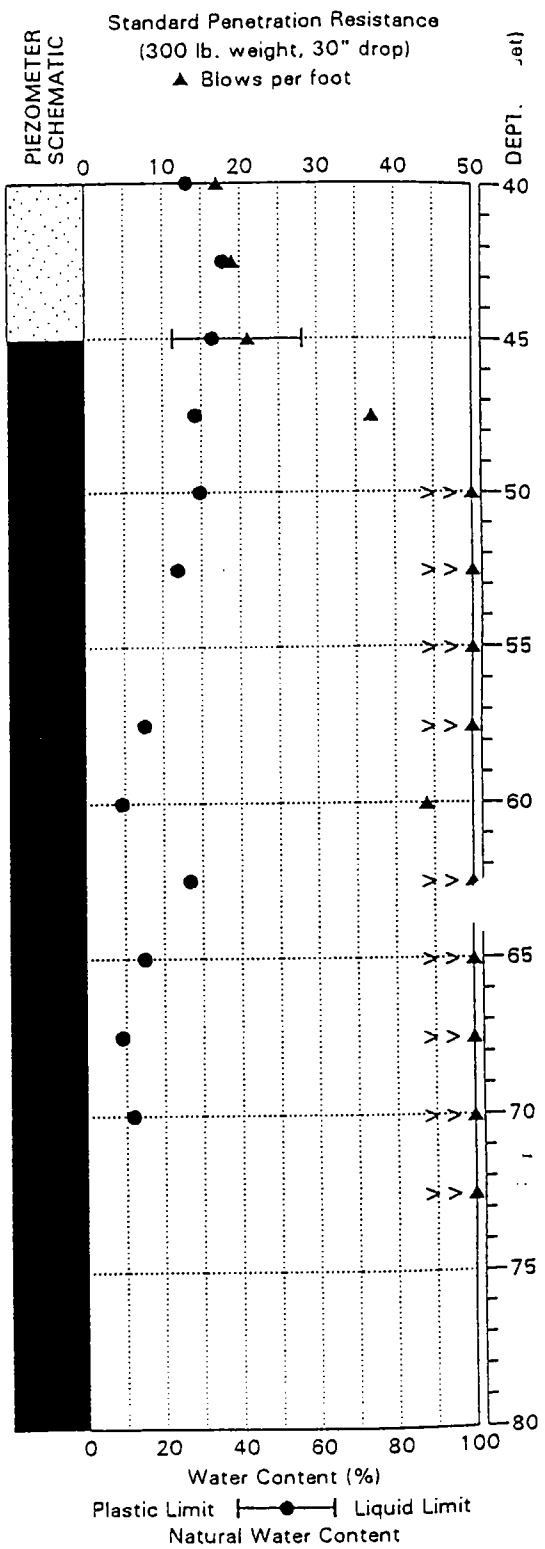
FIGURE: A-30

PZ0300 DWC 6/12/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 111.6 ± Feet

DATE COMPLETED: 4/29/98
LOGGED BY: RCD

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40	CH	Very stiff, dark gray, plastic CLAY, moist. Faint laminations. Few rounded gravel, 1/2" to 1" diameter. (GLACIOLACUSTRINE DEPOSITS)	S-14	4-9-8	
			S-15	6-9-10	
45			S-16	6-8-13	AL
		Becomes sandy plastic CLAY.	S-17	14-19-18	
50			S-18	14-24-31	
	SM	Very dense, gray, slightly silty to silty fine to medium SAND, wet. (OUTWASH)	S-19	8-40-50/5"	GS
55		No Sample Recovery.	S-19B	50/4"-50/1"	
	SC	Hard, dark gray, gravelly, clayey SAND, wet. Few thin layers of dark gray clay. (GLACIOMARINE DRIFT)	S-20	16-50/6"	
60			S-21	34-34-10	
		At 62.5 feet, increase in gravel content - gravelly clayey SAND.	S-22	100/6"	
65		Becomes dark greenish gray.	S-23	37-50/4"	
			S-24	50/6"-50/6"	GS
70			S-25	50/6"-50/4"	
		No Sample Recovery.	S-26	100/3"-100/1"	
75		Attempted core drilling 73' to 80'. No recovery.	C-1		
80		Total Depth = 80 feet.			



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BORING: CC-10

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

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PROJECT NO.: 97061 FIGURE: A-30

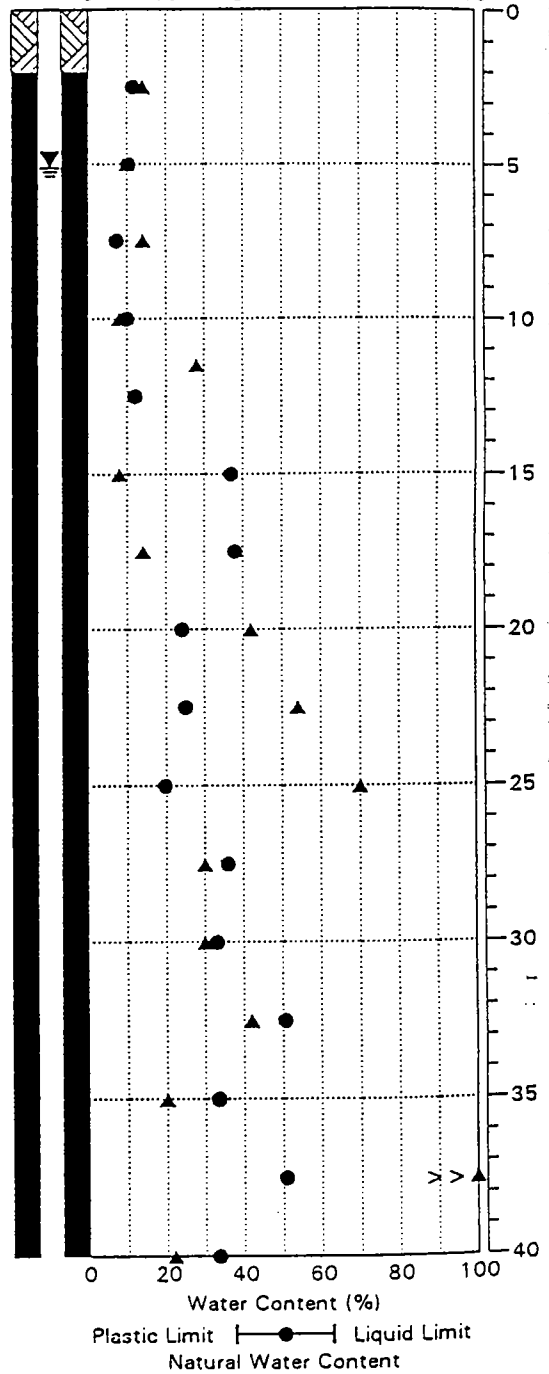
PZ0300 DWC 6/16/98

DRILLING COMPANY: Cherokee
DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 112.0 ± Feet

DATE COMPLETED: 5/6/98
LOGGED BY: ADM/RCD

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	GP	Loose, dark grayish brown, slightly sandy fine GRAVEL, moist. Gravel subrounded. (FILL)	S-1	5-3-4	
5			S-2	4-3-2	
			S-3	3-3-4	
10		At 10 feet, 2" thick layer of silty fine sand.	S-4	4-2-2	
			S-5	3-7-7	
		At 12.5 feet, layer of gray clayey sand in sample tip.			
15	CL	Soft, dark gray, lean CLAY, very moist. Occasional fine gravel.	S-6	2-2-2	
	SM	Loose, dark gray to black, silty fine SAND, wet. Abundant wood chips, wood fibers, and twigs. Creosote odor and oil sheen. (MARSH DEPOSITS / FILL)	S-7	3-3-4	
20	SP SM	Medium dense, gray, slightly silty fine SAND, wet. Shell fragments. (BEACH DEPOSITS)	S-8	6-10-11	
		At 20 feet, some wood in sample.	S-9	7-12-15	GS
25		At 25 feet, becomes fine to medium grained, dense.	S-10	8-19-16	
	GP GM	Medium dense, gray, slightly sandy, slightly silty GRAVEL, wet.	S-11	7-8-7	
	CH	Stiff to very stiff, gray, plastic CLAY, very moist. Massive. Few 3/4" to 2" rounded gravel.	S-12	7-7-8	
30		(GLACIOLACUSTRINE DEPOSITS)	S-13	8-10-11	
35			S-14	5-5-5	
		Sampler on rock or wood. Poor recovery.	S-15	66-40-50	
40					

PIEZOMETER SCHEMATIC



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BORING: CC-11

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 3

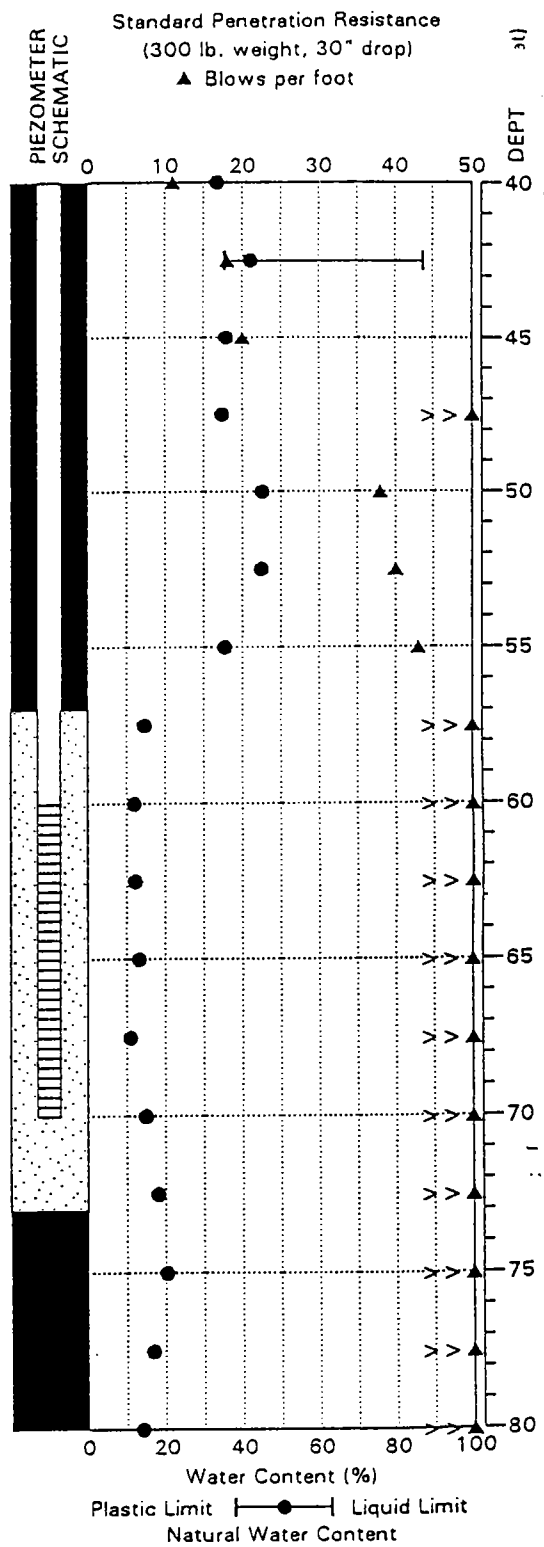
PROJECT NO.: 97061 FIGURE: A-31

PZ0300 DWC 6/12/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 112.0 ± Feet

DATE COMPLETED: 5/6/98
LOGGED BY: ADM/RCD

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40		Stiff to very stiff, gray, plastic CLAY, very moist. Massive.	S-16	6-5-6	
		(GLACIOLACUSTRINE DEPOSITS)	S-17	5-8-10	AL
45			S-18	4-10-10	
		Becomes hard, laminated.	S-19	12-27-32	
50			S-20	8-16-22	
		Below 52.5 feet, occasional thin layers of fine sand to silty sand.	S-21	9-17-23	
55			S-22	8-19-24	
	ML	Hard, dark gray, gravelly, sandy SILT, moist. Some cobbles. (GLACIOMARINE DRIFT)	S-23	19-26-38	
60	SC GC	Very dense, dark gray, clayey SAND to clayey GRAVEL, very moist.	S-24	10-33-35	
			S-25	100/6"	GS
65		Becomes dark olive gray.	S-26	70-50/3"	
			S-27	40-50/5"	
70			S-28	37-70/3"	GS
	ML	Hard, dark gray, SILT, very moist.	S-29	36-66/6"	
75	SP SM	Very dense, gray, slightly silty fine to medium SAND, very moist to wet. (OUTWASH)	S-30	37-60/5"	
			S-31	50-50/4"	
80					



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BORING: CC-11

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PROJECT NO.: 97061 FIGURE: A-31

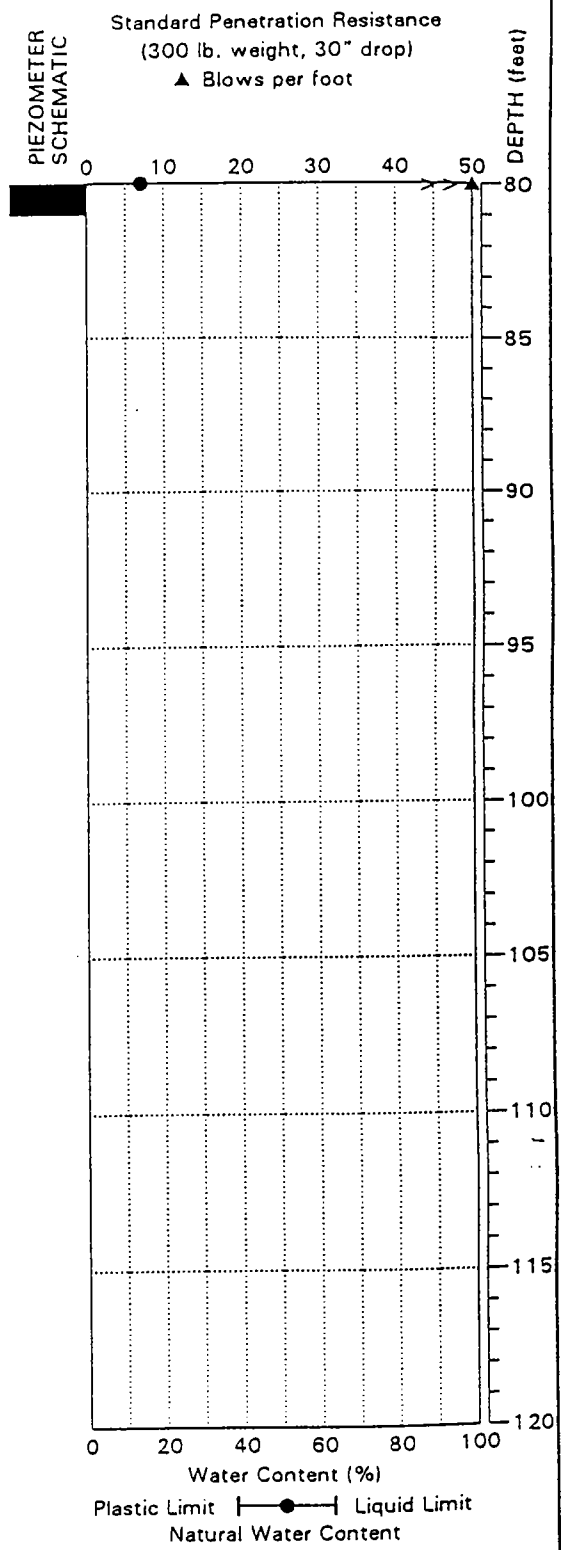
PZ0300 DWC 6/12/98

DRILLING COMPANY: Cherokee
DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 112.0 ± Feet

DATE COMPLETED: 5/6/98
LOGGED BY: ADM/RCD

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PIEZOMETER SCHEMATIC
80		CL	Hard, dark gray, gravelly, sandy CLAY, very moist.		S-32	57-50/3"		

Total Depth = 81 feet.



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BORING: CC-11

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PROJECT NO.: 97061 FIGURE: A-31

PZO300 DWC 8/12/98

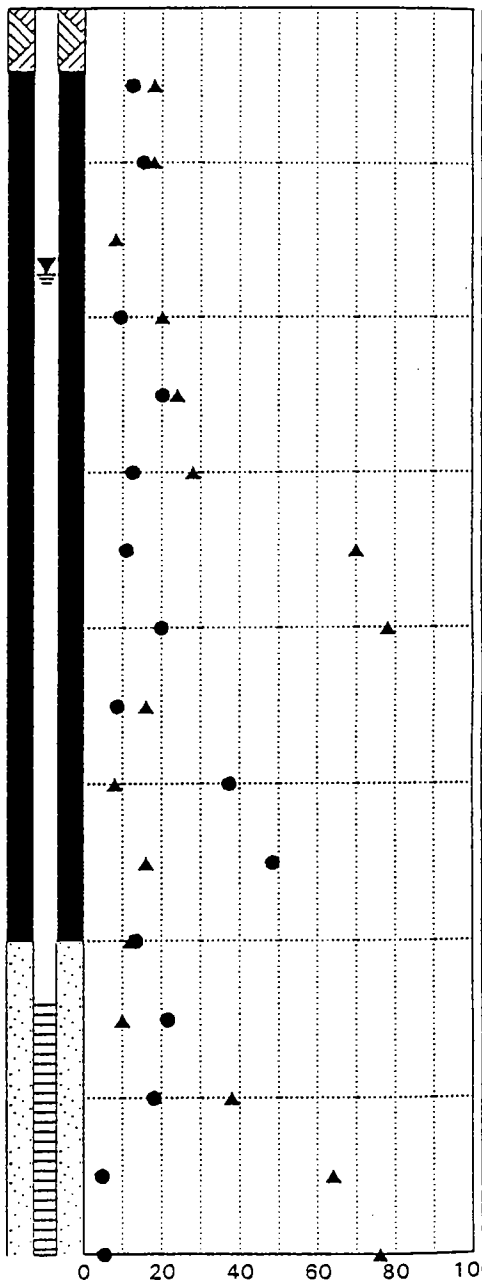
DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 113.6 ± Feet

DATE COMPLETED: 4/30/98
LOGGED BY: RCD/MB

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)
0	GP	Loose, light gray, sandy fine to coarse GRAVEL, wet. (FILL)	S-1	10-5-4
5			S-2	1-4-5
	GC	Loose, dark gray, sandy, clayey, fine to coarse GRAVEL with sand, wet.	S-3	1-2-2
10			S-4	2-4-6
		Becomes medium dense.	S-5	3-8-4
15		Piece of brick in sample.	S-6	5-8-6
	GM	Dense, greenish gray, sandy, silty GRAVEL, wet. Fine to coarse sand. Scattered chunks of silt.	S-7	3-26-9
20			S-8	14-18-21
		Becomes loose.	S-9	6-4-4
25	CL	Soft, dark gray, slightly sandy gravelly lean CLAY, wet.	S-10	2-2-2
	ML	Medium stiff, dark gray, slightly sandy SILT, wet. Trace organics - wood debris.	S-11	1-5-3
30		At 30 feet becomes slightly gravelly.	S-12	2-3-3
	SM	Loose, gray, silty fine SAND, wet. Shell fragments. Odor / Sheen.	S-13	2-2-3
35	SM	Medium dense, dark gray, silty fine to medium SAND, wet. Trace shell fragments and fine gravel. (BEACH DEPOSITS)	S-14	4-9-10
	SP SM	Dense, dark gray, gravelly, slightly silty fine to coarse SAND, wet. Shell fragments.	S-15	14-16-16
40				

OTHER TESTS: GS

PIEZOMETER SCHEMATIC



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BORING: CC-12

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PAGE: 1 of 2

PROJECT NO.: 97061

FIGURE: A-32

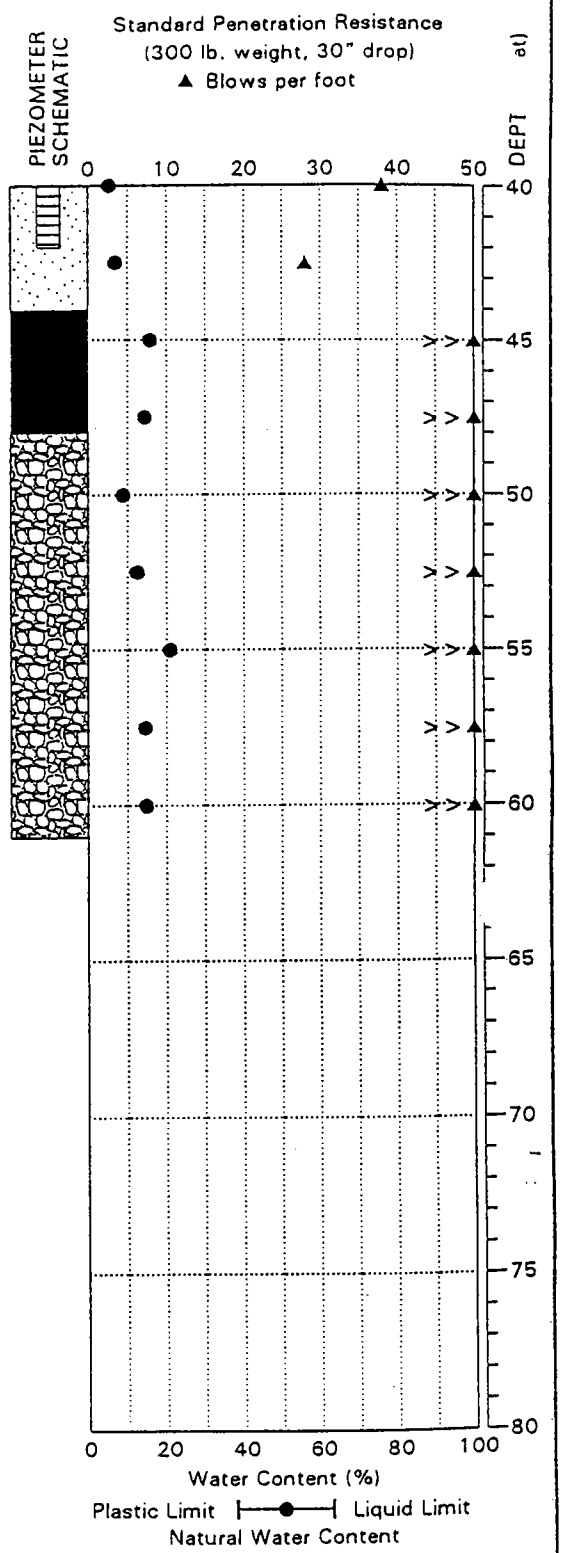
PZO300 DWC 6/12/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 113.6 ± Feet

DATE COMPLETED: 4/30/98
LOGGED BY: RCD/MB

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40	GM	Dense, dark gray, silty, sandy fine to coarse GRAVEL, wet.	S-16	16-19-17	
	SP SM	Medium dense, gray, slightly gravelly, slightly silty fine to coarse SAND, wet. Shell fragments.	S-17	15-17-11	GS
45	SM	Very dense, dark greenish gray, gravelly, silty fine to coarse SAND, moist. Pockets of silt and clay.	S-18	15-21-37	
		(GLACIOMARINE DRIFT)	S-19	43-50/5"	
50		Prior to 50-foot sample, hole blocked by log at 30 feet. Drilled through wood.	S-20	50/6"-50/4"	
	SM	Very dense, grayish brown, silty fine to medium SAND, moist.	S-21	34-50/5"	
55	ML	Hard, dark gray, sandy SILT, moist. Fine sand.	S-22	23-39-40	GS
	SM	Very dense, dark gray, gravelly, silty fine to coarse SAND, moist. Pockets of silt and clay.	S-23	26-50/4"	
60	ML	Hard, dark gray, sandy, gravelly SILT, moist.	S-24	19-50/4"	

Total Depth = 61 feet.
2" PVC Piezometer installed to 42 feet.



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BORING: CC-12

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

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PROJECT NO.: 97061 FIGURE: A-32

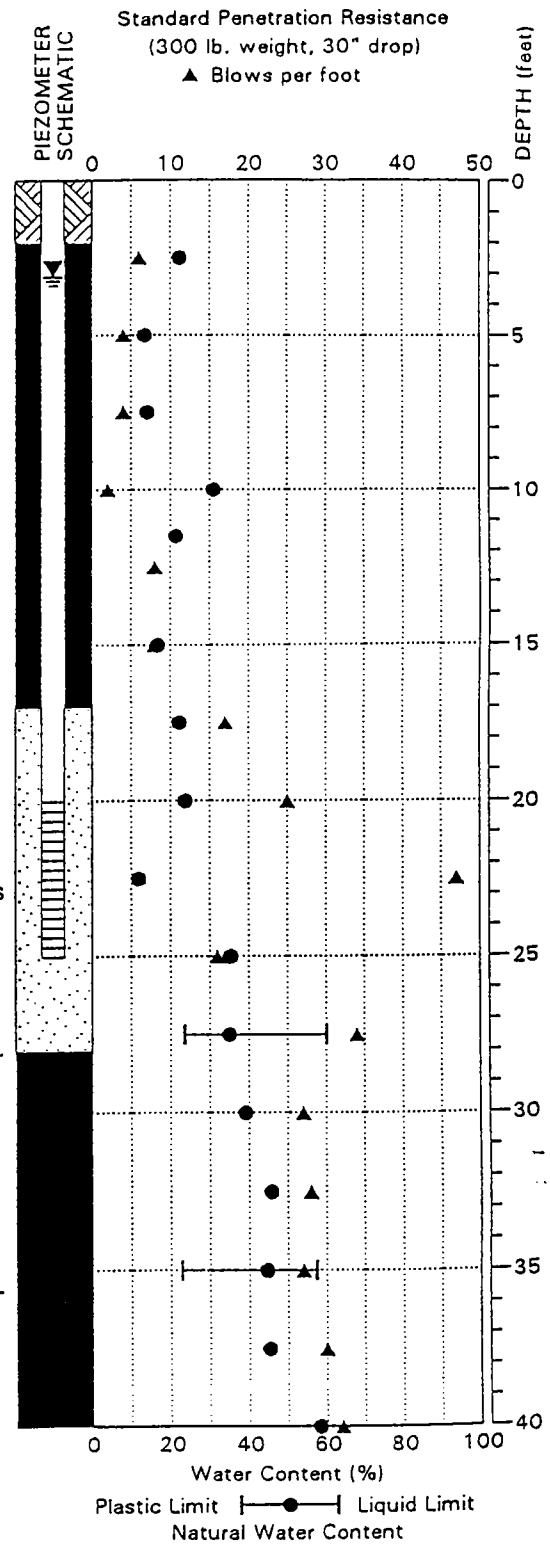
PZO300 DWC 8/12/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 110.5 ± Feet

DATE COMPLETED: 5/7/98
LOGGED BY: RCD

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION
0		GP	Loose, gray, slightly sandy fine to coarse GRAVEL, moist. (FILL)
10		CL	Soft, dark gray, slightly gravelly, sandy CLAY, very moist.
		SM	Loose, dark greenish gray, slightly gravelly, silty fine to medium SAND, wet.
20		SP SM	Medium dense, dark gray, slightly silty to silty fine to medium SAND, wet. Shell fragments. (BEACH DEPOSITS) Becomes dense, gravelly. Numerous shell fragments and several wood chips.
25		CH	Stiff to very stiff, dark gray, plastic CLAY, moist. Occasional gravel, to 32 feet. (GLACIOLACUSTRINE DEPOSITS)
40			

SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
	S-1	4-3-3	
	S-2	2-2-2	
	S-3	2-2-2	
	S-4	1-1-1	
	S-5	3-3-5	
	S-6	3-5-3	
	S-7	4-7-10	
	S-8	7-14-11	
	S-9	11-20-27	GS
	S-10	10-11-5	
	S-11	9-15-19	AL
	S-12	8-14-13	
	S-13	10-14-14	
	S-14	8-12-15	AL
	S-15	10-13-17	



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BORING: CC-13

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PAGE: 1 of 3

PROJECT NO.: 97061

FIGURE: A-33

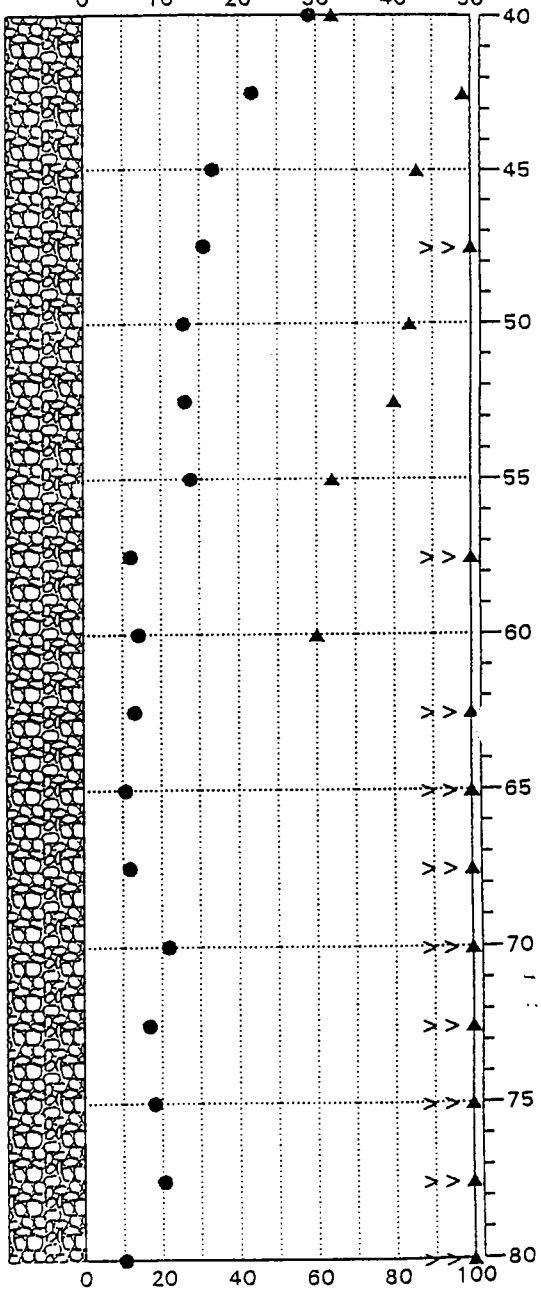
PZ0300 DWC 8/12/98

DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 110.5 ± Feet

DATE COMPLETED: 5/7/98
LOGGED BY: RCD

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
40			Hard, dark gray, plastic CLAY, wet. (GLACIOLACUSTRINE DEPOSITS)		S-16	10-17-15	
					S-17	15-19-30	
45		CL	Becomes lean CLAY. Below 45 feet, occasional thin beds of fine sand and occasional gravel/cobble.		S-18	14-15-28	
					S-19	13-30-50/4"	
50					S-20	8-15-27	
			At 52.5 feet, wood chips.		S-21	7-22-18	
55					S-22	9-16-16	
					S-23	20-34-50	
60		CL	Hard, gray, sandy CLAY with gravel, moist. (GLACIOMARINE DRIFT)		S-24	50-100/2"	
		ML	Hard, gray gravelly, sandy SILT, very moist. Some clay.		S-25	75-100/1"	
65					S-26	40-75/1"	
					S-27	50-50/3"	
70		CL ML	Interbedded gravelly, sandy SILT and gravelly sandy CLAY, with few layers of silty fine SAND: hard, gray, very moist.		S-28	18-34-66/5"	
					S-29	50-50/2"	
75					S-30	17-30-50/2"	
					S-31	30-65/3"	
80							

PIEZOMETER SCHEMATIC



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BORING: CC-13

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PROJECT NO.: 97061 FIGURE: A-33

PZO300 DWC 6/12/98

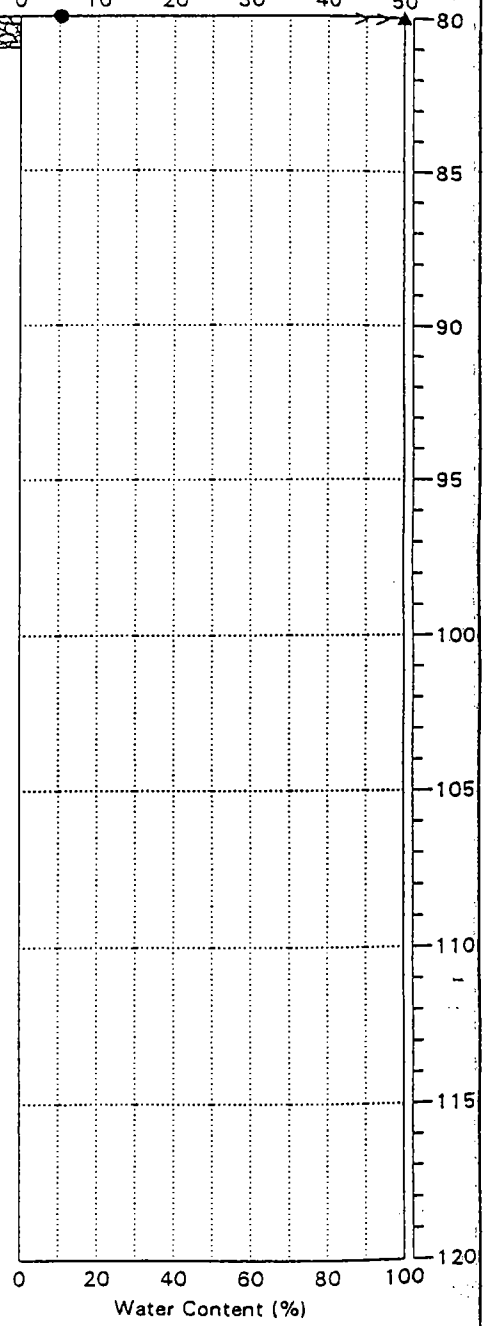
DRILLING METHOD: B-59 Mobile, Mud Rotary, 5"
SURFACE ELEVATION: 110.5 ± Feet

DATE COMPLETED: 5/7/98
LOGGED BY: RCD

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PIEZOMETER SCHEMATIC
80		SP SM	Very dense, light gray, gravelly, slightly silty, fine to coarse SAND, wet. (OUTWASH)		S-32	50-50/2"	GS	

Total Depth = 81 feet.

Standard Penetration Resistance
(300 lb. weight, 30" drop)
▲ Blows per foot



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BORING: CC-13

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

PROJECT NO.: 97061 FIGURE: A-33

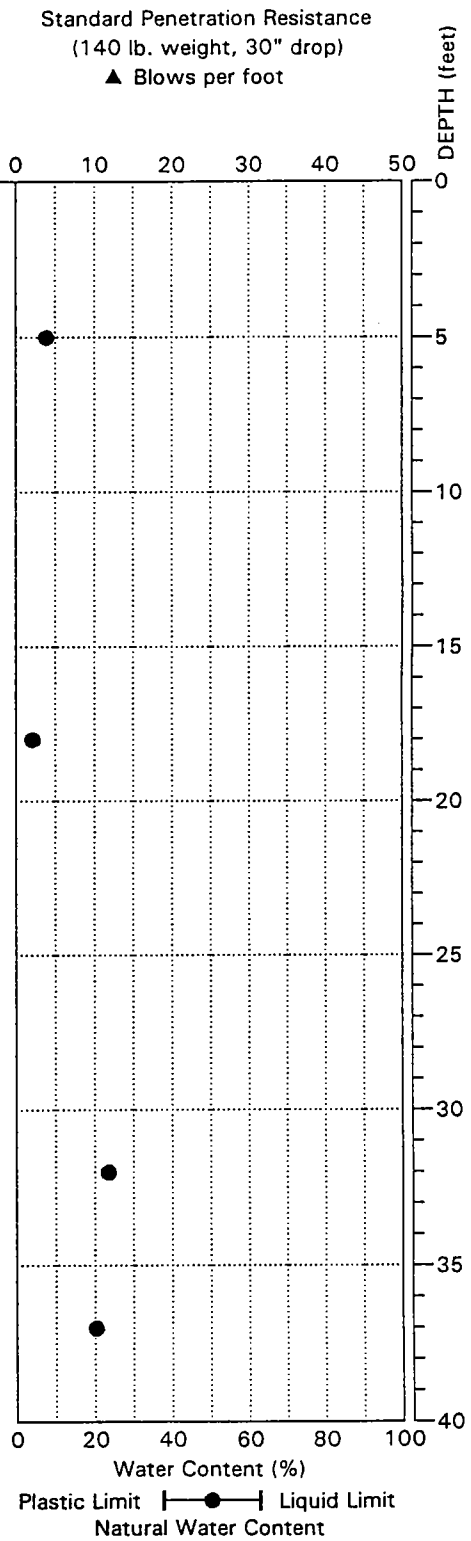
PZ0300 DWC 6/12/98

DRILLING COMPANY: Hokkaido Drilling
DRILLING METHOD: Cable tool,
SURFACE ELEVATION: ± Feet

LOCATION: See site plan.
DATE COMPLETED: 5/14/98
LOGGED BY: MLR

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE NUMBER
0	SP	Brownish gray, silty fine to medium SAND with fine to coarse gravel. (FILL)	S-1
5	GW	Olive-brown, silty fine to medium GRAVEL and SAND. Sand is fine to coarse. Some cobbles.	S-2
	GM	Very silty, fewer cobbles.	
10	GM	Olive brown, silty gravel with sand.	S-3
15	GM	Brownish gray, silty fine to coarse gravel with medium to coarse SAND. Very hard drilling.	S-4
20	GM	Gray silty coarse GRAVEL and COBBLES with medium to coarse sand and fine gravel. Layers of silt.	S-5
25	GM	Dark gray, silty coarse GRAVEL and COBBLES with medium to coarse sand.	S-6
30	PT	Dark brown, SAWDUST (FILL)	S-7
35	SM	Dark gray, very silty, fine to medium SAND with shell fragments. A (BEACH DEPOSITS)	S-8, S-9
		With trace gravel.	S-10
40	ML	Dark gray, clayey SILT with occasional gravel.	

SAMPLE TYPE
PEN. RESISTANCE (blows/6 inches)
OTHER TESTS
PIEZOMETER SCHEMATIC



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BORING: PW-5

HWA Denny Way / Lake Union CSO, Contract A

HWA GEOSCIENCES INC.

PAGE: 1 of 2

PROJECT NO.: 97061 FIGURE:

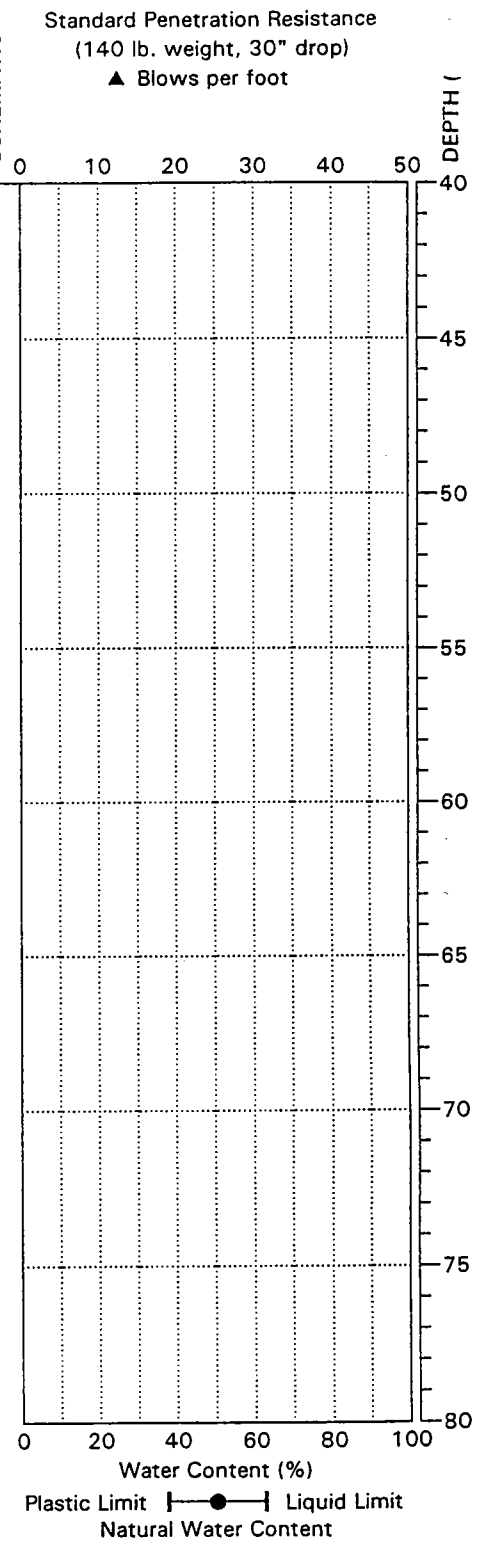
PZO DWA 7/31/98

DRILLING COMPANY: Hokkaido Drilling
DRILLING METHOD: Cable tool,
SURFACE ELEVATION: ± Feet

LOCATION: See site plan.
DATE COMPLETED: 5/14/98
LOGGED BY: MLR

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PIEZOMETER SCHEMATIC
40			(GLACIOLACUSTRINE)	S-11			

Bottom of boring at 42 feet.
16" diameter casing installed to 42 feet.



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BORING: PW-5

HWA GEOSCIENCES INC.

Denny Way / Lake Union CSO, Contract A

PAGE: 2 of 2

PROJECT NO.: 97061 FIGURE:

PZO DWA 7/31/98

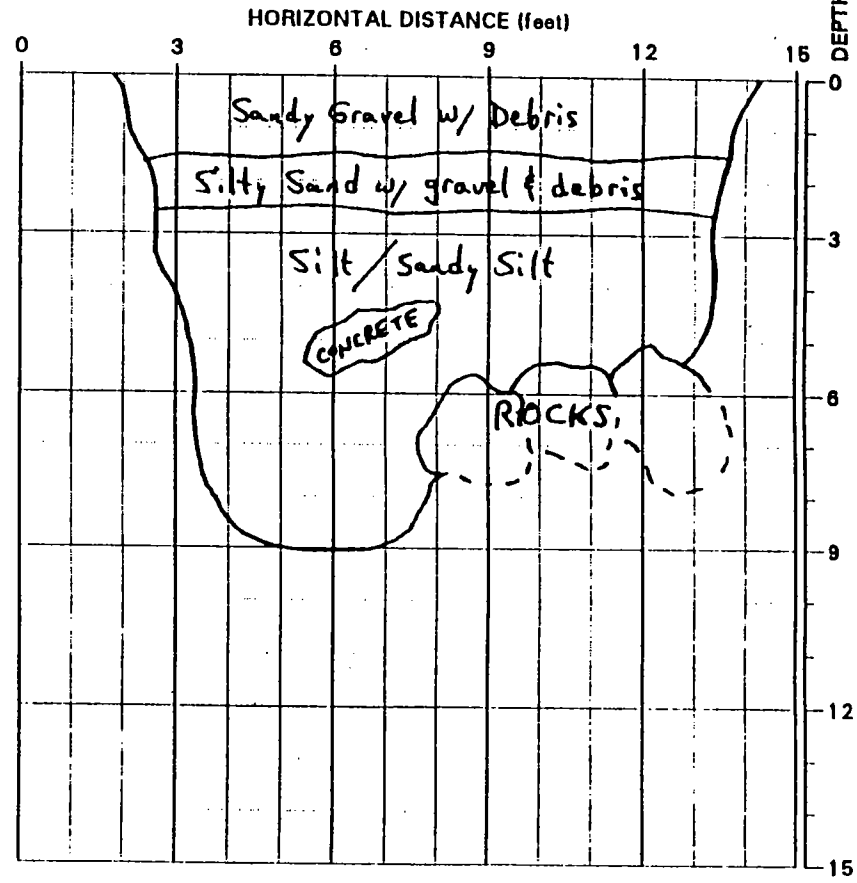
EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: ~~113 ± Feet~~ 112.2

LOCATION:
DATE COMPLETED: 7/14/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		GW	Medium dense, very dark brown to black, sandy GRAVEL, moist. Some debris - bricks, metal, rubber. (FILL)					
		SM	Medium dense, light brown, silty SAND with gravel, moist. Occasional debris.		S-1	11		
3		ML	Stiff, gray, SILT, moist. Debris - lumber, concrete.		S-2	21		
			Below 4 feet, zones of sandy SILT with some gravel and cobbles.					
			At 5 feet, 3'x1'x2' concrete chunk.		S-3	29		
6			At 5.5 to 7 feet, several large, immovable angular boulders (rip-rap). Seepage at 7 feet, rising to 6 feet.					▽
			Below 7 feet, more frequent debris (plastic, lumber, and cinders) and large rocks.		S-4	25		
					S-5	33		
9								
12								
15								

Total Depth = 9 feet. Refusal on rip-rap.
Groundwater seepage at 6 feet.
Caving below 4 feet, east side.

SKETCH OF EAST SIDE OF PIT



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HONGWEST & ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP- 1

PAGE: 1 of 1

PROJECT NO.: 97061 FIGURE: A-2

TPT15 DWC 7/23/97

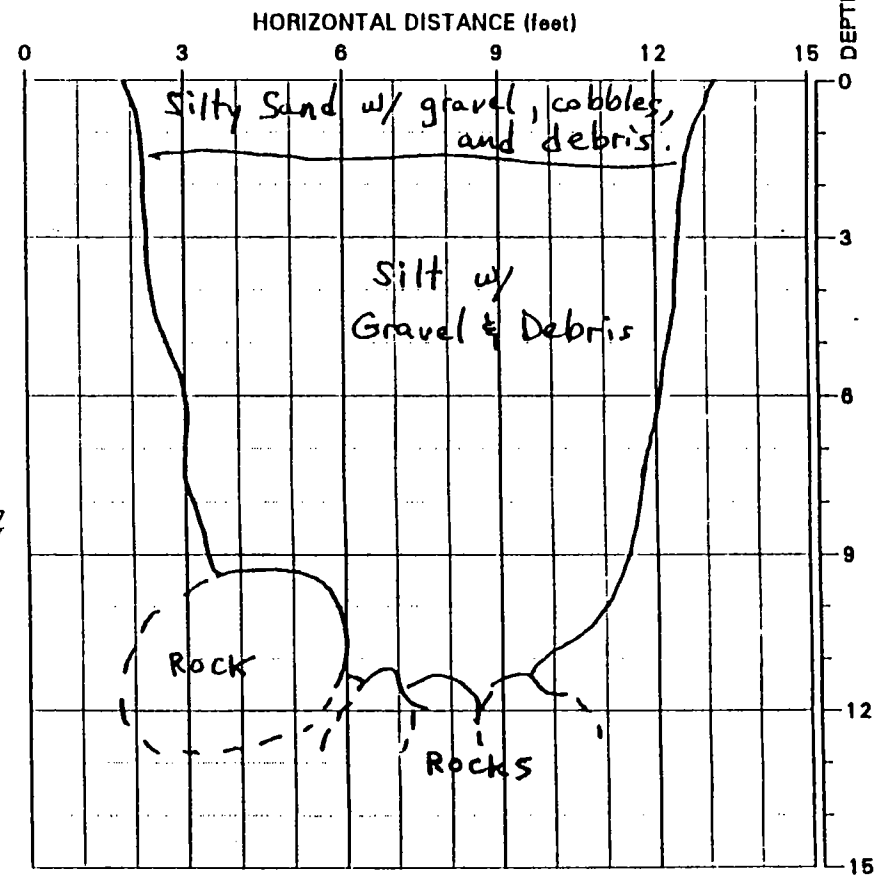
EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 7/14/97
LOGGED BY: ADM

111.7

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Medium dense, light to reddish brown, silty SAND with gravel and cobbles, moist. Debris - lumber, metal, cloth.					
		ML	(FILL) Stiff to very stiff, gray, SILT, very moist. Some gravel, and occasional lumber and bricks.		S-1	13		
3					S-2	28		
6			Below 6 feet, abundant gravel and cobbles to 6" diameter.		S-3	33	GS	
			Seepage at 8.5 feet. Fast flow, fills pit rapidly.		S-4	37		▽
9			At 9.5 feet, large, immovable angular boulder. At 10 feet, becomes gravelly SILT with debris - bricks and asphalt.		S-5	35		
12			Total Depth = 11.5 feet. Refusal on large rocks. Groundwater seepage at 8.5 feet. Caving below 7 feet, primarily on west side.					
15								

SKETCH OF EAST SIDE OF PIT



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HARTING WEST & ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP- 2

PAGE: 1

PROJECT NO.: 97061

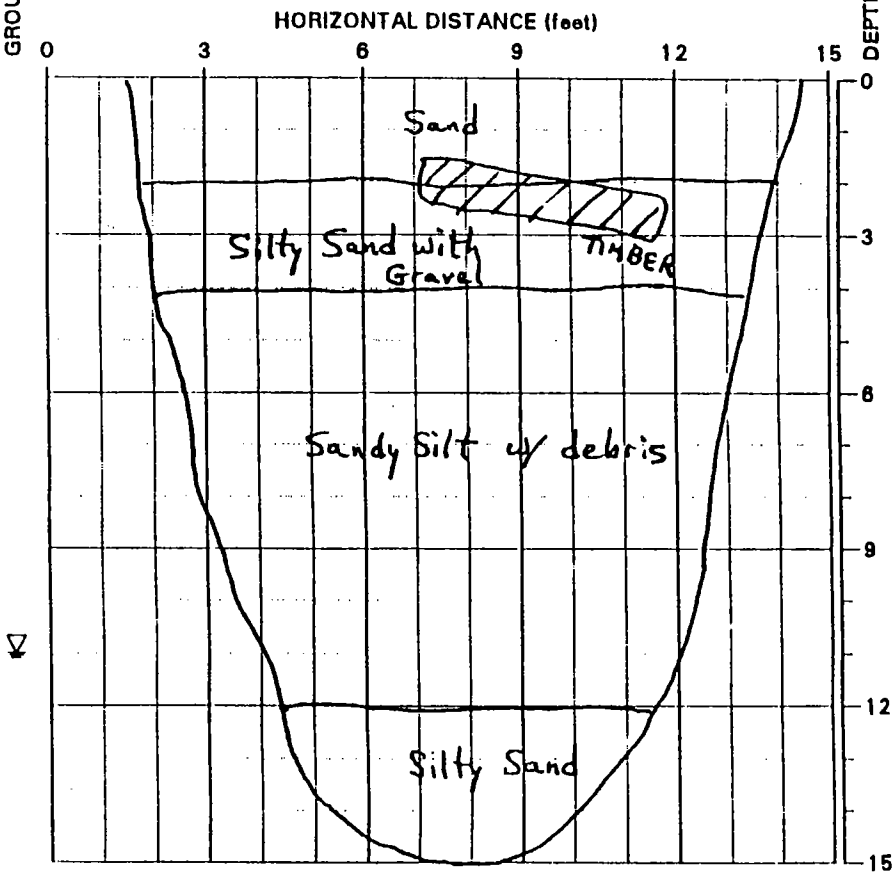
FIGURE: A-3

EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 7/14/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Medium dense to dense, light brown, medium to coarse SAND, wet. (FILL)		S-1	14		
3		SM	Medium dense, gray mottled brown, silty fine SAND with gravel, moist. Debris. At 2 to 3 feet, large piece of lumber (railroad tie).		S-2	22		
6		ML	Very stiff, gray, sandy SILT, moist. Some gravel and cobbles, and bricks.		S-3	28		
9			At 8.5 feet, some bricks and wood.		S-4	11		
12			Seepage at 11 feet.					▽
15		SM	Gray, loose, silty SAND, wet. Rounded gravel to 3 inches diameter. (Pipe backfill?) Total Depth = 15 feet. Groundwater seepage at 11 feet. Minor caving below 10 feet.		S-5	22	GS	

SKETCH OF EAST SIDE OF PIT



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HWA HONGWEST & ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP- 3

PAGE: 1 of 1

PROJECT NO.: 97061 FIGURE: A-4

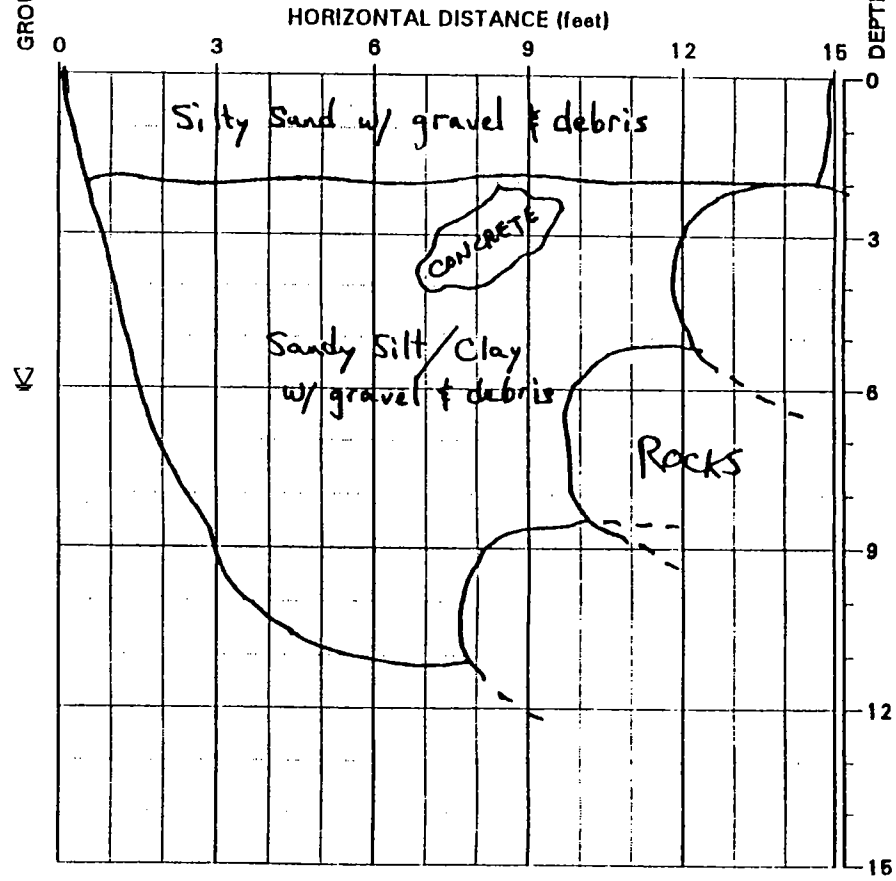
TPIT15 DWC 7/28/97

EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 7/14/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Medium dense to dense, reddish brown, silty SAND with gravel, moist. Some debris. (FILL)					
3		ML CL	Stiff to very stiff, gray, sandy SILT / sandy CLAY with gravel, moist. Debris - bricks, concrete. At 2 to 4 feet, large piece of concrete. From 2 feet to base of pit, large, rip-rap on east side of pit. Top rock broke loose, others immovable with backhoe. Rocks are granite/diorite. Seepage at 6 feet. Heavy flow from east side, filling bottom of pit.					▽
6								
9								
12			Total Depth = 11 feet. Groundwater seepage at 6 feet. Caving from surface. Entire south side slabbed off. East end of pit located 16 feet west of BN/SF railroad track centerline.					
15								

SKETCH OF NORTH SIDE OF PIT



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HWA HONGWEST & ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP- 4

PAGE: 1 1

PROJECT NO.: 97061 FIGURE: A-5

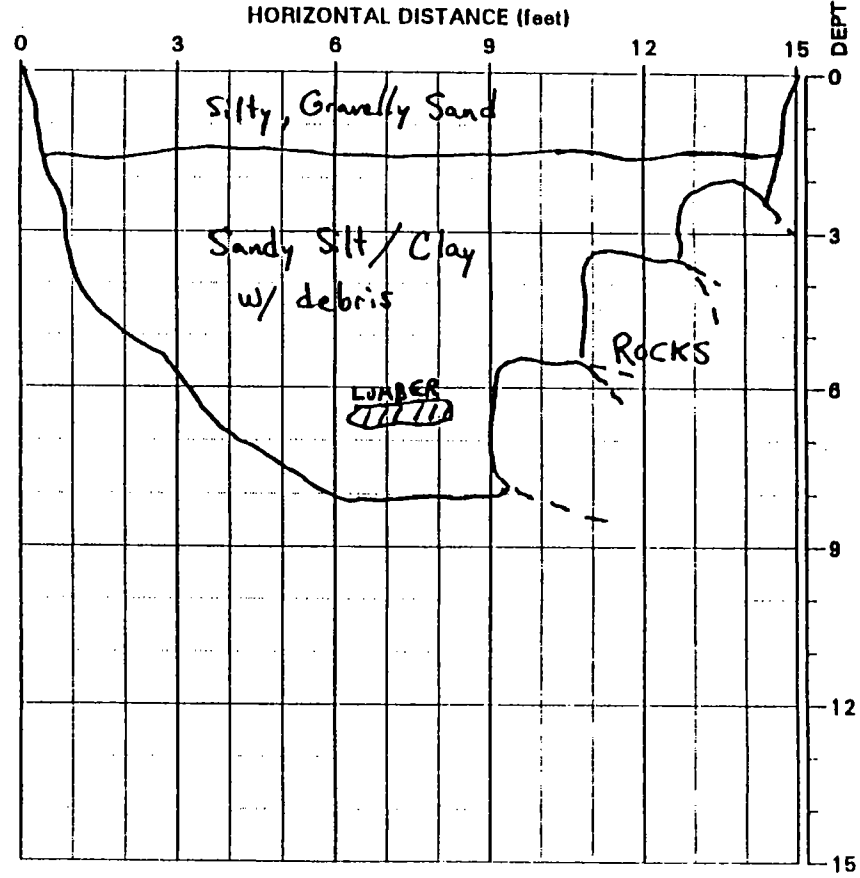
TPIT15 DWG 7/23/97

EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 7/14/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE / SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Medium dense to dense, brown, silty, gravelly SAND, dry to moist. (FILL)				
		ML CL	Stiff to very stiff, gray, sandy SILT / sandy CLAY, very moist to wet. Some debris - wood, concrete.				
3			Large, immovable, granite/diorite rip-rap along east wall of pit.				
6			Seepage at 7 feet.				▽
9			Total Depth = 8 feet. Groundwater seepage at 7 feet. Minor caving, both sides.				
			East end of pit located 16 feet west of BN/SF railroad track centerline.				
12							
15							

SKETCH OF NORTH SIDE OF PIT



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HWA HONGWEST & ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP- 5

PAGE: 1 of 1

PROJECT NO.: 97061 FIGURE: A-6

EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

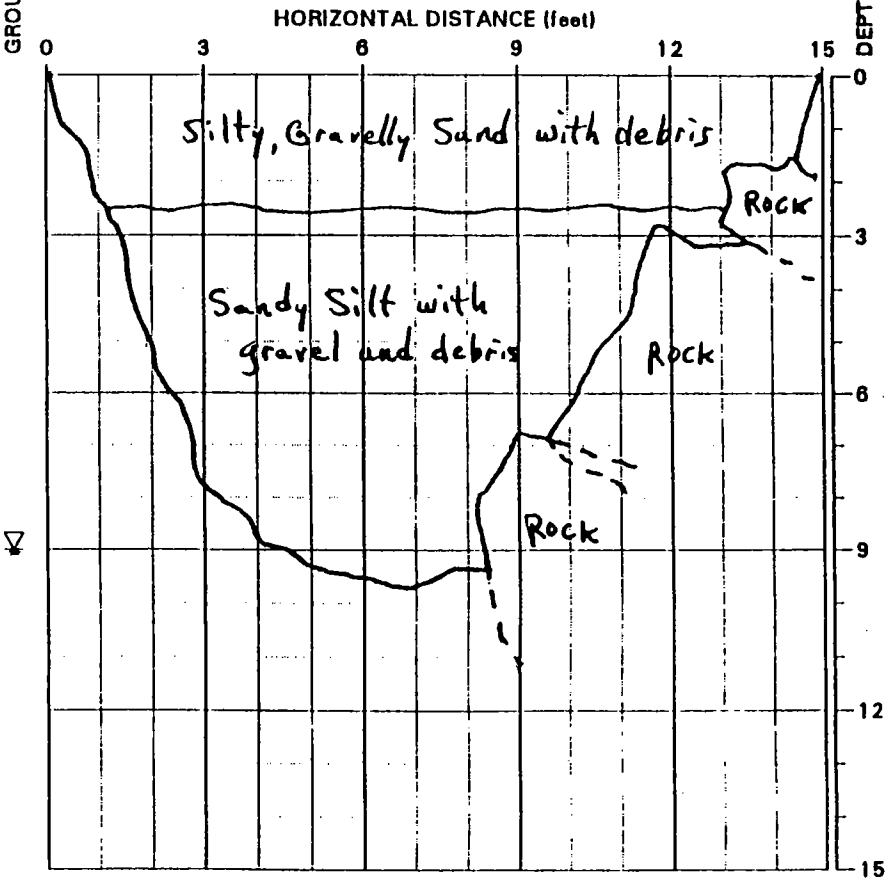
LOCATION:
DATE COMPLETED: 7/14/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Medium dense to dense, brown, silty gravelly SAND, moist. Debris - large concrete chunks. (FILL)					
3		ML	Stiff, gray, sandy SILT with gravel, very moist to wet. Some debris. Granite/diorite rip-rap along east wall of pit, below 1.5 feet.					
9			Seepage at 9 feet, fast.					▽
12								
15								

Total Depth = 9.5 feet.
Groundwater seepage at 9 feet.
Moderate caving, both sides.

East end of pit located 16 feet west of BN/SF railroad track centerline.

SKETCH OF NORTH SIDE OF PIT



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Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP- 6

PAGE: 1 of 1

PROJECT NO.: 97061

FIGURE: A-7

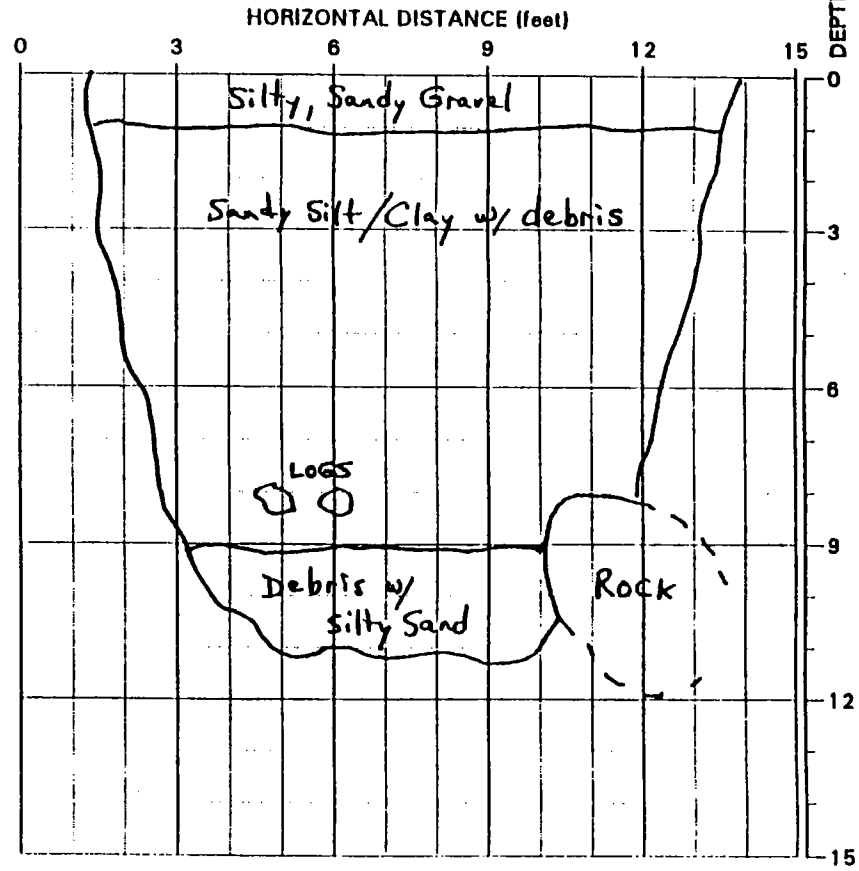
TPIT16 DWC 7/22/97

EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 7/14/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		GM	Dense, brown, silty sandy GRAVEL, dry to moist. (FILL)					
		ML CL	Very stiff, gray mottled brown, sandy SILT / sandy CLAY, moist. Some gravel. Debris - metal, bricks, lumber, concrete.					
3					S-1	17		
					S-2	30		
			At 5 feet, large concrete chunk - 2.5'x1'x1'. Also several boulders.					
6					S-3	26		
			At 7 feet, large log, 18" diameter. At 8 feet, large, immovable angular boulder at east end of pit. Seepage at 9 feet.		S-4	34		
9		SM	Medium dense, gray, silty SAND, wet. Very abundant rocks, concrete, sticks, and wire (debris fill).		S-5	37		▽
12			Total Depth = 11 feet. Groundwater seepage at 9 feet. Minor caving, both sides.					
			East end of pit located 16 feet west of BN/SF railroad track centerline.					
15								

SKETCH OF NORTH SIDE OF PIT



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HWA HONGWEST & ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP- 7

PAGE: 1 of 1

PROJECT NO.: 97061 FIGURE: A-8

TPT15 DWC 7/23/97

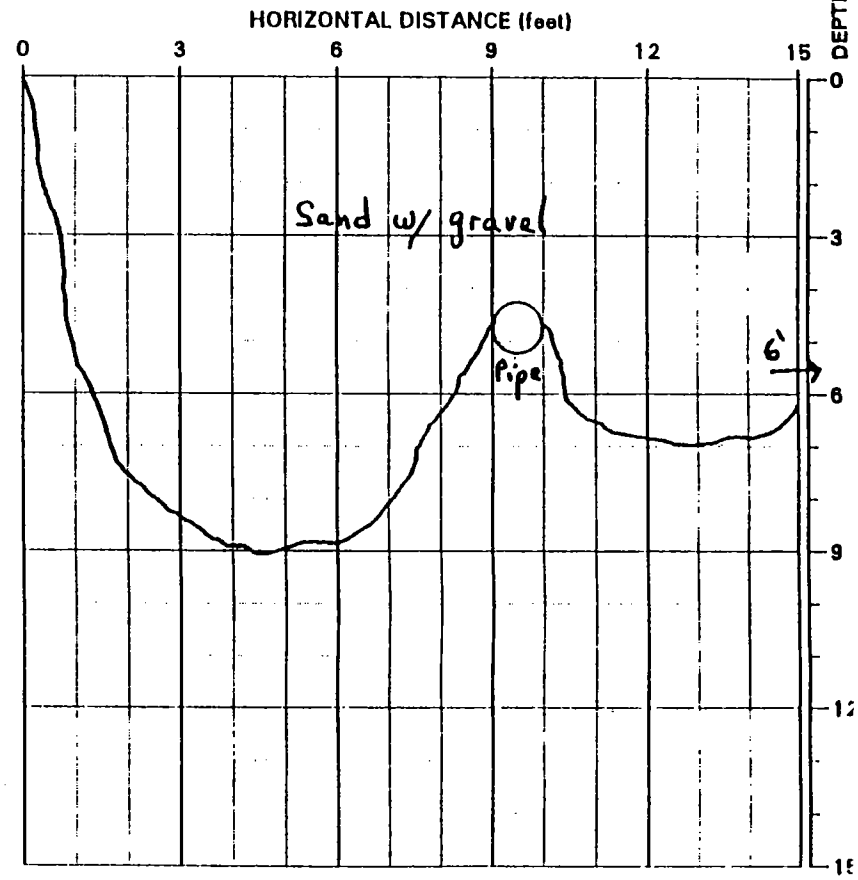
EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 7/14/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Medium dense, light brown, fine to medium SAND with gravel, dry to moist. Some silt. Some rounded cobbles to 5 inches diameter. (FILL)					
3			At 4'3", corrugated steel pipe, 12" diameter, trending east-west.		S-1	4		
6					S-2	3		
9					S-3	3		
12								
15								

Total Depth = 9 feet.
No groundwater encountered.
Massive caving, both sides. Excavation terminated due to caving.

SKETCH OF EAST SIDE OF PIT



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HWA HONGWEST ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP- 8

PAGE: 1 of 1

PROJECT NO.: 97061

FIGURE: A-

TH115 Dv. 7/22/97

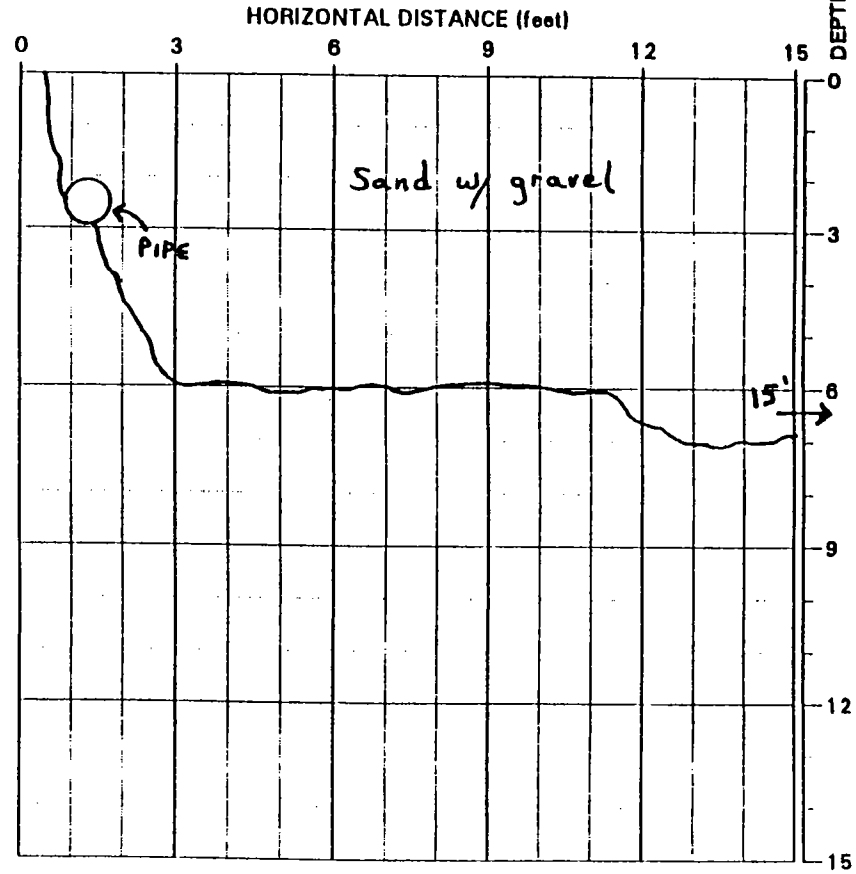
EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 7/15/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Medium dense, light brown, fine to medium SAND with gravel, dry to moist. Some cobbles to 6 inches diameter. (FILL) At 2 feet, corrugated steel pipe, 12" diameter, surrounded in 2"-minus drain rock.					
3					S-1	3		
6					S-2	3	GS	
9								
12								
15								

Total Depth = 7 feet.
No groundwater encountered.
Some caving below 2 feet, west side.

SKETCH OF EAST SIDE OF PIT



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HONGWEST & ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP- 9

PAGE: 1 of 1

PROJECT NO.: 97061

FIGURE: A-1

TPIT15 DWC 7/22/97

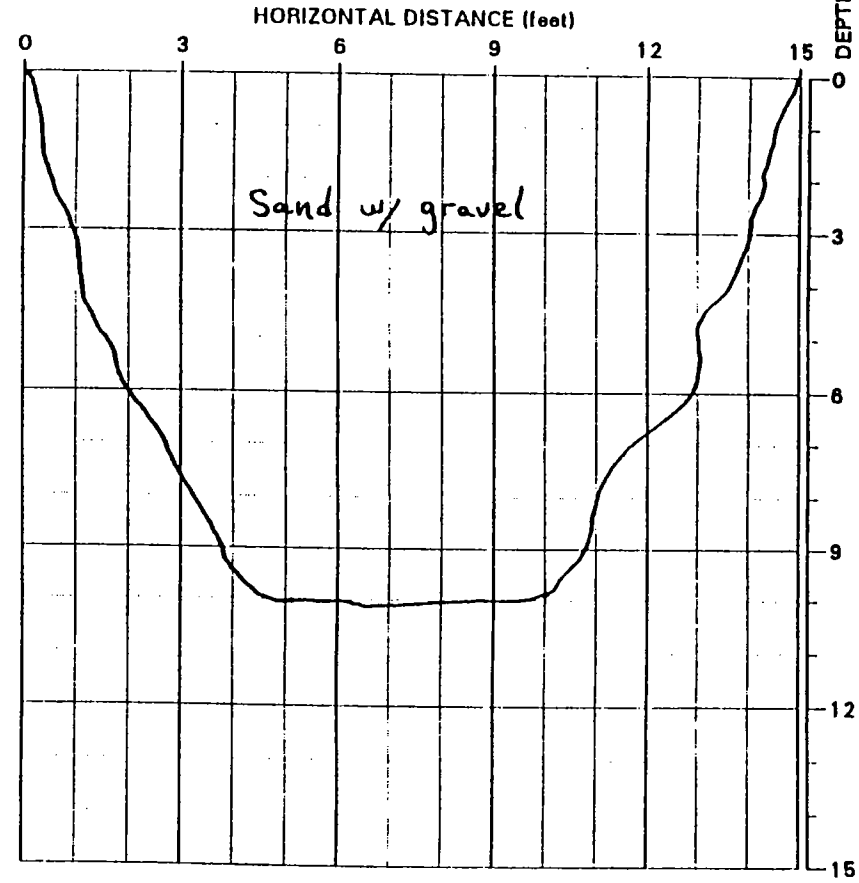
EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 7/15/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Medium dense, grayish brown, medium SAND with gravel and cobbles, dry to moist. Cobbles to 5 inches diameter. (FILL)					
3					S-1	2		
6					S-2	2		
9					S-3	5		
12								
15								

Total Depth = 10 feet.
No groundwater encountered.
Massive caving. Excavation terminated due to caving.

SKETCH OF EAST SIDE OF PIT



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HWA HONGWEST & ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP-10

PAGE: 1

PROJECT NO.: 97061

FIGURE: A-1

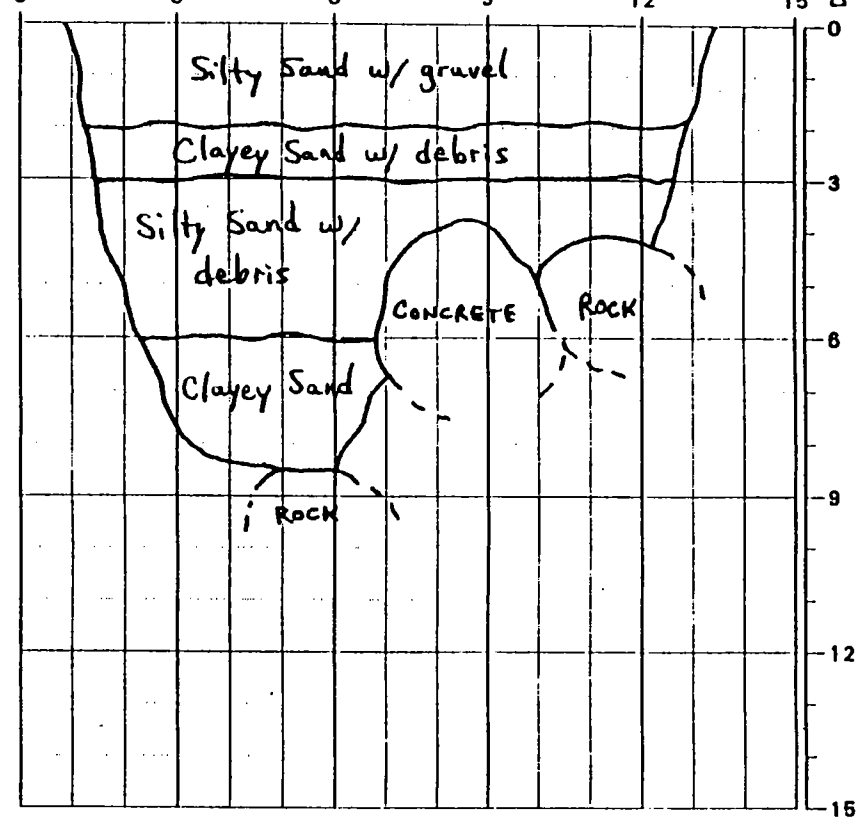
TPIT15 DWC 7/22/97

EXCAVATION COMPANY: Perkins Excavating
EXCAVATING EQUIPMENT: Backhoe, John Deere 310D
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 7/15/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SM	Medium dense, very dark brown, silty SAND with gravel, moist. (FILL) At 2 feet, 2" diameter PVC pipe, parallel to fence, 4 feet from fence.					
		SC	Dense, dark gray mottled black, clayey SAND, dry to moist. Debris - bricks, wire, wood, porcelain.		S-1	9		
3		SM	Medium dense, bluish gray, silty fine SAND with gravel, moist. Occasional concrete and asphalt. At 4 feet, large, immovable, concrete chunk and rock along base of pit at south end. Shifted pit to north.		S-2	13		
					S-3	18	GS	
6		SC	Medium dense, gray, clayey SAND with cobbles, very moist. Some debris. Angular and rounded cobbles. At 8 feet, slight seepage.		S-4	21		▽
9			Total Depth = 8.5 feet. Groundwater seepage at 8 feet. Minor caving, west side.					
12								
15								

SKETCH OF EAST SIDE OF PIT



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HONGWEST & ASSOCIATES, INC.

Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP-11

PAGE: 1 of 1

PROJECT NO.: 97061 FIGURE: A-1

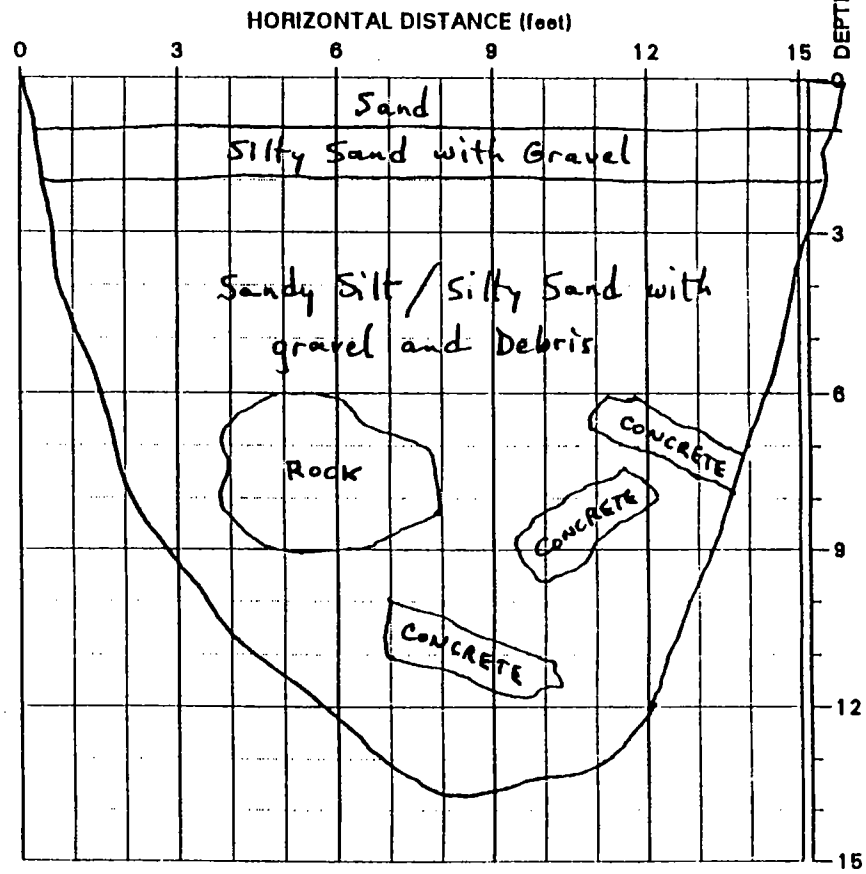
TPIT15 DWC 7/23/97

EXCAVATION COMPANY: Northwest Excavating
EXCAVATING EQUIPMENT: Trackhoe, Case 9010B
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 8/13/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Loose, light brown, poorly graded SAND, dry to moist. Some gravel. (FILL)					
		SM	Medium dense, brown, silty SAND with gravel, moist.					
3		SM ML	Very stiff, gray sandy SILT to silty SAND with gravel, moist. Abundant cobbles and debris - bricks, concrete, asphalt, lumber, metal.		S-1	14		
			(DEBRIS FILL)					
			Frequent concrete slab pieces, typically about 2'x4'x1'.		S-2	12		
6			Between 6 and 9 feet, angular boulder, 4 feet maximum dimension.					
9					S-3	16	%F	
					S-4	21		
12			Seepage at 11.5 feet. Fast flow, from west side.					▽
15			Total Depth = 13.5 feet. Groundwater seepage at 11.5 feet. Minor caving.					

SKETCH OF SOUTH SIDE OF PIT



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Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP-12

PAGE: 1 of 1

PROJECT NO.: 97061

FIGURE: A-13

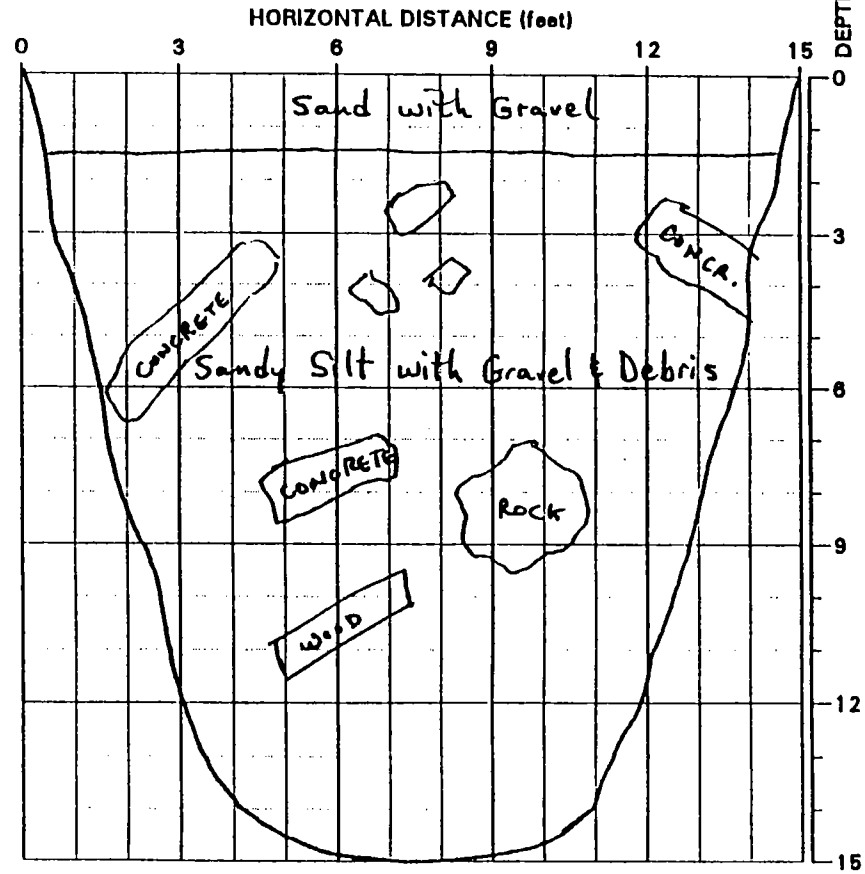
TPIT15 DWC 8/19/97

EXCAVATION COMPANY: Northwest Excavating
EXCAVATING EQUIPMENT: Trackhoe, Case 9010B
SURFACE ELEVATION: 113 ± Feet

LOCATION:
DATE COMPLETED: 8/13/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Loose, light brown, poorly graded fine to medium SAND with gravel, dry to moist. (FILL)					
		ML	Very stiff, gray, sandy SILT with gravel, moist. Abundant debris - bricks, wood, rebar, concrete chunks. Some cobbles and boulders. Some zones of reddish brown silty sand. (DEBRIS FILL)					
3					S-1	15		
6					S-2	22	%F	
9					S-3	14		
			Seepage at 11 feet. Moderate flow. Base of pit filled with water.		S-4	27		▽
12								
15			Total Depth = 15 feet. Groundwater seepage at 11 feet. Minor caving.					

SKETCH OF SOUTH SIDE OF PIT



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Denny Way / Lake Union CSO, Contract C
Seattle, Washington

LOG OF TEST PIT
TP-13

PAGE: 1 of 1

PROJECT NO.: 97061 FIGURE: A-14

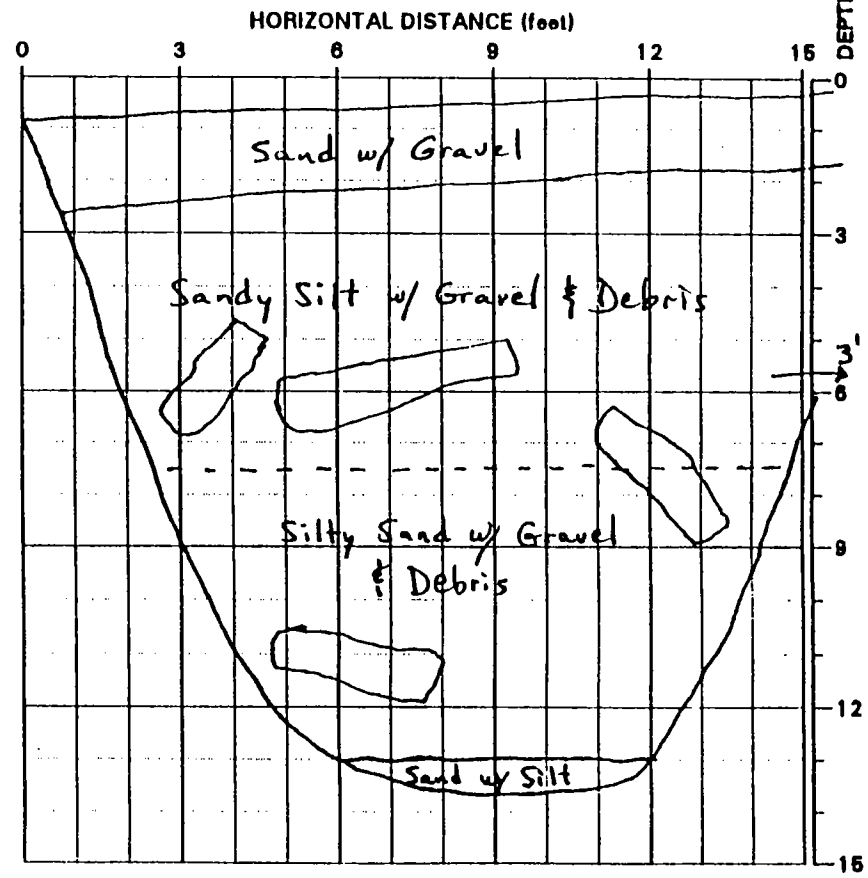
TPIT15 DWC 8/19/97

EXCAVATION COMPANY: Northwest Excavating
EXCAVATING EQUIPMENT: Trackhoe, Case 9010B
SURFACE ELEVATION: 113 ± Feet

LOCATION:
DATE COMPLETED: 8/13/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		SP	Loose, light brown, fine to medium poorly graded SAND with gravel, dry to moist. (FILL)					
		ML	Very stiff, gray, sandy SILT with gravel, very moist. Abundant debris - lumber, bricks, concrete, asphalt, glass. (DEBRIS FILL)					
3					S-1	13		
6					S-2	20		
			Gradational contact					
		SM	Medium dense, gray, silty SAND with gravel, very moist. Abundant debris as above.					
9			At 9 feet, becomes wet.		S-3	14	%F	
			Seepage at 11 feet. Fast flow.					▽
12								
		SP SM	Loose, gray, poorly graded fine to medium SAND with silt, wet. (BEACH DEPOSITS)		S-4	22	GS	
15			Total Depth = 13.5 feet. Groundwater seepage at 11 feet. Minor caving.					

SKETCH OF SOUTH SIDE OF PIT



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Seattle, Washington

LOG OF TEST PIT
TP-14

PAGE: 1 of 1

PROJECT NO.: 97061

FIGURE: A-15

TPIT15 DWC 8/20/97

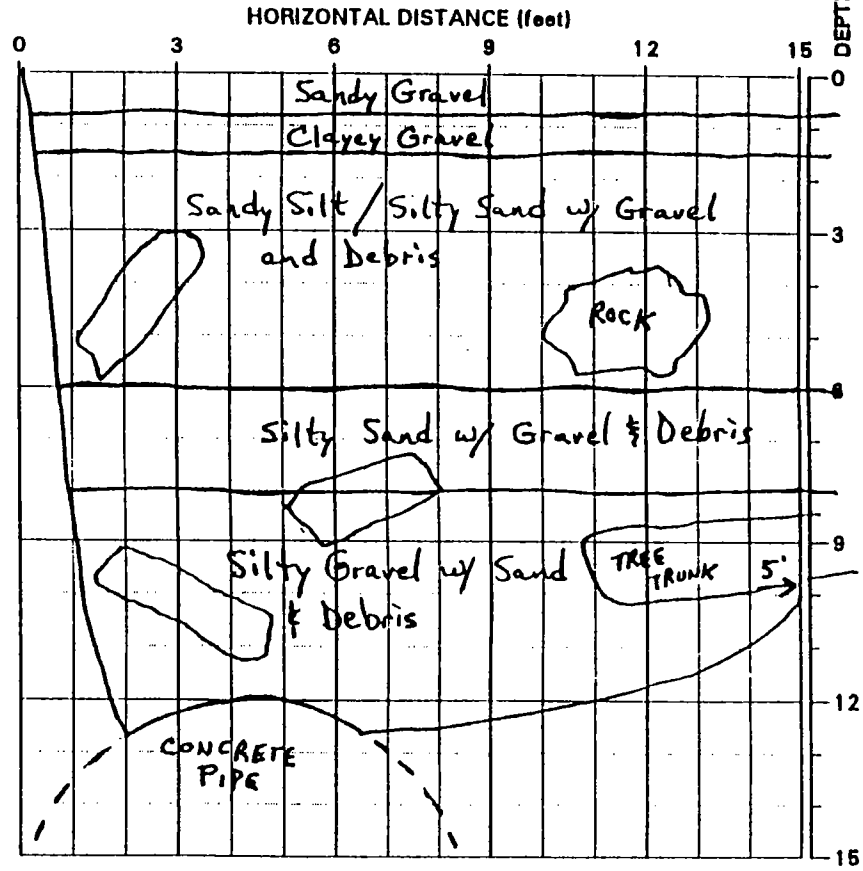
EXCAVATION COMPANY: Northwest Excavating
EXCAVATING EQUIPMENT: Trackhoe, Case 9010B
SURFACE ELEVATION: 112 ± Feet

LOCATION:
DATE COMPLETED: 8/13/97
LOGGED BY: ADM

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT (%)	OTHER TESTS	GROUNDWATER
0		GP	Medium dense, light brown, sandy GRAVEL, dry. (FILL)					
		GM	Stiff, dark brown, clayey GRAVEL, moist.					
3		SM ML	Very stiff, gray, sandy SILT to silty SAND with gravel, moist. Abundant debris - concrete, lumber, bricks. (DEBRIS FILL)		S-1	14	%F	
6		SM	Medium dense, gray mottled black, silty SAND with gravel, very moist. Abundant debris.		S-2	24		
9		GM	Medium dense, gray, silty GRAVEL with sand, moist to wet. Abundant debris. At 9 feet, steel cable and tree trunk - 8 feet long, 18" diameter. Seepage at 10 feet. Fast flow, west end of pit. Very fast seepage at 11.5 feet, east end of pit. At 12 feet, top of EBI pipe (felt through water with backhoe bucket). 10 feet from edge of bike trail.		S-3	14	GS	▽
12								
15								

Total Depth = 12.5 feet.
Groundwater seepage at 10 feet.
Massive caving below 8 feet.

SKETCH OF SOUTH SIDE OF PIT



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Seattle, Washington

LOG OF TEST PIT
TP-15

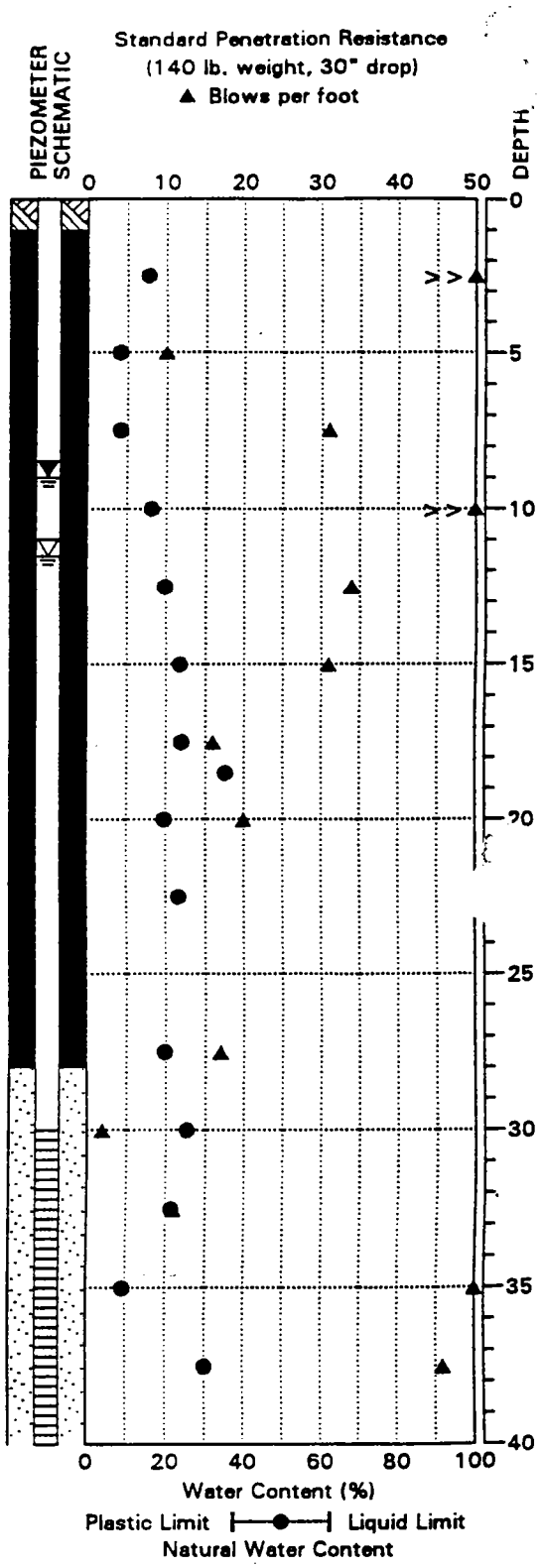
PROJECT NO.: 97061 FIGURE: A-16

TPIT15 DWC 8/20/97

DRILLING METHOD: Acker Soil Sampler, HSA
SURFACE ELEVATION: 112.0 ± Feet

DATE COMPLETED: 10/20/97
LOGGED BY: ADM/MLR

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	ML	Hard, very dark brown to gray, sandy SILT with gravel, dry to moist. Some brick, cobbles, wood fibers and asphalt. (FILL)		S-1	14-50/5"	
5				S-2	3-4-6	
	GM	Dense, gray, silty GRAVEL with sand, moist.		S-3	6-21-10	GS
10	SM	Dense, brown mottled black, silty SAND with gravel, very moist. Wood/roots.		S-4	16-50/5"	
	GW	Dense, dark gray, sandy GRAVEL, wet. Wood/twigs.		S-5	17-14-20	
15	SM	Dense, gray mottled dark brown, silty SAND, wet. Some wood and gravel.		S-6	19-17-14	
	SM	Medium dense, silty fine SAND with black charcoal, wet. Layer of very stiff, gray, CLAY with fine sand (sample S-7B)		S-7	18-10-6	
				S-7B		
20		Oil sheen and odor in sample at 20'.		S-8	9-10-10	
		No sample recovery at 23 feet.		S-9		
25	ML	Very stiff, very dark gray, sandy SILT, wet. Some organics - charcoal, with creosote odor. Layer of fine sand.		S-10	8-9-8	
30	SM ML	Loose to medium dense, gray to dark olive gray, sandy SILT to silty SAND, wet. Shell fragments and occasional piece of wood. (BEACH DEPOSITS)		S-11	2-1-1	
				S-12	4-5-6	GS
35	GP GM	Very dense, dark gray, GRAVEL with silt and sand, wet. Shell fragments.		S-13	50/5"	
				S-14	8-16-30	
				S-14B		
40	CL	Hard, blue-gray, lean CLAY, wet. Laminae, slickensides. (GLACIOLACUSTRINE DEP.)				



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BORING: CC- 1

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PROJECT NO.: 97061

FIGURE: A-21

PZO DWC 12/9/97