King County Department of Natural Resources and Parks

Solid Waste Division

Phase 1 – Vashon Island Closed Landfill

CONTRACT NO. E00102E08

Task No. 310.3 - D310.3.1.3

Remedial Investigation Report

VOLUME II
Appendices

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BHC Consultants

King County
Department of
Natural Resources and Parks
Solid Waste Division

Waste **Prevention** | *Resource* **Recovery** | *Waste* **Disposal**

www.kingcounty.gov/solidwaste

November 6, 2020

FINAL

APPENDIX A

Property Topographic Maps – 1979, 1986

MW-1

MW-2

MW-3

MW-4

SW 186 ST

Dense Trees

Notes

1. Topographic map based on aerial photograph by Walker & Associates, 4/20/1979.
2. Groundwater, Geology/Quality Investigations for the Rural Landfills, King County Department of Public Works, Solid Waste Division, R.W. Beck and Associates, December 1984.

0 300 600 Feet

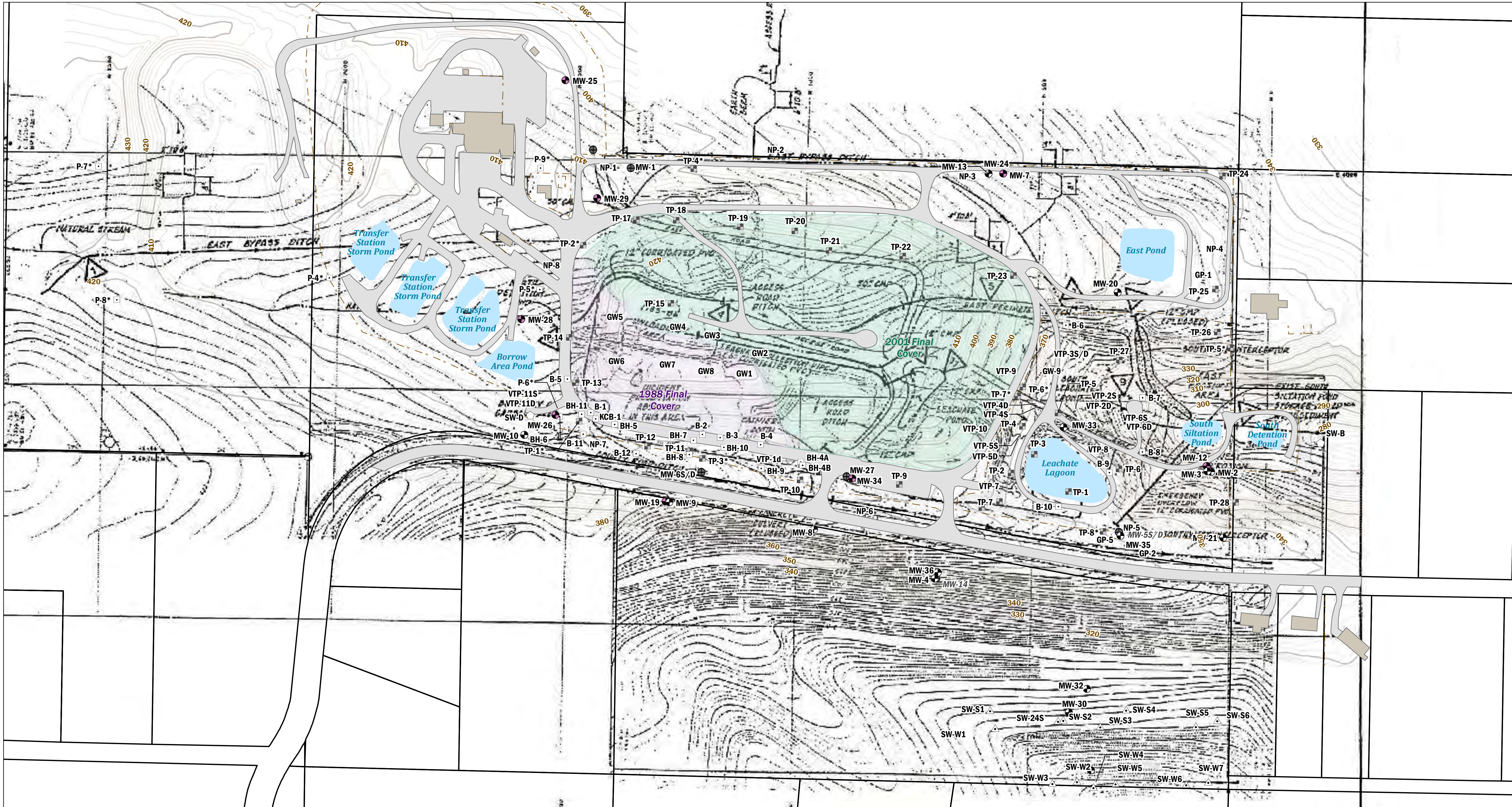
NORTH

1979 Topographic Map

Remedial Investigation
Vashon Island Closed Landfill
King County, Washington

King County	Aspect Consulting	Aug-2018	FIGURE NO.
		BY: DLC/SCC	A.1

CAD Path: Q:\King County\090057 Vashon Island Landfill\2018-05 RI-FS Report\090057-F1.dwg 11x17 Landscape || Coordinate System: NAD 1983 State Plane Washington North FIPS 4601 Feet || Date Saved: Aug 22, 2018 9:48am || User:scudd



Boring

Test Pit

Seep/Weir Sampling Location

Surface Water Monitoring Station

Monitoring Well (C-Unit)

Monitoring Well (D-Unit)

Decommissioned Monitoring Well

1988 Final Cover

2001 Final Cover

Pond

Building

Road

Fence

King County Tax Parcel

Notes:

**Iindicates exploration from Golder Associates, 1986*

- Topographic contours from King County Survey, Spring 2017.

- Base Map Source: Vashon Landfill Drainage Analysis, Technical Memorandum, Harper-Owes, March 1986.

N

0 200 400

Feet

1986 Topographic Map

Remedial Investigation

Vashon Island Closed Landfill

King County, Washington

King County

Aspect CONSULTING

MAR-2020

BY: DAC / SCC

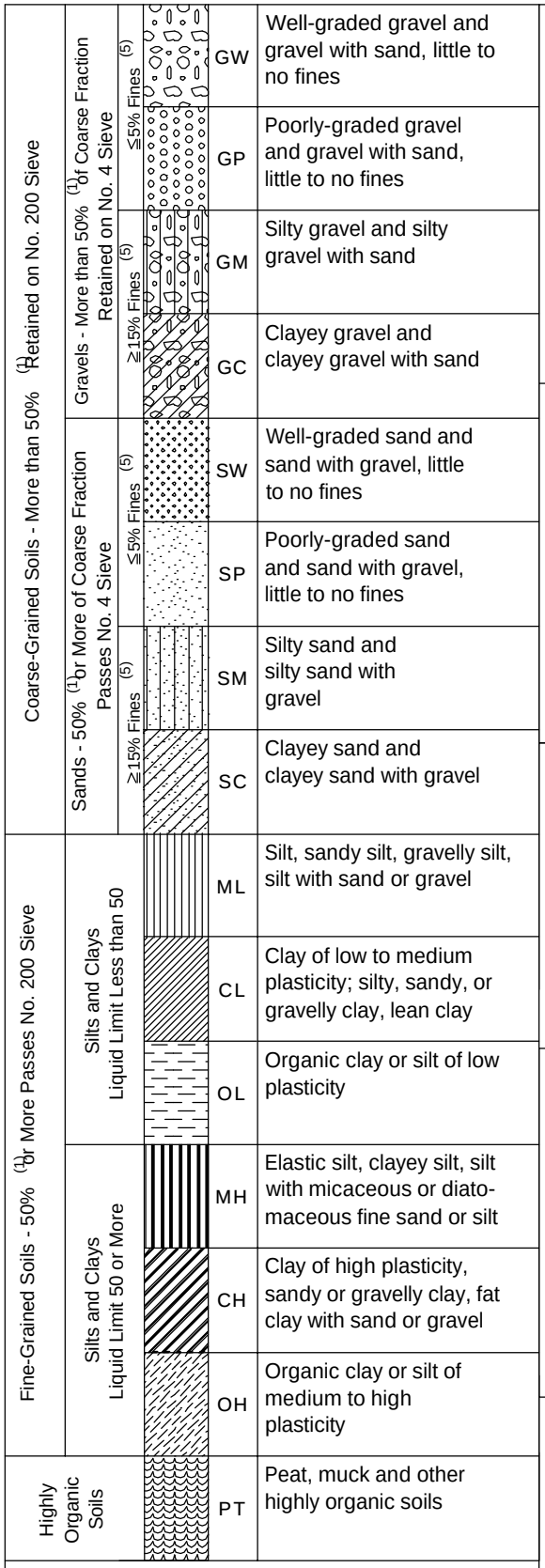
FIGURE NO.

A.2

GIS Path: T:\projects_8\KingCounty_SolidWaste\VashonIslandLandfill\Delivered\RIFS_Spring_2020\A-2 1986 Topographic Map.mxd || Coordinate System: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet || Date Saved: 2020-03-10 || User: [illegible] || Print Date: 2020-03-10

APPENDIX B

Boring & Test Pit Logs



Terms Describing Relative Density and Consistency

	Density	SPT (2) blows/foot
Coarse-Grained Soils	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50
	Consistency	**SPT (2) blows/foot**
Fine-Grained Soils	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

FC = Fines Content
G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Consolidation
DD = Dry Density
K = Permeability
Str = Shear Strength
Env = Environmental
PiD = Photoionization Detector

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

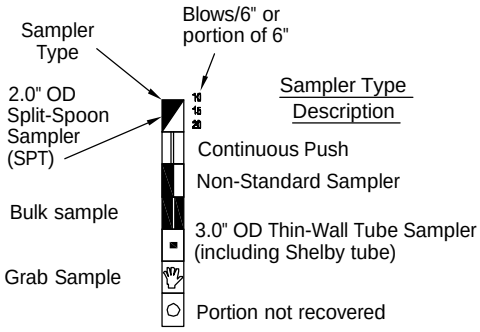
(3) Estimated Percentage

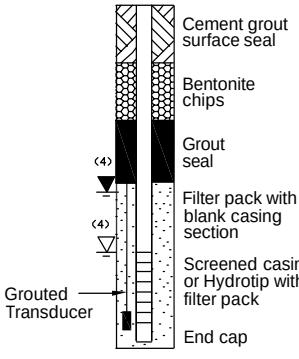
Percentage by Weight	Modifier
<5	Trace
5 to 15	Slightly (sandy, silty, clayey, gravelly)
15 to 30	Sandy, silty, clayey, gravelly)
30 to 49	Very (sandy, silty, clayey, gravelly)

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols





(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of groundwater — ATD = At time of drilling; Static water level (date); BGS = below ground surface
(5) Combined USCS symbols used for fines between 5% and 15% as estimated in General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

Aspect CONSULTING

Exploration Log Key

DATE:
DESIGNED BY:
DRAWN BY:
REVISED BY:

PROJECT NO.

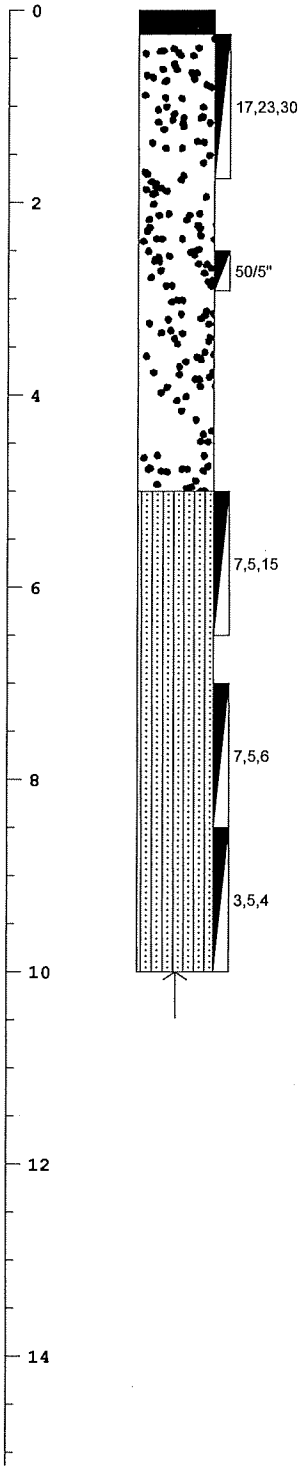
FIGURE NO.
B-1

Q:_ACAD Standards\Standard Details\Exploration Log Key B1.dwg

Boring and Monitoring Well Logs

LOG OF BORING
BORING B-1

PROJECT: **Vashon Transfer Station Pavement Investigation** DATE: **7-6-2017**
BORING LOCATION: **See Figure 2** START: **8:05 AM**
BORING METHOD: **Hollow-Stem Auger** FINISH: **8:45 AM**
DRILLER: **Holocene Drilling** LOGGER: **Tim Hyden**
DEPTH TO - Water: **N/A** Caving: **N/A** DATE CHECKED: **N/A**

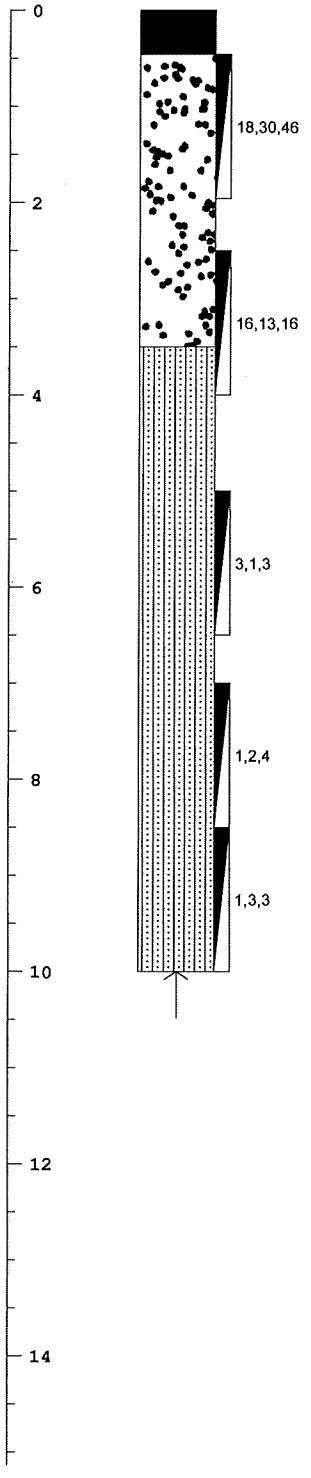


ELEVATION/ DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Moist (%)	-200 (%)	Remarks
		GP	Asphalt Pavement Light Brown, Very Dense, Poorly Graded Sandy Gravel, Moist.			13" Recovery. 8" Recovery. Small Piece of Plastic at 4'.
		SM	Gray with Some Mottling, Loose to Medium Dense Predominantly Fine Silty Sand with Some Gravel, Wet.			17" Recovery 18" Recovery. Plastic in Sampler. 17" Recovery.

FIGURE **3**

LOG OF BORING
BORING B-2

PROJECT: **Vashon Transfer Station Pavement Investigation** DATE: **7-6-2017**
BORING LOCATION: **See Figure 2** START: **8:50 AM**
BORING METHOD: **Hollow-Stem Auger** FINISH: **9:45 AM**
DRILLER: **Holocene Drilling** LOGGER: **Tim Hyden**
DEPTH TO - Water: **N/A** Caving: **N/A** DATE CHECKED: **N/A**



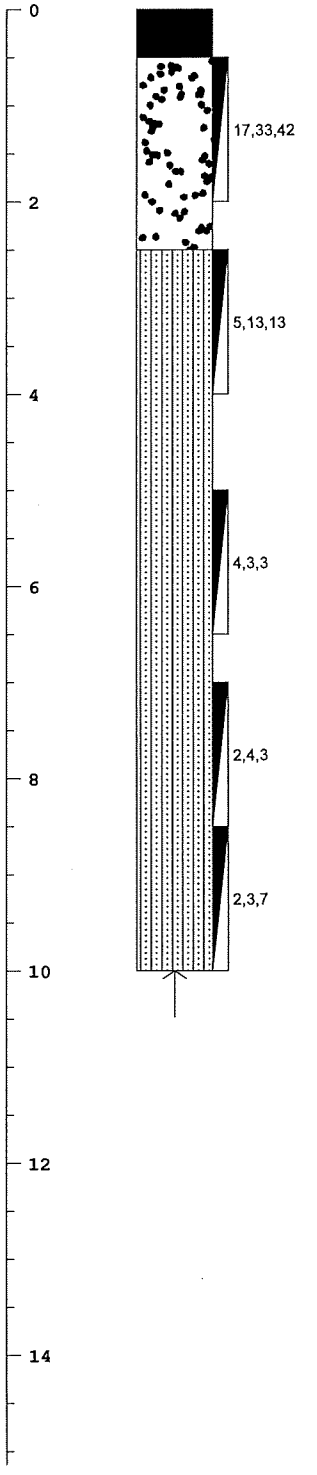
ELEVATION/ DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Moist (%)	-200 (%)	Remarks
			Asphalt Pavement			
		GP	Light Brown, Medium Dense to Very Dense, Poorly Graded Sandy Gravel, Moist.			17" Recovery.
						14" Recovery.
		SM	Gray with Some Mottling, Medium Dense, Fine Silty Sand with Some Gravel, Non-Plastic, Wet.			
			Gray and Reddish Brown with Some Mottling, Very Loose to Loose, Fine Silty Sand with a Trace of Gravel, Low Plasticity to Non-Plastic, Wet.			17" Recovery.
						14" Recovery. Organics and Paper Refuse at 8'.
						12" Recovery. Plastic, Wood, Glass and Paper Intermixed in Sampler.

FIGURE **4**

LOG OF BORING
BORING B-3

PROJECT: **Vashon Transfer Station Pavement Investigation**
BORING LOCATION: **See Figure 2**
BORING METHOD: **Hollow-Stem Auger**
DRILLER: **Holocene Drilling**
DEPTH TO - Water: **N/A** Caving: **N/A**

DATE: **7-6-2017**
START: **9:50 AM**
FINISH: **10:30 AM**
LOGGER: **Tim Hyden**
DATE CHECKED: **N/A**

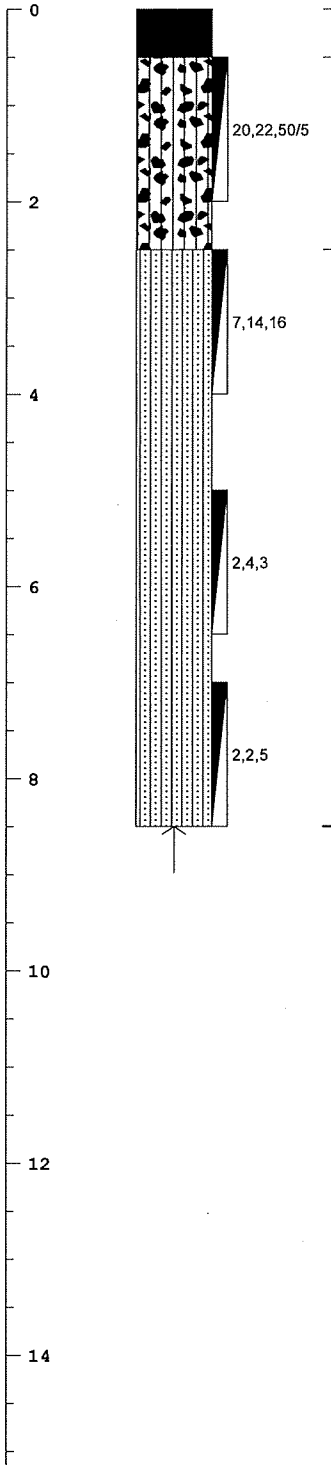


ELEVATION/ DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Moist (%)	-200 (%)	Remarks
			Asphalt Pavement			
		GP	Light Brown to Gray, Very Dense, Poorly Graded Sandy Gravel, Moist.			18" Recovery.
		SM	Gray Mottled with Iron Staining, Medium Dense, Fine Silty Sand with Some Gravel, Non-plastic, Moist to Wet.			16" Recovery.
			Gray with Minor Iron Staining, Loose, Fine Silty Sand with a Trace of Gravel, Non-plastic, Moist to Wet.			13" Recovery.
						14" Recovery. Charcoal and Plastic in Sampler.
						9" Recovery. Approx 30% by Volume (Charcoal, Plastic, Paper, Wood Fragments).

FIGURE **5**

LOG OF BORING
BORING B-4

PROJECT: **Vashon Transfer Station Pavement Investigation** DATE: **7-6-2017**
BORING LOCATION: **See Figure 2** START: **10:35**
BORING METHOD: **Hollow-Stem Auger** FINISH: **11:25 AM**
DRILLER: **Holocene Drilling** LOGGER: **Tim Hyden**
DEPTH TO - Water: **N/A** Caving: **N/A** DATE CHECKED: **N/A**

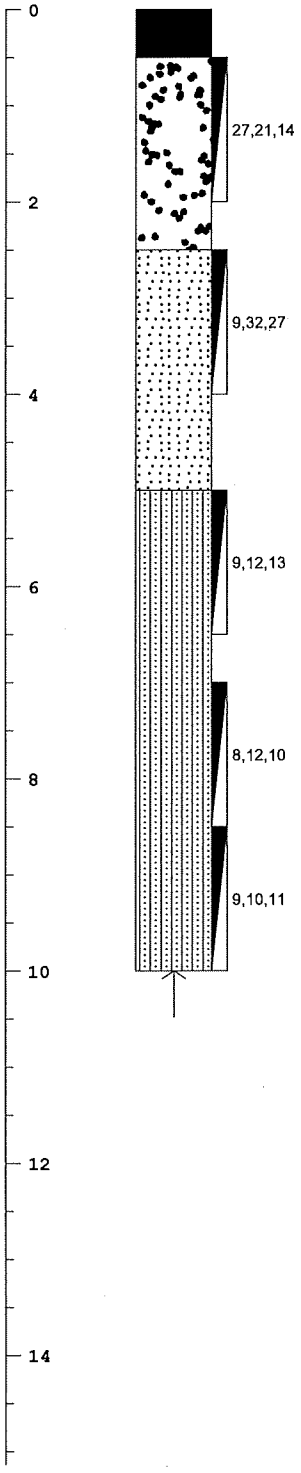


ELEVATION/ DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Moist (%)	-200 (%)	Remarks
			Asphalt Pavement			
		GM	Gray, Very Dense, Silty, Sandy Gravel, Non-plastic, Moist.			18" Recovery
		SM	Gray with Occasional Iron Staining, Medium Dense, Fine Silty Sand with Trace of Gravel, Non-plastic, Moist to Wet.			18" Recovery
			Gray with Occasional Iron Staining, Loose, Fine Silty Sand with Trace of Gravel, Non-plastic, Moist to Wet.			8" Recovery. Trace Charcoal and Organics
						7" Recovery. Charcoal, Wood Debris, Plastic in Sampler.

FIGURE **6**

LOG OF BORING
BORING B-5

PROJECT: **Vashon Transfer Station Pavement Investigation** DATE: **7-6-2017**
BORING LOCATION: **See Figure 2** START: **11:30 AM**
BORING METHOD: **Hollow-Stem Auger** FINISH: **12:30 PM**
DRILLER: **Holocene Drilling** LOGGER: **Tim Hyden**
DEPTH TO - Water: **N/A** Caving: **N/A** DATE CHECKED: **N/A**



ELEVATION/ DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Moist (%)	-200 (%)	Remarks
			Asphalt Pavement			
		GP	Gray, Sandy, Poorly Graded Gravel, Moist.			16" Recovery.
		SP	Gray with Minor Iron Staining, Medium Dense to Very Dense, Gravelly Poorly Graded Sand with Silt, Non-plastic, Wet.			14" Recovery.
		SM	Gray with Minor Iron Staining, Medium Dense, Fine Silty Sand with Trace of Gravel, Non-plastic, Wet.			14" Recovery.
						14" Recovery.
						16" Recovery.

FIGURE 7

KEY TO SYMBOLS

Symbol Description

Strata symbols

Asphalt Pavement

Poorly graded gravel

Poorly graded sand

Silty sand

Silty gravel

Misc. Symbols

Boring terminated

Soil Samplers

Standard penetration test

Notes:

1. Holocene Drilling completed five exploratory borings on July 6, 2017.
2. A Brainard-Kilman BK-81 truck-mounted drill rig was used to advance the 4.25-inch I.D. hollow stem auger.
3. SPT testing was performed using an automatic hammer.

FIGURE 8

KING COUNTY MATERIALS LABORATORY

GEOTECHNICAL BORING LOG

VASHON ISLAND TRANSFER STATION PAVEMENT INVESTIGATION

Boring and Monitoring Well Logs

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Environmental Exploration Log	
	Project Address & Site Specific Location Vashon Island, East side of South Slope		*Coordinates (SPN NAD83 ft)* E:1228104 N:162678	*Exploration Number* **B-06**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 365.183'	
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 4/4/2018	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	365	Gravel and topsoil surface restoration.			PID= 52.7		Dry to slightly moist, brown, Topsoil; fine to medium sand, fine subrounded gravel, numerous organics (root mass, grass)	0
		3/8-inch Bentonite chip backfill 1-25 ft bgs					**Fill** Slightly moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine subrounded to subangular gravel.	
					PID= 151			
5	360		S1		PID= 41.2			5
10	355		S2		CH4= 0% PID= 204			10
					PID= 98.1			
15	350				PID= 224			15
					PID= 970		**Vashon Advance Outwash/Unit B** Moist, brown, SAND (SP); fine to medium sand, fine subrounded gravel.	
20	345		S3		CH4= 0% PID= 146			20
					PID= 98.9			
					PID= 25.0			
25	340				CH4= 0%		Bottom of exploration at 25 ft. bgs.	25

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◧ Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log B-06
Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Environmental Exploration Log	
	Project Address & Site Specific Location Vashon Island, South east corner of South Slope		*Coordinates (SPN NAD83 ft)* E:1227949 N:162513	*Exploration Number* **B-07**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 322.485'	
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 4/4/2018	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	322	Gravel and topsoil surface restoration.					Dry to slightly moist, brown, Topsoil; fine to medium sand, fine subrounded gravel, numerous organics (root mass, grass)	0
					PID= 131.1		**Fill** Moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand, fine subrounded to subangular gravel, rare root fibers.	
	320	3/8-inch Bentonite chip backfill 1-25 ft bgs			PID= 108.3			
5			S1		PID= 21.9			5
	315							
10			S2		CH4= 0% PID= 86.5			10
	310				PID= 123.5		**Landfill Debris** Very moist, black to gray, silty, sandy, gravelly Fill; plastic scraps, paper, cardboard, glass, garbage bags, etc.	
15					PID= 18.7		Moist, brown SAND (SP); trace silt, fine to medium sand, trace root fibers, 5-10% debris (plastic scraps, garbage bags, glass).	15
	305							
20			S3		CH4= 0%		Landfill debris becomes rare (~1%) with roots and branches.	20
					PID= 13.5		**Vashon Advance Outwash/Unit B** Moist, brown, SAND (SP); fine to medium sand, fine subrounded gravel.	
	300				PID= 20.1			
25					CH4= 0%		Bottom of exploration at 25 ft. bgs.	25
	295							

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◧ Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log B-07
Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Environmental Exploration Log	
	Project Address & Site Specific Location Vashon Island, South end of South Slope		*Coordinates (SPN NAD83 ft)* E:1227832 N:162514	*Exploration Number* **B-08**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 331.764'	
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 4/4/2018	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		Gravel and topsoil surface restoration.			PID= 62.8		Dry to slightly moist, brown, Topsoil; fine to medium sand, fine subrounded gravel, numerous organics (root mass, grass)	
	330	3/8-inch Bentonite chip backfill 1-25 ft bgs			PID= 330		**Fill** Moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand, fine subrounded to subangular gravel, rare root fibers.	
					PID= 362			
5			S1		CH4= 0.1%			5
					PID= 50.7			
	325				PID= 398		**Vashon Advance Outwash/Unit B** Moist, brown, gravelly SAND (SP); fine to medium sand, fine subrounded gravel.	
					PID= 35.2			
10					CH4= 0%			10
					PID= 86.5		Sand becomes fine between 11 and 11.5 ft bgs.	
	320							
					PID= 301			
15			S2				Sand becomes fine to coarse 15 to 16.5 ft bgs.	15
					PID= 247			
	315							
					PID= 51.0		3-inch lens of brittle, slightly silty sand.	
20					CH4= 0%			20
	310				PID= 78.5			
			S3					
					PID= 69.6			
25					CH4= 0%		1.5-inch silty sand lens.	25
	305						Bottom of exploration at 25 ft. bgs.	

Legend

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log B-08

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Environmental Exploration Log	
	Project Address & Site Specific Location Vashon Island, South end of South Slope		*Coordinates (SPN NAD83 ft)* E:1227788 N:162585	*Exploration Number* **B-09**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 358.793'	
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 4/4/2018	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Gravel and topsoil surface restoration.			PID= 132		**Fill** Moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel, rare root fibers, cobbles.	0
		3/8-inch Bentonite chip backfill 1-40 ft bgs			PID= 213		Becomes brown gray.	
	355		S1					
5					PID= 95.6		Grades to dark brown gray.	5
	350				PID= 40.1			
10					CH4= 0% PID= 91.5			10
	345		S2		PID= 142.6			
15					PID= 54.2		**Alluvium** Moist, orange brown, gravelly, SAND (SP); trace silt, fine to medium sand, fine subround to subangular gravel. Grades to brown. Woody branches, and twigs between 17.5 to 18.	15
	340				PID= 45.1		**Vashon Advance Outwash/Unit B** Moist, gray brown, gravelly SAND (SP); fine to medium sand, fine subrounded gravel.	
20					CH4= 0% PID= 38.4			20
	335		S3		PID= 149.1			
25					PID= 144.9			25
	330				PID= 36.3		Sand becomes fine between 29 to 29.5.	
30					PID= 108		Sand becomes fine to coarse; gravel becomes trace, fine, and subrounded.	30
	325				PID= 65.4			
35			S4		PID= 17.2			35
	320				PID= 35.1		Sand becomes fine 39 to 40.	
40					CH4= 0%		Bottom of exploration at 40 ft. bgs.	40

Legend

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log B-09
Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Environmental Exploration Log	
	Project Address & Site Specific Location Vashon Island, Southwest corner of South Pond		*Coordinates (SPN NAD83 ft)* E:1227715 N:162694	*Exploration Number* **B-10**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 359.497'	
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 4/3/2018	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0		Gravel and topsoil surface restoration.					**Fill** Moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel, rare root fibers, cobbles.	0
		3/8-inch Bentonite chip backfill 1-30 ft bgs			PID= 221			
	355		S1					
5					PID= 150.8			5
					PID= 116			
	350							
10					CH4= 0%		**Vashon Advance Outwash/Unit B** Moist, brown, slightly gravelly SAND (SP); fine to medium sand, fine subrounded gravel.	10
					PID= 20.1			
	345		S2					
15					CH4= 0% PID= 8.1			15
					PID= 10.7		Oxidized layer 0.5 inches thick.	
					PID= 3.8			
	340							
20					CH4= 0%			20
					PID= 48.8			
	335		S3					
25					CH4= 0% PID= 22.1			25
					PID= 12.1			
							Sand becomes silty and fine between 28 to 28.5.	
					PID= 23.5			
	330							
30							Bottom of exploration at 30 ft. bgs.	30

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◧ Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log B-10
Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC_VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Environmental Exploration Log	
	Project Address & Site Specific Location Vashon Island, Outside of fence on West Perimeter Road		*Coordinates (SPN NAD83 ft)* E:1227868 N:163713	*Exploration Number* **B-11**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 405.979'	
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 4/5/2018	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	405	Gravel and topsoil surface restoration.			PID= 219		Dry to slightly moist, brown, silty, sandy Topsoil; fine to medium sand, fine subrounded gravel, numerous organics (root mass, grass)	0
		3/8-inch Bentonite chip backfill 1-20 ft bgs					**Fill** Moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine subrounded to subangular gravel, rare root fibers, rare scattered pieces of glass (<1%).	
							Vashon Till/Unit A Moist, brown, gravelly silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel.	
					PID= 102			
5	400		S1		PID= 176		Becomes gray.	5
					PID= 146			
10	395				CH4= 0.1% PID= 240			10
					PID= 271			
15	390		S2		PID= 216			15
					PID= 267			
20	385				CH4= 0%		Bottom of exploration at 20 ft. bgs.	20

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◧ Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log B-11
Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC_VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Environmental Exploration Log	
	Project Address & Site Specific Location Vashon Island, Outside of fence on West Perimeter Road		*Coordinates (SPN NAD83 ft)* E:1227829 N:163599	*Exploration Number* **B-12**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 402.774'	
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 4/5/2018	*Top of Casing Elev. (NAVD88)* NA	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	402	Gravel and topsoil surface restoration.			PID= 209		Dry to slightly moist, brown, silty, sandy Topsoil; fine to medium sand, fine subrounded gravel, numerous organics (root mass, grass)	0
							Fill Moist, brown, gravelly, SAND (SP); fine to medium sand, fine subrounded to subangular gravel, rare root fibers, rare scattered pieces of glass (<1%).	
	400	3/8-inch Bentonite chip backfill 1-20 ft bgs			PID= 94.4		**Vashon Till/Unit A** Moist, brown, gravelly silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel.	
5			S1		PID= 915		Becomes gray.	5
	395				PID= 472			
10					CH4= 0%			10
					PID= 383			
	390				PID= 560			
15			S2		PID= 398		Includes cobbles.	15
	385				PID= 748			
20					CH4= 0.1%		Bottom of exploration at 20 ft. bgs.	20

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◧ Continuous core 4" ID

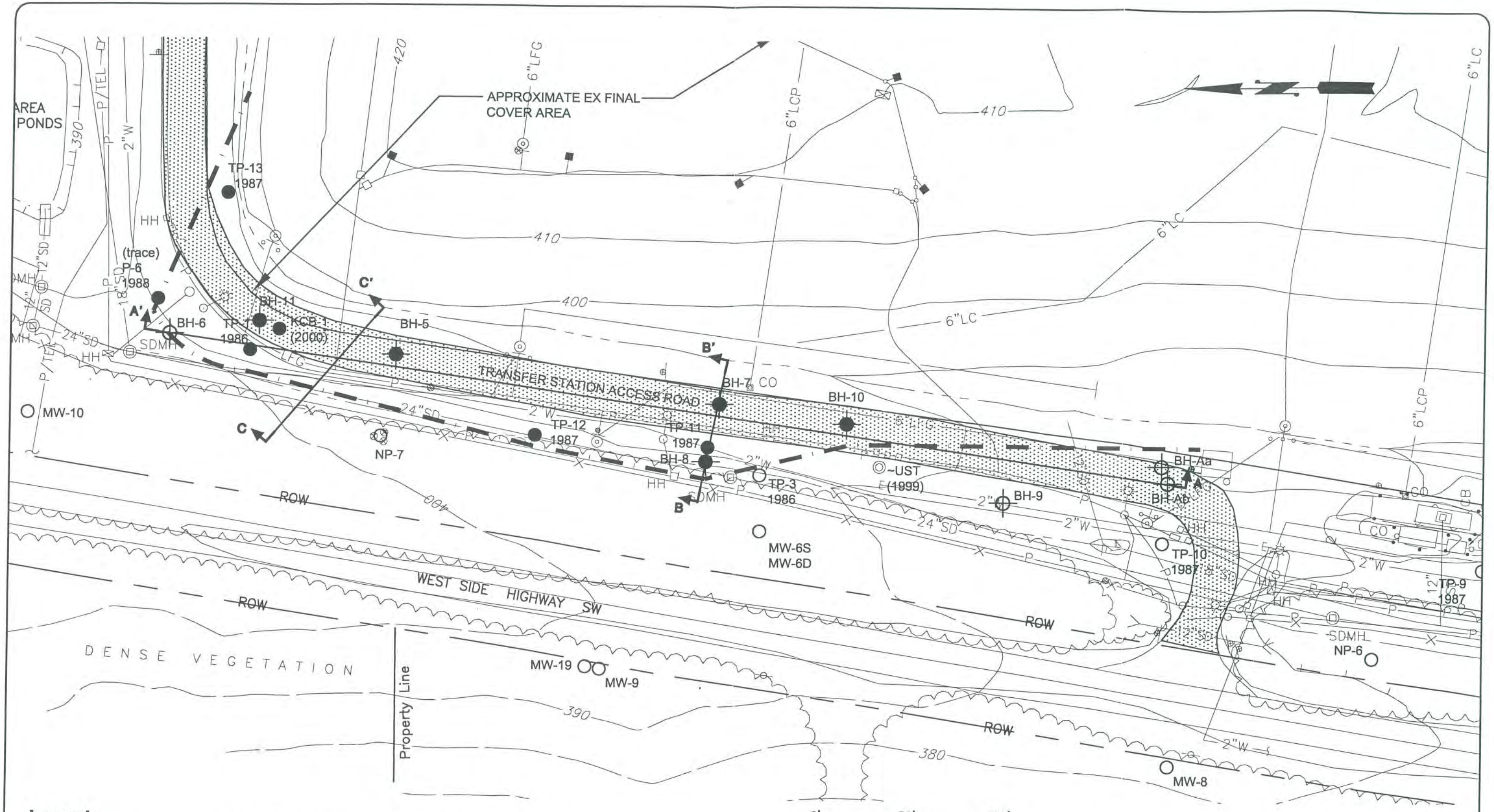
Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log B-12
Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC_VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018



Legend

- No Refuse Found (HWA, 2001)
- Refuse Found (HWA, 2001)
- Interpreted Limits of Refuse (HWA, 2001)
- A — A' Geologic Cross Section

Previous Explorations-See Appendix for Logs and Sources

- ~UST excavation (1999) - No Refuse
- No Refuse Found
- Refuse Found

C:\1PROJECTS\98\98158-401\98158401002.DWG

HWA GeoSciences Inc.

TRANSFER STATION ACCESS ROAD ASSESMENT VASHON, WASHINGTON

SITE AND EXPLORATION PLAN

DRAWN BY PL	FIGURE NO. 2
CHECKED BY SG	
DATE 06.12.01	PROJECT NO. 98158-4.01

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blow ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)	GW	Well-graded GRAVEL
			GP	Poorly-graded GRAVEL
	More than 50% of Coarse Fraction Retained on No. 4 Sieve	Gravel with Fines (appreciable amount of fines)	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	Sand and Sandy Soils	Clean Sand (little or no fines)	SW	Well-graded SAND
			SP	Poorly-graded SAND
More than 50% Retained on No. 200 Sieve Size	50% or More of Coarse Fraction Passing No. 4 Sieve	Sand with Fines (appreciable amount of fines)	SM	Silty SAND
			SC	Clayey SAND
Fine Grained Soils	Silt and Clay	Liquid Limit Less than 50%	ML	SILT
			CL	Lean CLAY
			OL	Organic SILT/Organic CLAY
50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit 50% or More	MH	Elastic SILT
			CH	Fat CLAY
			OH	Organic SILT/Organic CLAY
Highly Organic Soils			PT	PEAT

TEST SYMBOLS

%F	Percent Fines	
AL	Atterberg Limits:	PL = Plastic Limit LL = Liquid Limit
CBR	California Bearing Ratio	
CN	Consolidation	
DD	Dry Density (pcf)	
DS	Direct Shear	
GS	Grain Size Distribution	
K	Permeability	
MD	Moisture/Density Relationship (Proctor)	
MR	Resilient Modulus	
PID	Photoionization Device Reading	
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)	
SG	Specific Gravity	
TC	Triaxial Compression	
TV	Torvane Approx. Shear Strength (tsf)	
UC	Unconfined Compression	

SAMPLE TYPE SYMBOLS

- 2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
- Shelby Tube
- 3-1/4" OD Split Spoon with Brass Rings
- Small Bag Sample
- Large Bag (Bulk) Sample
- Core Run
- Non-standard Penetration Test (3.0" OD split spoon)

GROUNDWATER SYMBOLS

- Groundwater Level (measured at time of drilling)
- Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation.
Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

HWA GEOSCIENCES INC.

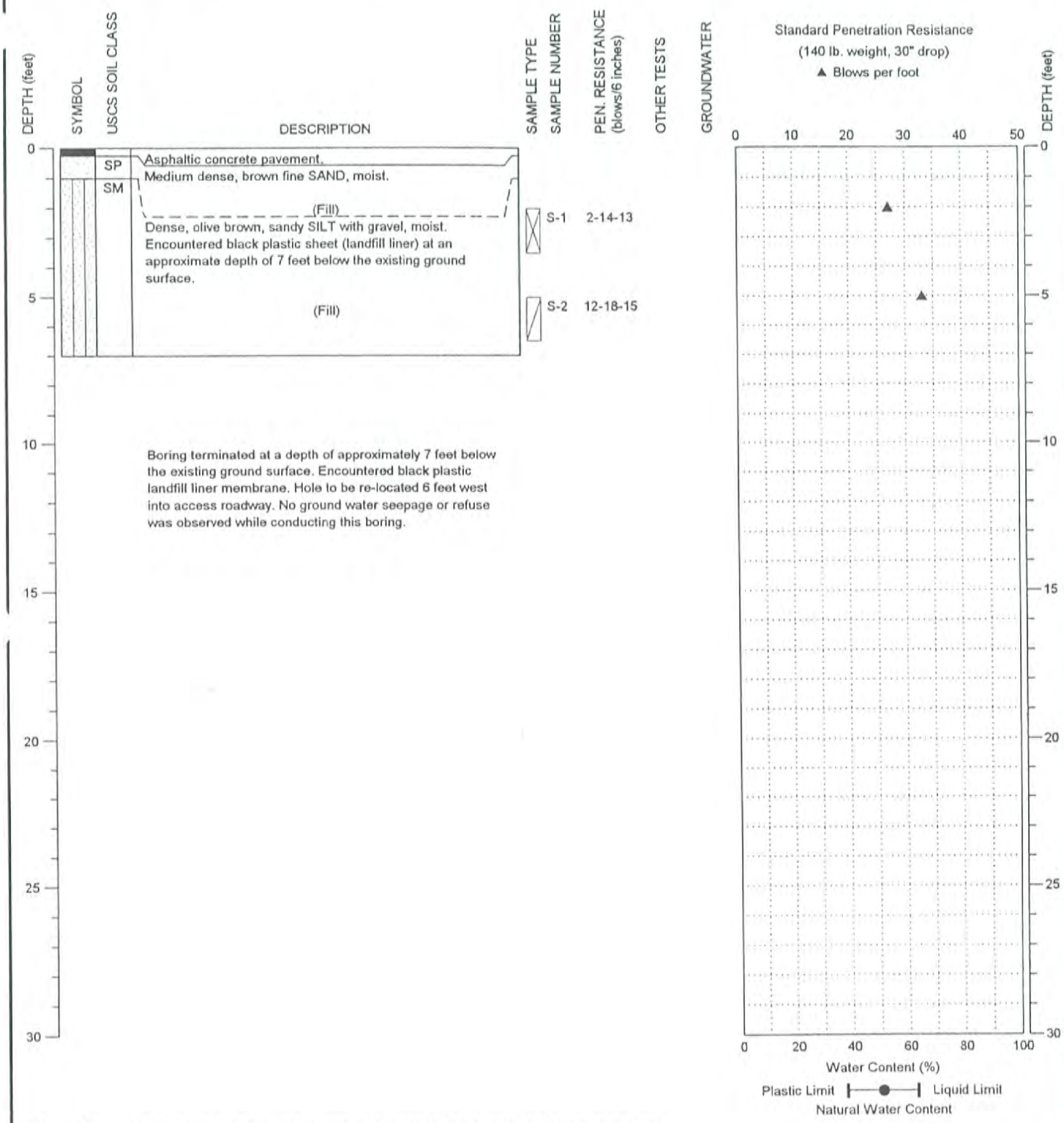
Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

PROJECT NO.: 98158-4.1 FIGURE: A-1

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME-75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 385 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/4/2001
DATE COMPLETED: 6/4/2001
LOGGED BY: S. Nelson



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.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH- 4a

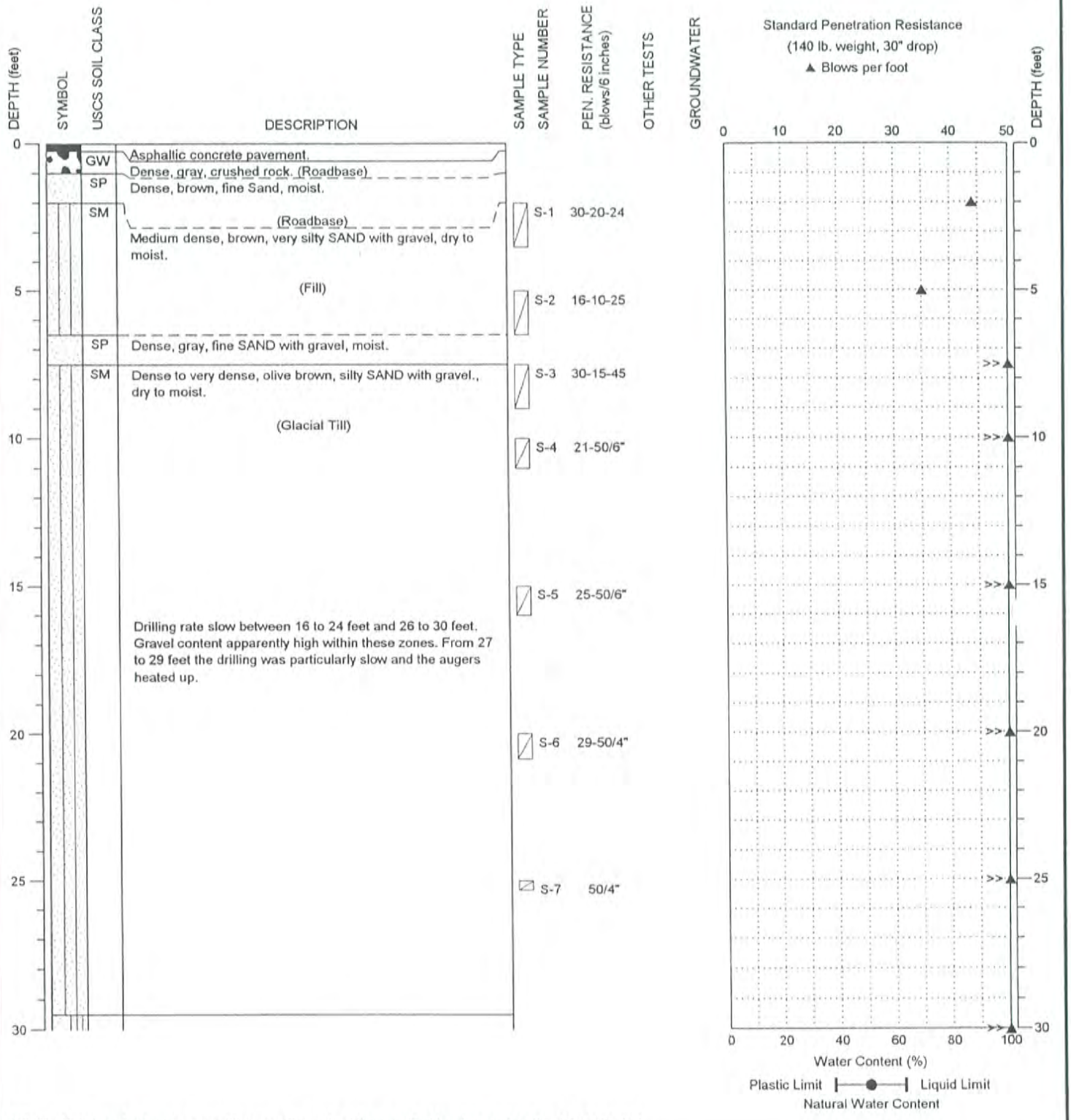
PAGE: 1 of 1

PROJECT NO.: 98158-4.1 FIGURE: A-2

BORING 98158.GPJ 3/8/02

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME-75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 385 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/4/2001
DATE COMPLETED: 6/4/2001
LOGGED BY: S. Nelson



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HWA GEOSCIENCES INC.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH- 4b

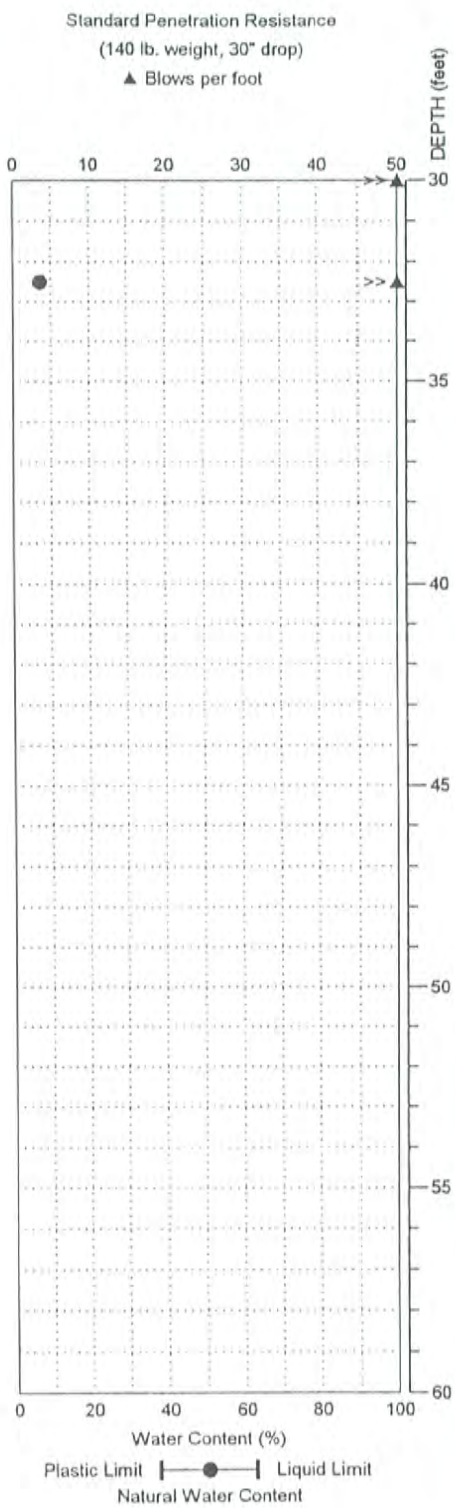
PROJECT NO.: 98158-4.1 FIGURE: A-3

BORING 98158.GPJ 3/8/02

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME-75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 385 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/4/2001
DATE COMPLETED: 6/4/2001
LOGGED BY: S. Nelson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		SP SM	Dense to very dense, olive, fine SAND with silt and gravel, moist. (Advance Outwash)		S-8	26-37-50/5"		
					S-9	27-40-50/4"		
35			Boring terminated at approximately 33.83 feet below the existing ground surface. No ground water seepage or refuse was observed while conducting this boring.					
40								
45								
50								
55								
60								



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HWA GEOSCIENCES INC.

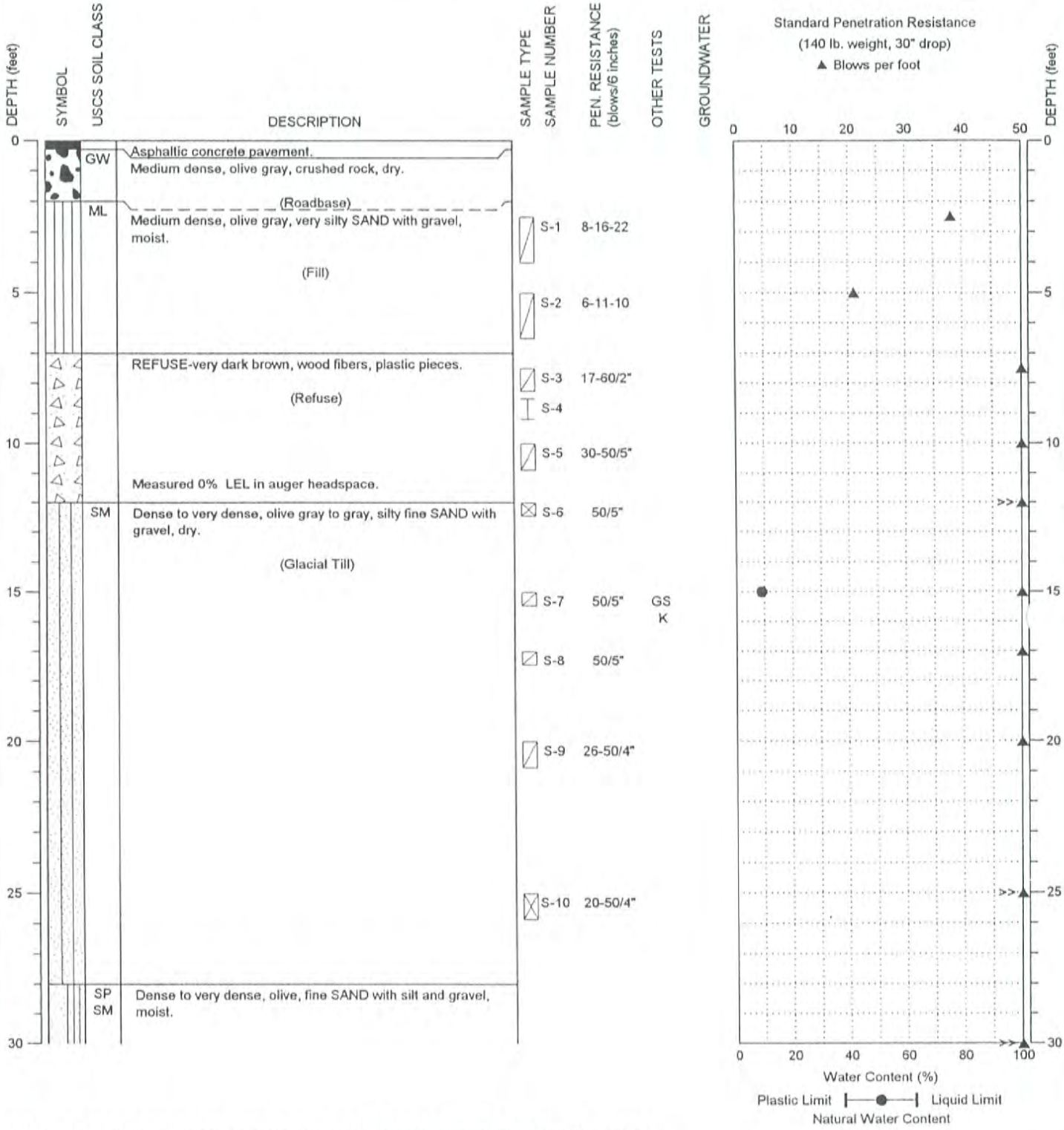
Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH- 4b

PROJECT NO.: 98158-4.1 FIGURE: A-3

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 402 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/6/2001
DATE COMPLETED: 6/6/2001
LOGGED BY: S. Nelson



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HWA GEOSCIENCES INC.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH- 5

PROJECT NO.: 98158-4.1 FIGURE: A-4

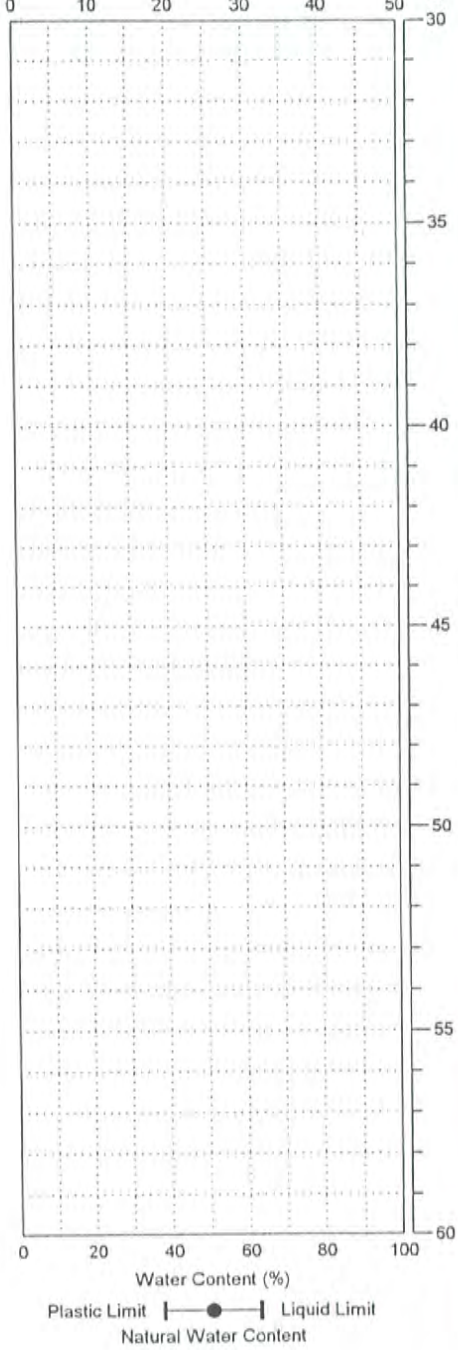
DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 402 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/6/2001
DATE COMPLETED: 6/6/2001
LOGGED BY: S. Nelson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30			(Advance Outwash)	X	S-11	29-50/5"		

Boring terminated at a depth of approximately 30.9 feet below the existing ground surface. Refuse observed from a depth of approximately 7 to 12 feet below the existing ground surface. No ground water seepage was observed while conducting this boring.

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



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HWA GEOSCIENCES INC.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

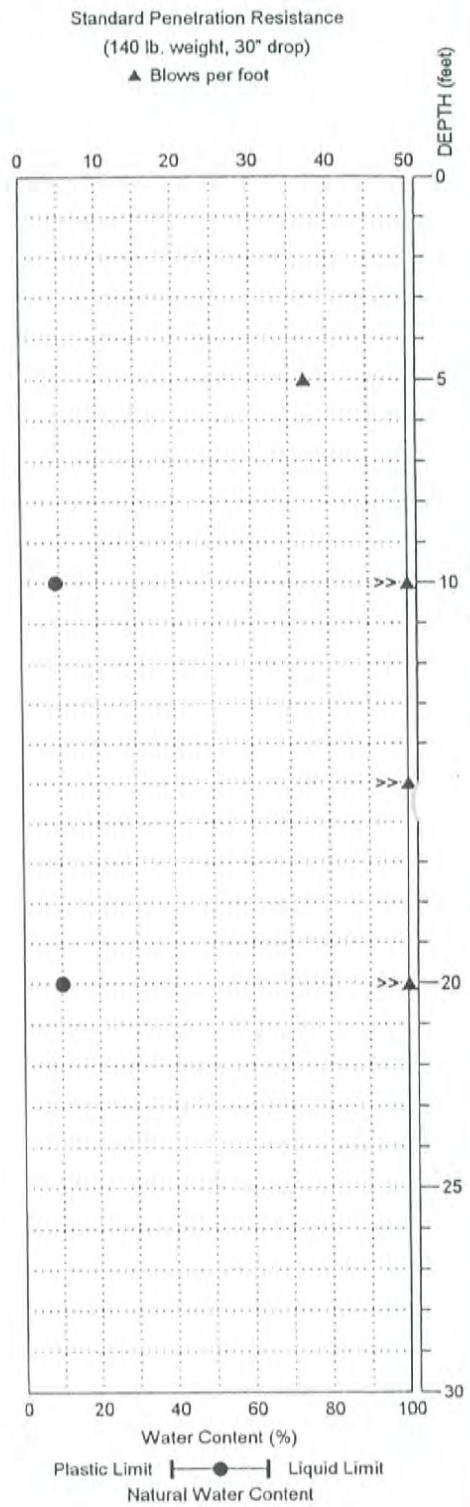
BORING:
BH- 5

PROJECT NO.: 98158-4.1 FIGURE: A-4

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 402 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/5/2001
DATE COMPLETED: 6/5/2001
LOGGED BY: S. Nelson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0		GM	Loose, dark brown, topsoil, moist. Medium dense, olive brown, silty GRAVEL with sand, moist. (Fill)					
5		SM	Medium dense to dense, olive gray, silty SAND with gravel and trace cobbles, moist.		S-1	7-23-14		
10		SM	Dense to very dense, olive gray, silty fine SAND with gravel, dry-moist. (Glacial Till)		S-2	29-50/6"		
15					S-3	50/6"		
20					S-4	50/5.5"	GS K	
25			Boring terminated at a depth of approximately 20.45 feet below the existing ground surface. No ground water seepage or refuse was observed while conducting this boring.					
30								



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.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH- 6

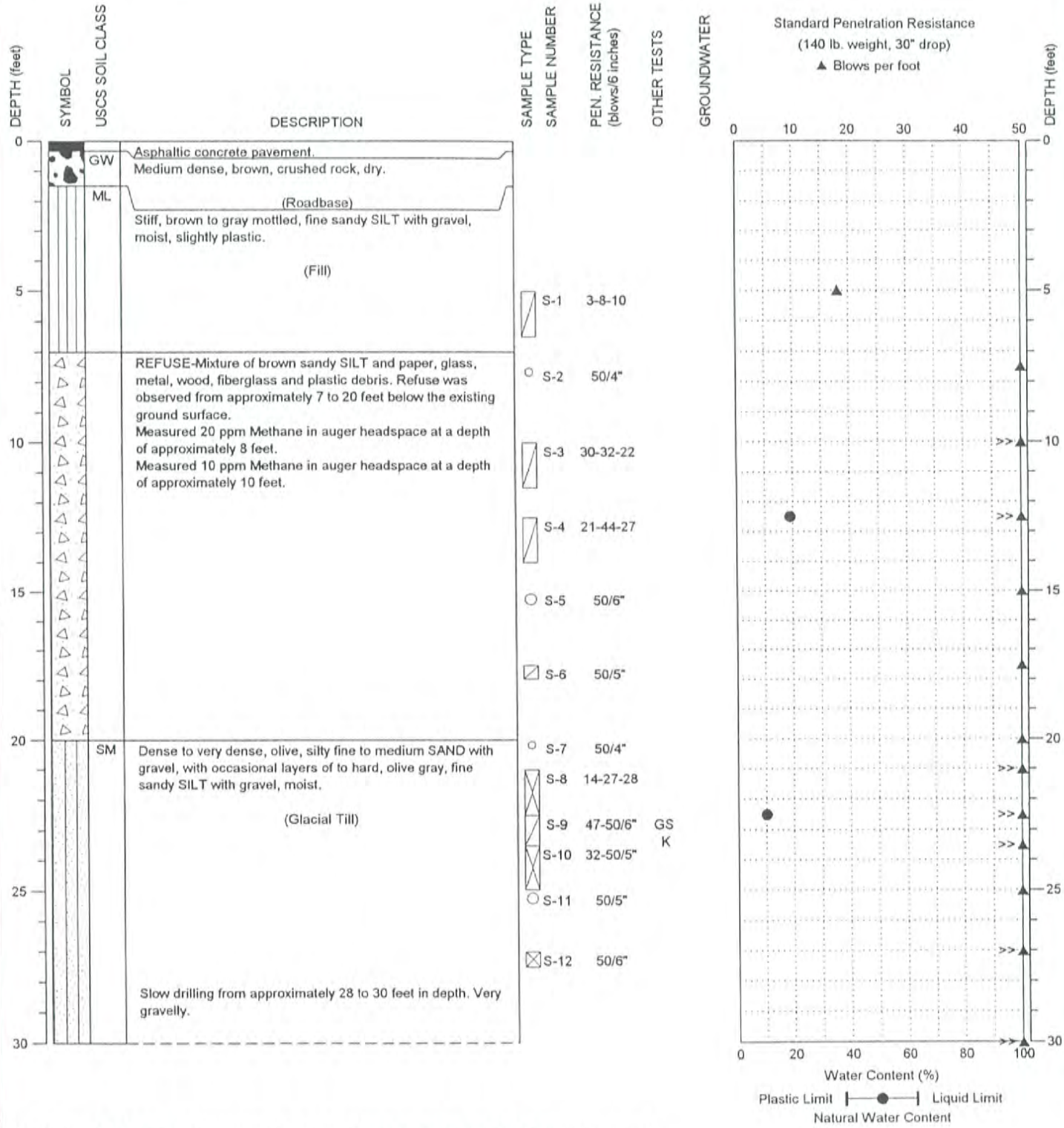
PAGE: 1 of 1

PROJECT NO.: 98158-4.1 FIGURE: A-5

BORING 98158.GPJ 3/8/02

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 395 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/5/2001
DATE COMPLETED: 6/5/2001
LOGGED BY: S. Nelson



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.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH- 7

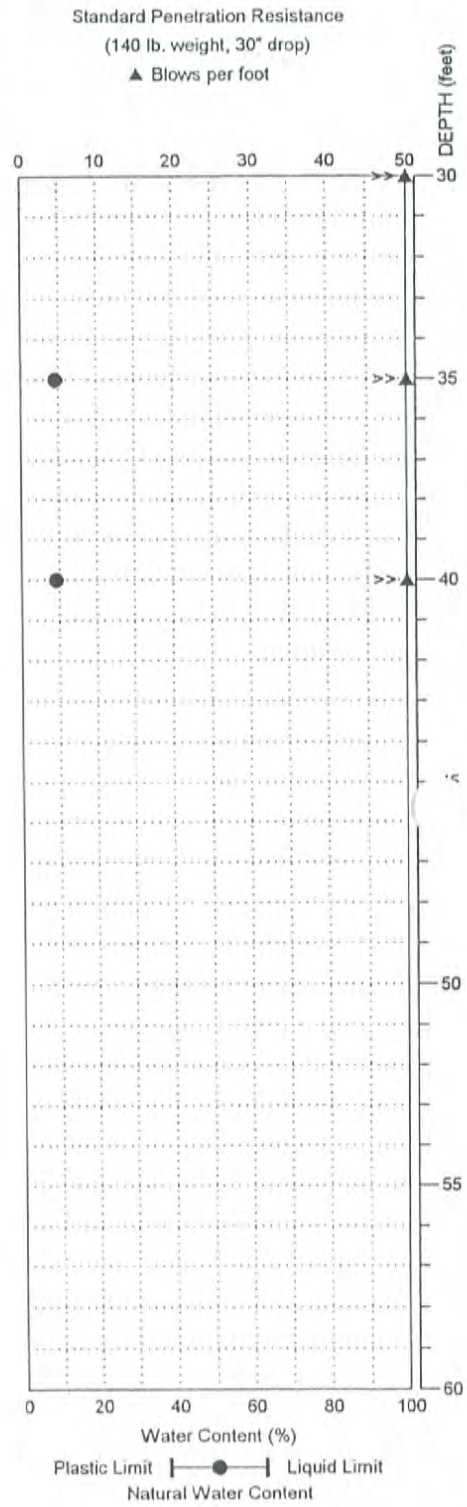
PROJECT NO.: 98158-4.1 FIGURE: A-6

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 395 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/5/2001
DATE COMPLETED: 6/5/2001
LOGGED BY: S. Nelson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		ML	Hard, fine sandy SILT with gravel, moist, slightly plastic.	☒	S-13	50/5"		
35		SP SM	Dense to very dense, brownish gray, fine SAND with silt and gravel, moist. (Advance Outwash)	☒	S-14	50/6"		
40				☒	S-15	32-50/5"		

Boring terminated at approximately 40.9 feet below the existing ground surface. Refuse was observed from a depth of approximately 7 to 20 feet below the existing ground surface. No ground water seepage was observed while conducting this boring.



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HWA GEOSCIENCES INC.

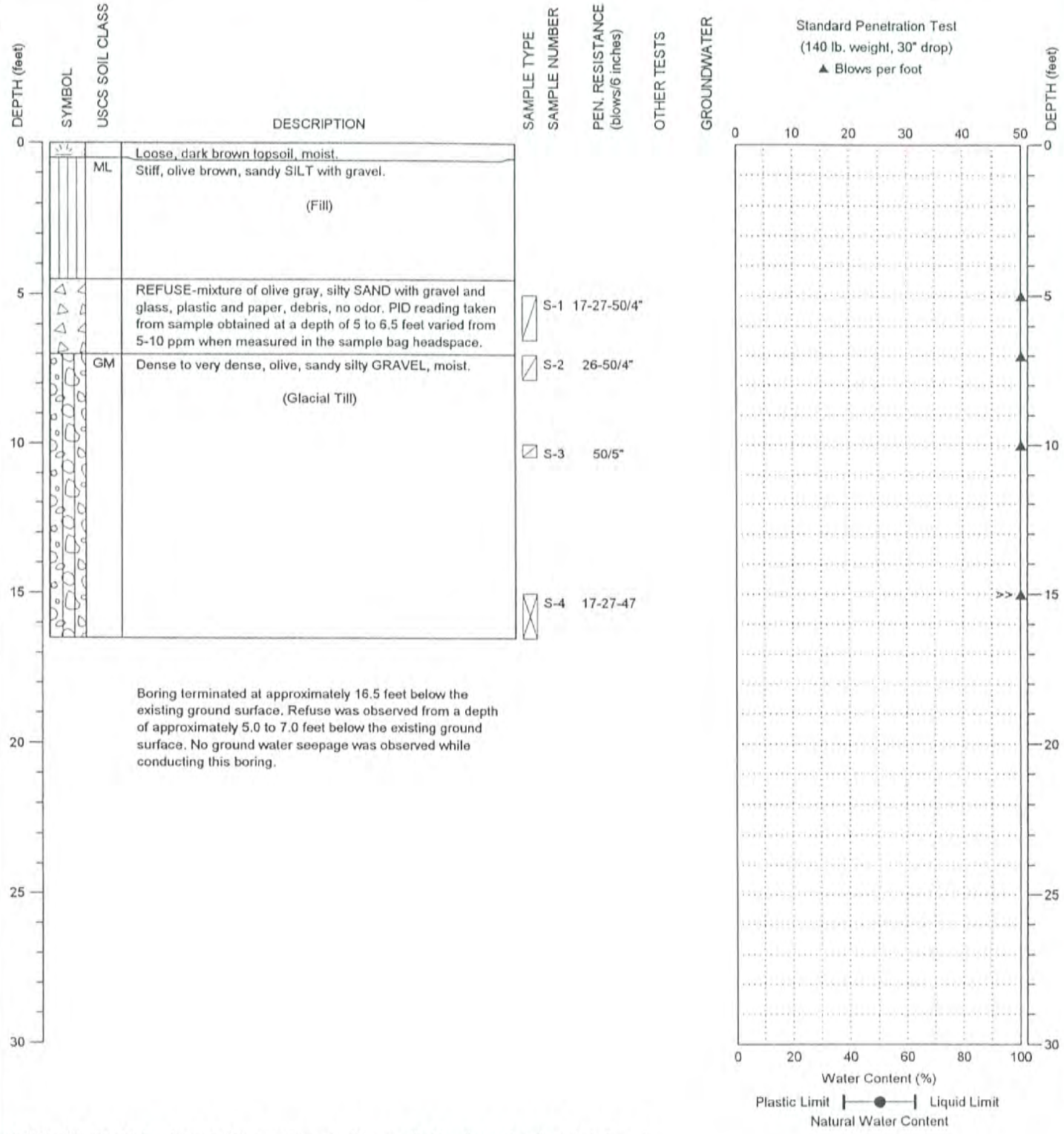
Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH- 7

PROJECT NO.: 98158-4.1 FIGURE: A-6

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 395 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/6/2001
DATE COMPLETED: 6/6/2001
LOGGED BY: S. Nelson



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.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH- 8

PAGE: 1 of 1

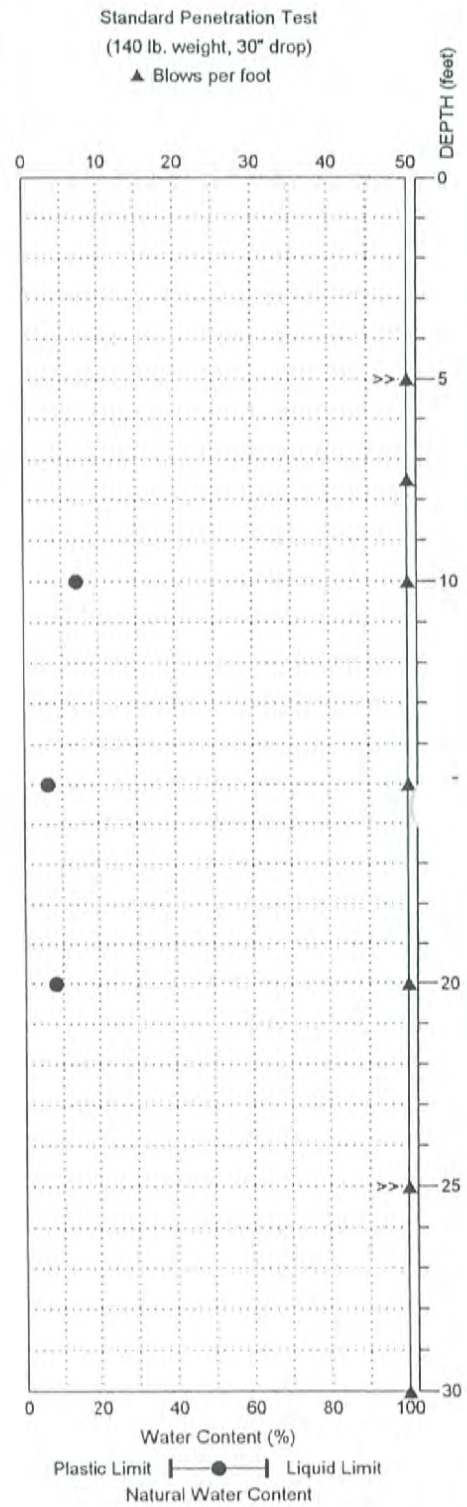
PROJECT NO.: 98158-4.1 FIGURE: A-7

BORING 98158.GPJ 3/8/02

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 387 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/4/2001
DATE COMPLETED: 6/4/2001
LOGGED BY: S. Nelson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0		GW	Loose, silty crushed rock,dry.					
		SP	Loose, fine to medium SAND, moist.					
		SM	Medium dense, grayish brown, very silty SAND with gravel, moist. (Fill)					
5					S-1	10-26-50/5"		
		SM	Dense to very dense, olive gray to gray, silty fine SAND with gravel, moist. Contains occasional layers of hard, gray, slightly fine sandy SILT with fine gravel. (Glacial Till)		S-2	50/4"		
10					S-3	30-50/5"		
15					S-4	45-50/3"		
20					S-5	50/5"	GS K	
25					S-6	50/3"		
30								



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.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

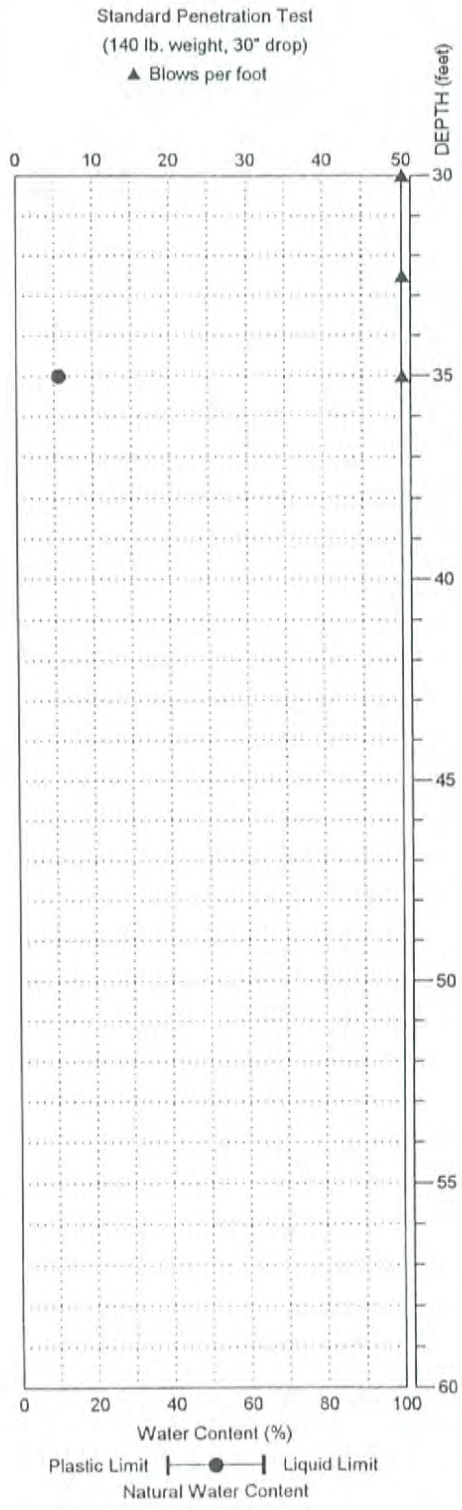
BORING:
BH- 9

PROJECT NO.: 98158-4.1 FIGURE: A-8

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 387 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/4/2001
DATE COMPLETED: 6/4/2001
LOGGED BY: S. Nelson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30				○	S-7	50/4"		
		SP	Dense to very dense, olive, fine SAND with gravel, moist. (Advance Outwash)	○	S-8	50/3"		
35				▨	S-9	50/6"		
40			Boring terminated at a depth of approximately 35.5 feet below the existing ground surface. No refuse or ground water seepage was observed while conducting this boring.					
45								
50								
55								
60								



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.

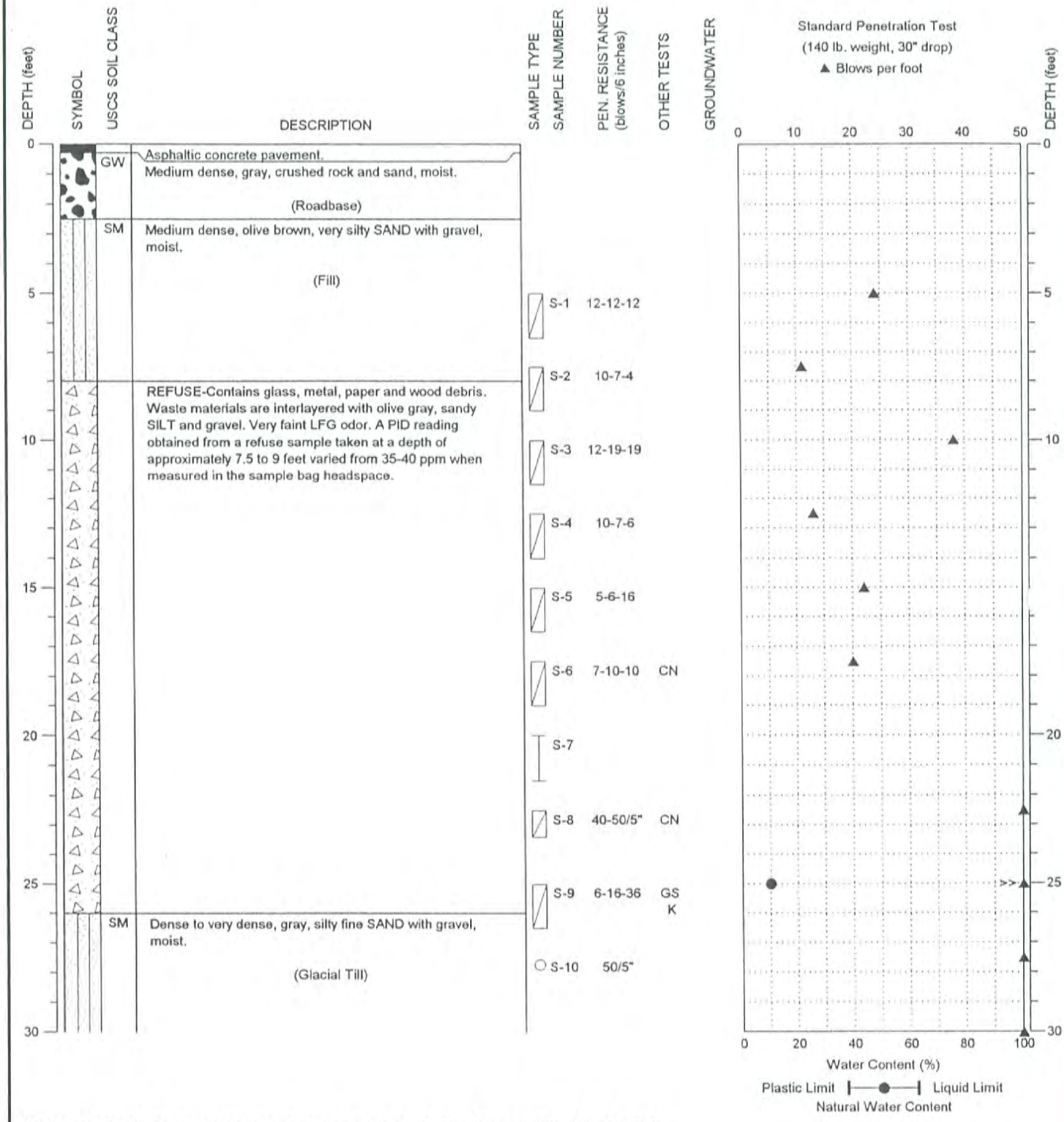
Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH- 9

PROJECT NO.: 98158-4.1 FIGURE: A-8

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 383 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/6/2001
DATE COMPLETED: 6/6/2001
LOGGED BY: S. Nelson



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HWA GEOSCIENCES INC.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH-10

PROJECT NO.: 98158-4.1 FIGURE: A-9

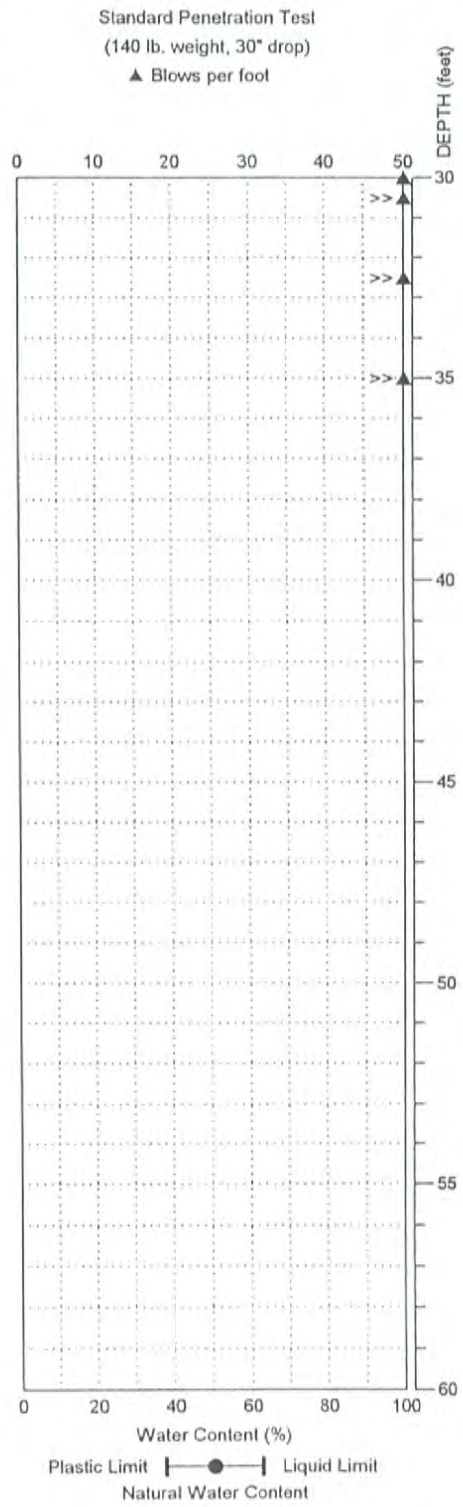
BORING 98158.GPJ 3/8/02

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Autohammer
SURFACE ELEVATION: 383 ± feet

LOCATION: See Figure 2.
DATE STARTED: 6/6/2001
DATE COMPLETED: 6/6/2001
LOGGED BY: S. Nelson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30					S-11	50/5"		
					S-12	50/4"		
					S-13	47-50/6"		
		SP	Dense to very dense, olive gray, fine SAND, trace fine gravel, moist.					
35			(Advance Outwash)		S-14	22-47-50		
40								
45								
50								
55								
60								

Boring terminated at approximately 36.5 feet below the existing ground surface. Refuse was observed from a depth of approximately 8 to 26 feet below the existing ground surface. No ground water seepage was observed while conducting this boring.



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HWA GEOSCIENCES INC.

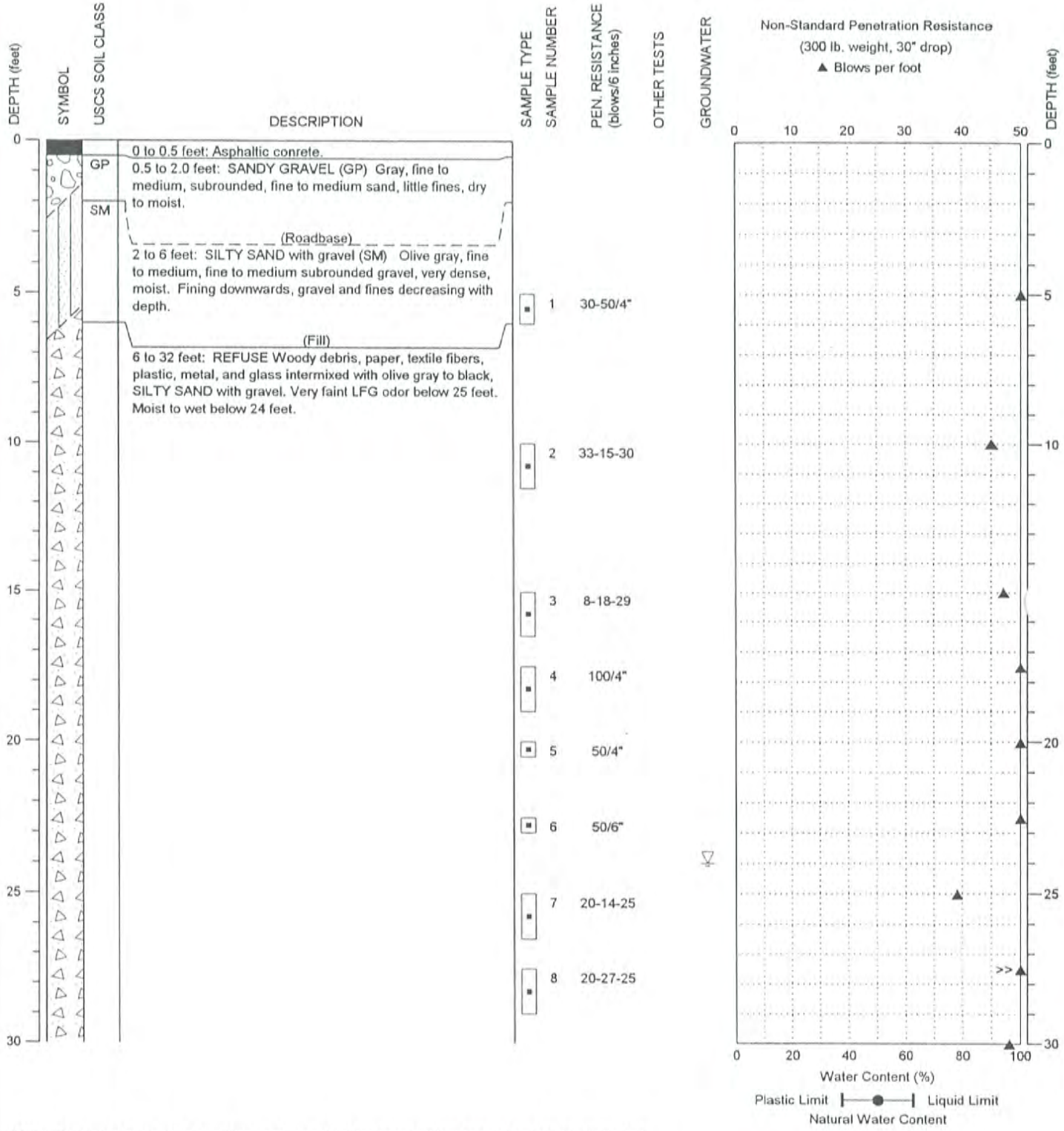
Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH-10

PROJECT NO.: 98158-4.1 FIGURE: A-9

DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Wire line jars and D&M sampler
SURFACE ELEVATION: 402 ± feet

LOCATION: 12 ft NNE of KCB-1
DATE STARTED: 1/21/2002
DATE COMPLETED: 1/21/2002
LOGGED BY: S. Nelson



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HWA GEOSCIENCES INC.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH-11

PROJECT NO.: 98158-4.1 FIGURE: A-10

BORING 98158.GPJ 3/8/02

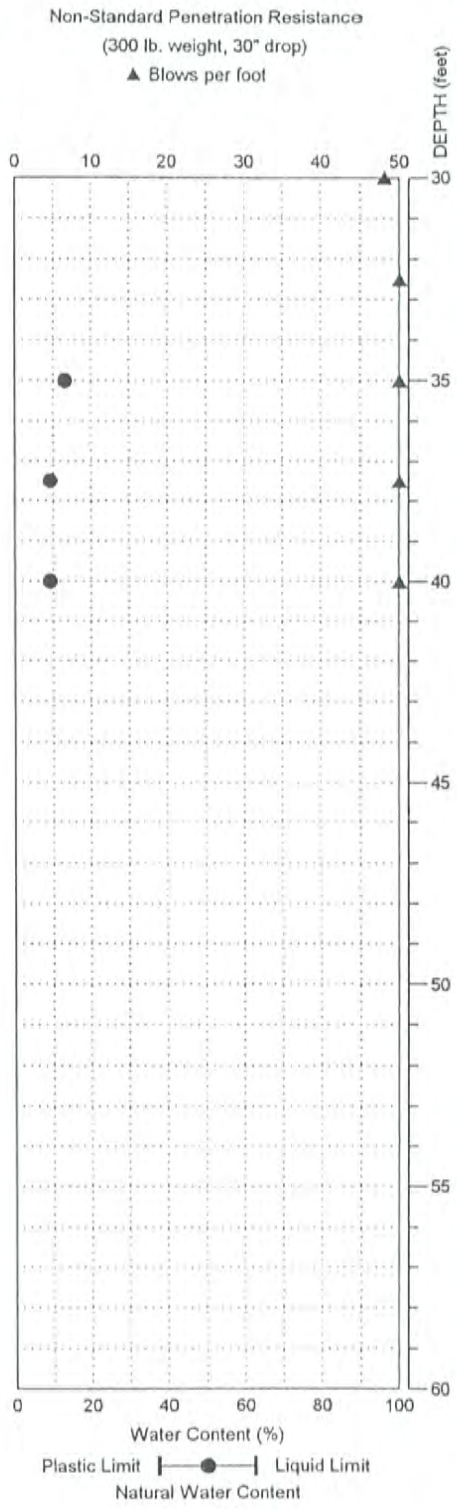
DRILLING COMPANY: Cascade Drilling, Inc.
DRILLING METHOD: CME 75, 4 1/4" HSA
SAMPLING METHOD: Wire line jars and D&M sampler
SURFACE ELEVATION: 402 ± feet

LOCATION: 12 ft NNE of KCB-1
DATE STARTED: 1/21/2002
DATE COMPLETED: 1/21/2002
LOGGED BY: S. Nelson

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30					9	23-23-25		
		SM	32 to 37 feet: SILTY SAND with Gravel (SM). Olive gray, fine to medium sand, non-plastic fines, fine to medium subrounded gravel, dense to very dense. Wet at 32 to 33 feet, moist below.		10	100/5"		
35			(Glacial Till)		11	50/4"	K GS DD	
		SP	37 to 40.5 feet: SAND (SP) Olive brown, fine, few fine subround gravel, trace fines, moist.		12	60/6"	%F DD	
40			(Advance Outwash)		13	60/5"	%F DD	
45								
50								
55								
60								

Boring terminated at a depth of approximately 40.5 feet below the existing ground surface (bgs). Refuse was observed from a depth of approximately 6 to 32 feet bgs. The refuse was wet from approximately 24 to 32 feet bgs.

Borehole was abandoned with medium bentonite chips as auger flights were removed.



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.

Vashon Island Landfill Access Road Evaluation
Vashon Island Landfill
King County, Washington

BORING:
BH-11

PROJECT NO.: 98158-4.1 FIGURE: A-10

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT King County Ground Water Study - Vashon

Location Northeast corner **Boring No.** MW-1

Surface Elevation 403.64 ft. **Drilling Method** Hollow Stem Auger (6" i.

Total Depth 130 ft. **Drilled By** Unitas/Kring

Date Completed 9/8/83 **Logged By** CEWells

WELL DETAILS	PENETRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
Bentonite; 3" dia. Sch. 80 PVC riser	N=24		1	D&M			0.0-35.0' Gravelly sandy silt (Till)- grey-tan, with some clay, occasional cobbles, some thin seams of clean sand, wet in sand seams, otherwise damp.	
	N=40	10	2	"				
	N=90		3	"		SM-GM		
	N=50/6"	20	4	"				
	N=50/5"		5	"				
	N= 50/5.5"	30	6	"				
	N= 100/3"		7	"			35.0'-46.0' Gravelly silty sand- grey, occasional cobbles, dense, damp.	
	N= 100/3"	40	8	"		SM		
	N= 100/4"		9	"			46.0'-77.0' Sand, gravelly sand- grey-tan, medium grained, poorly graded to well graded, variable sand-gravel ratios, with some cobbles, moderately hard, moist to wet.	
	N= 100/5"	50	10	"				
	N=50/6"		11	"				
	N=50/6"	60	12	"		SW		
	N=49		13	"				
	N=50/6"	70	14	"				

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT King County Ground Water Study - Vashon

Boring No. MW-1

WELL DETAILS	PENETRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
	N=50/6"		15	D&M				
	N=59	80	16	"			77.0'-130' Sand- Grey, very fine to medium grained, poorly graded to moderately poorly graded, distinctly stratified, with thin silt seams from 100 to 115 ft., damp to 121 ft., saturated below 121 ft.	
	N=85/11"		17	"				
	N=69	90	18	"				
	N=90/11"		19	"		SP		
	N=50/6"	100	20	"				
	N=73		21	"				
	N=60	110	22	"				
	N=85		23	"				
	N=77/9"	120	24	"				
	N=44		25	"				
	N=50/5"	130	26	"			Note: Penetration rate/ "N" value are based on blow counts using a Dames and Moore sampler.	
		140						

Bentonite

3" Sch. 80 PVC riser

3" dia. PVC screen 0.010" slots

Gravel Backfill

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT King County Ground Water Study - Vashon

Location South side **Boring No.** MW-2

Surface Elevation 313.31 ft. **Drilling Method** Hollow Stem Auger (6" i.d.

Total Depth 85 ft. **Drilled By** Unitas/Kring

Date Completed 9/9/83 **Logged By** CEWells

WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
Bentonite; 3" dia. Sch. 80 PVC riser	N=9		1	D&M			0.0'-39.0' Sand- Tan and light grey, fine to moderately poorly graded, loose, with rare gravels, few dark brown, 1/8" thick organic seams at approximately 35 ft., damp.	
	N=12	10	2	"				
	N=10		3	"				
	N=22	20	4	"		SP		
	N=21		5	"				
	N=20	30	6	"				
	N=21		7	"				
	N=20	40	8	"			39.0'-67.0' Silt- Dark grey, non-plastic, moderately dense, varied below 50 ft., rare 1/8" seams of very fine grained, poorly graded sand, damp to wet.	
	N=22		9	"				
	N=24	50	10	"		ML		
	N=26		11	"				
	N=22	60	12	"				
	N=24		13	"				
	N=27	70	14	"		SP	67.0'-78.0' Sand- Light brown to grey, fine to medium grained, poorly	

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT King County Ground Water Study - Vashon

Boring No. MW-2

WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
3" dia. Sch. 80 PVC, 0.010" slots Gravel Backfill	N=28		15	D&M		SP	graded, wet to saturated.	
	N=30	80	16	"		ML	78.0'-85.0' Silt- Dark grey, dense to very dense, hard, with some clay, damp.	
	N=70		17	"				
		90						
		100						
		110						
		120						
		130						
		140					Note: Penetration rate/ "N" value are based on blow counts using a Dames and Moore sampler.	

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT King County Ground Water Study - Vashon

Location South side

Boring No. MW-3

Surface Elevation 313.54 ft.

Drilling Method Hollow Stem Auger (6" i.d.)

Total Depth 40 ft.

Drilled By Unitas/Kring

Date Completed 9/12/83

Logged By CEWells

WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
Bentonite 3" dia. Sch. 80 PVC riser Bentonite Pellets Gravel 3" dia. Sch. 80 PVC, 0.010" slots		10 20 30 40 50 60 70	None taken.				See log for MW-2.	

SEA-300-02a

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT King County Ground Water Study - Vashon **Page** 1 **of** 2

Location West side **Boring No.** MW-4

Surface Elevation 374.33 ft. **Drilling Method** Hollow Stem Auger (6" i.d.)

Total Depth 110 ft. **Drilled By** Unitas/Kring

Date Completed 9/14/83 **Logged By** CEWells

WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
Bentonite / 3" dia. Sch. 80 PVC riser	N=68		1	D&M			0.0'-23.0' Gravelly sandy silt (Till)- Grey-tan, with some cobbles, well graded, moderately dense, dry.	
	N=36	10	2	"				
	N=48		3	"		SM-GM		
	N=50	20	4	"				
	N=38		5	"			23.0'-36.0' Sand, gravelly sand- Grey or grey-tan, medium to coarse grained sand with gravel to one inch diameter, occasional cobbles, well graded, damp.	
	N=36	30	6	"		SW		
	N=34		7	"				
	N=37	40	8	"			36.0'-103.0' Sand- Grey-tan or grey, variable/stratified, fine to very coarse, poorly graded to well graded, loose, occasional silty sand zones, gravelly zones below 75 ft., damp to wet.	
	N=35		9	"				
	N=28	50	10	"				
	N=30		11	"		SP		
	N=41	60	12	"				
	N=36		13	"				
	N=40	70	14	"				

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT King County Ground Water Study - Vashon

Boring No. MW-4

WELL DETAILS	PENETRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
Bentonite; 3" dia. Sch. 80 PVC riser; Gravel Backfill; 3" dia. Sch. 80 PVC, 0.010" slots	N=31		15	D&M				
	N=44	80	16	"				
	N=46		17	"		SP		
	N=54	90	18	"				
	N=55		19	"				
	N=53	100	20	"				
	N=37		21	"			103.0'-110.0' Silt- Grey, dense, with some very fine sand, wet to saturated.	
	N=30	110	22	"		ML		
		120						
		130						
		140					Note: Penetration rate/ "N" value are based on blow counts using a Dames and Moore sampler.	

RECORD OF BOREHOLE MW-5

Figure A-5
Page 1 of 5

LOCATION See Figure 2 DATUM 355.86 ft. MSL DATE 3-6-86

SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD- CABLE TOOL

EVN / PTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH
55.9						
1.0	Very dense, brown, SAND and GRAVEL, some silt to gravelly fine to coarse SAND, some silt (Till)	GM SW				
			1	DO	50 / 6"	5
42.9						
13.0	Very dense, brown, stratified, fine to coarse SAND, some to little silt, trace gravel (Proglacial sand)	SP	2	DO	10 41 51	10
			3	DO	6 16 50 / 4"	15
			4	DO	20 30 50 / 4"	
			5	DO	5 20 43	20
			6	DO	10 44 50 / 2"	25
			7	DO	17 30 4	30

PENETRATION TEST*
▲ "N" BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.

8" Locking steel monument
Cement grout
3/4" PVC gas monitoring probe
Pea gravel
2" Schedule 40 PVC casing

REMARKS: DO = Drive Open
* 320 lbs. hammer falling 1.6 ft.

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB # 853-1047.05

RECORD OF BOREHOLE MW-5

Figure A-5
Page 2 of 5

L[illegible]TION See Figure 2 DATUM 355.86 ft. MSL DATE 3-6-86

SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD - CABLE TOOL

ELEV/DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/6 IN.	DEPTH	PENETRATION TEST * ▲ 'N' BLOWS PER FOOT (20 40 60 80) / WATER CONTENT, PERCENT (Wp Wn Wl; 20 40 60 80)	PIEZOMETER INST.
	Very dense, brown, stratified, fine to coarse SAND, some to little silt, trace gravel (Proglacial sand)	SP	8	DO	14 32 50/4"	40		Pea gravel; 2" Schedule 40 PVC casing
			9	DO	1 16 50			
			10	DO	11 50/4"	45		
			11	DO	9 18 51	50		
			12	DO	2 4 47	55		
			13	DO	1 31 50/4"	60		
			14	DO	23 50/6"	65		
			15	DO	10 41 50/4"			

REMARKS:

VERTICAL SCALE

Golder Associates

VASHON LANDFILL

RECORD OF BOREHOLE MW-5

Figure A-5

LOCATION See Figure 2 DATUM 355.86 ft. MSL DATE 3-6-86

SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD- CABLE TOOL

ELEV / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES: NUMBER	TYPE	BLOWS/6 IN.	DEPTH
	Very dense, brown, stratified, fine to coarse SAND, some to little silt, trace gravel (Proglacial sand)	SP	16	DO	7 50 50/4"	75
			17	DO	1 12 48	
275.4						80
80.5	Dense, dark gray, medium SAND	SP	18	DO	3 12 25	
272.4						
83.5	Very hard, brownish-gray, SILT to fine sandy SILT, trace clay (Upper lacustrine silt)	ML/CL	19	DO	6 12 50/4"	85
			20	DO	19 50/5"	90
260.9						
95.0	Hard, brownish gray, interbedded, silty SAND and sandy SILT, trace clay	SM/ML	21	DO	1 1 37	95
255.9						
100.0	Hard, grayish-brown, stratified, sandy SILT and clayey SILT	ML/CL	22	DO	4 24 26	100
250.9						

PENETRATION TEST *
▲ 'N' BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.

2" Schedule 40 PVC screen .020" slots
4/10/86
#8 Monterey sand
Cap
Pea gravel
Bentonite pellet seal
2" Schedule 40 PVC casing
Pea gravel
Bentonite pellet seal

REMARKS:

VERTICAL SCALE

Golder Associates

VASHON LANDFILL

RECORD OF BOREHOLE MW-5

Figure A-5
Page 4 of 5

LOCATION See Figure 2 DATUM 355.86 ft. MSL DATE 3-6-86

SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD – CABLE TOOL

LEVATION / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/6 IN.	DEPTH
105.0	Very dense to very hard, dark gray, stratified, silty fine SAND, fine sandy SILT and SILT, trace fine sand	ML CL	23	DO	12 34 50/5"	
245.9						
110.0	Very dense to very hard, grayish-brown, medium to fine SAND and SILT	SM	24	DO	75/6"	110
			25	DO	43 50/4"	115
235.9						
120.0	Very dense, brownish-gray, silty fine to medium SAND	SM	26	DO	36 50/2"	120
231.9						
124.0	Very hard, dark gray, clayey SILT (Lower lacustrine silt)	CH	27	DO	24 50/4"	125
224.9						130
131.0	Very dense, brown, fine to coarse SAND, little silt, trace fine gravel	SM SP	28	DO	37 50/4"	135
			29	DO	25 50/6"	

PENETRATION TEST*
▲ "N" BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.

Pea gravel
#8 Monterey sand
4/10/86
2" Schedule 40 PVC screen .020 slots
Cap
Bentonite pellet seal
Pea gravel

REMARKS:

VERTICAL SCALE

Golder Associates

VASHON LANDFILL

RECORD OF BOREHOLE MW-5

Figure A-5
Page 5 of 5

LOCATION See Figure 2 DATUM 355.86 ft. MSL DATE 3-6-86

SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD- CABLE TOOL

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH	PENETRATION TEST * ▲ 'N' BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
	Very dense, brown, fine to coarse SAND, little silt, trace fine gravel	SM SP				140		Pea gravel
			30	DO	31 50/4"			
210.9 / 145.0	Very dense, dark gray, fine sandy SILT to silty fine SAND	SM ML	31	DO	18 46 50/5"	145		
206.9 / 149.0	Very dense, dark gray, fine SAND, trace silt	SP	32	DO	16 46 50/5"	150		
204.9 / 151.0	End of hole at 151.0 feet							

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB # 953-1067.05

RECORD OF BOREHOLE MW6

Figure A-6

LOCATION See Figure 2 DATUM 392.42 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD – CABLE TOOL

ELEV./ DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH	PENETRATION TEST * ▲ 'N' BLOWS PER FOOT 20 40 60 80	WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
2.4 / 0	Dense to very dense, grayish-brown, silty SAND and GRAVEL to gravelly, silty SAND (Till)	GM	1	DO	2 14 19	5			8" Locking steel monument; Cement grout; 3/4" PVC gas monitoring probe
			2	DO	50/4"	10			8" Steel casing
			3	DO	50/4"	15			
			4	DO	50/5"	20			
			5	DO	50/4"	25			Pea gravel
			6	DO	50/5"	30			2" Schedule 40 PVC casing
50	Very dense, brown, medium SAND trace gravel and silt to gravelly SAND, little silt (Proglacial sand)								

REMARKS. DO = Drive Open

* 320 lbs. hammer falling 1.6 ft.

VERTICAL SCALE

Golder Associates

VASHON LANDFILL

RECORD OF BOREHOLE MW6

Figure A-6

LOCATION See Figure 2 DATUM 392.42 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD- CABLE TOOL

LEVN / EPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH	PENETRATION TEST * ▲ 'N' BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
	Very dense, brown, medium SAND trace gravel and silt to gravelly SAND, little silt (Proglacial sand)	SP/SW	7	DO	100/6"			
			8	DO	13 50/5"	40		
			9	DO	21 50/4"	45		
			10	DO	18 50/6"	50		Pea gravel; 2" Schedule 40 PVC casing
			11	DO	70/6"	55		
			12	DO	17 50/5"	60		
			13	DO	9 22 50/2"	65		

REMARKS:

VERTICAL SCALE

RECORD OF BOREHOLE MW6

Figure A-6

L ATION See Figure 2 DATUM 392.42 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD– CABLE TOOL

LEVN / EPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH
	Very dense, brown, medium SAND trace gravel and silt to gravelly SAND, little silt(Proglacial sand)	SP/SW	14	DO	17 50/5"	
			15	DO	5 15 50/4"	75
			16	DO	9 50/6"	80
			17	DO	7 36 50/4"	85
304.4 / 88.0	Very dense, brown, fine SAND and silty fine SAND	SM	18	DO	10 28 50	90
299.4 / 93.0	Very dense, brown, medium SAND trace gravel and silt to gravelly SAND, little silt (Proglacial sand)	SP	19	DO	2 23 50	95
			20	DO	11 40 50	100

PENETRATION TEST*
▲ 'N' BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.

Pea gravel

2" Schedule 40 PVC casing

#8 Aqua sand

REMARKS:

VERTICAL SCALE

RECORD OF BOREHOLE MW6

Figure A-6

LOCATION See Figure 2 DATUM 392.42 ft. MSL DATE 3-19-86

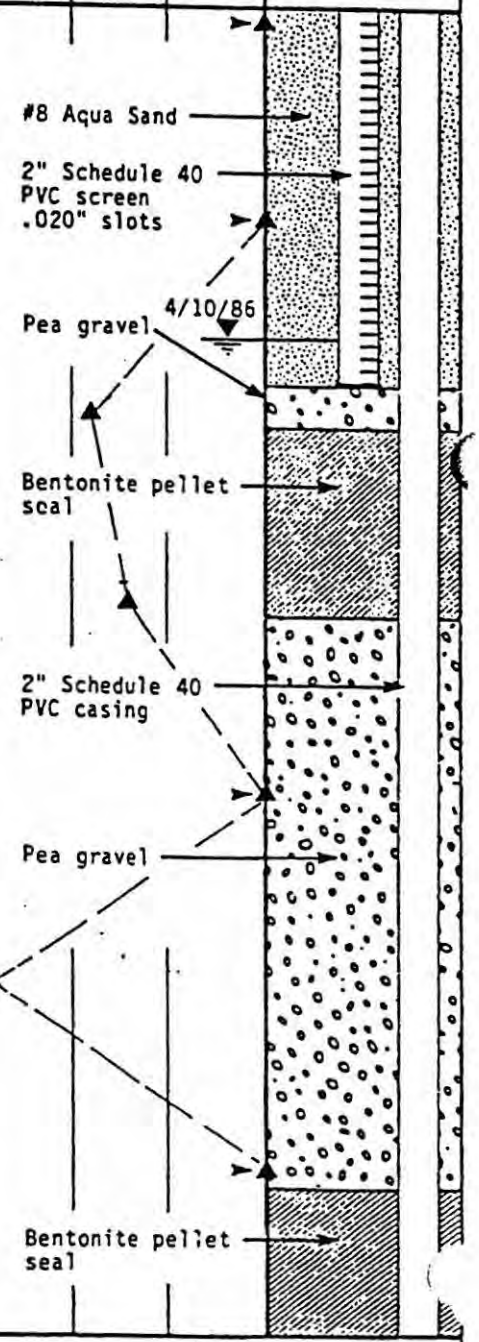
SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD – CABLE TOOL

ELEV/DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES: NUMBER	TYPE	BLOWS/6 IN.	DEPTH
79.9 / 12.5	Very hard, grayish-brown, SILT (Upper lacustrine silt)	SP	21	DO	4 48 50/4"	110
			22	DO	5 36 50/4"	
		ML	23	DO	4 17 47	115
			24	DO	5 24 48	120
			25	DO	12 45 50/4"	125
			26	DO	3 9 34	130
			27	DO	31 35 50/4"	135

PENETRATION TEST * ▲ "N" BLOWS PER FOOT 20 40 60 80

WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80

PIEZOMETER INST.



REMARKS:

VERTICAL SCALE

VASHON LANDFILL

RECORD OF BOREHOLE MW6

Figure A-6

ATION See Figure 2 DATUM 392.42 ft. MSL DATE 3-19-86

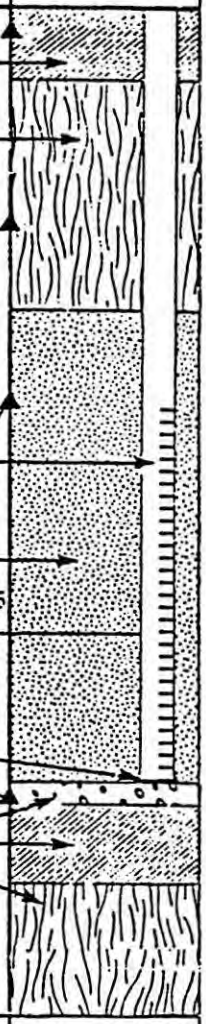
SAMPLER HAMMER WEIGHT 320 LB., DROP 19 IN. BORING METHOD – CABLE TOOL

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH
251.5			28	DO	2 9 50/5"	
140.9	Very dense, brown, fine to medium SAND, trace to little silt	SP				
249.4						
143.0	Hard, dark gray, SILT (Upper lacustrine unit)	ML	29	DO	14 20 50/4"	145
244.4						
148.0	Very dense, brown to brownish-gray, fine to coarse SAND, little to trace gravel and silt	SW	30	DO	50/4"	150
			31	DO	4 22 50	155
235.4						
157.0	Very dense, brownish-gray, gravelly SAND, trace silt	SP	32	DO	2 17 35	
233.4						
159.0		SP			5	
232.1						
160.3	Very hard, brownish-gray, SILT and medium to fine SAND (Lower lacustrine unit)	ML	33	DO	17 50/2"	160
230.4						
162.0	Very dense, gray, fine to coarse SAND, little gravel	SW	34	DO	2 9 12	
225.9			35	DO	3 15 50	
166.5	End of hole at 166.5 feet.					

PENETRATION TEST *
▲ "N" BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.



REMARKS:

VERTICAL SCALE

Golder Associates

VASHON LANDFILL

CHM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-7
106241.E3.ZZ	MW-7C	SHEET 1 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N583.02, E2987.97

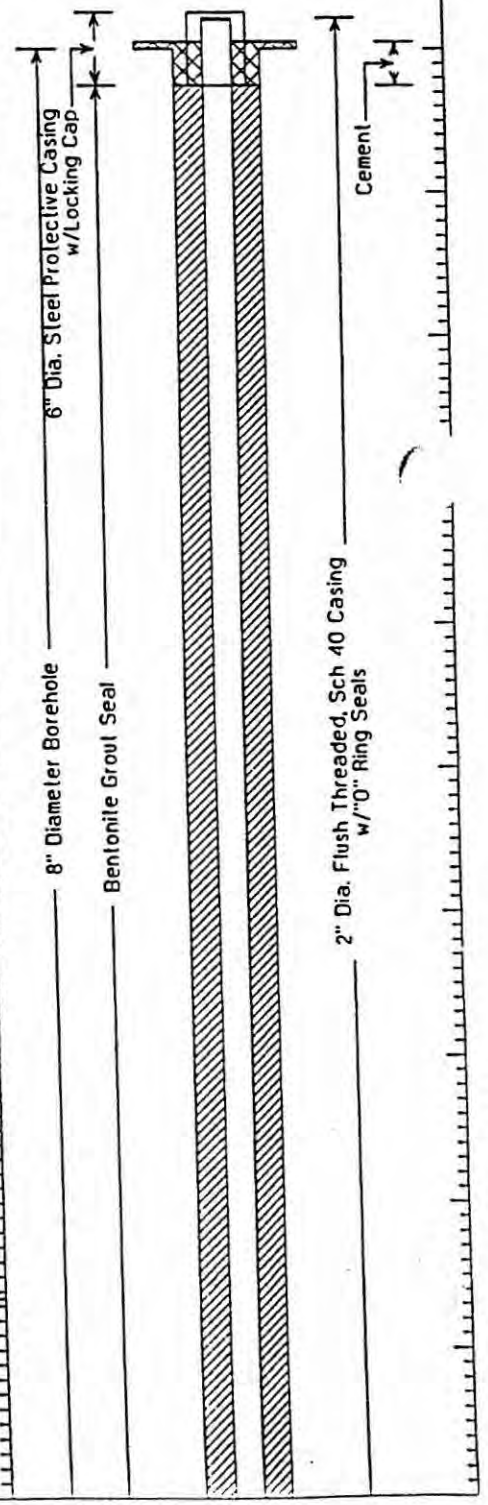
ELEVATION 371.09 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 04/21/95 FINISH 04/28/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
10.0					SILTY SAND (SM), light brown/gray, moist, firm, trace gravel up to 1" diameter
20.0	20 21.5	SS	8"	50-100/6"	
30.0					
40.0	40 41.5	SS	1.0'	75-100/6"	
50.0					WELL GRADED SAND WITH GRAVEL (SW), gray brown, moist, firm
60.0	60 61.5	SS	18"	50-200	SILTY SAND WITH GRAVEL (SM), gray brown, moist, firm
70.0					
80.0	80 81.5	SS	18"	13-65-50/5"	SANDY SILT (ML), gray brown, moist, firm
90.0					SILT (ML), gray brown, moist, firm, dense
100					

WELL COMPLETION DIAGRAM



V:\MW-7C.LOG
Use WELLBORE template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-7
106241.E3.ZZ	MW-7C	SHEET 2 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N583.02, E2987.97

ELEVATION 371.09 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 04/21/95 FINISH 04/28/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION	WELL COMPLETION DIAGRAM
	100	SS	1.0'	25-45-25/5"	SILT WITH SAND (ML), gray, moist, firm	
110.0					SILT (ML), trace fine sand, wet, firm, high plasticity	
	120				SILT WITH SAND (ML), gray, saturated, firm, slightly plastic	
120.0	121.5	SS	1.5'	13-20-50/5"		
130.0						
	140					
140.0	141.5	SS	1.2'	35-50-50/5"		
150.0						
	160					
160.0	161.5	SS	1.5	2-2-3	SILTY SAND (SW), gray, wet, firm	
					SILT (ML), gray, moist, firm, dense	
170.0					SANDY SILT (ML), gray, firm, saturated	
	180					
180.0	181.5	SS	1.4'	15-35-50/4"	FAT CLAY (CH), gray, dry, brittle, very dense, very hard	
					SANDY SILT (ML), gray/brown, damp, firm, hard and very hard, dense	
190.0						

8" Diameter Borehole

Bentonite Grout Seal

2" Dia. Flush Threaded, Sch 40 Casing w/"O" Ring Seals

VHW-7C.LOG Use WELLBORE Template

CHM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-7
106241.E3.ZZ	MW-7C	SHEET 3 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N583.02, E2987.97

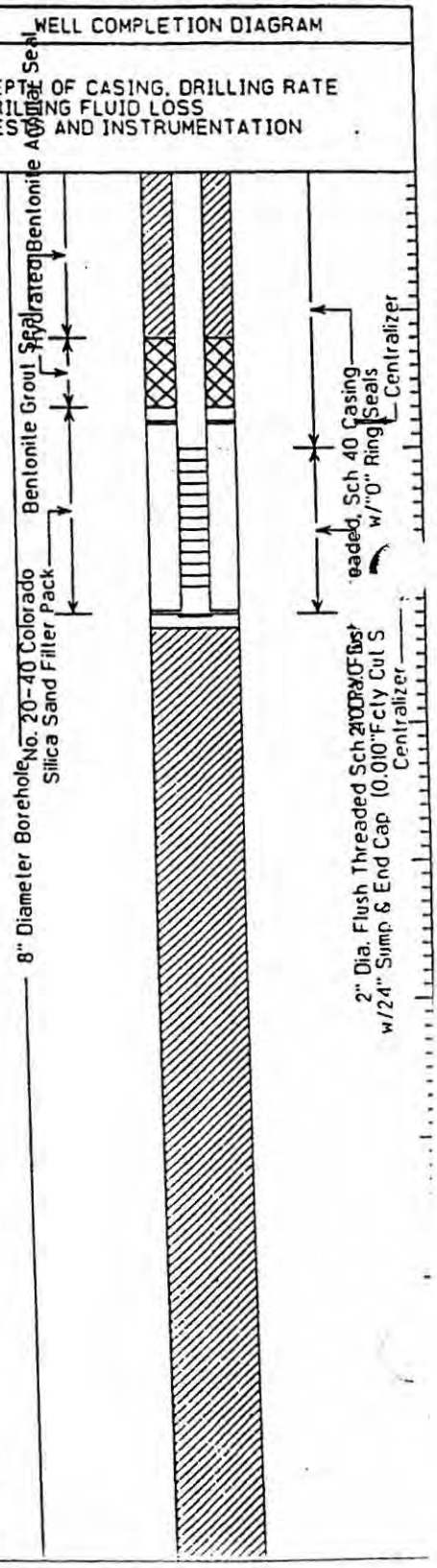
ELEVATION 371.09 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 04/21/95 FINISH 04/28/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
	200				
	205	SS	1.0'	8-15-30	CLAYEY SAND (SC), gray/brown, moist, firm, dense, trace 1/4" gravel
210.0					SILT WITH GRAVEL (ML), gray/brown, moist, firm, gravel sub angular up to 2 diameter
	220				
220.0	221.5	SS	6"	12-16-30	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), gray, saturated, firm
230.0					SILT (ML), gray, moist (wet), dense to very dense
	240				
240.0	241.5	SS	1.2'	18-30-30	FAT CLAY (CH), gray/brown, dry/moist, brittle, very dense
250.0					SILTY GRAVEL WITH SAND (GM), gray/brown, wet, saturated, wood fragments (3%)
	260				
260.0	261.5	SS	.5'	6-15-25	POORLY GRADED SAND WITH SILT (SP-SM), gray, wet, white pumice or tuff, trace silt, trace gravel 1/4-1/2" diameter
270.0					Wood fragments in sample
	280				SILTY GRAVEL WITH SAND (GM), gray/brown, wet, saturated, wood fragments (3%)
280.0	281.5	SS	1.0'	2-2-27	POORLY GRADED SAND WITH SILT (SP), gray, wet, saturated, firm, dense, trace silt
290.0					
	300				CLAY (CL), dark gray, moist, firm, dense

WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTING AND INSTRUMENTATION



VHM-7CLOG Use WELLBORE Template

CH2M HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-7
106241.E3.ZZ	MW-7C	SHEET 4 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N583.02, E2987.97

ELEVATION 371.09 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 04/21/95 FINISH 04/28/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
300	300	SS	1.0'	35-50-50/2"		
310.0						
320	320					
320.0	321.5	SS	1.2'	15-35-50/4"		
0						8" Diameter Borehole
340	340					
340.0	341.5	SS	1.0'	20-30-50/5"		
350	350					
350.0	351.5	SS	1.5'	35-75/5"	TOTAL DEPTH = 351.5 FEET	
360.0						
370.0						
380.0						
390.0						

VIWW-7CLOG
Use WELLBORE Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-7
106241.E3.77	MW-7C	SHEET 1 OF 4

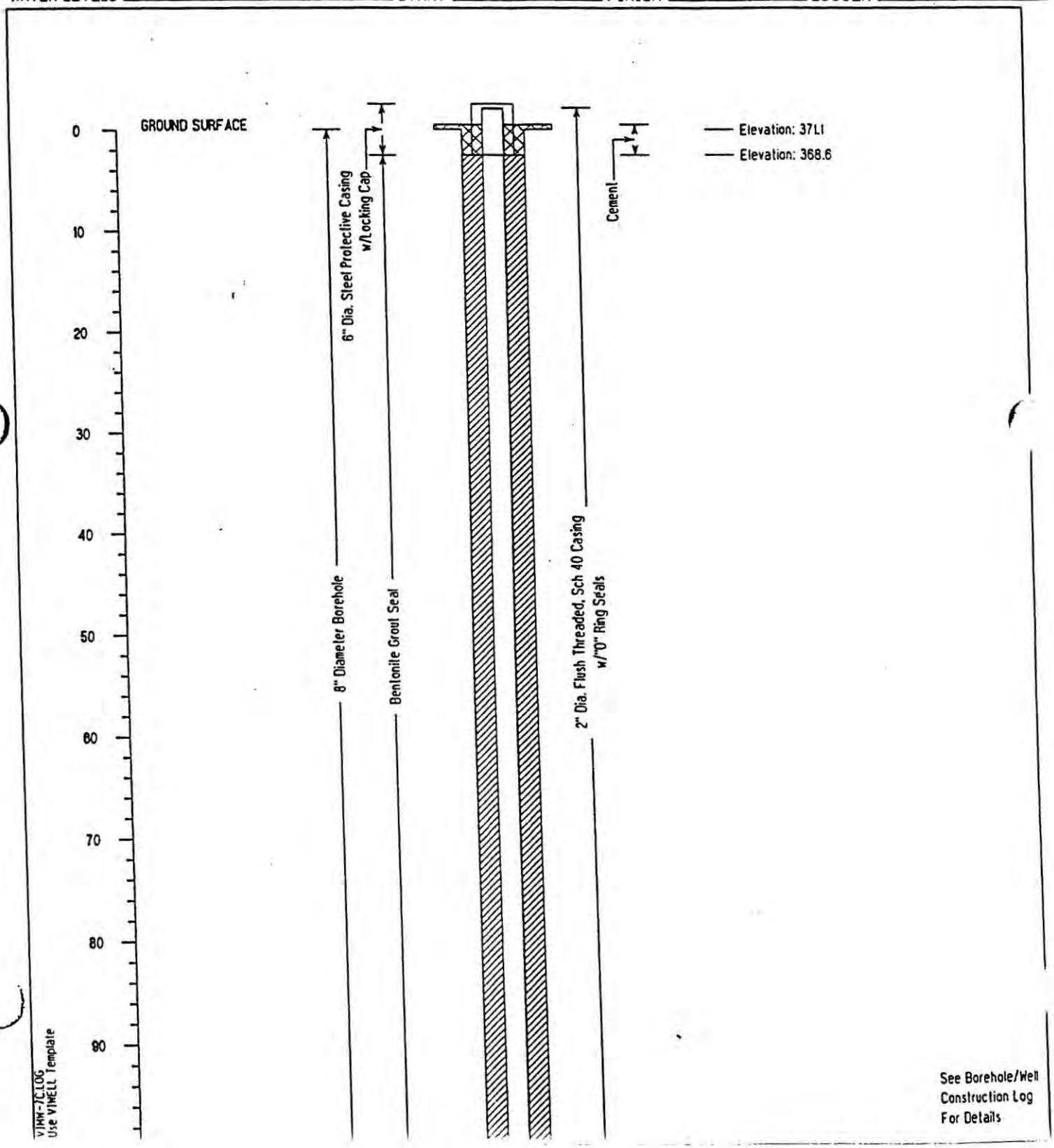
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N583.02, E2987.97

ELEVATION 371.09 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 04/21/95 FINISH 04/28/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

V:\HW-7C.LOG
Use VIMELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-7
106241.E3.77	MW-7C	SHEET 2 OF 4

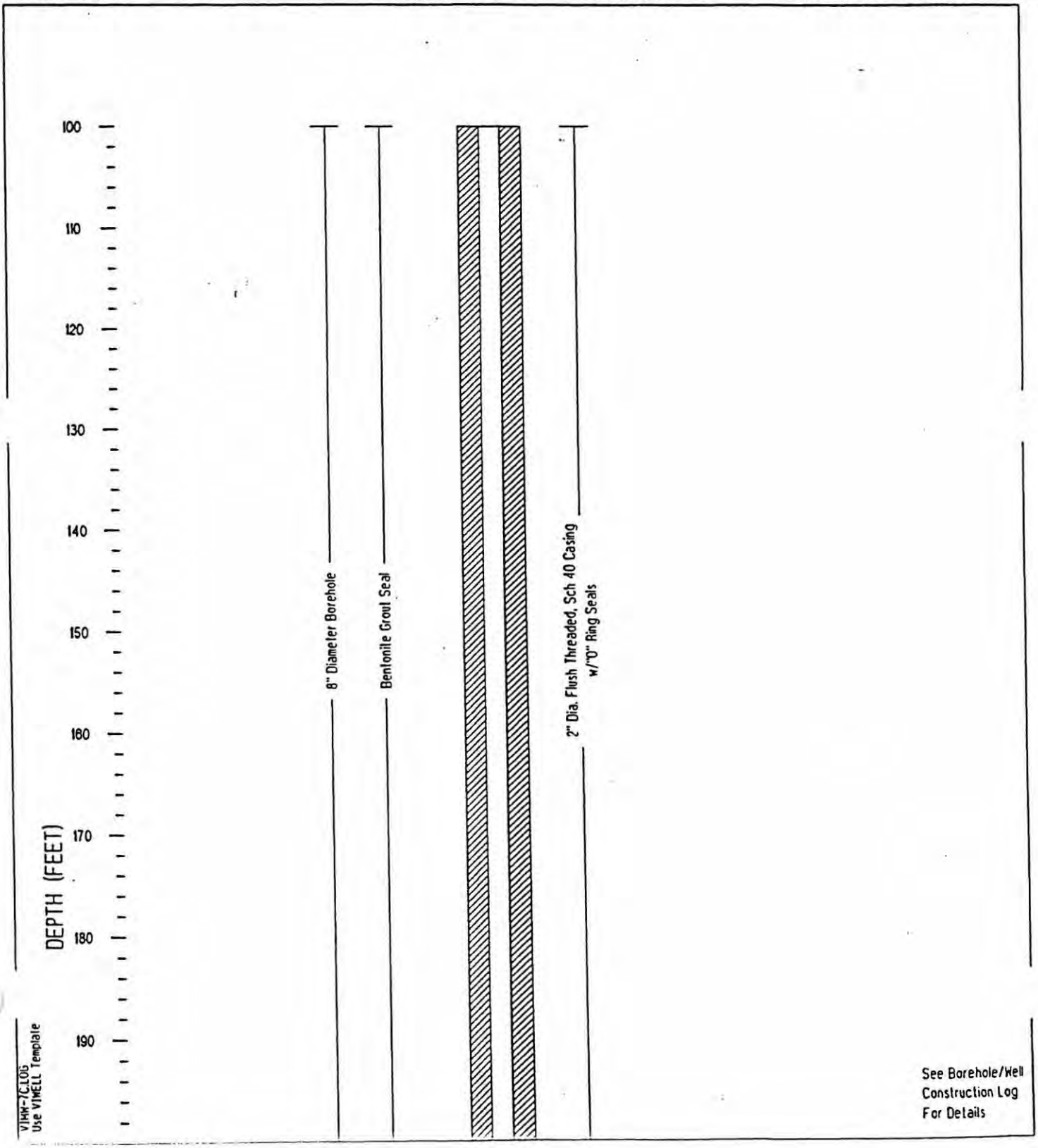
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N583.02. E2987.97

ELEVATION 371.09 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 04/21/95 FINISH 04/28/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VIHW-7.LOG
Use VIWELL Template

CHM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-7
106241.E3.ZZ	MW-7C	SHEET 3 OF 4

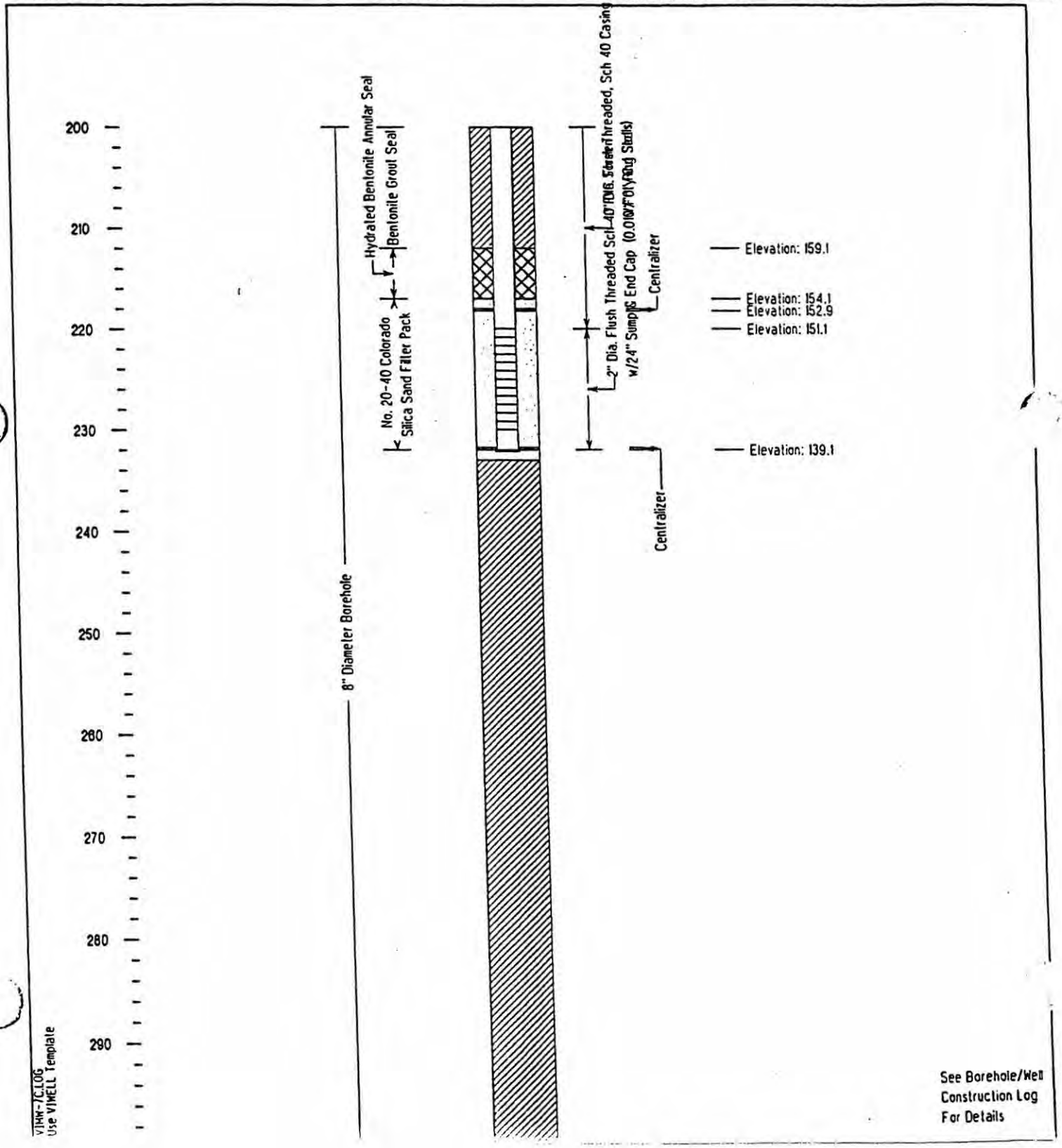
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N583.02, E2987.97

ELEVATION 371.09 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 04/21/95 FINISH 04/28/95 LOGGER T.O'CONNOR



VIHW-7C.LOG
Use VIWELL Template

See Borehole/Well Construction Log For Details

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-7
106241.E3.77	MW-7C	SHEET 4 OF 4

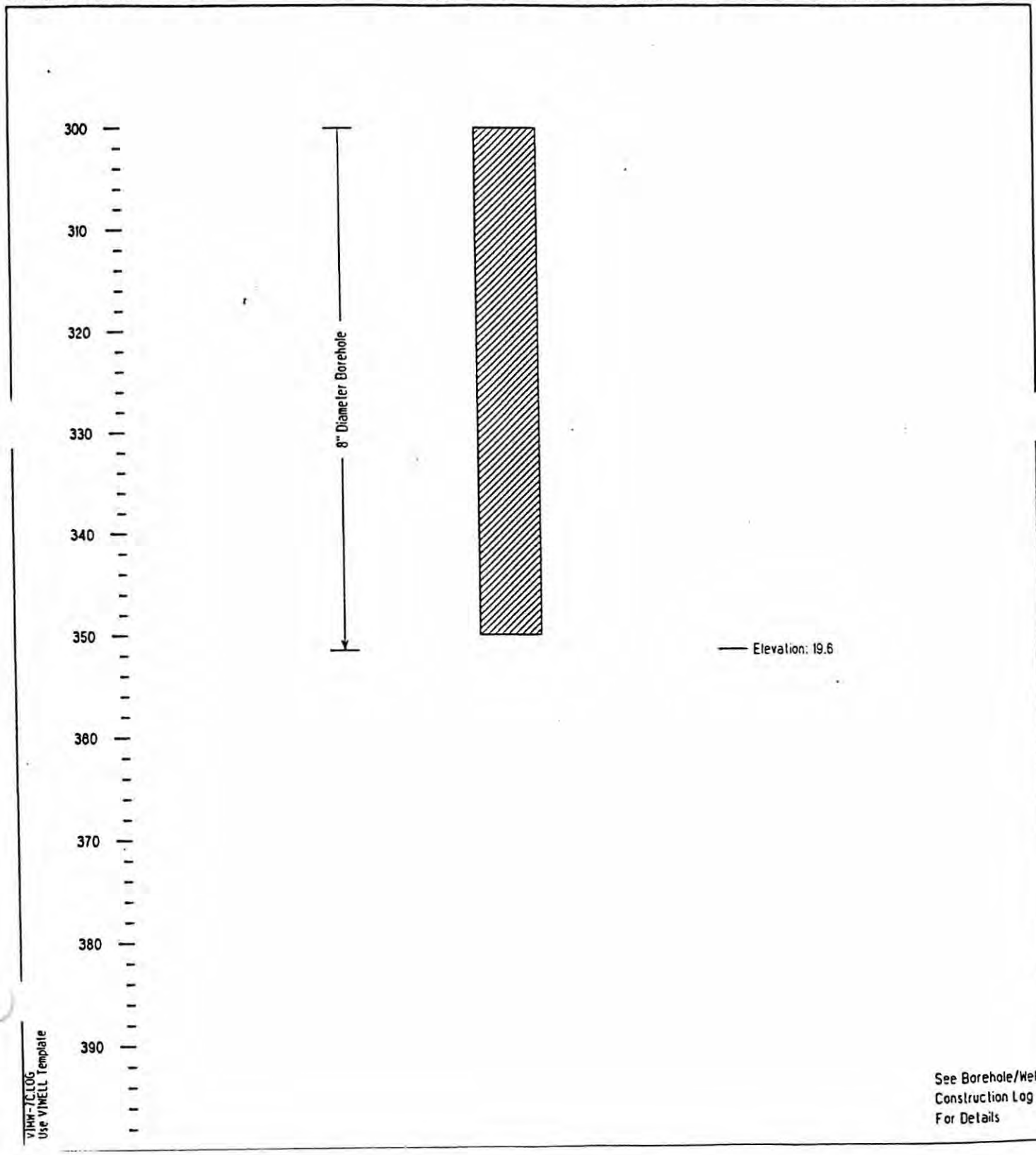
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N583.02, E2987.97

ELEVATION 371.09 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 04/21/95 FINISH 04/28/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VIHW-7CL06
Use VIWELL Template

CH2M HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-8
106241.E3.ZZ	MW-8B	SHEET 1 OF 2

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N972.30, E2217.04

ELEVATION 381.24 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/28/95 FINISH 06/30/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
10.0					SILTY SAND (SM), brown-tan, moist, firm, trace gravel
20.0	20				
	21	SS	1.0'	7-10-25	
30.0					POORLY GRADED SAND WITH SILT (SP-SM), brown, moist, firm
40.0	40				
	41	SS	1.0'		Trace gravel, up to 1" diameter
50.0					
60.0	60				
	61	SS	1.0'	12-15-35	OVA=20.2 CGI=20%
70.0					
80.0	80				
	81	SS	.6'	20-25-30	SILT (ML), olive, moist, firm, trace iron oxide staining, brittle
90.0					SILTY SAND (SM), brown, moist, firm, fine grained sand
	100				

WELL COMPLETION DIAGRAM

6" Dia. Steel Protective Casing w/Locking Cap

8" Diameter Borehole

Bentonite Grout Seal

2" Dia. Sch 40 Flush Threaded, PVC Well Casing w/"O" Ring Seals

Cement

Centralizer

VIHM-8B.LOG
Use WELLBORE Template

CH2M HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-8
106241.E3.ZZ	MW-8B	SHEET 2 OF 2

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N972.30, E2217.04

ELEVATION 381.24 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/28/95 FINISH 06/30/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
110.0	100 101	SS	1.0'	17-27-40	SILT (ML), olive, moist, firm
120.0	120 121	SS	1.0'	15-12"-35/6"	SANDY SILT (ML), dark gray, brown, moist, firm, iron oxide staining, stratified layering
130.0					SILT (ML), dark gray, moist-wet, firm, trace fine sand
140.0	140 141	SS	1.0'	3'-12"-10/6"	
150.0					SILTY SAND (SM), dark gray, moist, firm
160.0	160 161	SS	1.0'	25-40-50/4"	WELL GRADED SAND (SM), brown-tan, moist, firm SANDY LEAN CLAY (CL), grayish brown, moist, firm, horizontal layers
170.0					SILTY SAND (SM), brown-gray, moist-wet, medium coarse sand
180.0					TOTAL DEPTH = 180 FEET
190.0					

WELL COMPLETION DIAGRAM

DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION

8" Diameter Borehole
Hydrated Bentonite Annular Seal
Bentonite Grout Seal
No. 20-40 Colorado Silica Sand Filter Pack
2" Dia. Sch 40 Flush Threaded, PVC Well Casing w/"O" Ring Seals
Centralizer
168/213
178/203
Screen Slot (.010")
Centralizer
Threaded Sch 40 Cap (0.010" Fact

VIHM-80.LOG Use WELLBORE Template

CH2M HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-8
106241.E3.ZZ	MW-8B	SHEET 1 OF 2

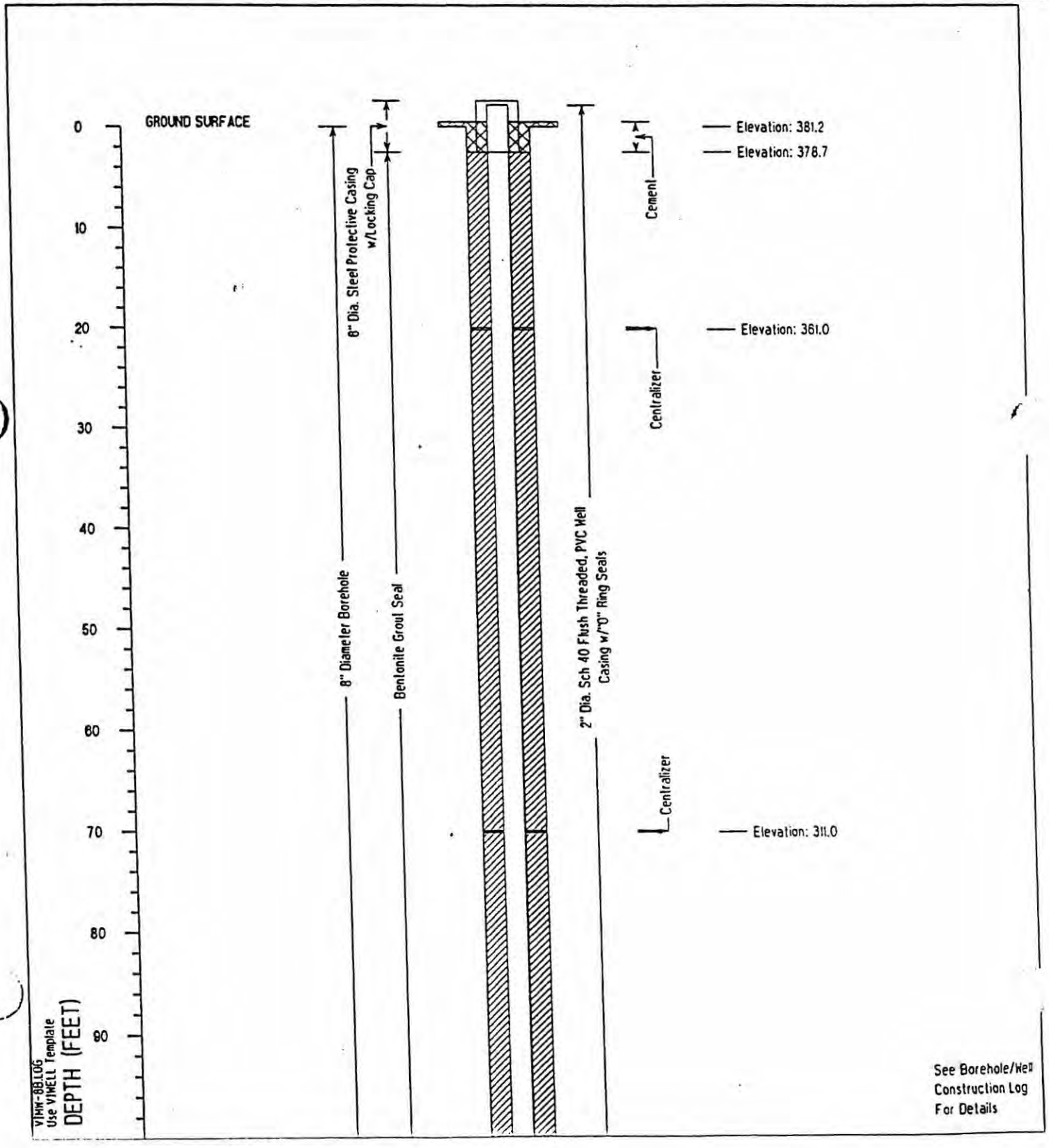
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N972.30, E2217.04

ELEVATION 381.24 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/28/95 FINISH 06/30/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VIMW-8BLOG
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-8
106241.E3.ZZ	MW-8B	SHEET 2 OF 2

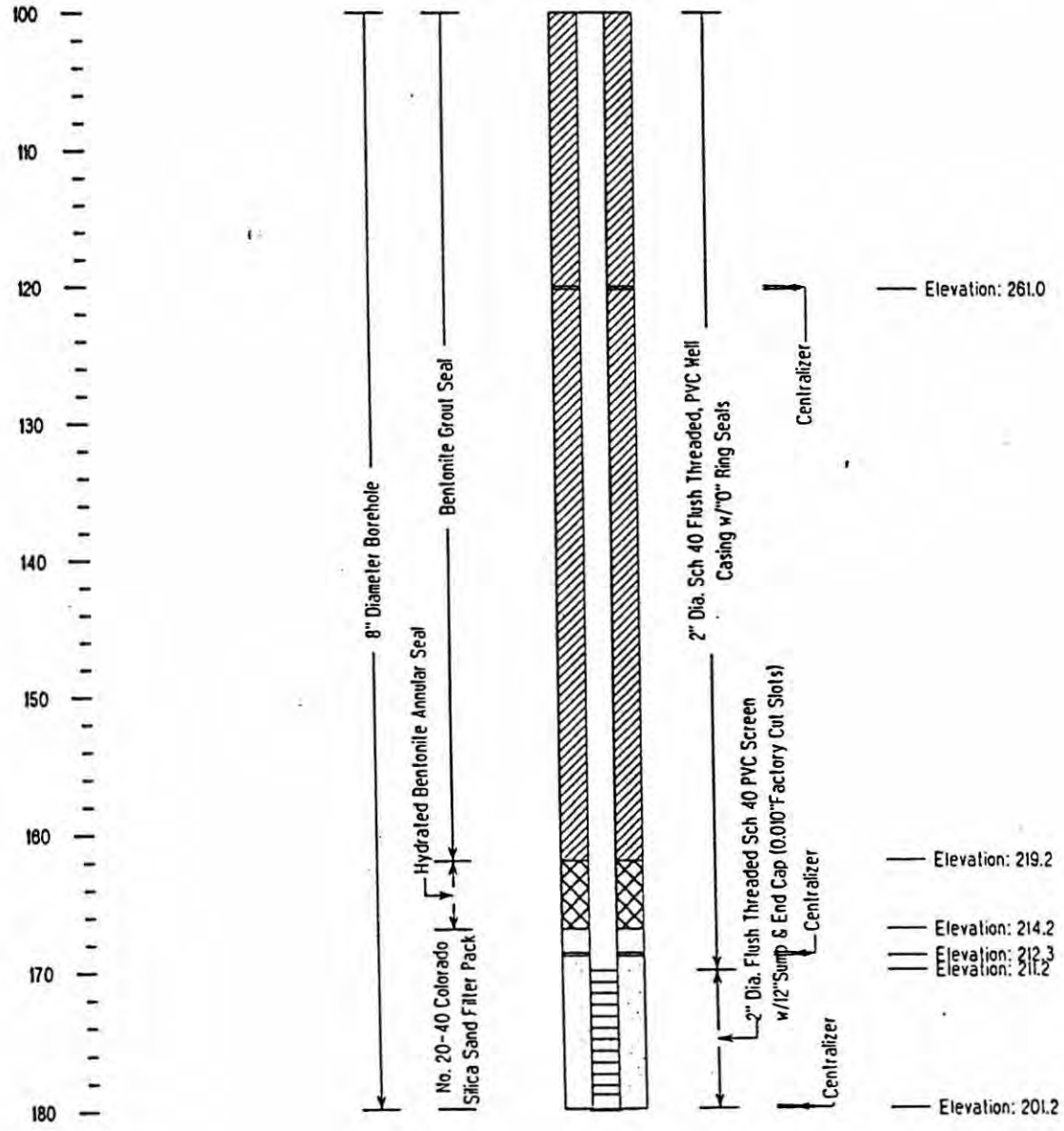
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N972.30, E2217.04

ELEVATION 381.24 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/28/95 FINISH 06/30/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VJMW-8B1.LOG
Use VIWELL Template

CHM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-9
106241.E3.ZZ	MW-98	SHEET 1 OF 2

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1291.50, E2269.88

ELEVATION 400.60 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH _____ LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
10.0					SILTY SAND, (SM) brown, moist, firm, trace pea gravel
20.0	20				
	21	SS	6"	50/4"	Gravel up to 1" diameter
30.0					
					POORLY GRADED SAND, (SP) brown, moist, firm, trace silt, trace gravel, up to 1" in diameter
40.0	40				
	41	SS	1.0	80/6" 100/1"	SILTY SAND, (SM) brown, moist, firm, trace gravel; OVA=1000; CGI=0
50.0					POORLY GRADED SAND, (SP) gray to light brown, moist, firm
					WELL GRADED SAND, (SW) gray to light brown, moist, firm
60.0	60				
	61	SS	1.1	35-50/6-50/3"	POORLY GRADED SAND WITH SILT AND GRAVEL, (SP-SM) olive, moist, firm; OVA=20; CGI=0
70.0					
80.0	80				
	81	SS	1.2	25-35-50/5"	POORLY GRADED SAND WITH SILT, (SP-SM), olive, moist, firm
90.0					
	100				

WELL COMPLETION DIAGRAM

6" Dia. Steel Protective Casing w/Locking Cap

Cement

8" Diameter Borehole

Bentonite Grout Seal

2" Dia. Flush-Threaded, Sch 40 PVC Casing w/"O" Ring Seals

Centralizer

V:\HW-98.LOG Use WELLBORE Template

CHM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-9
106241.E3.ZZ	MW-9B	SHEET 2 OF 2

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1291.50, E2269.88

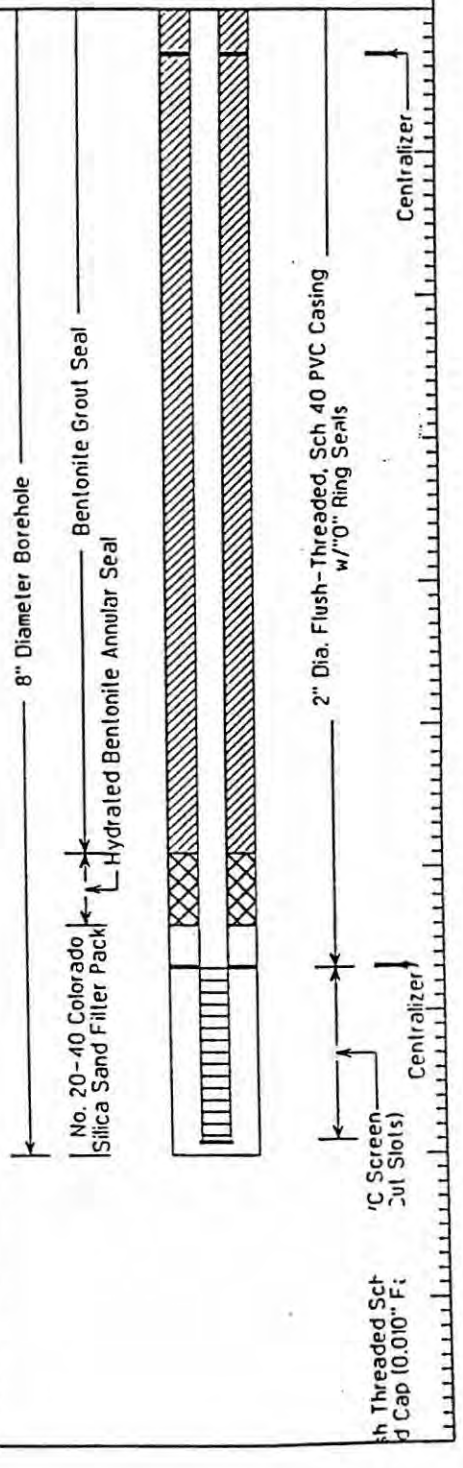
ELEVATION 400.60 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH _____ LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
	100				
	101	SS	1.5	10-25-40	SILT, (ML) olive, moist, brittle Red iron oxide deposit .1" thick with wood/fine sand, no silt
110.0					SILTY SAND, (SM), olive, moist, firm
	120				
120.0	121	SS	1.5	3-3-10	
0.0					SILT, (ML) grayish brown, moist, firm, plastic
	140				
140.0	141	SS	1.0	7-25-40	06/13/95, water level @ 143.0'
150.0					POORLY GRADED SAND WITH GRAVEL, (GP) gray, moist, firm, pea size gravel
	160				
160.0	161	SS	1.2	9-12-11	06/14/95, water level @ 163.20'
170.0					POORLY GRADED GRAVEL, moist, firm, size gravel GRAVEL, (SW) gray, moist, pea sized to 1/2" diameter, subrounded, trace coarse sand
180.0					TOTAL DEPTH = 180 FEET
190.0					

WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION



VIHW-9B.LOG
Use WELLBORE Template

CH2M HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-9
106241.E3.ZZ	MW-99	SHEET 1 OF 2

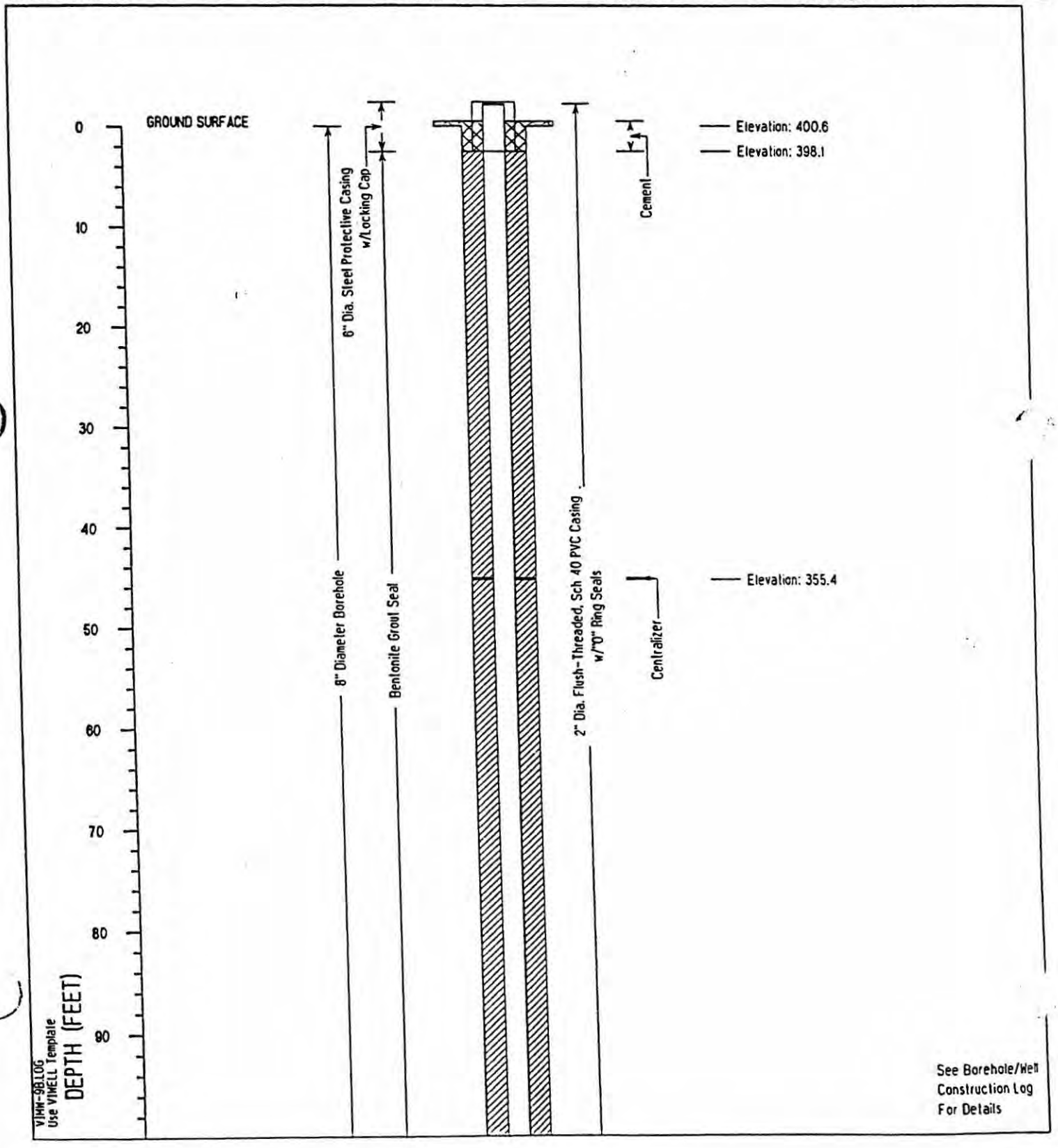
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1291.50, E2269.88

ELEVATION 400.60 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH _____ LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VIHW-98.LOG
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-9
106241.F3.77	MW-9B	SHEET 2 OF 2

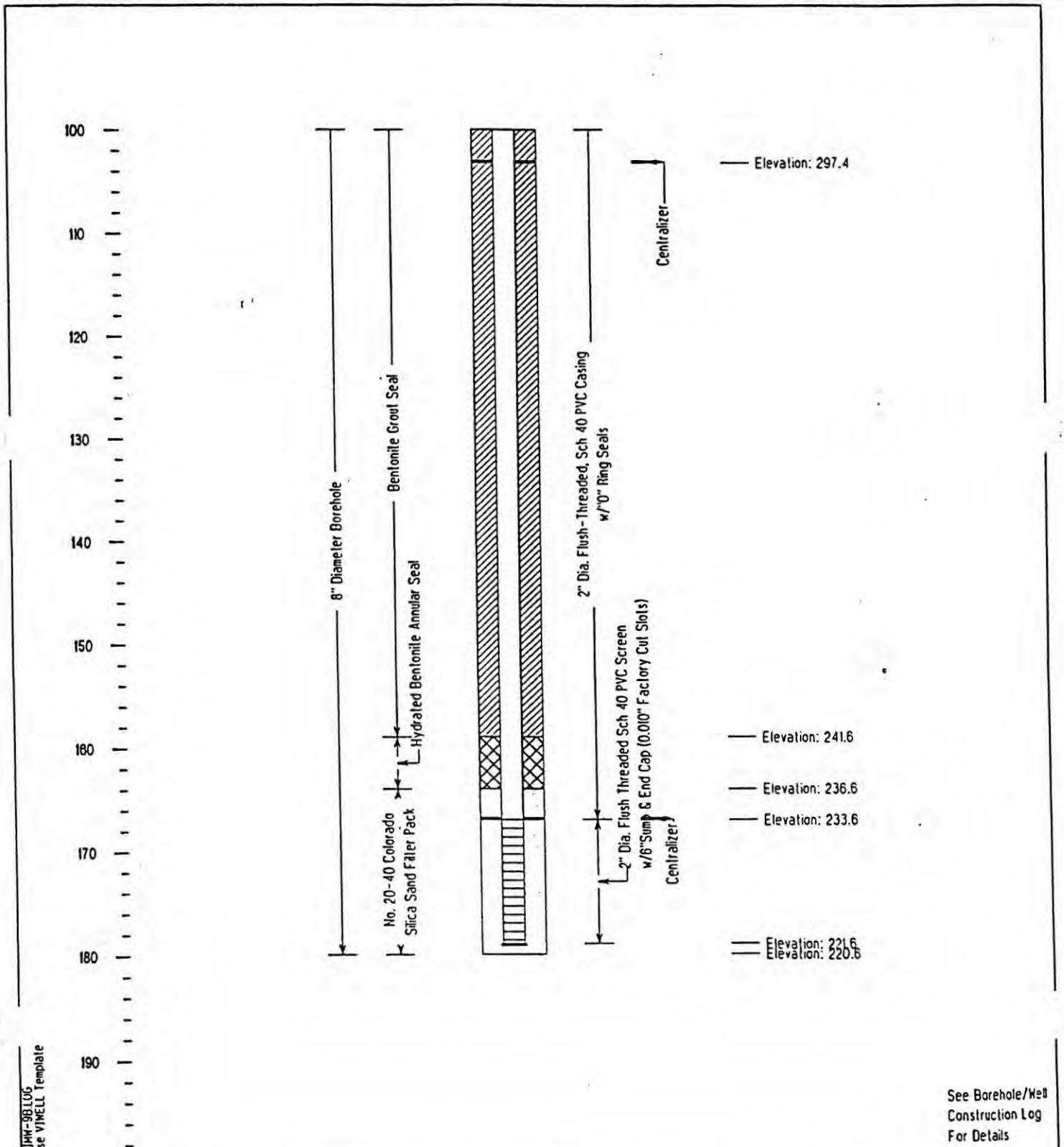
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1291.50, E2269.88

ELEVATION 400.60 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH _____ LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

V:\MW-9B.LOG
Use V:\WELL Template

CHM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-10
106241.E3.ZZ	MW-10B	SHEET 1 OF 2

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1597.18, E2406.73

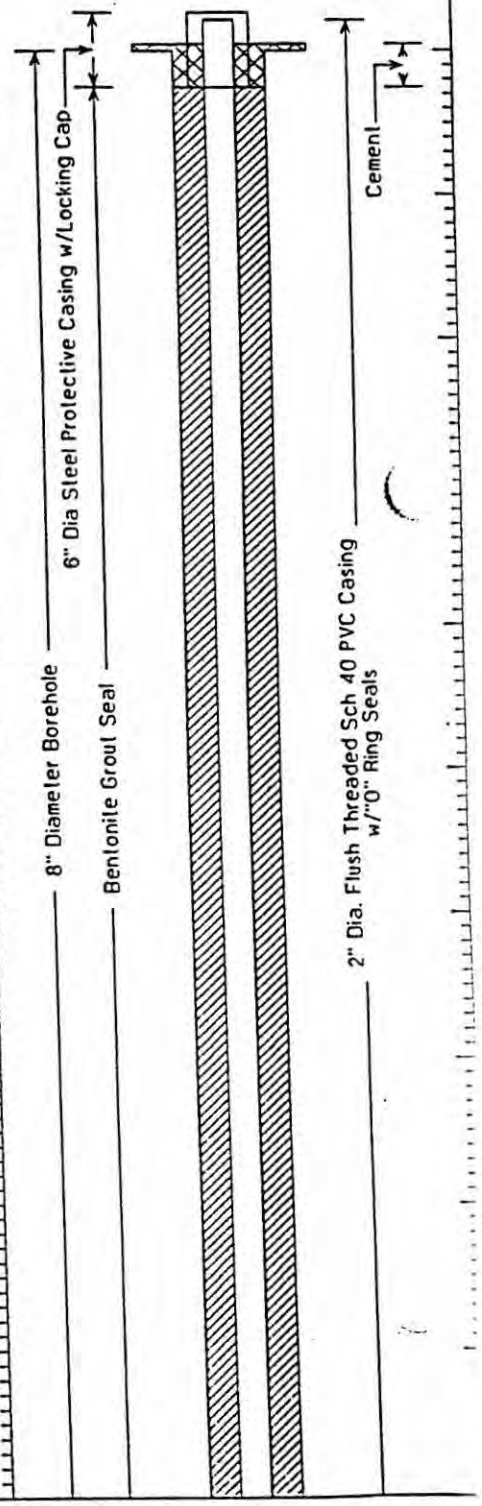
ELEVATION 405.34 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/26/95 FINISH 07/01/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
10.0					SILTY SAND (SM), brown, moist, firm, trace gravel up to 1 1/2" diameter
20.0	20				
	21	SS	1.0'	50/5"	
30.0					SILTY SAND WITH GRAVEL (SM), brown, moist, firm, gravel up to 1" diameter
40.0	40				
	41	SS	1'	35-50/4"	
50.0					POORLY GRADED SAND WITH GRAVEL (SP), olive gray, moist, firm, gravel up to 1" diameter
60.0	60				
	61	SS	1.0'	7/22/28	
70.0					
80.0	80				
	81	SS	1.0'	15/25/30	POORLY GRADED SAND WITH SILT (SP), olive gray, moist, trace gravel up to 1" diameter
90.0					
	100				

WELL COMPLETION DIAGRAM



VIHW-106.LOG
Use WELLBORE Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-10
106241.E3.ZZ	MW-10B	SHEET 2 OF 2

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1597.18, E2406.73

ELEVATION 405.34 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/26/95 FINISH 07/01/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION	WELL COMPLETION DIAGRAM
	100					
	101	SS	1.1	50/20/35	SILT (ML), brown-tan, moist, firm, trace iron oxide staining	
					POORLY GRADED SAND WITH SILT (SP), olive gray, moist, firm	
110.0					SILT (ML), brown-gray, moist, firm, trace fine sand, slightly plastic	
	120					
120.0	121	SS	6"		SILTY SAND (SM), brown-gray, moist, firm	
130.0						
					SAND WITH GRAVEL (SW), brown-tan, moist, firm	
	140					
140.0	141	SS	1.5	6/12/20	POORLY GRADED SAND WITH SILT (SP-SM), brown-tan, moist, firm, medium to coarse grained	
150.0						
	160					
160.0	161	SS	1.0		SILT (ML), dark gray, moist, hard, brittle	
					TOTAL DEPTH = 161 FEET	
170.0						
180.0						
190.0						

WELL COMPLETION DIAGRAM: 8" Diameter Borehole; Bentonite Grout Seal; Hydrated Bentonite Annular Seal; 2" Dia. Flush Threaded Sch 40 PVC Casing w/"O" Ring Seals; Centralizer; Bentonite chips; Sand Pack; Centralizer; 2"Dia Flush Threaded Sch 40 PVC Screen (Sump & End Cap (0.010"Factory Cut Slots))

VIHM-1UB1.UG
Use WELLBORE template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-10
106241.E3.77	MW-10B	SHEET 1 OF 3

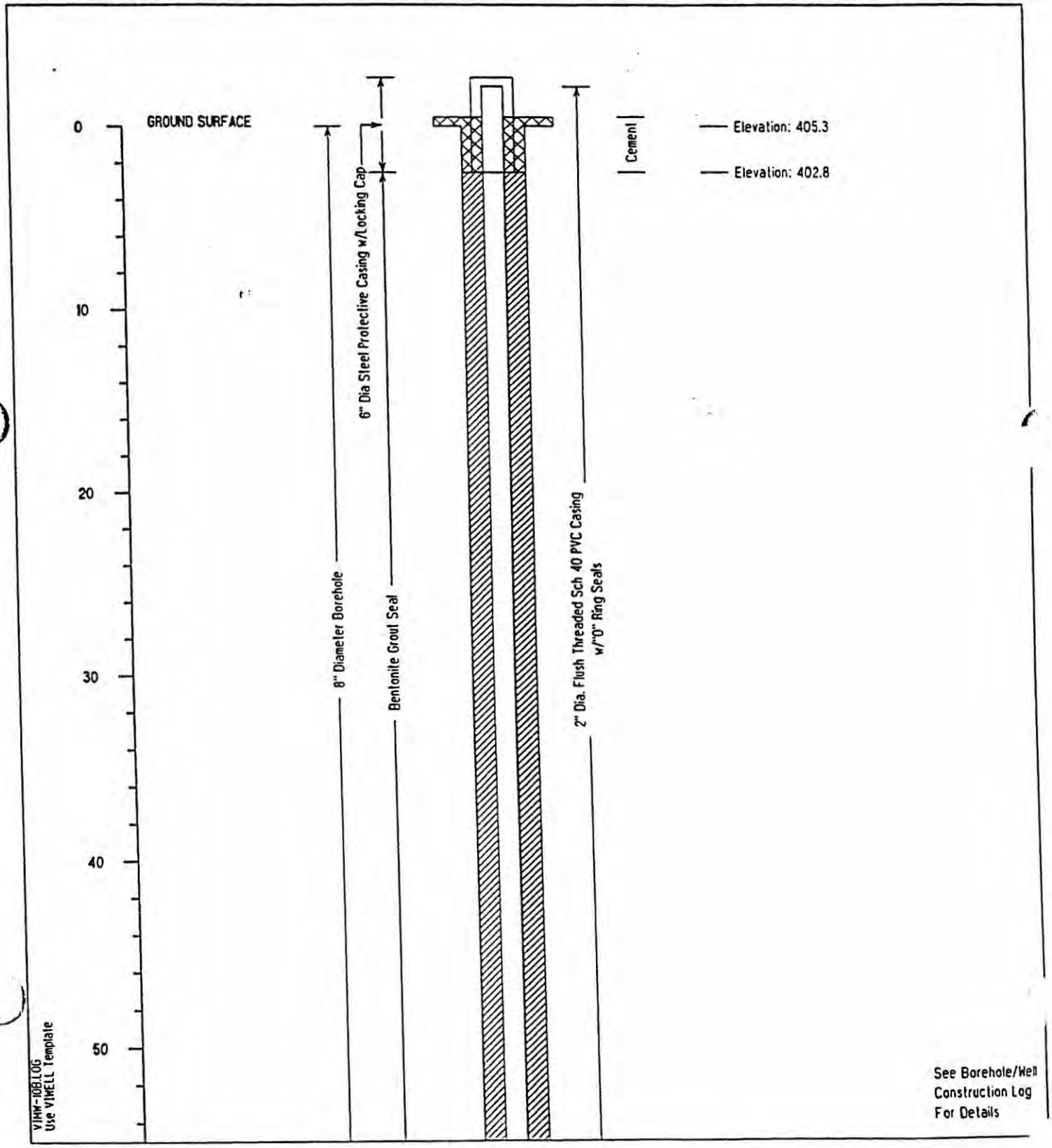
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1597.18, E2406.73

ELEVATION 405.34 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/26/95 FINISH 07/01/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VIMW-10B.LOG
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-10
106241.E3.77	MW-10B	SHEET 2 OF 3

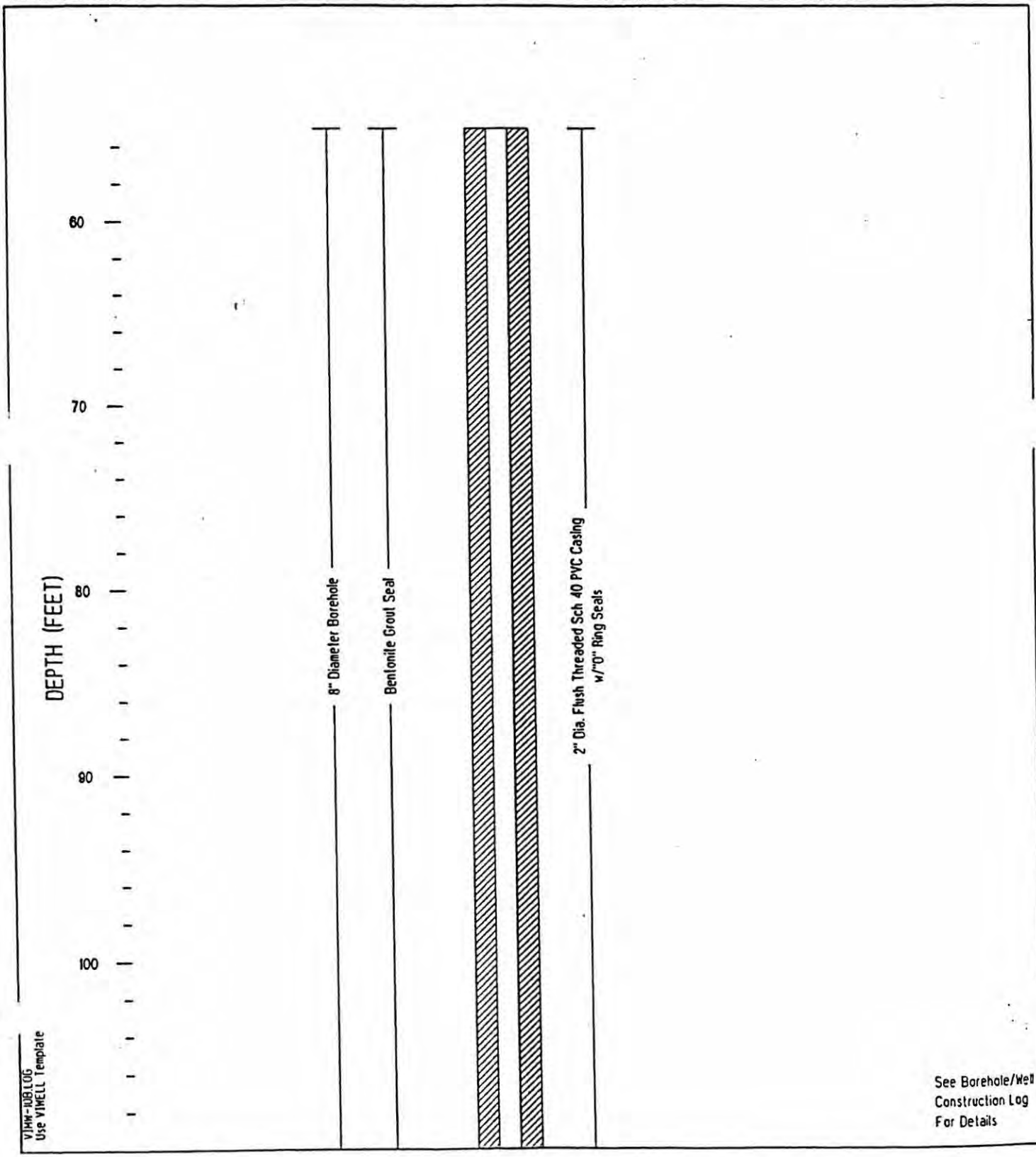
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1597.18, E2406.73

ELEVATION 405.34 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/26/95 FINISH 07/01/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VIHM-WBLOG
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-10
106241.E3.77	MW-10B	SHEET 3 OF 3

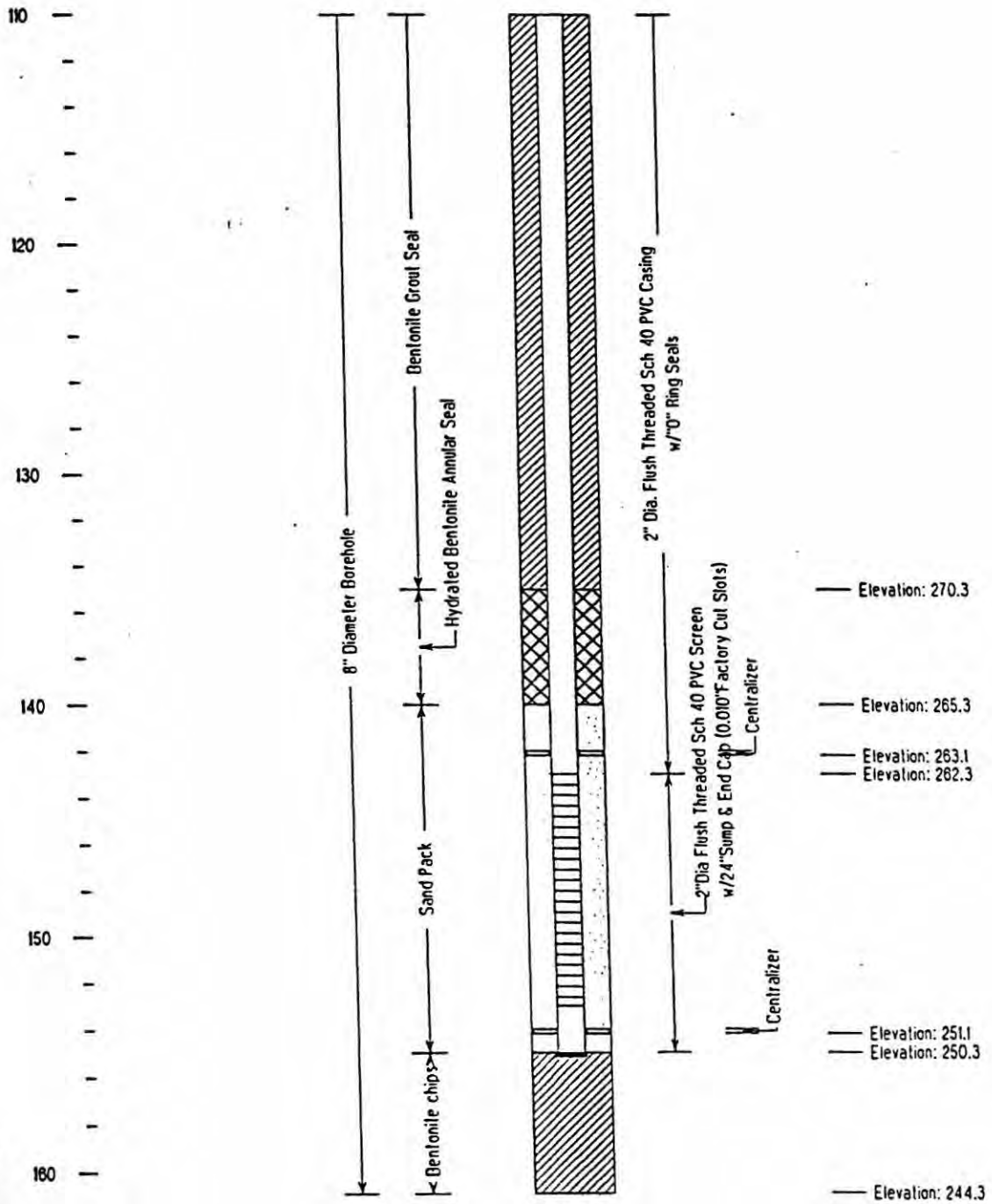
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1597.18, E2406.73

ELEVATION 405.34 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/26/95 FINISH 07/01/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

V:\HW-10\BLOG
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-11
106241.E3.ZZ	MW-1C	SHEET 1 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1471.91, E3023.75

ELEVATION 404.28 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/04/95 FINISH 05/15/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION
10.0					SILTY SAND, (SM) light brown, moist, firm, trace gravel
					SILTY SAND WITH GRAVEL, (SM) very dense, firm, wet, gravel 1/4"-1" diameter
					Dark grayish brown
					Reached H20 @ 18'
20.0	20				
	21		5"	50/5"	Gravel layer @ 20'
0.0					
	40				
40.0	41		4"	150/6"	
50.0					POORLY GRADED SAND, (SP) dark grayish brown, moist, firm
	60				
60.0	61		1.0	15-45-50/4"	SILTY SAND WITH GRAVEL, (SM) light brown, moist, firm, trace gravel up to 1/2" diameter
70.0					
	80				
80.0	81		1.0'	25-15-15	
90.0					
	100				

WELL COMPLETION DIAGRAM

- 8" Diameter Borehole
- 6" Dia Steel Protective Casing w/Locking Cap
- Bentonite Grout Seal
- 2" Dia. Flush Threaded Sch 40 PVC Casing w/"O" Ring Seals
- Concrete Pad
- Centralizer
- Centralizer

VHW-1C.LOG Use WELLBORE Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-11
106241.E3.ZZ	MW-1C	SHEET 2 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1471.91, E3023.75

ELEVATION 404.28 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/04/95 FINISH 05/15/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	100					
	101		1.2	120/6"	SILTY SAND, (SM) dark grayish brown, moist, firm	
110.0					SILT, (ML) brownish gray, firm, moist, trace fine sand	
	120					
120.0	121		1.0	15-100/6"	Trace iron oxide staining	
					SILTY SAND, (SM) dark grayish brown, moist, firm, dense	
130.0					SILT, (ML) dark gray, moist to wet, plastic, slight to moderate dilatancy	
	140					
140.0	141		1.1	15-35-35		
150.0					WELL GRADED SAND WITH SILT AND GRAVEL, (SW-SM) grayish brown, firm, moist	
	160					
160.0	161		1.0	8-15-25		
170.0						
	180					
180.0	181		1.2	35-100/4"	SANDY SILT, (ML), dark gray, massive, moist to dry, firm, dense, vertical layering	
190.0						
	200					

8" Diameter Borehole

Bentonite Grout Seal

2" Dia. Flush Threaded Sch 40 PVC Casing w/"O" Ring Seals

Centralizer

Centra

VIAN-1C.LOG Use WELLBORE 1.0plate

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-11
106241.E3.ZZ	MW-1C	SHEET 3 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1471.91, E3023.75

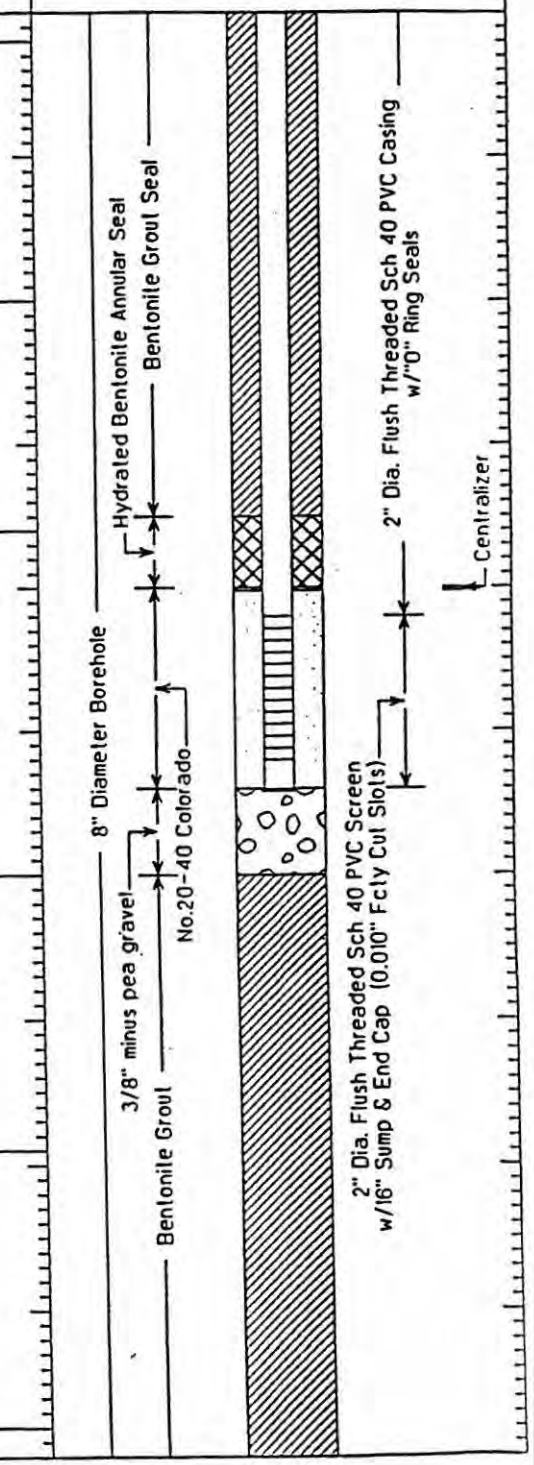
ELEVATION 404.28 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/04/95 FINISH 05/15/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
	200		.5'	50/6"-50/1"	SANDY SILT, (ML), as above.
					SILTY SAND WITH GRAVEL, (SM) dark gray, firm, moist
210.0					
	220				
220.0	221		.6"	50-100/5"	WELL GRADED SAND WITH SILT AND GRAVEL, (SW-SM) very dark gray, firm, moist
10.0					
	240				SILTY SAND WITH GRAVEL, (SM) dark gray, firm, moist, gravel 1/4-1/2" diameter
240.0	241		1.0'	25-45-50/5"	
250.0					
	260				
260.0	261		1.0	15-35-50/5"	SANDY SILT, (ML) dark gray, firm, moist, brittle, trace pea gravel
270.0					
	280				
280.0	281		1.0	15-35-50/5"	SILTY GRAVEL WITH SAND, (GM) dark gray, dense, moist, gravel ranging from 1/8-1" diameter, subangular
290.0					
	300				SANDY SILT, (ML) dark gray, firm, dense.

WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION



PROJECT NUMBER	BORING NUMBER	Renumbered as MW-11
106241.E3.ZZ	MW-1C	SHEET 4 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1471.91, E3023.75

ELEVATION 404.28 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/04/95 FINISH 05/15/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	300				SANDY SILT (ML), as above.	
	301		.5	6-30-30	POORLY GRADED SAND (SP) dark gray, firm, saturated, trace white tuffaceous material	
310.0						
	320					
320.0	321		1.0'	3-5-3		
330.0					Trace wood chips	
	340					
340.0	341		1.5'			
350.0						
360.0					POORLY GRADED SAND WITH GRAVEL (SW) dark gray, firm, moist	
370.0					TOTAL DEPTH = 375 FEET	
380.0						
390.0						

8" Diameter Borehole

Bentonite Grout

VIHW-T.LOG Use WELLBORE Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-11
106241.E3.77	MW-1C	SHEET 1 OF 4

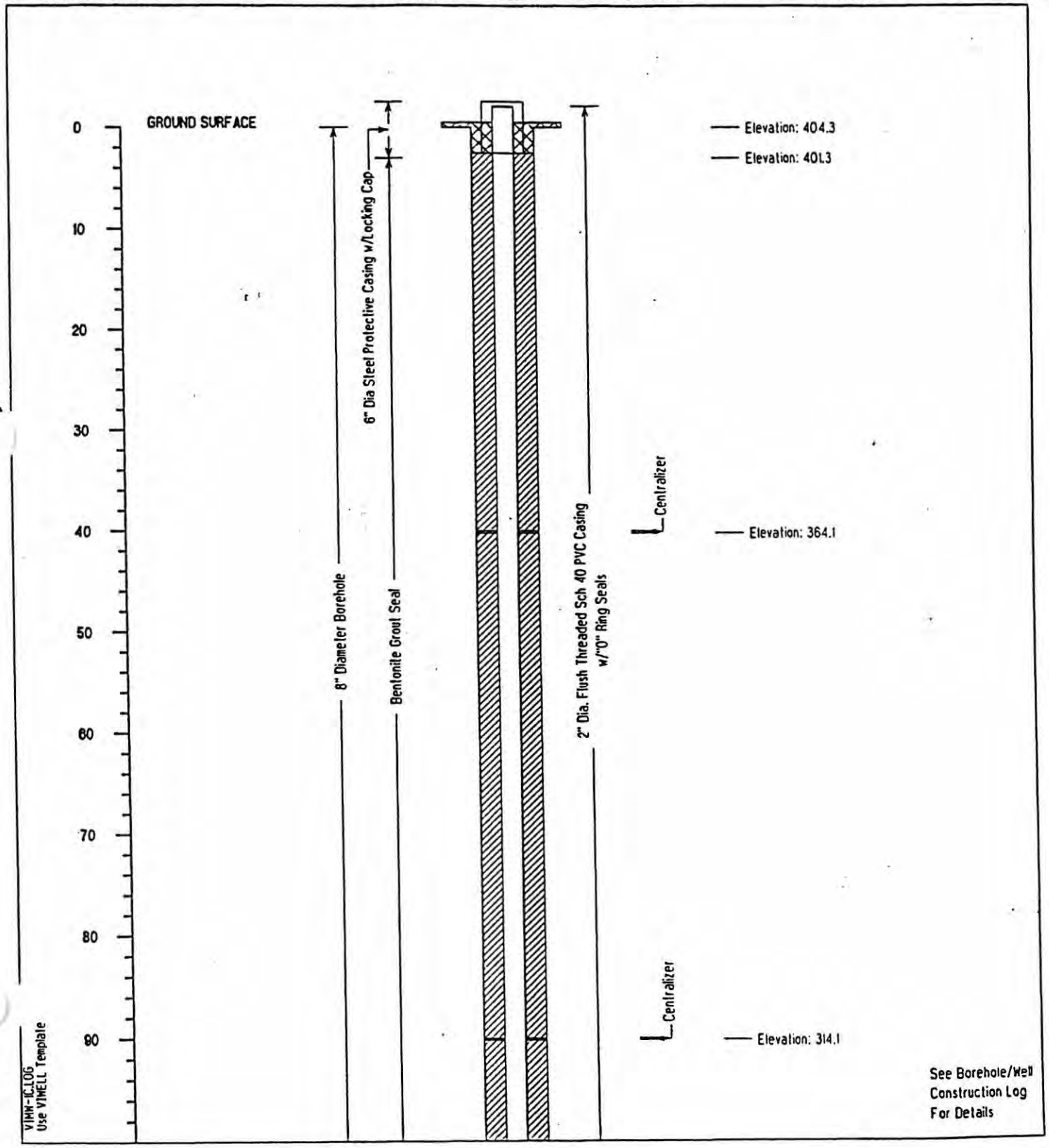
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1471.91, E3023.75

ELEVATION 404.28 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/04/95 FINISH 05/15/95 LOGGER T.O'CONNOR



VIMW-1C.LOG
Use VIWELL Template

CH2M HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-11
106241.E3.77	MW-1C	SHEET 2 OF 4

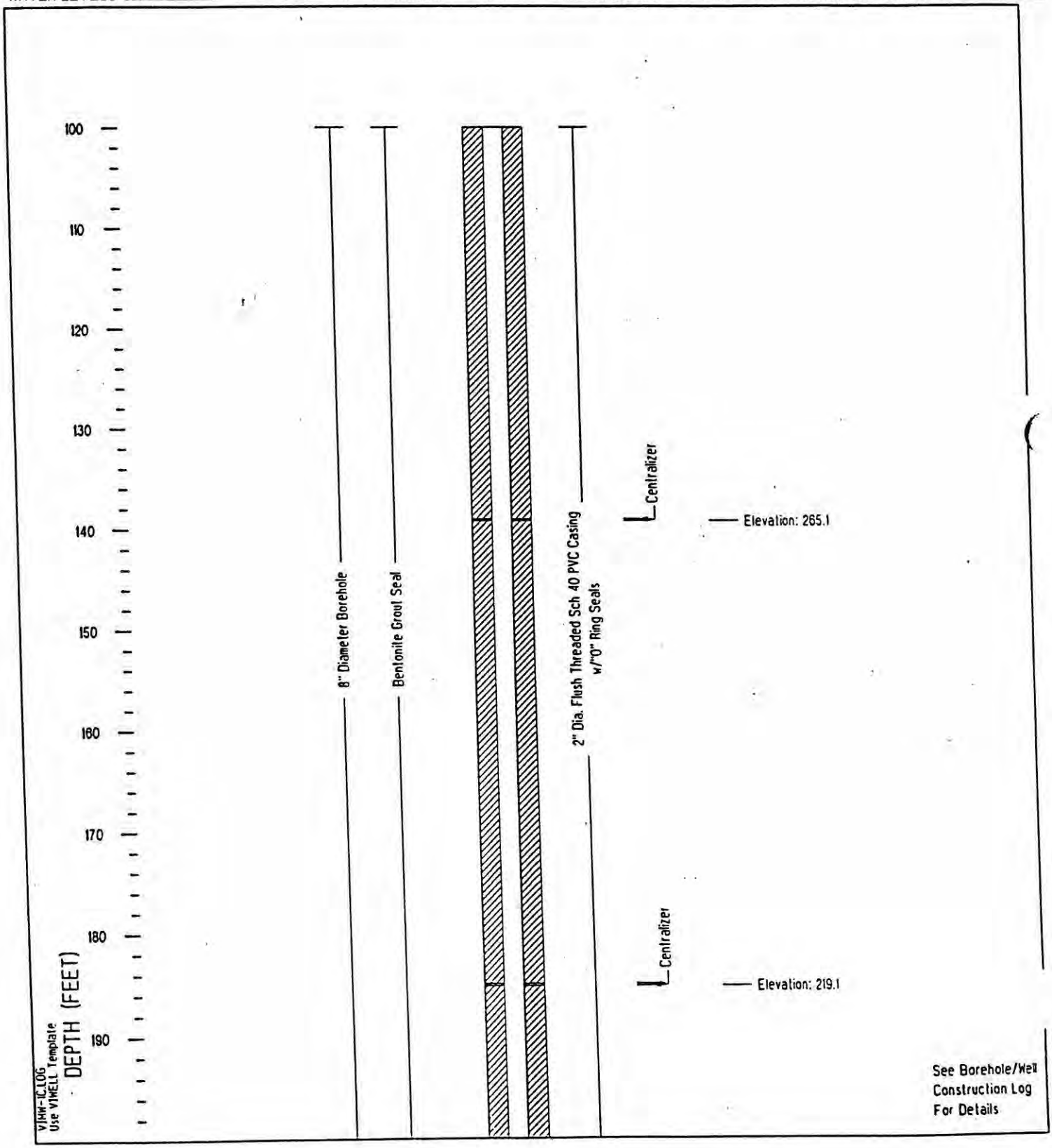
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1471.91, E3023.75

ELEVATION 404.28 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/04/95 FINISH 05/15/95 LOGGER T.O'CONNOR



V:\MW-1C.LOG
Use V:\WELL Template

CHM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-11
106241.E3.77	MW-1C	SHEET 3 OF 4

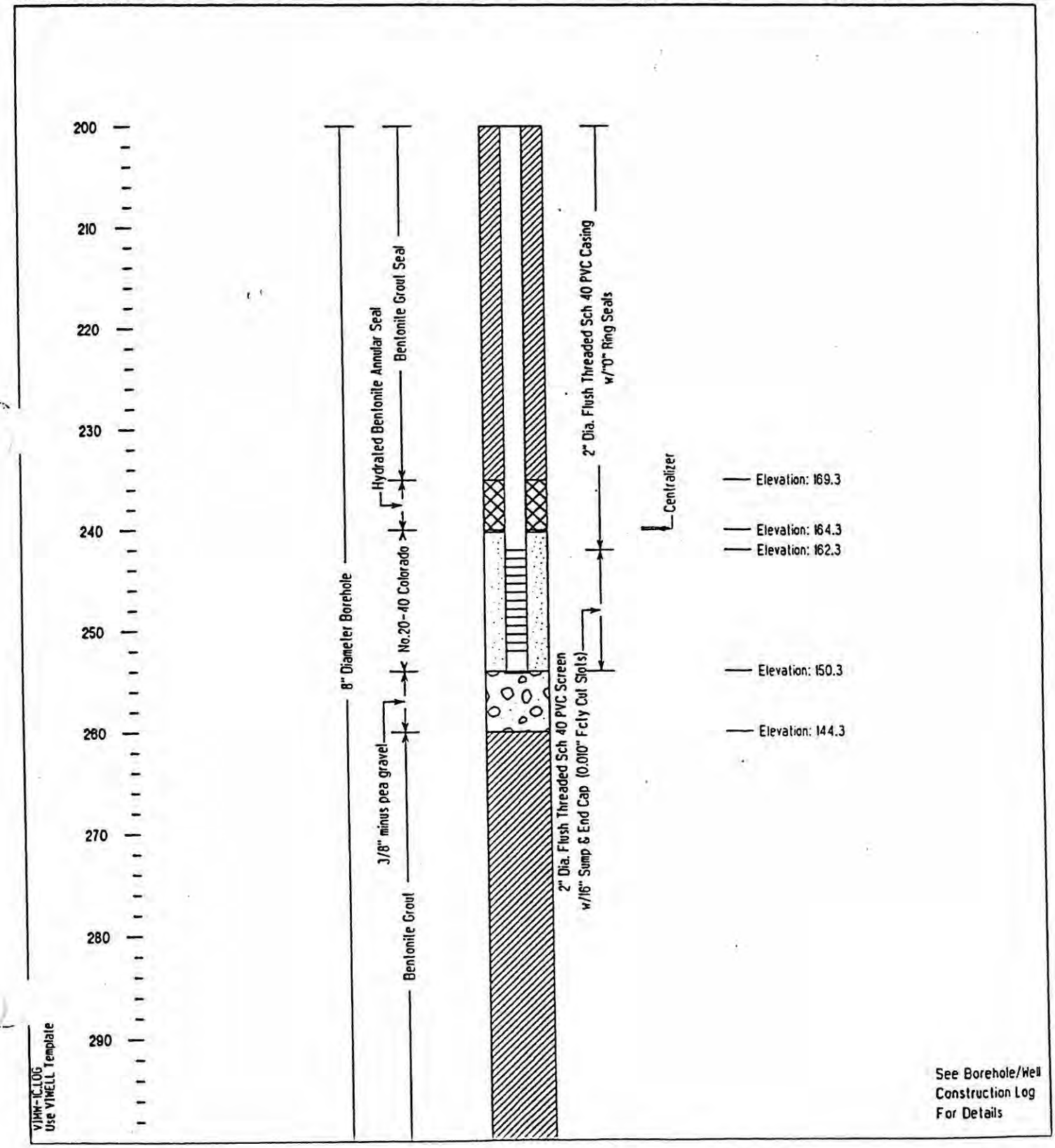
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1471.91, E3023.75

ELEVATION 404.28 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/04/95 FINISH 05/15/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VIHM-1C.LOG
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-11
106241.E3.77	MW-1C	SHEET 4 OF 4

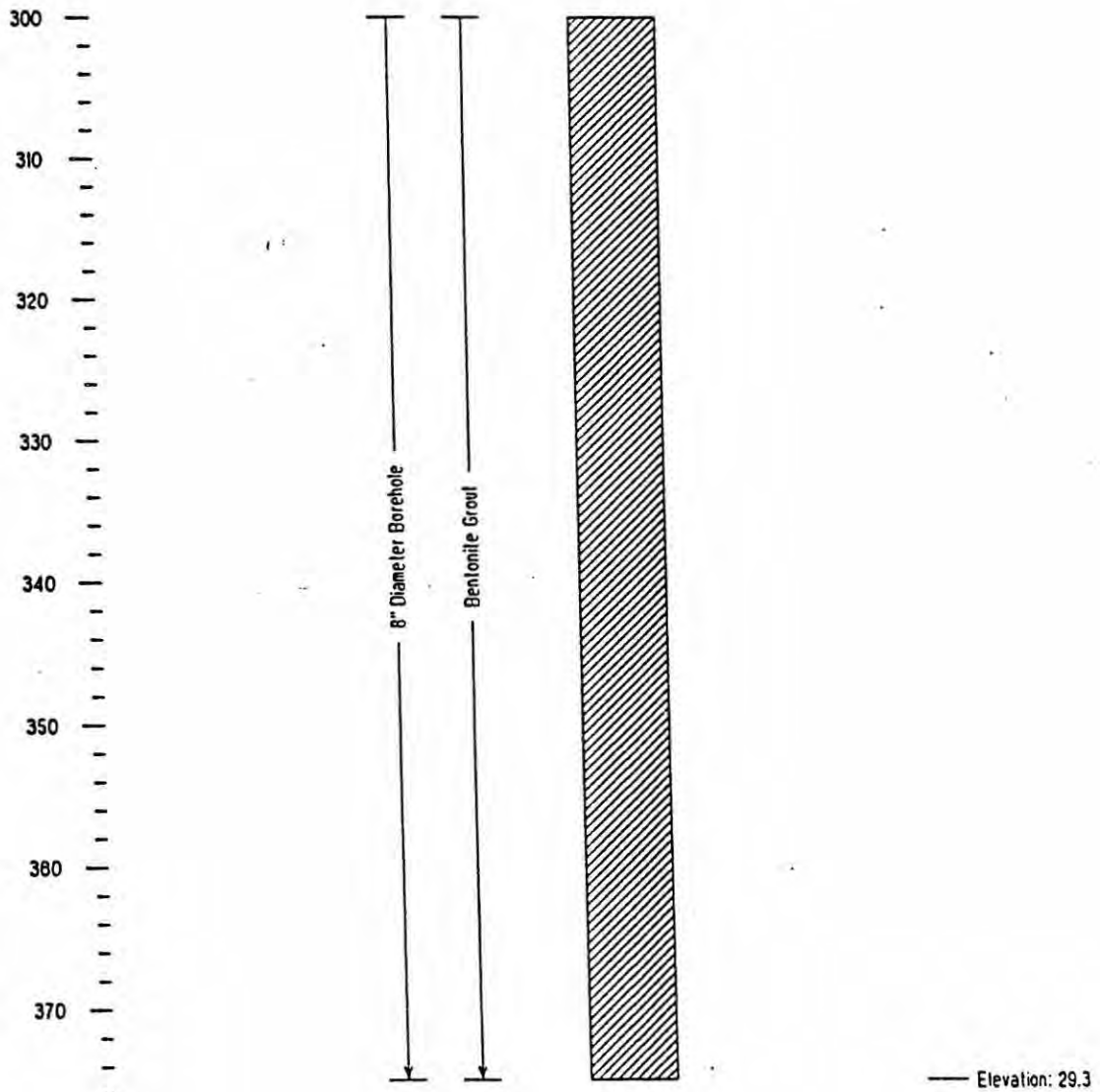
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1471.91, E3023.75

ELEVATION 404.28 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/04/95 FINISH 05/15/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

V:\MW-1C.LOG
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-12
106241.E3.ZZ	MW-2C	SHEET 1 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N133.51, E2370.88

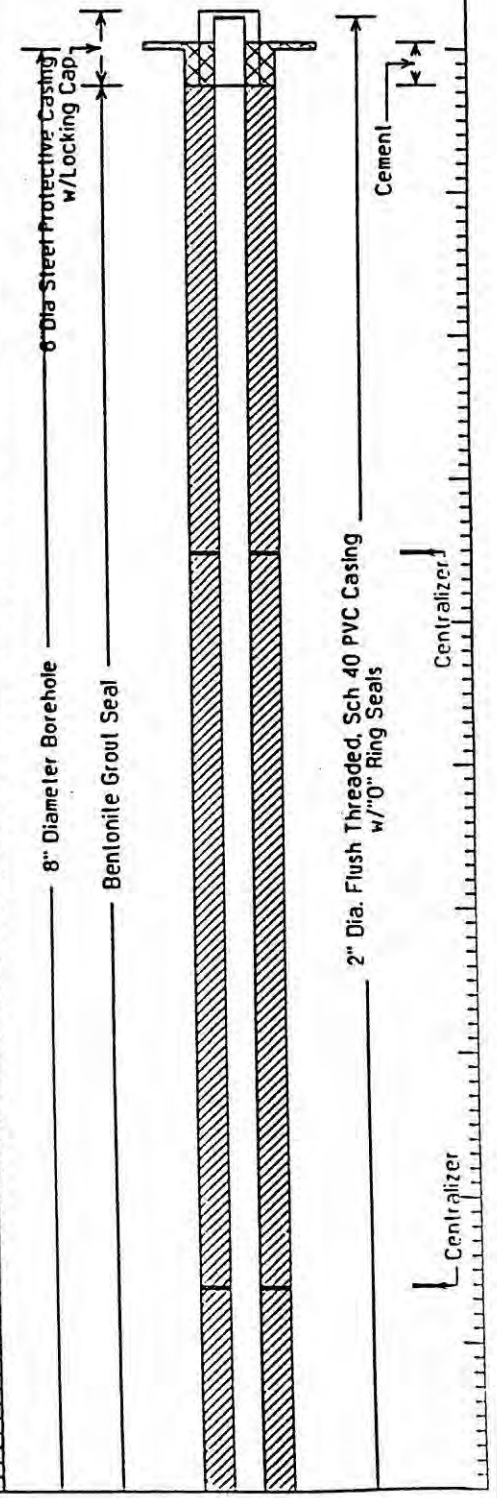
ELEVATION 310.12 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/19/95 FINISH 05/26/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
10.0					SILTY SAND (SM), gray brown, moist, firm
20.0	20				
	21		1.1	7-12-25	SILT (ML), brown/light brown, moist, firm, dense, brittle
30.0					POORLY GRADED SAND (SP), light brown, moist, firm, trace silt
	40				SILTY SAND (SM), gray, moist to wet
40.0	41.5		0.9"	18-20-50	SILT (ML), olive gray, moist to wet, firm, brittle, vertical layering, trace iron oxide mottling, non-plastic
50.0					Slightly plastic
60.0	60				
	61		1.0'	6-15-32	
70.0					WELL GRADED SAND (SW), light gray, moist, firm, trace silt
	80				SANDY SILT (ML), gray/brown, wet to moist, firm
80.0	81.5		1.0'	15-20-35	SILT (ML), dark gray, massive, dry, firm, dense, brittle
90.0					SILTY SAND (SM), light gray, moist to wet
					Trace Gravel
	100				WELL SORTED SAND (SW), light gray, moist, firm

WELL COMPLETION DIAGRAM



CH2M HILL

Renamed MW-12

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-12
106241.E3.ZZ	MW-2C	SHEET 2 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N133.51, E2370.88

ELEVATION 310.12 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/19/95 FINISH 05/26/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
110.0	100		1.5'	2-2-2	SILTY SAND (SM), dark gray, moist, firm
120.0	120		1.3'	2-2-12	SANDY SILT (ML), dark gray, wet, firm
130.0	121.5				SILT (ML), gray, moist, firm, plastic
140.0	144				WELL GRADED SAND (SW), light gray, moist, firm, trace silt
150.0	145.5		1.5	7-7-30	SILTY-CLAYEY SAND (SM-SC), dark gray, moist, firm
160.0	160				SAND WITH GRAVEL, light brown/gray, trace silt,
170.0	161.5		8"		POORLY GRADED SAND (SP), olive gray, wet, firm
180.0	180				
190.0	181.5		0.6"	2-10-18	POORLY GRADED SAND WITH SILT (SP-SM), gray, wet, firm, dense,
	200				SILT (ML), gray, moist, firm, dense

WELL COMPLETION DIAGRAM

DEPTH OF CASING, DRILLING RATE
DRILLING FLUID LOSS
TESTS AND INSTRUMENTATION

8" Diameter Borehole
Hydrated Bentonite Annular Seal
Bentonite Grout Seal
No. 20-40 Colorado Silica Sand Filter Pack
3/8" minus pea gravel
Bentonite Grout
2" Dia. Flush Threaded, Sch 40 PVC Casing w/"O" Ring Seals
Centralizer
Threaded Sch 40 PVC Factory Slotted (0.010") Centralizer

VJHW-2C.LOG
Use WELLBORE Template

CHM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-12
106241.E3.ZZ	MW-2C	SHEET 3 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N133.51, E2370.88

ELEVATION 310.12 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/19/95 FINISH 05/26/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
200.0	200.0	SS	1'	10-25-35	SANDY SILTY (ML), dark gray/black, moist, firm	8" Diameter Borehole; Bentonite Grout
					SILT (ML), dark gray, wet, firm, trace wood fragments	
210.0					POORLY GRADED SAND (SP), gray, moist, trace silt with white pumice	
	220					
220.0	221.5	SS	0.9	15-15-30	POORLY GRADED SAND WITH SILT (SP-SM), dark gray, wet, dense, white pumice, trace non-plastic silt	
230.0					WELL GRADED SAND (SW), gray, wet, wood fragments, some fine gravel, subrounded up to 1/4" in diameter	
					POORLY GRADED SAND (SP), gray, wet, trace wood fragements, trace subrounded gravel	
	240					
240.0	241.5	SS	1.5	7-30-50/4"	SILTY SAND (SM), dark gray, wet, dense, trace of gray non-plastic silt	
					SILTY SAND WITH GRAVEL (SP), dark gray, wet, firm	
250.0						
	260					
260.0	261.5	SS	0.5		POORLY GRADED SAND WITH GRAVEL (SP), gray, wet, gravel is subrounded to rounded, up to 1.5 inches in diameter	
					SILTY SAND (SM), gray, wet, firm, up to trace subrounded gravel (up to 3%) 1/2 inch in diameter	
270.0						
	280					
280.0	281.5	SS	1.0	5-7-30	POORLY GRADED SAND (SP), gray, very wet, medium dense, trace silt	
290.0						
	300					

VHW-2C LOG Use WELLBORE Template

CH2M HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-12
106241.E3.ZZ	MW-2C	SHEET 4 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N133.51, E2370.88

ELEVATION 310.12 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/19/95 FINISH 05/26/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
300	300	SS	0.8	1-1-6	POORLY GRADED SAND (SP), gray, wet, fine grain sand	Bentonite Grout
					TOTAL DEPTH = 301.5 FEET	8" Diameter Borehole
310.0						
320.0						
330.0						
340.0						
350.0						
360.0						
370.0						
380.0						
390.0						

VIHW-2C.LOG Use WELLBORE Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-12
106241.E3.77	MW-2C	SHEET 1 OF 4

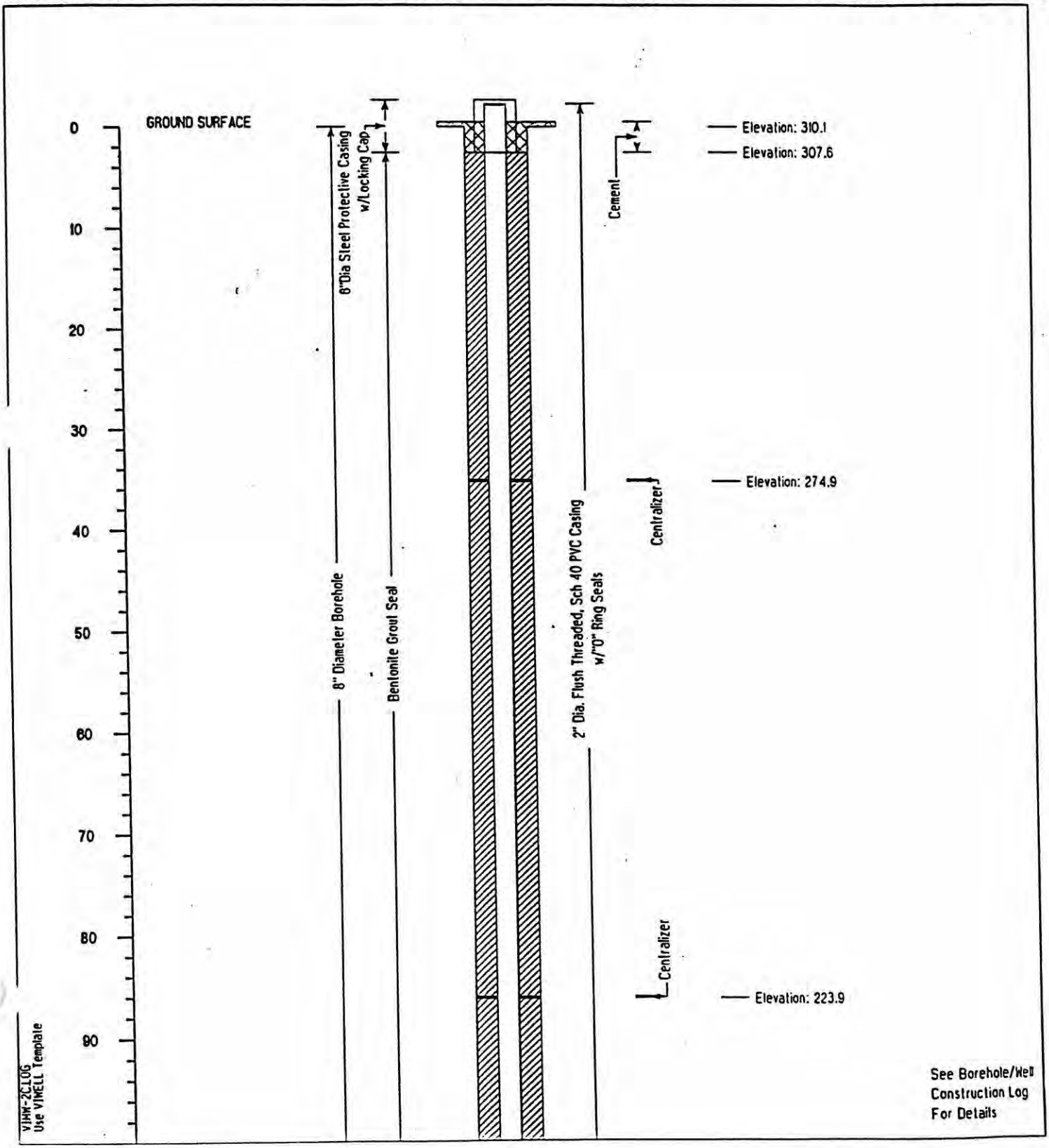
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N133.51, E2370.88

ELEVATION 310.12 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/19/95 FINISH 05/26/95 LOGGER T.O'CONNOR



VIHW-2C1.0G
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-12
106241.E3.ZZ	MW-2C	SHEET 2 OF 4

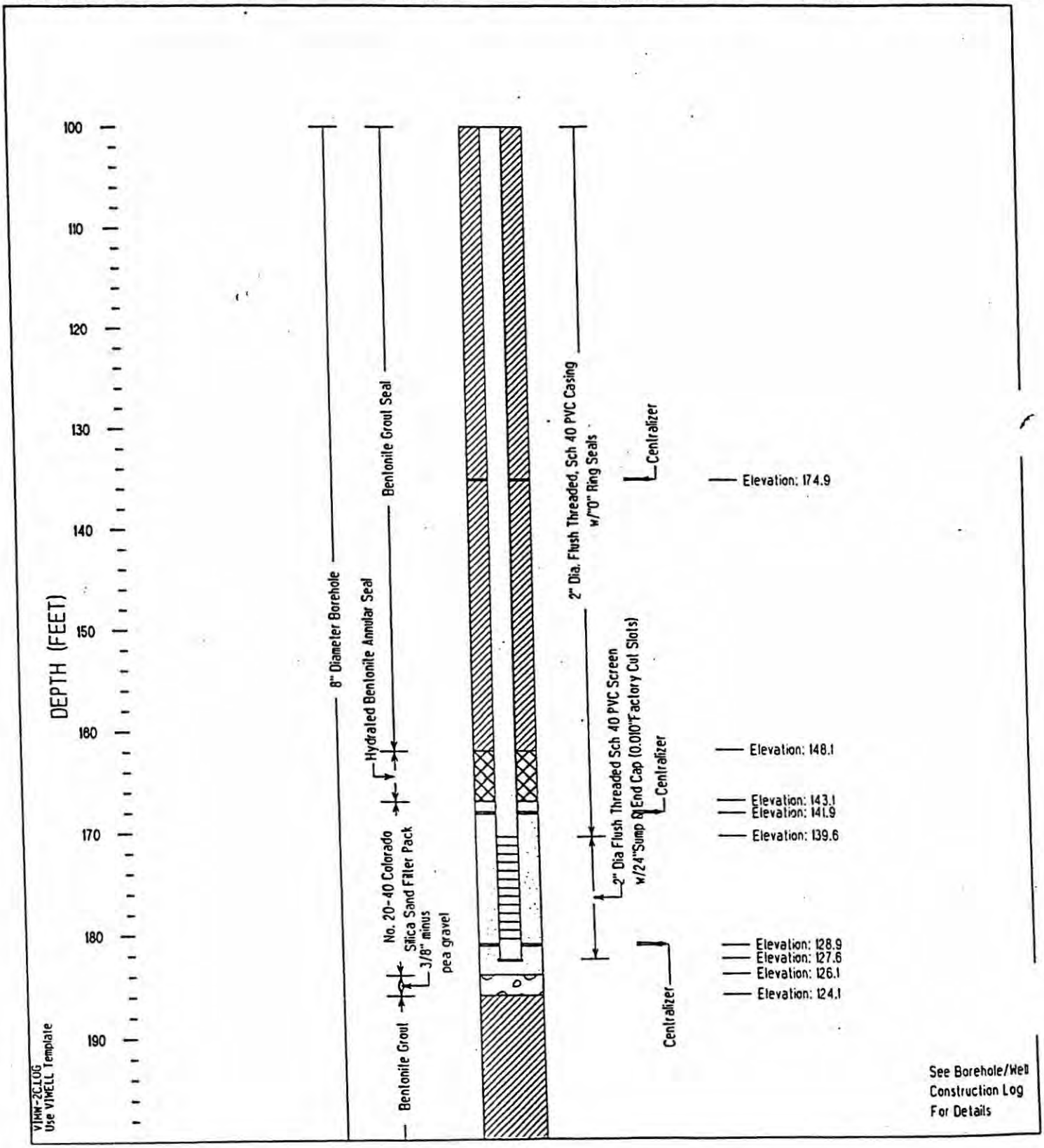
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N133.51, E2370.88

ELEVATION 310.12 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/19/95 FINISH 05/26/95 LOGGER T.O'CONNOR



VIHW-2C.LOG
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-12
106241.E3.77	MW-2C	SHEET 3 OF 4

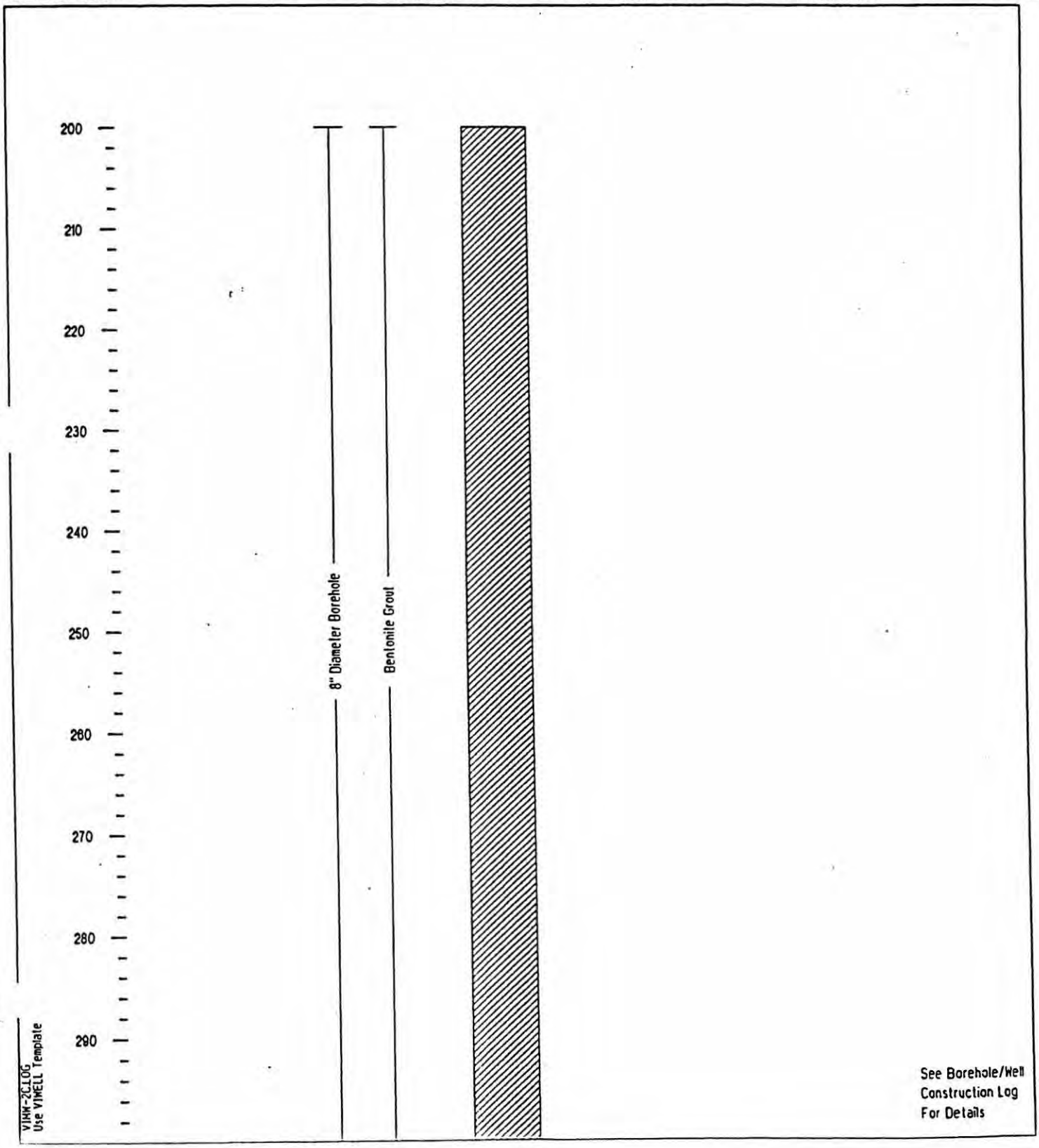
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N133.51, E2370.88

ELEVATION 310.12 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/19/95 FINISH 05/26/95 LOGGER T.O'CONNOR



VIHW-2C.LOG
Use VIWELL Template

Renumbered as MW-12

PROJECT NUMBER	BORING NUMBER	
106241.E3.77	MW-2C	SHEET 4 OF 4

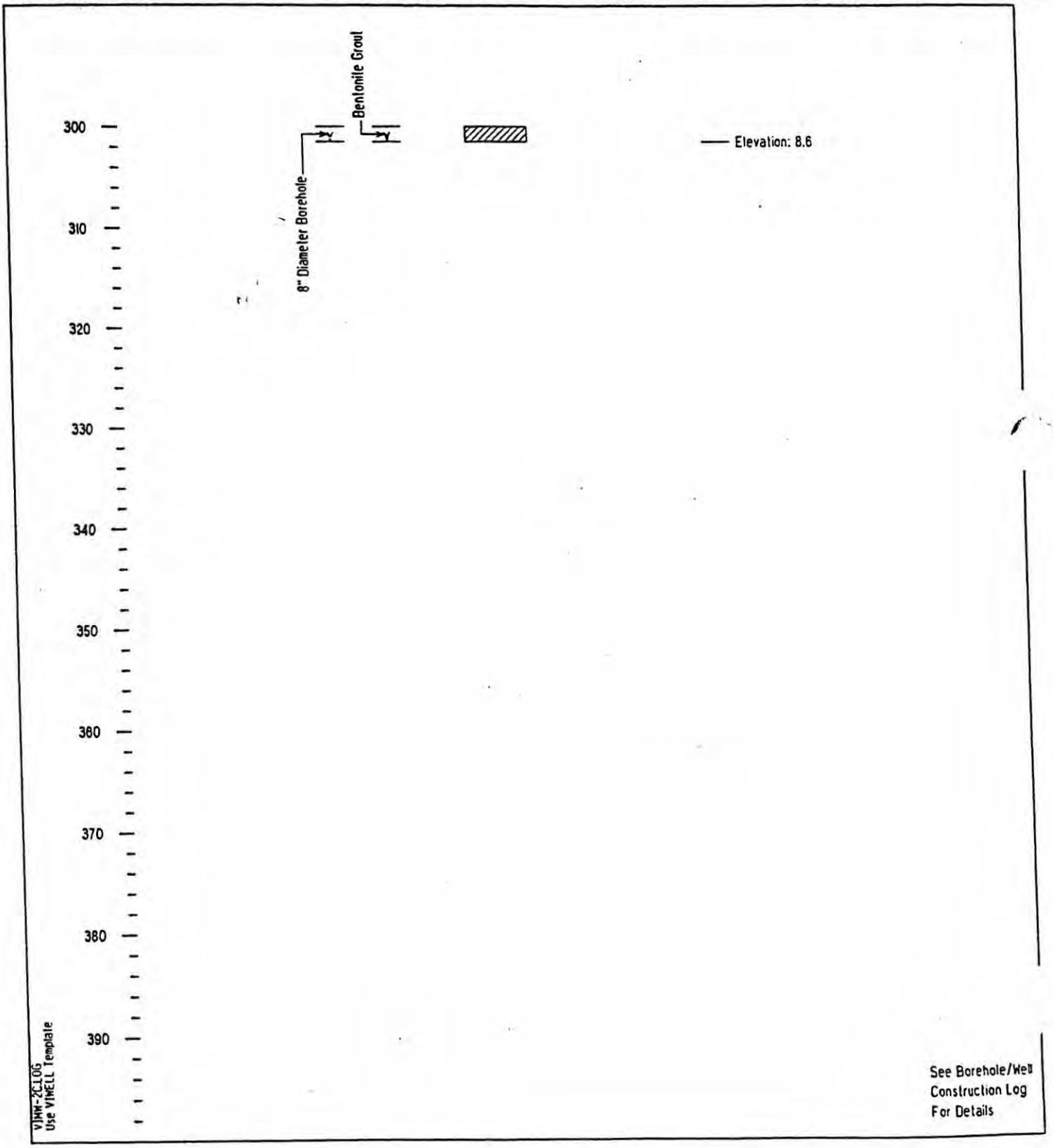
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N133.51, E2370.88

ELEVATION 310.12 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 05/19/95 FINISH 05/26/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VJHW-2C1.06
Use VIWELL Template

Boring No. P-3

1 of 3

Renumbered as MW-13

Logged by: CRL

Dated: 4-22-92

N 614.2871
E 2987.4369
Top of PVC Elev.
374.07

Graph/ USCS	Soil Description	Consistency	Depth (ft.)	Sample	(N) Blows (ft)	Water Content (%)	Well As-Built
SM	Gray-brown, silty SAND, with gravel, moist, with seepage zones below 20 feet. (Till)	very dense	5		50/6"	9	
			10		50/6"	13	
			15		50/6"	12	
	(No methane or volatile organics noted during drilling)		20		50/3"	11	
			25		50/6"	10	
	boulder at 34 feet		30		50/4"	12	
SM/SP	Gray-brown, silty to slightly silty medium SAND, dry to moist.	very dense	35		50/6"	10	
			40		50/6"	8	
			45		200/9"	—	
			50				

Continued

TERRA ASSOCIATES
Geotechnical Consultants

Boring Log
Vashon Landfill
King County, Washington

Proj. No. T-1996	Date 7/92	Figure 4

Boring No. P-3

2 of 3

Logged by: CRL

Dated: 4-22-92

Renumbered as MW-13

Graph/ USCS	Soil Description	Consistency	Depth (ft.)	Sample	(N) Blows (ft)	Water Content (%)	Well As-Built
SM	Gray-brown, silty to slightly silty SAND, dry to moist. (No methane or volatile organics noted during drilling)	very dense	55	H	50/5"	12	
			60	H	50/6"	10	
			65	H	50/5"	7	
			70	H	50/6"	15	
			75	H	50/6"	11	
			80	H	50/5"	5	
			85	H	50/6"	8	
	becomes finer grained and saturated at 90 feet.		90	H	50/6"	20	
ML	Gray, fine sandy SILT dilatent, saturated.	very dense	95	H	50/6"	24	
SM			100	H	50/6"	26	

Continued

TERRA ASSOCIATES
Geotechnical Consultants

Boring Log
Vashon Landfill
King County, Washington

Proj. No. T-1996	Date 7/92	Figure 5

Boring No. P-3

3 of 3

Logged by: CRL

Dated: 4-22-92

Renumbered as MW-13

Graph/ USCS	Soil Description	Consistency	Depth (ft.)	Sample	(N) Blows (ft)	Water Content (%)	Well As-Built
SM	Gray fine to medium SAND with silt, saturated.	very dense			50/6"	22	
ML	Gray SILT with fine sand, saturated.	very dense	105		50/2"	31	
SM/SP	Dark gray, medium SAND with silt, saturated.	very dense	110		50/6"	27	
ML	Gray SILT, slightly plastic	hard	115		50	32	

Total depth 115.5 feet

Wel As-built:

2" 0.0200 PVC Screen placed from 113 to 108 feet.

Pea-gravel placed from 115 to 113 feet.
#8 Silica Sand placed from 113 to 106 feet.
Bentonite grout tremied to bottom of auger from 106 to 2 feet.
Upper 2 feet is concrete plug to hold surface casing.

(No methane or volatile organics noted during drilling of this well)

Survey data provided by King County Solid Waste Division.

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-14
106241.E3.ZZ	MW-4B	SHEET 1 OF 2

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N713.05, E2126.69

ELEVATION 373.62 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/19/95 FINISH 06/21/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
10.0					SILTY SAND (SM), light brown, moist, firm, trace gravel
20.0	20 21.5	SS	1.2'	13-13-13	
30.0					
40.0	40 41.5	SS	1.0	30-50-4"	POORLY GRADED SAND WITH SILT (SP-SM)
50.0					
60.0	60 61.5	SS	1.0'	13-30-40	
70.0					POORLY GRADED SAND (SP), moist, firm, very fine to fine grained
					SILTY SAND (SM), olive, moist, firm
80.0	80 82	SS	1.0'	15-25-25	WELL GRADED SAND (SW), brown/tan, firm, moist
90.0					SILTY SAND (SM), olive, firm, moist
	100				

WELL COMPLETION DIAGRAM

- 6" Dia. Steel Protective Casing w/Locking Cap
- 8" Diameter Borehole
- Cement Bentonite Grout Seal
- 2" Dia. Flush Threaded, Sch 40 PVC Casing w/"O" Ring Seals
- Cement
- Centralizer
- Centralizer

VIHW-4B.LOG Use WELLBORE Template

CH2M HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-14
106241.E3.ZZ	MW-4B	SHEET 2 OF 2

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N713.05, E2126.69

ELEVATION 373.62 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

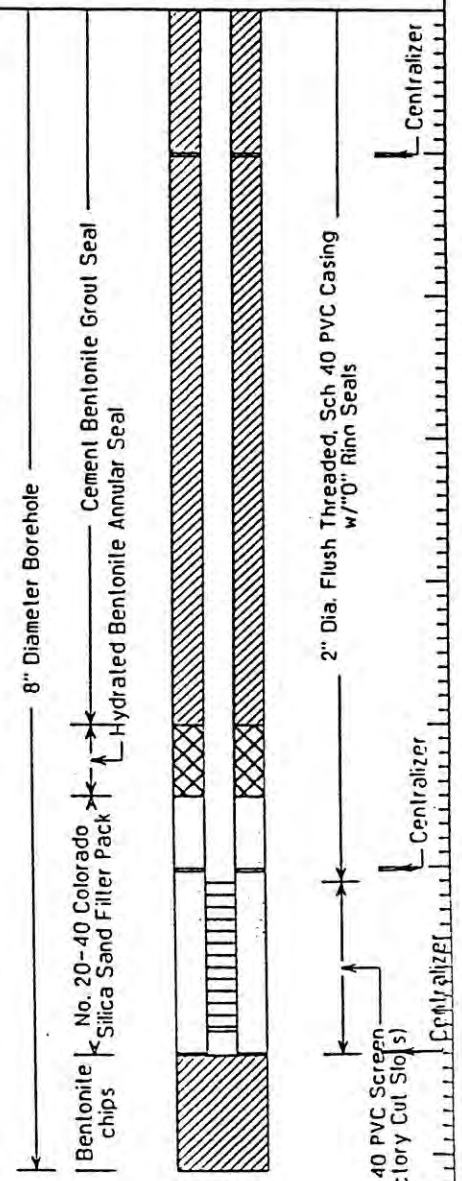
DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/19/95 FINISH 06/21/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
	100	SS	9"	75-40-45	
110.0					SILT (ML), brown-gray, moist, firm, trace fine sand
	120				
120.0	121.5	SS	1.0'	15-30-50/5"	SILTY SAND, olive, moist, firm
130.0					
	140				
140.0	141.5	SS	0.6"	9-30-45	
150.0					SILT (ML), brown, moist, trace sand, plastic.
	160				
160.0	161	SS	9"		POORLY GRADED SAND WITH SILT (SP-SM), olive, moist, firm
					SILTY SAND (SM), gray, moist to wet, firm, trace pea gravel
170.0					SILT (ML), gray, moist to wet, firm, dense to very dense, trace wood chips
					SILTY SAND (SM), gray, moist, firm
	180				
180.0	181.4	SS	11"	10-30-50/5"	SAND AND GRAVEL, brown, moist, firm, gravel up to 1" diameter
					TOTAL DEPTH = 181.4 FEET
190.0					

WELL COMPLETION DIAGRAM

DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION



V:\RM-4B.LOG
Use WELLBORE Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-14
106241.E3.77	MW-4B	SHEET 1 OF 2

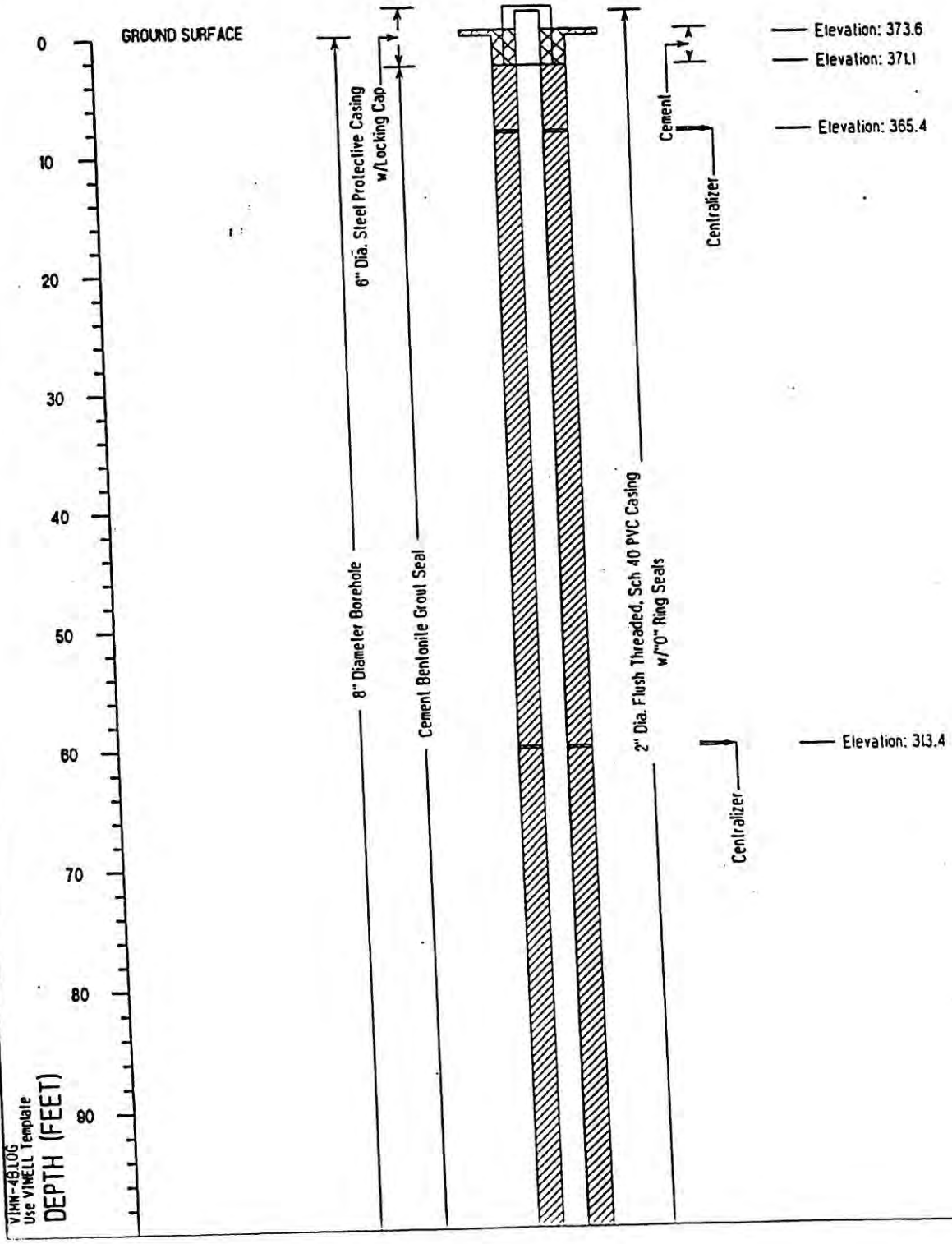
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N713.05, E2126.69

ELEVATION 373.62 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/19/95 FINISH 06/21/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VIHW-4BLOG
Use VIWELL Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-14
106241.E3.77	MW-4B	SHEET 2 OF 2

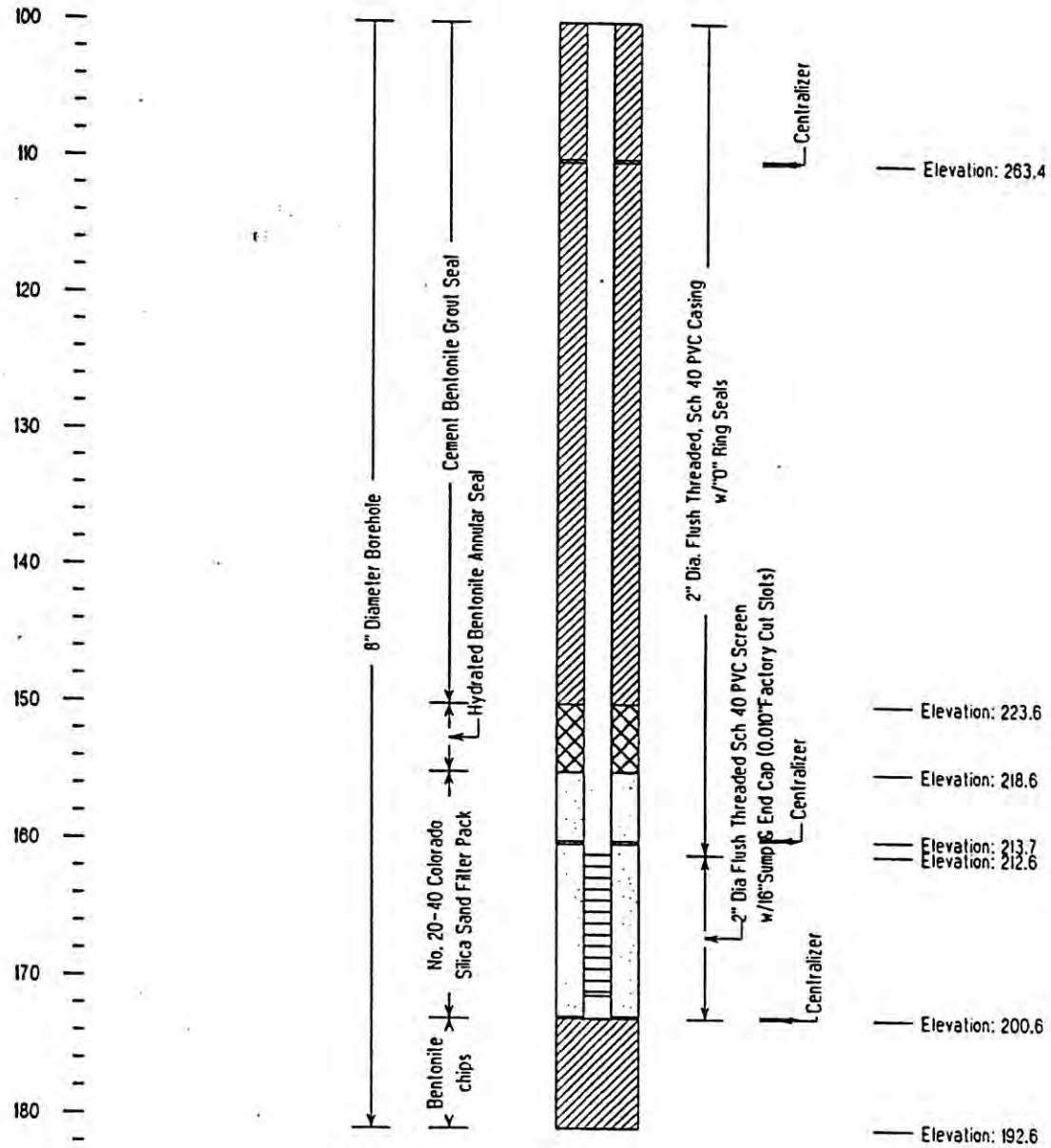
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N713.05, E2126.69

ELEVATION 373.62 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/19/95 FINISH 06/21/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VJHW-4B.LOG
Use VTWELL Template

CHM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-19
106241.E3.ZZ	MW-9C	SHEET 1 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1283.59, E2268.63

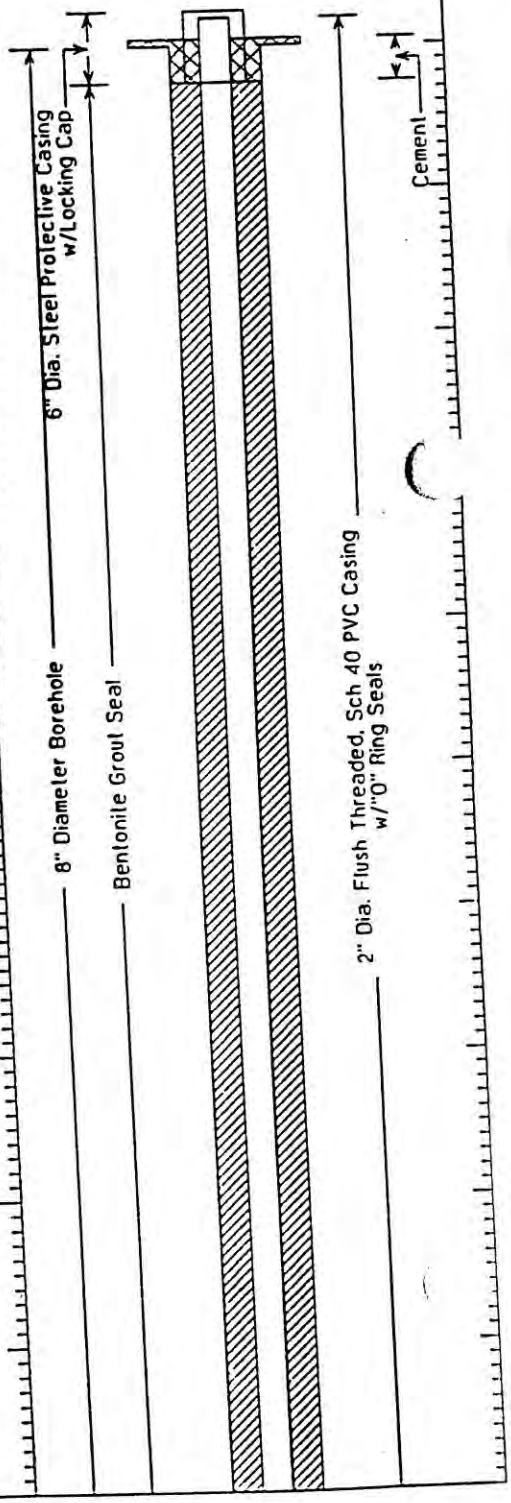
ELEVATION 400.64 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH 06/12/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION (SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)
10.0					SILTY SAND, (SM) brown, moist, firm, trace pea gravel
20.0	20				
	21	SS	6"	50/4"	Gravel up to 1" diameter
30.0					
					POORLY GRADED SAND, (SP) brown, moist, firm, trace silt, trace gravel, up to 1" in diameter
40.0	40				
	41	SS	1.2	80/6" 100/1"	SILTY SAND, (SM) brown, moist, firm, trace gravel; OVA=1000; CGI=0
50.0					POORLY GRADED SAND, (SP) gray to light brown, moist, firm
					WELL GRADED SAND, (SW) gray to light brown, moist, firm
60.0	60				
	61	SS	1.0	35-50/6-50/3"	POORLY GRADED SAND WITH SILT AND GRAVEL, (SP-SM) olive, moist, firm; OVA=20; CGI=0
70.0					
80.0	80				
	81	SS	1.0	25-35-50/5"	POORLY GRADED SAND WITH SILT (SP-SM), olive, moist, firm
90.0					
	100				

WELL COMPLETION DIAGRAM



VJHW-9C.LOG Use WELLBORE Template

CH2M HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-19
106241.E3.ZZ	MW-9C	SHEET 2 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1283.59, E2268.63

ELEVATION 400.64 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH 06/12/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	100					
	101	SS	1.5	10-25-40	SILT, (ML) olive, moist, brittle Red iron oxide deposit .1" thick with wood/fine sand, no silt	
					SILTY SAND, (SM), olive, moist, firm	
110.0						
	120					
120.0	121	SS	1.5	3-3-10		
30.0						
	140				SILT, (ML) grayish brown, moist, firm, plastic	
140.0	141	SS	1.0	7-25-40		
150.0					POORLY GRADED SAND WITH GRAVEL, (GP) gray, moist, firm, pea size gravel	
	160					
180.0	161	SS	8"			
170.0					POORLY GRADED GRAVEL, moist, firm, size gravel	
	180					
180.0	181	SS	1'	15-35-35	FAT CLAY, (CL) dark gray, dry, brittle, massive	
190.0						
	200					

8" Diameter Borehole

Bentonite Grout Seal

2" Dia. Flush Threaded, Sch 40 PVC Casing w/"O" Ring Seals

VIMW-9C.LOG Use WELLBORE Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-19
106241.E3.ZZ	MW-9C	SHEET 3 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1283.59, E2268.63

ELEVATION 400.64 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH 06/12/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY
	200				
	201	SS	1'	5-35-50/5"	SILTY SAND WITH GRAVEL, (SM) dark gray, moist, firm
210.0					
	220				
220.0	221	SS	.4"	10-15-50/5"	SILTY GRAVEL WITH SAND, (GM) dark gray, moist, firm, dense, gravel up to 1" diameter
230.0					
	240				
240.0	241	SS	.5'	25-75/6"	POORLY GRADED GRAVEL WITH SILT AND SAND, (GP-SM) dark grayish brown, moist, firm, large cobbles up to 3" diameter
250.0					POORLY GRADED SAND WITH SILT, (SP-SM) dark gray, moist to wet, firm
	260				
260.0	261	SS	.5'	1-1-1	
270.0					
					SILT, (ML) gray, dense, moist
					SILTY SAND, (SM) dark gray, moist, firm
	280				
280.0	281	SS	1.0	1-1-1	
					SILT, (ML) dark gray, firm, very dense
290.0					
	300				

WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION

8" Diameter Borehole
Hydrated Bentonite Annular Seal
Bentonite Grout Seal
No. 20-40 Colorado Silica Sand Filter Pack
Bentonite Chips
Bentonite Grout Seal
2" Dia. Flush Threaded, Sch 40 PVC Casing w/"O" Ring Seals
Centralizer
1 Sch 40 PVC Screen
Factory Cut Slots)
Centralizer
2" Dia. Flush Th
Sump & End Ca

VIMW-9C.LOG
Use WELLBORE template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-19
106241.E3.ZZ	MW-9C	SHEET 4 OF 4

BOREHOLE/WELL CONSTRUCTION LOG

PROJECT VASHON ISLAND LANDFILL LOCATION N1283.59, E2268.63

ELEVATION 400.64 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH 06/12/95 LOGGER T.O'CONNOR

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	WELL COMPLETION DIAGRAM: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	300					
	301	SS	1.2	25-90/6"	SILT, (ML) dark gray, firm, dense, brittle, moist, dry, non-plastic	
					SILTY SAND, (SM) gray, moist, firm	
310.0						
					SILT, (ML) dark gray, firm, dense, moist, semi-plastic	
					SILTY SAND, (SM) wet to moist, firm, very fine grained black, sand with pumice, with interlayers of brown to dark gray SILT (ML)	
	320					
320.0	321	SS	1.5	1-1-5		
					SILTY SAND, (SM) brown, saturated, firm, very fine sand to fine sand, white pumice material	
330.0					WOOD CHIPS, trace white pumice	
					SAND, (SW) well graded, moist to wet, firm, black to black brown, sand medium grained, trace pumice, trace wood fragments, large up 1" long, grading coarser	
	340					
340.0	341	SS	1.0	7-13-19	SILTY SAND, (SM) dark brown, wet, firm	
350.0						
	359				POORLY GRADED SAND WITH SILT, (SP-SM) dark gray, firm, wet	
360.0	360	SS	1.1	8-12-16	TOTAL DEPTH = 360 FEET	
370.0						
380.0						
390.0						

8" Diameter Borehole

Bentonite Grout Seal

VJHW-9C.LOG
Use WELLBORE Template

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-19
106241.E3.77	MW-9C	SHEET 1 OF 4

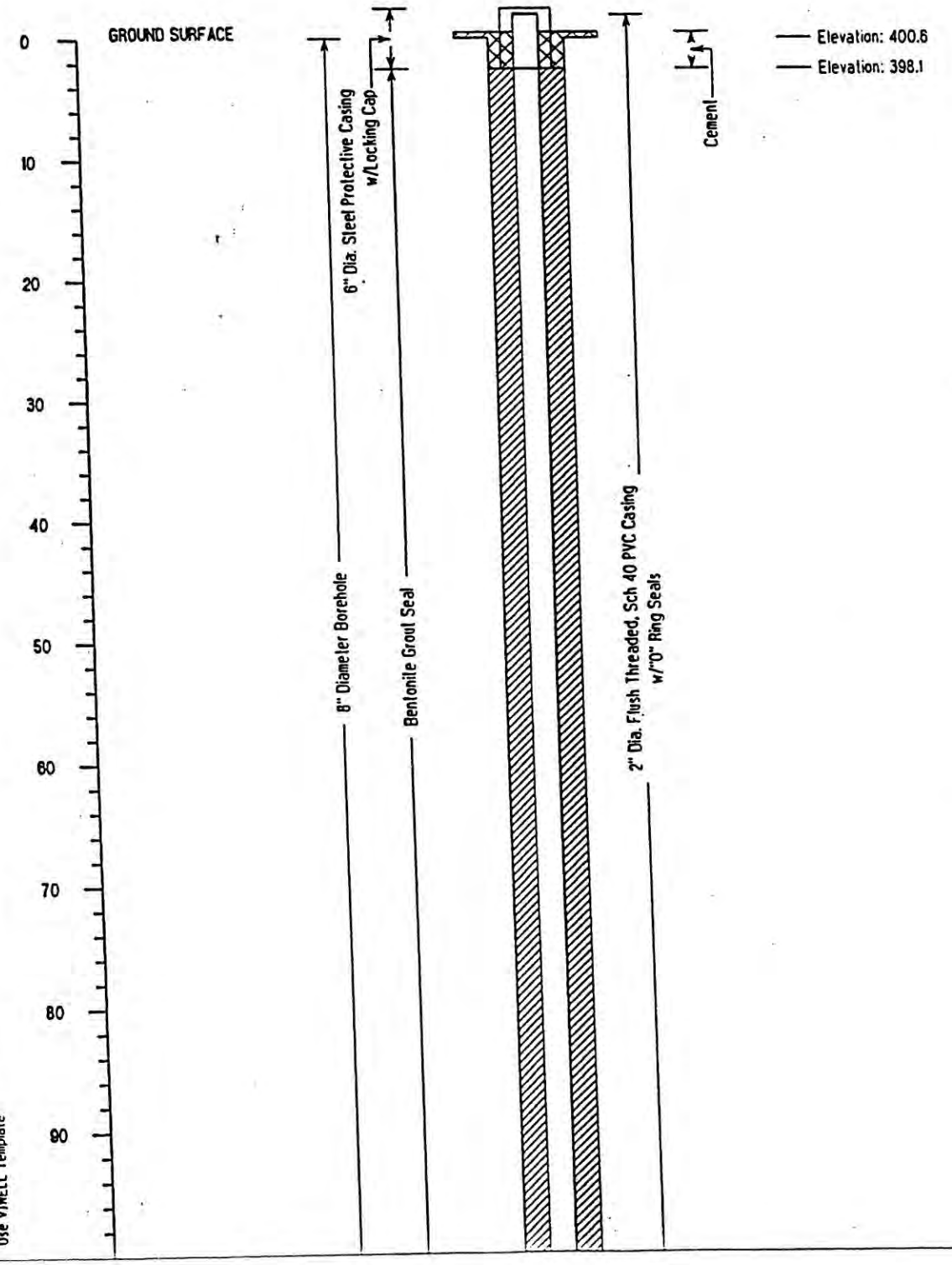
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1283.59, E2268.63

ELEVATION 400.64 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH 06/12/95 LOGGER T.O'CONNOR



VIMW-9C.LOG
Use VIWELL Template

See Borehole/Well Construction Log For Details

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-19
106241.E3.77	MW-9C	SHEET 2 OF 4

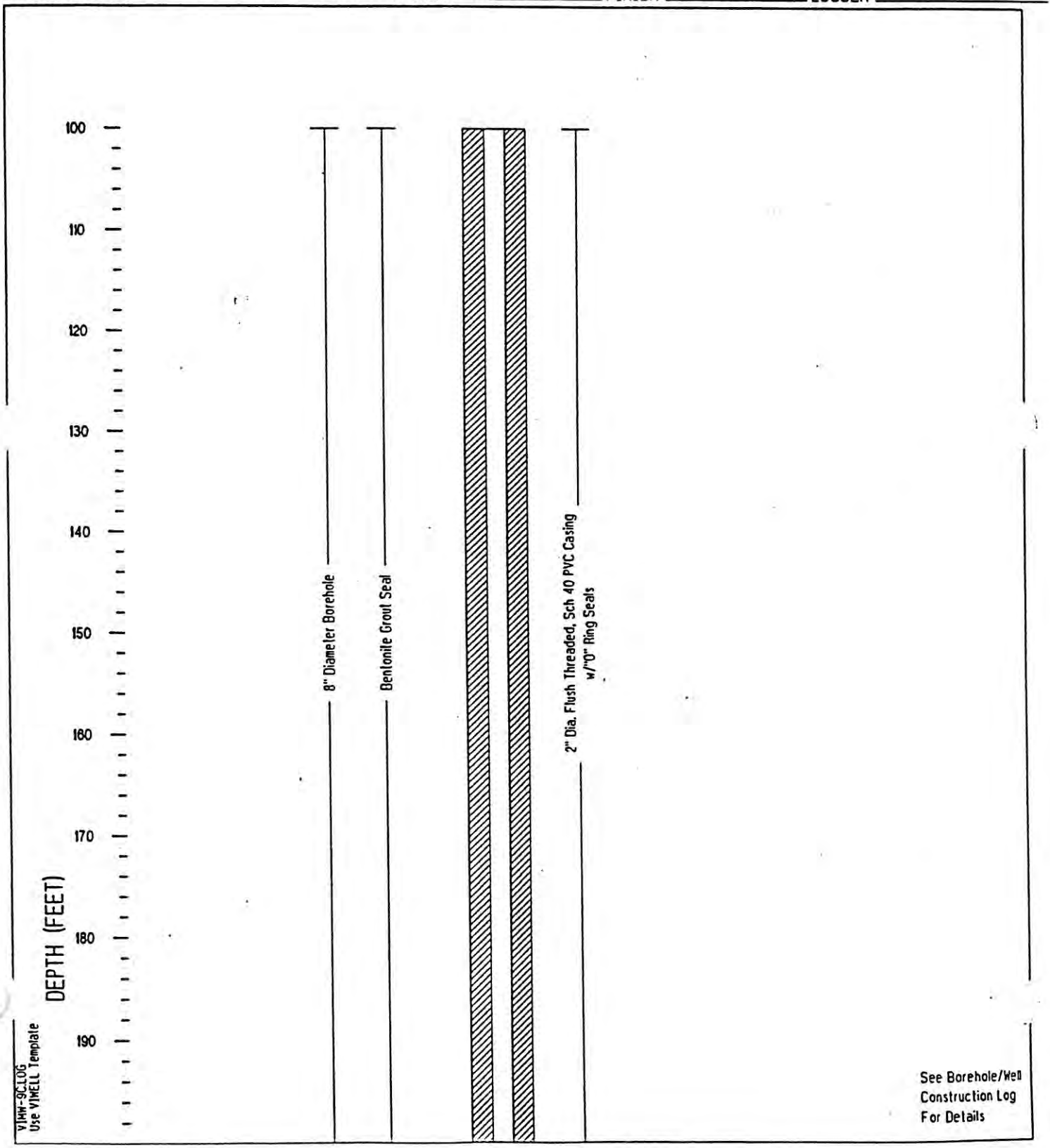
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1283.59, E2268.63

ELEVATION 400.64 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH 06/12/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

VIMW-9CLOG
Use VIWELL Template

CRM HILL

PROJECT NUMBER	BORING NUMBER	Renumbered as MW-19
106241.E3.ZZ	MW-9C	SHEET 3 OF 4

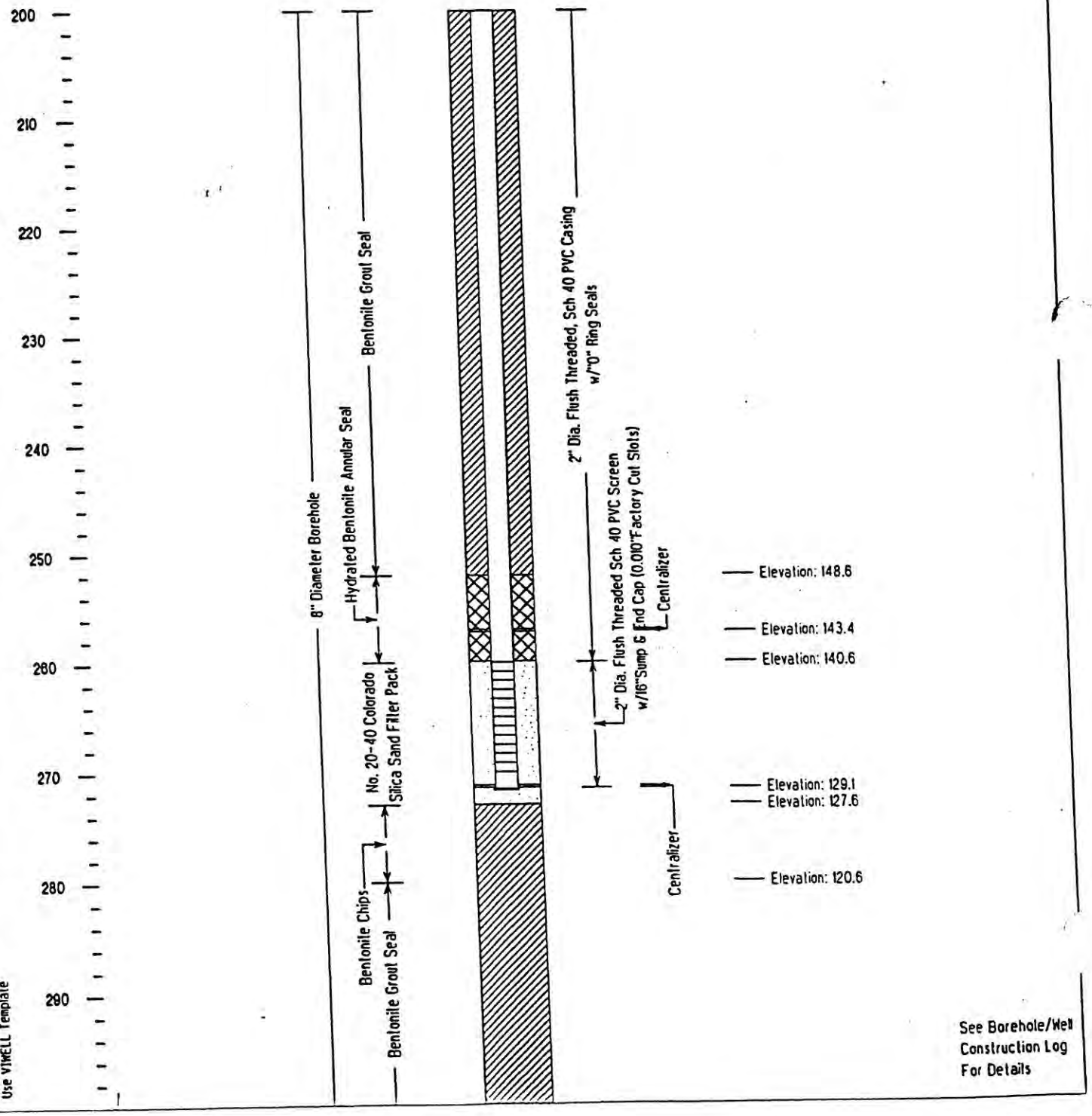
WELL CONSTRUCTIONSUMMARY

PROJECT VASHON ISLAND LANDFILL LOCATION N1283.59, E2268.63

ELEVATION 400.64 DRILLING CONTRACTOR TACOMA PUMP & DRILLING INC.

DRILLING METHOD AND EQUIPMENT AIR ROTARY

WATER LEVELS N/A START 06/01/95 FINISH 06/12/95 LOGGER T.O'CONNOR



See Borehole/Well Construction Log For Details

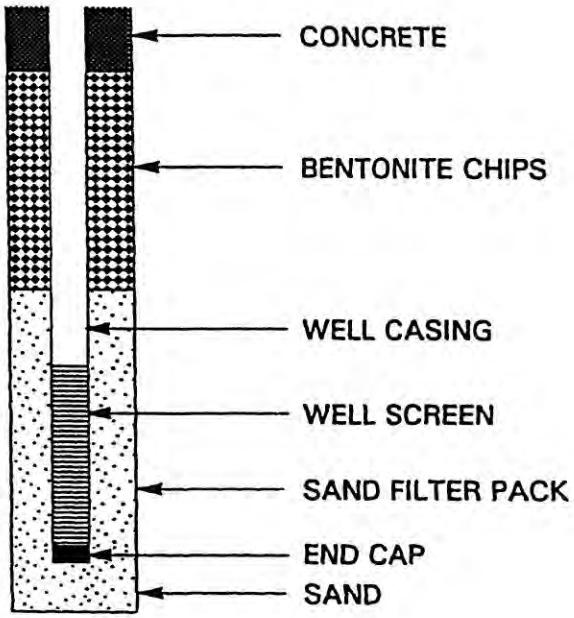
VIHM-9CLOG
Use VIWELL Template

EXPLANATION OF SYMBOLS ON EXPLORATORY BORING LOGS

SAMPLE COLUMN

SAMPLE INTERVAL (Attempted)

WELL DETAILS COLUMN

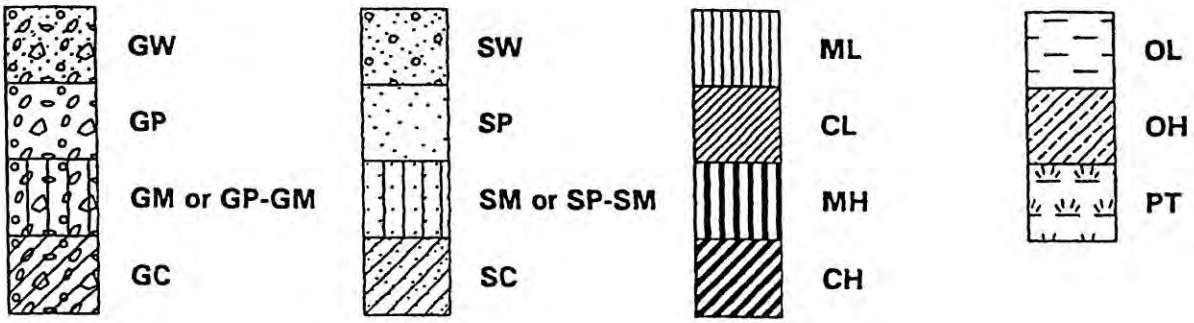


WATER LEVELS

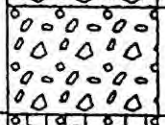
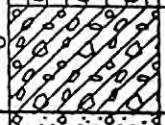
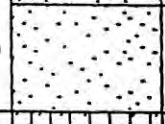
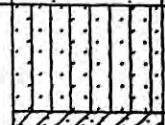
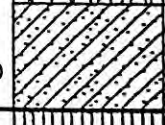
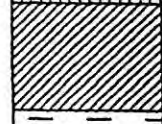
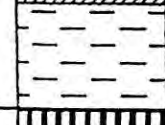
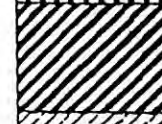
▽ LEVEL AT TIME OF DRILLING

▼ LEVEL AT SPECIFIED DATE

LITHOLOGIC COLUMN



UDALOY ENVIRONMENTAL SERVICES
SOIL CLASSIFICATION CHART

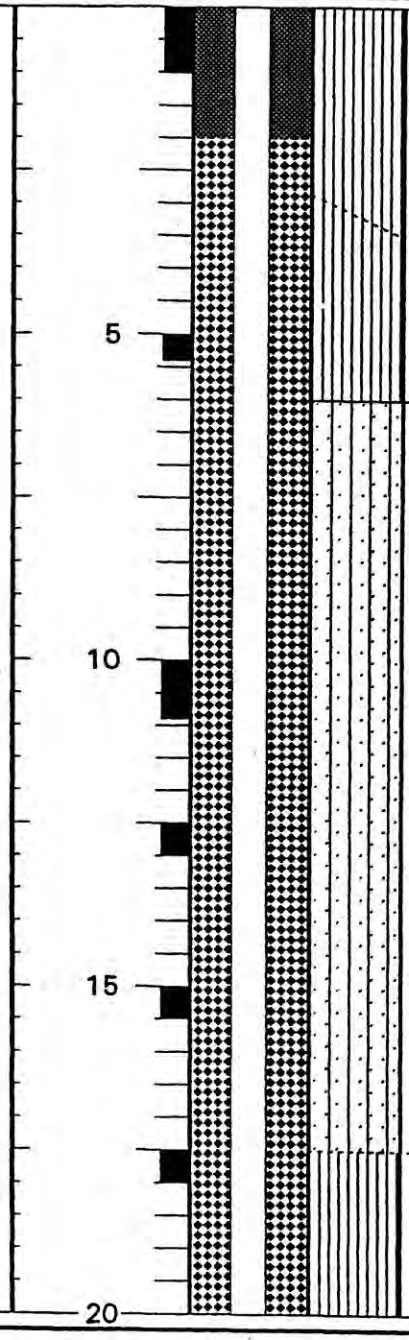
MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SAND OR LARGER BASED ON VISUAL CRITERIA	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION IS GRAVEL BASED ON VISUAL CRITERIA	CLEAN GRAVELS (MORE THAN 5% FINES BASED ON VISUAL CRITERIA)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (MORE THAN 5% FINES BASED ON VISUAL CRITERIA)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION IS SAND BASED ON VISUAL CRITERIA	CLEAN SANDS (LESS THAN 5% FINES BASED ON VISUAL CRITERIA)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (MORE THAN 15% FINES BASED ON VISUAL CRITERIA)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER SILT OR FINES BASED ON VISUAL CRITERIA	SILTS AND CLAYS	NON-PLASTIC TO MEDIUM PLASTICITY (BASED ON TACTILE CRITERIA)		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	HIGHLY PLASTIC (BASE ON TACTILE CRITERIA)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.
HYPHENATED SYMBOLS ARE USED TO INDICATE 5 TO 15 PERCENT FINES BASED ON VISUAL EXAMINATION.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-20
LOCATION	Vashon Island Landfill	PAGE	1 OF 8
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	365.20'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	121.30'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	0		**0 to 3.5 feet: SANDY SILT (ML)**, reddish brown, some fine to coarse sand, nonplastic, damp. Predominantly boulders (road subgrade) from 1.0 to 3.5 feet. (TOPSOIL/FILL)
			3.5 to 6.0 feet: SANDY SILT (ML), yellowish gray to gray, little fine sand, trace coarse sand and fine gravel, dry, stiff. (TILL)
SS	5	50/5"	
			6.0 to 17.5 feet: SILTY SAND (SM), yellowish gray with orange-brown mottles, lenses of SILT (ML), trace to few fine to medium subrounded gravel. Boulder from about 7 to 8 feet. Horizontal laminations with one gray silt lens (rip-up clast?) at 15.3 feet. Very slow drilling, very dense. (TILL)
SS	10	40-50/5"	
SS	12.5	40	
SS	15	50	
SS	17.5	50/4"	
			17.5 to 28.5 feet: SANDY SILT (ML), yellowish gray, some fine to medium sand, few coarse sand and fine gravel, very stiff to hard, damp. Common interbeds of SILTY SAND (SM), as above, gradational upper contact. Coarse



REMARKS

(1) Potable water added during drilling below 131.0 feet. (2) Top of steel casing elevation = 368.18 feet. (3) Northing = 333.12; Easting = 2739.35. (4) Static water elevation after well development = 244.61 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-20
LOCATION	Vashon Island Landfill	PAGE	2 OF 8
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	365.20'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	121.30'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
SS	20	9-50	content decreases with depth. Very slow drilling. (TILL)
SS	22.5	50	@ 23.0 feet: trace orange mottles.
SS	25	10-50	@ 25.8 to 26.0 feet: SAND (SP), yellowish gray, fine, wet.
SS	27.5	11-50	**28.5 to 30.5 feet: SANDY SILT (ML)**, yellowish gray, little to some fine sand, few fine to medium subrounded gravel, stiff, wet. Trace thin wet beds of yellowish gray SAND (SP). (ADVANCE OUTWASH)
SS	30	20-50	**30.5 to 49.0 feet: SAND (SP)**, white with brown and black, fine, trace subrounded coarse sand and fine gravel, damp to moist. Occasional thin (<2") SILT (ML) interbeds. Significantly faster drilling. (ADVANCE OUTWASH)
SS	32.5	50/5"	@ 30.5 feet: medium to coarse gravel.
SS	35	20-50	@ 32.5 feet: SANDY SILT (ML), brownish gray, firm to stiff, little fine sand, trace coarse sand and fine gravel, damp. Minimum 0.5-foot thickness.
SS	37.5	12-35	@ 38.0 feet: trace fine gravel.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN

25 30 35 40

REMARKS

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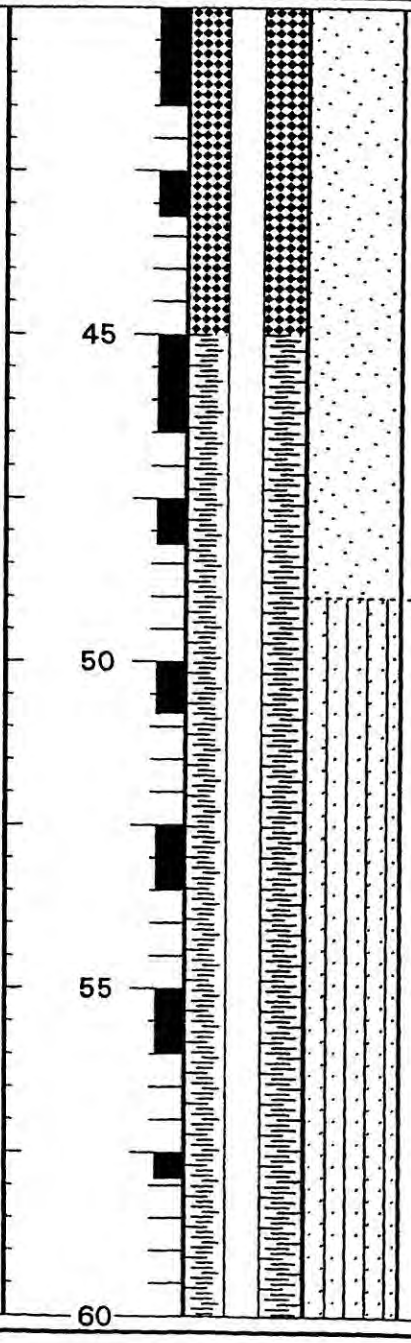
LOG OF EXPLORATORY BORING

PROJECT NAME Field Investigation Report
LOCATION Vashon Island Landfill
DRILLED BY Tacoma Pump & Drilling
DRILL METHOD Hollow-stem Auger
LOGGED BY A. Udaloy

BORING NO. MW-20
PAGE 3 OF 8
GROUND ELEV. 365.20'
TOTAL DEPTH 121.30'
DATE COMPLETED 10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
SS	40	12-30-35	**30.5 to 49.0 feet: SAND (SP),** see description on previous page. @ 40.0 feet: trace medium subrounded gravel.
SS	42.5	20-50/3"	@ 42.5 feet: trace fine to medium gravel.
SS	45	8-8-50	
SS	47.5	30-50/3"	
SS	50	20-50/4"	**49.0 to 72.0 feet: SILTY SAND (SP-SM),** white with brown and black, fine, few gray silt, trace clay, damp. Common thin (<1 mm) laminations. Gradational upper contact. (ADVANCE OUTWASH)
SS	52.5	30-50	@ 52.5 feet: moist.
SS	55	12-50	
SS	57.5	50/5"	

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

(1) Potable water added during drilling below 131.0 feet. (2) Top of steel casing elevation = 368.18 feet. (3) Northing = 333.12; Easting = 2739.35. (4) Static water elevation after well development = 244.61 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-20
LOCATION	Vashon Island Landfill	PAGE	4 OF 8
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	365.20'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	121.30'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
SS	60	30-50/3"	**49.0 to 72.0 feet: SILTY SAND (SP-SM)**, see description on previous page.
SS	62.5	50	
SS	65	20-50	@ 65.0 to 65.4 feet: SILTY SAND (SM), brown, fine, little fines, trace fine subrounded gravel.
SS	67.5	30-50	@ 67.5 feet: horizontal to subhorizontal laminae. @ 68.0 feet: one light brown SILT (ML) lamina.
SS	70	20-50/5"	@ 70.2 feet: SAND (SP), white with brown, fine, 1-inch thick.
SS	72.5	30-50/2"	**72.0 to 75.0 feet: SILTY SAND (SM)**, grayish brown, fine, some fines, trace subrounded gravel, moist. Gradational upper contact. (ADVANCE OUTWASH)
SS	75	20-50/4"	**75.0 to 75.5 feet: SANDY SILT (ML)**, light olive brown, some fine sand, firm, wet, gradational upper contact. (ADVANCE OUTWASH)
SS	77.5	20-50/5"	**75.5 to 78.1 feet: SILT (ML)**, light olive brown, firm, wet, finely laminated. Abrupt upper contact. Interbeds of SAND (SP) and SILTY SAND (SP-SM) from 77.5 to 78.1 feet. (ADVANCE OUTWASH)
			78.1 to 88.0 feet: SAND (SP), white with brown and black, fine, trace fines, moist above

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN

65 70 75 80

REMARKS

(1) Potable water added during drilling below 131.0 feet. (2) Top of steel casing elevation = 368.18 feet. (3) Northing = 333.12; Easting = 2739.35. (4) Static water elevation after well development = 244.61 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-20
LOCATION	Vashon Island Landfill	PAGE	5 OF 8
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	365.20'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	121.30'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
SS	80	20-50/5"	80.0 feet, damp below 80.0 feet. (ADVANCE OUTWASH) @ 80.0 to 80.5 feet: SILT (ML), grayish brown with common 1- to 5-mm-diameter orange mottles, soft, damp.
SS	82.5	50/3"	
SS	85	50	
SS	87.5	50	**88.0 to 127.5 feet: SILT (ML)**, gray, firm to stiff, moist to about 97.5 feet, wet (capillary saturation) below 97.5 feet. Occasional thin horizontal orange-stained layers below 90.4 feet. (LACUSTRINE PRE-VASHON DEPOSITS) @ 90.0 to 90.4 feet: finely laminated. @ 90.4 to 90.9 feet: SANDY SILT (ML), brown, few to little fine sand, wet, soft, orange staining at 90.4 feet. @ 92.5 to 93.4 feet: mostly beds of wet brownish gray SANDY SILT (ML) with common fine orange-stained laminae.
SS	90	20-50/5"	
SS	92.5	20-50/5"	
SS	95	20-50/5"	@ 95.3 to 95.4 feet: SANDY SILT (ML), orange staining, little fine sand, wet. @ 95.9 feet: brownish gray SANDY SILT (ML), with trace medium to coarse angular to subangular sand in sampler driveshoe.
SS	97.5	25-50	

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN

85 90 95 100

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-20
LOCATION	Vashon Island Landfill	PAGE	6 OF 8
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	365.20'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	121.30'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
SS	100	30-50/5"	**88.0 to 127.5 feet: SILT (ML)**, see description on previous page.
SS	102.5	30-50	
SS	105	25-50	@ 105.0 to 106.0 feet: SAND (SP), white with brown and black, fine, trace light brown fines, orange staining at 105.0 feet, moist.
SS	107.5	20-30-35	
SS	110	15-30-30	
SS	112.5	10-20-30	@ 113.5 to 114.0 feet: SAND (SP), white with brown and black, fine, moist.
SS	115	10-25-25	@ 115.0 feet: trace fine sand, fine horizontal laminae.
SS	117.5	25-25-45	@ 117.5 to 127.5 feet: varved, trace clay.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN

105 110 115 120

REMARKS

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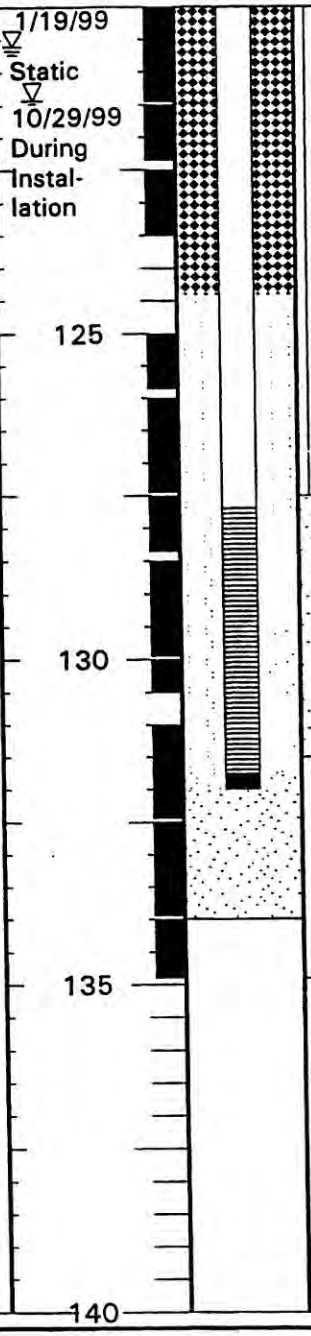
LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-20
LOCATION	Vashon Island Landfill	PAGE	7 OF 8
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	365.20'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	121.30'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
SS	120	10-15-35	**88.0 to 127.5 feet: SILT (ML)**, see description on previous page.
SS	121.5	25-50/5"	@ 121.1 to 121.5 feet: SAND (SP), gray, fine, wet, with brown and gray silt interbeds.
SS	122.5	25-50	
SS	125	25-50	@ 125.3 to 126.0 feet: SILTY SAND (SM), gray, fine, wet, with soft gray wet silt in sampler drive shoe.
SS	126		
SS	127.5	20-50/5"	**127.5 to 131.5 feet: SAND (SP)**, gray, fine, dense, wet. (PRE-VASHON DEPOSITS)
SS	129		
SS	130	50	
SS	131	20-30-40	**131.5 to 134.9 feet: SILT (ML)**, dark gray, stiff, moist. Varved with trace clay as varves. (LACUSTRINE PRE-VASHON DEPOSITS)
SS	132.5	10-20-50	
SS	134	25-50/5"	
			Total depth drilled = 134.0 feet. Total depth sampled = 134.9 feet.
			See Page 8 for Well Completion Details.

GROUND WATER LEVELS: 1/19/99 Static; 10/29/99 During Instal-lation

DEPTH IN FEET: 125, 130, 135, 140



REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-20
LOCATION	Vashon Island Landfill	PAGE	8 OF 8
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	365.20'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	121.30'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				145				**WELL COMPLETION DETAILS:** +2.0 to 127.7 feet: nominal 2-inch I.D., flush-threaded, Schedule 40 PVC blank riser pipe. 127.7 to 132.0 feet: nominal 2-inch I.D., flush-threaded, Schedule 40 PVC well screen with 0.020-inch machined slots. 132.0 to 132.9 feet: nominal 2-inch I.D., flush-threaded PVC with slip cap, cap is attached using one stainless steel screw. 34.5 to 35.5 feet: stainless steel centralizer. 126.5 to 127.5 feet: stainless steel centralizer. 132.0 to 132.9 feet: stainless steel centralizer. 0 to 2.0 feet: concrete. 2.0 to 45.0 feet: hydrated 3/4-inch Baroid bentonite chips. 45.0 to 119.0 feet: bentonite grout. 119.0 to 124.4 feet: 3/4-inch Baroid bentonite chips placed into standing water. 124.4 to 134.0 feet: 20 x 40 Colorado silica sand.
				150				
				155				
				160				

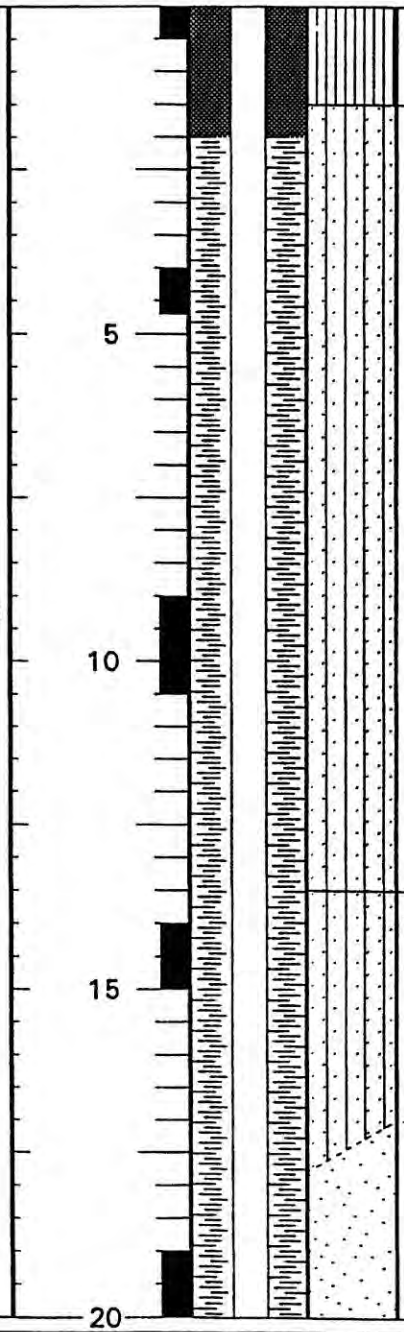
REMARKS

(1) Potable water added during drilling below 131.0 feet. (2) Top of steel casing elevation = 368.18 feet. (3) Northing = 333.12; Easting = 2739.35. (4) Static water elevation after well development = 244.61 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-21
LOCATION	Vashon Island Landfill	PAGE	1 OF 7
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	343.70'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	112.00'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G			**0 to 1.5 feet: SANDY SILT (ML)**, reddish brown, some fine to medium sand, little fine to coarse gravel, few cobbles, damp. (TOPSOIL/FILL)
			1.5 to 13.5 feet: SILTY SAND (SM), yellowish gray, fine to medium, some nonplastic fines, trace to few fine to coarse gravel, trace cobbles, damp. Very slow drilling, very dense. (TILL)
SS	4	50/7"	
SS	9	20-30-40	@ 9.0 to 10.5 feet: brownish gray, trace orange coatings on gravel.
SS	14	15-50	**13.5 to 17.0 feet: SILTY SAND (SP-SM)**, yellowish gray, fine, few fines, damp. Significantly faster drilling. (ADVANCE OUTWASH) @ 13.8 to 14.0 feet: bed of medium to coarse sand with fine gravel.
SS	19	20-50	**17.0 to 26.0 feet: SAND (SP)**, white with brown and black, fine, trace grayish brown fines, trace subangular to subrounded coarse sand, damp. (ADVANCE OUTWASH)



REMARKS

(1) No water added during drilling. (2) Top of steel casing elevation = 346.51 feet. (3) Northing = 95.12; Easting = 2218.51. (4) Static water elevation after well development = 239.42 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-21
LOCATION	Vashon Island Landfill	PAGE	2 OF 7
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	343.70'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	112.00'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			17.0 to 26.0 feet: SAND (SP), see description on previous page.
SS	21.5	24-50/3"	@ 21.5 feet: common thin laminations, trace coarse sand, rare horizontal orange staining, damp.
SS	24	15-50	@ 24.0 feet: rare coarse sand, rare horizontal orange staining, 1-inch bed of SILTY SAND (SP-SM).
SS	26.5	15-30-35	**26.0 to 33.0 feet: SILTY SAND (SP-SM)**, white with brown and black, fine, few fines, trace medium to coarse sand, damp. Common horizontal laminations. (ADVANCE OUTWASH)
SS	29	10-10-20	@ 29.0 feet: trace coal, occasional brown SILTY SAND (SM) interbeds, subhorizontal bedding.
SS	31.5	20-50/5"	
SS	34	15-30-30	**33.0 to 43.0 feet: SAND (SP)**, white with brown and black, fine to medium, trace fines, trace coarse sand, damp. Grain size decreases downhole. (ADVANCE OUTWASH)
			@ 34.0 feet: 2-inch-thick bed of medium sand.
SS	36.5	15-50	
SS	39	20-50/5"	

25 30 35 40

REMARKS

(1) No water added during drilling. (2) Top of steel casing elevation = 346.51 feet. (3) Northing = 95.12; Easting = 2218.51. (4) Static water elevation after well development = 239.42 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-21
LOCATION	Vashon Island Landfill	PAGE	3 OF 7
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	343.70'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	112.00'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			33.0 to 43.0 feet: SAND (SP), see description on previous page.
SS	41.5	25-50/3"	@ 41.5 feet: very fine to fine, trace fine subangular gravel, possibly aeolian.
			43.0 to 49.5 feet: SAND (SP), brownish yellow, fine, trace coarse sand and fine gravel, laminated. Generally rhythmic sequence of fine SAND (SP) grading down to brownish yellow SILTY SAND (SM), then abrupt basal contact with underlying SAND, beds 1- to 2-feet thick. Damp. (ADVANCE OUTWASH)
SS	44	20-50/5"	
			45
SS	46.5	20-30-30	
SS	49	25-50	
			50
			49.5 to 50.5 feet: SILT (ML), brown with gray clayey silt varves, firm, damp. Minimum 0.5-foot thickness. (ADVANCE OUTWASH)
			50.5 to 69.3 feet: SAND (SP), white with brown and black, fine, damp. Grain size decreases to very fine below about 61.0 feet. Laminated. (ADVANCE OUTWASH)
SS	51.5	20-30-35	
SS	54	15-20-30	@ 54.0 to 54.6 feet: interbed of brownish gray fine SILTY SAND (SP-SM) with trace subangular fine gravel.
			55
SS	56.5	20-25-35	@ 56.5 feet: occasional SILTY SAND (SP-SM) interbeds, rare orange staining.
SS	59	10-50	@ 59.0 feet: cross-bedded.
			60

REMARKS

(1) No water added during drilling. (2) Top of steel casing elevation = 346.51 feet. (3) Northing = 95.12; Easting = 2218.51. (4) Static water elevation after well development = 239.42 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-21
LOCATION	Vashon Island Landfill	PAGE	4 OF 7
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	343.70'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	112.00'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			50.5 to 69.3 feet: SAND (SP), see description on previous page.
SS	61.5	50/5"	
SS	64	50/5"	
SS	66.5	45-50/3"	
SS	69	20-50	
			69.3 to 72.0 feet: SILTY SAND (SP-SM), grayish brown, fine to very fine, little brown fines, subhorizontal laminations and occasional cross-beds, trace coal, damp. (ADVANCE OUTWASH)
SS	71.5	20-20-30	
			72.0 to 97.8 feet: SILT (ML), light gray to 88.0 feet, dark gray below, stiff, moist, varved. Orange-brown precipitate on parting plane at 72.3 feet. Brown laminae common to about 77.0 feet. Common orange banding. (LACUSTRINE PRE-VASHON DEPOSITS)
SS	74	20-20-20	
SS	76.5	10-20-20	@ 77.0 feet: SAND (SP), white and black, fine, common orange-stained laminae. @ 77.6 feet: trace coal. @ 77.8 feet: trace soft to firm, wet clay laminae (capillary saturation).
SS	79	10-15-20	

65 70 75 80

REMARKS

(1) No water added during drilling. (2) Top of steel casing elevation = 346.51 feet. (3) Northing = 95.12; Easting = 2218.51. (4) Static water elevation after well development = 239.42 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-21
LOCATION	Vashon Island Landfill	PAGE	5 OF 7
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	343.70'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	112.00'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			72.0 to 97.8 feet: SILT (ML), see description on previous page.
			@ 80.5 feet: hard orange-red iron concretions, 2-mm-thick layer.
SS	81.5	10-20-20	
			@ 82.5 feet: 1-mm-thick lens of fine SAND (SP).
SS	84	5-10-15	
			@ 84.4 to 85.0 feet: grayish brown SILTY SAND (SM), fine, wet, with orange laminations.
SS	86.5	10-20-30	
SS	89	10-50	
SS	91.5	20-30-30	
			@ 92.0 to 93.0 feet: SILTY SAND (SM), fine, wet, common brown laminae.
SS	94	10-20-30	
SS	95.5	10-25-30	
			@ 95.5 to 95.8 feet: SANDY SILT (ML), gray, some fine sand, wet, 1-cm-thick iron-concreted bed in tip of sampler.
SS	97	15-20-35	
SS	98.5	20-50/5"	**97.8 to 110.0 feet: SAND (SP)**, white with brown and black, fine, damp to about 104.0 feet, wet below 104.0 feet. Description continued on next page.

REMARKS

(1) No water added during drilling. (2) Top of steel casing elevation = 346.51 feet. (3) Northing = 95.12; Easting = 2218.51. (4) Static water elevation after well development = 239.42 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME	Field Investigation Report	BORING NO.	MW-21
LOCATION	Vashon Island Landfill	PAGE	6 OF 7
DRILLED BY	Tacoma Pump & Drilling	GROUND ELEV.	343.70'
DRILL METHOD	Hollow-stem Auger	TOTAL DEPTH	112.00'
LOGGED BY	A. Udaloy	DATE COMPLETED	10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
SS	100	40-50/5"	**97.8 to 110.0 feet: SAND (SP)**, continued: Brown iron-concretions at abrupt upper contact. Common orange laminae. (PRE-VASHON DEPOSITS)
SS	101.5	20-50	
SS	103	30-50/5"	
SS	104.5	25-50/5"	@ 104.5 to 110.0 feet: very fine to fine with trace fines, overall dark gray color, fines content increases downhole.
SS	106	25-50	
SS	107.5	25-27-40	
SS	109	25-30-35	
SS	110.5	15-20-35	**110.0 to 112.0 feet: SILT (ML)**, gray, stiff to hard, moist, laminated. (LACUSTRINE PRE-VASHON DEPOSITS)
			Total depth drilled = 110.5 feet. Total depth sampled = 112.0 feet.

GROUND WATER LEVELS: 1/19/99 Static; 10/28/98 During Instal-lation

DEPTH IN FEET: 105, 110, 115, 120

SAMPLES / WELL DETAILS / LITHOLOGIC COLUMN

See Page 7 for Well Completion Details.

REMARKS

(1) No water added during drilling. (2) Top of steel casing elevation = 346.51 feet. (3) Northing = 95.12; Easting = 2218.51. (4) Static water elevation after well development = 239.42 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

LOG OF EXPLORATORY BORING

PROJECT NAME Field Investigation Report
LOCATION Vashon Island Landfill
DRILLED BY Tacoma Pump & Drilling
DRILL METHOD Hollow-stem Auger
LOGGED BY A. Udaloy

BORING NO. MW-21
PAGE 7 OF 7
GROUND ELEV. 343.70'
TOTAL DEPTH 112.00'
DATE COMPLETED 10/21/98

SAMPLE TYPE	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				125				**WELL COMPLETION DETAILS:** +1.9 to 100.6 feet: nominal 2-inch I.D., flush-threaded, Schedule 40 PVC blank riser pipe. 100.6 to 110.0 feet: nominal 2-inch I.D., flush-threaded, Schedule 40 PVC well screen with 0.020-inch machined slots. 110.0 to 110.2 feet: nominal 2-inch I.D., flush-threaded PVC with threaded end cap. 29.0 to 30.0 feet: stainless steel centralizer. 98.0 to 99.0 feet: stainless steel centralizer. 109.0 to 110.0 feet: stainless steel centralizer. 0 to 2.0 feet: concrete. 2.0 to 91.5 feet: bentonite grout. 91.5 to 95.0 feet: 3/4-inch hydrated Baroid bentonite chips. 95.0 to 111.0 feet: 20 x 40 Colorado silica sand.
				130				
				135				
				140				

REMARKS

(1) No water added during drilling. (2) Top of steel casing elevation = 346.51 feet. (3) Northing = 95.12; Easting = 2218.51. (4) Static water elevation after well development = 239.42 feet, measured January 19, 1999. (5) SS = Nominal 2-inch-diameter split-spoon sampler. G = Grab.

Boring No. P-4

Logged by: CRL

Dated: 4-27-92

Renumbered as MW-24

N 603.3908
E 2988.0027
Top of PVC Elev.
373.93

Graph/ USCS	Soil Description	Consistency	Depth (ft.)	Sample	(N) Blows (ft)	Water Content (%)	Well As-Built
	See P-3 for stratigraphy		5, 10, 15				
			80, 85, 90				
ML	Gray SILT, plastic.	Hard			50/6"	27	

Total depth 90.5 feet.

Well As-built
2" 0.0200 PVC screen placed from 90 to 80 feet.

#8 silica sand placed from 90 to 77 feet.
Bentonite grout tremied to bottom of auger from 77 to 2 feet.
Upper 2 feet is concrete plug to hold surface casing.

(No methane or volatile organics noted during drilling of this well)

Survey data provided by King County Solid Waste Division.

TERRA ASSOCIATES
Geotechnical Consultants

Boring Log
Vashon Landfill
King County, Washington

Proj. No. T-1996	Date 7/92	Figure 7

UDALOY ENVIRONMENTAL SERVICES
SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SAND OR LARGER BASED ON VISUAL CRITERIA	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION IS GRAVEL BASED ON VISUAL CRITERIA	CLEAN GRAVELS (MORE THAN 5% FINES BASED ON VISUAL CRITERIA)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (MORE THAN 5% FINES BASED ON VISUAL CRITERIA)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION IS SAND BASED ON VISUAL CRITERIA	CLEAN SANDS (LESS THAN 5% FINES BASED ON VISUAL CRITERIA)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (MORE THAN 15% FINES BASED ON VISUAL CRITERIA)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER SILT OR FINES BASED ON VISUAL CRITERIA	SILTS AND CLAYS	NON-PLASTIC TO MEDIUM PLASTICITY (BASED ON TACTILE CRITERIA)		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	HIGHLY PLASTIC (BASE ON TACTILE CRITERIA)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

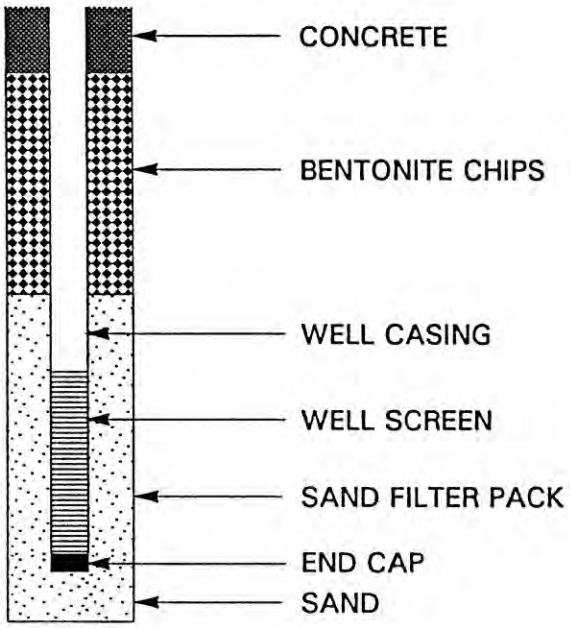
NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.
HYPHENATED SYMBOLS ARE USED TO INDICATE 5 TO 15 PERCENT FINES BASED ON VISUAL EXAMINATION.

EXPLANATION OF SYMBOLS ON EXPLORATORY BORING LOGS

SAMPLE COLUMN

SAMPLE INTERVAL (Attempted)

WELL DETAILS COLUMN

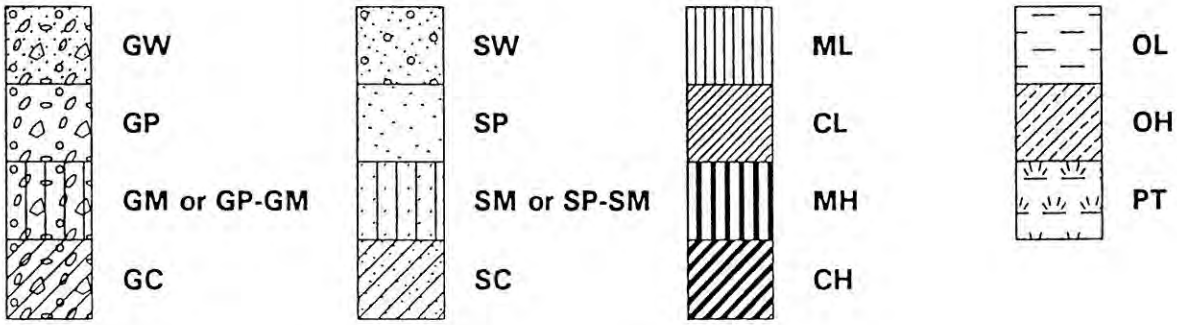


WATER LEVELS

▽ LEVEL AT TIME OF DRILLING

▼ LEVEL AT SPECIFIED DATE

LITHOLOGIC COLUMN



LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**1 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	2							**0 to 2.0 feet: SILTY GRAVEL (GM)**, moderate brown fines, medium to coarse, subrounded to subangular, some nonplastic fines, little fine to medium sand, trace roots, dry, uppermost 2" is mat of grass roots. (WEATHERED TILL/FILL)
								2.0 to 4.0 feet: GRAVELLY SILT (ML), moderate brown fines, nonplastic fines, some fine to coarse subrounded to subangular gravel, little fine to medium sand, trace roots, dry. (WEATHERED TILL)
G	5			5				**4.0 to 23.0 feet: GRAVELLY SILT (ML)**, olive gray fines, medium stiff, moderate plasticity, dry to about 8 feet, moist below 8 feet, little to some fine to medium sand, few fine to medium gravel, trace coarse gravel. (TILL)
G	10			10				@ 10.0 feet: basalt cobble.
G	15			15				
				20				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**2 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	20		**4.0 to 23.0 feet: GRAVELLY SILT (ML)**, continued.
			23.0 to 28.0 feet: SILTY GRAVEL (GM), olive gray fines, medium to coarse, subangular to subrounded, some nonplastic fines, little sand, moist.
G	25		
			28.0 to 34.0 feet: GRAVELLY SILT (ML), light olive brown fines, nonplastic, medium stiff, some fine to medium sand, few fine to coarse subrounded to subangular gravel, moist. (TILL)
G	29		
			34.0 to 46.0 feet: GRAVELLY SILT (ML), light olive gray fines, moderate plasticity, few fine to coarse gravel, little fine to medium sand, trace clay, moist. (TILL)
G	35		

GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN

25

30

35

40

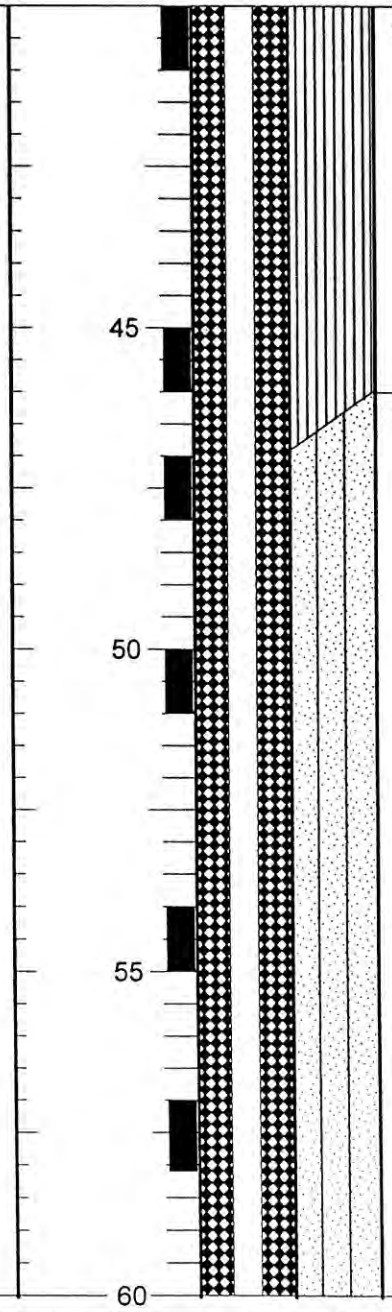
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**3 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	40		**34.0 to 46.0 feet: GRAVELLY SILT (ML)**, continued.
G	45		
G	47		**46.0 to 61.0 feet: SILTY SAND (SP-SM)**, yellow-brown fines, medium, few fines, trace to few medium to coarse subrounded gravel, trace clay, moist. (ADVANCE OUTWASH)
G	50		@ 50.0 feet: fewer fines, gradational to SP.
G	54		@ 54.0 feet: some fines (SM).
SS	57-58.1	8 41 50/2"	@ 57.0 to 57.6 feet: SP-SM as above; 57.6 to 58.1 feet: SP, fine to medium, trace fines, gravel absent.



REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**4 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			46.0 to 61.0 feet: SILTY SAND (SP-SM), continued.
			61.0 to 66.0 feet: SAND (SW), yellow brown fines, subrounded to subangular, trace fine gravel, trace fines, moist. (ADVANCE OUTWASH)
G	64		
			66.0 to 72.0 feet: SILTY GRAVEL (GP-GM), yellow brown fines, fine to medium with trace coarse, rounded to subangular, few fines as coatings on clasts and in silty sand matrix, some fine to medium sand, clast supported, moist. Basal contact position uncertain. (ADVANCE OUTWASH)
G	70		
			72.0 to 85.0 feet: SILTY SAND (SP-SM), yellow brown fines, fine to medium, gravels absent. Grades to trace fines (SP), moist. (ADVANCE OUTWASH)
G	76		

GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN

65 70 75 80

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**5 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	80		**72.0 to 85.0 feet: SILTY SAND (SP-SM)**, continued. @ 80.0 feet: trace fine to medium subrounded gravel.
			85
			85.0 to 96.0 feet: SAND (SP), yellow brown fines, fine, trace fines, moist. (ADVANCE OUTWASH)
G	86		
			@ 89.0 to 93.0 feet: thin interbeds of SILT (ML), gray with orange-brown stains, laminated.
			90
G	90		
			95
G	95		
			96.0 to 108.0 feet: SILTY SAND (SP-SM), yellow brown fines, fine, few medium, trace coarse, few fines, moist. (ADVANCE OUTWASH)
G	97		
			100

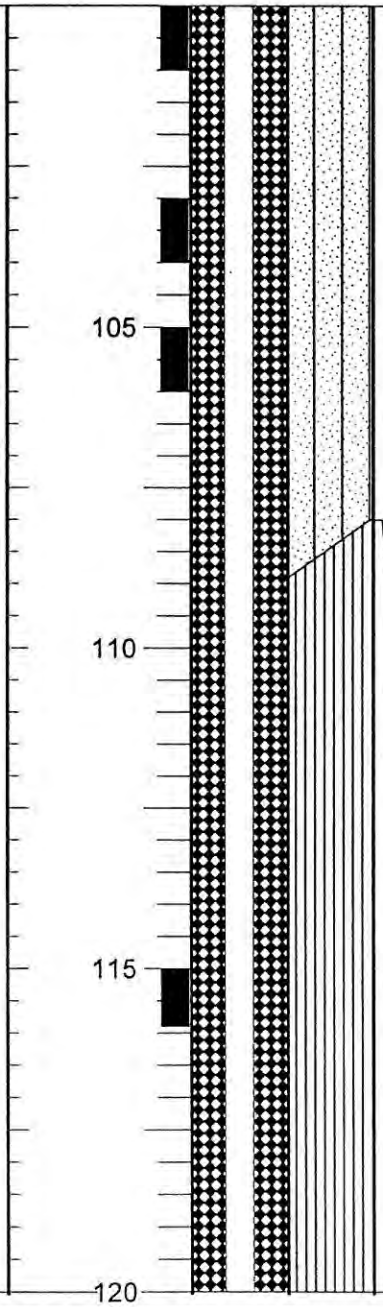
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**6 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	100		**96.0 to 108.0 feet: SILTY SAND (SP-SM)**, continued. @ 100.0 feet: thin interbeds of gray brown clayey silt (ML).
G	103		@ 103.0 feet: thin interbeds of yellow brown fine sandy silt (ML).
G	105		@ 105.0 feet: thin interbeds of gray laminated clayey silt (ML). @ 106.0 to 108.0 feet: cuttings are SP-SM, no returns at 108.0 feet.
			@ 108.0 to 113.0 feet: cuttings returned after drive shoe advanced to 113.0 feet, cuttings are moist to wet (capillary saturation?). Pull back to 108.0 feet and check for formation water: no free water. Water was noted and presumed to be derived from this interval during annular fill placement.
			108.0 to 148.0 feet: SILT (ML), light gray to dark gray with yellow-brown beds, trace to few fine sand, medium plasticity, soft to medium stiff, wet (capillary saturation) to 123.0 feet, water added during drilling below 123.0 feet. (LACUSTRINE DEPOSITS)
G	115-115.9	45 50/5"	@ 115.0 feet: 100% recovery. 115.0 to 115.3 feet: SILT (ML), gray, trace to few fine sand, medium stiff, saturated, rapid dilatancy, medium plasticity, low dry strength. 115.3 to 115.9 feet: SANDY SILT (ML), yellow brown, few to little fine sand, saturated, rapid dilatancy, medium plasticity.



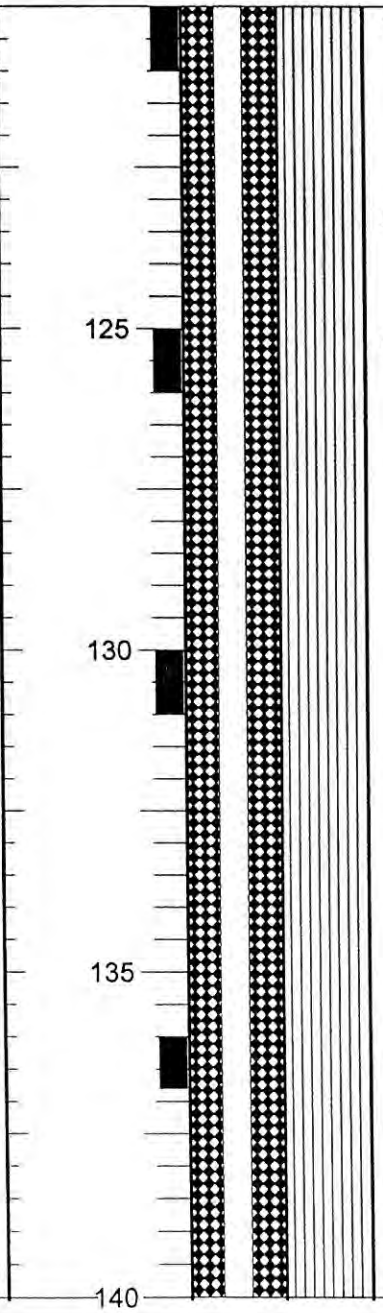
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**7 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	120		**108.0 to 148.0 feet: SILT (ML), continued.**
			@ 123.0 feet: no cutting returns until water is added; cuttings then are gray ML with trace to few fine sand, trace coarse sand (coarse sand may be residual cuttings from casing and cyclone sidewalls).
G	125		@ 125.0 feet: some fine sand.
G	130		
SB	136-136.8	30 20/4"	@ 136.0 feet: 100% recovery. 136.0 to 136.8 feet: clayey silt (ML), dark gray, trace fine sand, moist.



REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**8 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	140							**108.0 to 148.0 feet: SILT (ML)**, continued.
G	145			145				@ 145.0 feet: thin (1-5 mm) laminae, dark gray, few fine sandy silt interbeds.
								@ 148.0 feet: drill action changes, rougher.
								148.0 to 163.0 feet: GRAVELLY SAND (SW), gray brown fines, subangular, some fine to medium and trace coarse subangular to subrounded gravel, trace fines. (FLUVIAL DEPOSITS)
G	150			150				@ 152.0 feet: circulate to clean carry down.
G	155			155				
				160				

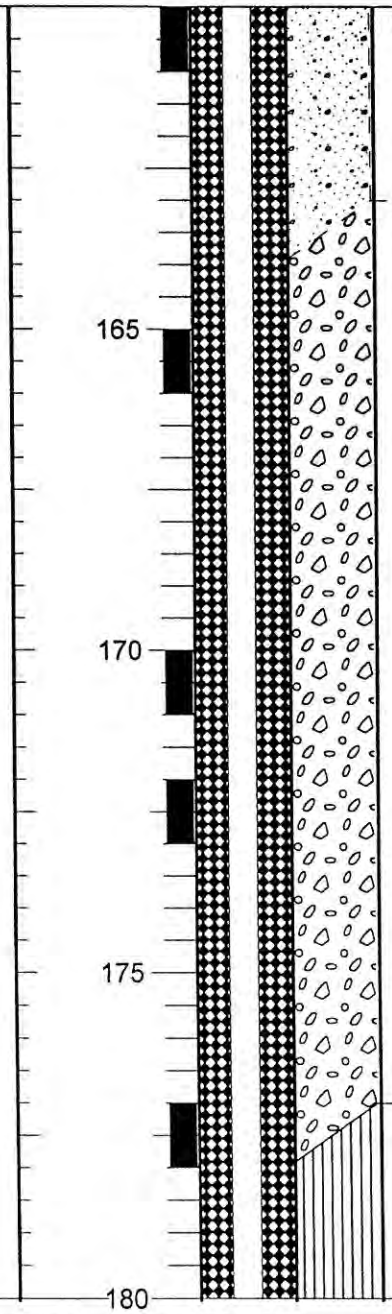
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-25
LOCATION	Vashon Island, Washington	PAGE	9 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	397.3
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	275.4'
LOGGED BY	Udaloy	DATE COMPLETED	8/11/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	160		**148.0 to 163.0 feet: GRAVELLY SAND (SW)**, continued.
			163.0 to 177.0 feet: SANDY GRAVEL (GP), gray brown fines, fine to medium, trace coarse, subangular to subrounded, some medium to coarse subangular to subrounded sand, trace fine sand, trace fines. (FLUVIAL DEPOSITS)
G	165		
G	170		
G	173		@ 173.0 feet: color change from overlying gray brown to yellow brown, fines content increases slightly.
			@ 175.0 feet: driller stops adding water, excellent cuttings returns.
G	177		**177.0 to 207.0 feet: SILT (ML), CLAYEY SILT (ML), and CLAY (CL)**, dark gray, trace to little clay, grades to mostly clay, damp, stiff, massive. (LACUSTRINE DEPOSITS)



REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**10 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	180							**177.0 to 207.0 feet: SILT (ML), CLAYEY SILT (ML) and CLAY (CL)**, continued. @ 180.0 to 185.0 feet: no cuttings recovery, stop casing at 185.0 feet and circulate until cuttings returned, all cuttings were gray silt (ML), no discernable bedding structures. Field test indicates trace clay. Note: below 180.0 feet, cuttings returns were affected by available compressed air supply.
G	185			185				@ 185.0 feet: no discernable bedding structures. Hydrometer test indicates about 53 percent clay-sized particles.
G	188							@ 188.0 feet: no discernable bedding structures.
G	190			190				@ 190.0 feet: no discernable bedding structures.
G	194							@ 194.0 feet: no discernable bedding structures.
G	197			195				@ 197.0 feet: no discernable bedding structures, cuttings stiff to very stiff.
				200				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**11 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								177.0 to 207.0 feet: SILT (ML), CLAYEY SILT (ML) and CLAY (CL), continued.
G	203							@ 203.0 feet: field test indicates mostly (55% or more) clay, trace of fine sand.
G	205			205				
								@ 207.0 feet: driller notes change, rougher action.
								207.0 to 244.0 feet: SILTY GRAVEL (GP-GM), gray fines, fine, trace medium and coarse, trace cobbles, subrounded to subrounded, clast supported with matrix of sandy silt, some fine to coarse subrounded to subangular sand, trace to few fines. Sandy silt matrix is stiff to very stiff. Grades downhole to GW-GM and GW. (FLUVIAL DEPOSITS)
G	209			210				
G	211							
G	215			215				
				220				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**12 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	220							**207.0 to 244.0 feet: SILTY GRAVEL (GP-GM)**, continued. @ 221.0 to 224.0 feet: no cuttings recovery, rotate casing at 224.0 feet while increasing water flow until circulation resumes.
G	224							@ 224.0 feet: no gravel recovery after weld, rotate until circulation re-established.
G	225			225				
				230				@ 230.0 feet: stop casing advance, sample recovery is for entire 225.0 to 230.0 feet interval. Below 230.0 feet: no sample recovery due to poor compressed air circulation.
				235				@ 235.0 feet: drilled to 235.0 feet, cased to 236.0 feet, check for water: 233.2 feet, not rising, interpreted as residual drilling water.
				240				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**13 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	240		▼ 10/14/03					**207.0 to 244.0 feet: SILTY GRAVEL (GP-GM)**, continued. @ 240.0 to 244.0 feet: yellow-brown fines (GW), trace fines, fine to coarse, trace cobbles, trace wood fragments.
								@ 244.0 feet: color change to gray fines.
G	244			245				**244.0 to 247.5 feet: SILT (ML) or SILTY SAND (SM)**, gray, sandy. Drilling action smoothed, cuttings appear as mostly silt with fine sand. (FLUVIAL DEPOSITS)
			▽ 9/23/03					
								@ 247.5 feet: drilling action changes, rougher.
G	248							**247.5 to 275.4 feet: SILTY GRAVEL (GP-GM)**, gray fines, fine to medium, subrounded to subangular, littler sand, few fines, wet. (FLUVIAL DEPOSITS)
				250				
				255				
G	258							@ 258.0 feet: well filled with filter pack and native soils below this level due to damage during installation. @ 258.0 to 275.4 feet: sample quality affected by air circulation. Gravels are recirculating and do not discharge until they are generally fine gravel or finer.
G	259			260				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**14 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	260							**247.5 to 275.4 feet: SILTY GRAVEL (GP-GM)**, continued.
								@ 260.0 to 275.4 feet: all cuttings reduced in fine gravel or finer, insufficient circulation for recovery of coarser fraction, drill action indicates entire interval is gravelly.
G	262							
G	263							
G	265			265				
				270				
G	272							
				275				Bottom of cased boring: 275.0 feet.
								Bottom of drilled boring: 275.4 feet.
								See Page 15 for Well Completion and Liner Details.
				280				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-25**
LOCATION	**Vashon Island, Washington**	PAGE	**15 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**397.3**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**275.4'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/11/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION

285

290

295

300

WELL COMPLETION DETAILS

+2.4 to 248.5 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe.

248.5 to 257.9 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

257.9 to 258.6 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank at joint between screen sections.

258.6 to 262.6 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

262.6 to 263.3 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing with end cap.

247.0 to 248.0 feet: Stainless steel centralizer.

255.0 to 256.0 feet: Stainless steel centralizer.

262.0 to 263.0 feet: Stainless steel centralizer.

0 to 2.0 feet: Concrete.

2.0 to 245.0 feet: Baroid® 3/4-inch bentonite chips.

245.0 to 267.0 feet: 16 x 30 Colorado™ silica sand.

267.0 to 275.4 feet: 10 x 20 Colorado™ silica sand.

160.0 to 171.4 feet: Slough.

171.4 to 178.4 feet: Slough and bentonite chips.

LINER DETAILS

Liner installed November 11, 2003.

244.7 to 248.4 feet: Nominal 3-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe.

248.4 to 257.3 feet: Nominal 3-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

257.3 to 258.0 feet: Nominal 3-inch O.D., flush-threaded, Schedule 80 PVC blank casing plus slip cap attached using four aluminum rivets.

A stainless steel eye-bolt is installed in the center of the cap to facilitate liner installation.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 123 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1524.71 E: 3168.16. (7) Top of PVC elevation = 399.22 feet. (8) Perched groundwater noted at ~108 feet below grade on 7/28/2003 during placement of annular backfill. (9) Groundwater elevation = 155.97 feet, October 14, 2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**1 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	2.5			5				**0 to 1.5 feet: SILTY GRAVEL (GW-GM)**, gray fines, fine to coarse, subrounded to subangular, some fine to coarse sand, little fines, damp to dry, trace plastic, common cobble-sized concrete rubble, very dense. (FILL) **1.5 to 7.0 feet: SILTY SAND (SM)**, yellow brown fines, fine to medium, little fines, some fine to coarse gravel, dense to very dense, moist. (FILL OR WEATHERED TILL)
G	7							**7.0 to 20.0 feet: SILTY SAND (SM)**, gray-brown fines, fine to medium, few to little fines, few fine to medium gravel, damp, dense to very dense. (TILL)
G	9			10				
								@ 12.0 to 20.0 feet: some fines.
G	14			15				
G	19			20				

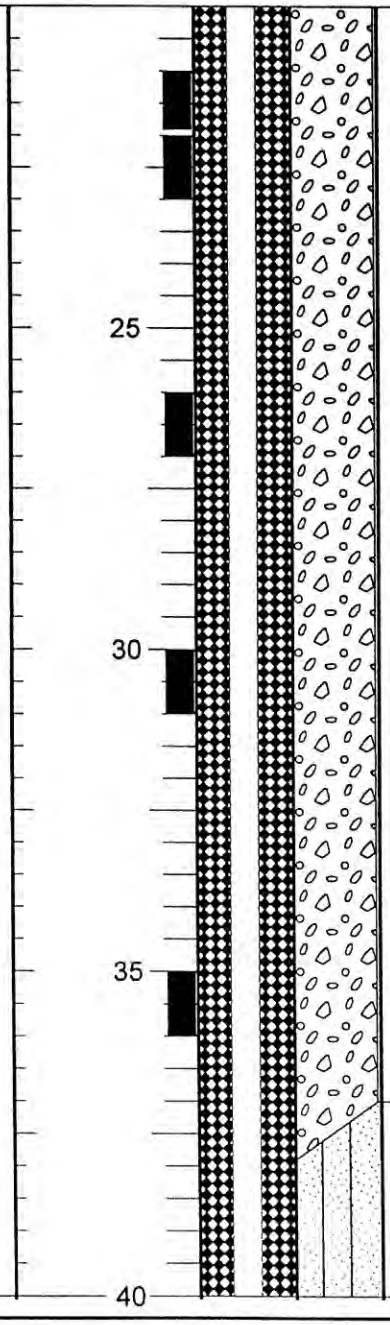
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**2 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	21		**20.0 to 37.0 feet: GRAVEL (GP)**, gray brown fines, medium to coarse, subrounded to subangular, some fine to medium sand, trace coarse sand and fine gravel, trace cobbles, trace boulders. Trace silt as silty sand coatings on gravel clasts. Damp to dry. (FLUVIAL DEPOSITS)
G	22		@ 21.0 to 24.0 feet: granite boulder, granite surface weathered to grus.
G	26		
G	30		@ 30.0 to 32.0 feet: some fine rounded gravel, trace to few fines, transitional to GP-GM.
G	35		@ 35.0 feet: trace to few fines, transitional to GP-GM.
			37.0 to 42.0 feet: SILTY SAND (SP-SM), yellow brown fines, fine to medium, some fine to medium gravel, trace coarse gravel, few fines, moist. Gradational basal contact. (FLUVIAL DEPOSITS)



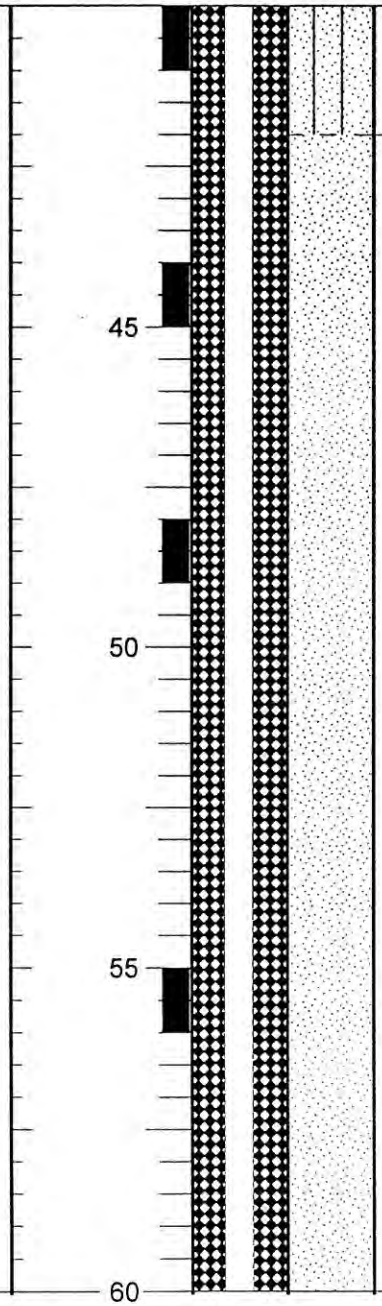
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**3 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	40		**37.0 to 42.0 feet: SILTY SAND (SP-SM)**, continued.
			42.0 to 106.0 feet: SAND (SP), yellow brown fines, fine, trace medium to coarse gravel, moist. (FLUVIAL DEPOSITS)
G	44		
G	48		
			@ 52.0 feet: single subrounded flattened coarse gravel clast in discharge.
G	55		@ 55.0 feet: install sample-through drill bit. @ 55.0 feet: few fine to coarse gravel, predominantly fine sand.



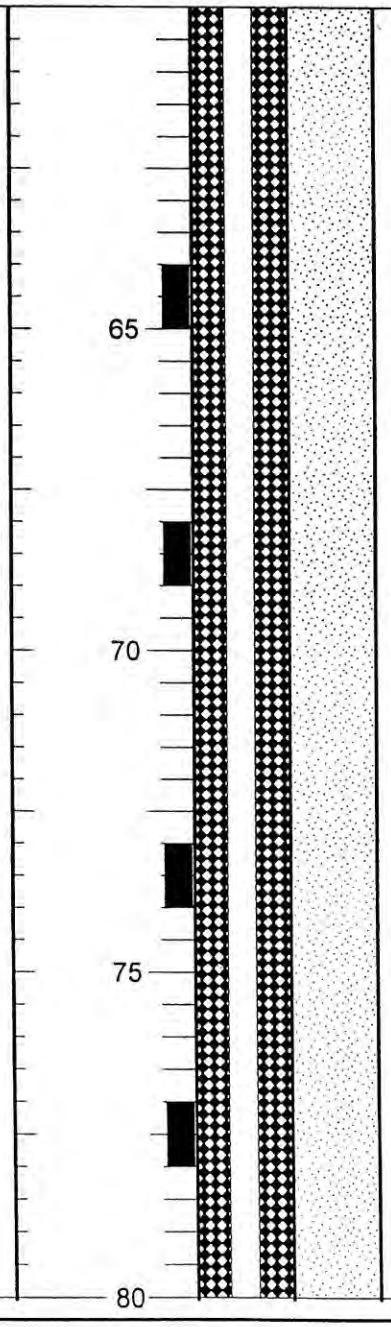
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**4 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			42.0 to 106.0 feet: SAND (SP), continued.
G	64		
			@ 66.0 to 69.0 feet: gravels trace to absent.
G	68		
			@ 69.0 to 78.0 feet: few fine to coarse subrounded to subangular gravel.
G	73		
G	77		
			@ 78.0 to 80.0 feet: trace medium sand, cobble.



REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**5 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								42.0 to 106.0 feet: SAND (SP), continued.
								@ 82.0 feet: losing air circulation to permeable soils, advance casing and drill plug to minimize air loss.
G	84			85				
G	89			90				
G	95			95				
				100				@ 100.0 feet: drive sample attempted, recovery all slough.

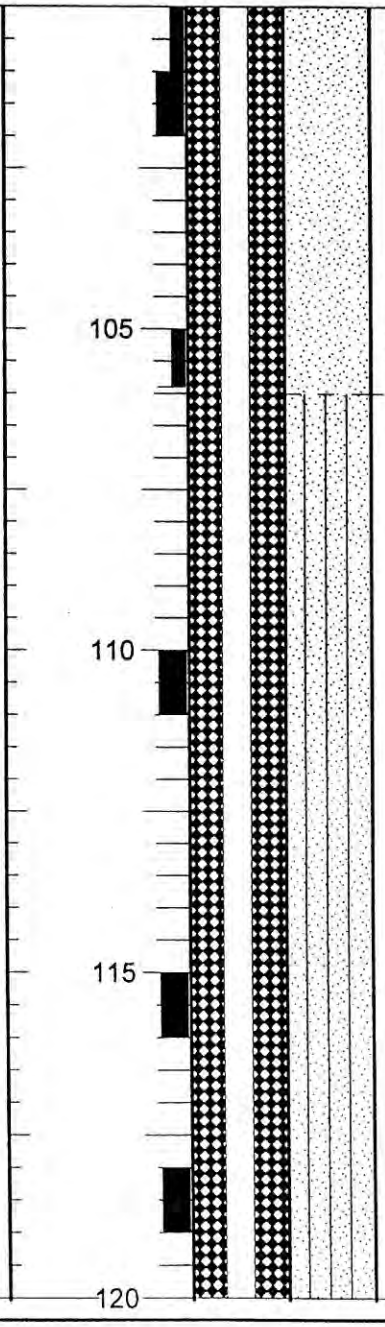
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-26
LOCATION	Vashon Island, Washington	PAGE	6 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.7
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	270.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/6/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
SS		1	**42.0 to 106.0 feet: SAND (SP)**, continued.
		1	
G	101	1	@ 100.0 feet: drive sample attempted, no recovery, all slough.
SS	105	10	@ 105.0 feet: no sample recovery.
		50/5"	
			106.0 to 120.0 feet: SILTY SAND (SM), brown fines, very fine to fine, trace thin (<5 mm) laminae of gray SILT (ML), with orange-brown stains to 118.0 feet. SILT is soft, with moderate plasticity and very high dry strength; some layers may be CLAYEY SILT or CLAY (CL), damp. Gradational basal contact. (LACUSTRINE DEPOSITS)
G	110		
G	115		@ 115.0 feet: common 1-mm-thick gray CLAYEY SILT or CLAY (CL) layers with orange-brown stains, sticky when wetted.
G	118		



REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**7 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								120.0 to 123.0 feet: SILTY SAND (SP-SM), brown fines, fine, trace fine to medium gravel, moist, low dry strength. (FLUVIAL/LACUSTRINE DEPOSITS)
G	122							**123.0 to 149.0 feet: SILTY SAND (SP-SM)**, brown fines, fine, trace fine to medium subrounded gravels, moist. Common thin (<1 mm) interbeds of fine SANDY SILT (ML). (FLUVIAL DEPOSITS)
SS	125	10 10 10		125				@ 125.0 feet: 0.7 foot recovered, SILTY SAND (SP-SM), fine, few brown fines, no apparent bedding structures.
G	126.5							@ 126.0 to 136.0 feet: gravel content increases.
G	131			130				
G	134			135				
				140				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-26
LOCATION	Vashon Island, Washington	PAGE	8 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.7
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	270.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/6/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	140							**123.0 to 149.0 feet: SILTY SAND (SP-SM)**, continued.
								@ 140.0 to 149.0 feet: few fine to coarse subrounded to subangular gravel.
								@ 142.5 feet: no formation water during annular fill placement.
G	144							
SS	145	12 30 32	▽ 8/1/03	145				@ 145.0 feet: 0.3 feet recovered below coarse gravel fragment. Sample is SILTY SAND (SP-SM), dark grayish brown fines, fine, trace to few fines, wet.
								@ 147.0 to 149.0 feet: little gravel.
G	149							@ 149.0 feet: when drilled out to 149.0 feet and cased to 148.0 feet, insufficient flow to permit grab groundwater sample collection.
				150				**149.0 to 210.0 feet: CLAYEY SILT (ML) to CLAY (CL)**, brown gray to 156.0 feet, light gray to dark gray below 156.0 feet. Varved. Damp to dry. Grain size distributions show about 55% to 80% silt-sized fraction, 20% to 45% clay-sized fraction; tactile tests yield classification as CL per ASTM D-422. (LACUSTRINE DEPOSITS)
				155				
SS	156	55/18"						@ 156.0 feet: 1.2 feet recovered. CLAYEY SILT (CL), light gray and medium gray, trace clay, varved (laminae are <1 mm thick), stiff to very stiff, moderate plasticity, dry. Water added while drilling below 156.0 feet.
				160				@ 160.0 feet: stiff to very stiff.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**9 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	160							**149.0 to 210.0 feet: CLAYEY SILT (ML) to CLAY (CL),** continued.
G	165			165				@ 165.0 feet: trace basalt coarse gravel or cobble, silt is stiff.
G	170			170				@ 170.0 feet: stiff to very stiff.
G	174							@ 174.0 feet: stiff to very stiff.
				175				
				180				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**10 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								149.0 to 210.0 feet: CLAYEY SILT (ML) to CLAY (CL), continued.
G	185			185				
G	190			190				
G	194							
G	195			195				
				200				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**11 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								149.0 to 210.0 feet: CLAYEY SILT (ML) to CLAY (CL), continued.
								@ 200.0 to 205.0 feet: no recovery, circulate at 205.0 feet, all cuttings are gray SILT (ML).
G	205			205				
G	209							@ 210.0 feet: rougher drilling.
				210				**210.0 to 226.0 feet: GRAVEL (GP)**, gray fines, fine to medium, rounded, subrounded, and subangular, trace fines, trace to few cobbles, clast-supported. Occasional rounded flattened and oblate flattened clasts. Gradational basal contact. (FLUVIAL DEPOSITS)
G	211							@ 214.0 feet: install additional air compressor.
G	215			215				
				220				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**12 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								210.0 to 226.0 feet: GRAVEL (GP), continued.
G	225			225				
								227.0 to 253.0 feet: GRAVEL (GW), brown-gray fines, fine to coarse, trace fines, little fine to medium sand, few cobbles. Drills with difficulty. (FLUVIAL DEPOSITS)
G	227							
				230				
G	234			235				
G	239			240				@ 239.0 to 241.0 feet: silty lens, few fines, gravels are subrounded to rounded (GP-GM), loose (drills easily).

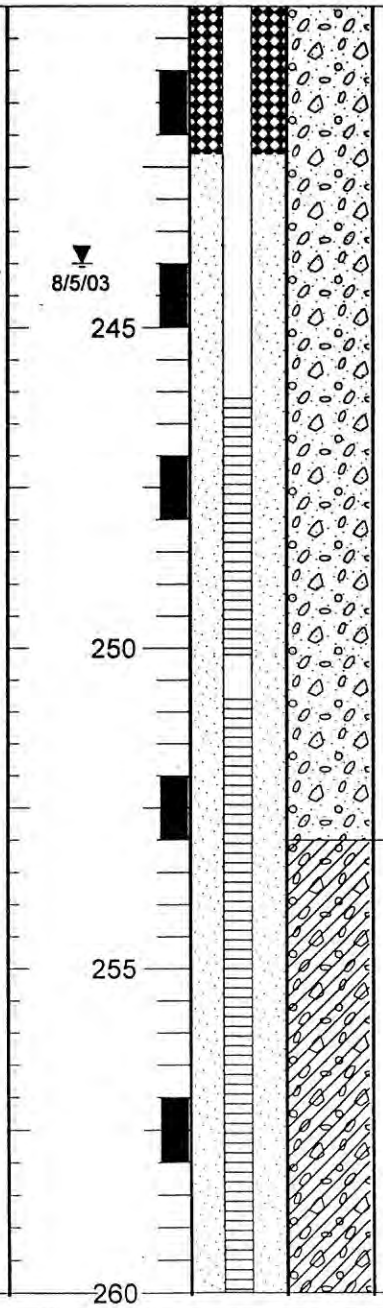
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**13 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	241		**227.0 to 253.0 feet: GRAVEL (GW),** continued.
G	244		@ 244.0 feet: gravels mostly fine to medium, trace light gray fines, trace to few cobbles, clast supported, matrix medium to coarse sand.
G	247		
G	252		
G	257		**253.0 to 270.0 feet: CLAYEY GRAVEL (GC),** light gray fines, fine to coarse, subrounded to rounded, commonly flattened, few cobbles, trace boulders, some fines, little fine to medium sand. Drills relatively easily. (FLUVIAL DEPOSITS)



REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 156 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1531.10 E: 2450.01. (7) Top of PVC elevation = 403.40 feet. (8) Perched groundwater noted at 145.5 feet below grade on 8/1/2003 during well construction. Groundwater elevation = 157.88 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**14 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	263			265				**253.0 to 270.0 feet: CLAYEY GRAVEL (GC), continued.**
				270				Bottom of cased boring: 266.0 feet. Bottom of drilled boring: 270.0 feet.
				275				
				280				See Page 15 for Well Completion Details.

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-26**
LOCATION	**Vashon Island, Washington**	PAGE	**15 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.7**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**270.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/6/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
				285 290 295 300				**WELL COMPLETION DETAILS** +2.7 to 246.1 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe. 246.1 to 250.1 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers. 250.1 to 250.8 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank at joint between screen sections. 250.8 to 260.2 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers. 260.2 to 260.8 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing with end cap. 245.0 to 246.0 feet: Stainless steel centralizer. 252.0 to 253.0 feet: Stainless steel centralizer. 259.5 to 260.5 feet: Stainless steel centralizer. 0 to 2.0 feet: Concrete. 2.0 to 242.3 feet: Pure Gold® bentonite chips. 242.3 to 263.7 feet: 16 x 30 Colorado™ silica sand. 263.7 to 267.4 feet: Pea gravel. 267.4 to 270.0 feet: Slough.

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	1 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			0 to 0.4 foot: ASPHALT
			0.4 to 2.5 feet: SILTY GRAVEL (GW-GM), brown fines, subrounded to subangular, some fine to medium sand, few fines, moist. (ROAD SUBGRADE)
G	4		**2.5 to 7.0 feet: SILTY GRAVEL (GP-GM)**, brown fines, medium to coarse, subrounded to subangular, some fine to coarse sand, few fines, few cobbles, trace boulders, dry to moist. Trace wood debris, broken glass and plastic debris at 3.0 to 3.5 feet. (FILL)
G	8		**7.0 to 11.0 feet: SILTY GRAVEL (GM)**, olive gray fines, fine to coarse, subrounded to subangular, some fines, little fine to medium sand, trace cobbles, moist. Gravel content decreases downhole, gradational basal contact. (TILL)
G	12		**11.0 to 27.0 feet: SILTY SAND (SM)**, olive gray fines, fine to medium, trace to few coarse, some nonplastic fines, some fine to medium gravel, trace coarse gravel, trace cobbles, moist. (TILL)
G	15		

GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN

5
10
15
20

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**2 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	20							**11.0 to 27.0 feet: SILTY SAND (SM)**, continued.
								@ 23.0 feet: gravelly.
G	25			25				@ 25.0 to 28.0 feet: slight increase in moisture content.
								27.0 to 39.0 feet: SILTY SAND (SP-SM), yellow brown fines, fine to medium, subrounded to subangular, trace to few subrounded coarse sand and fine gravel, few fines, moist. Transitional to SP. Basal contact defined as where silt occurs disseminated within matrix. (FLUVIAL DEPOSITS)
G	30			30				
								@ 33.0 feet: smoother drilling. @ 33.0 to 39.0 feet: trace to few fine subrounded to subangular gravel, drilling action suggests gravel occurs in beds, occasional thin (<5 mm) brown sandy silt (ML) as beds, silt also occurs as thin coatings on gravels.
G	35			35				
								39.0 to 45.0 feet: SILTY SAND (SM), see description on next page.
				40				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**3 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	40		**39.0 to 45.0 feet: SILTY SAND (SM)**, yellow brown fines, fine to medium, trace coarse, some fines, some subrounded to subangular fine gravel, damp to moist. Gradational basal contact. (FLUVIAL DEPOSITS)
			@ 42.0 to 44.0 feet: few fine gravel.
G	45		**45.0 to 74.0 feet: SILTY SAND (SP-SM)**, yellow brown to grayish brown fines, fine to medium, trace coarse, trace to few fines (gradational to SP), little to some rounded, subrounded and subangular fine gravel at 45.0 feet, trace to few fine gravel below. Uncertain basal contact due to discharge hose failure. (FLUVIAL DEPOSITS)
G	50		
G	55		@ 55.0 feet: remove standard tri-cone drill bit, install sample-through bit.
			@ 59.0 feet: cobbles.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**4 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	60							**45.0 to 74.0 feet: SILTY SAND (SP-SM)**, continued. @ 60.0 to 76.0 feet: very easy drilling, very easy to drive casing, transitional to SP-SM, sand is fine with trace medium, trace fine to coarse subrounded to subangular gravel.
G	65			65				
G	70			70				
								74.0 to 77.5 feet: SAND (SP), yellow brown fines, fine, trace fines, damp. (FLUVIAL DEPOSITS)
G	76			75				
								77.5 to 87.0 feet: SAND (SP), yellow brown fines, fine with common interbeds of thin (<3 mm) gray silt (ML) beds, damp to moist, silt beds are soft, moderate plasticity, damp to moist. (FLUVIAL DEPOSITS)
				80				

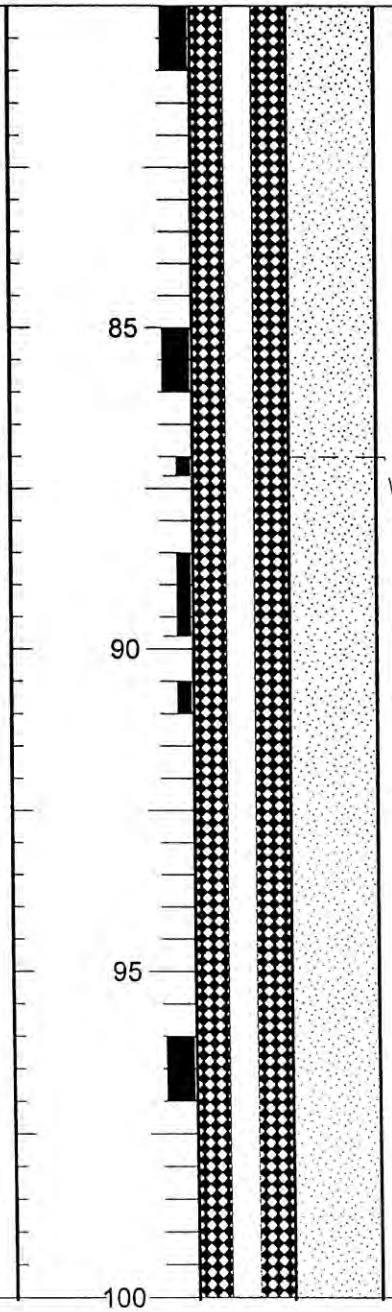
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**5 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	80		**77.5 to 87.0 feet: SAND (SP)**, continued.
G	85		
SS	87	100/3"	@ 87.0 feet: no sample recovery, fragments of a quartzite cobble in sampler drive shoe. No silt beds observed in cuttings below 87.0 feet.
SS	88.5	35 40 50/4"	**87.0 to 102.0 feet: SAND (SP)**, yellow brown fines, fine, trace fines, damp. Grades to SILTY SAND (SM). (FLUVIAL DEPOSITS) @ 88.5 feet: 3-inch recovery, fragments of a quartzite cobble plus slough, no formation.
SS	90.5	100	@ 90.5 feet: SILTY SAND (SM), fine, little to some fines.
			@ 92.0 feet: color change to brown fines, moist (possible former perched saturated zone?).
G	96		



REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**6 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	100		**87.0 to 102.0 feet: SAND (SP)**, continued. @ 100.0 feet: common orange-brown coatings on sand grains, moist.
G	102		**102.0 to 106.0 feet: SAND (SP)**, brown-orange fines, fine, trace medium to coarse, trace fine gravel, one gravel clast has red-orange stains, moist, with common beds of brown-gray silt (ML), silt is soft, moist, with moderate plasticity. Casing sinks freely from 104.0 to 106.0 feet. (FLUVIAL DEPOSITS)
SS	106	50	**106.0 to 118.0 feet: SILT (ML)**, brownish gray at upper contact, gray below, trace to some fine sand, soft at upper contact to slightly stiff below, moist, nonplastic to low plasticity. (LACUSTRINE DEPOSITS) @ 108.0 to 113.0 feet: poor sample recovery.
SS		50	@ 113.0 feet: no sample recovery.
SS	113.5	100/4"	@ 113.5 feet: 100 percent recovery. SANDY SILT (ML), gray, some fine sand, trace fine gravel, slightly stiff, moderate to low plasticity, moist. @ 115.0 feet: add water during drilling.
G	116		
SS	117	NR	@ 117.0 feet: gray very fine SANDY SILT (ML), soft, moderate plasticity, some very fine sand, moist to saturated (apparent capillary saturation).
			118.0 to 135.0 feet: SILT (ML), gray, soft to stiff. (LACUSTRINE DEPOSITS)

105 110 115 120

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**7 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	120		**118.0 to 135.0 feet: SILT (ML),** continued.
G	122		
G	124		@ 124.0 feet: trace subangular black (basalt) fine gravel, trace brown laminated silt (ML).
SS	126	100	@ 126.0 feet: no sample recovery. Install secondary air compressor to facilitate sample recovery.
SS	130.5	99/18"	
			@ 132.7 feet: depth to water measured during placement of annular backfill with 8-inch steel casing drive shoe at 134.1 below grade, 08/14/03. Borehole caved to 0.3 feet below drive shoe.
G	134		
			135.0 to 140.0 feet: SAND (SP), gray fines, fine, few fines. (FLUVIAL/LACUSTRINE DEPOSITS)
SS	137	10 30 50/5"	@ 137.0 feet: 3-inch recovery, SAND (SP), gray fines, fine, trace to few fines. No apparent bedding structures. Based on water levels measured during annular fill placement, sample was likely disturbed by heaving.

GROUND WATER LEVEL: ▽ 8/14/03

DEPTH IN FEET: 125, 130, 135, 140

SAMPLES

WELL DETAILS

LITHO-LOGIC COLUMN

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	8 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	140							**140.0 to 150.0 feet: SILT (ML)**, gray, very stiff to hard. Trace organic material at 140.0 feet, absent below. (LACUSTRINE DEPOSITS)
G	145			145				
G	148							
				150				**150.0 to 156.0 feet: SILTY GRAVEL (GM)**, yellow-brown fines, fine to medium, subrounded to subangular, matrix-supported, matrix is laminated gray clayey silt (CL) with yellow-brown staining adjacent to gravels. (FLUVIAL/LACUSTRINE DEPOSITS)
G	152							
				155				
G	156							**156.0 to 164.0 feet: SILT (ML)**, gray, trace clay, very stiff to hard. (LACUSTRINE DEPOSITS)
				160				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	9 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	160							**156.0 to 164.0 feet: SILT (ML),** continued.
G	165			165				**164.0 to 174.0 feet: SILTY GRAVEL (GP-GM),** brown-gray fines, medium to coarse, subrounded to subangular, some fine to medium sand, few to little fines (a portion of the fines may be carry-down). (FLUVIAL DEPOSITS)
G	169			170				
G	172							
G	175			175				**174.0 to 190.0 feet: GRAVELLY SAND (SP),** brown fines, fine to medium, trace fines, some fine to coarse gravel, trace cobbles, drills easily. (FLUVIAL DEPOSITS)
				180				

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	10 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								174.0 to 190.0 feet: GRAVELLY SAND (SP), continued.
G	181.5							
G	185			185				@ 185.0 feet: ½-inch-thick by 3-inch-diameter disc of PEAT, brown.
			▼ 10/14/03					
				190				**190.0 to 197.0 feet: SAND (SP)**, yellow brown fines, medium to coarse, subrounded to angular, few fines at upper contact (SP-SM), trace fines below, few fine to medium gravel, transitional to SW. Gradational basal contact. (FLUVIAL DEPOSITS)
G	191							
G	195			195				**197.0 to 211.0 feet: SILTY GRAVEL (GW-GM)**, yellow gray fines, fine to coarse, subrounded to subangular, few fines, little fine to coarse sand. (FLUVIAL DEPOSITS)
				200				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet ~~below grade on~~ 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

UDALOY ENVIRONMENTAL SERVICES

? TD=237' elevation 132.7 ft bgs

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	11 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	200							**197.0 to 211.0 feet: SILTY GRAVEL (GW-GM),** continued.
G	205			205				
G	209			210				**211.0 to 214.0 feet: SILTY GRAVEL (GM),** yellow brown fines, medium to coarse, subrounded to subangular, some fines, continuous with and basal unit of overlying GP-GM. (FLUVIAL DEPOSITS)
G	213							**214.0 to 217.0 feet: SILTY SAND (SM),** gray fines with black sand grains, very fine to fine, some fines, smooth drilling, uncertain basal contact. (FLUVIAL DEPOSITS)
G	215			215				$i = \frac{190.2 - 186.5}{217 - 193} = 0.15$
								@ 217.0 feet: with drive shoe at 217.0 feet, static water depth is 190.2 feet after 30 minutes.
								217.0 to 227.0 feet: GRAVEL (GP), gray brown fines (fine to medium, rounded to subrounded, some fine to medium sand, trace fines. Transitional to GP-GM. (FLUVIAL DEPOSITS)
				220				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	12 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	221							**217.0 to 227.0 feet: GRAVEL (GP)**, continued.
G	224			225				$i_2 = \frac{205.8 - 190.2}{227 - 217} = 1.56$
								@ 227.0 feet: with drive shoe at 227.0 feet, depth to water is 205.8 feet after 30 minutes, rising very slowly after 30 minutes. ~Elev 175'
G	228			230				**227.0 to 237.0 feet: SILTY GRAVEL (GM)**, gray fines, medium to coarse, subrounded to subangular, some fines, few to little fine to medium sand, trace cobbles. Easy drilling. (FLUVIAL DEPOSITS)
G	232			235				
G	236							Total depth drilled and sampled = 237.0 feet.
				240				See Page 13 for Well Completion Details.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**13 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION

245

250

255

260

WELL COMPLETION DETAILS

+2.3 to 186.5 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe.

186.5 to 190.6 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

190.6 to 191.4 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing at joint between screen sections.

191.4 to 200.7 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

200.7 to 201.3 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing and end plug.

185.0 to 186.0 feet: Stainless steel centralizer.
192.0 to 193.0 feet: Stainless steel centralizer.
200.0 to 201.0 feet: Stainless steel centralizer.

0 to 2.0 feet: Concrete.
2.0 to 134.0 feet: Baroid® 3/4-inch bentonite chips.
134.0 to 141.0 feet: Slough.
141.0 to 183.5 feet: Baroid® 3/4-inch bentonite chips.
183.5 to 203.5 feet: Norton™ 16 x 30 silica sand.
203.5 to 237.0 feet: Pea gravel.

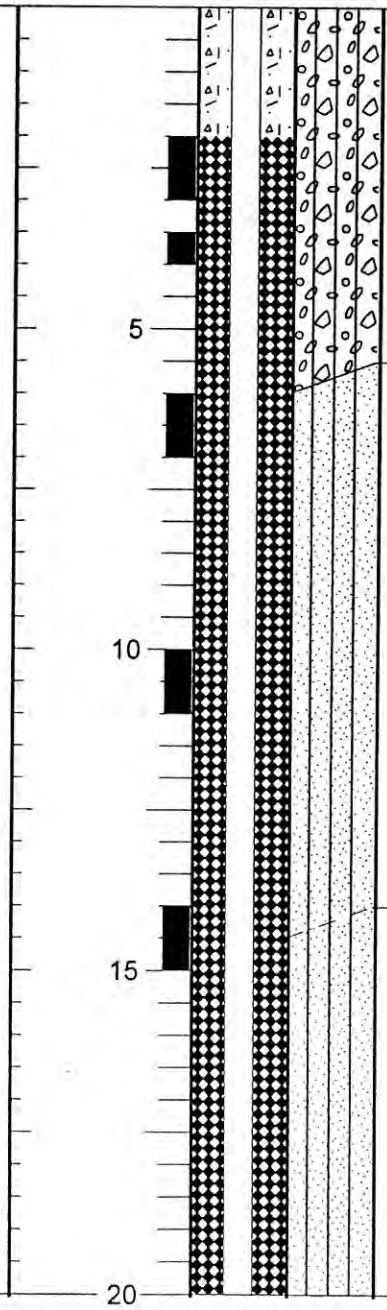
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	1 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	2		**0 to 5.5 feet: SILTY GRAVEL (GM)**, yellow brown fines, fine to coarse, subrounded to subangular, some fines, few to little fine to coarse sand, damp to dry. Very dense to 3.0 feet, dense compacted below 3.0 feet. Trace cobbles, trace boulders, trace organic material. (FILL)
G	3.5		
			@ 4.5 to 5.0 feet: SAND (SP), brown fines, fine to medium, telephone utility conduit bedding.
G	6		**5.5 to 14.0 feet: SILTY SAND (SM)**, yellow brown fines, fine to medium, some fines, some fine to medium subrounded to subangular gravel, damp. Very difficult drilling. (TILL)
G	10		
G	14		**14.0 to 33.5 feet: SILTY SAND (SM)**, gray brown fines, fine to medium, some fines, few fine to medium subrounded to subangular gravel, trace cobbles, trace boulders, damp. Difficult drilling. (TILL)
			@ 18.0 feet: cobble or boulder.



REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-28**
LOCATION	**Vashon Island, Washington**	PAGE	**2 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.5**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**277.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/29/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	20							**14.0 to 35.5 feet: SILTY SAND (SM)**, continued.
								@ 22.0 to 24.0 feet: cobbles or boulders.
G	25			25				
G	27							@ 27.0 feet: little fine to medium gravel, little coarse sand.
				30				
G	31							@ 31.0 feet: moist.
G	34			35				**33.5 to 40.0 feet: SILTY SAND (SW-SM)**, yellow brown fines, subrounded to subangular, trace to few fines, few fine to medium subrounded to subangular gravel, silt occurs both disseminated in matrix and as coatings on fine gravel. Uncertain basal contact. (FLUVIAL DEPOSITS)
G	39			40				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	3 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	41		**40.0 to 96.5 feet: SAND (SP)**, yellow brown fines, fine, trace coarse, trace fines, few medium to coarse rounded to subrounded gravel, moist. Easy drilling, casing falls freely behind drill bit. (FLUVIAL DEPOSITS)
G	45		
G	50		@ 50.0 feet: trace fines as very thin coatings on coarse sand and fine gravel.
G	54		@ 54.0 feet: damp to moist, trace to few fines (gradational to SP-SM). @ 55.0 feet: remove standard tri-cone drill bit, install sample-through drill bit.

45
50
55
60

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-28**
LOCATION	**Vashon Island, Washington**	PAGE	**4 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.5**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**277.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/29/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								40.0 to 96.5 feet: SAND (SP), continued.
								@ 60.0 to 66.0 feet: no sample recovery until 66.0 feet.
				65				
G	67							
				70				
G	70							
								@ 74.0 feet: poor sample recovery.
				75				
								@ 76.0 feet: install secondary air compressor to facilitate sample recovery.
G	78							
				80				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-28**
LOCATION	**Vashon Island, Washington**	PAGE	**5 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.5**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**277.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/29/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			40.0 to 96.5 feet: SAND (SP), continued.
G	83		
			85
SS	86	30 50/2"	@ 86.0 feet: 100 percent recovery, SAND (SP), fine, trace to few fines, subangular, damp, granite gravel fragment in drive shoe (gravel is likely carry-down).
G	90		@ 90.0 feet: few fines (gradational to SP-SM).
			90
G	94		
			95
G	96		@ 96.0 feet: trace fine rounded to subrounded gravel, including flattened oblate clasts, few fines, damp.
SS	97	100/12"	**96.5 to 100.0 feet: SILT (ML)**, gray at upper contact, olive brown below, trace to few clay, damp, stiff, micaceous, laminated. (FLUVIAL DEPOSITS) @ 97.0 feet: 100 percent recovery. Includes bed of wet fine SANDY SILT (ML), plus orange staining as subvertical tubular structures (rootlets?).
			100

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-28**
LOCATION	**Vashon Island, Washington**	PAGE	**6 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.5**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**277.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/29/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	101							**100.0 to 103.0 feet: SILTY GRAVEL (GW-GM)**, gray brown fines, subrounded, some fine to medium sand, few to little fines, damp. Silt occurs as thin coatings on gravels and in matrix. Clast supported. (FLUVIAL DEPOSITS)
								103.0 to 138.0 feet: SAND (SP), gray brown fines, fine, trace medium to coarse rounded to subrounded gravel, trace fines, trace cobbles, damp. Drills easily. (FLUVIAL DEPOSITS)
G	105			105				@ 105.0 to 110.0 feet: trace subangular to angular medium and coarse sand, trace subrounded flattened fine gravel.
G	110			110				
G	115			115				@ 116.0 feet: trace coarse gravel (may be carry-down), trace cobbles.
				120				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	7 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	120		**103.0 to 138.0 feet: SAND (SP)**, continued. @ 120.0 feet: few fine to medium gravel, trace cobbles.
G	122		@ 122.0 feet: few coarse sand and fine gravel.
G	125		
G	127		@ 127.0 feet: trace cobbles.
			▽ 8/26/03
G	132		@ 131.0 feet: color change to yellow brown fines. Perched water depth: 131.4 feet on 8/26/03 with boring cased to 136.0 feet and drilled to 138.0 feet. Wet below 131.4 feet.
			@ 134.0 feet: grab water sample quality: brown, turbid, opaque, odorless, no sheen, pH = 6.65, specific conductance = 116 µS/cm, temperature = 17°C.
G	136		@ 136.0 to 138.0 feet: thin (1 mm) gray beds of SILTY SAND (SM or SP-SM).
SS	138	15 15 30/2"	**138.0 to 194.0 feet: SILT (ML)**, gray, trace clay, stiff to very stiff to 154.0 feet, very stiff to hard below, wet near upper contact, dry to damp below 142.0 feet. Description continued on next page.
G	139.5		

125 130 135 140

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-28**
LOCATION	**Vashon Island, Washington**	PAGE	**8 of 15**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**393.5**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**277.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/29/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	143			145				**138.0 to 194.0 feet: SILT (ML)**, continued: Laminated. Occasional layers with trace very fine sand. (LACUSTRINE DEPOSITS) @ 138.0 feet: 8-inch recovery. Gray fine to medium SAND (SP) overlying 1-inch gray SILT (ML) with orange stains on upper contact, overlying ½-inch fine gray SAND (SP), overlying gray fine SANDY SILT (ML), and SILTY SAND (SM), wet.
G	149			150				
G	154			155				@ 155.0 feet: add water during drilling.
G	156							
				160				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	9 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	160							**138.0 to 194.0 feet: SILT (ML), continued.**
G	164			165				@ 164.0 feet: one clast of subrounded coarse basalt gravel.
G	168			170				
G	173			175				
G	177							
G	179			180				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	10 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								138.0 to 194.0 feet: SILT (ML), continued.
G	183			185				
G	188			190				
G	192							
G	194			195				**194.0 to 200.0 feet: SILTY SAND (SM)**, gray fines, fine to medium, some fines, little fine to medium subrounded to subangular gravel. (LACUSTRINE/FLUVIAL DEPOSITS)
								@ 195.0 to 203.0 feet: no water added during drilling.
G	198			200				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	11 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	202							**200 to 203.0 feet: SILT (ML)**, gray, gravels absent. (LACUSTRINE/FLUVIAL DEPOSITS)
								@ 203.0 feet: resume adding water during drilling.
G	205			205				**203.0 to 226.0 feet: SILTY SAND (SP-SM)**, gray fines, fine to medium, some fine to coarse subrounded to subangular gravel, trace cobbles. Drills easily. (FLUVIAL DEPOSITS)
G	208			210				
G	213			215				
				220				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	12 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	220		**203.0 to 226.0 feet: SILTY SAND (SP-SM)**, continued.
G	223		@ 223.0 feet: fine to coarse sand (SW-SM). Note that fines will be underestimated in sample submitted for grain size analysis due to drilling water flow.
			226.0 to 232.0 feet: SILTY GRAVEL (GW-GM), gray fines, fine to coarse, subrounded to subangular, some fine to coarse sand, trace to few fines. Transitional to GW. (FLUVIAL DEPOSITS)
G	230		@ 230.0 feet: with boring drilled and cased at 231.5 feet, no formation water in casing. With casing pulled back to 230.0 feet and open to 231.5 feet, no formation water.
			232.0 to 260.0 feet: SILT (ML), dark gray and light gray, trace to few clay, very stiff to very hard, dry to damp, laminated. (LACUSTRINE DEPOSITS)
G	234		
SS	235	15 30	@ 235.0 feet: no recovery except trace of hard gray SILT (ML).
G	238		

GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN

225

230

235

240

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	13 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			232.0 to 260.0 feet: SILT (ML), continued.
G	241		
G	244		
			245
G	246		
SS		50	@ 247.0 feet: no sample recovery, only slough.
G	248		
SS	249	100/8"	@ 249.0 feet: SILT (ML), dark gray, hard, no varves or bedding structures.
			250
G	254		
			255
G	257		
			260
			@ 260.0 feet: rough drilling.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	14 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	260							**260.0 to 277.0 feet: SILTY GRAVEL (GW-GM)**, gray fines, rounded, subrounded and subangular, few fines, little fine to coarse sand, trace cobbles, trace boulders, dry to damp. Transitional to GP-GM, medium to coarse. (FLUVIAL DEPOSITS)
G	262							
				265				
G	266							
				270				
G	270							
G	274							
				275				@ 275.0 feet: with boring cased to 275.0 feet and drilled to 277.0 feet, no formation water. After pulling casing back to 272.0 feet, no formation water after standing for 2.5 hours. Total depth drilled and sampled = 277.0 feet.
								See Page 15 for Well Completion Details.
				280				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-28
LOCATION	Vashon Island, Washington	PAGE	15 of 15
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	393.5
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	277.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION

285

290

295

300

WELL COMPLETION DETAILS

+2.1 to 219.6 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe.

219.6 to 223.7 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

223.7 to 224.5 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing at joint between screen sections.

224.5 to 234.0 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

234.0 to 234.4 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing and end plug.

218.5 to 219.5 feet: Stainless steel centralizer.
224.3 to 225.0 feet: Stainless steel centralizer.
233.2 to 234.2 feet: Stainless steel centralizer.

0 to 2.0 feet: Concrete.
2.0 to 216.5 feet: Baroid® 3/4-inch bentonite chips.
216.5 to 235.8 feet: Norton ™ 16 x 30 silica sand.
235.8 to 277.0 feet: Baroid® 3/4-inch bentonite chips.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 155 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 1608.67 E: 2654.33. (7) Top of PVC elevation = 395.59 feet. (8) Perched groundwater noted at 131.4 feet below grade on 8/26/2003. No groundwater in well as of 10/14/2003.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	1 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	2							**0 to 5.5 feet: SANDY SILT (ML)**, olive brown to yellow brown, nonplastic, few fine to medium sand, little fine to coarse subrounded to subangular gravel, trace cobbles, compacted, dry. (FILL and WEATHERED TILL)
G	5			5				**5.5 to 56.5 feet: SANDY SILT (ML)**, olive gray, nonplastic, some fine to medium sand, few medium to coarse subrounded to subangular gravel, trace cobbles, dry to damp, slow drill rate. (TILL)
G	6							@ below 9.0 feet: olive brown color.
G	10			10				
G	15			15				@ 19.0 feet: little gravel.
				20				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 138 feet. (4) Standard tri-cone bit used to 57 feet depth, sample-through bit used below 57 feet. (5) Reference elevation = ground surface. (6) N: 1451.61 E: 2917.03. (7) Top of PVC elevation = 410.57 feet. (8) Perched groundwater noted at 133.2 feet below grade on 8/25/2003 during well construction. Regional groundwater elevation = 164.60 feet on 8/29/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	2 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	20							**5.5 to 56.5 feet: SANDY SILT (ML)**, continued.
G	25			25				
G	30			30				
G	34							
				35				@ 35.0 to 36.0 feet: boulder.
G	36							
				40				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 138 feet. (4) Standard tri-cone bit used to 57 feet depth, sample-through bit used below 57 feet. (5) Reference elevation = ground surface. (6) N: 1451.61 E: 2917.03. (7) Top of PVC elevation = 410.57 feet. (8) Perched groundwater noted at 133.2 feet below grade on 8/25/2003 during well construction. Regional groundwater elevation = 164.60 feet on 8/29/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	3 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								5.5 to 56.5 feet: SANDY SILT (ML), continued.
G	44			45				
G	48			50				
G	53			55				
G	57			60				**56.5 to 59.0 feet: SILTY SAND (SW-SM)**, olive brown to yellow brown fines, fine to coarse, subrounded to subangular, few fines, little fine subrounded to subangular gravel, moist. (FLUVIAL DEPOSITS)
								59.0 to 113.0 feet: SAND (SP), yellow brown, fine, few medium, trace coarse, trace fines, trace fine to medium

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 138 feet. (4) Standard tri-cone bit used to 57 feet depth, sample-through bit used below 57 feet. (5) Reference elevation = ground surface. (6) N: 1451.61 E: 2917.03. (7) Top of PVC elevation = 410.57 feet. (8) Perched groundwater noted at 133.2 feet below grade on 8/25/2003 during well construction. Regional groundwater elevation = 164.60 feet on 8/29/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	4 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								subrounded to subangular gravel, moist. (FLUVIAL DEPOSITS)
G	63			65				
G	68			70				
G	72			75				@ 72.0 feet: yellow gray color, cuttings appear saturated but as if only capillary saturation.
G	76			80				@ 75.0 to 77.0 feet: SILTY SAND (SW-SM), few fine to medium subrounded to subangular gravel, no water enters boring although cuttings appear saturated.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 138 feet. (4) Standard tri-cone bit used to 57 feet depth, sample-through bit used below 57 feet. (5) Reference elevation = ground surface. (6) N: 1451.61 E: 2917.03. (7) Top of PVC elevation = 410.57 feet. (8) Perched groundwater noted at 133.2 feet below grade on 8/25/2003 during well construction. Regional groundwater elevation = 164.60 feet on 8/29/2003.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	5 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	80			85				**59.0 to 113.0 feet: SAND (SP)**, continued. @ 80.0 feet: some fine to medium gravel.
G	88			90				
G	92							@ 92.0 feet: trace to few fines. @ 93.0 to 95.0 feet: thin (<5 mm) beds of SILTY SAND (SP-SM or SM).
G	95			95				
				100				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 138 feet. (4) Standard tri-cone bit used to 57 feet depth, sample-through bit used below 57 feet. (5) Reference elevation = ground surface. (6) N: 1451.61 E: 2917.03. (7) Top of PVC elevation = 410.57 feet. (8) Perched groundwater noted at 133.2 feet below grade on 8/25/2003 during well construction. Regional groundwater elevation = 164.60 feet on 8/29/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	6 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	100							**59.0 to 113.0 feet: SAND (SP)**, continued.
G	105			105				
G	109			110				
G	111							@ 111.0 to 113.0 feet: no water enters boring, cuttings are moist (not saturated).
G	114			115				**113.0 to 122.0 feet: SANDY SILT (ML)**, yellow brown to dark olive brown, some very fine to fine sand, soft, moist to wet, micaceous. (LACUSTRINE DEPOSITS)
				120				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 138 feet. (4) Standard tri-cone bit used to 57 feet depth, sample-through bit used below 57 feet. (5) Reference elevation = ground surface. (6) N: 1451.61 E: 2917.03. (7) Top of PVC elevation = 410.57 feet. (8) Perched groundwater noted at 133.2 feet below grade on 8/25/2003 during well construction. Regional groundwater elevation = 164.60 feet on 8/29/2003.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	9 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	160		**154.0 to 176.0 feet: SILTY SAND (SP-SM)**, continued. @ 160.0 feet: trace to few medium to coarse gravel, few fines.
			165
G	166		
SS	168	40 50/5"	@ 168.0 feet: 0.5 foot recovery of SP, fine, below fragment of weathered granite cobble.
			170
G	172		@ 172.0 feet: sand is medium to coarse, with trace to few fine to medium subrounded gravel.
			@ 174.0 feet: water enters borehole during placement of annular backfill on 8/27/03.
			175
G	175		@ 175.0 feet: sand is fine to medium, with trace to few fine to coarse subrounded gravel.
			176.0 to 206.0 feet: CLAYEY SILT (ML), light gray to dark gray, stiff to very hard, dry, varved. Transitional to silty clay (CL). (LACUSTRINE DEPOSITS)
G	177		
			180

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	10 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			176.0 to 206.0 feet: SILT (ML), continued.
G	181		
G	185		
G	188		
SS	189.5	20 20 40	@ 189.5 feet: varves are 2 to 5 mm thick, with few-grain-thick layers of fine sand at 2 cm intervals, includes one 17-mm x 2-mm-thick flattened oval fine gravel (dropstone?), dry, stiff to hard.
G	194		@ 194.0 feet: dry hard chips of varved silt.
G	196.5		@ 196.5 feet: dry, hard chips of varved silt.

GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN

185

190

195

200

REMARKS

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UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	11 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	200							**176.0 to 206.0 feet: SILT (ML)**, continued.
G	205			205				
								206.0 to 221.0 feet: GRAVELLY SANDY SILT (ML), dark gray to medium gray, low to moderate plasticity, soft, some fine to medium sand, few to little medium to coarse subrounded to subangular gravel, trace cobbles, matrix supported. (FLUVIAL DEPOSITS)
G	209			210				
G	213			215				
SS	215.5							@ 215.5 feet: 0.55 foot recovered, dark gray, thin (2 mm) laminae of very fine to fine SANDY SILT.
G	218			220				

REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	12 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	220							**206.0 to 221.0 feet: GRAVELLY SANDY SILT (ML),** continued.
				225				**221.0 to 231.0 feet: SAND (SP),** gray fines, very fine to fine, trace fines, trace thin (1- to 2-mm thick) gray silt beds. (FLUVIAL DEPOSITS)
G	226							
G	230			230				
G	232							**231.0 to 238.0 feet: GRAVELLY SANDY SILT (ML),** light gray, some fine to medium sand, few coarse sand, some medium to coarse rounded, subrounded, and subangular gravel, trace to few cobbles, transitional to SILTY GRAVEL (GM). Poor sample recovery - circulated at 237.0 feet and logged composite sample.
				235				
								238.0 to 260.0 feet: SANDY GRAVEL (GW), grayish brown to 242.0 feet, gray below 242.0 feet, medium to coarse, rounded, subrounded, and subangular, trace to few fines, some fine to coarse sand, trace to few
				240				

REMARKS

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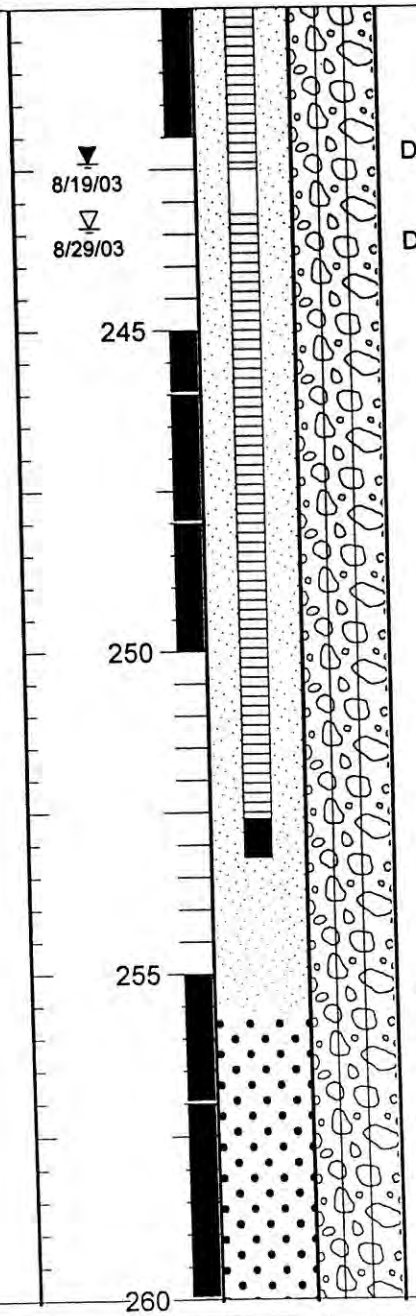
LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-29**
LOCATION	**Vashon Island, Washington**	PAGE	**13 of 14**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**408.00**
DRILL METHOD	**Dual Rotary**	TOTAL DEPTH	**261.5'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/29/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	240		cobbles, wet. (FLUVIAL DEPOSITS)
			Depth to water: 242.4 feet at time of drilling, August 19, 2003.
			Depth to water: 243.4 feet after well development, August 29, 2003.
G	245		
G	246		
G	248		
G	255		@ 255.0 to 257.0 feet: few fines, transitional to silty gravel (GW-GM).
G	257		@ 257.0 to 260.0 feet: fine to medium gravel, few fines (GP-GM).



REMARKS

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LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-29
LOCATION	Vashon Island, Washington	PAGE	14 of 14
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	408.00
DRILL METHOD	Dual Rotary	TOTAL DEPTH	261.5'
LOGGED BY	Udaloy	DATE COMPLETED	8/29/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	260			265, 270, 275, 280				**260.0 to 261.5 feet: SILT (ML), gray, gravels absent, few to little very fine to fine sand.**

Total depth drilled and sampled = 261.5 feet.

WELL COMPLETION DETAILS

+2.6 to +2.2 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank and slip-couple, secured using two stainless steel screws.
+2.2 to 238.4 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 blank riser pipe.
238.4 to 242.5 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.25-inch machined slots 0.025-inch spacers.
242.5 to 243.2 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank at joint between screen sections.
243.2 to 252.6 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.25-inch spacers.
252.6 to 253.2 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing and end plug.

237.0 to 238.0 feet: Stainless steel centralizer.
245.0 to 246.0 feet: Stainless steel centralizer.
252.0 to 253.0 feet: Stainless steel centralizer.

0 to 3.0 feet: Concrete.
3.0 to 232.6 feet: Baroid® 3/8-inch bentonite chips.
232.6 to 235.8 feet: Slough.
235.8 to 255.6 feet: Norton™ 16 x 30 silica sand.
255.6 to 261.5 feet: Pea gravel.

REMARKS

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UDALOY ENVIRONMENTAL SERVICES

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. PE04051

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☑ Construction
☐ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

Consulting Firm King County

Unique Ecology Well ID Tag No. APJ048 / MW-30

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee
Name (Print Last, First Name) Haroden, Don
Driller/Engineer /Trainee Signature
Driller or Trainee License No. 2914

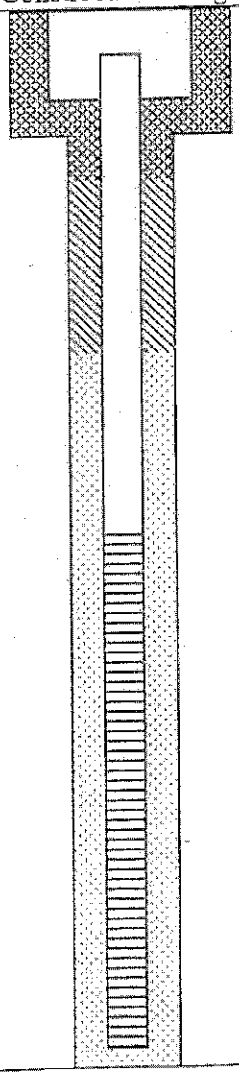
If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☒ Resource Protection
☐ Geotech Soil Boring

Property Owner King County Water & Waste Management
Site Address 18910 Westside Hwy SW
City Vashon Island
County King
Location SW1/4-1/4 SW1/4 Sec 36 Twn 23 R 02
EWM ☒ or WWM ☐
Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____
Long Deg ____ Min ____ Sec ____
Tax Parcel No. 3623029009
Cased or Uncased Diameter 2" Static Level 4.65' bgs
Work/Decommission Start Date 12-14-09
Work/Decommission Completed Date 12-14-09

Construction Design



Well Data

MONUMENT TYPE: N/A - Variance
CONCRETE SURFACE SEAL: N/A - Variance
ANNULAR SPACE: N/A
BACKFILL: 0-3
TYPE: No 8 Bentonite Chips
PVC BLANK: +1.2' - 4.02 bgs
SCREEN: 4.02 - 9.02' bgs
SLOT SIZE: .010
TYPE: 2" Sched 40 PVC Prepack
SAND PACK: 3' - 9.02'
MATERIAL: 10/20 Silica
DRILLING METHOD: Hand Auger
WELL DEPTH: 9.02' bgs
BORING DIAMETER: 3.25'

Formation Description

0-2' SW/SP Fill/Fill
2-5' SM/SC med-coarse sand w/silty sand. Fine gravel @ 5'/wet @ 5'
5'-18' SM/SC silty sand-med/silt Coarse Gravel @ 9'. From staining 6.5-18
Bottom of boring 11' bgs

SCALE: 1"= N/A PAGE 2 OF 3

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. RE09051

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission ("x" in box)

☒ Construction

☐ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

Type of Well ("x in box)

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner King County Water & Waste Management

Site Address 18910 Westside Hwy SW

City Vashon Island

County King

Consulting Firm King County

Unique Ecology Well IDTag No. APS 050 / MW-31

Location SW1/4-1/4 SW1/4 Sec 36 Twn 23 R 02

EWM ☒ or WWM ☐

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Min _____ Sec _____

Long Deg _____ Min _____ Sec _____

Tax Parcel No. 3623029009

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Haraden, Don

Driller/Engineer /Trainee Signature

Driller or Trainee License No. 2914

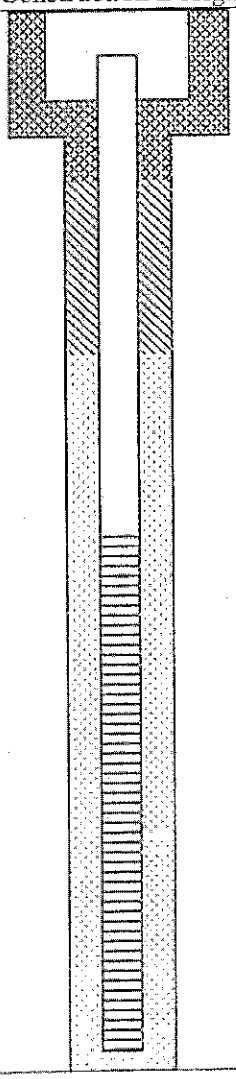
Cased or Uncased Diameter 2" Static Level ~9.02' bgs

Work/Decommission Start Date 12-15-09

Work/Decommission Completed Date 12-15-09

If trainee, licensed driller's Signature and License Number:

Construction Design



Well Data

MONUMENT TYPE: N/A - Variance

CONCRETE SURFACE SEAL: N/A - Variance

ANNULAR SPACE: N/A

BACKFILL: 0-4

TYPE: #50 Bentonite Chips

PVC BLANK: +2 - 5' BGS

SCREEN: 5-10'

SLOT SIZE: .010

TYPE: 2" Sched 40 PVC (Prepack)

SAND PACK: 4 - 10

MATERIAL: 10/20 Silica

DRILLING METHOD: Hand Auger

WELL DEPTH: 10.2' bgs

BORING DIAMETER: 3.25"

Formation Description

0-3 SM/SC Silty Sand & Sandy Silt

3-6.5 SM Silty Sand some med gravel starting @ 5'

6.5-9' SM Med - Course Sand w/ some fine sand lenses wet

9-11' SC Very fine Sand & Silt moist

SCALE: 1"= N/A PAGE 3 OF 3

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. RE04051

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☒ Construction

☐ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

Type of Well *("x in box)*

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner King County Water & Waste Management

Site Address 18910 Westside Hwy SW

City Vashon Island

County King

Consulting Firm King County

Unique Ecology Well IDTag No. APS 048 / MW-32

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Haenden, Don

Driller/Engineer /Trainee Signature

Driller or Trainee License No. 2914

If trainee, licensed driller's Signature and License Number:

Location SW1/4-1/4 SW1/4 Sec 36 Twn 23 R 02

EWM ☒ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____

Long Deg ____ Min ____ Sec ____

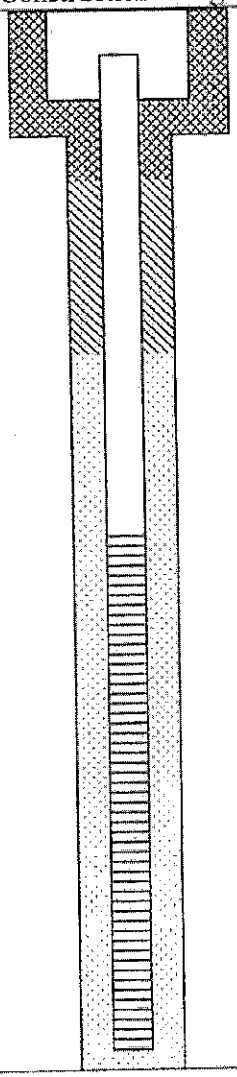
Tax Parcel No. 3623029009

Cased or Uncased Diameter 2" Static Level 19' bgs

Work/Decommission Start Date 12-14-09

Work/Decommission Completed Date 12-14-09

Construction Design



Well Data

MONUMENT TYPE: N/A - Variance

CONCRETE SURFACE SEAL: N/A - Variance

ANNULAR SPACE: N/A

BACKFILL: 0-8'

TYPE: No. 8 Bentonite Chips

PVC BLANK: +2 - 10' bgs

SCREEN: 10-20'

SLOT SIZE: .010

TYPE: 2" Sched 40 PVC Prepack

SAND PACK: 8-20'

MATERIAL: 10/20 Silica Sand

DRILLING METHOD: Hand Auger

WELL DEPTH: 20'

BORING DIAMETER: 3.25"

Formation Description

0-2' SW/SP Fill - brown/tan

2-5' SM/SC med-coarse Sand w/ Silty Sand. Some fine gravel @ 5'. Wet @ 5'

5-10' SM/SC Silty Sand w/ silt Coarse gravel @ 9'. Iron stain 6.5-10'

10-16.5 SM - med Sand w/ some silt, Fine Sand @ 13 Iron Stain @ 16. Damp to wet Zones 10-15'

16.5-20' SM - med - coarse Sand Well sorted w/ tr. pebbles Damp 16-18, moist 18-18½ Wet 19-20

20' Bottom of boring.

SCALE: 1"= N/A PAGE 1 OF 3

Department of Natural Resources & Parks
Water & Land Resources Division
Science & Technical Support Section

King Street Center, KSC-NR-0600
201 South Jackson Street, Suite 600
Seattle, WA 98104

King County

Boring and Well Installation Log

Project name/Location: West KC Vashon Landfill Hillslope	Elevation: ✓	Drilling Method: Stainless steel AMS Hand Auger	BH-30 MW-30 APJ-049
		Sampling Method:	
Contractor: ESN NW		Hammer Wt: ~15 lb	
Driller: Don Harndon #2914		Date: 12/14/09	Page 1 of 1
Start Time 1300	Stop time: 1530	Logger: BILIR	

Time	Moisture	Core Sample Recovery	Blows	Air Sampling	Depth In Feet	USCS Code	Notes	Well Construction Details
1320	Damp		Auger	20.6 O² 0 methane @BZ	1	SW/SP	FILL/SOIL; multi/variecolored, very loose, fine with medium sand	0
					2	SM/SC	MEDIUM-COARSE SAND with SILTY SAND, varicolored browns, rooting, red iron oxide stains	
1328			14	20.5 O² @ BH 0 methane @	3			2.8
			Auger					
				20.5 O² @ SW 0 methane @	4		fine gravel @ 5'	3.8
	Moist				5	SM/SC	very fine-FINE SAND with SILT brownish/gray; black organics, very dense	ATD
	Wet							
1339				20.7 O² @ BH 0 methane @	6			
				20.6 O² 0 methane (sample)	7			8.0
					8		reddish brown organics & stains (6.5-8.5)	
1400				20.6 O² 0 methane (sample)	9	SM	MEDIUM-COARSE SAND; grayish-brownish-multicolored, very dense reddish stains (8.5-10')	11.8
					10			
				20.7 O² 0 methane (sample)	11			
1430					12		BHTD = 11.5' bgs	
1600					13		-snap lock well cap -stick up = 1.2' ags -Bentonite pellets = 0-2.8' bgs -pre packed screen = 3.8-8.8' bgs -2" diameter PVC casing -flat bottom screw cap -borehole caved in = 8.8-11.5' bgs -supplemented 10/20 CO. Si. Sand -water level ATD = 5.85 BTOC -well depth ATD = 10.21' BTOC (on 12/22/09 DTW = 5.81' BTOC) (on 1/26/10 DTW = 5.76' BTOC) TOC = mark on snap cap gs = wooden platform (top)	
					14			
					15			
					16			
					17			
					18			
					19			
					20			

Department of Natural Resources & Parks
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Seattle, WA 98104

King County

Boring and Well Installation Log

Project name/Location: West KC Vashon Landfill Hillslope	Elevation: ~	Drilling Method: Stainless Steel AMS hand Auger	BH-31 MW-31 API-050
		Sampling Method:	
Contractor: ESN NW		Hammer Wt: ~15 lb	
Driller: Don Harndon #2914		Date: 12/15/09	Page: 1 of 1
Start Time 0945	Stop time: 1200	Logger: BILIR	

Time	Moisture	Core Recovery	Blows	Air Sampling	Depth In Feet	USCS Code	Notes	Well Construction Details
0950	Damp		Auger	20.7 O2 0 methane @ BH	1	SM/SC	SILTY SAND/SANDY SILT: 2.5Y 4/2 tan/ish/orange/ish; light mica flecks, rooting, loose, med. dense, trace black oxide stains	
					2			
					3			
			14		4	SM	MEDIUM SAND w/ some fine sand, variecolored, 2.5Y 7/2 light gray mica flecks; thinly bedded iron oxide stain (5'-6.5')	4
	Moist		Auger		5			5
					6			6/21/09
1000	Wet		27	20.7 O2 0 methane @ BH	7		trace gravels at 6.5'	
			Auger		8	SM	FINE SAND w/ Medium/coarse sand, bluish gray, coarse down pebbles up to 8cm (black 5Y 3/1) silty lens (<1cm w/ white quartz), red stains (6.5'-7.5')	
					9			ATO
				20.9 O2 0 methane @ BH	10	SC	Very fine sand, silt	10
1040 1120					11		BHTD = 10.5' bgs	
					12		- snaplock well cap - stick up = 2.08' ags - Bentonite pellets = 0'-4' bgs - prepacked screen = 5'-10' bgs - 2" diameter PVC casing - flat bottom screw cap - supplemented 10/20 CO, SI Sand - water level ATO = 11.02' BTOC - well depth ATD = 12.25' BTOC (on 12/22/09 DTW = 7.78 BTOC) (on 1/26/10 DTW = 7.91 BTOC)	
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20		TOC = mark on snap cap GS = top of wood platform	

Department of Natural Resources & Parks
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King County

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Boring and Well Installation Log

Project name/Location: KC Vashon Landfill West Hillslope	Elevation: ✓	Drilling Method: Stainless Steel AMS 4" Auger	BH-32 MW-32 APJ-048
		Sampling Method:	
Contractor: ESN NW		Hammer Wt: ~151b	
Driller: Don Harndon #2914		Date: 12/14/09	Page 1 of 2
Start Time 0930	Stop time: 1245	Logger: BILIR	

Time	Moisture	Core Recovery	Blows	Air Sampling	Depth In Feet	USCS Code	Notes	Well Construction Details
0930	DAMP		Auger	20.7 O Methane @BH:0	0	GW/GP	SOIL/FILL; brownish tan, very loose	
	↓		↓		1			
					2	SM/SC	Med-VM-Coarse Sand with silty Sand: 10yr 4/3 to 2.5y 5/4 brown to light olive brown; very loose	
	DRY		T		3			
			Auger		4			
0945	WET			21.0 @BH, O Methane	5		fine gravels @5	
	DAMP		↓		6	SM/SC	Silty Sand w/ SILT; light brownish gray 2.5Y 6/2, medium dense/loose; Rust iron oxide stains (6.5-10'), roofing (7.5-10')	
	↓		+50/4		7		dark grayish brown fine sand (7.5-8')	
1002			Auger	20.7 @BH O Methane	8		coarse gravel at 9'	
	↓		↓		9			
1015	MOIST		↓	20.7 @BH O Methane	10	SM	MEDIUM SAND with some SILT, 2.5Y 5/1 - 5/2 (gray - grayish brown) light gray MICA (9.5-12)	
	DAMP		+50		11			
			Auger					
	WET		↓		12			
1035	DAMP WET			20.0 @BH O Methane	13		V. FINE Sand @13; dense, 2.5Y 5/2 grayish brown	
	DAMP				14			
1050	WET				15		red iron oxide stain	
1115	DAMP				16		↓	
	↓		+50		17	SM	Med-Coarse Sand; multicolored, v. dense, loose with Silt; trace pebbles	
1120	↓ MOIST		Auger	20.7 O Methane @Sample @ Bit 17	18			
	↓ WET		↓		19			
1200	WET		+50	20.3 O Methane @19.75 @Sample	20			
1230							BHTD = 20' bgs	

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King County

Boring and Well Installation Log

Project name/Location: Vashon Landfill KC West hillslope	Elevation: ✓	Drilling Method: SS AMS Hand AugeR	BH-32 MW-32 APJ-048
Contractor: ESN NW		Sampling Method:	
Driller: DON HACKNOON #2914		Hammer Wt: ~15 lb	
Start Time 0930	Stop time: 1245	Date: 12/14/09	Page 2 of 2
		Logger: BILIR	

Time	Moisture	Core Recovery	Blows	Air Sampling	Depth In Feet	USCS Code	Notes	Well Construction Details
					1		Notes:	
					2		-Snap lock wellcap	
					3		-Stick UP = 1.75 ags	
					4		-Bentonite Pellets 0-5' bgs	
					5		-prepacked screen = 10-20' bgs	
					6		-2" diameter PVC casing	
					7		-flat bottom screw cap	
					8		-Supplemented 10/20 CO. Silica sand	
					9		-water level ATD: dRY (moist tip)	
					10		-well depth ATD = 21.89' TOC	
					11		(on 12/22/09 DTW = DRY)	
					12		(ON 1/ 110 DTW =)	
					13			
					14			
					15			
					16			
					17			
					18			
					19		TOC = mark on snapcap	
					20		GS = top of wood platform	

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-33	1 of 3

Project Name: King County Closed Landfills
Location: 162681.9114N, 1227883.1443E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 357.07
Top of Casing Elev. (NGVD 88) 359.7725
Depth to Water (ft BGS) 112.51
Start/Finish Date 3/9/2015-3/13/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
0 / 355	Above ground monument (KCSWD specification) Thermos cap Concrete surface seal from 0 to 3 feet						Slightly moist, dark brown, sandy, SILT (ML); Topsoil, roots	0
5 / 350		1	0% CH4, 0% CO2, 20.1% O2 measured in breathing zone, 2 feet above drill casing	0.0	Fill		Slightly moist, gray to brown, sandy, SILT (ML) with cobbles; fine to medium sand, fine to coarse subrounded gravel, subrounded cobbles Glass shard at 6.5 feet Becomes gray	5
10 / 345							Slightly moist, gray, gravelly, silty, SAND (SM) with cobbles; fine to medium sand, coarse gravel	10
15 / 340		2	0.5% CH4, 0% CO2, 20.5% O2	7.0			REFUSE includes plastic, metal, wood, fiberglass, K2 skis. Interspersed gray, silty, sand matrix.	15
20 / 335					Refuse		Dark brown, silty, sand matrix REFUSE includes wood, fiberglass, metal. Light brown to gray, silty, sand matrix.	20
25 / 330		3	0.03% CH4, 0% CO2, 21.2% O2	1.5			Dark brown, silty, sand matrix	25
30 / 325							Slightly moist, gray, SAND (SP); trace silt, trace refuse, fine to coarse sand Slightly gravelly, fine to medium sand, coarse gravel to cobbles Trace gravel	30
35 / 320	10-inch diameter conductor casing to 40 feet	4	0.0 ppm H2S, 0.4% CH4	1.1			1-inch-thick bed of slightly moist, green to gray, silty, SAND (SM), fine to medium sand at 36 feet	35
40 / 315					Qva B		Slightly moist, gray, SAND (SP); trace gravel 1-inch-thick bed of slightly moist, gray, SILT (ML) at 42.5 feet	40
45 / 310	8-inch diameter drill casing below 40 feet	5	0.0 ppm H2S, 0.4% CH4	0.8			1-inch-thick bed of slightly moist, gray, SILT (ML) at 49.8 feet	45

Sampler Type:
- ◯ No Recovery
- ▮ Continuous Core

PID - Photoionization Detector
- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 2

KCSWD_SONIC LOG KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-33	2 of 3

Project Name: King County Closed Landfills
Location: 162681.9114N, 1227883.1443E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 357.07
Top of Casing Elev. (NGVD 88) 359.7725
Depth to Water (ft BGS) 112.51
Start/Finish Date 3/9/2015-3/13/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
305							Slightly moist, gray, slightly gravelly, SAND (SP); fine to medium sand, coarse gravel	
							Slightly moist, gray, SILT (ML)	
55 / 300		6	0.0 ppm H2S, 0.5% CH4	0.2			Slightly moist, gray, slightly gravelly, SAND (SP); mostly fine sand, coarse gravel Light brown, no gravel	55
		○					No recovery	
60 / 295	Blank 4-inch schedule 40 PVC from 0 to 127.29 feet				Qva B		Slightly moist, gray, slightly silty, SAND (SP-SM); fine sand	60
							Moist, brown, SAND (SP); fine to medium sand	
65 / 290		7	0.0 ppm H2S, 0.4% CH4	0.5			Slightly moist, gray, slightly silty, SAND (SP-SM); fine sand	65
							Slightly moist, brown, SILT (ML)	
							Slightly moist, gray, slightly silty, SAND (SP-SM); trace silty sand interbeds ~0.5 inch thick	
		○					Slightly moist, gray, SILT (ML); trace fine sand	
70 / 285							No recovery Slightly moist, gray, silty, SAND (SM); fine sand	70
							Moist, gray, SILT (ML) Red mottling at 73 feet	
75 / 280	Bentonite (chips) seal from 3 to 124.17 feet	8	0.0 ppm H2S, 0.4% CH4	0.5			Slightly moist, gray, slightly silty, SAND (SP-SM); fine sand	75
							Slightly moist, gray, SAND (SP); trace silt, fine sand	
80 / 275	▽ Cased to 90 feet, Open to 87 feet						Wet at 80 feet Moist at 81 feet	80
					Cc1		Slightly moist, gray, SILT (ML); white laminae	
85 / 270	▽ Cased to 100 feet, Open to 88 feet	9	0.0 ppm H2S, 0.4% CH4	0.0			Slightly moist, gray, SAND (SP); trace silt, fine to medium sand 86 feet to 91.5 feet: water in casing/borehole	85
90 / 265							Slightly moist, gray, SILT (ML)	90
							Brown Slightly moist to moist, gray	
95 / 260		10	0.0 ppm, H2S, 0.4% CH4	0.0	Cf			95

Sampler Type:
○ No Recovery
▮ Continuous Core

PID - Photoionization Detector
▼ Static Water Level
▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 2

KCSWD_SONIC LOG KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-33	3 of 3

Project Name: King County Closed Landfills
Location: 162681.9114N, 1227883.1443E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 357.07
Top of Casing Elev. (NGVD 88) 359.7725
Depth to Water (ft BGS) 112.51
Start/Finish Date 3/9/2015-3/13/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
255							7.10 pH, 1011 µS/cm, 11.6ºC, DTW = 85 feet	
105		11	0.0 ppm H2S, 0.3% CH4	0.0			Slightly moist, gray, silty, SAND (SM); fine sand	105
250							Slightly moist, gray, slightly sandy, SILT (ML); low plasticity	
110	▽ Cased to 120 feet, Open to 120 feet						Gray, slightly sandy, SILT (ML); low plasticity	110
245	▼	12	0.0 ppm H2S, 0.3% CH4	1.7	Cf		Slightly moist, gray, SAND (SP); trace silt, fine sand	
							Slightly moist to moist, gray, slightly sandy, SILT (ML); low plasticity, fine sand	
115							No recovery	115
							Gray to olive gray	
240	▽ Cased to 130 feet, Open to 130 feet	13	0.0 ppm H2S, 0.3% CH4	1.2			Slightly moist to moist, gray, silty, SAND (SM); fine sand	
120							Moist, gray, SILT (ML); low plasticity	120
235								
125	Filter pack of 10/20 Colorado silica sand from 124.17 to 139.25 feet Centralizer at 127.29 feet	14	0.0 ppm H2S, 0.3% CH4	1.8			Moist, gray, slightly silty, SAND (SP); fine sand 7.15 pH, 1095 µS/cm, 14.0ºC Brown Slightly moist to moist, trace silt	125
230								
130	▽ Cased to 140 feet, Open to 140 feet						Slightly moist to moist, brown to olive gray, SILT (ML); low plasticity, hard Gray at 129.75 feet	130
225	20-slot 4-inch PVC from 127.29 to 137.29 feet				Cc2		Moist, gray, SAND (SP); trace silt, fine sand	
135	Centralizer at 137.29 feet Sump from 137.29 to 137.67 feet	15	0.0 ppm H2S, 0.4% CH4	0.7				135
220							Driller's Note: Heaving sands during well completion, used approx. 450 gallons of water to wash down heave	
140							Moist, gray, silty, SAND (SM); dilatent, fine sand	140
215	Bentonite seal (chips) from 139.25 to 145 feet						Wet, gray, slightly sandy, SILT (ML); medium plasticity 7.32 pH, 991 µS/cm, 11.7ºC Moist	
145	Native backfill from 145 to 150 feet	16	0.0 ppm H2S, 0.0% CH4	0.3			Slightly moist to moist	145
210							Slightly moist, gray, SAND (SP); trace silt, fine to medium sand Bottom of boring at 150 feet	
							No recovery	

Sampler Type:
- ○ No Recovery
- ▮ Continuous Core

PID - Photoionization Detector
- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 2

KCSWD_SONIC LOG KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-34	1 of 5

Project Name: King County Closed Landfills
Location: 163134.5971N, 1227773.7704E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 383.26
Top of Casing Elev. (NGVD 88) 385.8802
Depth to Water (ft BGS) 201.1
Start/Finish Date 3/18/2015-3/26/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
0 / 383	Above ground 3-foot monument (KCSWD specification) Thermos cap Concrete surface seal from 0 to 3 feet						FILL: Slightly moist to moist, gray, gravelly, SILT (ML); coarse subrounded gravel	0
							Slightly moist to moist, gray, gravelly, silty, SAND (SM); fine subangular gravel	
5 / 380		1	0 ppm H2S, 0% CH4, 20.6% O2	0.0			Slightly moist, light brown, gravelly, silty, SAND (SM); trace cobbles, fine to coarse subrounded gravel	5
							Moist, brown, SILT (ML); trace fine subrounded gravel	
10 / 375	10-inch diameter conductor casing to 20 feet	2	0.0 ppm H2S, 0.0% CH4, 20.6% O2	0.0			Slightly moist, brown, gravelly, silty, SAND (SM); trace subrounded cobbles, fine to coarse subrounded gravel	10
							Slightly moist, brown, gravelly, silty, SAND (SM); trace subrounded cobbles, fine to coarse subrounded gravel	
15 / 370		3			Qvt A			15
20 / 365	Drilled to 20 feet, Open to 20 feet, Cased to 10 feet	4	0.0 ppm H2S, 0.0% CH4, 20.9% O2	0.0			Slightly moist, brown, gravelly, slightly silty, SAND (SP-SM); trace subrounded cobbles, fine to coarse sand, fine to coarse subrounded gravel	20
25 / 360	8-inch drill casing below 20 feet	5					Slightly moist, brown, gravelly, silty, SAND (SM); trace subrounded cobbles, fine to coarse sand, fine to coarse subrounded gravel	25
							Gradational boundary	
30 / 355		6	0.0 ppm H2S, 0.0% CH4, 20.9% O2	0.0			Slightly moist to moist, brown, SAND (SP); trace silt, trace fine to coarse gravel	30
35 / 350								35
40 / 345	Bentonite seal from 3 to 80 feet (chips)	7	0.0 ppm H2S, 0.0% CH4, 21.1% O2	0.0	Qva B		Gravelly, mostly fine sand Trace gravel, fine to coarse sand	40
45 / 340							Gravelly, trace cobbles, fine subrounded gravel	45
							Trace gravel	
50 / 335		8	0.0 ppm H2S, 0.0% CH, 20.9% O2	0.0			gravelly, fine subrounded gravel	50
							Mostly medium to coarse sand Trace coarse sand, trace gravel, fine to medium sand	
55 / 330							Gravelly, fine to medium sand, fine subrounded gravel	55
60 / 325							Mostly fine sand, no gravel	60

Sampler Type:
- No Recovery
- Continuous Core

PID - Photoionization Detector
- Static Water Level
- Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 3

KCSWD_SONIC LOG KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-34	2 of 5

Project Name: King County Closed Landfills
Location: 163134.5971N, 1227773.7704E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 383.26
Top of Casing Elev. (NGVD 88) 385.8802
Depth to Water (ft BGS) 201.1
Start/Finish Date 3/18/2015-3/26/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
65 / 320	Blank 4-inch schedule 40 PVC from 0 to 235.3 feet	9	0.0 ppm H2S, 0.0% CH4, 20.9% O2	0.0			Trace silt, trace gravel, fine to medium sand Trace subrounded gravel, fine to coarse sand Fine to medium sand, no gravel	65
70 / 315				0.0			Mostly fine sand	70
75 / 310		10	0.0 ppm H2S, 0.0% CH4, 20.9% O2				Fine to medium sand Gravelly, fine to coarse sand, fine subrounded gravel	75
80 / 305				0.0	Qva B		Slightly moist to moist, brown, SAND (SW); trace silt, fine sand (bordering on silt size) Slightly moist to moist, brown, SAND (SP); mostly fine sand	80
85 / 300		11	0.0 ppm H2S, 0.0% CH4, 21.0% O2				Moist to wet Moist, brown to gray, silty, SAND (SM); fine sand, iron oxide staining Slightly moist to moist, brown, SAND (SP); trace silt, trace organics, fine sand 1/2-inch, moist, brown, SILT (ML) layer at 86.5 feet, trace iron oxide staining	85
90 / 295	Bentonite seal from 80 to 228 feet (grout)						Slightly moist, trace subrounded coarse gravel	90
95 / 290		12	0.0 ppm H2S, 0.0% CH4, 20.8% O2		Cc1?		Brown, silty lenses ~0.25 inches-thick at 95 feet with trace brown and black organics	95
100 / 285							Sand becomes brown yellow	100
105 / 280		13	0.0 ppm H2S, 0.0% CH4, 20.7% O2				Moist, light brown SILT (ML) with fine sandy layers; trace gravel, iron oxide mottling Wet	105
110 / 275		14	0.0 ppm H2S, 0.0% CH4, 20.6% O2	0.0			Moist, light brown grading to gray	110
115 / 270		15	0.0 ppm H2S, 0.0% CH4, 20.9% O2	0.0	Cf		Becomes gray Slightly moist Wet	115
							Slightly moist to moist, gray, silty, SAND (SM); fine	

Sampler Type:
- No Recovery
- Continuous Core

PID - Photoionization Detector
- Static Water Level
- Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 3

KCSWD_SONIC LOG_KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-34	3 of 5

Project Name: King County Closed Landfills
Location: 163134.5971N, 1227773.7704E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 383.26
Top of Casing Elev. (NGVD 88) 385.8802
Depth to Water (ft BGS) 201.1
Start/Finish Date 3/18/2015-3/26/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
260 / 125							sand	
		16	0.0 ppm H2S, 0.0% CH4, 21.0% O2	0.0	Cf		Moist, gray, SILT (ML); trace fine sand	125
255 / 130								130
250 / 135		17	0.0 ppm H2S, 0.0% CH4	0.0	Cc2		Moist, gray, SAND (SP); trace silt, fine sand	135
245 / 140					Cf		Moist, gray, slightly sandy, SILT (ML); fine sand	140
							Moist, gray, slightly silty, SAND (SP-SM); fine sand	
240 / 145		18	0.0 ppm H2S, 0.0% CH4	0.0			Moist to wet, gray SILT (ML)	145
							Moist	
235 / 150							Slightly moist to moist	150
							Slightly moist, brown yellow, SAND (SP); fine sand, no apparent bedding	
230 / 155	▽ Drilled to 160 feet, Open to 160 feet, Cased to 150 feet	19	0.0 ppm H2S, 0.0% CH4	0.0			Slightly moist to moist, light brown to gray, sandy, SILT (ML); fine sand	155
							Moist to wet, brown to gray, CLAY (CL)	
225 / 160							Moist	160
220 / 165		20	0.0 ppm H2S, 0.0% CH4	0.0			Slightly moist; trace fine to medium sand, trace silty nodules	165
215 / 170		○					No Recovery	170
		21	0.0 ppm H2S, 0.0% CH4, 20.5% O2	0.0			Light brown, slightly gravelly, very silty, SAND (SM); trace coarse sand, fine to medium sand, fine subrounded gravel	
210 / 175		22	0.0 ppm H2S, 0.0% CH4, 20.5% O2	0.0	Cc3		Dry, light brown, SAND (SP); trace silt, trace silty nodules, fine to medium sand	175
205								

Sampler Type:
○ No Recovery
▮ Continuous Core

PID - Photoionization Detector
▼ Static Water Level
▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 3

KCSWD_SONIC LOG_KC VASHON.GPJ June 30, 2015

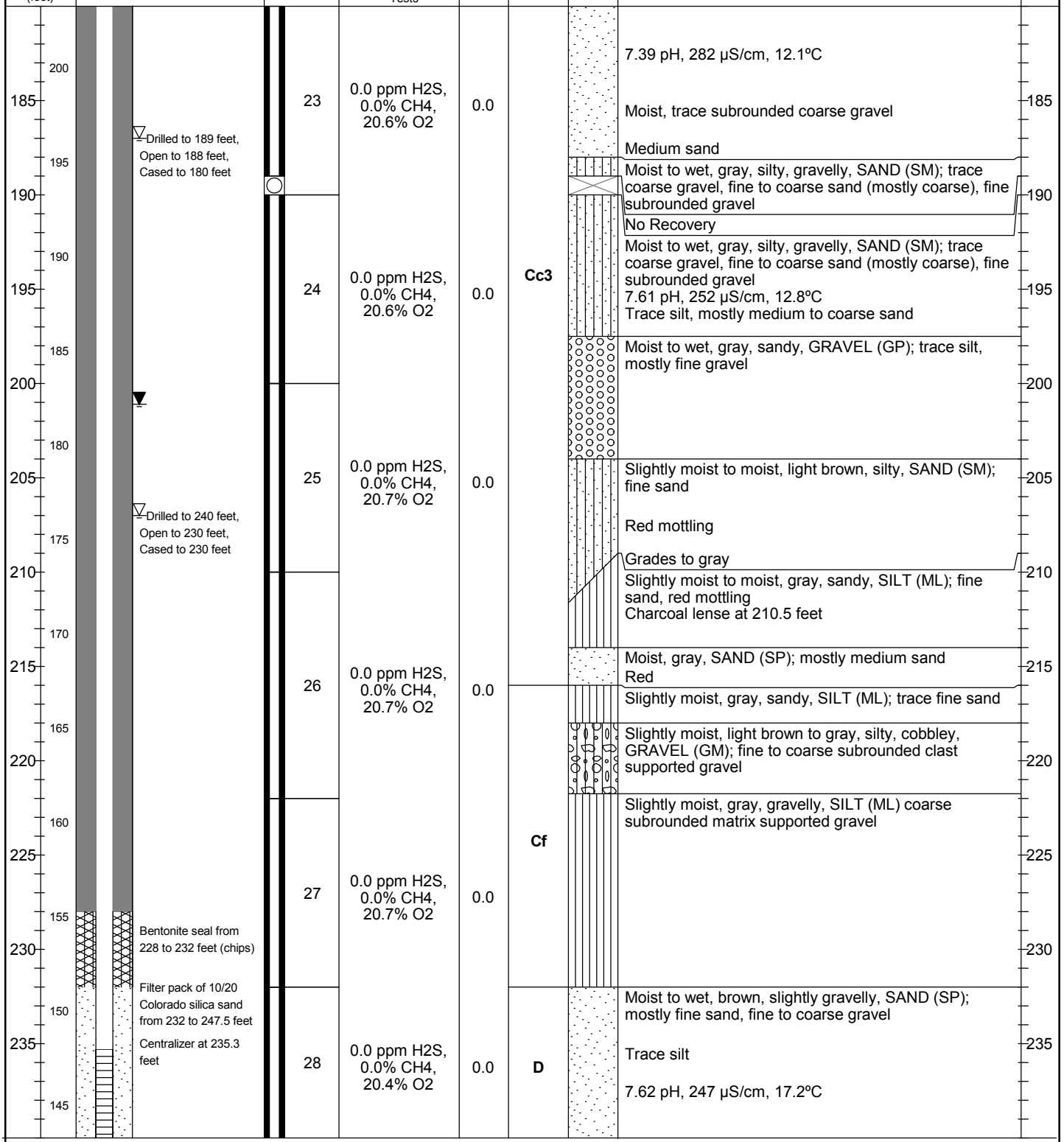
Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-34	4 of 5

Project Name: King County Closed Landfills
Location: 163134.5971N, 1227773.7704E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 383.26
Top of Casing Elev. (NGVD 88) 385.8802
Depth to Water (ft BGS) 201.1
Start/Finish Date 3/18/2015-3/26/2015



Sampler Type:
- No Recovery
- Continuous Core

PID - Photoionization Detector
- Static Water Level
- Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 3

KCSWD_SONIC LOG_KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-34	5 of 5

Project Name: King County Closed Landfills
Location: 163134.5971N, 1227773.7704E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 383.26
Top of Casing Elev. (NGVD 88) 385.8802
Depth to Water (ft BGS) 201.1
Start/Finish Date 3/18/2015-3/26/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
140 / 245	20-slot 4-inch PVC from 235.3 to 245.3 feet Centralizer at 245.3 Sump from 245.3 to 245.6 feet	28			D		8.52 pH, 247µS/cm, 12.4ºC	245
		29					Driller's Note: Heaving sands during well completion, used approx. 450 gallons of water to wash down heave	
135 / 250	Native backfill from 247.5 to 250.5 feet						Slightly moist, gray, SILT (ML); medium plasticity Bottom of boring at 250.5 feet	250
130 / 255								255
125 / 260								260
120 / 265								265
115 / 270								270
110 / 275								275
105 / 280								280
100 / 285								285
95 / 290								290
90 / 295								295
85								

Sampler Type:
- No Recovery
- Continuous Core

PID - Photoionization Detector
- Static Water Level
- Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 3

KCSWD_SONIC LOG_KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-35	1 of 3

Project Name: King County Closed Landfills
Location: 162559.4857N, 1227651.2087E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 358.75
Top of Casing Elev. (NGVD 88) 361.4655
Depth to Water (ft BGS) 117
Start/Finish Date 3/13/2015-3/18/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
0 / 358	Above ground 3-foot monument (KCSWD specification) Thermos cap Concrete surface seal from 0 to 3 feet						FILL: Moist, light brown, gravelly, slightly silty, SAND (SP-SM); fine to coarse sand, fine to coarse gravel, organics (roots)	
5 / 355		1	0.0 ppm H2S, 0.0% CH4, 20.8% O2	0.0	Qvt A		Slightly moist, gray to brown, sandy, gravelly, SILT (ML); trace cobble, fine rounded gravel Moist to wet	5
10 / 350							Slightly moist	10
15 / 345	10-inch conductor casing to 20 feet	2	0.0 ppm H2S, 0.0% CH4, 21.0% O2	0.0			Slightly moist to moist, brown, slightly gravelly, SAND (SP); trace cobble, fine to medium sand, fine subrounded gravel, stratification	15
20 / 340							Mostly fine sand	20
25 / 335	8-inch drill casing below 20 feet	3	0.0 ppm H2S, 0.0% CH4, 21.0% O2	0.0			Trace silt, fine to medium sand With cobbles Mostly fine sand	25
30 / 330					Qva B		Slightly moist to moist, brown, SAND (SP); trace cobble, fine to medium sand, stratification Trace gravel and coarse sand 32 to 33 feet	30
35 / 325		4	0.0 ppm H2S, 0.0% CH4, 21.0% O2	0.0				35
40 / 320		○					No recovery	40
45 / 315		5	0.0 ppm H2S, 0.3% CH4, 21.0% O2	0.0			Slightly moist to moist, brown, SAND (SP); trace cobble, mostly fine sand, stratification Fine to medium sand Mostly fine sand	45
50 / 310		○					No recovery	

Sampler Type:
○ No Recovery
▮ Continuous Core

PID - Photoionization Detector
▼ Static Water Level
▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 4

KCSWD_SONIC LOG KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-35	2 of 3

Project Name: King County Closed Landfills
Location: 162559.4857N, 1227651.2087E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 358.75
Top of Casing Elev. (NGVD 88) 361.4655
Depth to Water (ft BGS) 117
Start/Finish Date 3/13/2015-3/18/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
55 / 305	Blank 4-inch schedule 40 PVC from 0 to 114.5 feet	6	0.0 ppm H2S, 0.5% CH4, 20.5% O2	3.7	Qva B		Slightly moist to moist, brown, SAND (SP); trace cobble, mostly fine sand, stratification	55
60 / 300							No recovery	60
							Slightly moist to moist, brown, SAND (SP); trace silt, trace cobble, fine sand, stratification	
		7	0.0 ppm H2S, 0.5% CH4, 20.6% O2	1.3			Slightly moist, light brown, SILT (ML); low to medium plasticity	
65 / 295							Slightly moist, light brown, slightly silty, SAND (SP-SM); mostly fine sand	65
		8	0.0 ppm H2S, 0.4% CH4, 20.7% O2	1.5			Slightly moist, light brown, SAND (SP); trace silt, mostly fine sand	
70 / 290					Cc1			70
75 / 285	Bentonite (chips) seal from 3 to 111.5 feet	9	0.0 ppm H2S, 0.4% CH4, 20.8% O2	0.9			Slightly moist to moist, light brown, SILT (ML)	75
							Slightly moist, light brown, SAND (SP); trace silt, mostly fine sand	
80 / 280							Silty SAND (SM) nodules at 82 feet	80
85 / 275		10	0.0 ppm H2S, 0.4% CH4, 20.8% O2	0.9			Dry to slightly moist, light brown, slightly silty, SAND (SP-SM); fine to medium sand	85
							Slightly moist to moist, with silt, iron oxide staining at contact	
90 / 270							Moist, gray, SILT (ML); trace fine sand, silt borders on fine sand size	90
							Moist, light brown, SILT (ML)	
95 / 265		11	0.0 ppm H2S, 0.4% CH4, 20.2% O2	0.7	Cf			95
260								

Sampler Type:
- ◯ No Recovery
- ▮ Continuous Core

PID - Photoionization Detector
- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 4

KCSWD_SONIC LOG KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-35	3 of 3

Project Name: King County Closed Landfills
Location: 162559.4857N, 1227651.2087E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 358.75
Top of Casing Elev. (NGVD 88) 361.4655
Depth to Water (ft BGS) 117
Start/Finish Date 3/13/2015-3/18/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
105 / 255		11		0.7			Moist, gray, SILT (ML) Light brown	
					Cf		Moist, gray, slightly silty, SAND (SP-SM); fine sand	105
		12	0.0 ppm H2S, 0.3% CH4, 21.3% O2	0.0				
110 / 250							Slightly moist to moist, gray, SILT (ML)	110
	Filter pack of 10/20 Colorado silica sand from 111.5 to 125.2 feet Centralizer at 114.5 feet							
115 / 245							Slightly moist, light brown, SAND (SP); trace silt, fine sand	115
	Drilled to 130 feet, Open to 121 feet, Cased to 120 feet 20-slot 4-inch PVC from 114.5 to 124.5 feet	13	0.0 ppm H2S, 0.3% CH4, 21.1% O2	0.2	Cc2			
120 / 240							Moist to wet, gray, fine to medium sand	120
							6.93 pH, 1022 µS/cm, 15.7ºC	
125 / 235	Centralizer at 124.5 feet Sump from 124.5 to 124.8 feet Bentonite chips from 125.2 to 127 feet							125
		14	0.0 ppm H2S, 0.4% CH4, 20.2% O2	0.5	Cf		Moist to wet, gray, SILT (ML); low to medium plasticity	
130 / 230	Native backfill from 127 to 133 feet						Slightly moist	130
							Slightly moist to dry	
135 / 225							Slightly moist, gray, SAND (SP); trace silt, fine to medium sand Bottom of boring at 133 feet	135
140 / 220								140
145 / 215								145
210								

Sampler Type:
- ◯ No Recovery
- ▮ Continuous Core

PID - Photoionization Detector
- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 4

KCSWD_SONIC LOG_KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-36	1 of 4

Project Name: King County Closed Landfills
Location: 162951.3403N, 1227572.5516E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 375.25
Top of Casing Elev. (NGVD 88) 378.2412
Depth to Water (ft BGS) 146.1
Start/Finish Date 3/27/2015-4/2/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
0 / 375	Above ground monument (KCSWD specification) Thermos cap Concrete surface seal from 0 to 3 feet							
5 / 370		1	0.0 ppm H2S, 0.0% CH4, 20.7% O2	0.2	Qvt A		Slightly moist, brown, gravelly, very silty, SAND (SM) with cobbles; fine to coarse sand, fine to coarse sub-rounded to sub-angular gravel, sub-rounded cobbles, matrix supported	5
10 / 365		2	0.0 ppm H2S, 0.0% CH4, 20.8% O2	0.2				10
15 / 360	10-inch conductor casing to 20 feet							15
20 / 355	9-inch drill casing below 20 feet						Slightly moist, brown, gravelly, slightly silty, SAND (SP-SM); fine to coarse sand, fine sub-rounded to sub-angular gravel	20
25 / 350	Bentonite seal from 3 to 35 feet (chips)	3	0.0 ppm H2S, 0.0% CH4, 20.2% O2	0.1			Slightly moist, brown, slightly gravelly to gravelly, SAND (SP); trace silt, trace cobbles, fine to medium sand, fine subrounded gravel Fine to coarse sand Fine to medium sand	25
30 / 345							Slightly moist, brown, slightly silty, gravelly, SAND (SP-SM); trace cobble, fine to coarse sand	30
35 / 340		4	0.0 ppm H2S, 0.0% CH4, 21.3% O2	0.0	Qva B		Slightly moist, brown, SAND (SP); trace gravel, fine to coarse sand (mostly fine) Becomes gravelly, with cobbles	35
40 / 335							Medium to coarse sand Fine to medium sand	40
45 / 330		5	0.0 ppm H2S, 0.0% CH4, 20.1% O2	0.0				45

Sampler Type:
- ○ No Recovery
- ▮ Continuous Core

PID - Photoionization Detector
- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 5

KCSWD_SONIC LOG_KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-36	2 of 4

Project Name: King County Closed Landfills
Location: 162951.3403N, 1227572.5516E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 375.25
Top of Casing Elev. (NGVD 88) 378.2412
Depth to Water (ft BGS) 146.1
Start/Finish Date 3/27/2015-4/2/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
325							Trace cobbles, medium to coarse sand, fine subrounded gravel Trace fine rounded gravel, fine to medium sand	
55 320		6	0.0 ppm H2S, 0.0% CH4, 20.1% O2	0.5				55
60 315	Blank 4-inch schedule 40 PVC from 0 to 154 feet	7					Slightly moist to moist	60
65 310		8	0.0 ppm H2S, 0.0% CH4, 20.1% O2	0.3	Qva B		Slightly moist, brown, SILT (ML); trace fine sand Slightly moist, brown, SAND (SP); trace iron oxide staining, fine to medium sand	65
70 305		9	0.0 ppm H2S, 0.0% CH4, 20.0% O2	0.0			Trace silt, trace organics, sand is fine at 74.5 feet Fine to medium sand Slightly moist, brown, slightly sandy to sandy, SILT (ML); trace iron oxide staining, fine sand Slightly moist, brown to gray, SAND (SP); fine sand Slightly moist, brown, SILT (ML); low plasticity	70
75 300								75
80 295							No Recovery	80
85 290	Bentonite seal from 35 to 148 feet (grout)	10	0.0 ppm H2S, 0.0% CH4, 20.9% O2	0.0			Slightly moist, brown, SAND (SW); mostly fine sand	85
90 285		11	0.0 ppm H2S, 0.0% CH4, 20.8% O2	0.0	Cf		Slightly moist, brown, slightly silty, SAND (SP-SM); mostly fine sand Occasional silt nodules from 87 to 89 feet Moist, brown, SILT (ML) Sandy at 93.25 feet, fine sand	90
95 280							Slightly moist to moist, light brown, silty, SAND (SM): fine sand Slightly moist to moist, light brown, SAND (SP); fine sand	95
		12	0.0 ppm H2S, 0.0% CH4, 20.7% O2	0.0	Cc1		No Recovery Slightly moist to moist, light brown, SAND (SP); fine sand	

Sampler Type:
- ◯ No Recovery
- ▮ Continuous Core

PID - Photoionization Detector
- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 5

KCSWD_SONIC LOG_KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-36	3 of 4

Project Name: King County Closed Landfills
Location: 162951.3403N, 1227572.5516E (NAD 83/91) / Vashon Island Landfill
Driller/Method: Holt Services / Sonic
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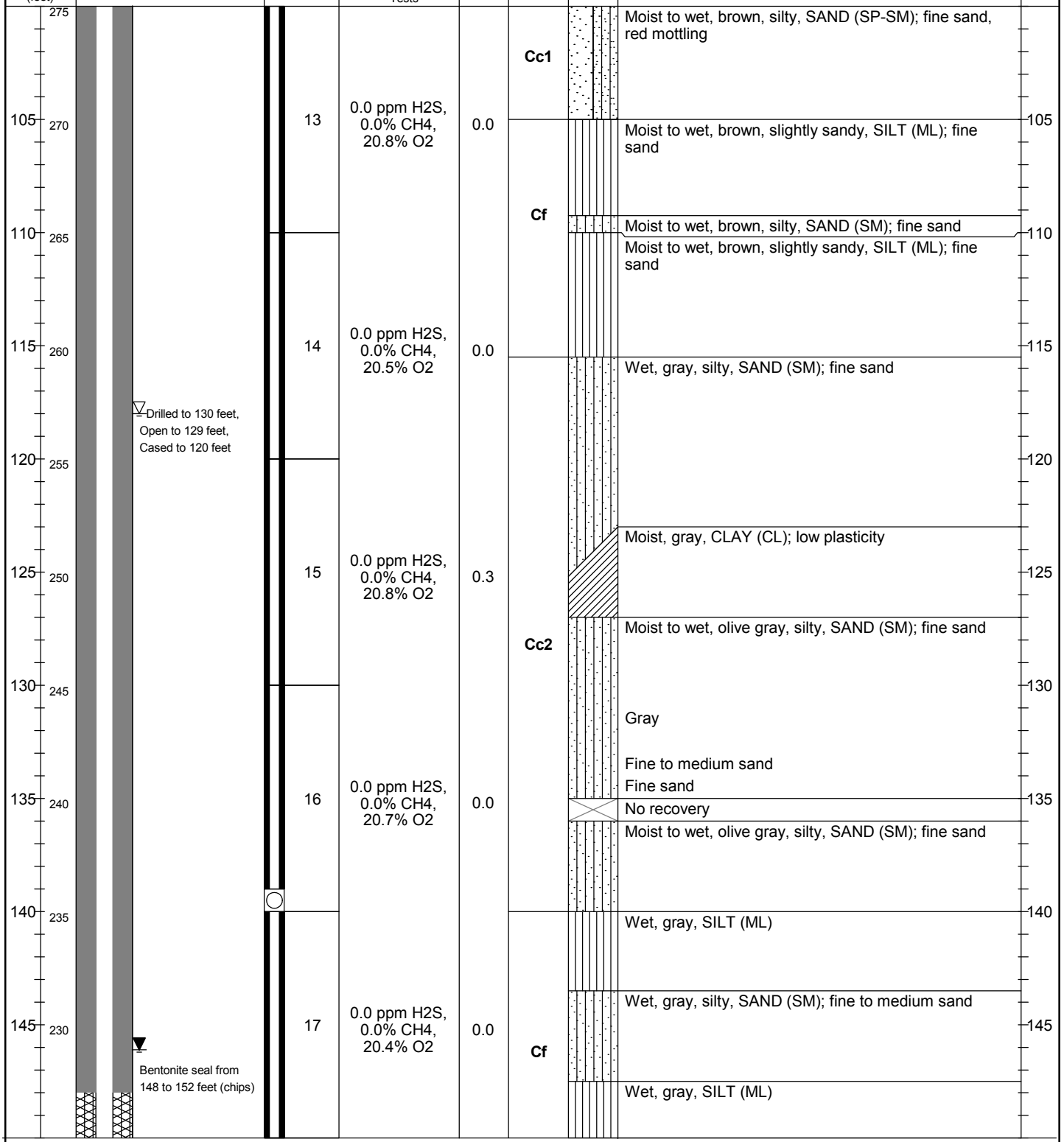
Ground Surface Elev (NGVD 88) 375.25
Top of Casing Elev. (NGVD 88) 378.2412
Depth to Water (ft BGS) 146.1
Start/Finish Date 3/27/2015-4/2/2015



Sampler Type:
- No Recovery
- Continuous Core

PID - Photoionization Detector
- Static Water Level
- Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 5

KCSWD_SONIC LOG_KC VASHON.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-36	4 of 4

Project Name: King County Closed Landfills
Location: 162951.3403N, 1227572.5516E (NAD 83/91) / Vashon Island Landfill
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Sampling Method: Continuous Core

Ground Surface Elev (NGVD 88) 375.25
Top of Casing Elev. (NGVD 88) 378.2412
Depth to Water (ft BGS) 146.1
Start/Finish Date 3/27/2015-4/2/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
225	Drilled to 160 feet, Open to 152 feet, Cased to 160 feet				Cf		Moist, gray, CLAY (CL)	
							Slightly moist at 152 feet	
155 / 220	Centralizer at 154 feet; Filter pack of 10/20 Colorado silica sand from 152 to 165 feet	18					Wet, olive gray to brown, SAND (SP); trace silt, fine to medium sand	155
160 / 215	Schedule 80 4-inch PVC from 154 to 164 feet; Centralizer at 164 feet; Sump from 164 to 164.3 feet				Cc3		Wet, gray, slightly silty, SAND (SP-SM); fine to medium sand	160
165 / 210	Bentonite seal from 165 to 166 feet (chips)	19					Slightly moist to moist, gray, SILT (ML); trace fine sand	165
	Native backfill from 166 to 170 feet						Slightly moist, gray, slightly silty, SAND (SP-SM); fine sand	
170 / 205							Bottom of boring at 170 feet	170
175 / 200								175
180 / 195								180
185 / 190								185
190 / 185								190
195 / 180								195

Sampler Type:
- ○ No Recovery
- ▮ Continuous Core

PID - Photoionization Detector
- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 5

KCSWD_SONIC LOG_KC VASHON.GPJ June 30, 2015

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

REPORT TO
HARPER OWES

GEOTECHNICAL MEMORANDUM #4
SUBTASK 1/TASK 1B
GEOTECHNCIAL DATA DEVELOPMENT
VASHON LANDFILL LEACHATE CONTROL

Distribution:

2 copies - Harper Owes
Seattle, Washington

4 copies - Golder Associates
Seattle (Redmond), Washington

August 1986

853-1047.001

RECORD OF BOREHOLE P-1

Figure A-7
Page 1 of 4

LOCATION See Figure 2 DATUM 393 ft. MSL DATE 3-12-86

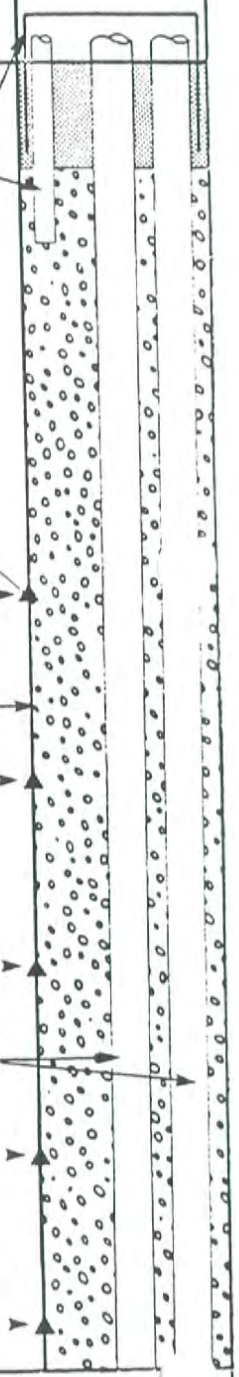
SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH
393.0 / 0.0	Dense to very dense, grayish-brown, fine to coarse SAND and SILT, trace gravel to silty SAND, some gravel (Till)	SM	1	DO	17, 11, 25	5
			2	DO	6, 22, 35	10
			3	DO	7, 50/4"	15
			4	DO	50/6"	20
			5	DO	50/5"	25
			6	DO	50/4"	30
			7	DO	50/4"	

STANDARD PENETRATION TEST
▲ 'N' BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.



REMARKS: DO = Drive Open
Piezometers have been grouted due to breakage

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.07

RECORD OF BOREHOLE P-1

Figure A-7
Page 2 of 4

LOCATION See Figure 2 | DATUM 393 ft. MSL | DATE 3-12-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. | BORING METHOD– HOLLOW STEM AUGER

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH
	Dense to very dense, grayish-brown, fine to coarse SAND and SILT, trace gravel to ...y SAND, some gravel (Till)	SM	8	DO	50/4"	40
			9	DO	50/5"	45
347.0						
46.0	Very dense, brown to grayish-brown, fine to medium SAND, trace gravel, little silt (Proglacial sand)	SP	10	DO	50/6"	50
			11	DO	50/6"	55
			12	DO	50/6"	60
			13	DO	50/6"	65
			14	DO	50/4"	

STANDARD PENETRATION TEST
▲ 'N' BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST

1" Schedule 40 flush threaded PVC casing

Pea gravel

REMARKS

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.07

RECORD OF BOREHOLE P-1

Figure A-7
Page 3 of 4

LOCATION See Figure 2 DATUM 393 ft. MSL DATE 3-12-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – CABLE TOOL

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH
	Very dense, brown to grayish-brown, fine to medium SAND, trace gravel, little silt (Proglacial sand)	SP	15	DO	50/6"	75
			16	DO	7 41 50/2"	80
			17	DO	50/5"	85
			18	DO	50/6"	90
			19	DO	34 50/5"	95
			20	DO	41 50/4"	100
289.5 103.5		ML	21	DO	21 50/6"	

STANDARD PENETRATION TEST
▲ 'N' BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST

Pea gravel
1" Schedule 40 flush threaded PVC casing
#8 Aqua sand
1" Schedule 40 PVC screen .020" slots
Cap

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.07

Figure A-7

RECORD OF BOREHOLE P-1

LOCATION See Figure 2 DATUM 393 ft. MSL DATE 3-12-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD- HOLLOW STEM AUGER

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH
	Very hard, dark gray to orange-brown SILT, trace sand (Upper lacustrine silt)	ML				
283.5			22	DO	32 50/5"	
109.5	Very dense, grayish-brown, silty fine to medium SAND	SM				110
			23	DO	50/6"	115
			24	DO	50/5"	120
271.0						
122.0	Very hard, dark gray SILT, trace sand to sandy SILT (Lower lacustrine silt)	ML	25	DO	50/5"	125
266.0						
127.0	Very dense, very hard, dark gray, interbedded, SILT and fine SAND	ML/SM	26	DO	23 50/6"	130
			27	DO	50/5"	135
256.0						
137.0	Very hard, dark gray, sandy SILT	ML	28	DO	42 50/3"	
253.0	End of hole at 140.0 feet					

STANDARD PENETRATION TEST
▲ "N" BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST

Bentonite pellet seal
#8 Aqua sand
1" Schedule 40 PVC screen .020" slots
Cap
Pea gravel
Bentonite pellet seal
Pea gravel and cave

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.07

Figure A-8

RECORD OF BOREHOLE P-1A

LOCATION See Figure 2 DATUM 394.02 ft. MSL DATE 3/25/86

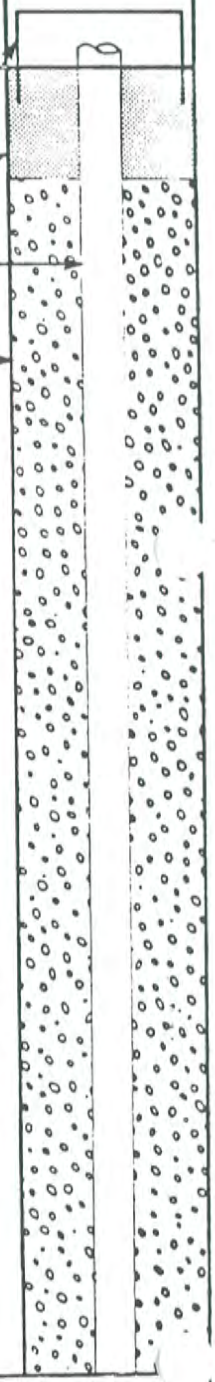
SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/6 IN	DEPTH
	For lithology, see log of boring P-1					5, 10, 15, 20, 25, 30

STANDARD PENETRATION TEST
▲ 'N' BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.



REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047/29

RECORD OF BOREHOLE P-1A

Figure A-8

LOCATION See Figure 2 DATUM 394.02 ft. MSL DATE 3/25/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD– HOLLOW STEM AUGER

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
ELEVN. / DEPTH	DESCRIPTION	USCS SYMBOL	NUMBER	TYPE	BLOWS/6 IN.	DEPTH		
	For lithology, see log of boring P-1					40 45 50 55 60 65	Pea gravel 1" Schedule 40 flush threaded PVC casing Bentonite slurry	

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL

JOB# 853-1047 /29

Figure A-8

RECORD OF BOREHOLE P-1A

LOCATION See Figure 2 DATUM 394.02 ft. MSL DATE 3/25/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

SOIL PROFILE			SAMPLES					
ELEVN. / DEPTH	DESCRIPTION	USCS SYMBOL	NUMBER	TYPE	BLOWS/6 IN.	DEPTH	STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
	For lithology, see log of boring P-1					75 80 85 90 95 100		Bentonite slurry; 1" Schedule 40 flush threaded PVC casing

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047/29

RECORD OF BOREHOLE P-1A

Figure A-8

LOCATION See Figure 2 DATUM 394.02 ft. MSL DATE 3/25/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80	PIEZOMETER INST.
ELEVN. / DEPTH	DESCRIPTION	USCS SYMBOL	NUMBER	TYPE	BLOWS/6 IN.	DEPTH	WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	
	For lithology, see log of boring P-1					110		#8 Monterey sand 4/10/86
						115		1" Schedule 40 PVC screen .020" slots
						120		Cap
						125		Pea gravel Bentonite pellet seal
						130		

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

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JOB# 853-1047/29

RECORD OF BOREHOLE P-1B

Figure A-9

LOCATION See Figure 2 DATUM 393.08 ft. MSL DATE 3/29/86

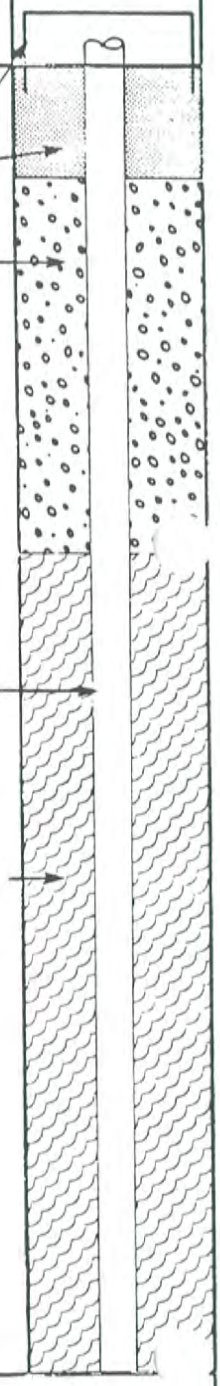
SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/6 IN.	DEPTH
	For lithology, see log of boring P-1					5, 10, 15, 20, 25, 30

STANDARD PENETRATION TEST
▲ 'N' BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST.



REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

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VASHON LANDFILL
JOB# 853-1047/30

Figure A-9

RECORD OF BOREHOLE P-1B

LOCATION See Figure 2 DATUM 393.08 ft. MSL DATE 3/29/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST	PIEZOMETER INST.
ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	NUMBER	TYPE	BLOWS/6 IN.	DEPTH	▲ "N" BLOWS PER FOOT 20 40 60 80 WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	
	For lithology, see log of boring P-1					40 45 50 55 60 65	1" Schedule 40 flush threaded PVC casing Bentonite slurry	

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047/30

RECORD OF BOREHOLE P-1B

LOCATION See Figure 2 DATUM 393.08 ft. MSL DATE 3/29/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
ELEVN. / DEPTH	DESCRIPTION	USCS SYMBOL	NUMBER	TYPE	BLOWS/6 IN.	DEPTH		
	For lithology, see log of boring P-1					75 80 85 90 95 100		Bentonite slurry 1" Schedule 40 flush threaded PVC casing 10x20 Silica sand 1" Schedule 40 PVC screen .020" slots 4/10/86 Cap Pea gravel

REMARKS:

RECORD OF BOREHOLE P-1B

Figure A-9

LOCATION See Figure 2 DATUM 393.08 ft. MSL DATE 3/29/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
ELEVN. / DEPTH	DESCRIPTION	USCS SYMBOL	NUMBER	TYPE	BLOWS/6 IN.	DEPTH		
	For lithology, see log of boring P-1					110	Bentonite pellet seal	

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

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JOB# 853-1047/30

RECORD OF BOREHOLE P-2

Figure A-10
Page 1 of 4

LOCATION See Figure 2 DATUM 373.73 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH
373.73						
0.0	Dense to very dense, grayish-brown, silty, gravelly, fine to coarse SAND (Till)	GM SM	1	DO	33 22 19	5
			2	DO	36 50/4"	10
			3	DO	50/6"	15
			4	DO	50/6"	20
			5	DO	50/3"	25
			6	DO	50/2"	30
341.2						
32.5	Very dense, grayish-brown, fine to coarse SAND, trace to little GRAVEL and SILT (Proglacial sand)	SP	7	DO	36 50/3"	

STANDARD PENETRATION TEST
▲ "N" BLOWS PER FOOT
20 40 60 80

WATER CONTENT, PERCENT
Wp Wn Wl
20 40 60 80

PIEZOMETER INST

6" Locking steel surface casing
Bentonite/ cement grout
3/4" PVC gas monitoring probe
Pea gravel
1.25" Schedule 40 flush threaded PVC casing

REMARKS: DO = Drive Open

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.08

RECORD OF BOREHOLE P-2

LOCATION See Figure 2 DATUM 373.73 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/6 IN	DEPTH	STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT (20 40 60 80) / WATER CONTENT, PERCENT (Wp Wn Wl; 20 40 60 80)	PIEZOMETER INST
	Very dense, grayish-brown, fine to coarse SAND, trace to little GRAVEL and SILT (Proglacial sand)	SP	8	DO	50/6"	40		Pea gravel
			9	DO	50/6"	45		
			10	DO	50/6"	50		1.25" Schedule 40 flush threaded PVC casing
			11	DO	50/6"	55		
			12	DO	31 50/3"	60		
			13	DO	50/6"	65		
			14	DO	28 50/5"			

REMARKS

VERTICAL SCALE
1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL
JOB# 853-1047.08

RECORD OF BOREHOLE P-2

LOCATION See Figure 2 DATUM 373.73 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN.	DEPTH	STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT (20 40 60 80) / WATER CONTENT, PERCENT Wp Wn Wl (20 40 60 80)	PIEZOMETER INST.
301.7		SP						Pea gravel
72.0	Very dense, medium to coarse SAND	SP	15	DO	34 50/5"	75		
			16	DO	34 50/4"	80		1.25" Schedule 40 flush threaded PVC casing
			17	DO	50/6"	85		
282.7			18	DO	28 50/3"	90		Bentonite pellet seal
91.0	Very hard, dark gray, SILT, little to trace fine sand, (Upper lacustrine silt)	ML	19	DO	34 50/4"			
			20	DO	21 30 43	95		4/10/86
275.7								#8 Aqua sand
98.0	Very hard, dark grayish brown, sandy SILT, (Upper lacustrine silt)	SM	21	DO	50/5"	100		
270.7								1.25" Schedule 40 PVC screen 0.020" slots
103.0	Very dense, dark gray, fine to medium silty SAND	ML						

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

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JOB# 853-1047.08

RECORD OF BOREHOLE P-2

Figure A-10
Page 4 of 4

LOCATION See Figure 2 DATUM 373.73 ft. MSL DATE 3-19-86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD—HOLLOW STEM AUGER

ELEVN / DEPTH	DESCRIPTION	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/6 IN	DEPTH	STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST
	Very dense, dark gray, fine to medium silty SAND	SM	22	DO	33 50/4"			#8 Aqua sand
			23	DO	25 50/4"	110		1.25" Schedule 40 PVC screen 0.020" slot size
261.2								
112.5	Very hard, grayish brown, SILT, little to trace fine sand (Lower lacustrine silt)	ML	24	DO	40 50/4"	115		Cap
	Grades to silty fine SAND (Lower lacastrine silt)		25	DO	29 39 50/3"	120		Pea gravel
								Bentonite pellet seal
247.7			26	DO	47 50/4"	125		
126.0	End of hole at 126.0 feet							

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

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VASHON LANDFILL
JOB# 853-1047.08

Figure A-11

RECORD OF BOREHOLE P-2A

LOCATION See Figure 2 DATUM 373.6 ft. MSL DATE 3/24/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
ELEVN. / DEPTH	DESCRIPTION	USCS SYMBOL	NUMBER	TYPE	BLOWS/6 IN.	DEPTH		
	For lithology, see log of boring P-2					5, 10, 15, 20, 25, 30		6" locking steel surface casing; Cement seal; Pea gravel; 2" Schedule 40 flush threaded PVC casing; Bentonite slurry

REMARKS:

VERTICAL SCALE
1 IN. TO 5 FT.

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JOB# 853-1047 /31

Figure A-11

RECORD OF BOREHOLE P-2A

LOCATION See Figure 2 DATUM 373.6 ft. MSL DATE 3/24/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

SOIL PROFILE			SAMPLES				STANDARD PENETRATION TEST ▲ "N" BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
ELEVN. / DEPTH	DESCRIPTION	USCS SYMBOL	NUMBER	TYPE	BLOWS/6 IN.	DEPTH		
	For lithology, see log of boring P-2					40		Bentonite slurry
						45		
						50		2" Schedule 40 flush threaded PVC casing
						55		
						60		
						65		

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL

JOB# 853-1047/31

Figure A-11

RECORD OF BOREHOLE P-2A

LOCATION See Figure 2 DATUM 373.6 ft. MSL DATE 3/24/86

SAMPLER HAMMER WEIGHT 140 LB., DROP 30 IN. BORING METHOD – HOLLOW STEM AUGER

SOIL PROFILE			SAMPLES					
ELEVN. / DEPTH	DESCRIPTION	USCS SYMBOL	NUMBER	TYPE	BLOWS/6 IN.	DEPTH	STANDARD PENETRATION TEST ▲ 'N' BLOWS PER FOOT 20 40 60 80 / WATER CONTENT, PERCENT Wp Wn Wl 20 40 60 80	PIEZOMETER INST.
	For lithology, see log of boring P-2					75 80 85 90 95 100		#8 Aqua sand ▼ 4/10/86; 2" Schedule 40 PVC screen .020 slots; Pea gravel; Bentonite pellet seal

REMARKS:

VERTICAL SCALE 1 IN. TO 5 FT.

Golder Associates

VASHON LANDFILL

JOB# 853-1047/31

Test Pit Logs

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

REPORT TO
HARPER OWES

RESULTS OF GEOTECHNICAL INVESTIGATION
PROPOSED SURFACE DRAINAGE DESIGN
VASHON LANDFILL PROJECT

Distribution:

5 copies - Harper Owes
Seattle, Washington

3 copies - Golder Associates
Redmond (Seattle), Washington

June 1986

853-1047.2

TABLE 1: TEST PIT LOGS

TEST PIT TP-1

DEPTH (FT)	STRATUM
0 to 3	Medium dense brown Sandy SILT, some Gravel, some Cobbles, little trash debris (FILL)
3 to 5	Dense brown Silty Sand, some Gravel (FILL)
5 to 10	Misc. TRASH, wood, plastic, fabric, sawdust, etc. (GARBAGE)
	No seepage on 3/31/86

TEST PIT TP-2

DEPTH (FT)	STRATUM
0 to 1	Medium dense brown Sandy SILT, some Gravel (TILL)
1 to 3	Medium dense orange-brown Sandy SILT, with roots (WEATHERED TILL)
3 to 8	Very dense brown Silty SAND, some Gravel (TILL)
	seepage at -5.5 feet on 3/31/86

TEST PIT TP-3

DEPTH (FT)	STRATUM
0 to 1	Medium dense orange brown Silty SAND, some Gravel, occasional roots (WEATHERED TILL)
1 to 8.5	Very dense grey brown Silty SAND, some Gravel, little Cobbles (TILL)
	No seepage on 3/31/86

TEST PIT TP-4

DEPTH (FT)	STRATUM
0 to 1	Medium dense reddish brown Silty SAND, some Gravel (WEATHERED TILL)
1 TO 9.5	Very dense grey brown Silty SAND, some Gravel, little Cobbles, a 24" boulder encountered (TILL)
	Seepage at -2.5 feet and -4.5 feet on 3/31/86

TABLE 1: TEST PIT LOGS (Continued)

TEST PIT TP-5

DEPTH (FT)	STRATUM
0 TO 1	Medium dense orange brown Silty SAND, some Gravel (WEATHERED TILL)
1 TO 9.5	Very dense grey brown Silty SAND, some Gravel, sandy zones at -7.5' and -8.5' (TILL)
	Seepage at -7.5 feet on 3/31/86

TEST PIT TP-6

DEPTH (FT)	STRATUM
0 to 3	Medium dense grey brown Silty fine to coarse SAND, little to some Gravel, little to some Trash (FILL AND TRASH)
3 to 7.5	Misc. TRASH, wood, plastic, fabric, sawdust, rubber tires, etc. (GARBAGE)
	No seepage on 3/31/86

TEST PIT TP-7

DEPTH (FT)	STRATUM
0 to 3	Medium dense grey brown Silty fine to coarse SAND, little to some Gravel, little to some Trash (FILL AND TRASH)
3 to 9	Misc. TRASH, wood, plastic, fabric, sawdust, rubber tires, etc. (GARBAGE)
	No seepage on 3/31/86

TEST PIT TP-8

DEPTH (FT)	STRATUM
0 to 1	Medium dense orange brown Sandy SILT, little Gravel, some organics (FILL)
1 to 4.5	Medium dense orange brown Silty SAND, some Gravel, little Cobbles (WEATHERED TILL)
4.5 to 11	Very dense grey brown Gravelly SAND, some cobbles, little Silt (SANDY TILL)
	No seepage on 3/31/86

TABLE 2 - HAND PROBE

HP-1

DEPTH (FT)	STRATUM
0 TO 1	Brown f/m SAND, little to some Silts, trace Gravel (RECENT ALLUVIUM)
1 to 4	Orange brown f/c SAND, little Silt, trace Gravel (DENSE SANDS)

HP-2

DEPTH (FT)	STRATUM
0 to 1	Dark brown organic TUFF
1 to 4	Orange brown medium SAND, little to some Silt, little gravel (DENSE SAND)

HP-3

DEPTH (FT)	STRATUM
0 to 0.5	Dark brown organic TUFF
0.5 to 4	Orange brown f/m SAND, little to some Silt, trace gravel (DENSE SAND)

HP-4

DEPTH (FT)	STRATUM
0 to 1	Brown Gravelly SAND, trace Silt (RECENT ALLUVIUM)
1 to 1.1	Organic Clayey Silt (RECENT ALLUVIUM)
1 to 4	Orange brown Silty fine SAND, little Gravel (DENSE SAND)

HP-5

DEPTH (FT)	STRATUM
0 to 4	Brown f/m SAND, lenses of soft Clayey Silt (RECENT ALLUVIUM)

TABLE 2 - HAND PROBE (CONTINUED)

HP-6

DEPTH (FT)	STRATUM
0 to 1	Light grey SAND, little silt
1 to 4	Orange brown Silty SAND, little gravel (DENSE SAND)

HP-7

DEPTH (FT)	STRATUM
0 to 4	Brown f/m SAND, little to some Gravel, trace SILT, metal debris fragment at -4' (RECENT ALLUVIUM)

HP-8

DEPTH (FT)	STRATUM
0 to 2	Brown Gravelly f/c SAND, trace Cobbles (RECENT ALLUVIUM)

HP-9

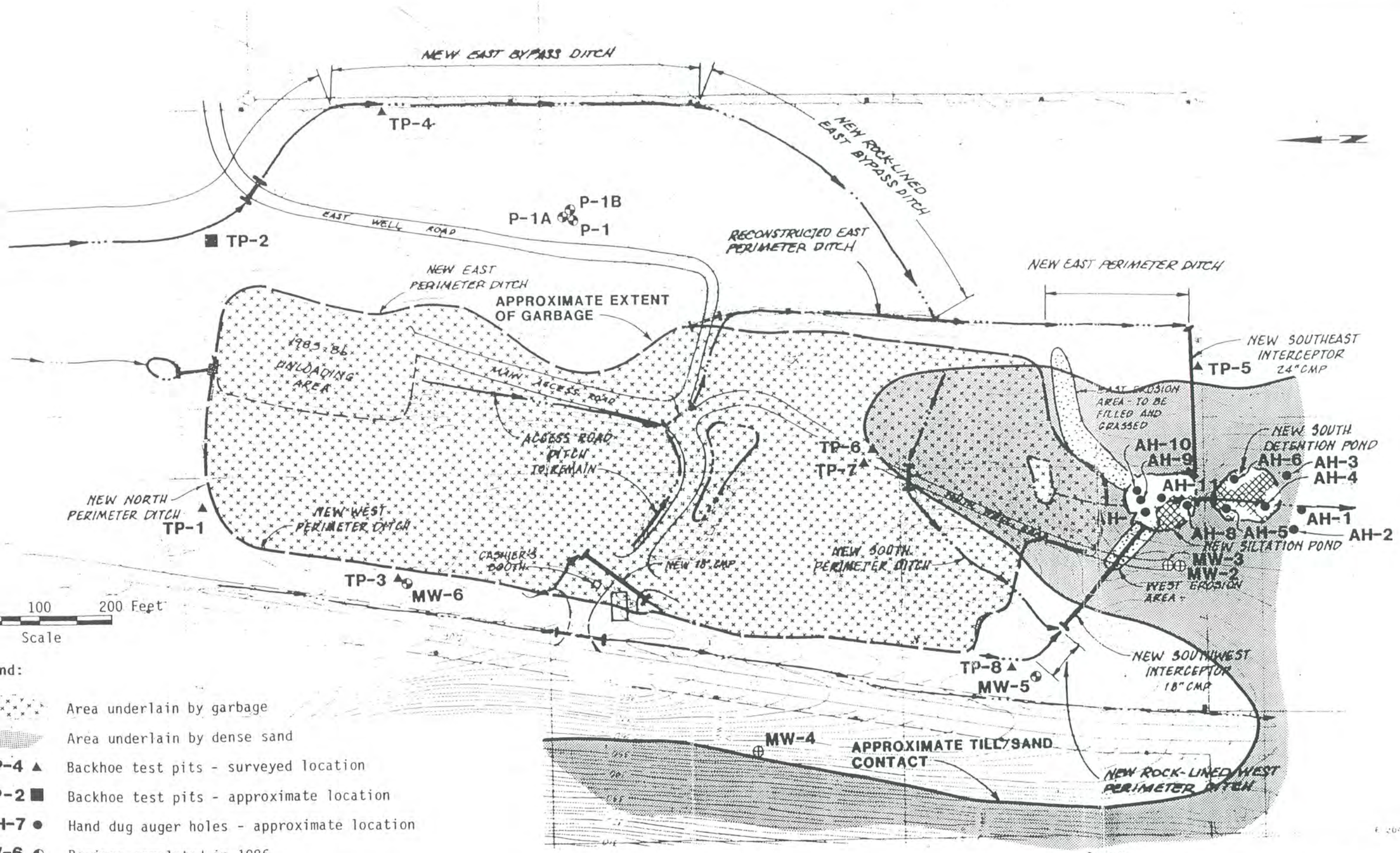
DEPTH (FT)	STRATUM
0 to 4	Brown f/c SAND, little Gravel, trace Silt (RECENT ALLUVIUM)

HP-10

DEPTH (FT)	STRATUM
0 to 3	Brown Gravelly f/c SAND (RECENT ALLUVIUM)

SITE PLAN
VASHON LANDFILL DRAINAGE IMPROVEMENTS

Figure 1



Legend:

- Area underlain by garbage
- Area underlain by dense sand
- TP-4 ▲ Backhoe test pits - surveyed location
- TP-2 ■ Backhoe test pits - approximate location
- AH-7 ● Hand dug auger holes - approximate location
- MW-6 ⊕ Borings completed in 1986
- MW-4 ⊕ Borings completed prior to 1986

Source:
Based on Harper-Owes drawing entitled "Alternative No. 4 - Seperate Flow Control and Siltation Ponds".

Golder Associates

Rev. VASHON LANDFILL/18
Dwg. No. 853-1047-002 Date 5/22/86 Eng. M.D.

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

REPORT TO
HARPER OWES

SUPPLEMENTARY GEOTECHNICAL INVESTIGATION FOR VASHON LANDFILL CLOSURE AND EXPANSION DESIGN

Distribution:
1 copy - Harper Owes
Seattle, Washington
5 copies - Golder Associates
Seattle (Redmond), Washington

October 1987

873-1174

TABLE 1
TEST PIT LOGS*

1	
0 to 1.5 ft	Loose, brown-gray, silty SAND, little gravel (FILL)
1.5 to 3.0 ft	Soft, brown, organic SILT, little sand, roots, and grass (TOPSOIL/ORGINAL GROUND SURFACE)
3.0 to 7.5 ft	Compact to dense, gray-brown to gray, massive, silty, fine to medium SAND, little to trace gravel; becomes sandier with depth to medium SAND, little to trace silt and gravel, moist (TILL)
	Test pit was terminated at 7.5 ft depth. No water was encountered in the test pit.
2	
0 to 0.5 ft	Loose, brown, fine to medium SAND, little gravel
0.5 to 7.5 ft	Loose, dark brown to gray, silty SAND, little garbage to GARBAGE in layers
	Test pit was terminated at 7.5 ft depth. No water was encountered in the test pit.
3	
0 to 1.5 ft	Loose, brown, fine sandy SILT, little trace gravel
1.5 to 5.0 ft	Dense, gray, silty, fine to medium SAND, trace gravel (TILL)
	Test pit was terminated at 5.0 ft depth. No water was encountered in the test pit.

* Test pits were excavated and logged on February 25 and 26, 1987. Test locations are shown in Figure 1.

4

0 to 0.5 ft	Loose, gray, silty, fine SAND (FILL)
0.5 to 2.5 ft	GARBAGE
	Test pit was terminated at 2.5 ft depth. No water was encountered in the test pit.

5

0 to 2.0 ft	Loose, brown, silty, fine SAND (FILL)
2.0 to 6.0 ft	GARBAGE with silty, fine sand
	Test pit was terminated at 6.0 ft depth. No water was encountered in the test pit.

6

0 to 0.5 ft	Loose, brown, fine to medium SAND, little to trace roots
0.5 to 6.0 ft	Compact, brown, weakly bedded, fine to medium SAND, trace gravel
	Test pit was terminated at 6.0 ft depth. No water was encountered in the test pit.

7

0 to 3.0 ft	Loose, brown-gray, silty fine SAND, little to trace gravel (FILL)
3.0 to 5.5 ft	GARBAGE
	Test pit was terminated at 5.5 ft depth. No water was encountered in the test pit.

8

0 to 1.5 ft	Loose, brown, sandy GRAVEL (ROAD FILL)
1.5 to 6.0 ft	Loose to compact, gray, fine, sandy SILT, little to trace gravel (WEATHERED TILL)
6.0 to 9.5 ft	Dense, brown, massive, fine, sandy SILT, little to trace gravel (TILL)
	Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit.

9

0 to 2.5 ft	Compact, brown, medium to fine SAND (FILL)
2.5 to 3.0 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
3.0 to 4.5 ft	Very dense, mottled brown and gray, massive, silty, fine to medium SAND, little to trace gravel (TILL)
	Test pit was terminated at 4.5 ft depth. No water was encountered in the test pit.

10

0 to 1.5 ft	Compact, brown, silty, fine to medium SAND (FILL)
1.5 to 3.5 ft	Very dense, brown, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 3.5 ft depth. No water was encountered in the test pit.

11

0 to 0.5 ft	Loose, gray-brown, silty, fine SAND (FILL)
0.5 to 2.5 ft	GARBAGE
	Test pit was terminated at 2.5 ft depth. No water was encountered in the test pit.

12

0 to 1.0 ft	Loose, gray, fine sandy SILT, little to trace gravel (FILL)
1.0 to 3.0 ft	GARBAGE

Test pit was terminated at 3.0 ft depth. No water was encountered in the test pit. Dense to very dense till was encountered in the far western edge of the test pit.

13

0 to 5.5 ft	Loose to compact, brown, fine sandy SILT, little gravel and garbage (FILL)
5.5 to 8.5 ft	Loose to compact, dark brown, fine sandy SILT, little roots and organics (FOREST TOPSOIL)
8.5 to 9.0 ft	Very dense, light brown, fine to medium sandy SILT, little gravel (TILL)

Test pit was terminated at 9.0 ft depth. No water was encountered in the test pit.

14

0 to 3.0 ft	Loose to compact, brown-gray, fine to medium sandy SILT, little gravel (FILL)
3.0 to 6.5 ft	Loose, dark brown, fine sandy SILT, little large roots and organics (FOREST TOPSOIL)

Test pit was terminated at 6.5 ft depth. Water was encountered in the test pit at 6.0 ft depth.

15

0 to 4.5 ft	Compact, brown, massive, silty, fine to medium SAND, little gravel (TILL)
4.5 to 5.0 ft	Very dense, brown, massive, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 5.0 ft depth. No water was encountered in the test pit.

16

0 to 3.0 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
3.0 to 9.5 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit.

17

0 to 3.0 ft	Loose to compact, brown, fine sandy SILT, little gravel and debris/garbage (FILL)
3.0 to 4.0 ft	Loose, dark brown, silty, organic SAND, many roots (TOPSOIL)
4.0 to 6.5 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
6.5 to 9.5 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel, moist below 9.2 ft (TILL)
	Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit.

18

0 to 5.0 ft	Loose to compact, brown, massive, fine to medium sandy SILT, little gravel and debris/garbage (FILL)
5.0 to 6.0 ft	Loose, dark brown, organic, silty SAND, many large roots (FOREST TOPSOIL)
6.0 to 9.0 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
9.0 to 10.7 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 10.7 ft depth. No water was encountered in the test pit.

19

0 to 0.2 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.2 to 4.0 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
4.0 to 8.0 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 8.0 ft depth. No water was encountered in the test pit.

20

0 to 1.0 ft	Loose, brown, silty, fine SAND, little gravel (FILL)
1.0 to 4.0 ft	Loose, dark brown, fine sandy SILT, little roots and organics (TOPSOIL)
4.0 to 6.0 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
6.0 to 9.5 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit.

21

0 to 0.5 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.5 to 5.0 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
5.0 to 9.5 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit.

22

0 to 0.5 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.5 to 2.0 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
2.0 to 8.5 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 8.5 ft depth. No water was encountered in the test pit.

23

0 to 0.5 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.5 to 3.0 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
3.0 to 8.0 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel to fine to medium SAND, little silt and gravel (TILL)
	Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit.

24

0 to 0.5 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.5 to 2.5 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
2.5 to 9.0 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 9.0 ft depth. No water was encountered in the test pit.

25

0 to 0.5 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.5 to 2.5 ft	Compact to dense, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
2.5 to 3.5 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 3.5 ft depth. No water was encountered in the test pit.

26

0 to 2.0 ft	Compact, brown, massive, silty, fine to medium SAND, little gravel, trace roots (WEATHERED TILL)
2.0 to 7.5 ft	Dense to very dense, gray, fissile, silty, fine to medium SAND, little gravel to fine to medium SAND, little gravel and silt (TILL)
	Test pit was terminated at 9.5 ft depth. No water was encountered in the test pit.

27

0 to 0.5 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.5 to 4.5 ft	Compact to dense, fine to medium SAND, little silt and gravel (TILL)
	Test pit was terminated at 5.5 ft depth. No water was encountered in the test pit.

28

0 to 3.0 ft	Compact, brown, fine SAND, little silt (FILL)
3.0 to 9.0 ft	Dense, gray, massive, fine to medium SAND, little silt and gravel (TILL)
	Test pit was terminated at 9.0 ft depth. No water was encountered in the test pit.

29

0 to 0.5 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.5 to 2.0 ft	Compact to dense, brown, massive, silty, fine to medium sand, little gravel, trace roots (WEATHERED TILL)
2.0 to 6.0	Very dense, gray, fissile, fine to medium SAND, little silt and gravel to silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 6.0 ft depth. No water was encountered in the test pit.

30

0 to 0.5 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.5 to 1.5 ft	Compact to dense, brown, massive, silty, fine to medium sand, little gravel, trace roots (WEATHERED TILL)
1.5 to 5.0 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel, occassional boulders >18 inches (TILL)
	Test pit was terminated at 5.0 ft depth. No water was encountered in the test pit.

31

0 to 1.0 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
1.0 to 2.0 ft	Compact to dense, brown, massive, silty, fine to medium sand, little gravel, trace roots (WEATHERED TILL)
2.0 to 4.0 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 4.0 ft depth. No water was encountered in the test pit.

32

0 to 0.5 ft	Loose, dark brown, organic, silty SAND (TOPSOIL)
0.5 to 2.0 ft	Compact to dense, brown, massive, silty, fine to medium sand, little gravel, trace roots (WEATHERED TILL)
2.0 to 6.0 ft	Very dense, gray, fissile, silty, fine to medium SAND, little gravel (TILL)
	Test pit was terminated at 6.0 ft depth. No water was encountered in the test pit.

FIGURE **2**

CONTOURED ELEVATION OF BASE OF TILL

VASHON LANDFILL

PROJECT NO 873-1174-000 DWG NO 6052 DATE 10/6/87 DRAWN TB APPROVED CK

Golder Associates

Gas Probes and Extraction Wells

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, North of main gate	E:1227778 N:163363 (est)	**VTP-1D**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev.
Holt Services, Inc	Rotary drill rig	Rotary core	NA (est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev.	Depth to Water (Below GS)
Dave	Sonic	8/3/2016	NA (est)	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
-2		Valved hose barb						-2
-1								-1
0		Concrete surface seal						0
1					PID= 0.0		Overdrilled section of VTP-1S to 10' bgs, no soil samples collected. Installed VTP-1D at same location.	1
2								2
3					PID= 0.0			3
4		3/4-inch SCH 40 PVC 0-31 ft bgs						4
5			S1		PID= 0.0			5
6		3/8-inch Bentonite chip backfill 2-30 ft bgs						6
7								7
8					PID= 0.0			8
9								9
10							**Vashon Till/A Unit** Very dense, slightly moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, diamict fabric, no odor.	10
11					PID= 0.0			11
12								12
13					PID= 0.0			13
14								14
15			S2		PID= 0.0			15
16								16
17					PID= 0.0			17
18								18
19								19
20								20
21			S3					21

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-1D

Sheet 1 of 2

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, North of main gate	E:1227778 N:163363 (est)	**VTP-1D**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev.
Holt Services, Inc	Rotary drill rig	Rotary core	NA (est)

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev.	Depth to Water (Below GS)
Dave	Sonic	8/3/2016	NA (est)	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
23					PID= 0.0			23
24								24
25					PID= 0.0			25
26			S3					26
27								27
28					PID= 0.0			28
29							**Vashon Advance Outwash/B Unit**	29
30		Gravel filter pack 30-34 ft bgs			PID= 0.0		Slightly moist to moist, brown, slightly silty SAND (SP-SM); trace silt, trace fine subangular to subrounded gravel, predominantly medium sand, no odor	30
31					PID= 0.0		Moist, brown SAND (SP); trace silt, trace fine subangular to subrounded gravel, predominantly medium sand, no odor	31
32		3/4-inch 0.020 slot SCH 40 screen 31-33.5 ft bgs	S4					32
33								33
34		Endcap			PID= 0.0		Bottom of exploration at 34 ft. bgs.	34
35								35
36								36
37								37
38								38
39								39
40								40
41								41
42								42
43								43
44								44
45								45
46								46

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-1D
Sheet 2 of 2

(TP-1S)

HERRERA

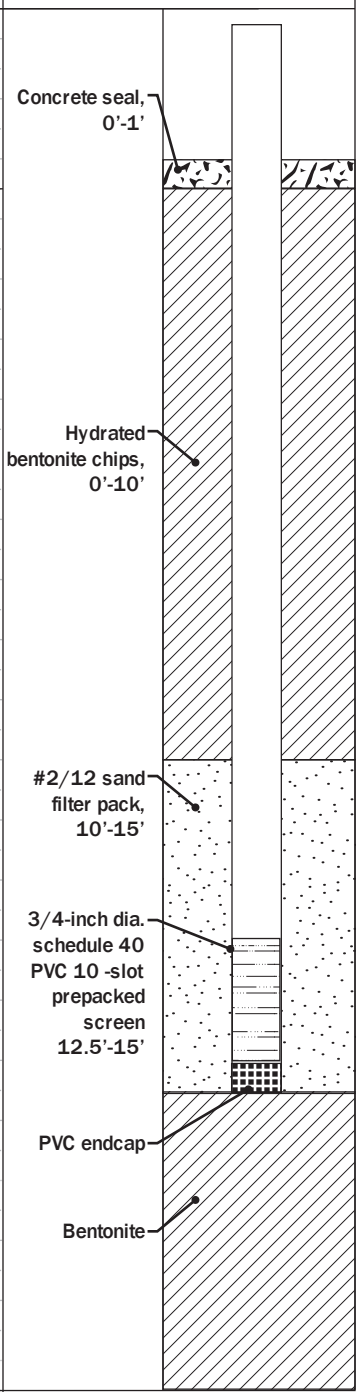
SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

Probe / Boring ID: VTP1S
Total depth: 23'
Sheet 1 of 2

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: 123' N and 12' W of EF-2 West side of landfill
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' sampler w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

GEM (% volume)	Sample Type, Interval	% Recovery	Depth (feet, BGS)	Soil Group	Water Level (feet)	Soil Description
			3			
						stickup 2.7'
			2			
			1			
			0			
CH_4 0 CO_2 0 O_2 20.8	5-ft core sample	80	1 2	SM		Grass/Topsoil, damp Light brown - tan silty gravelly, SAND, damp (till) wet @ 2' (water perched near top of till)
			3			
			4			
			5			
						Grayish brown, damp
CH_4 0 CO_2 0 O_2 20.9	5-ft core sample	85	6 7			
			8			
			9		▽	Static water level 8.9' 5/1/2013
			10			
CH_4 0 CO_2 0 O_2 20.8	5-ft core sample	100	11 12			
			13			
			14			
			15			
						(Second boring drilled to 15' and probe constructed)
CH_4 0 CO_2 0 O_2 21.0	5-ft core sample	100	16 17			
			18			
			19	SM		Grayish-brown silty gravelly SAND, damp (till)
			20			



Last Modified: 06/20/2013
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(TP-1S)

SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

HERRERA

Probe / Boring ID: VTP1S
Total depth: 23'
Sheet 2 of 2

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: 123' N and 12' W of EF-23 West side of landfill
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' core w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

GEM (% volume)	Sample Type, Interval	% Recovery	Depth (feet, BGS)	Soil Group	Water Level (feet)	Soil Description	Probe / Boring Detail
CH_4 0 CO_2 0 O_2 21	3-ft core sample	100	21 22 23			Probe unable to penetrate beyond 23' Pressure grouted (with first boring) with bentonite slurry, left two 5' sections of pipe and cutting shoe in hole. Soil vapors were measured in bore hole using GEM 2000 gas analyzer.	

Last Modified: 6/20/2013
Filepath: G:\Graphics\Y2009\09-04304-000\gas_probe_VTP1S.ai

(TP-2D)

SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

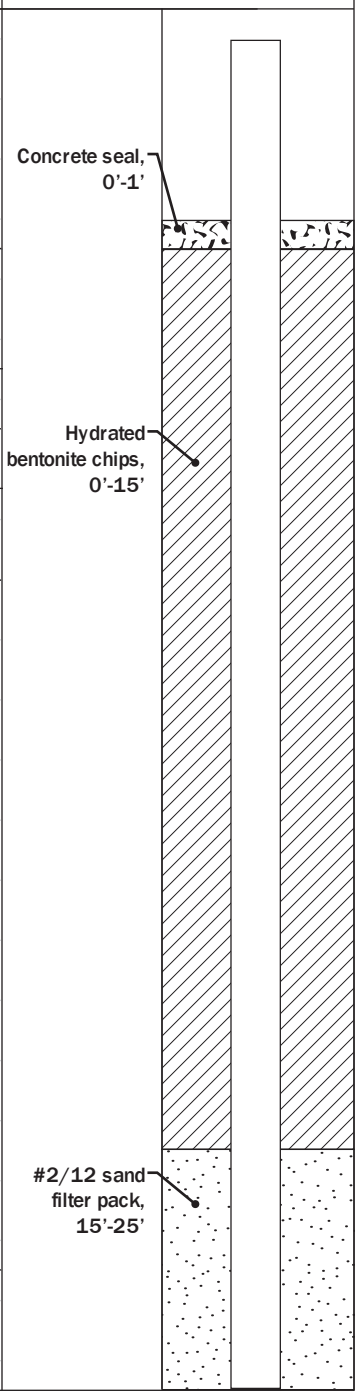
HERRERA

Probe / Boring ID: VTP2D
Total depth: 25'
Sheet 1 of 2

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: South side LF (50' E and 100' S of condensate trap)
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' core w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

GEM (% volume)	Sample Type, Interval	% Recovery	Depth (feet, BGS)	Soil Group	Water Level (feet)	Soil Description
			4			Stickup 3.5'
			3			
			2			
			1			
			0			Grass/Topsoil, damp
			1			Brown silty SAND, tr, gravel, damp
CH_4 0	5-ft		2	SM		
CO_2 0	core					Brown gravelly silty SAND, damp
O_2 21	sample	80	3			dense
			4			
						Geotextile liner Brown sandy
			5	GW		GRAVEL, tr, silt, damp
			6			Gray gravelly, sandy SILT,
CH_4 0	5-ft					tr, clay, damp
CO_2 0	core		7	ML		
O_2 21	sample	60				
			8			
						Gray, gravelly silty SAND
			9	SM		tr, clay, damp
			10			
			11			
CH_4 0	5-ft	60	12			
CO_2 0	core					
O_2 21	sample		13			
			14			
			15			
			16			
CH_4 0	5-ft					
CO_2 0	core	70	17			
O_2 21	sample			SM		Gray silty SAND, damp-wet, fuel odor
			18			
			19			



Last Modified: 06/20/2013
Filepath: G:\Graphics\Y2009\09-04304-000\gas_probe_VTP2D.ai

(TP-2D)

SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

HERRERA

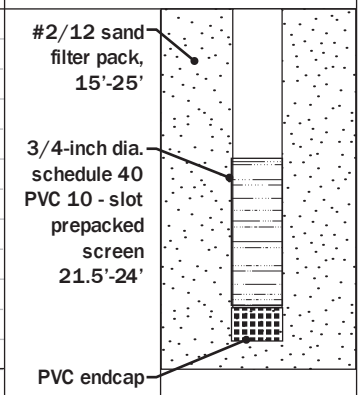
Probe / Boring ID: VTP2D
Total depth: 25'
Sheet 2 of 2

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: South side LF (50' E and 100' S of condensate trap)
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' core w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

GEM (% volume)	Sample Type, Interval	% Recovery	Depth (feet, BGS)	Soil Group	Water Level (feet)	Soil Description
			20	MSW		Refuse, shredded paper, cloth, fiberglass, plastic, damp-wet
CH_4 0 CO_2 0 O_2 21	5-ft core sample	50	21 22		▽	Static water level 21.92' 5/1/2013
			23 24			Silty SAND mixed with refuse, sawdust, plastic, fiberglass, damp
			25			Soil vapors were measured in borehole using GEM 2000 gas analyzer.

Probe / Boring Detail



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(TP-2S)

SOIL BORING AND MONITORING PROBE CONSTRUCTION RECORD

HERRERA

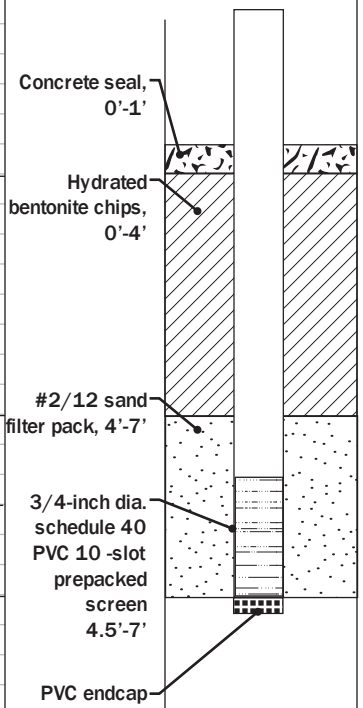
Probe / Boring ID: VTP2S
Total depth: 7'
Sheet 1 of 1

Project name: Vashon LF
Project number: 09-04304-000
Client: KCSWD
Location: South side LF (50' E and 100' S of condensate trap)
HEC rep.: Bruce Carpenter
Installation Date: 04/30/2013

Drilling Contractor: Cascade
Drilling method: GeoProbe
Sampling method: 5' core w/ liner
Air monitoring (y/n): Y
Instrument(s): GEM

GEM (% volume)	Sample Type, Interval	% Recovery	Depth (feet, BGS)	Soil Group	Water Level (feet)	Soil Description
			3			
			2			Stickup 3'
			1			
			0			
			1			Grass/Topsoil, damp Brown silty SAND, tr, gravel, damp
CH_4 0 CO_2 0 O_2 21	5-ft core sample		2	SM		
		80	3			Brown gravelly silty SAND, damp dense
			4			
			5	GW		Geotextile liner, Brown sandy GRAVEL, tr, silt, damp
CH_4 0 CO_2 0 O_2 21	3-ft core sample	60	6			Gray gravelly, sandy SILT, tr, clay, damp
			7	ML		
			8			Soil vapors were measured in borehole using GEM 2000 gas analyzer.
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

Probe / Boring Detail



(TP-3D)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, East side of South Slope	E:1228037 N:162717	**VTP-3D**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	
Holt Services, Inc	Rotary drill rig	Rotary core	361.58'	Ecology Well Tag No. BJX-258

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	8/5/2016 to 8/8/2016	365.08'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
-2	364	Valved hose barb						-2
-1	363							-1
0	362							0
1	361	Concrete surface seal					**FILL** Dry to slightly moist, brown, slightly gravelly SAND (SP); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass)	1
2	360				PID= 0.0			2
3	359							3
4	358	3/4-inch SCH 40 PVC 0-36 ft bgs					Geotextile fabric at 4 ft bgs	4
5	357		S1		PID= 0.0		Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, rare organics (roots, twigs).	5
6	356	3/8-inch Bentonite chip backfill 2-34 ft bgs			PID= 0.0			6
7	355							7
8	354				PID= 0.0			8
9	353							9
10	352							10
11	351							11
12	350				PID= 0.0			12
13	349						Some brown mottling at 12.5 ft bgs	13
14	348				PID= 0.0		6-inch rounded cobble	14
15	347		S2				**LANDFILL DEBRIS** Moist, gray to black, gravelly, sandy Fill; trash bags, paper, glass, metal wires, textiles, plastic	15
16	346				PID= 0.0			16
17	345							17
18	344				PID= 0.0			18
19	343							19
20	342				PID= 0.0			20
21	341		S3					21
	340							

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-3D

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

(TP-3D)

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Monitoring Well Log	
	Project Address & Site Specific Location Vashon Island, East side of South Slope		*Coordinates (SPN NAD83 ft)* E:1228037 N:162717	*Exploration Number* **VTP-3D**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 361.58'	Ecology Well Tag No. BJX-258
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 8/5/2016 to 8/8/2016	*Top of Casing Elev. (NAVD88)* 365.08'	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
23	339		S3		PID= 170		Debris includes fiberglass, plastic shavings and scraps	23
24	338				PID= 289			24
25	337							25
26	336				PID= 87			26
27	335							27
28	334				PID= 170			28
29	333				PID= 150		Debris includes lumber, insulation, cardboard, with ~5% organics (roots, twigs)	29
30	332							30
31	331				PID= 84			31
32	330	10-inch conductor casing set at 35 ft bgs and sealed with 3 ft of hydrated bentonite chips						32
33	329		S4		PID= 35		**Vashon Advance Outwash/B Unit** Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand	33
34	328	Gravel filter pack 34-40 ft bgs						34
35	327							35
36	326							36
37	325	3/4-inch 0.020 slot SCH 40 screen 36-38.5 ft bgs			PID= 70			37
38	324							38
39	323	Endcap	S5		PID= 26.8			39
40	322							40
41	321	3/8-inch Bentonite chip backfill 40-43.5 ft bgs			PID= 72			41
42	320							42
43	319				PID= 23.1			43
44	318						Bottom of exploration at 43.5 ft. bgs.	44
45	317							45
46	316							46
	315							

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-3D
Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

(TP-3S)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, East side of South Slope	E:1228042 N:162717	**VTP-3S**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	362.15'	BJX-255

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Dave	Sonic	8/5/2016	365.9'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	362	Concrete surface seal			PID= .4		**FILL** Dry to slightly moist, brown, slightly gravelly SAND (SP); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass)	0
4	358	3/4-inch SCH 40 PVC 0-25 ft bgs			PID= 2.8		Geotextile fabric at 4 ft bgs Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, rare organics (roots, twigs).	4
6	356	3/8-inch Bentonite chip backfill 2-23 ft bgs	S1		PID= 1.9			6
8	354				PID= 0.6			8
12	350				PID= 17.3		Some brown mottling at 12.5 ft bgs	12
14	348		S2		PID= 31.1		6-inch rounded cobble	14
16	346				PID= 63.5		**LANDFILL DEBRIS** Moist, gray to black, gravelly, sandy Fill; trash bags, paper, glass, metal wires, textiles, plastic	16
18	344				PID= 85			18
19	343				PID= 41.1			19
20	342		S3					20
21	341							21

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-3S

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, East side of South Slope	E:1228042 N:162717	**VTP-3S**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	362.15'	BJX-255

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Dave	Sonic	8/5/2016	365.9'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
23	339				PID= 670		Debris includes fiberglass, plastic shavings and scraps	23
24	338	Gravel filter pack 23-29 ft bgs			PID= 415			24
25	337							25
26	336	3/4-inch 0.020 slot SCH 40 screen 25-27.5 ft bgs	S3		PID= 518			26
27	335							27
28	334	Endcap			PID= 650			28
29	333				PID= 822		Debris includes lumber, insulation, cardboard, with ~5% organics (roots, twigs)	29
30	332							30
31	331	3/8-inch Bentonite chip backfill 29-40 ft bgs			PID= 960			31
32	330							32
33	329				PID= 431			33
34	328							34
35	327		S4		PID= 250		**Vashon Advance Outwash/B Unit** Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand	35
36	326							36
37	325				PID= 30			37
38	324							38
39	323				PID= 26			39
40	322						Bottom of exploration at 40 ft. bgs.	40
41	321							41
42	320							42
43	319							43
44	318							44
45	317							45
46	316							46

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-3S

Sheet 2 of 2

(TP-4D)

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, West side of South Slope	E:1227935 N:162743	**VTP-4D**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	358.08'	BJX-256

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	8/8/2016 to 8/9/2016	361.86'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
-2	360	Valved hose barb						-2
-1	359							-1
0	358	Concrete surface seal					**FILL** Dry to slightly moist, brown, slightly gravelly SAND (SP); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass)	0
1	357							1
2	356				PID= 0.0			2
3	355							3
4	354	3/4-inch SCH 40 PVC 0-51.5 ft bgs			PID= 0.0		Geotextile fabric at 4 ft bgs Slightly moist, gray brown, sandy, silty GRAVEL (GM); fine to medium sand, fine to coarse, subrounded gravel, with rare root organics	4
5	353		S1					5
6	352	3/8-inch Bentonite chip backfill 2-50 ft bgs			PID= 0.0		Slightly moist to moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse, subrounded gravel, with rare root organics	6
7	351							7
8	350				PID= 0.0			8
9	349							9
10	348							10
11	347							11
12	346				PID= 0.0			12
13	345							13
14	344				PID= 2.8		**LANDFILL DEBRIS** Moist, black to gray, sandy, gravelly Fill; clothing, textiles, metal cans, plastic scraps, etc.	14
15	343		S2					15
16	342				PID= 8.9			16
17	341						Becomes brown	17
18	340				PID= 14.2			18
19	339							19
20	338						Includes scattered thinly bedded sand	20
21	337		S3					21

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-4D

Sheet 1 of 3

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, West side of South Slope	E:1227935 N:162743	**VTP-4D**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	
Holt Services, Inc	Rotary drill rig	Rotary core	358.08'	Ecology Well Tag No. BJX-256
Operator	**Exploration Method(s)**	**Work Start/Completion Dates**	**Top of Casing Elev. (NAVD88)**	**Depth to Water (Below GS)**
Pete	Sonic	8/8/2016 to 8/9/2016	361.86'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
23	335				PID= 6.1			23
24	334				PID= 7.6			24
25	333							25
26	332		S3		PID= 7.3			26
27	331							27
28	330				PID= 14.8			28
29	329						Debris includes lumber and wood	29
30	328							30
31	327							31
32	326				PID= 9.1			32
33	325							33
34	324				PID= 22		Debris includes steel up to 1/4" thick	34
35	323		S4					35
36	322							36
37	321				PID= 22.4			37
38	320							38
39	319				PID= 26.1			39
40	318						Debris more intermittent and includes twigs and branches	40
41	317				PID= 52			41
42	316							42
43	315		S5		PID= 31.2			43
44	314							44
45	313				PID= 28.3			45
46	312							46

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-4D

Sheet 2 of 3

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, West side of South Slope	E:1227935 N:162743	**VTP-4D**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	358.08'	BJX-256

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	8/8/2016 to 8/9/2016	361.86'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
48	310	Conductor casing set at 50 ft and sealed with 3 feet of hydrated bentonite chips before advancing	S5		PID= 9.1		**Vashon Advance Outwash/B Unit** Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand	48
49	309							49
50	308							50
51	307				PID= 8.7			51
52	306	Gravel filter pack 50-56 ft bgs						52
53	305	3/4-inch 0.020 slot SCH 40 screen 51.5-54 ft bgs						53
54	304	Endcap			PID= 6.3			54
55	303		S6					55
56	302							56
57	301	3/8-inch Bentonite chip backfill 56-60 ft bgs						57
58	300				PID= 4.1			58
59	299							59
60	298						Bottom of exploration at 60 ft. bgs.	60
61	297							61
62	296							62
63	295							63
64	294							64
65	293							65
66	292							66
67	291							67
68	290							68
69	289							69
70	288							70
71	287							71

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-4D

Sheet 3 of 3

(TP-4S)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, West side of South Slope	E:1227927 N:162741	**VTP-4S**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	358.58'	BJX-254

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Dave	Sonic	8/4/2016	362.58'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
-2	361	Valved hose barb						-2
-1	360							-1
0	359							0
1	358	Concrete surface seal					**FILL** Dry to slightly moist, brown, slightly gravelly SAND (SP); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass)	1
2	357				PID= 0.0			2
3	356							3
4	355	3/4-inch SCH 40 PVC 0-22.5 ft bgs					Geotextile fabric at 4 ft bgs	4
5	354		S1		PID= 0.0		Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, rare organics (roots, twigs).	5
6	353	3/8-inch Bentonite chip backfill 2-21 ft bgs			PID= 0.0			6
7	352							7
8	351				PID= 0.0			8
9	350							9
10	349							10
11	348							11
12	347				PID= 0.0			12
13	346							13
14	345				PID= 2.2			14
15	344		S2					15
16	343				PID= 1.6		**LANDFILL DEBRIS** Moist, gray to black, gravelly, sandy Fill; trash bags, paper, glass, metal wires, textiles, plastic	16
17	342							17
18	341				PID= 4.7			18
19	340							19
20	339							20
21	338		S3		PID= 6.6			21
	337							

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-4S

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

(TP-4S)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, West side of South Slope	E:1227927 N:162741	**VTP-4S**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	358.58'	BJX-254

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Dave	Sonic	8/4/2016	362.58'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
23	336	Gravel filter pack 21-27 ft bgs	S3		PID= 15		Debris includes fiberglass, plastic shavings and scraps	23
24	335	3/4-inch 0.020 slot SCH 40 screen 22.5-25 ft bgs			PID= 34			24
25	334							25
26	333		S4		PID= 4.9			26
27	332							27
28	331				PID= 3.1			28
29	330		S5				Debris includes lumber, insulation, cardboard, with ~5% organics (roots, twigs)	29
30	329	3/8-inch Bentonite chip backfill 27-45ft bgs						30
31	328				PID= 1.2			31
32	327		S6					32
33	326				PID= 0.6			33
34	325							34
35	324						Debris includes glass, plastic, animal fur	35
36	323				PID= 0.5			36
37	322		S7					37
38	321							38
39	320				PID= 0.5			39
40	319							40
41	318				PID= 0.4			41
42	317		S8					42
43	316				PID= 0.1		**Vashon Advance Outwash/B Unit** Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand	43
44	315							44
45	314						Bottom of exploration at 45 ft. bgs.	45
46	313							46
	312							

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log VTP-4S

Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

(TP-5D)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, West side of South Slope	E:1227860 N:162780	**VTP-5D**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	359.6925'	BKY-334

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	1/9/2017	363.0922'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	360	Valved hose barb 6-inch SCH 80 PVC Monument Concrete surface seal					Topsoil; fine to medium sand, abundant root mass.	0
					PID= 0.7		**FILL** Moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine subangular gravel.	
5	355	3/4-inch SCH 40 PVC 0-24 ft bgs 3/8-inch Bentonite chip backfill 2-22 ft bgs	S1		PID= 4.6 PID= 2.0		Geotextile at 4 ft bgs and becomes gray brown.	5
					PID= 2.0		Moist, brown, slightly gravelly SAND (SP); fine to medium sand, fine subrounded gravel.	
10	350						**LANDFILL DEBRIS** Moist gray, sandy, gravelly Fill; fine to medium sand, debris (trash bags, plastic)	10
					PID= 45.1			
15	345		S2		PID= 162.3 PID= 816		Debris includes paper and plastic shavings.	15
					PID= 25.5			
20	340	Conductor casing set at 20 ft and sealed with 3 feet of hydrated bentonite chips before advancing Gravel filter pack 22-28 ft bgs	S3		PID= 15.1		**Vashon Advance Outwash/B Unit** Moist, gray brown, slightly gravelly SAND (SP); fine to medium sand, fine subrounded gravel.	20
25	335	3/4-inch 0.020 slot SCH 40 screen 24-26.5 ft bgs			PID= 34.5 PID= 35.1			25
			S4					
30	330	3/8-inch Bentonite chip backfill 28-30 ft bgs			PID= 7.7		Bottom of exploration at 30 ft. bgs.	30

Legend

Sample Method
- No Soil Sample Recovery
- Continuous core 4" ID
- Continuous core 7"

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-5D
Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

(TP-5S)

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, West side of South Slope	E:1227865 N:162778	**VTP-5S**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	360.0117'	BKY-333

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	1/9/2017	363.3776'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	360	Valved hose barb; 6-inch SCH 80 PVC Monument; Concrete surface seal					Topsoil; fine to medium sand, abundant root mass.	0
							FILL	
					PID= 0.0		Moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine subangular gravel.	
5	355	3/4-inch SCH 40 PVC 0-15 ft bgs; 3/8-inch Bentonite chip backfill 2-13 ft bgs	S1		PID= 0.0		Geotextile at 4 ft bgs and becomes gray brown.	5
					PID= 0.0		Moist, brown, slightly gravelly SAND (SP); fine to medium sand, fine subrounded gravel.	
							LANDFILL DEBRIS	
					PID= 1.5		Moist gray, sandy, gravelly Fill; fine to medium sand, debris (trash bags, cardboard, plastic)	
10	350							10
					PID= 124		Debris includes aluminum cans, copper, rope, cloth, rubber.	
		Gravel filter pack 13-19 ft bgs			PID= 57.3			
15	345	3/4-inch 0.020 slot SCH 40 screen 15-17.5 ft bgs	S2		PID= 12.5			15
					PID= 399		Debris includes rubber gloves, paper, plastic shavings.	
		3/8-inch Bentonite chip backfill 19-30 ft bgs			PID= 206			
20	340						**Vashon Advance Outwash/B Unit**	20
					PID= 14.8		Moist, gray brown, slightly gravelly SAND (SP); fine to medium sand, fine subrounded gravel.	
					PID= 7.9			
25	335		S3		PID= 10.9			25
					PID= 9.0		No gravel below 28 ft bgs	
					PID= 11.4			
30	330						Bottom of exploration at 30 ft. bgs.	30

Legend

Sample Method
- ◯ No Soil Sample Recovery
- ◧ Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-5S

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

(TP-6D)

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, South end of South Slope	E:1227887 N:162558	**VTP-6D**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	324.8379'	BKY-331

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	1/10/2017	328.3087'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	325	Valved hose barb 6-inch SCH 80 PVC Monument Concrete surface seal					Topsoil; fine to medium sand, abundant root mass.	0
							FILL Very moist to wet, brown, slightly gravelly, silty SAND (SM); fine to medium sand, fine subrounded gravel. Hand dug to 3 ft bgs Becomes gray brown.	
					PID= 0.0			
5	320	3/4-inch SCH 40 PVC 0-18.5 ft bgs 3/8-inch Bentonite chip backfill 2-17 ft bgs	S1		PID= 0.9		**LANDFILL DEBRIS** Moist gray, sandy, gravelly Fill; fine to medium sand, debris (plastic shavings, bags)	5
					PID= 4.5		Becomes wet.	
					PID= 1.2			
10	315						Woody debris between 10 and 14 ft bgs.	10
					PID= 2.3			
					PID= 2.8			
15	310	Conductor casing set at 17 ft and sealed with 3 feet of hydrated bentonite chips before advancing Gravel filter pack 17-23 ft bgs	S2		PID= 0.7			15
					PID= 0.6		**Vashon Advance Outwash/B Unit** Moist, brown SAND (SP); trace fine rounded gravel, fine to medium sand.	
		3/4-inch 0.020 slot SCH 40 screen 18.5-21 ft bgs			PID= 0.4			

Legend

Sample Method
- Grab Sample
- Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-6D

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

(TP-6D)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, South end of South Slope	E:1227887 N:162558	**VTP-6D**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	324.8379'	BKY-331

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	1/10/2017	328.3087'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
20	305		S2				**Vashon Advance Outwash/B Unit** Moist, brown SAND (SP); trace fine rounded gravel, fine to medium sand. (continued) Gravel becomes fine to coarse.	20
			S3		PID= 1.1			
					PID= 1.9			
25	300							25
					PID= 0.8		Moist, gray, silty SAND (SM); fine massive sand Frequent very thin laminae of light gray silt between 26 and 27 ft bgs.	
			S4		PID= 1.0		Moist, gray brown SAND (SP); fine to medium sand. 1-inch lens of gray silty sand and red orange mottling on edges. 1-inch lens of gray silty sand and red orange mottling on edges.	
30	295							30
							Moist, gray, silty SAND (SM); fine sand w/ trace red mottling.	
					PID= 0.2		Moist, gray brown SAND (SP); predominantly fine sand. Sand becomes fine to coarse.	
35	290		S5					35
					PID= 2.1		Moist, brown, silty SAND (SM); fine sand.	
							Moist, gray brown SAND (SP); predominantly fine sand, coarsening with depth.	
					PID= 17.9			
40	285						Bottom of exploration at 40 ft. bgs.	40

3/8-inch Bentonite chip backfill 23-40 ft bgs

Legend

Sample Method
- Grab Sample
- Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-6D

Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

(TP-6S)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, South end of South Slope	E:1227892 N:162560	**VTP-6S**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	324.5111'	BKY-330

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	1/10/2017	328.2467'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	325	Valved hose barb; 6-inch SCH 80 PVC Monument; Concrete surface seal; 3/8-inch Bentonite chip backfill 2-4 ft bgs					Topsoil; fine to medium sand, abundant root mass.	0
							FILL Very moist to wet, brown, slightly gravelly, silty SAND (SM); fine to medium sand, fine subrounded gravel. Becomes gray brown. Hand dug to 3 ft bgs	
5	320	Gravel filter pack 4-10 ft bgs; 3/4-inch SCH 40 PVC 0-6.5 ft bgs; 3/4-inch 0.020 slot SCH 40 screen 6.5-9 ft bgs	S1		PID= 1.1; PID= 7.1		**LANDFILL DEBRIS** Moist gray, sandy, gravelly Fill; fine to medium sand, debris (plastic shavings, bags)	5
10	315	3/8-inch Bentonite chip backfill 10-20 ft bgs			PID= 13.8; PID= 7.3		Becomes wet. Becomes moist with woody debris between 12.5 and 14 ft bgs.	10
15	310		S2		PID= 14.8; PID= 2.0		Debris includes plastic bags and glass.	15
20	305				PID= 2.5		**Vashon Advance Outwash/B Unit** Moist, brown SAND (SP); trace fine subrounded gravel, fine to medium sand.	20
							Bottom of exploration at 20 ft. bgs.	
25	300							25
30	295							30

Legend

Sample Method
- No Soil Sample Recovery
- Grab Sample
- Continuous core 4" ID

Water Level
- No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-6S

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINTW\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ March 14, 2017

(TP-7)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Project Address & Site Specific Location: Vashon Island, West side of South Slope

Monitoring Well Log

Contractor	Equipment	Sampling Method	Coordinates (SPN NAD83 ft)	Exploration Number
Holt Services, Inc	Rotary drill rig	Rotary core	E:1227762 N:162804	**VTP-7**
Operator	**Exploration Method(s)**	**Work Start/Completion Dates**	**Ground Surface (GS) Elev. (NAVD88)**	**Ecology Well Tag No.**
Pete	Sonic	4/3/2018	359.775'	BKX-135
			Top of Casing Elev. (NAVD88)	**Depth to Water (Below GS)**
			359.199'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		12-inch steel flush monument Valved hose barb			PID= 39.6		Dry to slightly moist, brown, Topsoil; fine to medium sand, fine subrounded gravel, numerous organics (root mass, grass)	
		Concrete surface seal					**Fill** Moist, brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine subrounded to subangular gravel.	
		3/8-inch Bentonite chip backfill 2-8 ft bgs			PID= 69			
5	355	2-inch SCH 40 PVC 0-9 ft bgs	S1		PID= 24.0			5
					PID= 162		Becomes gray brown.	
		Gravel filter pack 8-15 ft bgs					**Landfill Debris** Very moist, black to gray, silty, sandy, gravelly Fill; plastic scraps, thin aluminum sheets, paper, cardboard, garbage bags, etc. Becomes moist.	
					PID= 414			
10	350	2-inch 0.020 slot SCH 40 screen 9-14 ft bgs	S2		CH4= 1.6%			10
					PID= 70.0			
					PID= 66.7		Fiberglass fibers Plywood at bottom of debris contact.	
15	345	3/8-inch Bentonite chip backfill 15-20 ft bgs	S3		CH4= 0% PID= 345		**Vashon Advance Outwash/Unit B** Moist, gray brown, SAND (SP); fine to medium sand, fine subrounded to subangular gravel.	15
					PID= 27.3			
					PID= 13.6			
20	340				CH4= 0%		Bottom of exploration at 20 ft. bgs.	20

Legend

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-7

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINT\WPROJECTSIKC_VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

(TP-8)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Project Address & Site Specific Location: Vashon Island, East side of leachate pond

Monitoring Well Log

Coordinates (SPN NAD83 ft): E:1227838 N:162641

Exploration Number: **VTP-8**

Ecology Well Tag No. BKX-134

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	*Depth to Water (Below GS)*
Holt Services, Inc	Rotary drill rig	Rotary core	359.315'	No Water Encountered

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*
Pete	Sonic	4/3/2018	358.892'

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		12-inch steel flush monument Valved hose barb					Topsoil; fine to medium sand, rare root fibers.	
		Concrete surface seal			PID= 280		**Fill** Slightly moist, brown, slightly gravelly, silty SAND (SM); fine to medium sand, fine subrounded gravel.	
		3/8-inch Bentonite chip backfill 2-14 ft bgs			PID= 713			
	355							
5		2-inch SCH 40 PVC 0-15 ft bgs	S1		PID= 455		Becomes gray brown.	5
					PID= 304		Becomes dark gray brown with coarse subrounded gravel and subrounded cobbles. silty SAND (SM)	
	350							
10					CH4= 0% PID= 134		Becomes brown. Becomes gray and siltier.	10
					PID= 280			
			S2				Becomes brown.	
					PID= 207			
	345						Root fiber organics.	
15		Gravel filter pack 14-21 ft bgs			CH4= 0% PID= 513		**Landfill Debris** Very moist, black to gray, sandy, gravelly Fill; red and blue plastic scraps, paper, cardboard, garbage bags, white fibers, glass.	15
		2-inch 0.020 slot SCH 40 screen 15-20 ft bgs			PID= 570			
			S3				Becomes silty.	
	340				PID= 5073			
20					CH4= 0%			20
					PID= 2877		**Fill** Moist, brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel.	
		3/8-inch Bentonite chip backfill 21-25 ft bgs	S4				**Vashon Advance Outwash/Unit B** Moist, gray brown, SAND (SP); trace silt, fine to medium sand, fine subrounded to subangular gravel.	
	335				PID= 1312			
25					CH4= 0%		Bottom of exploration at 25 ft. bgs.	25

Legend

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-8

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC_VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

(TP-9)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Project Address & Site Specific Location
Vashon Island, South Perimeter Road

Monitoring Well Log

Coordinates (SPN NAD83 ft)
E:1227987 N:162784

Exploration Number
VTP-9
Ecology Well Tag No. BKX-132

Contractor	*Equipment*	*Sampling Method*	*Ground Surface (GS) Elev. (NAVD88)*	*Depth to Water (Below GS)*
Holt Services, Inc	Rotary drill rig	Rotary core	373.646'	No Water Encountered

Operator	*Exploration Method(s)*	*Work Start/Completion Dates*	*Top of Casing Elev. (NAVD88)*
Pete	Sonic	4/2/2018	373.223'

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	373	12-inch steel flush monument Valved hose barb Concrete surface seal					14-inch thick Asphalt.	0
		3/8-inch Bentonite chip backfill 2-7 ft bgs					**Fill** Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel.	
5	370	2-inch SCH 40 PVC 0-7.5 ft bgs			CH4= 0.1% PID= 204		Geotextile at 6 ft.	5
		Gravel filter pack 7-10 ft bgs	S1		PID= 506		Moist, gray brown, gravelly, silty SAND (SM); fine to coarse sand, fine to coarse subrounded to subangular gravel.	
10	365	2-inch 0.020 slot SCH 40 screen 7.5-10 ft bgs			CH4= 0% PID= 405		Bottom of exploration at 10 ft. bgs. Note: Vaccumed down to 6 ft bgs	10
15	360							15
	355							

Legend

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-9
Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

(TP-10)

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Monitoring Well Log	
	Project Address & Site Specific Location Vashon Island, South perimeter road		*Coordinates (SPN NAD83 ft)* E:1227882 N:162832	*Exploration Number* **VTP-10**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 376.139'	Ecology Well Tag No. BKX-133
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 4/2/2018	*Top of Casing Elev. (NAVD88)* 375.311'	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		12-inch steel flush monument Valved hose barb					7-inch thick Asphalt.	
	375	Concrete surface seal					Slightly moist, brown, gravelly, slightly silty SAND (SP-SM); fine to medium sand, fine to coarse subrounded to subangular gravel.	
		3/8-inch Bentonite chip backfill 2-6.75 ft bgs					**Fill** Slightly moist to dry, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel.	
5		2-inch SCH 40 PVC 0-7.5 ft bgs						5
	370				CH4= 0%		Geotextile at 6.75 ft.	
		Gravel filter pack 6.75-10 ft bgs			PID= 213		Moist, brown, gravelly, slightly silty SAND (SP-SM); fine to medium sand, fine subrounded gravel.	
		2-inch 0.020 slot SCH 40 screen 7.5-10 ft bgs	S1				Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded to subangular gravel. Sand becomes predominantly fine.	
10					PID= 72.4 CH4= 0%		Bottom of exploration at 10 ft. bgs. Note: Vaccumed down to 6 ft bgs	10
	365							
15								15
	360							

Legend

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-10

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC_VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

(TP-11S)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Monitoring Well Log

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
Vashon Island, Northwest perimeter road	E:1227950 N:163802	**VTP-11S**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc	Rotary drill rig	Rotary core	401.479'	BKX-137

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	4/6/2018	400.832'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		12-inch steel flush monument Valved hose barb					Moist, brown, silty, sandy Topsoil; fine to medium sand, abundant root mass.	
	400	Concrete surface seal					**Fill** Moist, brown, slightly gravelly, slightly silty SAND (SP-SM); fine to medium sand, fine subrounded gravel.	
					PID= 23.9		Slightly moist, gray brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine to coarse subrounded to subangular gravel.	
		3/8-inch Bentonite chip backfill 2-5 ft bgs						
		2-inch SCH 40 PVC 0-6 ft bgs						
5			S1		PID= 60.5			5
		Gravel filter pack 5-12 ft bgs						
	395	2-inch 0.020 slot SCH 40 screen 6-11 ft bgs					Becomes slightly silty SAND (SP-SM).	
					PID= 33.9		**Vashon Till/Unit A** Slightly moist, gray brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine to coarse subrounded to subangular gravel.	
					PID= 66.9			
10					CH4= 0%			10
					PID= 14.1			
	390		S2					
		3/8-inch Bentonite chip backfill 12-15 ft bgs						
					PID= 31.4			
15					PID= 38.5 CH4= 0%		Bottom of exploration at 15 ft. bgs.	15
	385							

Legend

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-11S

Sheet 1 of 1

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINT\WPROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

(TP-11D)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Project Address & Site Specific Location
Vashon Island, Northwest perimeter road

Monitoring Well Log

Contractor	Equipment	Sampling Method	Coordinates (SPN NAD83 ft)	Exploration Number
Holt Services, Inc	Rotary drill rig	Rotary core	E:1227938 N:163804	**VTP-11D**
Operator	**Exploration Method(s)**	**Work Start/Completion Dates**	**Ground Surface (GS) Elev. (NAVD88)**	**Ecology Well Tag No.**
Pete	Sonic	4/5/2018	402.145'	BKX-136
			Top of Casing Elev. (NAVD88)	**Depth to Water (Below GS)**
			401.479'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
		12-inch steel flush monument Valved hose barb					Moist, brown, silty, sandy Topsoil; fine to medium sand, abundant root mass.	
		Concrete surface seal			PID= 35.5		**Fill** Moist, brown, slightly gravelly, slightly silty SAND (SP-SM); fine to medium sand, fine subrounded gravel.	
	400	3/8-inch Bentonite chip backfill 2-30 ft bgs						
					PID= 54.3		Slightly moist, gray brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine to coarse subrounded to subangular gravel.	
5		2-inch SCH 40 PVC 0-31 ft bgs	S1					5
					PID= 50.8		Becomes slightly silty SAND (SP-SM).	
	395						**Vashon Till/Unit A** Slightly moist, gray brown, gravelly, silty SAND (SM); predominantly fine to medium sand, fine to coarse subrounded to subangular gravel.	
					PID= 107			
10					CH4= 0%			10
					PID= 201			
	390							
			S2		PID= 463			
15					PID= 579			15
					PID= 820			
	385				CH4= 0%		Becomes slightly silty SAND (SP-SM).	
			S3					
20					PID= 15,000		Moist, gray brown, gravelly, silty SAND (SM); predominantly fine to coarse sand, fine to coarse subrounded to subangular gravel.	20
	380		S4					
					PID= 326			

Legend

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-11D
Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

(TP-11D)

Aspect CONSULTING

King County Vashon Island Landfill - 090057

Project Address & Site Specific Location
Vashon Island, Northwest perimeter road

Monitoring Well Log

Contractor	Equipment	Sampling Method	Coordinates (SPN NAD83 ft)	Exploration Number
Holt Services, Inc	Rotary drill rig	Rotary core	E:1227938 N:163804	**VTP-11D**
Operator	**Exploration Method(s)**	**Work Start/Completion Dates**	**Ground Surface (GS) Elev. (NAVD88)**	**Ecology Well Tag No.**
Pete	Sonic	4/5/2018	402.145'	BKX-136
			Top of Casing Elev. (NAVD88)	**Depth to Water (Below GS)**
			401.479'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
25					PID= 2420		Moist, gray brown, gravelly, silty SAND (SM); predominantly fine to coarse sand, fine to coarse subrounded to subangular gravel. (continued)	25
	375		S4		PID= 140			
30		Gravel filter pack 30-42 ft bgs			CH4= 0.1%		**Vashon Advance Outwash/Unit B** Moist, brown, gravelly SAND (SP); trace silt, predominantly fine to medium sand, fine to coarse subrounded to subangular gravel.	30
	370	2-inch 0.020 slot SCH 40 screen 31-41 ft bgs					Gravel becomes trace between 32 and 33.5 ft bgs.	
35			S5				Gravel becomes trace between 35 and 36 ft bgs.	35
	365						Gravely silty sand (SM) lens.	
40					CH4= 0%			40
	360	3/8-inch Bentonite chip backfill 42-45 ft bgs	S6					
45							Bottom of exploration at 45 ft. bgs. Note: Elevated PID readings due to hot drilling conditions.	45
	355							

Legend

Sample Method: Continuous core 4" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration Log VTP-11D
Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE \\BISERVER1.ASPECT.LOCAL\PROJECTS\GINTW\PROJECTSIKC VASHON_AUGUST 2016 AND LATER.GPJ October 3, 2018

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Monitoring Well Log	
	Project Address & Site Specific Location Vashon Island, Center of South Slope		*Coordinates (SPN NAD83 ft)* E:1227986 N:162728	*Exploration Number* **GW-9**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 358.19'	Ecology Well Tag No. BJX-257
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 8/9/2016 to 8/10/2016	*Top of Casing Elev. (NAVD88)* 362.28'	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
	361	HDPE top flange with viton gasket						
-2	360							-2
-1	359	HDPE T-joint						-1
0	358	Concrete surface seal					**FILL** Dry to slightly moist, brown, slightly silty SAND (SP-SM); trace silt, fine to medium sand, fine subrounded gravel, trace organics (root mass, grass)	0
1	357							1
2	356							2
3	355				PID= 0.0			3
4	354	4-inch SDR 11 HDPE 0-17 ft bgs					Geotextile fabric at 4 ft bgs	4
5	353		S1		PID= 0.0		Moist, gray brown, gravelly, silty SAND (SM); fine to medium sand, fine to coarse subrounded gravel, rare organics (roots, twigs).	5
6	352	3/8-inch Bentonite chip backfill 2-15 ft bgs						6
7	351				PID= 68			7
8	350							8
9	349				PID= 90			9
10	348							10
11	347							11
12	346				PID= 117		**LANDFILL DEBRIS** Moist, black to gray, sandy, gravelly Fill; clothing, textiles, metal cans, plastic scraps, paper, cardboard, tubing, garbage bags, etc.	12
13	345							13
14	344							14
15	343		S2					15
16	342				PID= 155			16
17	341							17
18	340							18
19	339				PID= 40			19
20	338							20
21	337		S3					21

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log GW-9

Sheet 1 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Monitoring Well Log	
	Project Address & Site Specific Location Vashon Island, Center of South Slope		*Coordinates (SPN NAD83 ft)* E:1227986 N:162728	*Exploration Number* **GW-9**
Contractor Holt Services, Inc	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 358.19'	Ecology Well Tag No. BJX-257
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 8/9/2016 to 8/10/2016	*Top of Casing Elev. (NAVD88)* 362.28'	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
23	336							23
	335				PID= 162			
24	334	Gravel filter pack 17-35 ft bgs						24
25	333							25
		4-inch SDR 11 HDPE screen with 1/2-inch perforations 17-35 ft bgs	S3					
26	332				PID= 124			26
27	331							27
28	330							28
29	329				PID= 28			29
30	328							30
31	327				PID= 12.1			31
32	326							32
33	325							33
34	324				PID= 9.7			34
35	323	Welded endcap	S4					35
36	322							36
37	321	3/8-inch Bentonite chip backfill 36-40 ft bgs			PID= 8.1			37
38	320						**Vashon Advance Outwash/B Unit** Moist, brown SAND (SP); trace fine subrounded gravel, predominantly medium sand	38
39	319				PID= 3.2			39
40	318						Bottom of exploration at 40 ft. bgs.	40
41	317							41
42	316							42
43	315							43
44	314							44
45	313							45
46	312							46

Legend

Sample Method: Continuous core 7"

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: MML
Approved by: JJS

Exploration log GW-9

Sheet 2 of 2

ASPECT STANDARD EXPLORATION LOG TEMPLATE P:\GINT\PROJECTS\KC VASHON_AUGUST 2016 AND LATER.GPJ September 26, 2016

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Monitoring Well Log	
	Project Address & Site Specific Location 18900 Westside Highway SW, Vashon, WA 98070, North of leachate lagoon, between VTP-4S and VTP-5S.		*Coordinates (SPN NAD83 ft)* E:-122.500 N:47.4340	*Exploration Number* **GW-10**
Contractor Holt Services, Inc.	*Equipment* Rotary drill rig	*Sampling Method* Rotary core	*Ground Surface (GS) Elev. (NAVD88)* 359.9499'	Ecology Well Tag No. BKX482
Operator Pete	*Exploration Method(s)* Sonic	*Work Start/Completion Dates* 6/25/2018 to 6/26/2018	*Top of Casing Elev. (NAVD88)* 363.7966'	*Depth to Water (Below GS)* No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	360	Sealed top flange gasket HDPE Tee-joint Concrete surface seal, 0 to 2 feet bgs 4-inch Sch 80 HDPE, +3.85 to 15.5 feet bgs 3/8-inch bentonite chip backfill, 2 to 14.5 feet bgs 3/4-inch to 1-inch gravel filter pack, 14.5 to 29.5 feet bgs 4-inch Sch 80 HDPE screen with 1/2-inch perforations, 15.5 to 28.5 feet bgs			PID = 5.7		**FILL** SILTY SAND WITH GRAVEL (SM); Moist, light brown; medium to coarse gravels, fine to coarse sand, non-cohesive material. Geotextile fabric observed at 3.5 feet bgs	0
5	355				PID = 20.8 PID = 8.0		SANDY SILT WITH GRAVEL (ML); Moist, dark gray; fine to coarse sands, medium to coarse gravels, more cohesive.	5
10	350				PID = 20.2 CH4 = 0.0		SILTY SAND WITH GRAVEL (SM); Moist, dark gray; fine to coarse gravels with cobbles, fine to coarse sand.	10
15	345				PID = 57.8 PID = 112.5 PID = 29.0		SAND WITH SILT (SP-SM); Moist, light brown; fine to coarse sand. **LANDFILL DEBRIS** SILTY SAND WITH GRAVEL (SM); Moist, dark gray to black; plastic bags, plastic, glass, metal scraps. Debris includes red plastic, red painted lumber, plywood, woody debris, metal scraps.	15
20	340				PID = 33.9 CH4 = 0.0		Debris includes glass, plastic bags, textiles, woody debris, newspaper	20

Legend

Sample Method: Continuous core 7" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: MVA/PSB

Exploration Log GW-10

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_090057-310.1.7.6_VASHONLF.GPJ July 18, 2018

Aspect CONSULTING	King County Vashon Island Landfill - 090057		Monitoring Well Log	
	Project Address & Site Specific Location: 18900 Westside Highway SW, Vashon, WA 98070, North of leachate lagoon, between VTP-4S and VTP-5S.		Coordinates (SPN NAD83 ft): E:-122.500 N:47.4340	Exploration Number: **GW-10**
Contractor: Holt Services, Inc.	Equipment: Rotary drill rig	Sampling Method: Rotary core	Ground Surface (GS) Elev. (NAVD88): 359.9499'	Ecology Well Tag No. BKX482
Operator: Pete	Exploration Method(s): Sonic	Work Start/Completion Dates: 6/25/2018 to 6/26/2018	Top of Casing Elev. (NAVD88): 363.7966'	Depth to Water (Below GS): No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
					PID = 59.6		**LANDFILL DEBRIS** SILTY SAND WITH GRAVEL (SM); Moist, dark gray to black; plastic bags, plastic, glass, metal scraps. (continued) Debris includes blue plastic jugs, glass, aluminum cans, lumber, egg cartons, concrete	
25	335				PID = 85.5		Debris includes charcoal, ash debris, glass, metal, burned paper (appears visibly burnt)	25
					PID = 37.1		Debris includes blue plastic, glass, wood debris	
		Welded endcap						
30	330	Backfilled with bentonite chips to 35 feet bgs			PID = 14.4 CH4 = 0.0			30
							SILTY SAND (SM); Moist, light brown; charcoal debris, trace lumber debris	
					PID = 8.8		**Vashon Advance Outwash/B unit** SAND (SP); Moist, light brown; trace silt, fine to coarse sand, trace fine to coarse gravels, no visible landfill debris.	
35	325				PID = 4.1		Bottom of exploration at 35 ft. bgs.	35
40	320							40
45	315							45

Legend

Sample Method: Continuous core 7" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: MVA/PSB

Exploration Log GW-10

Sheet 2 of 2

NEW STANDARD LOG FORM P:\GINTW\PROJECTS\2018_090057-310.1.7.6_VASHONLF.GPJ July 18, 2018

King County Vashon Island Landfill - 090057

Monitoring Well Log

Aspect CONSULTING

Project Address & Site Specific Location	Coordinates (SPN NAD83 ft)	Exploration Number
18900 Westside Highway SW, Vashon, WA 98070, Northwest of leachate lagoon, between VTP-7 and VTP-5D.	E:-122.501 N:47.4341	**GW-11**

Contractor	Equipment	Sampling Method	Ground Surface (GS) Elev. (NAVD88)	Ecology Well Tag No.
Holt Services, Inc.	Rotary drill rig	Rotary core	360.1557'	BKX483

Operator	Exploration Method(s)	Work Start/Completion Dates	Top of Casing Elev. (NAVD88)	Depth to Water (Below GS)
Pete	Sonic	6/25/2018 to 6/26/2018	363.6807'	No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Analytical Sample Number & Lab Test(s)	Field Tests	Material Type	Description	Depth (ft)
0	360	Sealed top flange gasket HDPE Tee-joint Concrete surface seal, 0 to 2 feet bgs					TOPSOIL; Dry, light brown; root mass, non-cohesive material.	0
					PID = 3.2		**FILL** SAND WITH SILT AND GRAVEL (SW-SM); Moist, dark brown; fine to coarse sand, fine to coarse gravels, minor orange staining.	
5	355	4-inch Sch 80 HDPE, +3.53 to 10.5 feet bgs 3/8-inch bentonite chip backfill, 2 to 9.5 feet bgs			PID = 3.2		Geotextile fabric at 6.5 feet bgs	5
					PID = 11.1		**LANDFILL DEBRIS** SILTY SAND WITH GRAVEL (SM); Moist, dark brown to black; debris includes plastic, metal, glass shards, brick, plastic dish gloves.	
10	350	3/4-inch to 1-inch gravel filter pack, 9.5 to 18 feet bgs 4-inch Sch 80 HDPE screen with 1/2-inch perforations, 10.5 to 17 feet bgs			PID = 7.0 CH4 = 1.1			10
					PID = 35.0		Debris includes wood debris, plastic, metal	
15	345	Welded endcap			PID = 290.0		Debris includes fiberglass, shredded paper, metal wires	15
					PID = 132.1		Debris includes plastic, plastic bags, cardboard, lumber	
							SAND (SP); Moist, dark blue-gray; trace gravel, and trace plastic debris.	
20	340	Backfilled with bentonite chips to 25 feet bgs			PID = 202.7 CH4 = 0.0		**Vashon Advance Outwash/B Unit** SAND (SW); Moist, dark gray; trace gravel and trace silt, no debris observed, noticeable refuse odor.	20
					PID = 19.3			
25	335				PID = 11.9		Bottom of exploration at 25 ft. bgs.	25

Legend

Sample Method: Continuous core 7" ID

Water Level: No Water Encountered

See Exploration Log Key for explanation of symbols

Logged by: ACO
Approved by: MVA/PSB

Exploration Log GW-11

Sheet 1 of 1

NEW STANDARD LOG FORM P:\GINT\PROJECTS\2018_090057-310.1.7.6_VASHONLF.GPJ July 18, 2018

Decommissioned Well Logs

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-1	1 of 2

Project Name:	King County Closed Landfills	Ground Surface Elev	403.64
Location:	Vashon Island Landfill	Top of Casing Elev.	Approx 404
Driller/Method:	Holt Services / Sonic	Depth to Water (ft BGS)	
Sampling Method:	Continuous Core	Start/Finish Date	4/3/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
5 (400), 10 (395), 15 (390), 20 (385), 25 (380), 30 (375), 35 (370), 40 (365), 45 (360), 50 (355), 55 (350), 60 (345), 65 (340), 70 (335), 75 (330), 80 (325), 85 (320), 90 (315), 95 (310), 305							**Decommissioning Details** Monitoring well decommissioned by overdrilling using rotosonic drilling methods 0 to 2 feet: Soil backfill 2 to 131 feet: Bentonite chips (66 bags) Well monument had been damaged previously, and was sitting on top of the PVC. An approximately 1-foot diameter void existed around the well from ground surface to approximately 50 feet below ground surface. The void was backfilled with bentonite as part of the decommissioning process. **Original Well Construction** +1 feet to 130 feet: Nominal 3-inch O.D., Schedule 80 PVC blank riser and 10-slot screen 0 to 112.5 feet: Bentonite 112.5 to 130 feet: Gravel backfill	5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

Figure No. C - 2

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-1	2 of 2

Project Name:	King County Closed Landfills	Ground Surface Elev	403.64
Location:	Vashon Island Landfill	Top of Casing Elev.	Approx 404
Driller/Method:	Holt Services / Sonic	Depth to Water (ft BGS)	
Sampling Method:	Continuous Core	Start/Finish Date	4/3/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
105 300 110 295 115 290 120 285 125 280 130 275 135 270 140 265 145 260 150 255 155 250 160 245 165 240 170 235 175 230 180 225 185 220 190 215 195 210 205								105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

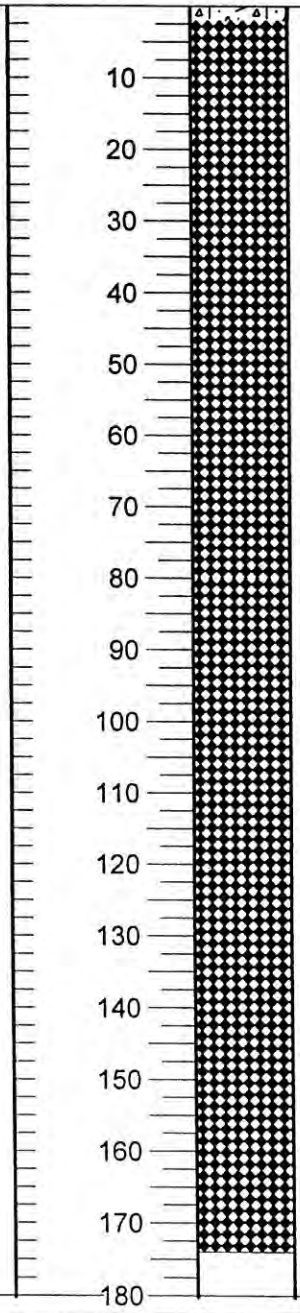
Figure No. C - 2

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-6**
LOCATION	**Vashon Island, Washington**	PAGE	**1 of 1**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**392.4**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**174.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION



DECOMMISSIONING DETAILS
0 to 2.0 feet: Concrete.
2.0 to ~80.0 feet: Bentonite chips (48 stacks).
80.0 to 174.0 feet: Bentonite grout (~500 gallons).

ORIGINAL CONSTRUCTION
+2.5 to ~23.0 feet: Nominal 8-inch O.D. steel casing and drive shoe, also used as security monument.
+2.0 to 5.0 feet: Nominal 2-inch O.D., Schedule 40 gas probe ("GP-6").
+1.8 to 11.5 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and screen ("MW-6S").
+1.7 to 160.0 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and screen ("MW-6D").

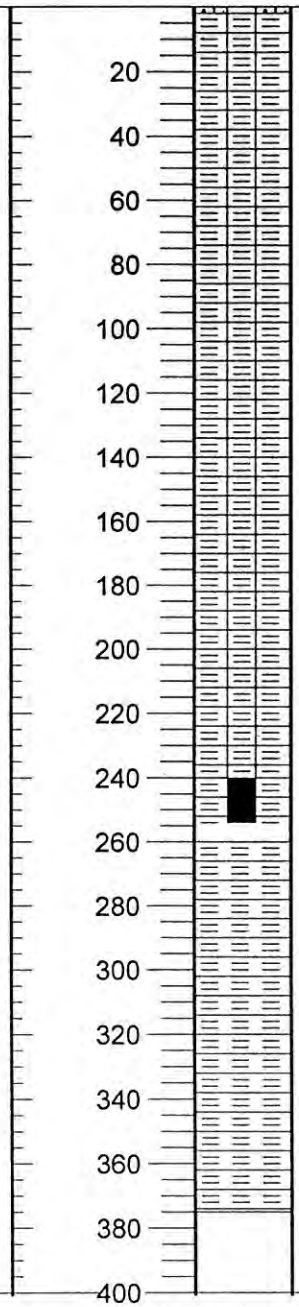
0 to 3.0 feet: Concrete.
3.0 to 102.0 feet: Pea gravel.
102.0 to 115.0 feet: #8 Aqua sand.
115.0 to 116.0 feet: Pea gravel.
116.0 to 121.0 feet: Bentonite pellets.
121.0 to 136.0 feet: Pea gravel.
136.0 to 142.0 feet: Bentonite pellets.
142.0 to 148.0 feet: Slough.
148.0 to 160.5 feet: #8 Aqua sand.
160.5 to 161.0 feet: Pea gravel.
161.0 to 163.0 feet: Bentonite pellets.
163.0 to 166.5 feet: Slough.
Total original borehole depth: 166.5 feet.

REMARKS
Existing nominal 8-inch casing and drive shoe were removed, then existing well assemblies and backfill were overdrilled using nominal 8-inch-diameter casing to below the original installation depth. Backfill was placed concurrent with casing removal.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-11**
LOCATION	**Vashon Island, Washington**	PAGE	**1 of 1**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**404.3**
DRILL METHOD	**Dual Rotary**	TOTAL DEPTH	**375.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**7/29/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION



DECOMMISSIONING DETAILS
0 to 2.0 feet: Concrete.
2.0 to 254.0 feet: Bentonite grout pumped into well screen and casing using the tremie method.

ORIGINAL CONSTRUCTION
Depth of boring = 375.0 feet.

~2.5 to 242.0 feet: Nominal 2" PVC casing.
242.0 to 254.0 feet: Nominal 2" PVC screen and end plug.

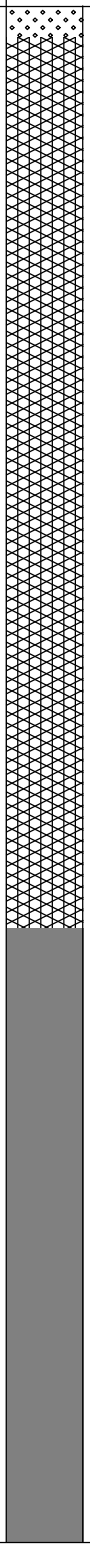
0 to 2.0 feet: Concrete.
2.0 to 235.0 feet: Bentonite grout.
235.0 to 240.0 feet: Bentonite chips.
240.0 to 254.0 feet: 20 x 40 CSSI sand.
254.0 to 260.0 feet: Pea gravel.
260.0 to 375.0 feet: Bentonite grout.

REMARKS
Original N: 1471.91 E: 3023.75.

Monitoring Well Construction Log

Project Number	Well Number	Sheet
090057	MW-14	1 of 2

Project Name:	King County Closed Landfills	Ground Surface Elev	373.62
Location:	Vashon Island Landfill	Top of Casing Elev.	Approx. 376
Driller/Method:	Holt Services / Sonic	Depth to Water (ft BGS)	
Sampling Method:	Continuous Core	Start/Finish Date	4/7/2015-4/9/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
5 370 10 365 15 360 20 355 25 350 30 345 35 340 40 335 45 330 50 325 55 320 60 315 65 310 70 305 75 300 80 295 85 290 90 285 95 280 275							**Decommissioning Details** Monitoring well decommissioned by overdrilling using rotosonic drilling methods 0 to 2 feet: Soil backfill 2 to 60 feet: Bentonite chips 60 to 150 feet: Bentonite grout 150 to 180 feet: Bentonite chips **Original Well Construction** +2 feet to 172 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and 10-slot screen 0 to 2 feet: Concrete 2 to 150 feet: Bentonite grout 150 to 154 feet: Bentonite chips 154 to 172 feet: No. 20-40 Colorado Silica Sand 172 to 180 feet: Bentonite chips	5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

Figure No. C - 3

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-14	2 of 2

Project Name:	King County Closed Landfills	Ground Surface Elev	373.62
Location:	Vashon Island Landfill	Top of Casing Elev.	Approx. 376
Driller/Method:	Holt Services / Sonic	Depth to Water (ft BGS)	
Sampling Method:	Continuous Core	Start/Finish Date	4/7/2015-4/9/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
105 / 270								105
110 / 265								110
115 / 260								115
120 / 255								120
125 / 250								125
130 / 245								130
135 / 240								135
140 / 235								140
145 / 230								145
150 / 225								150
155 / 220								155
160 / 215								160
165 / 210								165
170 / 205								170
175 / 200								175
180 / 195								180
185 / 190								185
190 / 185								190
195 / 180								195
175								

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

Figure No. C - 3

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

Monitoring Well Construction Log

Project Number	Well Number	Sheet
090057	MW-5	1 of 2

Project Name:	King County Closed Landfills	Ground Surface Elev	355.86
Location:	Vashon Island Landfill	Top of Casing Elev.	Approx. 358
Driller/Method:	Holt Services / Sonic	Depth to Water (ft BGS)	
Sampling Method:	Continuous Core	Start/Finish Date	4/3/2015-4/7/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
355 / 5 / 350 / 10 / 345 / 15 / 340 / 20 / 335 / 25 / 330 / 30 / 325 / 35 / 320 / 40 / 315 / 45 / 310 / 50 / 305 / 55 / 300 / 60 / 295 / 65 / 290 / 70 / 285 / 75 / 280 / 80 / 275 / 85 / 270 / 90 / 265 / 95 / 260							**Decommissioning Details** Monitoring well decommissioned by overdrilling using rotosonic drilling methods 0 to 2 feet: Soil backfill 2 to 152 feet: Bentonite chips (84 bags) **Original Well Construction** +2 feet to 5 feet: Nominal 3/4-inch O.D. PVC gas monitoring probe +2 feet to 84 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and 20-slot screen ("MW-5S") +2 feet to 126 feet: Nominal 2-inch O.D., Schedule 40 PVC blank riser and 20-slot screen ("MW-5D") 0 to 3 feet: Concrete 3 to 69 feet: Pea gravel 69 to 84 feet: #8 Monterey sand 84 to 84.5 feet: Pea gravel 84.5 to 89 feet: Bentonite pellets 89 to 101 feet: Pea gravel 101 to 106 feet: Bentonite pellets 106 to 113 feet: Pea gravel 113 to 126 feet: #8 Monterey sand 126 to 132 feet: Bentonite pellets 132 to 151 feet: Pea gravel	5 / 10 / 15 / 20 / 25 / 30 / 35 / 40 / 45 / 50 / 55 / 60 / 65 / 70 / 75 / 80 / 85 / 90 / 95

Sampler Type:
○ No Recovery

PID - Photoionization Detector
▼ Static Water Level
▽ Water Level (ATD)

Logged by: AHP
Approved by: John Strunk
Figure No. C - 4

KCSWD_SONIC LOG KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

Monitoring Well Construction Log

Aspect CONSULTING

Project Number	Well Number	Sheet
090057	MW-5	2 of 2

Project Name:	King County Closed Landfills	Ground Surface Elev	355.86
Location:	Vashon Island Landfill	Top of Casing Elev.	Approx. 358
Driller/Method:	Holt Services / Sonic	Depth to Water (ft BGS)	
Sampling Method:	Continuous Core	Start/Finish Date	4/3/2015-4/7/2015

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
255 / 105								105
250 / 110								110
245 / 115								115
240 / 120								120
235 / 125								125
230 / 130								130
225 / 135								135
220 / 140								140
215 / 145								145
210 / 150								150
205 / 155								155
200 / 160								160
195 / 165								165
190 / 170								170
185 / 175								175
180 / 180								180
175 / 185								185
170 / 190								190
165 / 195								195
160								

Sampler Type:

○ No Recovery

PID - Photoionization Detector

▼ Static Water Level

▽ Water Level (ATD)

Logged by: AHP

Approved by: John Strunk

Figure No. C - 4

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ June 30, 2015

MW-27 Decommissioning Summary Memo

Memo

August 22, 2016 Aspect Project No.: 090057

To: Isabel McClure – King County Solid Waste Division (KCSWD)

cc: Anne Holmes, Tom Theno, Dan Swope – KCSWD
Henry Haselton, Adam Griffin – Aspect Consulting LLC

From: Aaron Pruitt, LG – Aspect Consulting LLC
John Strunk, LHG – Aspect Consulting LLC

Re: **Vashon Island Closed Landfill - Task 310.1.10 - Contract No. E000102E08**
MW-27 Decommissioning Summary Memo

Field investigations performed in the Spring of 2015 at the Vashon Island Closed Landfill included the installation of four new wells (MW-33 through MW-36). One of the new wells, MW-34, was installed in close proximity to existing well MW-27. Evaluations of stratigraphic and water level data from both MW-27 and MW-34 indicate that MW-27 was completed in a way that may allow interconnection of the Cc3 and D hydrogeologic units. Evaluation of MW-27 well completion details, stratigraphic information obtained from sonic drilling and core samples at MW-34 and groundwater hydrographs provided information to support a recommendation to decommission MW-27. KCSWD approved the recommendation in May 2016 to decommission MW-27.

The decommissioning of MW-27 occurred between July 5th and July 12th, 2016. The well was decommissioned by overdrilling using a rotosonic drill rig operated by Holt Services, Inc. (Holt), a subcontractor to Aspect Consulting, LLC (Aspect). The well was overdrilled with a 9-inch inner diameter barrel to 90 feet below ground surface (ft bgs), and a 7-inch inner diameter drill barrel from 90 ft bgs to the total depth of 237 ft bgs (see Decommissioning Log, Attachment A). During overdrilling, it was noted that the well deviated from plumb to the southeast at 37 ft bgs, and well casing was not extracted below the deviation. Soil cuttings from 90 ft bgs to 100 ft bgs included a small amount of hydrated bentonite, likely from MW-27 completion.

After overdrilling to total depth, the boring was backfilled with bentonite pellets from 237 ft bgs to 210.5 ft bgs, and bentonite chips from 210.5 ft bgs to 2 ft bgs. Ten bags of bentonite chips were required to backfill 7 feet of boring at a depth starting at 176 ft bgs, when only 3.5 bags of bentonite chips would be expected to fill that amount of borehole volume. It is likely that a void (possibly the bottom section of well casing) was filled at the 176 ft depth. The well casing below the deviation at 37 ft bgs was also backfilled with bentonite chips, taking an additional sixteen bags of bentonite

chips. The ground surface was patched with black-dyed concrete. Daily field reports are provided in Attachment B.

During the decommissioning of MW-27, a transducer was deployed in the nearby well MW-34 to monitor water levels in the D-unit aquifer (Figure 1). Water levels increased by over a foot when drilling advanced between 200 ft bgs and 210 ft bgs. This suggests that the low-transmissivity Cf unit between the Cc3 and D unit aquifers is interconnected between 200 ft bgs and 210 ft bgs. This depth is below the former screen depth interval in MW-27, but within the original gravel pack interval in MW-27. This water level response supports the observation that the extended gravel pack interval in MW-27 was serving as a conduit cross-connecting the Cc3 and D units. Water levels fluctuated as drilling continued to total depth, and stabilized as the boring was backfilled with bentonite.

Limitations

Work for this project was performed for the King County Solid Waste Division (Client), and this memorandum was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This memorandum does not represent a legal opinion. No other warranty, expressed or implied, is made.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

\\biserver1.aspect.local\projects\King Co Closed Landfills\Phase I\Vashon Is\Task 310.1.10 Infrastructure Improvements\MW-27\MW-27 Decom Memo.docx

Attachments:

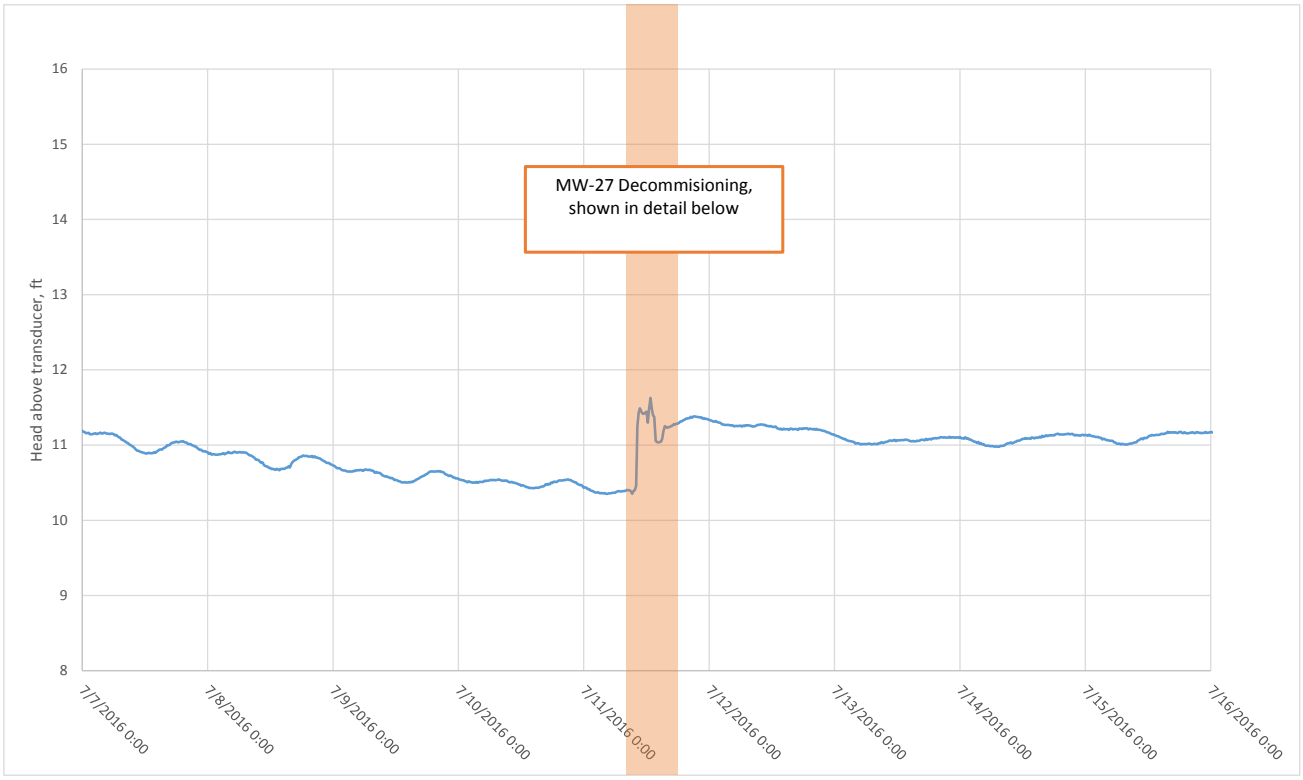
Figure 1 – MW-34 Hydrograph

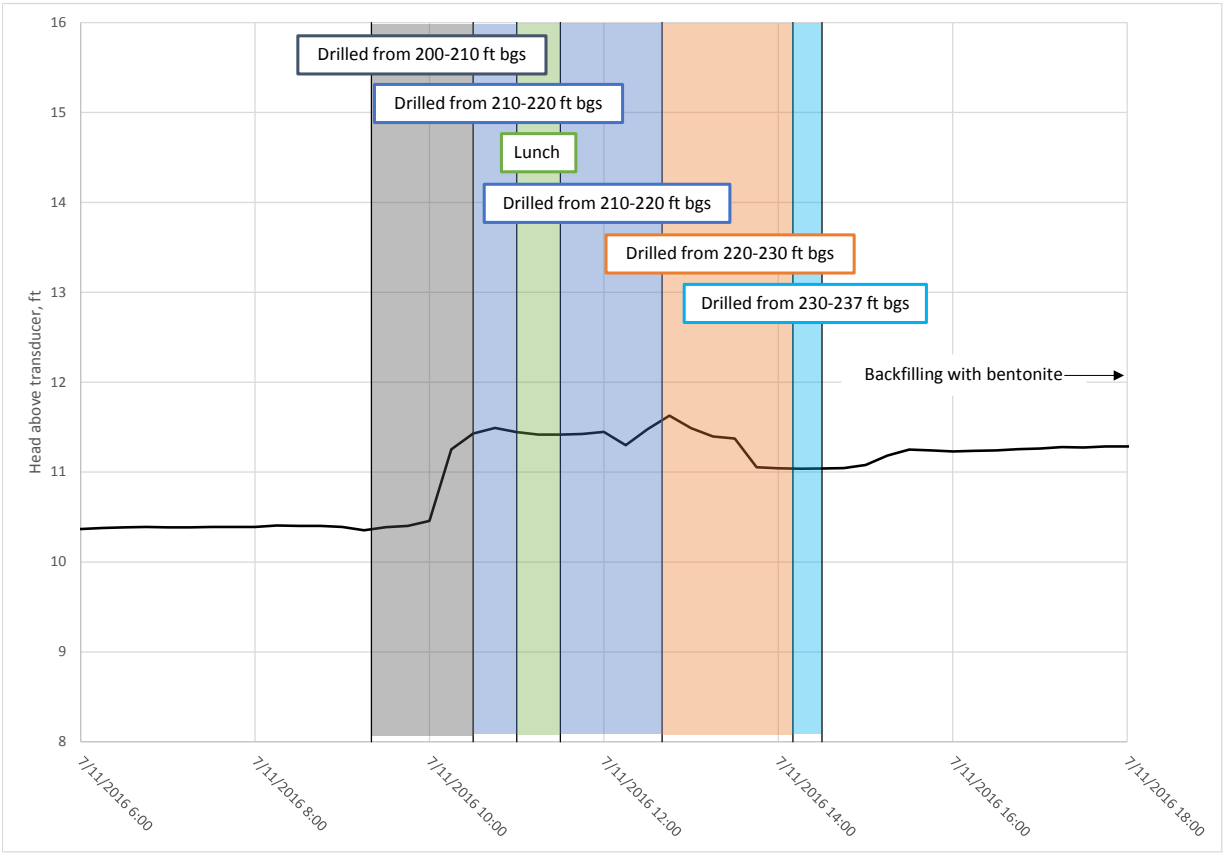
Attachment A – MW-27 Decommissioning Log

Attachment B – Daily Field Reports

Figure 1 – MW-34 Hydrograph

Figure 1- MW-34 Hydrograph





Attachment A – MW-27 Decommissioning Log

Monitoring Well Construction Log

Project Number	Well Number	Sheet
090057	MW-27	1 of 2

Project Name: King County Closed Landfills
Location: Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method:

Ground Surface Elev (NGVD 88) 386.34
Top of Casing Elev. (NGVD 88) 388.63
Depth to Water (ft BGS)
Start/Finish Date 7/5/2016-7/12/2016

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
385	Concrete surface patch						**Decommissioning Details** Monitoring well decommissioned by overdrilling using rotosonic drilling methods: 9-inch ID barrel to 90 feet, 7-inch ID barrel 90 to 237 feet. 0 to 2 feet: Concrete surface patch (dyed black) 2 to 210.5 feet: Bentonite chips 210.5 to 237 feet: Bentonite pellets Additional Notes: -Well casing deviates from plumb to the SE at 37 ft bgs (observed) -Well casing below the deviation not extracted -Remaining well casing below deviation at 37 ft bgs backfilled with bentonite chips (16 bags) **Original Well Construction** +2.3 to 186.5 feet: 4-inch OD, Sch 80 PVC blank riser 186.5 to 190.6 feet: 4-inch OD, Sch 80 PVC 20-slot screen 190.6 to 191.4 feet: 4-inch OD, Sch 80 PVC blank casing joint 191.4 to 200.7 feet: 4-inch OD, Sch 80 PVC 20-slot screen 200.7 to 201.3 feet: 4-inch OD, Sch 80 PVC blank casing and end plug 0 to 2 feet: Concrete, steel monument, bollards 2.0 to 134.0 feet: 3/4-inch bentonite chips 134.0 to 141.0 feet: Slough 141.0 to 183.5 feet: 3/4-inch bentonite chips 183.5 to 203.5 feet: Norton 16 x 30 silica sand 203.5 to 237.0 feet: Pea gravel	
380								
375	Bentonite chips 2 - 210.5 ft bgs							
370								
365								
360								
355								
350								
345								
340								
335								
330								
325								
320								
315								
310								
305								
300								
295								
290								
285								
280								
275								
270								

Sampler Type:
○ No Recovery

PID - Photoionization Detector
▼ Static Water Level
▽ Water Level (ATD)

Logged by: MML
Approved by: John Strunk
Figure No. A - 2

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ August 16, 2016

Monitoring Well Construction Log

Project Number	Well Number	Sheet
090057	MW-27	2 of 2

Project Name: King County Closed Landfills
Location: Vashon Island Landfill
Driller/Method: Holt Services / Sonic
Sampling Method:

Ground Surface Elev (NGVD 88) 386.34
Top of Casing Elev. (NGVD 88) 388.63
Depth to Water (ft BGS)
Start/Finish Date 7/5/2016-7/12/2016

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Laboratory Tests	PID (ppm)	Unit	Material Type	Description	Depth (ft)
265 to 150	Bentonite chips 2 - 210.5 ft bgs; Bentontite pellets 210.5 - 237 ft bgs							125 to 235

Sampler Type:
○ No Recovery

PID - Photoionization Detector
▼ Static Water Level
▽ Water Level (ATD)

Logged by: MML
Approved by: John Strunk
Figure No. A - 2

KCSWD_SONIC LOG_KC VASHON_DECOMMISSIONED.GPJ August 16, 2016

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. AE38181

Construction/Decommission

☐ Construction

☒ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

☒ Resource Protection

☐ Geotechnical Soil Boring

Consulting Firm Aspect

Property Owner King County

Site Address 18910 Westside Hwy SW

City Vashon Island County King

Unique Ecology Well ID

Tag No. MW27

Location 1/4 SW 1/4 SW Sec 36 Twn 23 R 2 or WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

☒ Driller ☐ Trainee Name (Print) David Dickinson

Driller/Trainee Signature _____

Driller/Trainee License No. 3017

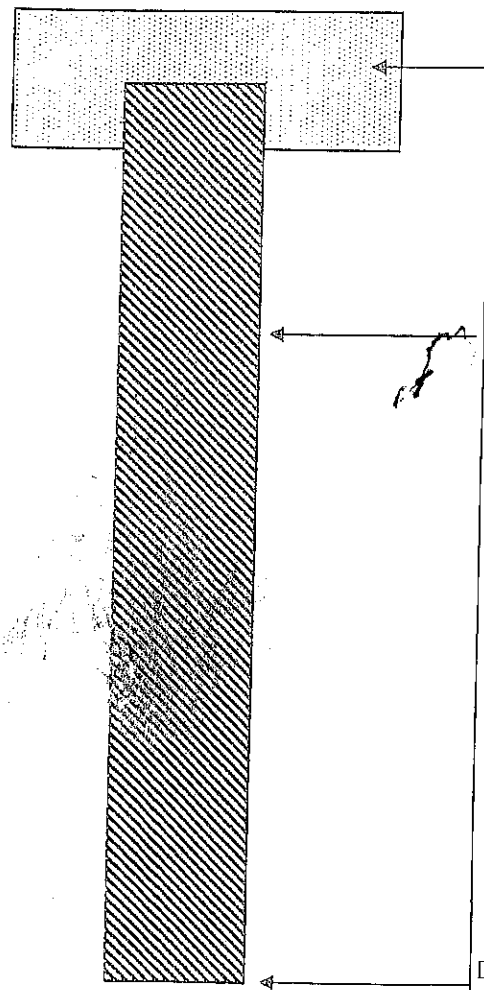
Cased or Uncased Diameter 8 in Static Level _____

Work/Decommision Start Date 7-5-16

If trainee, licesned drillers' Signature and License No. _____

Work/Decommision Completed Date 7-12-16

Construction/Design



Well Data

CONCRETE SURFACE SEAL 2 FT Redi Mix

BACKFILL 208 FT Bentonite Chips

210 Bentonite Pellets. ↓

DEPTH OF BORING 237 FT

Formation Description

0 - 50 FT Bentonite

50 - 225 FT Silty Sand + gravel

225 ~~215~~ & 237 FT Silt.

Notes:
Drill from surface to 50 ft overdrilling a well at 50 ft, we lost the well during drilling. Aspect P.M. contacted DOE. was told to keep drilling. While backfilling we exposed the pvc. once again and poured in bentonite hole plug till full.

Scale 1" = _____

Page _____ of _____

ECY 050-1-20 (Rev 6/96)

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Intent to Decommission a Well

Notification Number **AE38181**

This form and required fees **MUST BE RECEIVED** by the Department of Ecology **72 HOURS BEFORE** you construct a well.

Submit one completed form for each job site and required fee (check or money order only) to:
Department of Ecology Cashiering Unit, P.O. Box 47611, Olympia, WA 98504-7611

NOTE: Please print. Processing your Notice of Intent may be delayed if all fields are not filled in completely.

1. Property Owner	Phone Number		
King County			
Mailing Address	**City**	**State**	**Zip Code**
18910 Westside Highway SW	Vashon Island	WA	98070

2. Agent (if different from above)	Phone Number		
Mailing Address	**City**	**State**	**Zip Code**

3. Well Location

Tax Parcel Number, Township, Range, Section, ¼, and ¼ ¼ are Required. Latitude and longitude (if available).

County Name			
King - 17			
Well Site Street Address	**City**	**State**	**Zip Code**
18910 Westside Highway SW	Vashon Island	WA	98070

Tax Parcel Number	Township	Range	Section	¼ (within 160 acres)	¼ -¼ (within 40 acres)
	23N	2E	36	SW	SW

Latitude Degrees	Latitude Time	Horizontal Collection Method
	min sec	
Longitude Degrees	**Longitude Time**	
	min sec	

4. Notice of Intent Number of well being decomissioned

Unique Well Tag Number of well being decomissioned (if applicable)

5. Well Type to Decommission

Resource Protection - $20.00 each Revised Code: 027-WEL1**-02-87-000101 How Many? 1

6. Estimated Decommission Start Date 7/5/2016 Project Name Aspect Vashon Island Closed Landfill

7. Professional's License Number

8. Well Drilling Company Name	Holt Services, Inc.	Phone Number (253) 604-4878
9. Well Driller Name		Driller License Number

10. **Send the entire form.**

Please copy the notification number (located in the upper and lower right corners) and keep in a safe place. Use this reference number when communicating with the Department of Ecology.

Water Well :	$50.00
Soil Sampling, Dewatering, Environmental investigation wells:	No Fee
All other wells:	$20.00 each
Amount Enclosed $	$20.00

This notification number must be provided to your driller:

AE38181

Your validation will be sent to the e-mail address you provided: sk@holtservicesinc.com

Instructions

Item 1: Property owner's name, daytime phone number and mailing address.

Item 2: Agent - If the driller, consultant or other person is acting as your agent and is submitting the notification fee, please provide their name, mailing address and daytime phone number

Item 3: Complete county name and code number from drop down list. If the site street address is available, please fill in the complete address here. Include city and zip code. Please enter the tax parcel number if available. NOTE: Include all dashes and zeros. Please provide the Township, Range, Section, where the well is located. This information can be found in your property legal description or the County Assessor's Office

Item 4: Please enter the original construction notice of intent number if available.

Item 5: Type of well to decommission. Please note those wells that require a fee and those that do not.

Item 6: Enter the approximate decommissioning start date.

Item 7-11: This information should be available from your well driller.

For Assistance

Contact the Department of Ecology Regional Office where the well is located.

Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima counties contact:

Central Regional Office (CRO) (509) 575-2490 TTY 711 and 1-800-833-6388

Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman counties contact:

Eastern Regional Office (ERO) (509) 329-3400 TTY 711 and 1-800-833-6388

Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom counties contact:

Northwest Regional Office (NWRO) (425) 649-7000 TTY 711 and 1-800-833-6388

Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum counties contact:

Southwest Regional Office (SWRO) (360) 407-6300 TTY 711 and 1-800-833-6388

ECY 040- 24 To request ADA accommodation including materials in a format for the visually impaired, call Ecology Water Resources Program at 360-407-6872. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	1 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			0 to 0.4 foot: ASPHALT
			0.4 to 2.5 feet: SILTY GRAVEL (GW-GM), brown fines, subrounded to subangular, some fine to medium sand, few fines, moist. (ROAD SUBGRADE)
G	4		**2.5 to 7.0 feet: SILTY GRAVEL (GP-GM)**, brown fines, medium to coarse, subrounded to subangular, some fine to coarse sand, few fines, few cobbles, trace boulders, dry to moist. Trace wood debris, broken glass and plastic debris at 3.0 to 3.5 feet. (FILL)
G	8		**7.0 to 11.0 feet: SILTY GRAVEL (GM)**, olive gray fines, fine to coarse, subrounded to subangular, some fines, little fine to medium sand, trace cobbles, moist. Gravel content decreases downhole, gradational basal contact. (TILL)
G	12		**11.0 to 27.0 feet: SILTY SAND (SM)**, olive gray fines, fine to medium, trace to few coarse, some nonplastic fines, some fine to medium gravel, trace coarse gravel, trace cobbles, moist. (TILL)
G	15		

GROUND WATER LEVEL | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHO-LOGIC COLUMN

5
10
15
20

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**2 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	20							**11.0 to 27.0 feet: SILTY SAND (SM)**, continued.
								@ 23.0 feet: gravelly.
G	25			25				@ 25.0 to 28.0 feet: slight increase in moisture content.
								27.0 to 39.0 feet: SILTY SAND (SP-SM), yellow brown fines, fine to medium, subrounded to subangular, trace to few subrounded coarse sand and fine gravel, few fines, moist. Transitional to SP. Basal contact defined as where silt occurs disseminated within matrix. (FLUVIAL DEPOSITS)
G	30			30				
								@ 33.0 feet: smoother drilling. @ 33.0 to 39.0 feet: trace to few fine subrounded to subangular gravel, drilling action suggests gravel occurs in beds, occasional thin (<5 mm) brown sandy silt (ML) as beds, silt also occurs as thin coatings on gravels.
G	35			35				
								39.0 to 45.0 feet: SILTY SAND (SM), see description on next page.
				40				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**3 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	40		**39.0 to 45.0 feet: SILTY SAND (SM)**, yellow brown fines, fine to medium, trace coarse, some fines, some subrounded to subangular fine gravel, damp to moist. Gradational basal contact. (FLUVIAL DEPOSITS)
			@ 42.0 to 44.0 feet: few fine gravel.
G	45		**45.0 to 74.0 feet: SILTY SAND (SP-SM)**, yellow brown to grayish brown fines, fine to medium, trace coarse, trace to few fines (gradational to SP), little to some rounded, subrounded and subangular fine gravel at 45.0 feet, trace to few fine gravel below. Uncertain basal contact due to discharge hose failure. (FLUVIAL DEPOSITS)
G	50		
G	55		@ 55.0 feet: remove standard tri-cone drill bit, install sample-through bit.
			@ 59.0 feet: cobbles.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**4 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	60							**45.0 to 74.0 feet: SILTY SAND (SP-SM)**, continued. @ 60.0 to 76.0 feet: very easy drilling, very easy to drive casing, transitional to SP-SM, sand is fine with trace medium, trace fine to coarse subrounded to subangular gravel.
G	65			65				
G	70			70				
								74.0 to 77.5 feet: SAND (SP), yellow brown fines, fine, trace fines, damp. (FLUVIAL DEPOSITS)
G	76			75				
								77.5 to 87.0 feet: SAND (SP), yellow brown fines, fine with common interbeds of thin (<3 mm) gray silt (ML) beds, damp to moist, silt beds are soft, moderate plasticity, damp to moist. (FLUVIAL DEPOSITS)
				80				

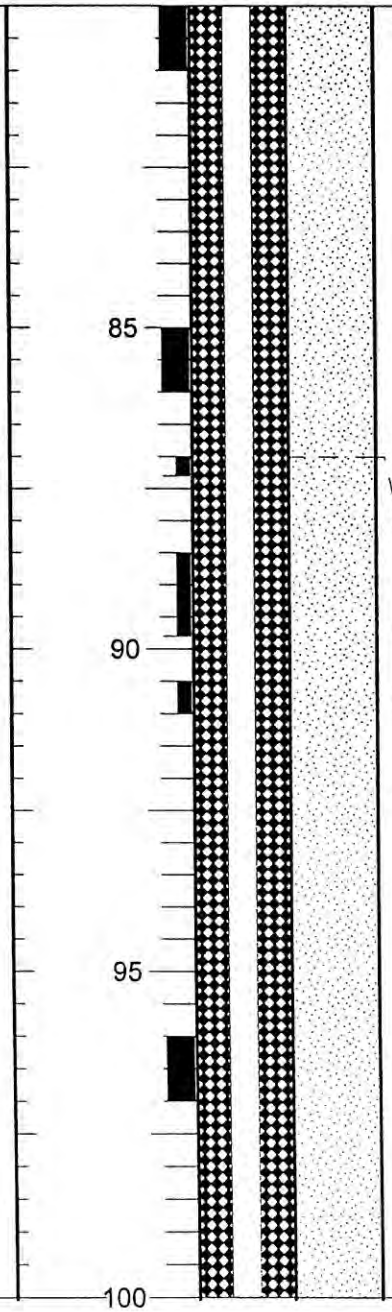
REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**5 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	80		**77.5 to 87.0 feet: SAND (SP)**, continued.
G	85		
SS	87	100/3"	@ 87.0 feet: no sample recovery, fragments of a quartzite cobble in sampler drive shoe. No silt beds observed in cuttings below 87.0 feet.
SS	88.5	35 40 50/4"	**87.0 to 102.0 feet: SAND (SP)**, yellow brown fines, fine, trace fines, damp. Grades to SILTY SAND (SM). (FLUVIAL DEPOSITS) @ 88.5 feet: 3-inch recovery, fragments of a quartzite cobble plus slough, no formation.
SS	90.5	100	@ 90.5 feet: SILTY SAND (SM), fine, little to some fines.
			@ 92.0 feet: color change to brown fines, moist (possible former perched saturated zone?).
G	96		



REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**6 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	100		**87.0 to 102.0 feet: SAND (SP)**, continued. @ 100.0 feet: common orange-brown coatings on sand grains, moist.
G	102		**102.0 to 106.0 feet: SAND (SP)**, brown-orange fines, fine, trace medium to coarse, trace fine gravel, one gravel clast has red-orange stains, moist, with common beds of brown-gray silt (ML), silt is soft, moist, with moderate plasticity. Casing sinks freely from 104.0 to 106.0 feet. (FLUVIAL DEPOSITS)
SS	106	50	**106.0 to 118.0 feet: SILT (ML)**, brownish gray at upper contact, gray below, trace to some fine sand, soft at upper contact to slightly stiff below, moist, nonplastic to low plasticity. (LACUSTRINE DEPOSITS) @ 108.0 to 113.0 feet: poor sample recovery.
SS		50	@ 113.0 feet: no sample recovery.
SS	113.5	100/4"	@ 113.5 feet: 100 percent recovery. SANDY SILT (ML), gray, some fine sand, trace fine gravel, slightly stiff, moderate to low plasticity, moist. @ 115.0 feet: add water during drilling.
G	116		
SS	117	NR	@ 117.0 feet: gray very fine SANDY SILT (ML), soft, moderate plasticity, some very fine sand, moist to saturated (apparent capillary saturation).
			118.0 to 135.0 feet: SILT (ML), gray, soft to stiff. (LACUSTRINE DEPOSITS)

105 110 115 120

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**7 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
G	120		**118.0 to 135.0 feet: SILT (ML),** continued.
G	122		
G	124		@ 124.0 feet: trace subangular black (basalt) fine gravel, trace brown laminated silt (ML).
SS	126	100	@ 126.0 feet: no sample recovery. Install secondary air compressor to facilitate sample recovery.
SS	130.5	99/18"	
			@ 132.7 feet: depth to water measured during placement of annular backfill with 8-inch steel casing drive shoe at 134.1 below grade, 08/14/03. Borehole caved to 0.3 feet below drive shoe.
G	134		
			135.0 to 140.0 feet: SAND (SP), gray fines, fine, few fines. (FLUVIAL/LACUSTRINE DEPOSITS)
SS	137	10 30 50/5"	@ 137.0 feet: 3-inch recovery, SAND (SP), gray fines, fine, trace to few fines. No apparent bedding structures. Based on water levels measured during annular fill placement, sample was likely disturbed by heaving.

GROUND WATER LEVEL: ▽ 8/14/03

DEPTH IN FEET: 125, 130, 135, 140

SAMPLES

WELL DETAILS

LITHO-LOGIC COLUMN

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	8 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	140							**140.0 to 150.0 feet: SILT (ML)**, gray, very stiff to hard. Trace organic material at 140.0 feet, absent below. (LACUSTRINE DEPOSITS)
G	145			145				
G	148							
				150				**150.0 to 156.0 feet: SILTY GRAVEL (GM)**, yellow-brown fines, fine to medium, subrounded to subangular, matrix-supported, matrix is laminated gray clayey silt (CL) with yellow-brown staining adjacent to gravels. (FLUVIAL/LACUSTRINE DEPOSITS)
G	152							
				155				
G	156							**156.0 to 164.0 feet: SILT (ML)**, gray, trace clay, very stiff to hard. (LACUSTRINE DEPOSITS)
				160				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

UDALOY ENVIRONMENTAL SERVICES

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	9 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	160							**156.0 to 164.0 feet: SILT (ML),** continued.
G	165			165				**164.0 to 174.0 feet: SILTY GRAVEL (GP-GM),** brown-gray fines, medium to coarse, subrounded to subangular, some fine to medium sand, few to little fines (a portion of the fines may be carry-down). (FLUVIAL DEPOSITS)
G	169			170				
G	172							
G	175			175				**174.0 to 190.0 feet: GRAVELLY SAND (SP),** brown fines, fine to medium, trace fines, some fine to coarse gravel, trace cobbles, drills easily. (FLUVIAL DEPOSITS)
				180				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	10 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
								174.0 to 190.0 feet: GRAVELLY SAND (SP), continued.
G	181.5							
G	185			185				@ 185.0 feet: ½-inch-thick by 3-inch-diameter disc of PEAT, brown.
			▼ 10/14/03					
				190				**190.0 to 197.0 feet: SAND (SP)**, yellow brown fines, medium to coarse, subrounded to angular, few fines at upper contact (SP-SM), trace fines below, few fine to medium gravel, transitional to SW. Gradational basal contact. (FLUVIAL DEPOSITS)
G	191							
G	195			195				**197.0 to 211.0 feet: SILTY GRAVEL (GW-GM)**, yellow gray fines, fine to coarse, subrounded to subangular, few fines, little fine to coarse sand. (FLUVIAL DEPOSITS)
				200				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet ~~below grade on~~ 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

UDALOY ENVIRONMENTAL SERVICES

? TD=237' elevation 132.7 ft bgs

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	11 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	200							**197.0 to 211.0 feet: SILTY GRAVEL (GW-GM),** continued.
G	205			205				
G	209			210				**211.0 to 214.0 feet: SILTY GRAVEL (GM),** yellow brown fines, medium to coarse, subrounded to subangular, some fines, continuous with and basal unit of overlying GP-GM. (FLUVIAL DEPOSITS)
G	213							**214.0 to 217.0 feet: SILTY SAND (SM),** gray fines with black sand grains, very fine to fine, some fines, smooth drilling, uncertain basal contact. (FLUVIAL DEPOSITS)
G	215			215				$i = \frac{190.2 - 186.5}{217 - 193} = 0.15$
								@ 217.0 feet: with drive shoe at 217.0 feet, static water depth is 190.2 feet after 30 minutes.
								217.0 to 227.0 feet: GRAVEL (GP), gray brown fines (fine to medium, rounded to subrounded, some fine to medium sand, trace fines. Transitional to GP-GM. (FLUVIAL DEPOSITS)
				220				

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	Vashon Island Landfill Closure	BORING NO.	MW-27
LOCATION	Vashon Island, Washington	PAGE	12 of 13
DRILLED BY	Tacoma Pump & Drilling	REFERENCE ELEV.	380.8
DRILL METHOD	Dual Rotary, Foremost DR24	TOTAL DEPTH	237.0'
LOGGED BY	Udaloy	DATE COMPLETED	8/15/03

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION
G	221							**217.0 to 227.0 feet: GRAVEL (GP)**, continued.
G	224			225				$i_2 = \frac{205.8 - 190.2}{227 - 217} = 1.56$
								@ 227.0 feet: with drive shoe at 227.0 feet, depth to water is 205.8 feet after 30 minutes, rising very slowly after 30 minutes. ~Elev 175'
G	228			230				**227.0 to 237.0 feet: SILTY GRAVEL (GM)**, gray fines, medium to coarse, subrounded to subangular, some fines, few to little fine to medium sand, trace cobbles. Easy drilling. (FLUVIAL DEPOSITS)
G	232			235				
G	236							Total depth drilled and sampled = 237.0 feet.
				240				See Page 13 for Well Completion Details.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

LOG OF EXPLORATORY BORING

PROJECT NAME	**Vashon Island Landfill Closure**	BORING NO.	**MW-27**
LOCATION	**Vashon Island, Washington**	PAGE	**13 of 13**
DRILLED BY	**Tacoma Pump & Drilling**	REFERENCE ELEV.	**380.8**
DRILL METHOD	**Dual Rotary, Foremost DR24**	TOTAL DEPTH	**237.0'**
LOGGED BY	**Udaloy**	DATE COMPLETED	**8/15/03**

SAMPLE METHOD	SAMPLE NUMBER	BLOWS PER 6 INCHES	GROUND WATER LEVEL	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHO-LOGIC COLUMN	LITHOLOGIC DESCRIPTION

245

250

255

260

WELL COMPLETION DETAILS

+2.3 to 186.5 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank riser pipe.

186.5 to 190.6 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

190.6 to 191.4 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing at joint between screen sections.

191.4 to 200.7 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC screen with 0.020-inch machined slots and 0.25-inch spacers.

200.7 to 201.3 feet: Nominal 4-inch O.D., flush-threaded, Schedule 80 PVC blank casing and end plug.

185.0 to 186.0 feet: Stainless steel centralizer.
192.0 to 193.0 feet: Stainless steel centralizer.
200.0 to 201.0 feet: Stainless steel centralizer.

0 to 2.0 feet: Concrete.
2.0 to 134.0 feet: Baroid® 3/4-inch bentonite chips.
134.0 to 141.0 feet: Slough.
141.0 to 183.5 feet: Baroid® 3/4-inch bentonite chips.
183.5 to 203.5 feet: Norton™ 16 x 30 silica sand.
203.5 to 237.0 feet: Pea gravel.

REMARKS

(1) See General Remarks. (2) Blow counts do not represent SPT values. (3) Water added during drilling below 115 feet. (4) Standard tri-cone bit used to 55 feet depth, sample-through bit used below 55 feet. (5) Reference elevation = ground surface. (6) N: 905.52 E: 2333.31. (7) Top of PVC elevation = 383.06 feet. (8) Perched groundwater noted at 248.1 feet below grade on 8/14/2003. Groundwater elevation = 193.8 feet on 10/14/2003.

Attachment B – Daily Field Reports

DAILY REPORT

350 Madison Avenue North
Bainbridge Island, Washington 98110
(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

DATE: 7/05/16	**PROJECT NO.** 090057 TASK 310.1.10	**WEATHER:** PARTLY CLOUDY, HIGH 60'S
PROJECT NAME: Vashon Landfill	**CLIENT:** KCSWD	
EQUIPMENT USED: WATER LEVEL IND,	**PROJECT LOCATION:** VASHON ISLAND, WA	

THE FOLLOWING WAS NOTED:
Arrival Time: 0901
Activities: Ensure access, direct equipment drop off
Personnel/Visitors: Matthew Lewis (Aspect)
Departure Time: 1300
Field Forms Used: Field Notebook

Summary of Activities:
Matthew arrived on site, unlocked the south gate, and identified the well to be decommissioned (MW-27 with Ecology Tag AHM-855). At 0910, received a call from driller with Holt Services that there is a problem with the brake system of the truck hauling the drill rig and it is temporarily parked at the Vashon ferry terminal dock until it can be moved to the landfill. A mechanic from Holt was been dispatched to make repairs. At 1000, the roll-off box for soil cuttings is delivered and staged on the side of the perimeter road at the SE corner of the landfill. Driller informs me that repairs will take the rest of the day. I instruct them to leave the rigs near MW-27 after the repairs are made, but not to block access to the perimeter road.

Aspect off site at 1300 after locking the south gate.

Problems Encountered: Lost time equipment failure (Holt), no other problems.

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Page 1 of 1	**FIELD REP.:** MML

DAILY REPORT

350 Madison Avenue North
Bainbridge Island, Washington 98110
(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

DATE: 7/06/16	**PROJECT NO.** 090057 TASK 310.1.10	**WEATHER:** PARTLY CLOUDY, MID 60'S
PROJECT NAME: Vashon Landfill	**CLIENT:** KCSWD	
EQUIPMENT USED: WATER LEVEL IND, FIELD COMPUTER, DIVERS	**PROJECT LOCATION:** VASHON ISLAND, WA	

THE FOLLOWING WAS NOTED:
Arrival Time: 0720
Activities: Safety mtg., install divers, remove monument, start overdrilling
Personnel/Visitors: Matthew Lewis - Aspect, David (Holt driller) and helpers (Ben, Grady)
Departure Time: 1645
Field Forms Used: Field Notebook

Summary of Activities:
Matthew arrived on site, met driller, have safety meeting. Matthew removes the pump and tubing from MW-27, installs a diver and barometric diver in MW-34 while drillers prep equipment and remove bollards. At 0850, Holt's vac-truck arrives with a jackhammer to remove the concrete monument and leaves at 0930. At 1000 Holt levels rig, preps equipment, and begins over drilling MW-27.

At 1100 Holt's mechanic arrives to make further repairs on truck. He is on and off the site throughout the day, buying parts as necessary.

The soil cuttings returned for depth interval 40 to 50 ft bgs contains no bentonite or PVC well casing from MW-27. I call Bob to report, he recommends drilling to 106 ft bgs to reacquire the well. Well borehole is likely not plumb and vertically aligned between 30 and 40 ft bgs. Review of the MW-27 drill log indicate that the tri-cone bit was replaced with a sample-through bit at 55 ft bgs which could account for a non-plumb borehole.

I go to the hardware store to buy plastic sheeting so that samples can now be laid out and observed for signs of the well materials (bentonite, PVC, filter pack, etc.)

Holt advances to 90 ft bgs with no indication of the well below 40 ft bgs. Samples are covered, gates are locked, roll-box is closed before leaving.

Personnel off site at 1645.

Problems Encountered: Well was installed at an angle, not being returned in soil cuttings. No other problems.

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Page 1 of 1	**FIELD REP.:** MML

DAILY REPORT

350 Madison Avenue North
Bainbridge Island, Washington 98110
(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

DATE: 7/07/16	**PROJECT NO.** 090057 TASK 310.1.10	**WEATHER:** CLOUDY/LT RAIN, MID 60'S
PROJECT NAME: Vashon Landfill		**CLIENT:** KCSWD
EQUIPMENT USED: NONE		**PROJECT LOCATION:** VASHON ISLAND, WA

THE FOLLOWING WAS NOTED:
Arrival Time: 0730
Activities: Continue drilling, scout future boring locations
Personnel/Visitors: Matthew Lewis, Bob Hanford & John Strunk (Aspect), David (Holt driller) and helpers (Ben, Grady), Dan Swope (KCSWD)
Departure Time: 1550
Field Forms Used: Field Notebook

Summary of Activities:
Matthew arrives on site at 0730, Bob and John S. arrive at 0840. Holt is running late, arrives at 0900 and resumes drilling. Bob, John, and Matthew scout locations for future drilling work for gas extraction well and probes on South Slope. After discussion with KCSWD, John recommends drilling to the total depth (237 ft bgs) and backfilling as planned. Holt switched from 9-inch casing to 7-inch casing at 90 ft bgs. Soil cuttings from 90-100 ft bgs contain a very small amount (handful) of bentonite chips. No bentonite was observed below this depth.

Bob and John leave at 1120. Holt advances casing to 150 ft bgs by end of the day.

At 1550, Holt and Aspect leave site.

Problems Encountered: No problems.

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DAILY REPORT

350 Madison Avenue North
Bainbridge Island, Washington 98110
(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

DATE: 7/08/16	**PROJECT NO.** 090057 TASK 310.1.10	**WEATHER:** RAINY TO SUNNY, MID 60'S
PROJECT NAME: Vashon Landfill	**CLIENT:** KCSWD	
EQUIPMENT USED: NONE	**PROJECT LOCATION:** VASHON ISLAND, WA	

THE FOLLOWING WAS NOTED:
Arrival Time: 0800
Activities: Continue drilling
Personnel/Visitors: Matthew Lewis (Aspect), David (Holt driller) and helpers (Ben, Grady)
Departure Time: 1610
Field Forms Used: Field Notebook

Summary of Activities:
Arrive at 0800. Holt resumes drilling for the day. No indications of well in cuttings. Drilled to 200 ft bgs by end of day.

At 1610 Holt and Aspect leave site after closing roll-off box, locking gates, and covering samples.

Problems Encountered: No problems.

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DAILY REPORT

350 Madison Avenue North
Bainbridge Island, Washington 98110
(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

DATE: 7/11/16	**PROJECT NO.** 090057 TASK 310.1.10	**WEATHER:** CLOUDY, MID 60'S
PROJECT NAME: Vashon Landfill	**CLIENT:** KCSWD	
EQUIPMENT USED: NONE	**PROJECT LOCATION:** VASHON ISLAND, WA	

THE FOLLOWING WAS NOTED:
Arrival Time: 0730
Activities: Continue drilling
Personnel/Visitors: Matthew Lewis (Aspect), David (Holt driller) and helpers (Ben, Grady)
Departure Time: 1615
Field Forms Used: Field Notebook

Summary of Activities:
Arrive at 0730. Holt continues drilling for the day. No indications of well in cuttings. Drilled to 237 ft bgs by end of day. Boring terminates in slightly moist, hard, gravelly SILT.

At 1430 Holt begins backfilling the boring with bentonite pellets (12 buckets, 50 lbs each). Top of pellets sounded at 210.5 ft bgs. Begin backfilling with 3/8" bentonite chips.

At 1605 Holt reports that it took 10 bags of chips to backfill 7 ft of hole at 176 ft bgs (instead of the expected ~3 ½ bags). Likely a void at that depth has been filled in. I reexamined samples from that interval, and confirm there is no indication of MW-27. The boring is backfilled to 170 ft by end of day.

At 1615 Aspect leave site after closing roll-off box, locking gates, and covering samples. Holt leaves at 1630 after putting some equipment away.

Problems Encountered: No problems.

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DAILY REPORT

350 Madison Avenue North
Bainbridge Island, Washington 98110
(206) 780-9370

401 Second Avenue S, Suite 201
Seattle, Washington 98104
(206) 328-7443

DATE: 7/12/16	**PROJECT NO.** 090057 TASK 310.1.10	**WEATHER:** CLOUDY, MID 60'S
PROJECT NAME: Vashon Landfill	**CLIENT:** KCSWD	
EQUIPMENT USED: NONE	**PROJECT LOCATION:** VASHON ISLAND, WA	

THE FOLLOWING WAS NOTED:
Arrival Time: 0730
Activities: Complete decommissioning
Personnel/Visitors: Matthew Lewis (Aspect), David (Holt driller) and helpers (Ben, Grady)
Departure Time: 1615
Field Forms Used: Field Notebook

Summary of Activities:
Arrive at 0730 and unlock the south gate. Holt arrives at 0800 and resumes backfilling with bentonite chips.

At 1150, Holt reports another void at 37 ft bgs. We attach a flashlight to drop tape and can see the opening to MW-27 at the SE edge of the boring (the conductor casing is at 30 ft bgs leaving 7 ft of open hole). I call Bob, and talk to John S and Erick Miller, they recommend continue filling the void as much as possible, keeping track of how much goes down the well. The total amount of bentonite chips that go down the PVC casing is 16 bags. Holt calls the shop to request more bentonite chips. Holt begins decontaminating the casing removed from the boring, and disposing of samples.

At 1410, a driver from Holt arrives with a pallet of bentonite chips, and they resume backfilling to surface. Holt patches the surface with black-dyed concrete.

- Total materials used for backfilling MW-27
  - 162 bags (50 lbs each) of bentonite chips
  - 12 buckets (50 lbs each) of bentonite pellets
  - 7 bags of concrete
- The roll-off box is about ½ full and closed
- There are 3 drums of decon water are marked and next to the roll-off box

Holt and Aspect leave the site by 1615 after closing the roll-off box, and locking the south gate.

Problems Encountered: No problems.

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Page 1 of 1	**FIELD REP.:** MML