

# **Soil Boring Logs and Well As-Builts**

# Soil Classification System

	MAJOR DIVISIONS	CLEAN GRAVEL (Little or no fines)	GRAPHIC SYMBOL	LETTER SYMBOL <sup>(1)</sup>	TYPICAL DESCRIPTIONS <sup>(2)(3)</sup>
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL  (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		<b>GW</b>	Well-graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		<b>GP</b>	Poorly graded gravel; gravel/sand mixture(s); little or no fines
	SAND AND SANDY SOIL  (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		<b>GM</b>	Silty gravel; gravel/sand/silt mixture(s)
		GRAVEL WITH FINES (Appreciable amount of fines)		<b>GC</b>	Clayey gravel; gravel/sand/clay mixture(s)
		CLEAN SAND (Little or no fines)		<b>SW</b>	Well-graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		<b>SP</b>	Poorly graded sand; gravelly sand; little or no fines
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY  (Liquid limit less than 50)	CLEAN SAND (Little or no fines)		<b>SM</b>	Silty sand; sand/silt mixture(s)
		SAND WITH FINES (Appreciable amount of fines)		<b>SC</b>	Clayey sand; sand/clay mixture(s)
		SILT AND CLAY  (Liquid limit greater than 50)		<b>ML</b>	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
	SILT AND CLAY  (Liquid limit greater than 50)		<b>CL</b>	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay	
			<b>OL</b>	Organic silt; organic, silty clay of low plasticity	
			<b>MH</b>	Inorganic silt; micaceous or diatomaceous fine sand	
HIGHLY ORGANIC SOIL		<b>CH</b>	Inorganic clay of high plasticity; fat clay		
		<b>OH</b>	Organic clay of medium to high plasticity; organic silt		
		<b>PT</b>	Peat; humus; swamp soil with high organic content		

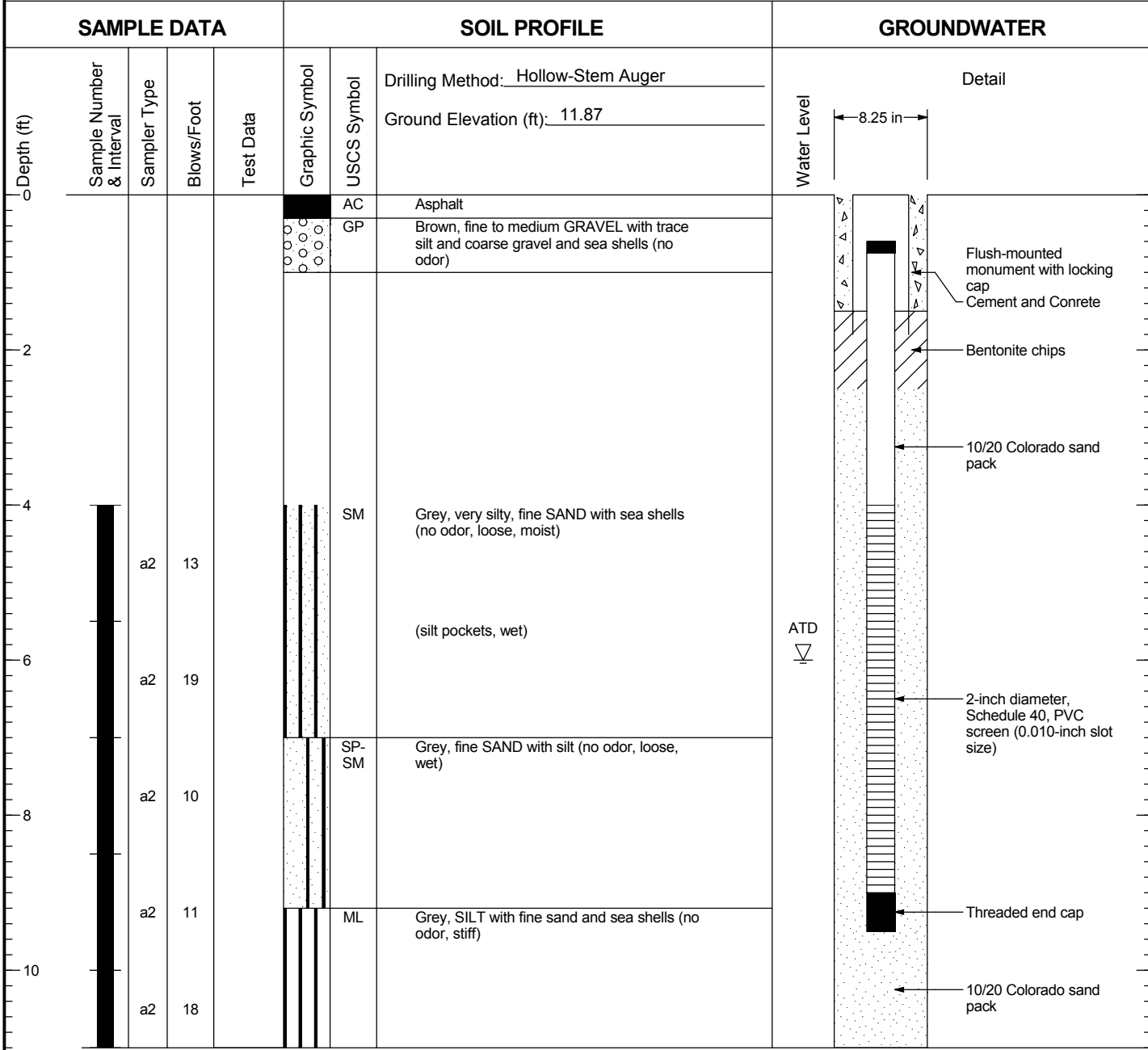
OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		<b>AC or PC</b>	Asphalt concrete pavement or Portland cement pavement
ROCK		<b>RK</b>	Rock (See Rock Classification)
WOOD		<b>WD</b>	Wood, lumber, wood chips
DEBRIS		<b>DB</b>	Construction debris, garbage

- Notes:
- USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
  - Soil descriptions are based on the general approach presented in the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the *Standard Test Method for Classification of Soils for Engineering Purposes*, as outlined in ASTM D 2487.
  - Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:
    - Primary Constituent: > 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
    - Secondary Constituents: > 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
    - > 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
    - Additional Constituents: > 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
    - ≤ 5% - "trace gravel," "trace sand," "trace silt," etc., or not noted.

Drilling and Sampling Key		Field and Lab Test Data																																																				
SAMPLER TYPE	SAMPLE NUMBER & INTERVAL																																																					
<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Code</th> <th style="width: 90%;">Description</th> </tr> <tr><td>a</td><td>3.25-inch O.D., 2.42-inch I.D. Split Spoon</td></tr> <tr><td>b</td><td>2.00-inch O.D., 1.50-inch I.D. Split Spoon</td></tr> <tr><td>c</td><td>Shelby Tube</td></tr> <tr><td>d</td><td>Grab Sample</td></tr> <tr><td>e</td><td>Single-Tube Core Barrel</td></tr> <tr><td>f</td><td>Double-Tube Core Barrel</td></tr> <tr><td>g</td><td>Other - See text if applicable</td></tr> <tr><td>1</td><td>300-lb Hammer, 30-inch Drop</td></tr> <tr><td>2</td><td>140-lb Hammer, 30-inch Drop</td></tr> <tr><td>3</td><td>Pushed</td></tr> <tr><td>4</td><td>Rotasonic</td></tr> <tr><td>5</td><td>Air Rotary (Rock)</td></tr> <tr><td>6</td><td>Wash Rotary (Rock)</td></tr> <tr><td>7</td><td>Other - See text if applicable</td></tr> </table>	Code	Description	a	3.25-inch O.D., 2.42-inch I.D. Split Spoon	b	2.00-inch O.D., 1.50-inch I.D. Split Spoon	c	Shelby Tube	d	Grab Sample	e	Single-Tube Core Barrel	f	Double-Tube Core Barrel	g	Other - See text if applicable	1	300-lb Hammer, 30-inch Drop	2	140-lb Hammer, 30-inch Drop	3	Pushed	4	Rotasonic	5	Air Rotary (Rock)	6	Wash Rotary (Rock)	7	Other - See text if applicable		<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Code</th> <th style="width: 90%;">Description</th> </tr> <tr><td>PP = 1.0</td><td>Pocket Penetrometer, tsf</td></tr> <tr><td>TV = 0.5</td><td>Torvane, tsf</td></tr> <tr><td>PID = 100</td><td>Photoionization Detector VOC screening, ppm</td></tr> <tr><td>W = 10</td><td>Moisture Content, %</td></tr> <tr><td>D = 120</td><td>Dry Density, pcf</td></tr> <tr><td>-200 = 60</td><td>Material smaller than No. 200 sieve, %</td></tr> <tr><td>GS</td><td>Grain Size - See separate figure for data</td></tr> <tr><td>AL</td><td>Atterberg Limits - See separate figure for data</td></tr> <tr><td>GT</td><td>Other Geotechnical Testing</td></tr> <tr><td>CA</td><td>Chemical Analysis</td></tr> </table>	Code	Description	PP = 1.0	Pocket Penetrometer, tsf	TV = 0.5	Torvane, tsf	PID = 100	Photoionization Detector VOC screening, ppm	W = 10	Moisture Content, %	D = 120	Dry Density, pcf	-200 = 60	Material smaller than No. 200 sieve, %	GS	Grain Size - See separate figure for data	AL	Atterberg Limits - See separate figure for data	GT	Other Geotechnical Testing	CA	Chemical Analysis
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Approximate water elevation at time of drilling (ATD) or on date noted. Groundwater levels can fluctuate due to precipitation, seasonal conditions, and other factors.																																																						

7/10/07 \\EDM\DATA\GINT\PROJECTS\529013.GPJ SOIL CLASS SHEET

# MW-01



Boring Completed 04/26/07  
Total Depth of Boring = 11.0 ft.

Elevation at Top of Casing = 11.59 ft.

- Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
  2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
  3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529.013 7/10/07 \\NED\DATA\GINT\GINT\PROJECTS\529013.GPJ WELL LOG



Port of Anacortes  
Anacortes

Log of MW-01

Figure  
**A-2**

# MW-02

SAMPLE DATA				SOIL PROFILE			GROUNDWATER	
Depth (ft) 0 2 4 6 8 10 12 14	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: <u>Hollow-Stem Auger</u>	Water Level Detail 
					AC	Asphalt	Ground Elevation (ft): <u>12.74</u>	
					GP	Brown, fine to medium GRAVEL with trace silt and coarse gravel and sea shells (no odor)		
					SP-SM	Brown, fine SAND with silt and sea shells (no odor, no sheen)		
		a2		13		ML	Dark, black SILT with medium gravel and fine sand (stiff, moist) (no odor, no sheen)	
		a2		11		SP	Brown, fine to medium SAND with gravel (loose, moist) (no odor, no sheen)	
						ML	Grey, SILT with medium gravel and trace sand (medium stiff, moist) (no odor, no sheen)	
		a2		19		SP-SM	Grey, fine SAND with silt and sea shells and trace medium gravel ( loose, moist) (no odor, no sheen)  (silt pockets)	
		a2		16		ML	Dark, grey SILT with peat (stiff, wet) (no odor, no sheen)	
		a2		22		SM	Dark, grey, very silty SAND with sea shells (wet) (no odor, no sheen)	

Boring Completed 04/26/07  
Total Depth of Boring = 11.0 ft.

Elevation at Top of Casing = 12.30 ft.

- Notes:
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  2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
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529,013 7/10/07 \\NED\DATA\GINT\GINT\PROJECTS\529013.GPJ WELL LOG

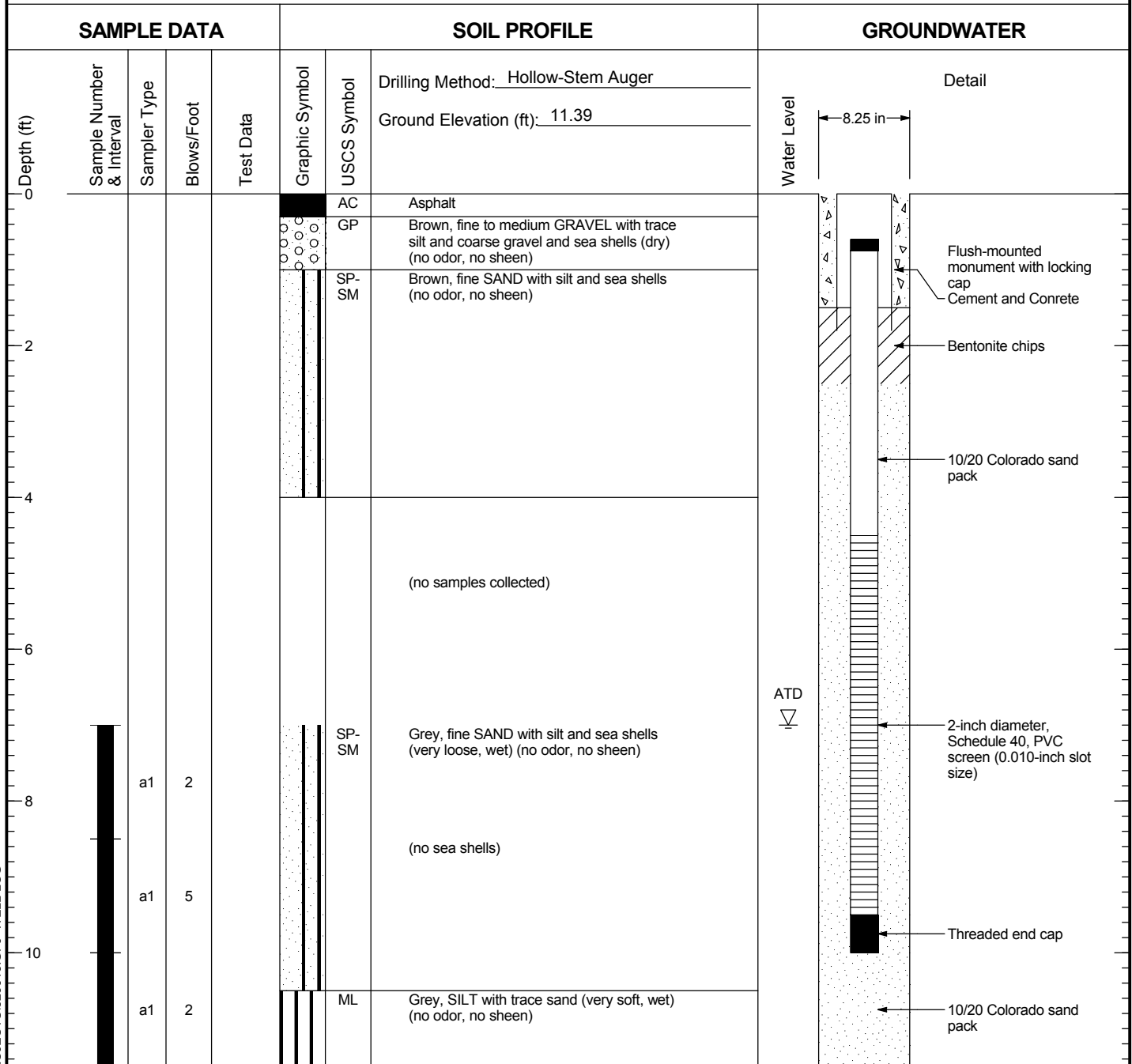


Port of Anacortes  
Anacortes

Log of MW-02

Figure  
**A-3**

# MW-03S



Boring Completed 04/25/07  
 Total Depth of Boring = 11.5 ft.

Elevation at Top of Casing = 11.04 ft.

- Notes:
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529.013 7/10/07 \\NED\DATA\GINT\GINT\PROJECTS\529013.GPJ WELL LOG

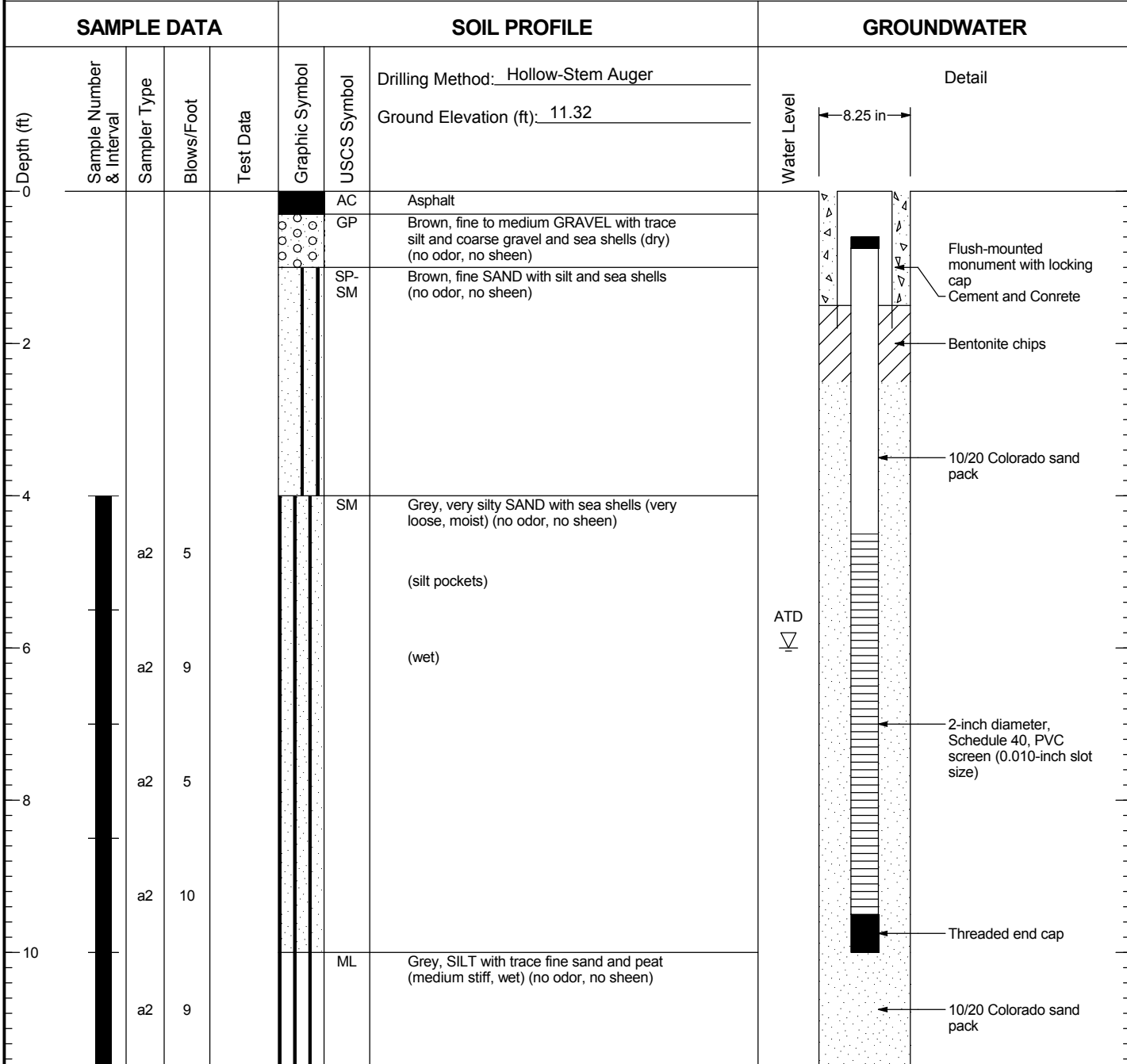


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 Anacortes

Log of MW-03S

Figure  
**A-4**

# MW-04



Boring Completed 04/26/07  
Total Depth of Boring = 11.5 ft.

Elevation at Top of Casing = 11.02 ft.

- Notes:
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529,013 7/10/07 \\NED\DATA\GINT\GINT\PROJECTS\529013.GPJ WELL LOG



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Log of MW-04

Figure  
**A-5**

# MW-03D

SAMPLE DATA				SOIL PROFILE			GROUNDWATER			
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Drilling Method: <u>Hollow-Stem Auger</u>	Ground Elevation (ft): _____	Water Level	Detail
0					○	AC				
					○	GP				
					○	SM				
					○	SM				
5	a1	2			○	ML			ATD	
	a1	3			○	SM			▽	
	a1	3			○	SM				
	a1	2			○	ML				
10	a1	2			○	ML				
	a1	3			○	ML				
	a1	2			○	ML				
15					○	ML				
	a1	2			○	ML				
	a1	5			○	ML				
20	a1	3			○	ML				
	a1	4			○	ML				
	a1	4			○	ML				
25	a1	3			○	ML				
	a1	4			○	ML				
	a1	3			○	ML				
30	a1	2			○	ML				

Boring Completed 04/25/07  
Total Depth of Boring = 31.0 ft.

- Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
  2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
  3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529.013 7/10/07 \\NED\DATA\GINT\GINT7\PROJECTS\529013.GPJ WELL LOG








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Anacortes

Log of MW-03D

Figure  
**A-6**

# SB-1

SAMPLE DATA		SOIL PROFILE				GROUNDWATER		
Depth (ft) 0 2 4 6 8 10	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: <u>Geoprobe™</u> Ground Elevation (ft): _____ Drilled By: <u>Cascade Drilling Inc.</u>	Water Level
	SB1 (1-2)	d3		0.0		AC GM	Asphalt Grey, sandy GRAVEL (medium dense, dry) (no odor, no sheen) (fill)	
	SB1 (4-5)	d3		0.0		SP	Light grey, gravelly, fine to medium SAND (medium dense, dry) (no odor, no sheen)	
	SB1 (5-6)	d3		0.0		SM	Dark greyish/brown, silty, fine to medium SAND with shell fragments and gravel (medium dense, wet) (no odor, no sheen)	 ATD
		d3		0.0		ML	Dark to light grey, sandy SILT with shell fragments (soft, wet) (no odor, no sheen)	

Boring Completed 05/24/07  
Total Depth of Boring = 10.0 ft.

- Notes:
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  3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529013.14 7/10/07 \\MED\DATA\GINT\GINT\PROJECTS\529013.010.014\GPJ.GPJ SOIL BORING LOG



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Anacortes, Washington

Log of Boring SB-1

Figure  
**A-7**



# SB-2

SAMPLE DATA		SOIL PROFILE				GROUNDWATER		
Depth (ft) 0 2 4 6 8 10	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: <u>Geoprobe™</u> Ground Elevation (ft): _____ Drilled By: <u>Cascade Drilling Inc.</u>	Water Level
						PC	Concrete slab	
	SB2 (1-2)			0.0		SP	Grey, gravelly, fine SAND with shell fragments and silt seams (loose, dry)	
		d3				SP	Grey, gravelly, fine to medium SAND with shell fragments (loose, damp) (oily odor, no sheen)	
				250		SM	Grey, silty, fine to medium SAND with shell fragments, (loose, wet) (odor, oily sheen)	▽ ATD
	SB2 (8-9)			15.6		ML	Grey, sandy SILT with shells (loose, wet) (oily odor, no sheen)	
	SB2 (9-10)			0.5		ML	Grey, sandy SILT with shells (loose, wet) (oily odor, no sheen)	

Boring Completed 05/24/07  
Total Depth of Boring = 10.0 ft.

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529013.14 7/10/07 \\MED\DATA\GINT\GINT\PROJECTS\529013.010.014\GPJ.GPJ SOIL BORING LOG



Cap Sante Marine  
Anacortes, Washington

Log of Boring SB-2

Figure  
**A-8**

# SB-3

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
0					■	AC Asphalt	
0.5	SB3 (0.5-1.5)				●	SP Dark grey, gravelly, fine to medium SAND with shell debris (loose, dry) (no odor, no sheen)	
1.5	SB3 (1.5-2.5)	d3 d3		0.0 0.0	●	SP Dark grey, gravelly, fine to medium SAND with shell debris (loose, damp) (no odor, no sheen)	
4.0				0.0	▨	SM Grey, silty medium SAND with shells (loose, moist) (no odor, no sheen)	
6.0	SB3 (6-7)	d3 d3		0.0	▨	ML Dark grey, sandy SILT with shells (medium dense, wet)	▽ ATD
8.0							

Boring Completed 05/24/07  
Total Depth of Boring = 8.0 ft.

529013.14 7/10/07 \MED\DATA\GINT\GINT\PROJECTS\529013.010.014\GPJ.GPJ SOIL BORING LOG

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Anacortes, Washington

Log of Boring SB-3

Figure  
**A-9**