Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22709

Job No. XL2066 SR 167 Elevation 47.8 ft (14.6 m) HOLE No. SRX-18-05

Sheet 2 of 3

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT Driller Danny Henderson Lic# 2742T

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				5 (9)						
	7									
25				6 6 7 (13)		D-5		Poorly graded SAND, medium dense, BROWN, wet, Homogeneous. Length Recovered 1.0 ft, Length Retained 1.0 ft		
	8									
						S-6		Sandy SILT, very loose, light grey, moist, Homogeneous. Length Recovered 1.9 ft, Length Retained 1.9 ft		
30	9			1 5 3 (8)		D-7		Sandy SILT, loose, light grey, moist, Stratified. Length Recovered 1.5 ft, Length Retained 1.5 ft		
	10									
35				2 9 12 (21)		D-8		Silty SAND, medium dense, light grey, moist, Stratified. Length Recovered 0.9 ft, Length Retained 0.9 ft		
	11									
	12		>>	70/3" (70/3") RQD 88 FF 6		D-9 C-10		Silty SAND, very dense, light grey, dry, Homogeneous, ENCOUNTERED SANDSTONE at 37.1'. Length Recovered 0.2 ft, Length Retained 0.2 ft SANDSTONE, medium light grey, coarse grained, fresh, very weak rock. Discontinuities are moderately spaced and in fair condition, soil infill from 47.5' to 47.7' note, top 1.5' sand. Percent Recovered 100.0%		
40										
	13									
45										

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 4/26/05 8:43:52 A4

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22709

HOLE No. SRX-18-05

Job No. XL2066 SR 167 Elevation 47.8 ft (14.6 m)

Sheet 3 of 3

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Danny Henderson Lic# 2742T

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14		>>	73 (73/6") RQD 100 FF .4		D-11 C-12		Poorly graded SAND, very dense, light grey, moist, Homogeneous, SANDSTONE BEDROCK Length Recovered 0.4 ft, Length Retained 0.4 ft SANDSTONE, light grey, coarse grained, fresh, very weak rock. Discontinuities are moderately spaced and in fair condition, Percent Recovered 91.0%		
	15									
50				RQD 100 FF 0		C-13		SANDSTONE, light grey, coarse grained, fresh, moderately weak rock. Discontinuities are widely spaced and in fair condition, Percent Recovered 100.0%		
	16								▽	
								02/23/2005		
55	17							End of test hole boring at 55.5 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	18									
60										
	19									
65										
	20									
	21									
70										

SOIL XL-2066 SR 167 I-405 RENTON NICKEL GPJ SOIL.GDT 4/29/05,8:43:53 A4

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22686

HOLE No. SRX-19-05

Job No. XL2066 SR 167 Elevation 85.2 ft (26.0 m)

Sheet 1 of 2

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Joe Judd Lic# 2454

Site Address Vic I-405 & Benson Rd.

Inspector Dave Nelson

Start March 8, 2005 Completion March 8, 2005 Well ID# Equipment CME 850 w/ auto hammer

Station Offset Casing HQ x 34.0 Method Wet Rotary

Northing 174474.992 Easting 1300830.882 Latitude Longitude

County King Subsection NW 1/4 of NW 1/4 Section 20 Range 5 EWM Township 23 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			38 50/2" (50/2")		D-1		Silty SAND, sandstone, very dense, yellowish brown, moist, Homogeneous. Length Recovered 0.7 ft		
	2			RQD 60 FF 1		C-2		SANDSTONE, yellowish brown, medium grained, slightly weathered, moderately weak rock. Discontinuities are moderately spaced and in good condition, Percent Recovered 75.0%		
10	3			RQD 80 FF 1		C-3		SANDSTONE, yellowish brown/grey, medium grained, slightly weathered, moderately weak rock. Discontinuities are moderately spaced and in good condition, Percent Recovered 100.0%		
	4									
15				RQD 22 FF 2		C-4		SANDSTONE, grey, medium grained, slightly weathered, moderately weak rock. Discontinuities are moderately spaced and in good condition, Percent Recovered 60.0%		
	5									
20	6			RQD 68		C-5		SANDSTONE, grey, medium grained, slightly weathered, moderately weak rock. Discontinuities are moderately		

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 4/29/05 9:43:53 A4

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22686

HOLE No. SRX-19-05

Job No. XL2066 SR 167 Elevation 85.2 ft (26.0 m)

Sheet 2 of 2

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Joe Judd Lic# 2454

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				FF 1				spaced and in good condition, coal seams, Percent Recovered 100.0% 03/08/2005		
	7									
25				RQD 28 FF 1		C-6		SANDSTONE, grey, medium grained, slightly weathered, moderately weak rock. Discontinuities are moderately spaced and in good condition, Percent Recovered 40.0%		
	8									
	9			RQD 81 FF 1		C-7		SANDSTONE, grey, medium grained, slightly weathered, moderately weak rock. Discontinuities are moderately spaced and in good condition, Percent Recovered 100.0%		
30										
	10									
35								End of test hole boring at 34 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	11							Started Bail test at 4.0 ft. Stopped Bail test at 29.4 ft. Recharged to 20.0 ft.		
	12							5 = 28.3 ft. 10 = 27.4 ft. 15 = 26.2 ft. 20 = 25 ft. 25 = 23.8 ft. 30 = 21.9 ft. 35 = 20.0 ft.		
40										
	13									
45										

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 4/29/05 9:43:53 A4

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-65962

HOLE No. SRX-20-05

Job No. XL2066 SR 167 Elevation 149.5 ft (45.6 m)

Sheet 1 of 4

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Sean Verlo Lic# 2615

Site Address Vic. SR 405 & SR-167

Inspector Cleo Andrews

Start March 3, 2005 Completion March 4, 2005 Well ID# AHN-924

Equipment CME 45 w/ autohammer

Station Offset Casing (HW 32.0')(HQ 95.0') Method Wet Rotary

Northing 175308.182 Easting 1301599.823 Latitude Longitude

County King Subsection NW 1/4 of the NW 1/4 Section 20 Range 5 EWM Township 23 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			4 3 3 (6)		D-1		Silty SAND, with weathered coal, roots and fine grained sand with clay, soft, black, moist, mine tailing, Stratified, Disrupted. 100% drilling fluid return. Length Recovered 1.5 ft, Length Retained 1.0 ft		
10	2 3			3 2 2 (4)		D-2	GS MC	SM, M.C. = 56% Silty SAND, with coal and roots, very loose, black, moist, mine tailing, Stratified, Disrupted, trace of clay. Length Recovered 1.2 ft, Length Retained 1.0 ft		
15	4 5			2 2 2 (4)		D-3	GS MC	SM, M.C. = 57% Silty SAND, with highly weathered angular chunks of sandstone, very loose, brownish yellow, moist, Stratified, Disrupted, (mine tailing consists of completely weathered sandstone mixed with angular sandstone that can be broken down by hand, traces of black staining). Length Recovered 1.0 ft, Length Retained 1.0 ft		
20	6			6 9		D-4		Silty SAND with gravel, with fine grained sand lens, medium dense, brown , wet, Laminated, very little drilling		

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 5/3/05 8:38:12 AS

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-65962

HOLE No. SRX-20-05

Job No. XL2066 SR 167 Elevation 149.5 ft (45.6 m)

Sheet 2 of 4

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT Driller Sean Verlo Lic# 2615

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				7 (16)				fluid loss starting at 19.0'. Length Recovered 0.2 ft, Length Retained 0.2 ft		
25	7 8		>>	15 24 50 (74)		D-5	GS MC	SM, M.C. = 12% Silty SAND with gravel, very dense, grayish brown, moist, Homogeneous., traces of dark brown stains. Length Recovered 1.5 ft, Length Retained 1.0 ft		
30	9 10			42 50/3" (50/3") RQD 100 FF 0		D-6 C-7		SANDSTONE, light yellowish brown, fine grained, completely weathered, very weak rock. Discontinuities are very widely spaced and in very poor condition, (Changed at 27.0' as indicated by driller) Length Recovered 0.5 ft, Length Retained 0.5 ft		
35	11			RQD 95 FF 2		C-8		SANDSTONE, light brown, fine grained, highly weathered, very weak rock. Discontinuities are closely spaced and in poor condition, Percent Recovered 100.0%		
40	12 13			RQD 100 FF 0		C-9		SANDSTONE, light brown, fine grained, highly weathered, very weak rock. Discontinuities are very closely spaced and in fair condition, Percent Recovered 100.0%		
45										

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 5/3/05 8:36:12 A5

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-65962

HOLE No. SRX-20-05

Job No. XL2066 SR 167 Elevation 149.5 ft (45.6 m)

Sheet 3 of 4

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Sean Verlo Lic# 2615

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			RQD 100 FF 0		C-10		SANDSTONE, light brown, fine grained, highly weathered, very weak rock. Discontinuities are very closely spaced and in good condition, Percent Recovered 100.0%		
	15									
50				RQD 100 FF 0		C-11		SANDSTONE, light brown, fine grained, highly weathered, very weak rock. Discontinuities are very closely spaced and in good condition, Percent Recovered 100.0%		
	16									
55				RQD 88 FF 1		C-12		SANDSTONE with 0.2' layer of weathered low grade bituminous coal, brownish orange in color, light gray, fine grained, highly weathered, very weak rock. Discontinuities are closely spaced and in fair condition, Percent Recovered 100.0%		
	17									
	18									
60				RQD 100 FF 0		C-13		SANDSTONE, light brown to light gray, fine grained, highly weathered, very weak rock. Discontinuities are very widely spaced and in good condition, Percent Recovered 100.0%		
	19									
65				RQD 100 FF 0		C-14		SANDSTONE, light gray, fine grained, highly weathered, very weak rock. Discontinuities are very closely spaced and in good condition, Percent Recovered 100.0%		
	20									
	21									
70										

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 5/3/05 8:38:12 AS

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-65962

HOLE No. SRX-20-05

Job No. XL2066 SR 167 Elevation 149.5 ft (45.6 m)

Sheet 4 of 4

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Sean Verlo Lic# 2615

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				RQD 100 FF 0		C-15		SANDSTONE, light gray, fine grained, highly weathered, very weak rock. Discontinuities are very closely spaced and in good condition, Percent Recovered 100.0%		
	22									
75	23			RQD 100 FF 0		C-16		SANDSTONE with horizontal closed layers of silt and organic, olive gray to black in color, light gray, fine grained, highly weathered, very weak rock. Discontinuities are very closely spaced and in good condition, Percent Recovered 100.0%		
	24									
80				RQD 100 FF 0		C-17		SANDSTONE with closed horizontal seams of organic, black in color, light gray, fine grained, highly weathered, very weak rock. Discontinuities are very closely spaced and in good condition, Percent Recovered 100.0%		
	25									
85	26			RQD 100 FF 0		C-18		SANDSTONE with horizontal closed seams of very low grade bituminous coal, black in color, light gray, fine grained, highly weathered, very weak rock. Discontinuities are very closely spaced and in good condition, Percent Recovered 100.0%		
	27									
90								End of test hole boring at 90 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	28							Water table in hole over night reading was 89.5'. Installed 1" ID piezo well at 50.0' with 10.0' slotted screen. See piezo diagram. (Dry hole). 3/4/05		
95										

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 5/3/05 8:38:12 A5

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22685

HOLE No. SRX-21-05

Job No. XL2066 SR 167 Elevation 89.6 ft (27.3 m)

Sheet 1 of 3

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Mike Harvey Lic# 2599

Site Address Vic. SR 405 & Cedar Ave. S.

Inspector Dan Reed

Start March 9, 2005 Completion March 9, 2005 Well ID# Equipment CME 55 w/ autohammer

Station Offset Casing HW-4.5/HQ-3.5 Method Wet Rotary

Northing 176531.65 Easting 1301491.594 Latitude Longitude

County King Subsection SW 1/4 of the SW 1/4 Section 17 Range 5 EWM Township 23 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			6 5 4 4 (8)		D-1		Well graded SAND with gravel, angular, slightly silty, loose, gray, moist, Homogeneous. Length Recovered 1.0 ft, Length Retained 1.0 ft		
10	3			8 9 8 8 (16)		D-2		Well graded SAND with gravel, angular, medium dense, gray, moist, Homogeneous, Contact with concrete rubbel, 100% drilling fluid loss. Length Recovered 0.5 ft, Length Retained 0.5 ft		
15	5		>>	64 (64/6")		D-3		Well graded SAND, very dense, light brown, moist, Homogeneous. Contact with highly weathered SANDSTONE at 14.0' as indicated by drilling process. 100% drilling fluid loss. Length Recovered 0.4 ft, Length Retained 0.4 ft		
20	6		>>							

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 4/29/05 9:43:56 A4

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22685

HOLE No. SRX-21-05

Job No. XL2066 SR 167 Elevation 89.6 ft (27.3 m)

Sheet 2 of 3

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT Driller Mike Harvey Lic# 2599

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
			>>	103 (103/6") RQD 100 FF 0		D-4 C-5		Well graded SAND, very dense, light brown, moist, Homogeneous. Highly weathered SANDSTONE set up to core C-5 20.5'-22.0'. Length Recovered 0.5 ft, Length Retained 0.5 ft SANDSTONE, coarse grained, slightly weathered, moderately weak rock. Discontinuities are moderately spaced and in good condition, Percent Recovered 100.0%		
	7			RQD 100 FF 0		C-6		SANDSTONE, coarse grained, slightly weathered, moderately weak rock. Discontinuities are moderately spaced and in good condition, Percent Recovered 100.0%		
25								03/09/2005 03/09/2005		
	8		>>	89/4" (89/4") RQD 93 FF 1		D-7 C-8		Well graded SAND, very dense, light brown, moist, Homogeneous. Length Recovered 0.3 ft, Length Retained 0.3 ft SANDSTONE, coarse grained, slightly weathered, moderately weak rock. Discontinuities are moderately spaced and in good condition; Percent Recovered 100.0%		
	9									
30				RQD 100 FF 1		C-9		SANDSTONE, coarse grained, slightly weathered, moderately weak rock. Discontinuities are moderately spaced and in good condition, Altered zone 36.0' to 37.0', Percent Recovered 100.0%.		
	10									
35										
	11			RQD 60 FF 2		C-10		SANDSTONE, medium grained, highly weathered, moderately weak rock. Discontinuities are closely spaced and in poor condition, Coal seams, mixed colors, brown to gray. Highly weathered joints, Percent Recovered 82.0%.		
	12									
40			>>	90 (90/6")		D-11		Well graded SAND, very dense, gray, moist, Homogeneous. Highly weathered SANDSTONE. Length Recovered 0.3 ft, Length Retained 0.3 ft		
	13							End of test hole boring at 42.5 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock		
45										

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 4/29/05 9:43:56 A4

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22685

HOLE No. SRX-21-05

Job No XL2066 SR 167 Elevation 89.6 ft (27.3 m)

Sheet 3 of 3

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Mike Harvey Lic# 2599

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14							descriptions are derived from visual field identifications and laboratory test data. Bail and Recharge. Bore hole water level before bailing -9.3', bailed bore hole water level to -37.0', after 15 minutes -34.3', after 30 minutes -30.1', after 45 minutes -27.3', after 60 minutes -25.1', water table stabilized at -23.1'.		
	15									
50										
	16									
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 4/28/05 8:43:56 A4

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22684

HOLE No. SRX-22-05

Job No. XL2066 SR 167 Elevation 75.4 ft (23.0 m)

Sheet 1 of 3

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Sean Verlo Lic# 2615

Site Address Vic. of SR 405 & Cedar Ave. South

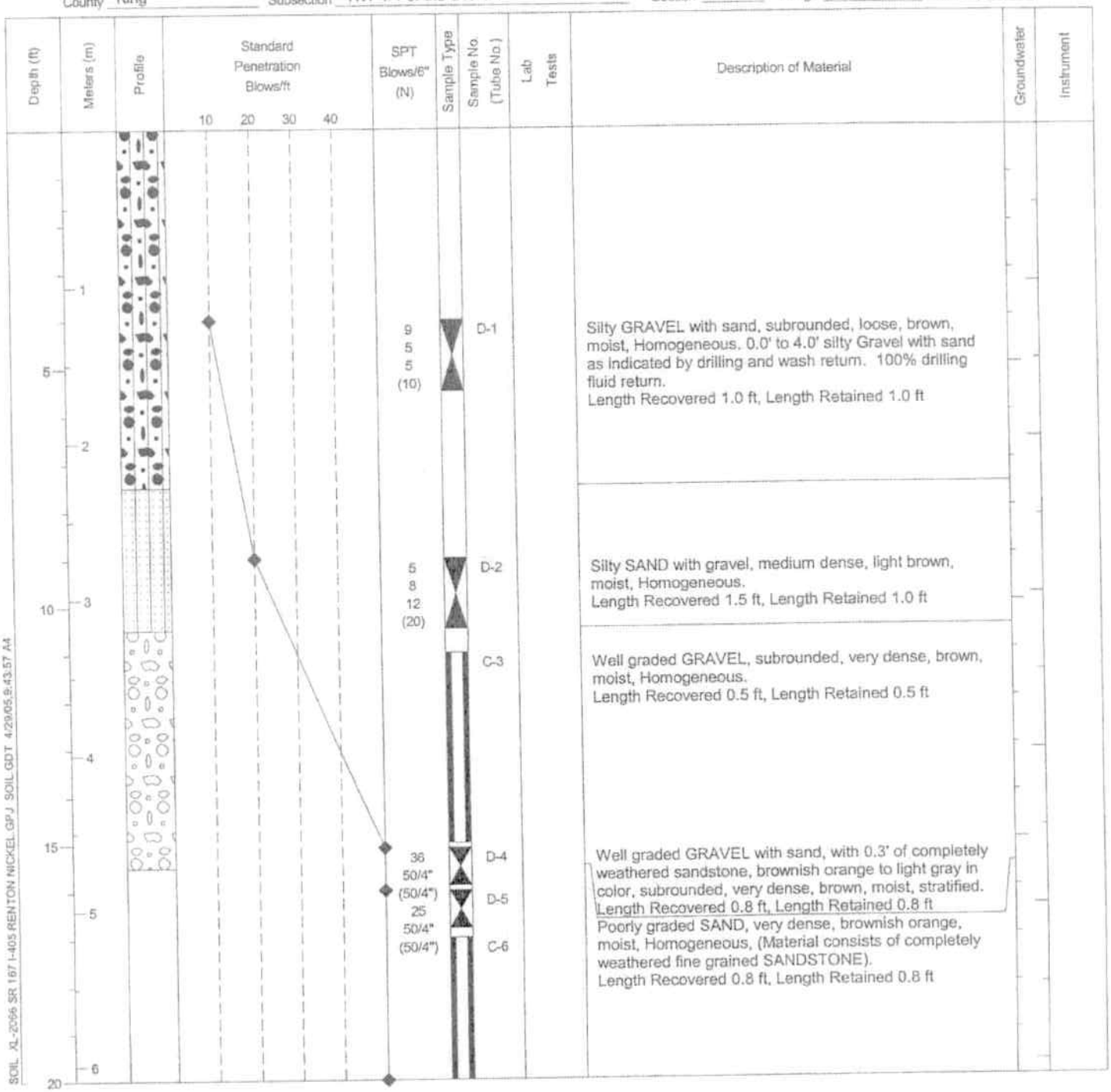
Inspector Cleo Andrews

Start March 15, 2005 Completion March 16, 2005 Well ID# Equipment CME 45 w/ autohammer

Station Offset Casing (HWT 4" ID x 16.0')(HQ 3" ID x [illegible]) Wet Rotary

Northing 177385.434 Easting 1301584.418 Latitude Longitude

County King Subsection NW 1/4 of the SW 1/4 Section 17 Range 5 EWM Township 23 N



SOIL_XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 4/29/05 8:43:57 A4

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22684

HOLE No. SRX-22-05

Job No. XL2066 SR 167 Elevation 75.4 ft (23.0 m)

Sheet 2 of 3

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT

Driller Sean Verlo Lic# 2615

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				50/4" (50/4") RQD 48 FF 3		D-7 C-8		Poorly graded SAND, very dense, light gray, moist, Homogeneous, (Material consists of completely weathered fine grained SANDSTONE). 100% drilling fluid return). Length Recovered 0.3 ft, Length Retained 0.3 ft SANDSTONE, light gray, fine grained, moderately weathered, moderately weak rock. Discontinuities are closely spaced and in good condition, Percent Recovered 100.0%		
25	7			RQD 55 FF 5		C-9		SANDSTONE, with thin black seams and oxidized green staining, light gray, fine grained, moderately weathered, moderately weak rock. Discontinuities are closely spaced and in good condition, Percent Recovered 100.0%		
30	8 9			RQD 78 FF 6		C-10		SANDSTONE, with healed goints, with thin black seams, and green oxidized staining, light gray, fine grained, moderately weathered, moderately weak rock. Discontinuities are closely spaced and in fair condition, Percent Recovered 100.0%		
35	10 11			RQD 73 FF 10		C-11		SANDSTONE, with oxidized orange staining, light gray, fine grained, moderately weathered, moderately weak rock. Discontinuities are closely spaced and in fair condition, Percent Recovered 100.0%		
40	12 13			RQD 38 FF 9		C-12		SANDSTONE, moderately fractured with healed joints with small pieces of sandstone black and light gray with orange oxidized staining, fine grained, moderately weathered, moderately weak rock. Discontinuities are moderately spaced and in fair condition, Percent Recovered 100.0%		
45										

SOIL XL-2068 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 4/29/05 8:43:57 A4

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S-22684

HOLE No. SRX-22-05

Job No. XL2066 SR 167 Elevation 75.4 ft (23.0 m)

Sheet 3 of 3

Project I-405 RENTON NICKEL & IMPLEMENTATION PROJECT Driller Sean Verlo Lic# 2615

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	14			RQD 73 FF 7		C-13		SANDSTONE, moderately fractured, light gray, fine grained, moderately weathered, moderately weak rock. Discontinuities are closely spaced and in good condition, (Water table is 21.8'). Percent Recovered 100.0%		
	15									
50								End of test hole boring at 50 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	16							Ended and abandoned test boring at 50.0' below ground elevation. 3/16/05.,		
55	17									
	18									
60	19									
	20									
65	21									
70										

SOIL XL-2066 SR 167 I-405 RENTON NICKEL.GPJ SOIL.GDT 4/29/05 8:43:57 AM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (MORE THAN 50% RETAINED ON NO. 200 SIEVE)	GRAVEL AND GRAVELLY SOILS (MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE)	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS (MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE)	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS (MORE THAN 50% PASSING NO. 200 SIEVE)	SILTS AND CLAYS (LIQUID LIMIT LESS THAN 50)			ML	INORGANIC SILTS, ROCK FLOUR, 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 (LIQUID LIMIT GREATER THAN 50)			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	CC	Cement Concrete
	AC	Asphalt Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

- Measured groundwater level in exploration, well, or piezometer
- Groundwater observed at time of exploration
- Perched water observed at time of exploration
- Measured free product in well or piezometer

Stratigraphic Contact

- Distinct contact between soil strata or geologic units
- Gradual change between soil strata or geologic units
- Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

- 2.4-inch I.D. split barrel
- Standard Penetration Test (SPT)
- Shelby tube
- Piston
- Direct-Push
- Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

Figure A-1

Date(s) Drilled	04/18/05 - 04/20/05	Logged By	MR4	Checked By	KGO
Drilling Contractor	WSDOT	Drilling Method	Mud Rotary	Sampling Methods	SPT
Auger Data	HW-4.5/HQ-3.5	Hammer Data	140 (lb) Autohammer	Drilling Equipment	CME 55 Truck-Mounted Drill Rig
Total Exploration Depth (ft)	40	Ground Surface Elevation (ft)	36	Groundwater Elevation (ft)	33
Vertical Datum	NAVGD-1983	Datum/ System	WA State Plane 1983 (North)	Easting(x): Northing(y):	13004003.8 174188.389

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	Blows/foot	Sub-Sample	Sample Number	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³
35	0						SM	Brown silty fine to medium sand (medium dense, wet) (fill)		
		4	15		1					
		14	3		2					
30	5						GP	Brown fine gravel (very loose, wet) (pea gravel)		
		14	10		3					
		12	2		4		SP-SM	Brown fine to medium sand with silt (very loose to medium dense, wet)		
25	10							%F = 6	24	
		14	12		5					
		18	8		6			GS, %F = 10	25	
20	15									
		18	15		7					
		18	25		8		ML	Brown silt with sand (oxidation staining) (very stiff, moist)		
15	20									
		17	22		9			AL	34	
		18	19		10		SM/ML	Brown silty fine sand with layers of sandy silt (medium dense, wet)		
10	25						SM	Brown silty fine sand (medium dense, wet) GS, %F = 44	17	
		16	9		11			Grades to gray		
		20	20		12			%F = 46	14	
5	30									
		10	50/3"		13					
		8			C-1		SSTN	Gray sandstone		
0	35									

WELL CONSTRUCTION

Steel Surface
Concrete Surface Seal
Bentonite Seal
1-inch Schedule 40 PVC well casing
10-20 sand backfill
1-inch Schedule 40 PVC screen
End cap
Bentonite

Note: See Figure A-1 for explanation of symbols.

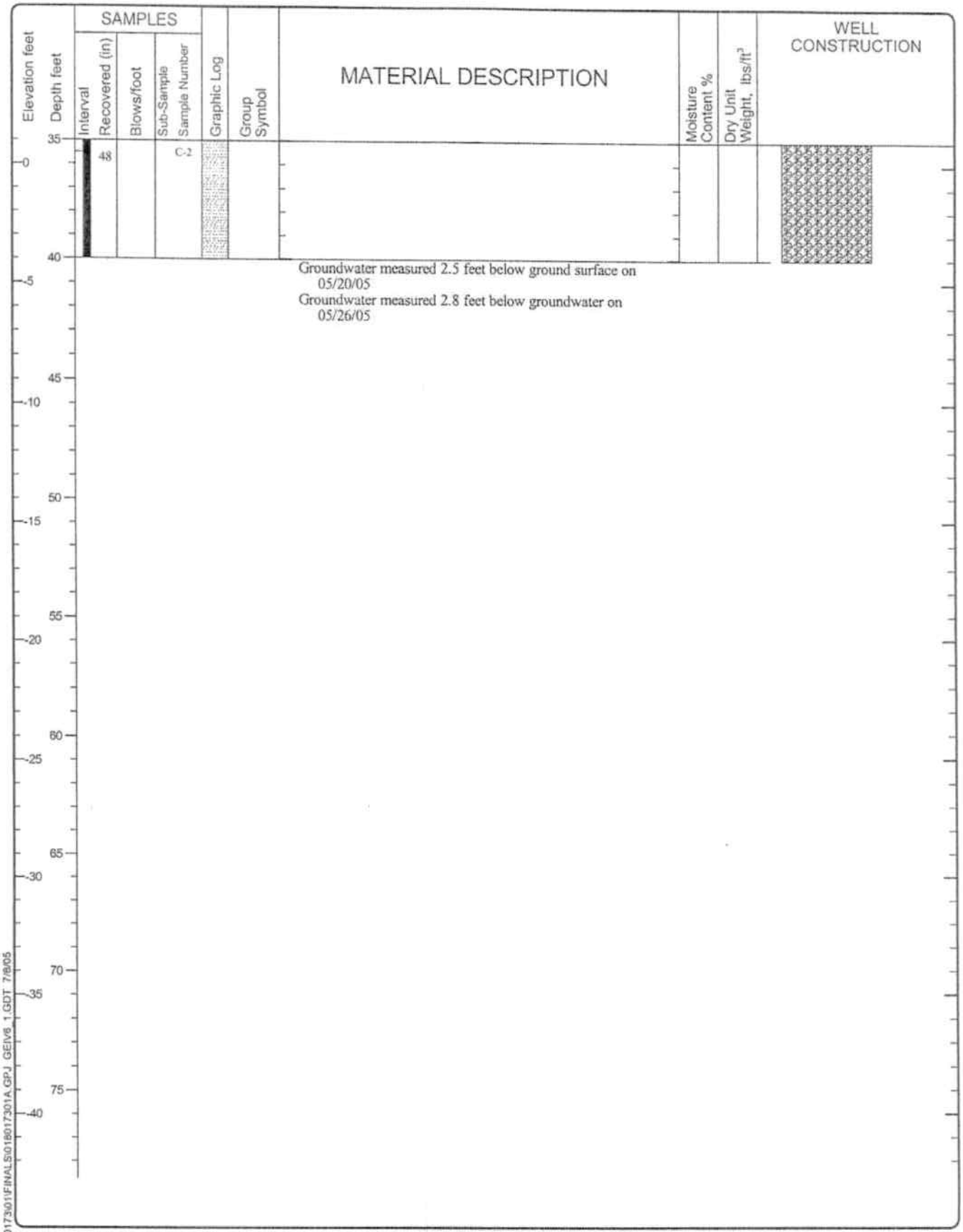
LOG OF BORING SRL-05-05

GeoEngineers

Project: South Renton Liquefaction Evaluation
Project Location: Renton, Washington
Project Number: 0180-173-01

Figure A-6
Sheet 1 of 2

V8_GTWELL P:\0018017301\FINALS\018017301A.GPJ GEIV8_1.GDT 7/8/05



V6_GTWELL P:\00180173\01FINALS\00180173O1A.GPJ GEIV6_1.GDT 7/8/05

LOG OF BORING SRL-05-05 (continued)

GeoEngineers

Project: South Renton Liquefaction Evaluation
Project Location: Renton, Washington
Project Number: 0180-173-01

Figure A-6
Sheet 2 of 2

Date(s) Drilled	05/03/05	Logged By	MR4/BJM	Checked By	KGO
Drilling Contractor	WSDOT	Drilling Method	Mud Rotary	Sampling Methods	SPT
Auger Data	4-inch	Hammer Data	140 (lb) Autohammer	Drilling Equipment	CME 45 Track-Mounted Drill Rig
Total Depth (ft)	36.5	Surface Elevation (ft)	46	Groundwater Elevation (ft)	35
Vertical Datum	NAVGD-1983	Datum/ System	WA State Plane 1983 (North)	Easting(x): Northing(y):	1300493.975 1742443.24

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
45	0						SM	Brown silty fine to medium sand with gravel (loose, moist) (fill)			
	5		24	1							Pounding on gravel, blowcount overstated
40			4	2							
			9	3							
	10							(oxidation staining)	16		%F = 28
35			3	4	▼			Wet			
									20		%F = 28
			3	5			SM	Gray and brown silty fine to medium sand (loose, wet)			
	15										
30			7	6							
									23		SA, %F = 15
			10	7							
	20							Grades to medium dense	22		%F = 12
25			11	8							
			14	9							
	25								19		%F = 32
20			38	10			SM	Brown silty fine sand (dense, moist to wet) (oxidation staining)			
			56/4"	11				Grades to very dense			
	30						SM	Light gray silty fine sand (very dense, moist) (weathered sandstone)			
15			50/2"	12							
			70/2"	13							
35											

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING P:\0\0180173\01\FINALS\0180173O1A.GPJ GEIV6_1.GDT 7/8/05

LOG OF BORING SRL-06-05

GeoEngineers

Project: South Renton Liquefaction Evaluation
Project Location: Renton, Washington
Project Number: 0180-173-01

Figure A-7
Sheet 1 of 2

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
35											
-10		2	60/1½"	14							
	40										
-5											
	45										
0											
	50										
-5											
	55										
-10											
	60										
-15											
	65										
-20											
	70										
-25											
	75										
-30											

V6_GTBORING P:\0\0180173\01\FINALS\0180173O1A.GPJ GEIV6_1.GDT 7/8/05

LOG OF BORING SRL-06-05 (continued)

GeoEngineers

Project: South Renton Liquefaction Evaluation
Project Location: Renton, Washington
Project Number: 0180-173-01

Figure A-7
Sheet 2 of 2

Date(s) Drilled	01/22/07	Logged By	TB2	Checked By	TB2
Drilling Contractor	Holocene	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-1/4-inch ID	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	CME 850
Total Depth (ft)	29	Surface Elevation (ft)		Groundwater Level (ft. bgs)	Not Encountered
Vertical Datum		Datum/ System	NAD 83	Easting(x): Northing(y):	1301698.11 174953.53

Depth feet	SAMPLES Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
0						TS	12 inches topsoil and roots			
						SM	Brown silty fine to medium sand (very loose, wet)			
	12	1	1							
5	18	82/11"	2			SM	Brown silty fine to medium sand with gravel (very dense, moist) (weathered sandstone)	10		Till-like fabric SA; %F = 31
						SM	Gray silty fine sand (very dense, moist) (sandstone)			
10	8	50/3"	3							
15	4	50/4"	4							Drill 1 ft/min
20	4	50/4"	5			SM	Light brown silty fine sand (very dense, moist) (sandstone)	9		%F = 29 Drill 1 ft/3 min
25	5	50/5"	6							Drill 1 ft/10 min
	3	50/3"	7							
30										
35										

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING P:\0\0186710\00\FINALS\0186710000.GPJ GEIV6 1.GDT 2/14/07

LOG OF BORING B-0/6A

GeoEngineers

Project: PSE Talbot Transmission Towers
Project Location: Renton, Washington
Project Number: 0186-710-00

Figure A-2
Sheet 1 of 1

Date(s) Drilled	01/23/07	Logged By	TB2	Checked By	TB2
Drilling Contractor	Holocene	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-1/4-inch ID	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	CME 850
Total Depth (ft)	49	Surface Elevation (ft)		Groundwater Level (ft. bgs)	8
Vertical Datum		Datum/ System	NAD 83	Easting(x): Northing(y):	1301001.6 175191.7

Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
0						TS	2 feet topsoil and roots			
	18	19	1			SM	Light brown with oxidation staining silty fine to medium sand with a trace of organic matter (medium dense, moist) (fill?)			
5	18	18	2							SA; %F = 27
	18	4	3	▼						
10						SM	Gray silty fine to medium sand (very dense, wet) (sandstone)			
	9	50/3"	4							Drill 1 ft/min
15										
	5	50/5"	5					12		% ORG = 4
20							With a trace of coal			Drill 1 ft/min
	6	50/6"	6				Black coal (very dense, moist)			Drill 1 ft/min
25										
	5	50/5"	7			SM	Gray silty fine sand (very dense, moist) (sandstone)			Drill 1 ft/3 min
30										
	5	50/5"	8					10		Drill 1 ft/2 min %F = 47
35										

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING P:\0\0186710\00\FINALS\0186710000.GPJ GEIV6_1.GDT 2/23/07

LOG OF BORING B-0/7

GeoEngineers

Project: PSE Talbot Transmission Towers
Project Location: Renton, Washington
Project Number: 0186-710-00

Figure A-3
Sheet 1 of 2

Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
35										
40	3	50/3"	9							Drill 1½ ft/min
45	3	50/3"	10							Drill 1 ft/3 min
50	3	50/3"	11							
55										
60										
65										
70										
75										

LOG OF BORING B-0/7 (continued)

GeoEngineers

Project: PSE Talbot Transmission Towers
Project Location: Renton, Washington
Project Number: 0186-710-00

Figure A-3
Sheet 2 of 2

V6_GTBORING P:\0\0186710\00\FINALS\0186710000.GPJ GEIV6_1.GDT 2/23/07

Date(s) Drilled	01/22/07	Logged By	TB2	Checked By	TB2
Drilling Contractor	Holocene	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-1/4-inch ID	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	CME 850
Total Depth (ft)	50.5	Surface Elevation (ft)		Groundwater Level (ft. bgs)	1
Vertical Datum		Datum/ System	NAD 83	Easting(x): Northing(y):	1300566 174542

Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
0				▼		TS	Brown topsoil with grass and organic matter			
						SM	Brown with oxidation staining silty fine to medium sand (loose, wet) (weathered sandstone)			
	18	5	1							
5	18	5	2							
						SM	Reddish brown silty fine sand (medium dense to very dense, wet) (weathered sandstone)	23		SA; %F = 32
10	18	26	3							
15	12	50/4"	4							
20	6	50/1"	5			SM	Gray silty fine to medium sand (very dense, moist) (sandstone)			
25	2	50/2"	6							
30	4	50/4"	7					11		Drill 1 ft/min %F = 32
35										

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING P:\0\0186710\00\FINALS\0186710000.GPJ GEIV6_1.GDT 2/14/07

LOG OF BORING B-0/13

GeoEngineers

Project: PSE Talbot Transmission Towers
Project Location: Renton, Washington
Project Number: 0186-710-00

Figure A-4
Sheet 1 of 2

Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
35	4	50/4"	8							Drill 1 ft/min
40	4	50/4"	9							Drill 1 ft/min
45	5	50/5"	10							Drill 1 ft/min
50	5	50/5"	11							Drill 1 ft/min
55										
60										
65										
70										
75										

V6_GTBORING P:\0\0186710\00\FINALS\0186710000.GPJ GEIV6_1.GDT 2/14/07

LOG OF BORING B-0/13 (continued)

GeoEngineers

Project: PSE Talbot Transmission Towers
Project Location: Renton, Washington
Project Number: 0186-710-00

Figure A-4
Sheet 2 of 2