INTERSTATE 405 Corridor Program
Congestion Relief & Bus Rapid Transit Projects

APPENDIX G4

Forbes Creek Fish Passage: Geotechnical Baseline Report

I-405, SR520 to SR522 Stage 1 (Kirkland Stage 1)

Request For Proposal
July 15, 2005

Washington State Department of Transportation

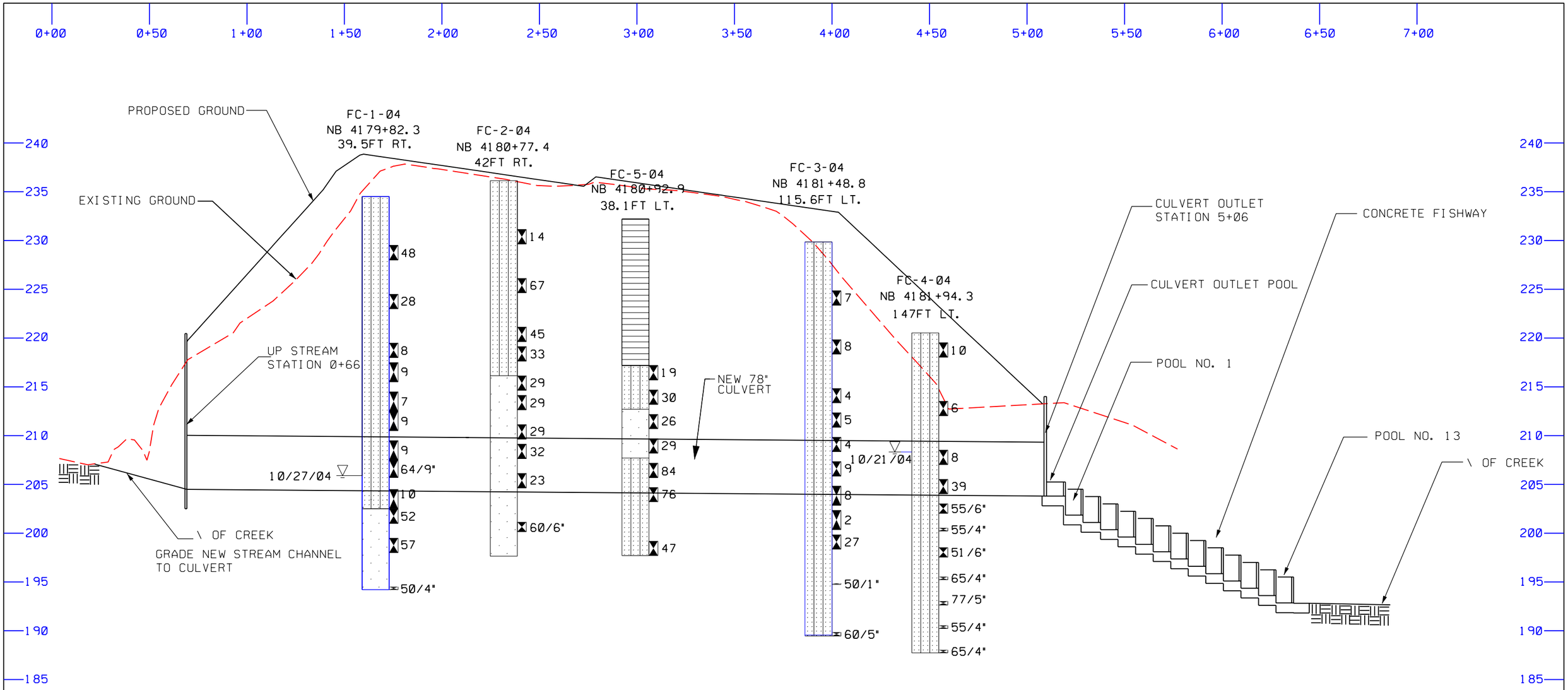
Forbes Creek Fish Passage

The improvement of the fish passage at Forbes Creek located on I405 in the vicinity of milepost 19 will require the placement of a larger diameter culvert. The current fish passage enhancement plan proposes adding a minimum 72 inch diameter culvert approximately 440 ft in length located parallel to the existing 42 inch diameter culvert. The 42 inch culvert will remain in place. The elevation of the proposed new culvert inlet and outlet is approximately 204.4 ft and 204.1 ft respectively.

Five test borings were advanced through the existing embankment along the proposed alignment of the new culvert. The location of the test borings is shown in Figure 1. Explorations completed in the vicinity of the new culvert include: FC-1-04, FC-2-04, FC-3-04, FC-4-04 and FC-5-04. All borings were advanced through the roadway fill and into the foundation soils supporting the embankment. Standard penetration tests (SPT) were generally taken every 5 ft except between 15 ft and 30 ft where 2 samples were taken for every 5 ft of run. No SPT's were obtained in the upper 15 ft in test boring FC-5-04. Figure 2 contains a subsurface profile along the alignment of the proposed new culvert. The existing fills vary in thickness between 15 and 30 ft and consist of very loose to very dense gray, silty sand with gravel and cobbles. Underlying the fills is a dense to very dense, gray sandy silt and silty sand unit with gravel and cobbles and very stiff to hard, gray silt unit containing thin layers of fine sand. Wood fragments were observed in this soil unit.

An open stand pipe piezometer was installed in test boring FC-1-04. The groundwater was observed at an elevation of 207.7 on 10/27/04. The groundwater is expected to vary with the seasons.

Copies of the logs of test borings and laboratory test data are included.



VERY LOOSE TO VERY DENSE, GRAY, MOTTLED, SILTY SAND WITH GRAVEL AND COBBLES.

DENSE TO VERY DENSE, VERY STIFF TO HARD, GRAY, SANDY SILT AND SILT WITH WOOD FRAGMENTS, LAMINATED CONTAINING THIN FINE SAND LAYERS.

NO SAMPLE RETRIEVED

TEST HOLE LEGEND

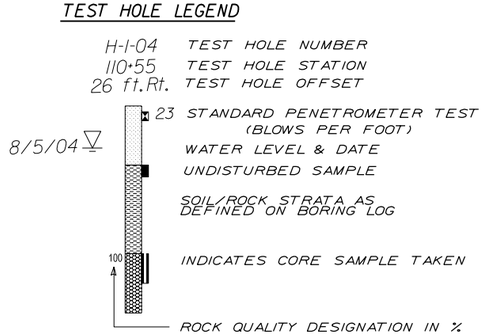


FIGURE 2: CULVERT PROFILE

JOB XL-2068 S.R. 405 C.S. _____

FORBES CREEK FISH PASSAGE

WASHINGTON STATE
TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION

MATERIALS BRANCH

T. E. BAKER MATERIALS ENGINEER

DATE 12/2004
SCALE 1=10' VERT.
1=50' HORIZ.
SHEET ___ OF ___
DRAWN BY WM

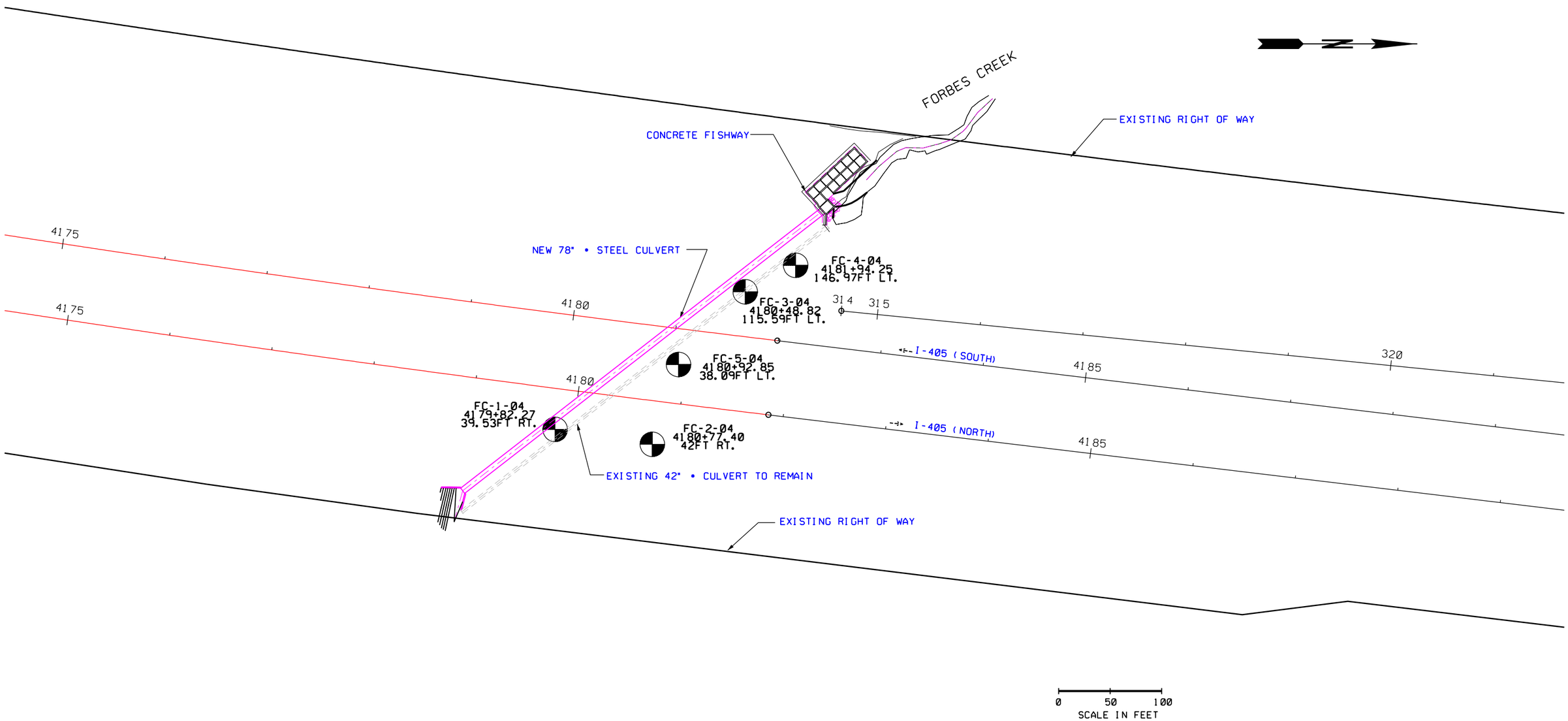


FIGURE 1: SITE PLAN

JOB XL-2068 S.R. 405 C.S. _____

FORBES CREEK FISH PASSAGE

WASHINGTON STATE
TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION

MATERIALS BRANCH

T. E. BAKER MATERIALS ENGINEER

DATE 12/2004

SCALE 1=100' VERT. HORIZ.

SHEET ____ OF ____

DRAWN BY WM

Washington State
Department of Transportation

LOG OF TEST BORING

Start Card R 65882

HOLE No. FC-1-04

Sheet 1 of 2

Job No. XL-2068 SR 405 Elevation 234.5 ft (71.5 m)

Project Forbes Creek Fish Passage

Driller Verlo Lic# 2615

Site Address I 405 near NE 85th

Inspector Nebgen

Start October 26, 2004 Completion October 26, 2004 Well ID# AHN 886 Equipment CME 45 w/ autohammer

Station NB 4179+82.3 Offset 39.5ft Rt. Casing 4" x 40' Method Wet Rotary

Northing 255894.2 Easting 1308670.5 Latitude Longitude

County King Subsection SW/SW Section 33 Range 5EWM Township 26N

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			19 25 23 (48)		D-1		Silty SAND, with cobbles, dense, brown, dry, Homogeneous, no HCl reaction, on the ground surface were scattered concrete fragments. Length Recovered 1.3 ft, Length Retained 1.3 ft		
10	2			11 14 14 (28)		D-2		Silty SAND, with cobbles, dense, brown, moist, Homogeneous, no HCl reaction Length Recovered 1.0 ft, Length Retained 1.0 ft		
15	3			3 3 5 (8)		D-3		Silty SAND, loose, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.7 ft, Length Retained 0.7 ft		
	4			4 4 5 5 (9)		D-4		Silty SAND, loose, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.3 ft, Length Retained 0.3 ft		
20	5									
	6									

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R 65882

Job No. XL-2068 SR 405 Elevation 234.5 ft (71.5 m)

HOLE No. FC-1-04

Sheet 2 of 2

Project Forbes Creek Fish Passage

Driller 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
				3 3 4 6 (7)		D-5		Silty SAND, loose, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
	7			4 4 5 5 (9)		D-6	GS MC	SM, M.C. = 14% Silty SAND, loose, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.4 ft, Length Retained 0.4 ft		
25	8			2 6 3 3 (9)		D-7		Silty SAND, loose, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.9 ft, Length Retained 0.9 ft	10/27/2004	
			>>	4 5 39 25/3 (64/9")		D-8	GS MC	SM, M.C. = 19% Silty SAND, with wood fragments, dense, brown and grey, moist, stratified, no HCl reaction, organic silt with wood and grass roots 30 ft to 31 ft. Length Recovered 1.1 ft, Length Retained 1.1 ft		
30	9			3 4 6 15 (10)		D-9		Silty SAND, with wood fragments, loose, grey, moist, laminated, no HCl reaction Length Recovered 0.9 ft, Length Retained 0.9 ft		
	10		>>	8 20 32 (52)		D-10	GS MC AL	ML, M.C. = 25%, PI = NP Sandy SILT, fine sand partings, very dense, grey, moist, laminated, no HCl reaction Length Recovered 1.5 ft, Length Retained 1.2 ft		
35	11		>>	20 27 30 (57)		D-11	GS MC AL	ML, M.C. = 30%, PI = 8 SILT, hard, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.3 ft, Length Retained 0.3 ft		
40	12			50/4 (50/4")		D-12		Silty SAND, very dense, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.3 ft, Length Retained 0.3 ft		
	13							End of test hole boring at 40.3 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.		
45										

Washington State
Department of Transportation

LOG OF TEST BORING

Start Card S 24048

HOLE No. FC-2-04

Sheet 1 of 2

Job No. XL-2068 SR 405 Elevation 236.1 ft (72.0 m)

Project Forbes Creek Fish Passage

Driller Verlo Lic# 2615

Site Address I 405 near NE 85 th

Inspector Nebgen

Start October 27, 2004 Completion October 27, 2004 Well ID# Equipment CME 45 w/ autohammer

Station NB 4180+77.4 Offset 42ft Rt. Casing 4"x38.5 Method Wet Rotary

Northing 255990.6 Easting 1308683.4 Latitude Longitude

County King Subsection SW/SW Section 33 Range 5 EWM Township 26N

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			7 8 6 (14)		D-1		Silty SAND with gravel, medium dense, grey, moist, Homogeneous, no HCl reaction Length Recovered 1.2 ft, Length Retained 1.2 ft		
10	2		>>	20 27 40 (67)		D-2	GS MC	SM, M.C. = 10% Silty SAND with gravel, very dense, grey, moist, Homogeneous, no HCl reaction Length Recovered 1.5 ft, Length Retained 1.3 ft		
15	3			11 20 25 (45)		D-3		Silty SAND with gravel, dense, grey, moist, Homogeneous, no HCl reaction Length Recovered 1.5 ft, Length Retained 1.3 ft		
20	4			12 14 19 (33)		D-4	GS MC	SM, M.C. = 18% Silty SAND, dense, grey, moist, stratified, no HCl reaction, thin layers of sand and silt. Length Recovered 1.5 ft, Length Retained 1.3 ft		
	5									
	6									

Washington State
Department of Transportation

LOG OF TEST BORING

Start Card S 24048

HOLE No. FC-2-04

Job No. XL-2068 SR 405 Elevation 236.1 ft (72.0 m)

Sheet 2 of 2

Project Forbes Creek Fish Passage Driller 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
				8 12 17 (29)		D-5		SILT, dense, grey, moist, laminated, no HCl reaction Length Recovered 1.1 ft, Length Retained 1.1 ft		
	7			7 13 16 (29)		D-6	GS MC	ML, M.C. = 30% SILT, horiznal beds, dense, brown and grey, moist, laminated, no HCl reaction Length Recovered 1.5 ft, Length Retained 1.3 ft		
25	8			9 12 17 (29)		D-7		SILT, very stiff, grey, moist, laminated, no HCl reaction Length Recovered 1.5 ft, Length Retained 1.3 ft		
	9			7 13 19 (32)		D-8	GS MC.AL	ML, M.C. = 28%, LL = 31% SILT, hard, grey, moist, laminated, no HCl reaction, Non plastic Length Recovered 1.5 ft, Length Retained 1.3 ft		
30	10			7 10 13 (23)		D-9		SILT, very stiff, grey, moist, laminated, no HCl reaction Length Recovered 1.5 ft, Length Retained 1.3 ft		
35	11		>>	22 60/6 (60/6")		D-10		Silty SAND with gravel, subrounded, very dense, grey, moist, Homogeneous, no HCl reaction, stopped drilling at 38.5 feet when encountered a large cobble or boulder Length Recovered 0.9 ft, Length Retained 0.9 ft		
40	12 13							End of test hole boring at 38.5 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.		
45										

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 24048

HOLE No. FC-3-04

Sheet 1 of 2

Job No. XL-2068 SR 405 Elevation 229.9 ft (70.1 m)

Project Forbes Creek Fish Passage

Driller Verlo Lic# 2615

Site Address I 405 near NE 85th

Inspector Nebgen

Start October 25, 2004 Completion October 25, 2004 Well ID# Equipment CME 45 w/ autohammer

Station NB 4181+48.8 Offset 115.6ft Lt. Casing 4"x40' Method Wet Rotary

Northing 256129 Easting 1308510.5 Latitude Longitude

County King Subsection SW/SW Section 33 Range 5 EWM Township 26N

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 4 3 (7)		D-1		Silty SAND, loose, brown, moist, Homogeneous, no HCl reaction Length Recovered 1.1 ft, Length Retained 1.1 ft		
10	2			1 3 5 (8)		D-2	GS MC	SM, M.C. = 18% Silty SAND, loose, grey, moist, Homogeneous, no HCl reaction Length Recovered 1.0 ft, Length Retained 1.0 ft		
15	3			2 2 2 (4)		D-3		Silty SAND, very loose, grey, wet, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
20	4 5 6			1 2 3 (5)		D-4		Silty SAND with gravel, loose, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.4 ft, Length Retained 0.4 ft		

Washington State
Department of Transportation

LOG OF TEST BORING

Start Card S 24048

HOLE No. FC-3-04

Job No. XL-2068 SR 405 Elevation 229.9 ft (70.1 m)

Sheet 2 of 2

Project Forbes Creek Fish Passage Driller 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
				3 2 2 (4)		D-5		Silty SAND with gravel, very dense, grey, wet, Homogeneous, no HCl reaction Length Recovered 0.2 ft, Length Retained 0.2 ft		
	7			1 4 5 (9)		D-6	GS MC	SM, M.C. = 16% Silty SAND, loose, grey, moist, Homogeneous, no HCl reaction Length Recovered 1.0 ft, Length Retained 1.0 ft		
25	8			6 5 3 3 (8)		D-7	GS MC	SM, M.C. = 13% Silty SAND with gravel, loose, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.3 ft, Length Retained 0.3 ft		
	9			2 1 1 2 (2)		D-8		Silty SAND, very loose, grey, wet, Homogeneous, no HCl reaction Length Recovered 0.7 ft, Length Retained 0.7 ft		
30	10			6 9 18 (27)		D-9	GS MC	SM, M.C. = 14% Silty SAND, dense, grey, dry, Homogeneous, no HCl reaction Length Recovered 1.0 ft, Length Retained 1.0 ft		
35	11			50/1" (50/1")		D-10		No Recovery		
40	12		>>	60/5 (60/5")		D-11		Silty SAND, very dense, grey, moist, Homogeneous, no HCl reaction Length Recovered 0.4 ft, Length Retained 0.4 ft		
45	13							End of test hole boring at 40.4 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.		

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 24048

HOLE No. FC-4-04

Sheet 1 of 2

Job No. XL-2068 SR 405 Elevation 220.5 ft (67.2 m)

Project Forbes Creek Fish Passage

Driller Sean Verlo Lic# 2615

Site Address Vic. of NE 85th St. and I-405

Inspector Dan Reed

Start October 21, 2004 Completion October 21, 2004 Well ID# Equipment CME 45 w/ autohammer

Station NB 4181+94.3 Offset 147ft Lt. Casing HW 4.5/HQ 3.5 Method Wet Rotary

Northing 256080.9 Easting 1308535.6 Latitude Longitude

County King Subsection SW 1/4 of the SW 1/4 Section 33 Range 5 EWM Township 26N

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 5 5 (10)		D-1		Silty SAND, subangular, loose, gray, moist, Homogeneous, no HCl reaction, trace of organics. Drove large gravel into sampler bit. Length Recovered 0.3 ft, Length Retained 0.3 ft		
5	1									
	2			2 2 4 (6)		D-2	GS MC	SM, M.C. = 15% Silty SAND, with wood fragments, loose, gray, moist, Homogeneous, no HCl reaction, with large gravel as indicated by drilling process 2.5' to 5.5'. Length Recovered 0.6 ft, Length Retained 0.6 ft		
10	3									
				2 4 4 (8)		D-3		Silty SAND, subangular, loose, gray, moist, disrupted, no HCl reaction, mixed soil colors and types. Trace of organics. Length Recovered 1.5 ft, Length Retained 1.5 ft 10/21/2004 10/21/2004	▼	
15	4									
	5			7 15 24 (39)		D-4		Silty SAND with gravel, angular, dense, light brown, moist, Homogeneous, no HCl reaction, with large gravel as indicated by drilling process. Soil color changed to light brown to gray 16.0' to 16.5'. Length Recovered 1.2 ft, Length Retained 1.2 ft		
			>>	35 55/6 (55/6")		D-5		Silty SAND with gravel, subangular, very dense, gray, moist, Homogeneous, weak HCl reaction, with large gravel as indicated by drilling process. Length Recovered 1.0 ft, Length Retained 1.0 ft		
20	6		>>							

Washington State
Department of Transportation

LOG OF TEST BORING

Start Card S 24048

HOLE No. FC-4-04

Job No. XL-2068 SR 405 Elevation 220.5 ft (67.2 m)

Sheet 2 of 2

Project Forbes Creek Fish Passage

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
			>>	55/4 (55/4")		D-6		Silty SAND with gravel, angular, very dense, gray, moist, Homogeneous, no HCl reaction, with large gravel as indicated by drilling process. Drove on large gravel. Length Recovered 0.2 ft, Length Retained 0.2 ft		
	7		>>	23 51/6 (51/6")		D-7	GS MC	SM, M.C. = 16% Silty SAND with gravel, angular, very dense, gray, wet, Homogeneous, no HCl reaction, with large gravel as indicated by drilling process. Length Recovered 1.0 ft, Length Retained 1.0 ft		
25	8		>>	65/4 (65/4")		D-8		Silty SAND with gravel, angular, very dense, gray, moist, Homogeneous, no HCl reaction, with large gravel as indicated by drilling process. Length Recovered 0.2 ft, Length Retained 0.2 ft		
	9		>>	77/5 (77/5")		D-9	GS MC	SM, M.C. = 10% Silty SAND with gravel, angular, very dense, gray, moist, Homogeneous, no HCl reaction, with large gravel as indicated by drilling process. Length Recovered 0.4 ft, Length Retained 0.4 ft		
30	10		>>	55/4 (55/4")		D-10	GS MC	SP-SM, M.C. = 17% Poorly graded SAND with silt and gravel, angular, very dense, gray, moist, Homogeneous, no HCl reaction, with large gravel as indicated by drilling process. Length Recovered 0.2 ft, Length Retained 0.2 ft		
			>>	65/4 (65/4")		D-11		Silty SAND with gravel, angular, very dense, gray, moist, Homogeneous, no HCl reaction, with large gravel as indicated by drilling process. Length Recovered 0.2 ft, Length Retained 0.2 ft		
35	11							End of test hole boring at 32.8 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.		
	12							This test boring was not instrumental with a piezometer. Prior to removal, a bail test was performed within the drill casing. The water level observed from this test may not truly reflect the actual groundwater conditions present at the site.		
40	13							Bore hole water level before bailing 8.1', after bailed 28.0', after 15 minutes 22.1', after 30 minutes 18.1', after 45 minutes 15.6', after 60 minutes 12.3', water table stabilized at 12.1' in casing.		
45										

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 24049

HOLE No. FC-5-04

Sheet 1 of 2

Job No. XL-2068 SR 405 Elevation 232.2 ft (70.8 m)

Project Forbes Creek Fish Passage Driller Kerry Cooper Lic# 2552

Site Address Vic. of NE 85th St. and I-405 Inspector Cleo Andrews

Start November 7, 2004 Completion November 7, 2004 Well ID# Equipment CME 45 w/ autohammer

Station NB 4180+92.9 Offset 38.1ft Lt. Casing HQ 3" ID x 37.0' Method Wet Rotary

Northing Easting Latitude Longitude

County King Subsection Sw 1/4 of the SW 1/4 Section 33 Range 5 EWM Township 26 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
								No Samples taken from 0 to 15 ft.		
15	5			10 11 9 (19)		D-1		Silty SAND, with brownish orange mottling, medium dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.5 ft, Length Retained 1.5 ft		
				9 13 17 (30)		D-2	GS MC	SM, M.C. = 20% Silty SAND, with brownish orange mottling, dense, olive gray, moist, Stratified, HCl reaction not tested Length Recovered 1.3 ft, Length Retained 1.3 ft		
20	6									

Washington State Department of Transportation

LOG OF TEST BORING

Start Card S 24049

Job No. XL-2068 SR 405 Elevation 232.2 ft (70.8 m)

HOLE No. FC-5-04

Sheet 2 of 2

Project Forbes Creek Fish Passage

Driller Kerry Cooper Lic# 2552

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
				8 10 16 (26)		D-3	GS MC AL	ML, M.C. = 29%, PI = 6 SILT, medium dense, olive gray, moist, Homogeneous, HCl reaction not tested Length Recovered 1.5 ft, Length Retained 1.5 ft		
	7			7 12 17 (29)		D-4		SILT, dense, medium gray, moist, Homogeneous, HCl reaction not tested Length Recovered 1.5 ft, Length Retained 1.5 ft		
25			>>	33 39 45 (84)		D-5		Silty SAND, with 0.1' layer of sandy lean Clay with gravel between 25.0' and 25.1', very dense, olive gray, moist, Stratified, HCl reaction not tested, Traces of brownish orange mottling. Length Recovered 1.2 ft, Length Retained 1.2 ft		
	8									
			>>	39 44 32 (76)		D-6		Silty SAND with gravel, subrounded, very dense, grayish brown, moist, Stratified, HCl reaction not tested Length Recovered 1.5 ft, Length Retained 1.5 ft		
	9									
30										
	10			20 21 26 (47)		D-7	GS MC	SM, M.C. = 14% Silty SAND with gravel, traces of wood particles, subrounded, dense, medium dark gray, moist, Stratified, HCl reaction not tested. Length Recovered 1.5 ft, Length Retained 1.5 ft		
35								End of test hole boring at 34.5 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.		
	11									
	12									
40										
	13									
45										

Job No. **XL-2068** Date **November 12, 2004**

Hole No. **FC-1-04** Sheet **1** of **1**

Project **Forbes Creek Fish Passage**

Laboratory Summary

Washington State Department of Transportation

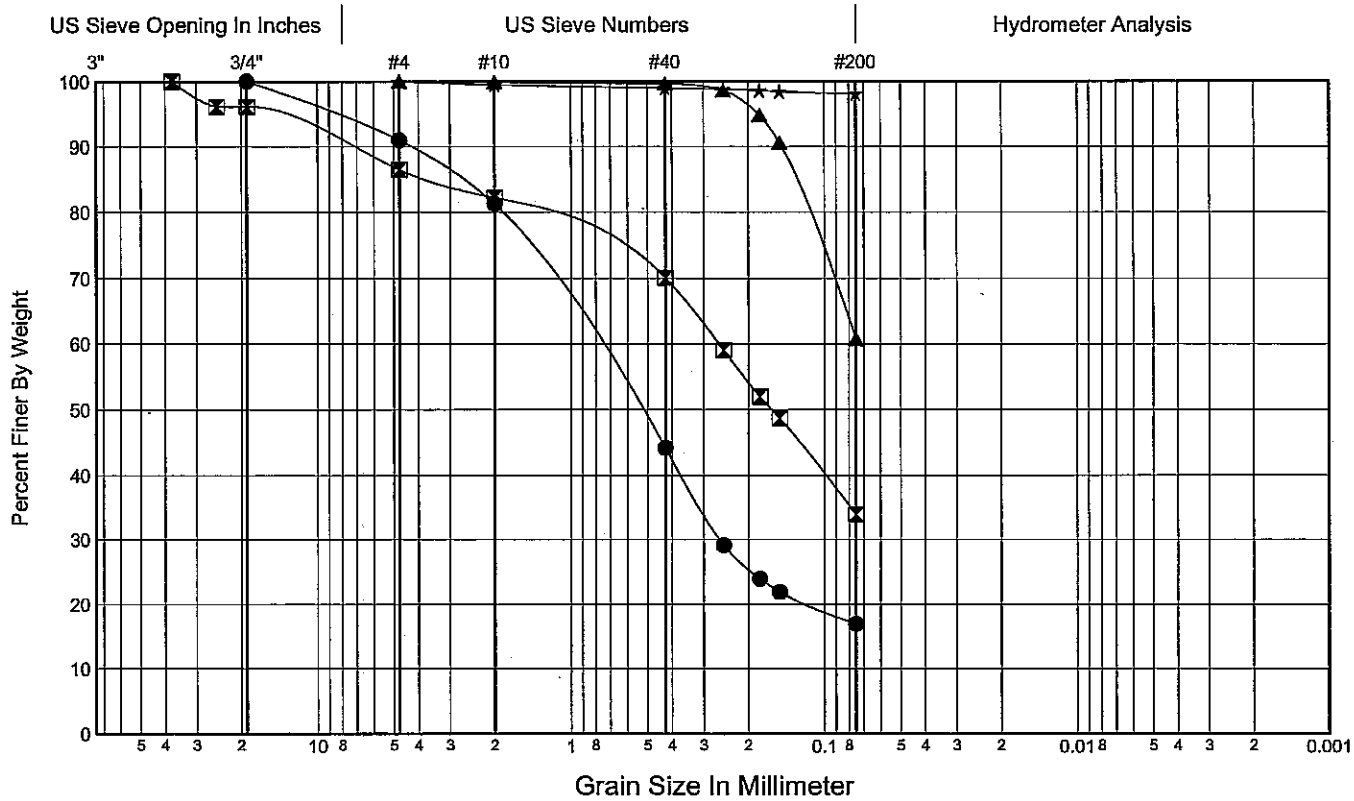
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	22.0	6.71	D-6	SM	See Boring Log	SILTY SAND	14			
⊠	27.0	8.23	D-8	SM	See Boring Log	SILTY SAND (with wood fragments)	19			
▲	32.0	9.75	D-10	ML	See Boring Log	SANDY SILT (too small for Leagle PI)	25	NP	NP	NP
★	35.0	10.67	D-11	ML	See Boring Log	SILT	30	35	27	8

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	9.0	74.0	16.9		
⊠	13.5	52.6	33.9		
▲	0.0	39.3	60.7		
★	0.0	1.9	98.1		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.823	0.54	0.26	0.11	
⊠	0.262	0.16			
▲					
★					



Gravel	Sand			Silt and Clay
	Coarse	Medium	Fine	

Job No. **XL-2068** Date **November 12, 2004**

Hole No. **FC-3-04** Sheet **1** of **1**

Project **Forbes Creek Fish Passage**

Laboratory Summary

Washington State Department of Transportation

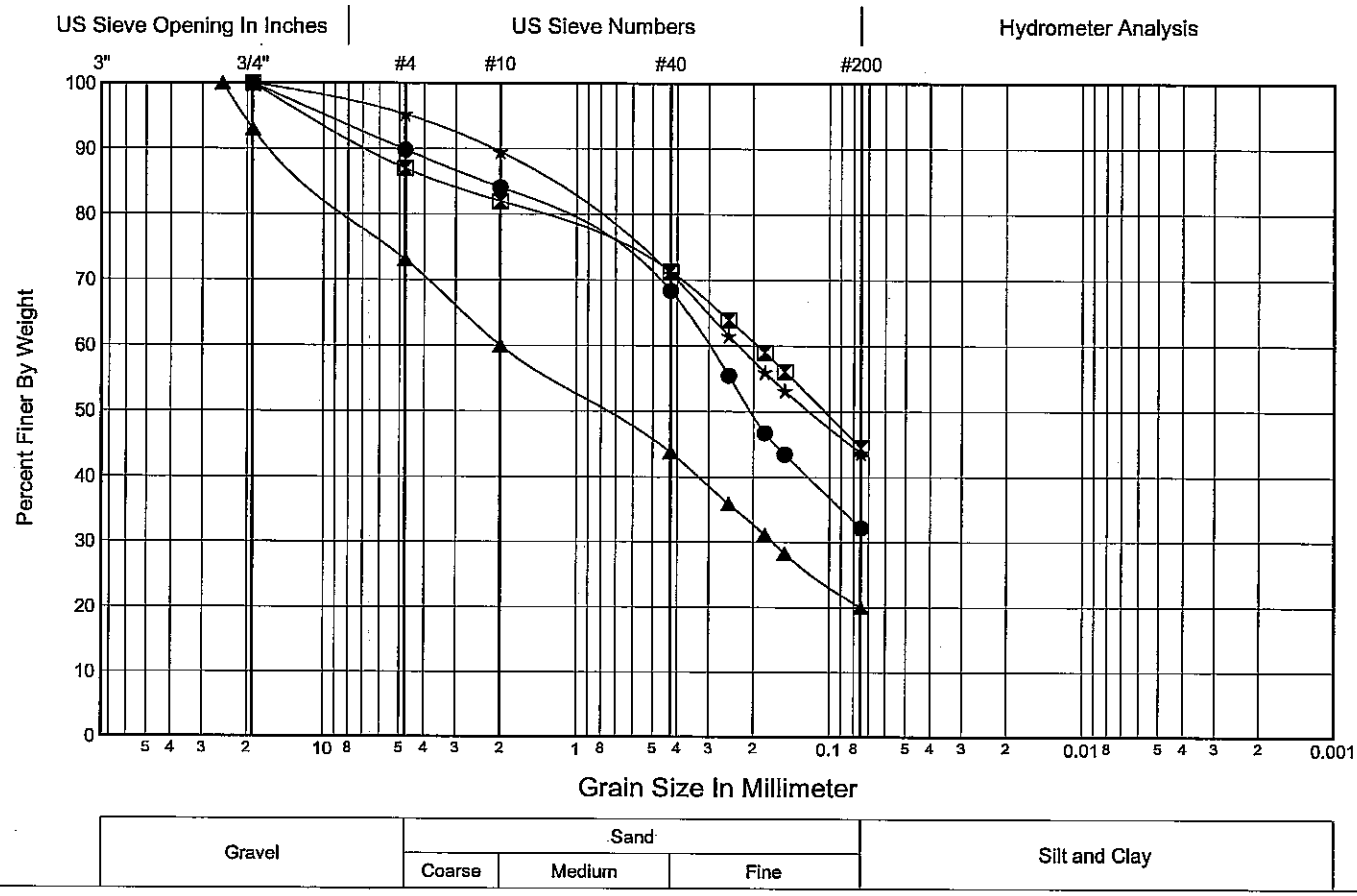
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	10.0	3.05	D-2	SM	See Boring Log	SILTY SAND (with wood fragments)	18			
⊠	22.5	6.86	D-6	SM	See Boring Log	SILTY SAND (with wood fragments)	16			
▲	25.0	7.62	D-7	SM	See Boring Log	SILTY SAND with GRAVEL	13			
★	30.0	9.14	D-9	SM	See Boring Log	SILTY SAND	14			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	10.2	57.6	32.2		
⊠	13.0	42.5	44.4		
▲	26.9	53.1	20.0		
★	4.8	51.5	43.7		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.301	0.20			
⊠	0.192	0.10			
▲	2.001	0.77	0.17	0.08	
★	0.228	0.12			



Job No. **XL-2068** Date **October 28, 2004**

Hole No. **FC-4-04** Sheet **1** of **1**

Project **Forbes Creek Fish Passage**

Laboratory Summary

Washington State Department of Transportation

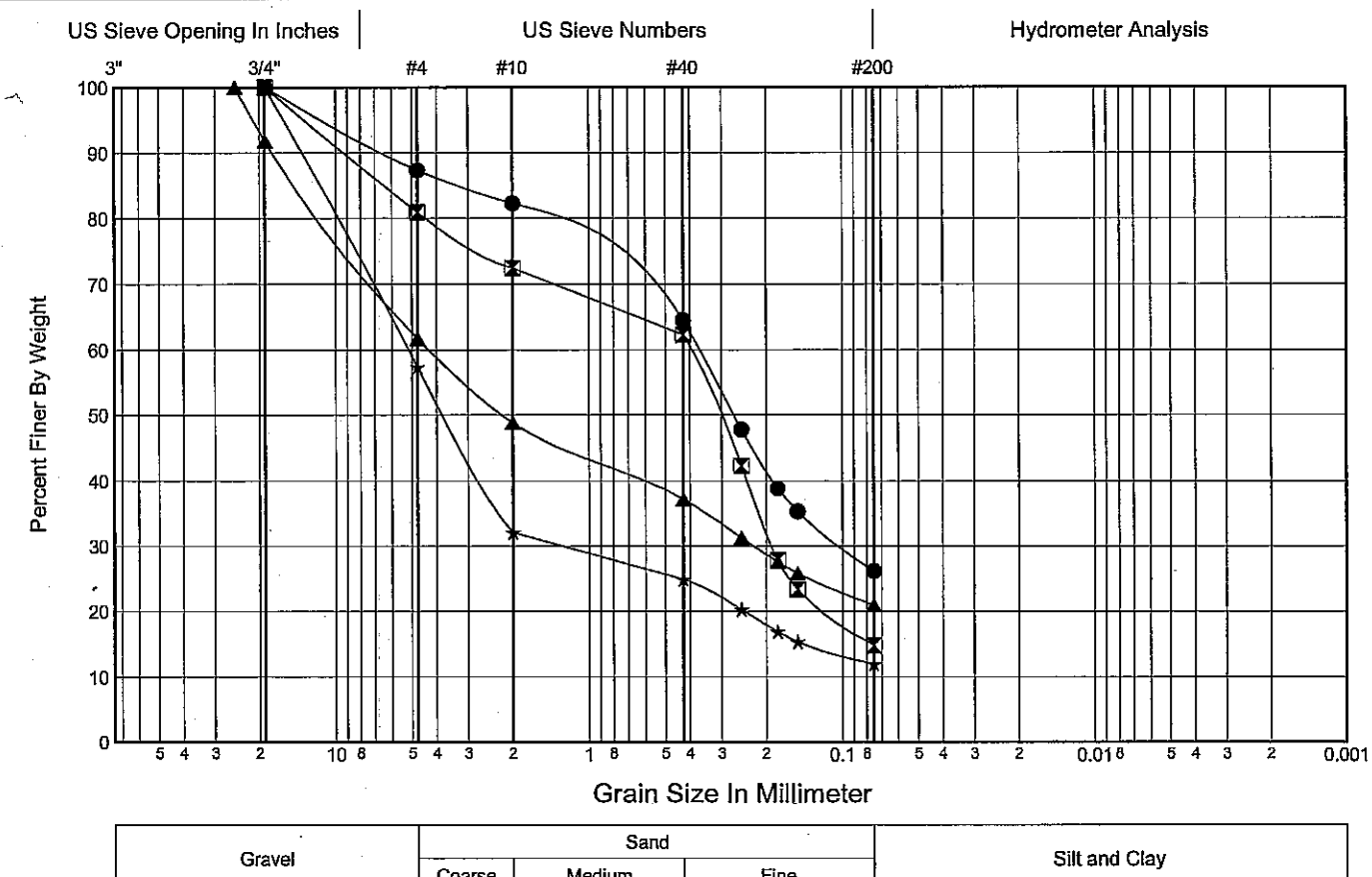
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	7.0	2.13	D-2	SM	See Boring Log	SILTY SAND (with wood fragments)	15			
⊠	22.0	6.71	D-7	SM	See Boring Log	SILTY SAND with GRAVEL	16			
▲	27.5	8.38	D-9	SM	See Boring Log	SILTY SAND with GRAVEL	10			
★	30.0	9.14	D-10	SP-SM	See Boring Log	POORLY GRADED SAND with SILT and GRAVEL	17			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	12.7	61.2	26.2		
⊠	19.1	66.1	14.8		
▲	38.3	40.8	20.9		
★	42.7	45.4	12.0	6.4	103.8

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.369	0.27	0.10		
⊠	0.400	0.31	0.19	0.11	
▲	4.233	2.17	0.22		
★	5.180	3.70	1.28	0.24	



Job No. **XL-2068**
Hole No. **FC-5-04**
Project **Forbes Creek Fish Passage**

Date **November 30, 2004**
Sheet **1** of **1**

Laboratory Summary

Washington State Department of Transportation

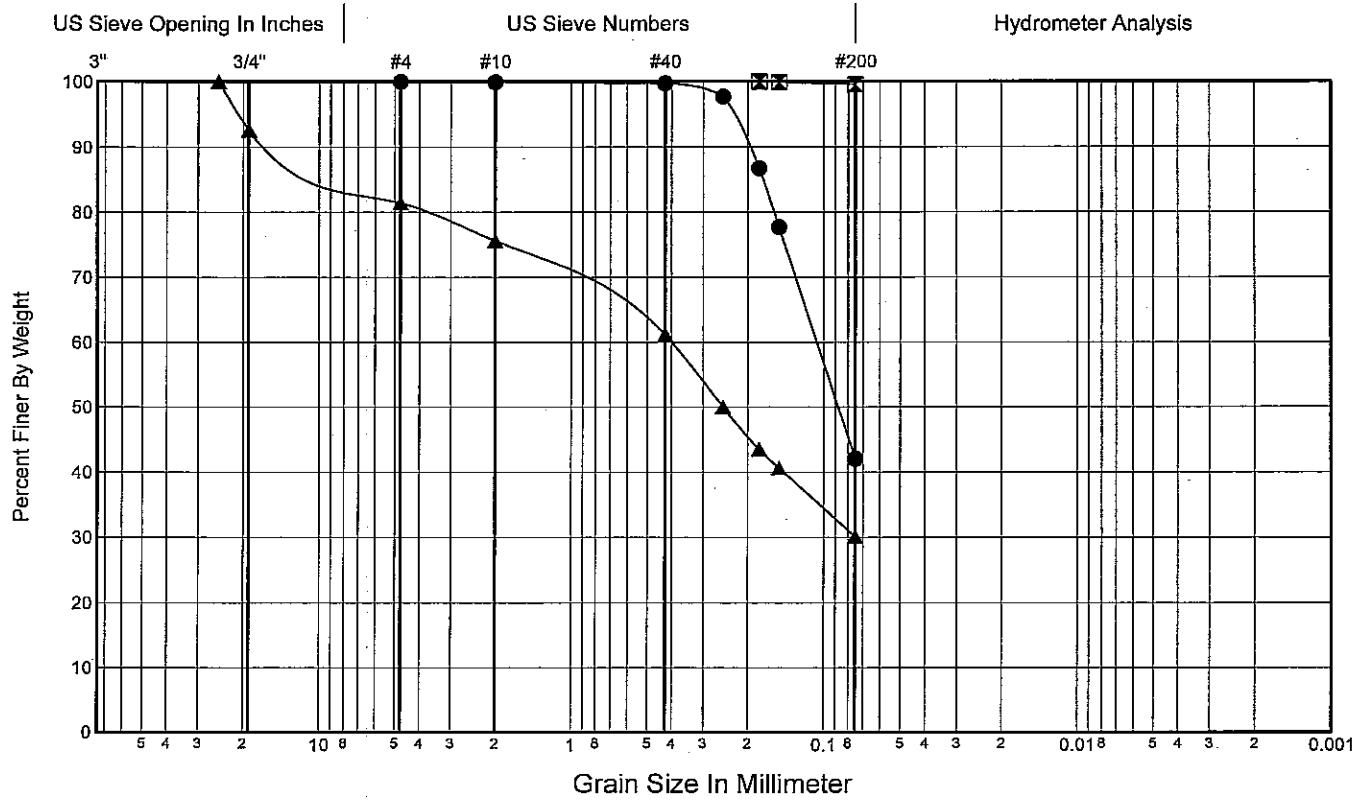
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	17.5	5.33	D-2	SM	See Boring Log	SILTY SAND	20			
⊠	20.0	6.10	D-3	ML	See Boring Log	SILT	29	33	27	6
▲	33.0	10.06	D-7	SM	See Boring Log	SILTY SAND with GRAVEL	14			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.0	58.0	42.0		
⊠	0.0	0.5	99.5		
▲	18.6	51.3	30.1		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.106	0.09			
⊠					
▲	0.402	0.25			



Job No. **XL-2068** Date **November 12, 2004**

Hole No. **FC-2-04** Sheet **1** of **1**

Project **Forbes Creek Fish Passage**

Laboratory Summary

Washington State Department of Transportation

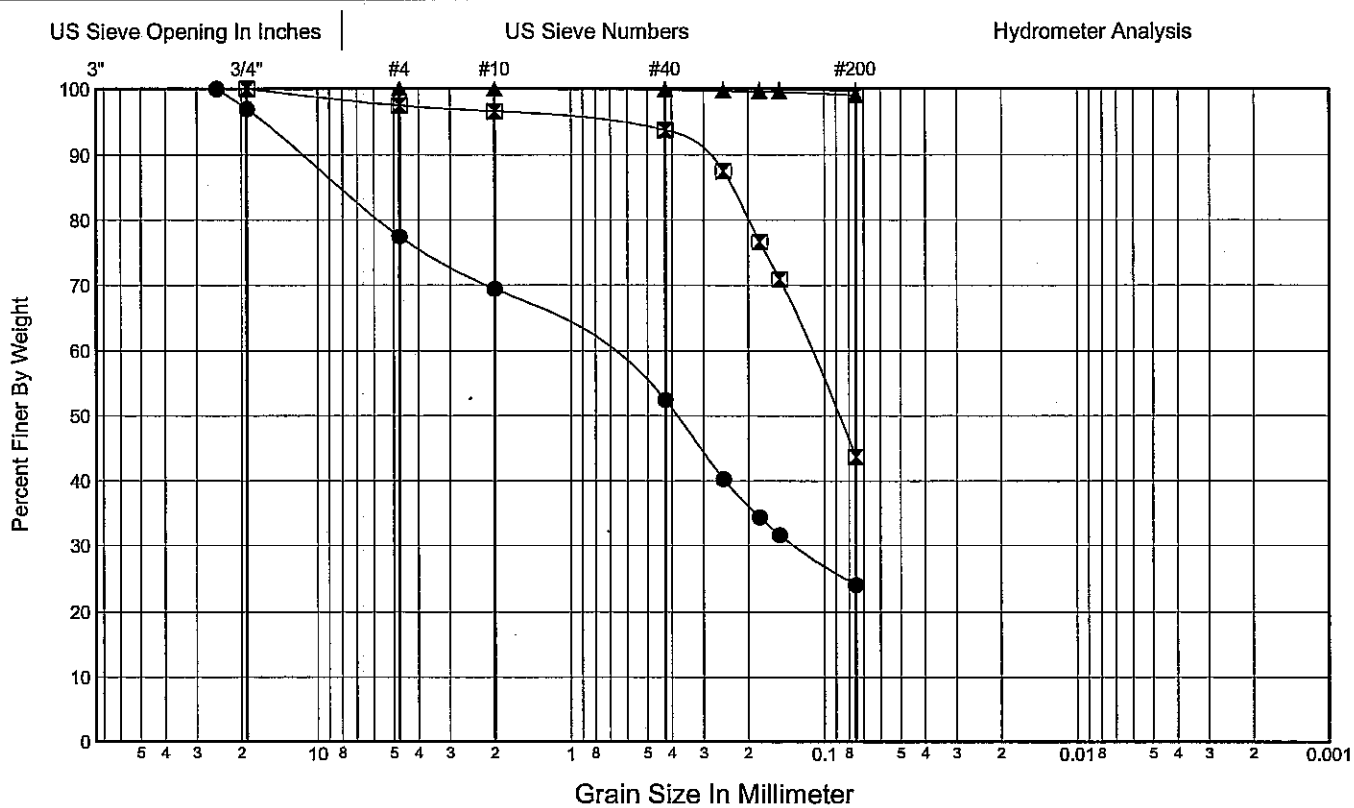
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	10.0	3.05	D-2	SM	See Boring Log	SILTY SAND with GRAVEL	10			
⊠	17.0	5.18	D-4	SM	See Boring Log	SILTY SAND	18			
▲	22.0	6.71	D-6	ML	See Boring Log	SILT	30			
★	27.0	8.23	D-8	ML	See Boring Log	SILT	28	31		

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	22.6	53.4	24.0		
⊠	2.5	53.8	43.7		
▲	0.0	1.0	99.0		
★	0.0	0.2	99.8		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.847	0.38	0.13		
⊠	0.114	0.09			
▲					
★					



Gravel	Sand			Silt and Clay
	Coarse	Medium	Fine	