



Washington State
Department of Transportation

Foundation File Copy

Memorandum

Date: November 22, 1995
From: *TA*
T. M. Allen/N. F. Boyd
OSC Materials Laboratory, 47365
Geotechnical Services Branch
Phone: 360-664-8258
(FAX 360-586-4611)
Subject: QS-G-78, SF 3142
Murhard Quarry
To: J. Allinger
Southwest Region, S15

This memorandum is provided as a supplement to the quarry site evaluation prepared by the Geotechnical Branch in 1988. At the request of your office, we have undertaken the following: 1) mapped vent areas containing poor quality rock, 2) further defined the basal limit of mineable rock, 3) determined the rock quality of the materials underlying the Boring Lavas, 4) attempted to determine the existence of unusual water conditions, and 5) estimated the quantities of merchantable rock in various areas of the quarry.

Introduction

A brief history of the workings of this quarry is given in the 1988 Quarry Evaluation. Since 1988, the quarry has been worked down from elevations 225 feet to 170 feet in portions of the southern half of the quarry, and from approximately 290 feet in the north central part of the active quarry floor down to 230 feet. A topographic map depicting contours from September 1995 is shown in Figure 1.

The exploitable material at this site belongs to a geologic unit known as the Boring Lava. It is generally described as a grey, fine grained, slightly vesicular, basaltic andesite. The Boring Lava was extruded through several vents located within the quarry boundary. Volcanic vent areas encountered during mining have been primarily left in place. Unusable excavated material is currently being wasted in an area to the south of the quarry access road, in the northwestern corner of the quarry. The large quantities of older oversized rock located along the southern border of the quarry adjacent to SR 14 have been largely left in place, although some oversize rock material has been excavated during the current lease agreement.

Field Investigation

A field investigation was conducted between September and November 1995. The field investigation consisted of two parts: geologic field review and mapping, and geotechnical test borings. Field mapping was undertaken with the purpose of identifying volcanic vent areas and water conditions.

Five geotechnical test borings were advanced at the locations identified in Figure 1. Rock core samples were obtained using triple tube core barrels to minimize damage to the core samples. Borings were advanced through the Boring Lava and 10 to 20 feet into the underlying material. Logs of Test Borings are located in Appendix A.

Volcanic Vents

The volcanic vent material at this site is characterized as an orange-brown, highly altered, soil-like material. Due to the poor quality of the vent material, it is not considered to be merchantable rock. The lateral limits of these vents form an almost vertically oriented, undulating plane in contact with the exploitable basalt. A map showing volcanic vent locations is shown in Figure 2.

Basal Limit of the Boring Lava

Since mining in the southern portion of the quarry is approaching the basal limit of the exploitable material as identified in the 1988 Quarry Evaluation, five test borings were advanced in order to more accurately determine the basal limit in the area to be worked under the upcoming lease agreement. These test holes extended through the Boring Lava and into the underlying material.

The underlying materials encountered in this phase of exploration appear to be the sands and gravels of the Upper Troutdale Formation. This unit is moderately to highly altered near the contact with the Boring Lava. The poor quality of this rock precludes it as an economically viable material for mining.

A revised isopac map depicting the basal limit of the exploitable Boring Lava unit is shown in Figure #3. Elevations noted by test holes indicate the lowest elevation of exploitable Boring Lava encountered in each test hole.

Water Conditions

Unusual water conditions were not encountered during this phase of test drilling. However, water was observed to be issuing from the upper contact of the Oligocene basalts at several locations along SR 14. The flow is apparently intermittent in nature. A pond has also been present in the active quarry floor at various times, but there is not presently any standing water. The water table has not been determined within the quarry boundaries.

Quantities

Figure 4 illustrates the areas designated for estimates of quantities. Estimates are of bank yard volumes of merchantable rock in each area. Quantities are based on the surface topography shown in Figure 4. Merchantable rock is generally assumed to be composed of the intact Boring Lava unit. Volcanic vent material and quarry waste material is not considered, for the purpose of this estimation, to be merchantable rock. Estimates assume a maximum limit of excavation to elevation 150 feet, except in Area 4, where the limit of excavation was assumed to be approximately 165 feet in elevation. In the eastern

corner of Area 1, the rock knob is assumed to have an excavation limit averaging elevation 200 feet. Quantities (bank yards) for each area are listed in the following table:

<u>Area</u>	<u>Description</u>	<u>Waste</u>	<u>Merchantable Rock</u>
Area 1	south side/front	490,000 cubic yards	710,000 cubic yards
Area 2	south	8,500 cubic yards	767,000 cubic yards
Area 3	west central	53,000 cubic yards	2,027,000 cubic yards
Area 4	central	<u>400,000 cubic yards</u>	<u>1,183,000 cubic yards</u>
Totals		951,500 cubic yards	4,687,000 cubic yards

Conclusion

This memorandum is intended as a supplement to the 1988 quarry evaluation. The supplementary information provided herein is based upon the investigation conducted September through November 1995, in conjunction with the 1988 report. Since the scope of work was limited to obtaining the information provided above, the 1988 report should be consulted for additional information.

Please feel free to contact Nancy Boyd at the above number, or Steve Lowell at 360-753-4660 should you have any questions.

TMA:nfb.

cc: Jim Ray, S-15
Gerry Smith, S-15
Allan McDonald, S-15
Rich Laing, S-15
Bill Pierce, S-15

Attachments

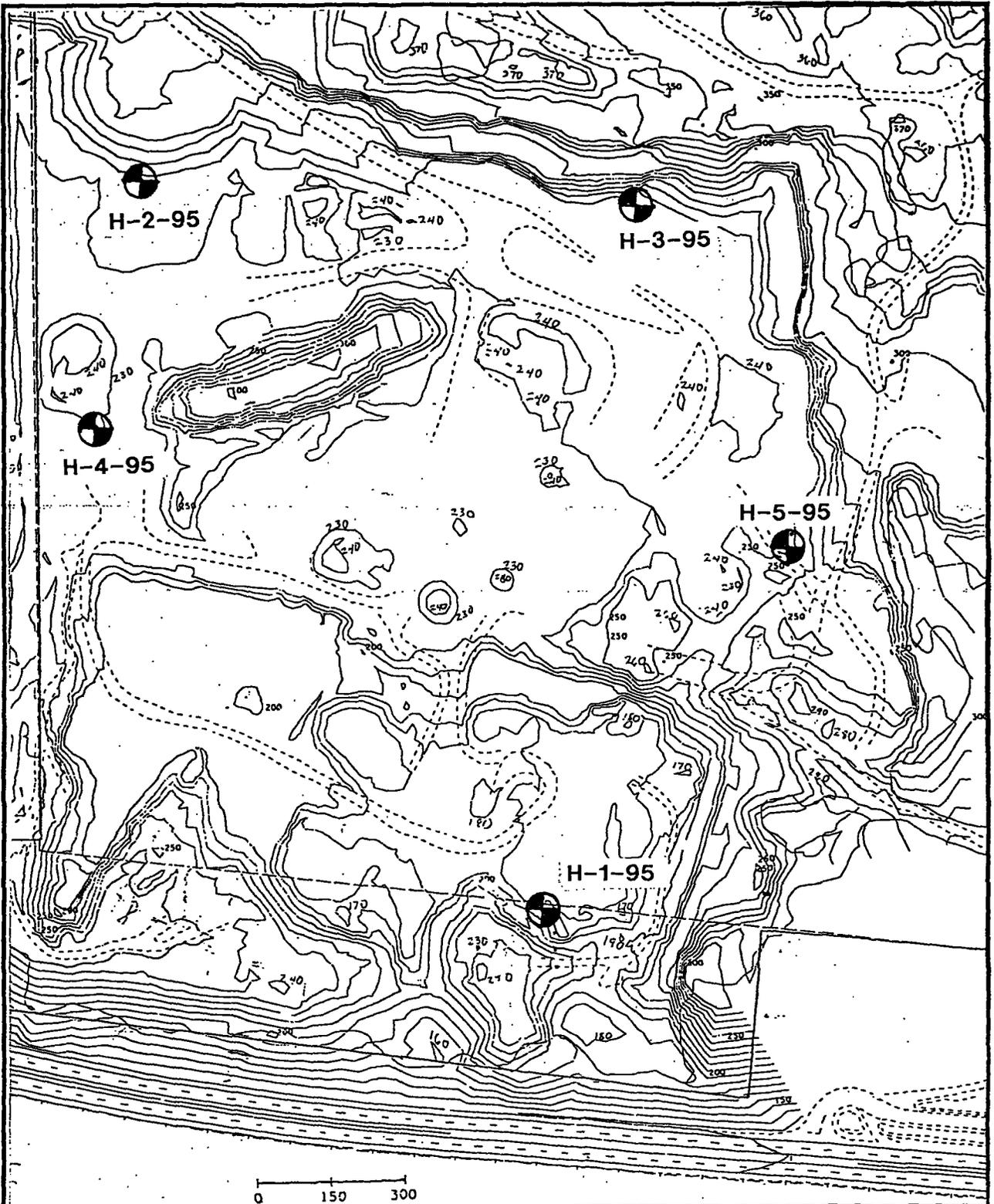


FIGURE 1: TEST HOLE LOCATIONS

JOB <u>SF-3142</u> S.R. <u>14</u> C.S. <u>0604</u>	
QS-G-78 MURHARD QUARRY	
QUARRY LEASE	
WASHINGTON STATE TRANSPORTATION COMMISSION	
DEPARTMENT OF TRANSPORTATION MATERIALS BRANCH	
D. JACKSON Materials Engineer	
DATE <u>NOV. 1995</u>	SCALE <u>NS</u> VERT.
	<u>1"=300'</u> HORIZ.
SHEET <u> </u> OF <u> </u>	DRAWN BY <u>PAA</u>

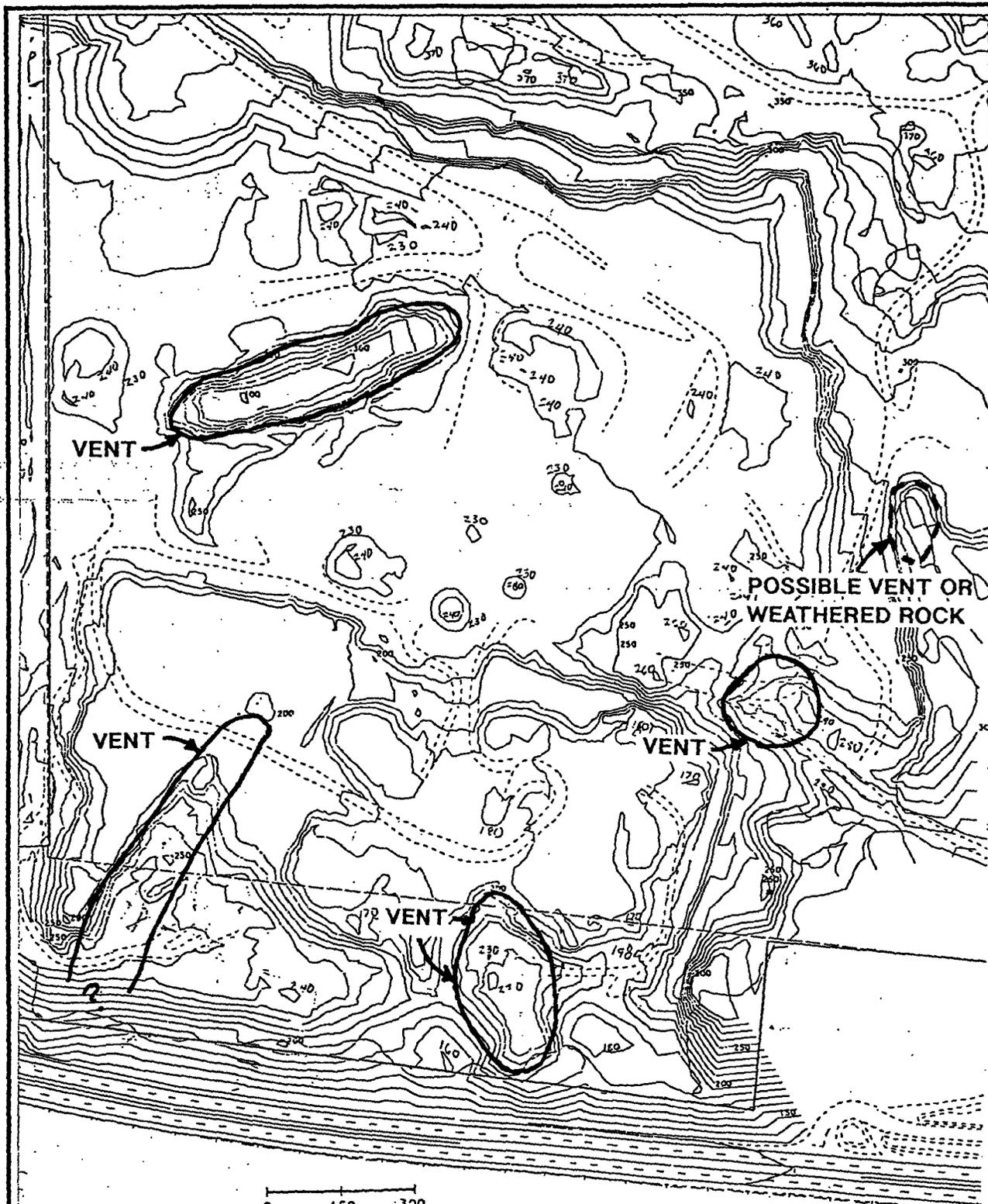
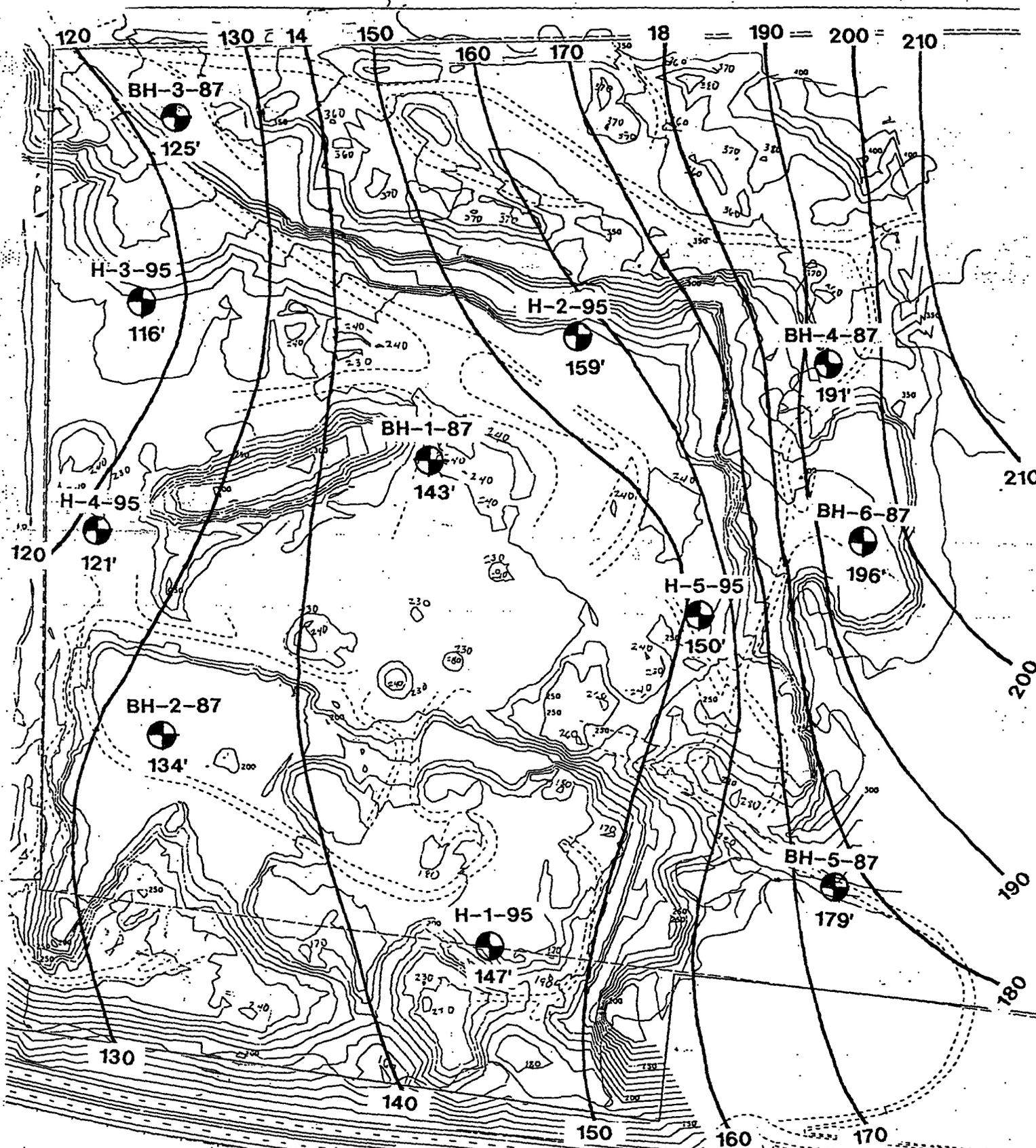


FIGURE 2: LOCATIONS OF VENT AREAS

JOB <i>SF-3142</i> S.R. <i>14</i> C.S. <i>0604</i>	
QS-G-78 MURHARD QUARRY QUARRY LEASE	
 WASHINGTON STATE TRANSPORTATION COMMISSION DEPARTMENT OF TRANSPORTATION MATERIALS BRANCH D. JACKSON Materials Engineer	DATE: <i>NOV. 1995</i> SCALE <i>NS</i> VERT. <i>1" = 300'</i> HORIZ. SHEET <i> </i> OF <i> </i> DRAWN BY <i>PAA</i>



0 150 300
SCALE IN FEET

FIGURE 3: ISOPAC MAP

TOPOGRAPHY OF THE BASAL LIMIT OF BORING LAVA

JOB SF-3142 S.R. 14 C.S. 0604	
QS-G-78 MURHARD QUARRY QUARRY LEASE	
WASHINGTON STATE TRANSPORTATION COMMISSION DEPARTMENT OF TRANSPORTATION MATERIALS BRANCH	DATE: NOV. 1995 SCALE: N.S. VERT. 1" = 300' HORIZ.
D. JACKSON Materials Engineer	SHEET ___ OF ___ DRAWN BY PAA

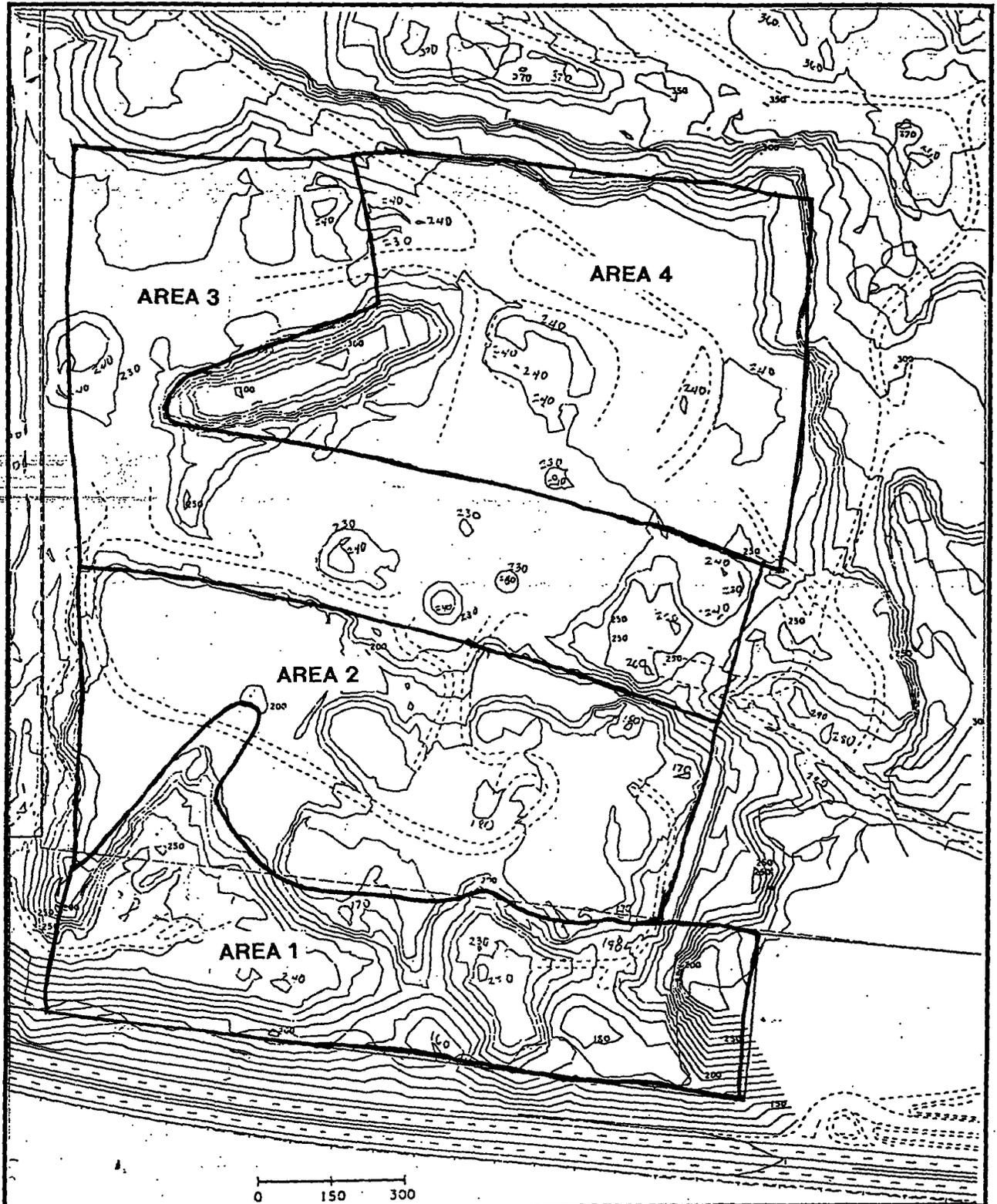


FIGURE 4: AREAS OF QUANTITY ESTIMATES

JOB <i>SF-3142</i> SR <i>14</i> CS <i>0604</i>	
QS-G-78 MURHARD QUARRY QUARRY LEASE	
WASHINGTON STATE TRANSPORTATION COMMISSION DEPARTMENT OF TRANSPORTATION MATERIALS BRANCH D. JACKSON Materials Engineer	DATE <i>Nov. 1995</i> SCALE <i>NS</i> VERT. <i>1"=300'</i> HORIZ. SHEET <i> </i> OF <i> </i> DRAWN BY <i>PAA</i>

Appendix A

Boring Logs

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LOG OF TEST BORING



Washington State
Department of Transportation

HOLE No. H-1-95

Sheet 2 of 3

PROJECT QS-G-78, Murhard Quarry

Job No. SF-3142

Depth (ft)	Meters (m)	Profile	Rock Quality Designation (%)				% Rec. FPF	Rock Strength Sample Type	Sample No.	Lab Tests	Description of Material	Groundwater	Instrument
			20	40	60	80							
7		▽▽▽▽					90 8	C-5		BASALT, dark gray, fine grained, fresh, strong (to 23'), changing to medium grained, vesicular, very strong to strong, with fractured pieces of cobbles and gravel with silty infilling. Core Recovery = 90% (4.5 ft.)			
25		++++					90 6	C-6		BASALT, dark gray, medium grained and vesicular, medium strong. At 29.5 ft. becomes altered, with broken fine to coarse gravel-sized rock with silty infilling, increasingly vesicular. Core Recovery = 90% (4.5 ft.)			
30		○○○○					17	C-7		BASALT cobbles with silt and very fine, dark brown sand matrix. Void? with sand (33' to 37'), Washed away core. Core Recovery = 17% (0.85 ft.)			
35		○○○○					95 2	C-8		SANDSTONE and CONGLOMERATE with vesicular basalt cobbles, coarse grained, moderately weathered, brown to dark brown to black, medium strong to weak to medium strong, stratified. Core Recovery = 95% (4.75').			
40		○○○○					90 1	C-9		CONGLOMERATE with sandy matrix, vesicular basalt cobbles and granitic gravel, dark gray, coarse grained, moderately weathered, medium strong to weak, stratified. Core Recovery = 60% (4.5 ft.).			
45		○○○○											

LOG OF TEST BORING



Washington State
Department of Transportation

HOLE No. H-2-95

Sheet 3 of 6

PROJECT QS-G-78, Murhard Quarry

Job No. SF-3142

Depth (ft)	Meters (m)	Profile	Rock Quality Designation (%)				% Rec. FPF	Rock Strength Sample Type	Sample No.	Lab Tests	Description of Material	Groundwater	Instrument
			20	40	60	80							
14		[Hatched Profile]	[Hatched Area]				100/0		C-10		BASALT, gray, fine grained, fresh, strong rock. Core Recovery = 100% (5 ft.)		
15			[Hatched Area]				100/1		C-11		BASALT, gray, fine grained, fresh, strong rock. Core Recovery = 100% (5 ft.)		
50			[Hatched Area]				100/1		C-12		BASALT, gray, fine, grained, fresh, strong rock. Fractures are closely spaced, and in good condition. Core Recovery = 100% (5 ft.)		
16			[Hatched Area]				100/1		C-13		BASALT, gray, fine, grained, fresh, strong rock. Fractures are closely spaced, and in good condition. Core Recovery = 100% (5 ft.)		
55		[Hatched Profile]	[Hatched Area]				100/1		C-14		BASALT, dark gray, fine to very fine grained, fresh, strong to very strong rock. Fractures are closely spaced, and in good condition. Core Recovery = 100% (5 ft.)		
17			[Hatched Area]				100/2						
18			[Hatched Area]										
60			[Hatched Area]										
19			[Dashed Profile]										
65			[Dashed Profile]										
20			[Dashed Profile]										
21			[Dashed Profile]										
70			[Dashed Profile]										

LOG OF TEST BORING



Washington State
Department of Transportation

HOLE No. H-2-95

Sheet 4 of 6

PROJECT QS-G-78, Murhard Quarry

Job No. SF-3142

Depth (ft)	Meters (m)	Profile	Rock Quality Designation (%)				% Rec. FPF	Rock Strength Sample Type	Sample No.	Lab Tests	Description of Material	Groundwater	Instrument
			20	40	60	80							
22							$\frac{100}{1}$		C-15				
75	23						$\frac{100}{2}$		C-16				
80	24												
85	25						$\frac{100}{1}$		C-17				
90	26						$\frac{100}{0}$		C-18				
95	27												
	28						$\frac{100}{1}$		C-19				

LOG OF TEST BORING



Washington State
Department of Transportation

HOLE No. H-2-95

Sheet 5 of 6

PROJECT QS-G-78, Murhard Quarry

Job No. SF-3142

Depth (ft)	Meters (m)	Profile	Rock Quality Designation (%)				% Rec. FPF	Rock Strength Sample Type	Sample No.	Lab Tests	Description of Material	Groundwater	Instrument
			20	40	60	80							
29		[Hatched Profile]	[Hatched Area]				100	[Vertical Line]	C-20		BASALT, dark gray, fine to very fine grained, fresh, very strong rock. Fractures are closely spaced, and in good condition. Core Recovery = 100% (5 ft.)		
30						100	C-21			BASALT, dark gray, fine to very fine grained, fresh, very strong rock. Fractures are closely spaced, and in good condition. Core Recovery = 100% (5 ft.)			
100						100	C-22			BASALT, dark gray, fine to very fine grained, fresh, very strong rock. Fractures are closely spaced, and in good condition. Core Recovery = 100% (5 ft.)			
31						100	C-23			CONGLOMERATE and SANDSTONE with basalt boulders, gray, fine grained, poorly cemented. Core recovery = 81% (4.1 ft.)			
105		[Hatched Profile]	[Hatched Area]				100		C-24		CONGLOMERATE and SANDSTONE with basalt boulders, gray, fine grained, poorly cemented. Core recovery = 70% (3.5 ft.)		
32						100							
33		[Circle Profile]	[Hatched Area]				81						
110						81							
34						81							
115		[Circle Profile]	[Hatched Area]				70						
35						70							
36		[Circle Profile]	[Hatched Area]										
120		[Circle Profile]	[Hatched Area]										

LOG OF TEST BORING



Washington State
Department of Transportation

HOLE No. H-3-95

PROJECT QS-G-78, Murhard Quarry

Job No. SF-3142

Quarry Lease

S.R. 14

Station _____ Offset _____

C.S. 0604

Equipment CME 45 Casing HQ X 80'

Ground El 230.0 (70.10 m)

Method of Boring Wet Rotary

Start Date October 26, 1995

Completion Date November 7, 1995

Sheet 1 of 4

Depth (ft)	Meters (m)	Profile	Rock Quality Designation (%)				% Rec. FPF	Rock Strength	Sample Type	Sample No.	Lab Tests	Description of Material	Groundwater	Instrument
			20	40	60	80								
1							$\frac{100}{2}$			C-1		BASALT, gray, medium to fine grained, fresh, strong rock. Fractures are closely spaced and in good condition. Core Recovery = 100% (5 ft.)		
5							$\frac{100}{1}$			C-2		BASALT, gray, medium to fine grained, fresh, strong rock. Fractures are closely spaced and in good condition. Core Recovery = 100% (5 ft.)		
10							$\frac{100}{1}$			C-3		BASALT, gray, fine grained, fresh, strong rock. Fractures are closely spaced and in good condition. Core Recovery = 100% (5 ft.)		
15							$\frac{100}{0}$			C-4		BASALT, gray, fine grained, fresh, strong rock. Fractures are closely spaced and in good condition. Core Recovery = 100% (5 ft.)		
20														

LOG OF TEST BORING



Washington State
Department of Transportation

HOLE No. H-4-95

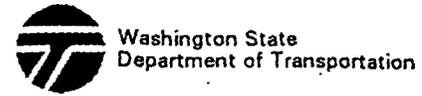
Sheet 2 of 5

PROJECT QS-G-78, Murhard Quarry

Job No. SF-3142

Depth (ft)	Meters (m)	Profile	Rock Quality Designation (%)				% Rec. FPF	Rock Strength Sample Type	Sample No.	Lab Tests	Description of Material	Groundwater	Instrument	
			20	40	60	80								
7							100/0	C-5		BASALT, gray, medium grained, fresh, strong rock. Fractures are closed and healed. Core Recovery = 100% (5 ft.)				
25							100/0							
8							100/0						C-6	BASALT, gray, medium grained, fresh, strong rock. Fractures are closed and healed. Core Recovery = 100% (5 ft.)
9							100/0						C-7	BASALT, gray, medium grained, fresh, strong rock. Fractures are open, closed, and healed. Core Recovery = 100% (5 ft.)
10							100/0						C-8	BASALT, gray, medium grained, fresh, strong rock. Fractures are open, closed, and healed. Core Recovery = 100% (5 ft.)
35						100/0	C-8	BASALT, gray, medium grained, fresh, strong rock. Fractures are open, closed, and healed. Core Recovery = 100% (5 ft.)						
11						100/0	C-8	BASALT, gray, medium grained, fresh, strong rock. Fractures are open, closed, and healed. Core Recovery = 100% (5 ft.)						
12						100/0	C-8	BASALT, gray, medium grained, fresh, strong rock. Fractures are open, closed, and healed. Core Recovery = 100% (5 ft.)						
40						100/0	C-8	BASALT, gray, medium grained, fresh, strong rock. Fractures are open, closed, and healed. Core Recovery = 100% (5 ft.)						
13						100/0	C-9	BASALT, gray, medium grained, fresh, strong rock. Fractures are open and closed, closely spaced and in good condition. Core Recovery = 100% (5 ft.)						
45						100/0	C-9	BASALT, gray, medium grained, fresh, strong rock. Fractures are open and closed, closely spaced and in good condition. Core Recovery = 100% (5 ft.)						

LOG OF TEST BORING



HOLE No. H-4-95

Sheet 3 of 5

PROJECT QS-G-78, Murhard Quarry

Job No. SF-3142

Depth (ft)	Meters (m)	Profile	Rock Quality Designation (%)				% Rec. FPF	Rock Strength Sample Type	Sample No.	Lab Tests	Description of Material	Groundwater	Instrument
			20	40	60	80							
14		[Hatched Profile]	[Hatched Area]				100/0		C-10		BASALT, gray, medium grained, fresh, strong rock. Fractures are closely spaced and in good condition, closed. Core Recovery = 100% (5 ft.)		
15			[Hatched Area]				100/1		C-11		BASALT, gray, medium grained, fresh, strong rock. Fractures are open and closed, closely spaced and in good condition. Core Recovery = 100% (5 ft.)		
16			[Hatched Area]				100/3		C-12		BASALT, dark gray, medium to fine grained, fresh, strong rock. Fractures are open and closed, closely spaced and in good condition. Core Recovery = 100% (5 ft.)		
17			[Hatched Area]				100/3		C-13		BASALT, dark gray, medium to fine grained, fresh, strong rock. Fractures are, open and closed, closely spaced, and in good condition. Core Recovery = 100% (5 ft.)		
18			[Hatched Area]				100/3		C-14		BASALT, dark gray, fine grained, fresh, very strong rock. Fractures are open and closed, rough, closely spaced and in good condition. Core Recovery = 100% (5 ft.)		
19			[Hatched Area]										
20			[Hatched Area]										
21			[Hatched Area]										
70			[Hatched Area]										

LOG OF TEST BORING



Washington State
Department of Transportation

HOLE No. H-5-95

Sheet 2 of 4
Job No. SF-3142

PROJECT QS-G-78, Murhard Quarry

Depth (ft)	Meters (m)	Profile	Rock Quality Designation (%)				% Rec. FPF	Rock Strength Sample Type	Sample No.	Lab Tests	Description of Material	Groundwater	Instrument	
			20	40	60	80								
7		+	[Hatched area]				100/0	C-5		BASALT, gray, medium grained, fresh, moderately strong. Fractures are open, rough, closely spaced and in good condition. Core Recovery = 100% (5 ft.)				
25		+												
8		+												
9		+												
30		+	[Hatched area]				100/1	C-6		BASALT, dark gray, fine grained, fresh, very hard. Fractures are closed. Core Recovery = 100% (5 ft.)				
10		+												
35		+												
11		+												
40		+	[Hatched area]				100/1	C-7		BASALT, dark gray, fine grained, fresh, very hard. Fractures are open and closed, closely spaced, rough and in good condition. Core Recovery = 100% (5 ft.)				
12		+												
45		+												
13		+												
45		+	[Hatched area]				100/1	C-8		BASALT, dark gray, fine grained, fresh, very hard. Fractures are open, closely spaced and in good condition. Core Recovery = 100% (5 ft.)				
12		+												
11		+												
10		+												
13		+	[Hatched area]				100/1	C-9		BASALT, dark gray, fine grained, fresh, very hard. Fractures are open and closed, closely spaced and in fair condition. Core Recovery = 100% (5 ft.)				
40		+												
35		+												
30		+												

