

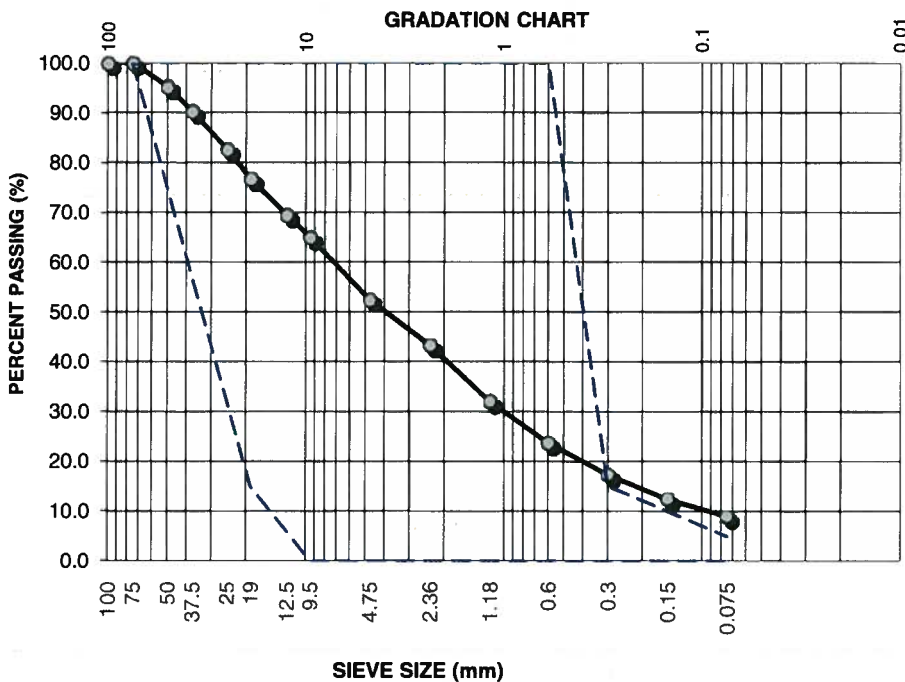


## SIEVE ANALYSIS REPORT

**CLIENT:** Ministry of Transportation & Infrastructure  
 310 - 1500 Woolridge St.  
 Coquitlam, BC V3K 0B8  
**ATTN:** Terence Lai

**Project Number:** VA06707-109  
**Date:** 18-Oct-13  
**Client P.O.:** 156CS0670

**PROJECT:** Forestry Pit- Fraser Valley District



**Lab Number:** L4710 ✓

**Date Sampled:** Sampled by MOTI

**Date Received:** 8-Oct-13

**Date Tested:** 9-Oct-13

**Sampled By:** MOTI

**Tested By:** William Mendez

**TP/TH No.:** Stockpile-South Area

**Bag No.:** 211 ✓

**Material Type:** Pit Run ✓


**Sample No.:** SA1

Gravel Sizes (mm)	Percent Passing	Gradation Limits	
		Lower	Upper
100	100	-	-
75	100	100	100
50	95	-	-
37.5	90	-	-
25	83	-	-
19	77	15	100
12.5	70	-	-
9.5	65	0	100

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits	
		Lower	Upper
4.75	52	-	-
2.36	43	-	-
1.18	32	-	-
0.6	24	0	100
0.3	17	0	15
0.15	12	-	-
0.075	9.0	0	5

**Comments:** Sieve analysis test was conducted in accordance with ASTM C136 and C117  
 Plotted to Table 202-C SGSB gradation specification

**Prepared By:** Giti Ghorbanian  
 Senior Materials Technologist

**Reviewed By:**   
 Riyadh Islam, M.A.Sc, P.Eng  
 Materials Engineer

AMEC Environment &  
Infrastructure  
#110 - 18568 - 96th Avenue  
Surrey British Columbia  
Canada, V4N 3P9  
Tel: 604-295-8657  
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## FRACTURE COUNT FOR COARSE AGGREGATE (BCH 1-13)

**CLIENT:** Ministry of Transportation & Infrastructure  
310 - 1500 Woolridge St.  
Coquitlam, BC V3K 0B8  
**ATTN:** Terence Lai

**Project Number:** VA06707-109  
**Date:** October 18, 2013  
**Client P.O.:** 156CS0670

**PROJECT:** Forestry Pit-Fraser Valley District

**Sample Source & ID:** Stockpile- South Area- Bag #211 SA #1 - Pit Run ✓  
**Lab No.:** L4710

Sieve Size (mm)	Total No. of Particles	No. of Fractured Particles	No. of Non Fractured Particles	% Fracture per Sieve	Total % Fracture
50 to 37.5					
37.5 to 25.0					
25.0 to 19.0	102	42	60	41	
19.0 to 12.5	259	90	169	35	
12.5 to 9.5	417	203	214	49	
9.5 to 4.75	764	312	452	41	
<b>Totals</b>	1542	647			<b>42</b>

**Comments:** Fracture Particles in Coarse Aggregate tests were conducted in accordance with BCH 1-13 Method A

**Prepared By:** \_\_\_\_\_

Giti Ghorbanian  
Senior Materials Technologist

**Reviewed By:** \_\_\_\_\_

*B2*

Riyad Islam, M.A.Sc, P.Eng  
Materials Engineer

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Tel: 604-295-8657  
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## FRACTURE COUNT FOR COARSE AGGREGATE (BCH 1-13)



**CLIENT:** Ministry of Transportation & Infrastructure  
310 - 1500 Woolridge St.  
Coquitlam, BC V3K 0B8  
**ATTN:** Terence Lai

**Project Number:** VA06707-109  
**Date:** October 18, 2013  
**Client P.O.:** 156CS0670

**PROJECT:** Forestry Pit-Fraser Valley District

**Sample Source & ID:** Stockpile- South Area- Bag #211 SA #1 - Pit Run  
**Lab No.:** L4710

Sieve Size (mm)	Original Weight (g)	Fractured Particles (g)	Non- Fractured Particles (g)	% Fracture
50 to 37.5				
37.5 to 25.0				
25.0 to 19.0	1699.5	497.4	1202.1	
19.0 to 13.2	1373.3	477.6	895.7	
13.2 to 9.5	1129.0	425.5	703.5	
<b>Totals</b>	4202	1400.5	2801.3	<b>33</b>

**Comments:** Fracture Particles in Coarse Aggregate tests were conducted in accordance with BCH 1-13 Method B

**Prepared By:** \_\_\_\_\_  
Giti Ghorbanian  
Senior Materials Technologist

**Reviewed By:** \_\_\_\_\_  
Riyad Islam, M.A.Sc, P.Eng  
Materials Engineer

## Test Results for Resistance of Aggregate to Degradation by Abrasion in the Micro-Deval



**CLIENT:** Ministry of Transportation & Infrastructure  
310 - 1500 Woolridge St.  
Coquitlam, BC V3K 0B8  
**ATTN:** Terence Lai

**Project Number:** VA06707-109  
**Date:** October 18, 2013  
**Client P.O.:** 156CS0670

**PROJECT:** Forestry Pit-Fraser Valley District

**Sample Source & ID:** Stockpile- South Area- Bag #211 SA #1 - Pit Run ✓  
**Lab No.:** L4710

### Coarse and Fine Aggregate

Grading	Initial Mass (g)	Final Mass (g)	Loss of Mass (g)	% Loss
	A	B	A - B	(A-B)*100/A
Coarse	1495.9	1226.4	269.5	18.0
Fine	502.5	431.5	71.0	14.1

### Comments:

Maximum size of aggregate is 50 mm.

Resistance of materials to Degradation by Abrasion in the Micro-Deval Apparatus was conducted in accordance with ASTM D6928 for Coarse aggregate and ASTM D7428 for Fine aggregate

Grading for coarse aggregate used for test is: 19-16 mm, 16-12.5 mm, 12.5-9.5 mm

Drain Brothers- Stony Lake Quarry was used as calibration coarse materials and percent loss is 15.0%. Southerland Sand was used as calibration fine materials and percent loss is 17.7%.

### MOTI Standard:

Maximum acceptable value of any base material is 25 or less

Maximum acceptable value of any Sub-base material is 30 or less

**Prepared By:** \_\_\_\_\_  
Giti Ghorbanian  
Senior Materials Technologist

**Reviewed By:** \_\_\_\_\_  
Riyad Islam, M.A.Sc, P.Eng  
Materials Engineer

AMEC Environment & Infrastructure  
#110 - 18568 - 96th Avenue  
Surrey British Columbia  
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## Sand Equivalent Value of Soils and Fine Aggregate



**CLIENT:** Ministry of Transportation & Infrastructure  
310 - 1500 Woolridge St.  
Coquitlam, BC V3K 0B8  
**ATTN:** Terence Lai

**Project Number:** VA06707-109  
**Date:** 18-Oct-13  
**Client P.O.:** 156CS0670

**PROJECT:** Forestry Pit-Fraser Valley District

---

**Sample type and No.:** Stockpile-South Area, Bag #211, SA#1- Pit Run


**Lab No.:** L4710

**Sample Source:** Sampled and Submitted by MOTI

Trial #	1	2	3
Sand Height, mm	91	91	84
Clay Height, mm	290	284	290
Sand Equivalent Value= 100*Sand Height/Clay Height	32	32	29
Average Sand Equivalent	31		

**Comments:** Sand Equivalent tests was conducted in accordance with ASTM D2419

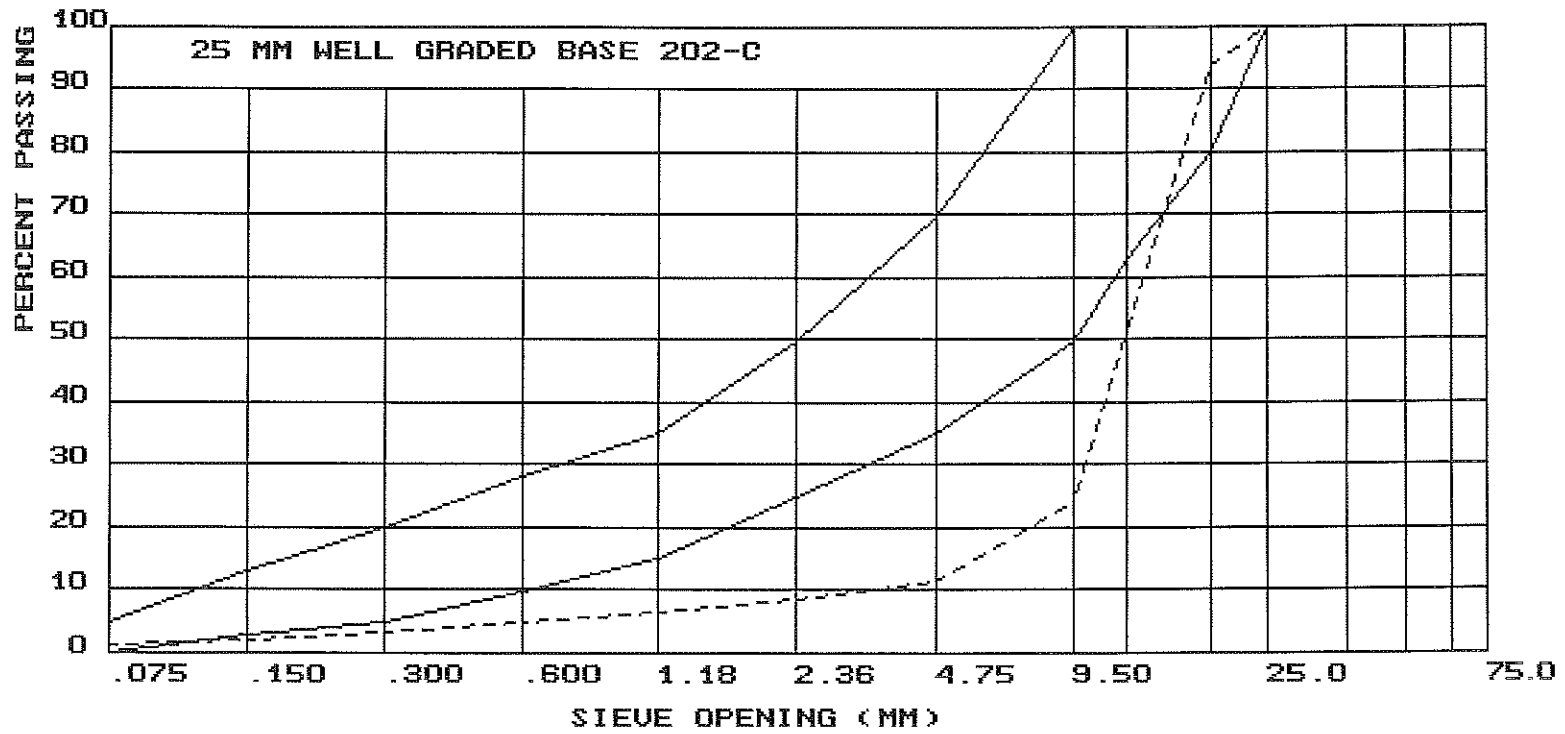
**Prepared By:** \_\_\_\_\_  
Giti Ghorbanian  
Senior Materials Technologist

**Reviewed By:** \_\_\_\_\_  
  
Riyad Islam, M.A.Sc, P.Eng  
Materials Engineer

AGGREGATE GRADATION CURVE

BLEND: Stock Pile % = 0.0

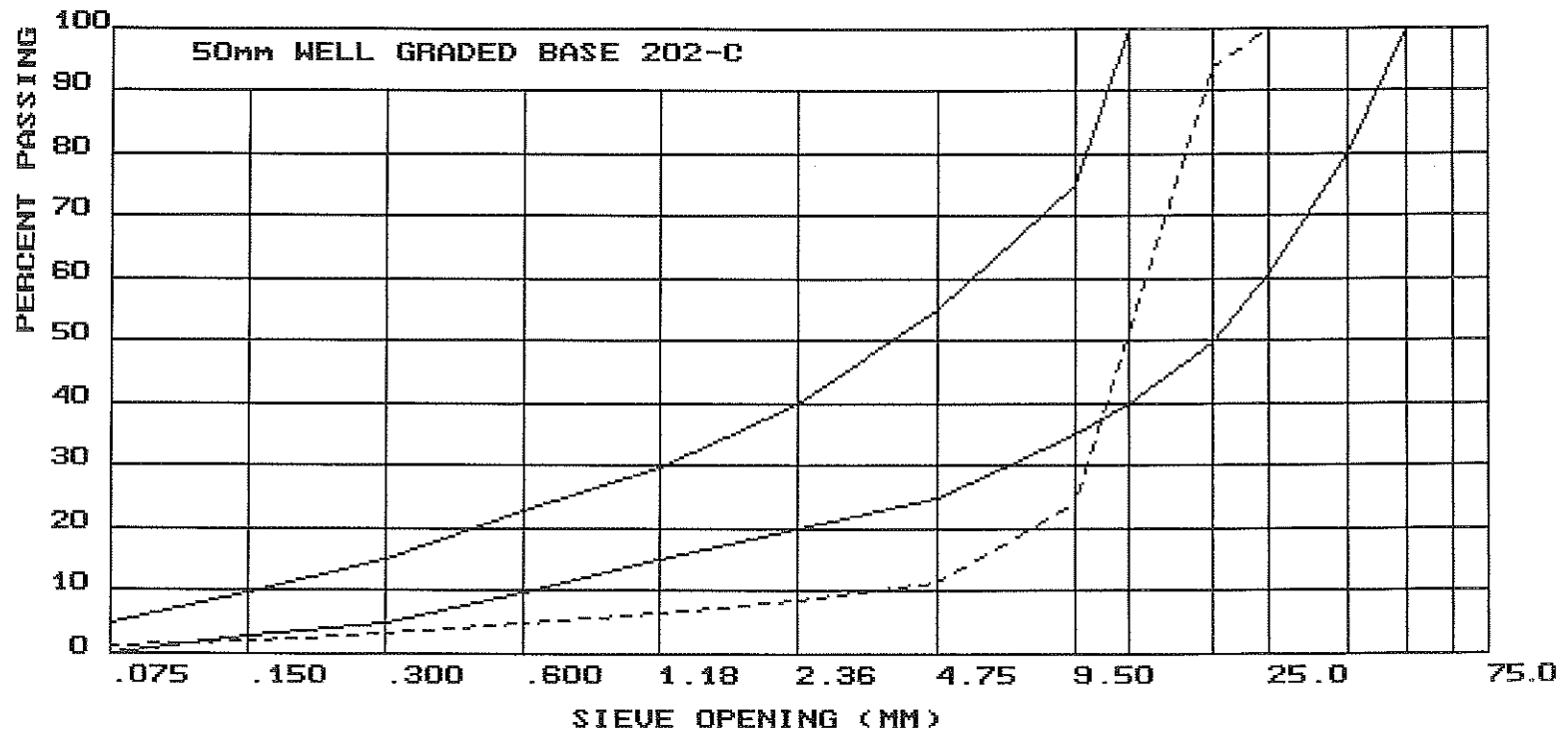
BASE: Stock Pile % = 100.0



AGGREGATE GRADATION CURVE

BLEND: Stock Pile % = 0.0

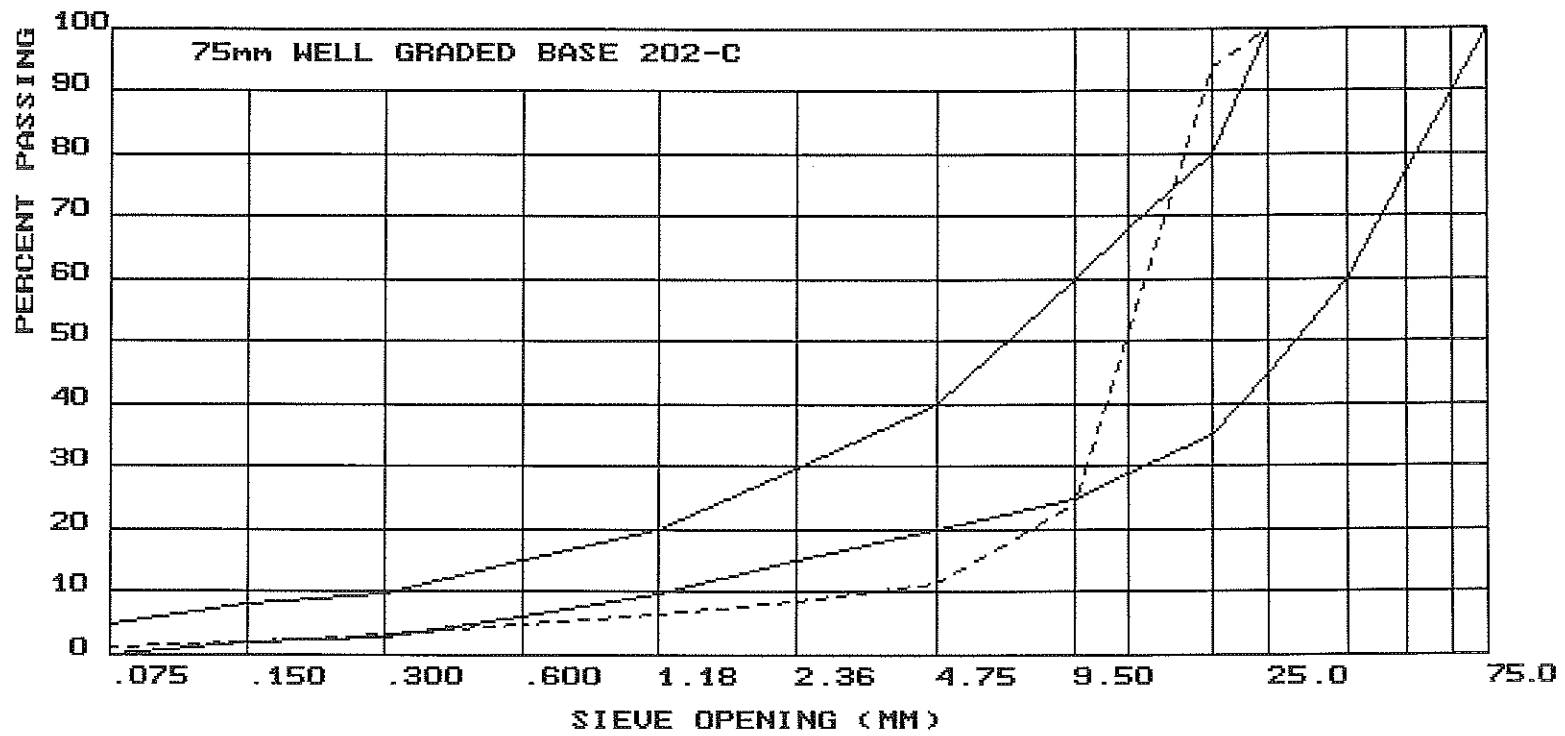
BASE: Stock Pile % = 100.0



AGGREGATE GRADATION CURVE

BLEND: Stock Pile % = 0.0

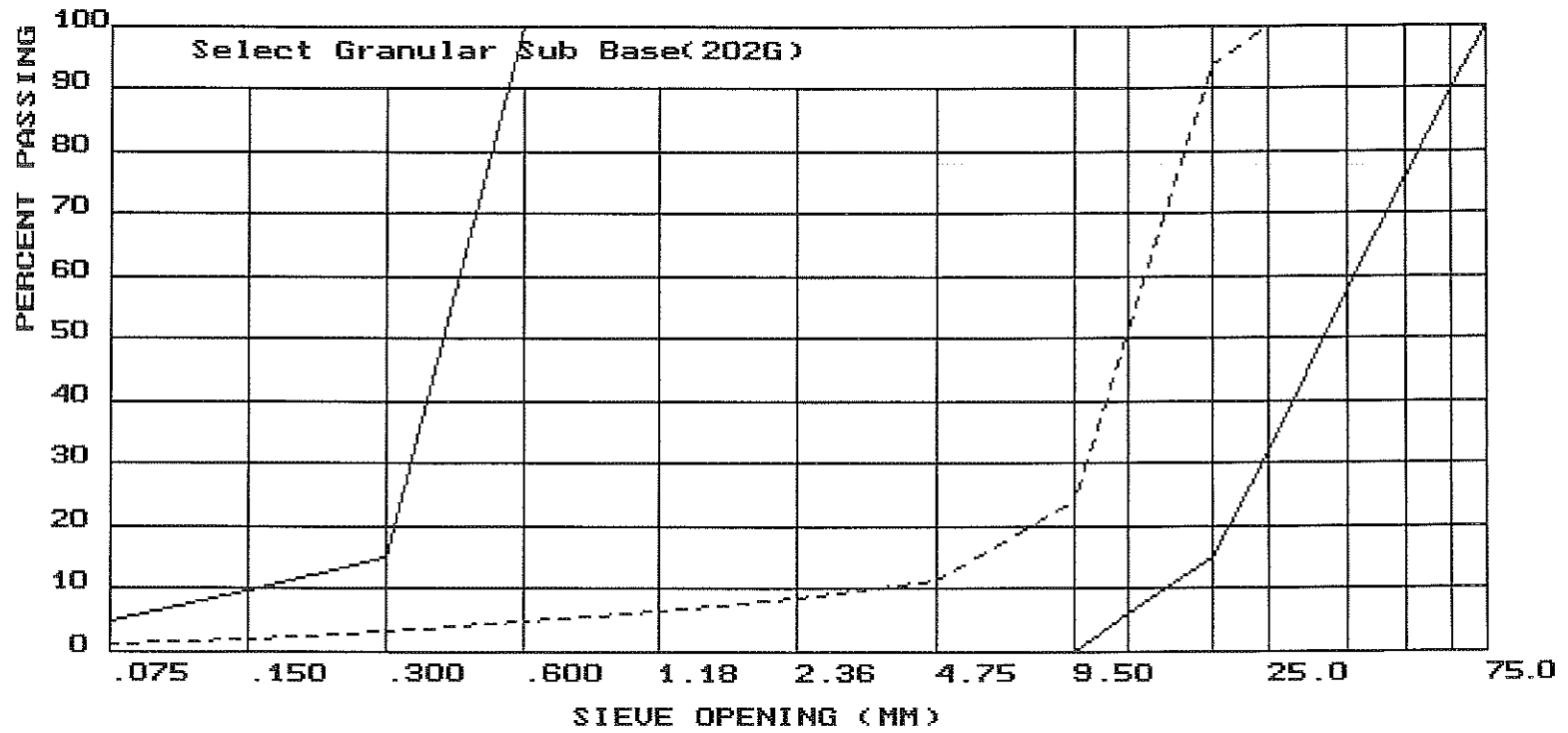
BASE: Stock Pile % = 100.0



AGGREGATE GRADATION CURVE

BLEND: Stock Pile % = 0.0

BASE: Stock Pile % = 100.0



**GEOTECHNICAL AND MATERIALS BRANCH  
SIEVE ANALYSIS**

**SAMPLE IDENTIFICATION**

PROJECT : Forestry Pit  
 GROUP : St.Pile TESTHOLE :  
 SAMPLE : 1 BAG :  
 DEPTH UPPER BOUNDARY : 0.0 LOWER BOUNDARY: 0.0  
 SAMPLED BY : KWL DATE : 99 9 9  
 SIEVE BY : T.W. DATE : 99 9 20  
 METHOD : COMMENTS : Forestry Pit Stockpile

**GRADATION INFORMATION NOT CORRECTED FOR OVERSIZE**

PERCENT ERROR COARSE : 0.0 P ERROR FINE : 0.0  
 PERCENT +255MM : 0.0 PERCENT GRAVEL: 88.4  
 PERCENT +150 - 225 : 0.0 PERCENT SAND : 10.4  
 PERCENT +75 - 150 : 0.0 PERCENT FINES : 1.2  
 CLASSIFICATION: GW COEFF CURV : 2.3 COEFF UNIF : 4.1  
 ORIGINAL MASS : 12540.0 AFTER WASHING : 12410.0 WASHED OUT : 130.0

MASS RETAINED	PERCENT RETAINED	PERCENT PASSING	SIEVE_SIZE
0.0	0.0	100.0	75.0 MM
0.0	0.0	100.0	63.0 MM
0.0	0.0	100.0	50.0 MM
0.0	0.0	100.0	37.5 MM
0.0	0.0	100.0	25.0 MM
795.0	6.3	93.7	19.0 MM
5270.0	42.0	51.6	12.5 MM
3465.0	27.6	24.0	9.50 MM
1550.0	12.4	11.6	4.75 MM
390.0	3.1	8.5	2.36 MM
243.0	1.9	6.6	1.18 MM
200.0	1.6	5.0	.600 MM
219.0	1.7	3.3	.300 MM
170.0	1.4	1.9	.150 MM
82.0	0.7	1.2	.075 MM
26.0	1.2	0.0	PAN



Wood Environmental & Infrastructure  
Solutions  
ATTN: Giti Ghorbanian  
# 600 - 4445 Lougheed Hwy  
Burnaby BC V5C 0E4

Date Received: 17-AUG-20  
Report Date: 27-AUG-20 17:11 (MT)  
Version: FINAL

Client Phone: --

## Certificate of Analysis

Lab Work Order #: L2492300  
Project P.O. #: NOT SUBMITTED  
Job Reference: KA21172.1400  
C of C Numbers:  
Legal Site Desc:

Selam Worku  
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

# ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2492300-1				
		Description					
		Sampled Date	01-AUG-20				
		Sampled Time					
		Client ID	FORESTRY PIT (BAG 1019)				
Grouping	Analyte						
<b>SOIL</b>							
<b>Inorganic Parameters</b>	Water-Soluble Chloride Ion Content (%)		0.0075				
	Total Sulphate Ion Content (%)		<0.050				

## Reference Information

### Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<b>CL-S-CSA-A23-ED</b>	Soil	Water-Soluble Chloride Ion Content	CSA INTERNATIONAL A23.2
Water-soluble chloride content is determined by mixing soil with water then digesting by boiling in an autoclave for 15 minutes. After filtration of the hot digest, analysis by ion chromatography proceeds.			
<b>SO4-T-CSA-A23-ED</b>	Soil	Total Sulphate Ion Content	CSA INTERNATIONAL A23.2-3B
Total sulphate content is determined by mixing soil with water then hydrochloric acid, and digesting just below boiling point, for 15 minutes. Analysis by ion chromatography follows.			
NOTE: the CSA-A23 method states that for a total sulphate ion content greater than 0.2%, soluble sulphate ion content shall be determined on the basis of a water extraction. This water extraction requires the total sulphate ion content result to calculate the correct ratio for the water extraction.			

\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

*The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:*

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA

### Chain of Custody Numbers:

#### GLOSSARY OF REPORT TERMS

*Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.*

*mg/kg - milligrams per kilogram based on dry weight of sample.*

*mg/kg wwt - milligrams per kilogram based on wet weight of sample.*

*mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.*

*mg/L - milligrams per litre.*

*< - Less than.*

*D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).*

*N/A - Result not available. Refer to qualifier code and definition for explanation.*

*Test results reported relate only to the samples as received by the laboratory.*

**UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.**

*Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.*



## Quality Control Report

Workorder: L2492300

Report Date: 27-AUG-20

Page 1 of 2

Client: Wood Environmental & Infrastructure Solutions  
 # 600 - 4445 Lougheed Hwy  
 Burnaby BC V5C 0E4  
 Contact: Giti Ghorbanian

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>CL-S-CSA-A23-ED</b>								
	<b>Soil</b>							
<b>Batch</b>	<b>R5203000</b>							
<b>WG3392515-3</b>	<b>DUP</b>	<b>L2492300-1</b>						
Water-Soluble Chloride Ion Content		0.0075	0.0074		%	1.0	30	27-AUG-20
<b>WG3392515-2</b>	<b>LCS</b>							
Water-Soluble Chloride Ion Content			105.8		%		70-130	27-AUG-20
<b>WG3392515-1</b>	<b>MB</b>							
Water-Soluble Chloride Ion Content			<0.0025		%		0.0025	27-AUG-20
<b>SO4-T-CSA-A23-ED</b>								
	<b>Soil</b>							
<b>Batch</b>	<b>R5202780</b>							
<b>WG3392361-3</b>	<b>CRM</b>	<b>ED-634A_CEMENT</b>						
Total Sulphate Ion Content			83.2		%		80-120	27-AUG-20
<b>WG3392361-4</b>	<b>DUP</b>	<b>L2492300-1</b>						
Total Sulphate Ion Content		<0.050	<0.050	RPD-NA	%	N/A	30	27-AUG-20
<b>WG3392361-2</b>	<b>LCS</b>							
Total Sulphate Ion Content			101.4		%		70-130	27-AUG-20
<b>WG3392361-1</b>	<b>MB</b>							
Total Sulphate Ion Content			<0.050		%		0.05	27-AUG-20

# Quality Control Report

Workorder: L2492300

Report Date: 27-AUG-20

Page 2 of 2

## Legend:

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Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

## Sample Parameter Qualifier Definitions:

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Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

---

## Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

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The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



PROVINCE OF BRITISH COLUMBIA  
 MINISTRY OF TRANSPORTATION & HIGHWAYS  
 GEOTECHNICAL & MATERIALS BRANCH

Project FORESTRY PIT  
 Sta or T.H. \_\_\_\_\_ Sample # \_\_\_\_\_  
 Depth \_\_\_\_\_  
 Cost Code \_\_\_\_\_ Date 10-23-97  
 Technician BW

## DEGRADATION TEST

TRIAL #	1	2	3	4
Sediment Height (H) mm	<u>200</u>	<u>212</u>	<u>322</u>	<u>308</u>
Degradation Factor (D)	<u>24.76</u>	<u>22.47</u>	<u>6.25</u>	<u>7.93</u>
	<u>97-15</u>	<u>97-43</u>		
	✓ <u>97-15</u>	✓ <u>97-43</u>	✓ <u>97-9</u>	✓ <u>97-6</u>
	<u>37829</u>	<u>37931</u>	<u>37832</u>	<u>37835</u>

### CALCULATIONS

$$D = \frac{381 - H}{381 + 1.75 H} \times 100$$

PROVINCE OF BRITISH COLUMBIA  
 MINISTRY OF TRANSPORTATION & HIGHWAYS  
 GEOTECHNICAL & MATERIALS BRANCH

**DEGRADATION TEST**

Project Forestry Pit  
 Sta or T.H. \_\_\_\_\_ Sample # \_\_\_\_\_  
 Depth \_\_\_\_\_  
 Cost Code \_\_\_\_\_ Date 27-11-07  
 Technician T.W.

TRIAL #	1	2	3	4
Sediment Height (H) mm	<u>170</u>	<u>270</u>	<u>300</u>	<u>290</u>
Degradation Factor (D)	<u>31.10</u>	<u>13.01</u>	<u>8.94</u>	<u>10.24</u>
	<u>37828</u>	<u>37831</u>	<u>37936</u>	<u>37935</u>
	<u>97-16</u>	<u>97-10</u>	<u>97-37</u>	<u>97-38</u>
	✓	✓		✓

CALCULATIONS

$$D = \frac{381 - H}{381 + 1.75 H} \times 100$$

PROVINCE OF BRITISH COLUMBIA  
 MINISTRY OF TRANSPORTATION & HIGHWAYS  
 GEOTECHNICAL & MATERIALS BRANCH

Project FORESTRY Pit  
 Sta or T.H. \_\_\_\_\_ Sample # \_\_\_\_\_  
 Depth \_\_\_\_\_  
 Cost Code \_\_\_\_\_ Date NOV. 27/97  
 Technician J.D.

## DEGRADATION TEST

TRIAL #	1	2	3	4
Sediment Height (H) mm	<u>210</u>	<u>178</u>	<u>338</u>	<u>258</u>
Degradation Factor (D)	<u>22.45</u>	<u>29.31</u>	<u>4.42</u>	<u>15.08</u>
	<u>97-34</u> ✓	<u>97-29</u> ✓	#37930	#37827
	37937	37939	9744	97-17

### CALCULATIONS

$$D = \frac{381 - H}{381 + 1.75 H} \times 100$$

PROVINCE OF BRITISH COLUMBIA  
 MINISTRY OF TRANSPORTATION & HIGHWAYS  
 GEOTECHNICAL & MATERIALS BRANCH

Project Forestry Pit  
 Sta or T.H. \_\_\_\_\_ Sample # \_\_\_\_\_  
 Depth \_\_\_\_\_  
 Cost Code \_\_\_\_\_ Date Nov. 28/97  
 Technician J.D.

**DEGRADATION TEST**

TRIAL #	1	2	3	4
Sediment Height (H) mm	<u>374</u>	<u>324</u>	<u>196</u>	_____
Degradation Factor (D)	<u>6.68</u>	<u>6.01</u> ✓	<u>25.55</u>	_____
	# <u>37934</u> <u>97-39</u> ✓	<u>37933</u> <u>97-40</u> ✓	<u>37826</u> <u>97-21</u> ✓	

CALCULATIONS

$$D = \frac{381 - H}{381 + 1.75 H} \times 100$$

PROVINCE OF BRITISH COLUMBIA  
 MINISTRY OF TRANSPORTATION & HIGHWAYS  
 GEOTECHNICAL AND MATERIALS BRANCH

Project FORESTRY PIT  
 Sta. or T.H. \_\_\_\_\_ Sample # \_\_\_\_\_  
 Depth \_\_\_\_\_  
 Cost Code \_\_\_\_\_ Date 10-23-97  
 Technician BW.

**SAND EQUIVALENT TEST**

TRIAL #	1	2	3	4
Clay Height mm	<u>127</u>	<u>134</u>	<u>212</u>	<u>280</u>
Sediment Period	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>
Sand Height mm	<u>100</u>	<u>102</u>	<u>82</u>	<u>82</u>
	✓	✓	✓	
	<u>97-15</u>	<u>97-43</u>	<u>97-9</u>	<u>97-6</u>
Sand Equivalent (SE)	<u>78.7</u>	<u>76.1</u>	<u>37.7</u>	<u>29.3</u> ✓
	<u>37829</u>	<u>37931</u>	<u>37832</u>	<u>37935</u>

INTERPRETATION OF RESULTS

SE	50	40	30	20
	absence of plastic material		possible plastic material	plastic material

REMARKS:

CALCULATIONS:

$$\text{Sand Equivalent (SE)} = \frac{\text{Sand Height}}{\text{Clay Height}} \times 100$$

PROVINCE OF BRITISH COLUMBIA  
 MINISTRY OF TRANSPORTATION & HIGHWAYS  
 GEOTECHNICAL AND MATERIALS BRANCH

Project FORESTRY PIT  
 Sta. or T.H. \_\_\_\_\_ Sample # \_\_\_\_\_  
 Depth \_\_\_\_\_  
 Cost Code \_\_\_\_\_ Date 10-28-97  
 Technician BW

**SAND EQUIVALENT TEST**

TRIAL #	1	2	3	4
Clay Height mm	<u>131</u>	<u>160</u>	<u>198</u>	<u>130</u>
Sediment Period	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>
Sand Height mm	<u>82</u>	<u>80</u>	<u>88</u>	<u>102</u>
	<u>✓</u>	<u>✓</u>	<u>✓</u>	<u>✓</u>
Sand Equivalent (SE)	<u>97-37</u> <u>62.6</u>	<u>97-10</u> <u>50.0</u>	<u>97-38</u> <u>44.4</u>	<u>97-16</u> <u>78.5</u>
	<u>37936</u>	<u>37831</u>	<u>37835</u>	<u>37828</u>

INTERPRETATION OF RESULTS

SE	50	40	30	20
	absence of plastic material		possible plastic material	plastic material

REMARKS:

CALCULATIONS:

$$\text{Sand Equivalent (SE)} = \frac{\text{Sand Height}}{\text{Clay Height}} \times 100$$

PROVINCE OF BRITISH COLUMBIA  
 MINISTRY OF TRANSPORTATION & HIGHWAYS  
 GEOTECHNICAL AND MATERIALS BRANCH

Project FORESTRY PIT  
 Sta. or T.H. \_\_\_\_\_ Sample # \_\_\_\_\_  
 Depth 1997 PIT DEVEL.  
 Cost Code \_\_\_\_\_ Date 97-11-18  
 Technician B.W.

**SAND EQUIVALENT TEST**

TRIAL #	1	2	3	4
Clay Height mm	<u>338</u>	<u>256</u>	<u>130</u>	<u>134</u>
Sediment Period	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>
Sand Height mm	<u>84</u>	<u>80</u>	<u>98</u>	<u>90</u>
	<u>97-24</u> ✓	<u>97-21</u> ✓	<u>97-17</u> ✓	<u>97-44</u> ✓
Sand Equivalent (SE)	<u>24.9</u>	<u>31.3</u>	<u>75.4</u>	<u>67.2</u>
	<u>37939</u>	<u>37826</u>	<u>37827</u>	<u>37930</u>

INTERPRETATION OF RESULTS

SE	50	40	30	20
	absence of plastic material		possible plastic material	plastic material

REMARKS:

CALCULATIONS:

$$\text{Sand Equivalent (SE)} = \frac{\text{Sand Height}}{\text{Clay Height}} \times 100$$

PROVINCE OF BRITISH COLUMBIA  
 MINISTRY OF TRANSPORTATION & HIGHWAYS  
 GEOTECHNICAL AND MATERIALS BRANCH

Project FORESTRY PIT  
 Sta. or T.H.: ~~4997~~ AT Sample # \_\_\_\_\_  
 Depth 1997 PIT DEVEL.  
 Cost Code \_\_\_\_\_ Date 97-11-18  
 Technician J.D.

**SAND EQUIVALENT TEST**

TRIAL #	1	2	3	4
Clay Height mm	<u>190</u>	<u>262</u>	<u>328</u>	_____
Sediment Period	<u>20</u>	<u>20</u>	<u>20</u>	_____
Sand Height mm	<u>92</u>	<u>80</u>	<u>84</u>	_____
	<del>37935</del>			
	✓ 97-40	✓ 97-39	97-34 ✓	
Sand Equivalent (SE)	<u>48.4</u>	<u>30.5</u>	<u>25.6</u>	_____
	# 37933	37934	37937	

INTERPRETATION OF RESULTS

SE	50	40	30	20
	absence of plastic material		possible plastic material	plastic material

REMARKS:

CALCULATIONS:

$$\text{Sand Equivalent (SE)} = \frac{\text{Sand Height}}{\text{Clay Height}} \times 100$$

3  
13"

Ministry of Transportation and Highways  
 GEOTECHNICAL AND MATERIALS BRANCH

PROJECT FORESTRY PIT  
 Station or T.H. 97-8 Sample No. 1  
 Depth 37833 Cost Code \_\_\_\_\_  
 Date OCT. 27/97  
 Technician BW.

SOUNDNESS TEST (A.S.T.M. C88)

Sieve Size		Grading of Original Sample (%)	Mass of Test Fractions Before Test (g)	After 5 Cycles		Weighted Percentage Mass Loss (%)
Passing	Retained			Mass Remaining (g)	Loss (%)	
<b>SOUNDNESS TEST OF COARSE AGGREGATE</b>						
63 mm	50 mm	}	}			
50 mm	37.5 mm					
37.5 mm	25.0 mm	}	}			
25.0 mm	19.0 mm					
19.0 mm	12.5 mm	}	}	1002.7	871.1	13.1
12.5 mm	9.5 mm					
9.5 mm	4.75 mm	}	}	300.0	230.5	23.2
<b>TOTALS</b>		100.0				17.5

<b>SOUNDNESS TEST OF FINE AGGREGATE</b>						
★9.5 mm	4.75 mm					
4.75 mm	2.36 mm	44.0	100.0	59.5	40.5	17.8
2.36 mm	1.18 mm	29.6	100.0	55.2	44.8	13.3
1.18 mm	.600 mm	16.2	100.0	57.2	42.8	6.9
.600 mm	.300 mm	10.2	100.0	65.9	34.1	3.5
.300 mm	.150 mm					
.150 mm	PAN					
<b>TOTALS</b>		100.0				41.5

★ This Fraction is not used When Sample Contains Both Coarse and Fine Portions

% Of Initial Sample Passing 4.75 mm Sieve = \_\_\_\_\_%

REMARKS:- \_\_\_\_\_  
 \_\_\_\_\_

Ministry of Transportation and Highways  
 GEOTECHNICAL AND MATERIALS BRANCH

PROJECT FORESTRY PIT  
 Station or T.H. 97-42 Sample No. 1  
 Depth 37932 Cost Code \_\_\_\_\_  
 Date OCT 27/97  
 Technician BW.

SOUNDNESS TEST (A.S.T.M. C88)

Sieve Size		Grading of Original Sample (%)	Mass of Test Fractions Before Test (g)	After 5 Cycles		Weighted Percentage Mass Loss (%)
Passing	Retained			Mass Remaining (g)	Loss (%)	
<b>SOUNDNESS TEST OF COARSE AGGREGATE</b>						
63 mm	50 mm	}	}			
50 mm	37.5 mm					
37.5 mm	25.0 mm	}	}			
25.0 mm	19.0 mm					
19.0 mm	12.5 mm	}	}	1001.7	852.2	17.6
12.5 mm	9.5 mm			57.7	332.4	
9.5 mm	4.75 mm	}	}	300.2	215.1	28.4
				42.3		
<b>TOTALS</b>		100.0				22.1

<b>SOUNDNESS TEST OF FINE AGGREGATE</b>						
★9.5 mm	4.75 mm					
4.75 mm	2.36 mm	51.2		100.1	54.1	46.0
2.36 mm	1.18 mm	27.6		100.0	47.3	52.7
1.18 mm	.600 mm	13.5		100.0	46.3	53.7
.600 mm	.300 mm	7.7		100.0	55.4	44.6
.300 mm	.150 mm					
.150 mm	PAN					
<b>TOTALS</b>		100.0				48.8

★ This Fraction is not used When Sample Contains Both Coarse and Fine Portions

% Of Initial Sample Passing 4.75 mm Sieve = \_\_\_\_\_%

REMARKS:- \_\_\_\_\_  
 \_\_\_\_\_

Project # FORESTRY PIT  
 Bag # 37828  
 Technician : JJ

Testhole # \_\_\_\_\_  
 Date : Nov. 20/97

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates		
Method A (Count)			
Passing 37.5mm	Unfractured	_____	
Retained 25.0 mm	Fractured	_____	_____ % (25mm)
Passing 25.0mm	Unfractured	<u>5</u>	
Retained 19.0 mm	Fractured	<u>5</u>	<u>50.0</u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>18</u>	
Retained 12.5 mm	Fractured	<u>54</u>	<u>75.0</u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>74</u>	
Retained 9.5 mm	Fractured	<u>85</u>	<u>53.5</u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>565</u>	
Retained 4.75mm	Fractured	<u>704</u>	<u>55.5</u> % (4.75mm)
	Unfractured	<u>662</u>	
TOTAL	Fractured	<u>848</u>	<u>56.2</u> % Fracture A
METHOD (MASS)			
Passing 19.0mm	Unfractured	_____	
Retained 12.5 mm	Fractured	_____	_____ % (12.5mm)
Passing 12.5mm	Unfractured	_____	
Retained 9.5 mm	Fractured	_____	_____ % (9.5mm)
Passing 9.5mm	Unfractured	_____	
Retained 4.75mm	Fractured	_____	_____ % (4.75mm)
	Unfractured	_____	
Arithmetic Average	Fractured	_____	_____ % Fracture B

Project # Forestry Pit  
 Bag # 37835  
 Technician: J.J.

Testhole # \_\_\_\_\_  
 Date: Nov. 20/97

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates		
Method A (Count)			
Passing 37.5mm	Unfractured	_____	
Retained 25.0 mm	Fractured	_____	_____ % (25mm)
Passing 25.0mm	Unfractured	<u>2</u>	
Retained 19.0 mm	Fractured	<u>12</u>	<u>85.7</u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>10</u>	
Retained 12.5 mm	Fractured	<u>86</u>	<u>89.6</u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>13</u>	
Retained 9.5 mm	Fractured	<u>100</u>	<u>88.5</u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>88</u>	
Retained 4.75mm	Fractured	<u>53</u>	<u>85.9</u> % (4.75mm)
	Unfractured	<u>113</u>	
TOTAL	Fractured	<u>734</u>	<u>86.7</u> % Fracture A
METHOD (MASS)			
Passing 19.0mm	Unfractured	_____	
Retained 12.5 mm	Fractured	_____	_____ % (12.5mm)
Passing 12.5mm	Unfractured	_____	
Retained 9.5 mm	Fractured	_____	_____ % (9.5mm)
Passing 9.5mm	Unfractured	_____	
Retained 4.75mm	Fractured	_____	_____ % (4.75mm)
	Unfractured	_____	
Arithmetic Average	Fractured	_____	_____ % Fracture B

Project # Forestry Pit  
 Bag # 37833  
 Technician: J.Q.

Testhole # \_\_\_\_\_  
 Date: Nov. 20 / 97

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates		
Method A (Count)			
Passing 37.5mm	Unfractured	_____	
Retained 25.0 mm	Fractured	_____	_____ % (25mm)
Passing 25.0mm	Unfractured	<u>10</u>	
Retained 19.0 mm	Fractured	<u>19</u>	<u>65.5</u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>26</u>	
Retained 12.5 mm	Fractured	<u>55</u>	<u>67.9</u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>77</u>	
Retained 9.5 mm	Fractured	<u>120</u>	<u>60.9</u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>276</u>	
Retained 4.75mm	Fractured	<u>556</u>	<u>66.8</u> % (4.75mm)
	Unfractured	<u>389</u>	
TOTAL	Fractured	<u>750</u>	<u>65.9</u> % Fracture A
METHOD (MASS)			
Passing 19.0mm	Unfractured	_____	
Retained 12.5 mm	Fractured	_____	_____ % (12.5mm)
Passing 12.5mm	Unfractured	_____	
Retained 9.5 mm	Fractured	_____	_____ % (9.5mm)
Passing 9.5mm	Unfractured	_____	
Retained 4.75mm	Fractured	_____	_____ % (4.75mm)
	Unfractured	_____	
Arithmetic Average	Fractured	_____	_____ % Fracture B

Project # Forestry Pit  
 Bag # 37831  
 Technician: J. J.

Testhole # \_\_\_\_\_  
 Date: Apr. 20/97

97-10

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates		
Method A (Count)			
Passing 37.5mm	Unfractured	_____	
Retained 25.0 mm	Fractured	_____	_____ % (25mm)
Passing 25.0mm	Unfractured	<u>3</u>	
Retained 19.0 mm	Fractured	<u>8</u>	<u>72.7</u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>40</u>	
Retained 12.5 mm	Fractured	<u>67</u>	<u>62.6</u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>66</u>	
Retained 9.5 mm	Fractured	<u>131</u>	<u>66.5</u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>296</u>	
Retained 4.75mm	Fractured	<u>800</u>	<u>73.0</u> % (4.75mm)
	Unfractured	<u>405</u>	
TOTAL	Fractured	<u>1006</u>	<u>71.3</u> % Fracture A
METHOD (MASS)			
Passing 19.0mm	Unfractured	_____	
Retained 12.5 mm	Fractured	_____	_____ % (12.5mm)
Passing 12.5mm	Unfractured	_____	
Retained 9.5 mm	Fractured	_____	_____ % (9.5mm)
Passing 9.5mm	Unfractured	_____	
Retained 4.75mm	Fractured	_____	_____ % (4.75mm)
	Unfractured	_____	
Arithmetic Average	Fractured	_____	_____ % Fracture B

Project # Forestry  
 Bag # 37827  
 Technician : \_\_\_\_\_

97-17

Testhole # \_\_\_\_\_  
 Date : Nov. 28/97

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates		
Method A (Count)			
Passing 37.5mm	Unfractured	_____	
Retained 25.0 mm	Fractured	_____	_____ % (25mm)
Passing 25.0mm	Unfractured	<u>5</u>	
Retained 19.0 mm	Fractured	<u>22</u>	<u>81.5</u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>30</u>	
Retained 12.5 mm	Fractured	<del>77</del>	<u>72.0</u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>92</u>	
Retained 9.5 mm	Fractured	<u>136</u>	<u>59.7</u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>308</u>	
Retained 4.75mm	Fractured	<u>420</u>	<u>57.7</u> % (4.75mm)
	Unfractured	<u>435</u>	
TOTAL	Fractured	<u>755</u>	<u>63.5</u> % Fracture A
METHOD (MASS)			
Passing 19.0mm	Unfractured	_____	
Retained 12.5 mm	Fractured	_____	_____ % (12.5mm)
Passing 12.5mm	Unfractured	_____	
Retained 9.5 mm	Fractured	_____	_____ % (9.5mm)
Passing 9.5mm	Unfractured	_____	
Retained 4.75mm	Fractured	_____	_____ % (4.75mm)
	Unfractured	_____	
Arithmetic Average	Fractured	_____	_____ % Fracture B

Project # FORESTAY  
 Bag # 37937  
 Technician : \_\_\_\_\_

97-34

Testhole # 97-34  
 Date : Nov. 23 / 97

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates
Method A (Count)	
Passing 37.5mm	Unfractured _____
Retained 25.0 mm	Fractured _____ % (25mm)
Passing 25.0mm	Unfractured <u>6</u>
Retained 19.0 mm	Fractured <u>15</u> <u>71.4</u> % (19.0mm)
Passing 19.0mm	Unfractured <u>31</u>
Retained 12.5 mm	Fractured <u>54</u> <u>63.5</u> % (12.5mm)
Passing 12.5mm	Unfractured <u>97</u>
Retained 9.5 mm	Fractured <u>101</u> <u>51.0</u> % (9.5mm)
Passing 9.5mm	Unfractured <u>322</u>
Retained 4.75mm	Fractured <u>584</u> <u>64.5</u> % (4.75mm)
	Unfractured <u>456</u>
TOTAL	Fractured <u>754</u> <u>62.3</u> % Fracture A
METHOD (MASS)	
Passing 19.0mm	Unfractured _____
Retained 12.5 mm	Fractured _____ % (12.5mm)
Passing 12.5mm	Unfractured _____
Retained 9.5 mm	Fractured _____ % (9.5mm)
Passing 9.5mm	Unfractured _____
Retained 4.75mm	Fractured _____ % (4.75mm)
	Unfractured _____
Arithmetic Average	Fractured _____ % Fracture B

Project # Forestry Pit  
 Bag # 37934  
 Technician: J. D.

Testhole # \_\_\_\_\_  
 Date: Nov. 28/97

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates		
Method A (Count)			
Passing 37.5mm	Unfractured	_____	
Retained 25.0 mm	Fractured	_____	_____ % (25mm)
Passing 25.0mm	Unfractured	<u>5</u>	
Retained 19.0 mm	Fractured	<u>119</u>	<u>84.9</u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>28</u>	
Retained 12.5 mm	Fractured	<u>97</u>	<u>77.6</u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>80</u>	
Retained 9.5 mm	Fractured	<u>204</u>	<u>71.8</u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>224</u>	
Retained 4.75mm	Fractured	<u>1176</u>	<u>84.0</u> % (4.75mm)
	Unfractured	<u>337</u>	
TOTAL	Fractured	<u>1496</u>	<u>81.6</u> % Fracture A
METHOD (MASS)			
Passing 19.0mm	Unfractured	_____	
Retained 12.5 mm	Fractured	_____	_____ % (12.5mm)
Passing 12.5mm	Unfractured	_____	
Retained 9.5 mm	Fractured	_____	_____ % (9.5mm)
Passing 9.5mm	Unfractured	_____	
Retained 4.75mm	Fractured	_____	_____ % (4.75mm)
	Unfractured	_____	
Arithmetic Average	Fractured	_____	_____ % Fracture B

Project # Forestry Pit 97-21  
 Bag # 37826  
 Technician: J.D.

Testhole # \_\_\_\_\_  
 Date: Nov. 28/97

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates	
Method A (Count)		
Passing 37.5mm	Unfractured	_____
Retained 25.0 mm	Fractured	_____ % (25mm)
Passing 25.0mm	Unfractured	<u>2</u>
Retained 19.0 mm	Fractured	<u>16</u> <u>88.9</u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>19</u>
Retained 12.5 mm	Fractured	<u>78</u> <u>80.4</u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>56</u>
Retained 9.5 mm	Fractured	<u>152</u> <u>73.1</u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>196</u>
Retained 4.75mm	Fractured	<u>460</u> <u>70.1</u> % (4.75mm)
	Unfractured	<u>273</u>
TOTAL	Fractured	<u>706</u> <u>72.1</u> % Fracture A
METHOD (MASS)		
Passing 19.0mm	Unfractured	_____
Retained 12.5 mm	Fractured	_____ % (12.5mm)
Passing 12.5mm	Unfractured	_____
Retained 9.5 mm	Fractured	_____ % (9.5mm)
Passing 9.5mm	Unfractured	_____
Retained 4.75mm	Fractured	_____ % (4.75mm)
	Unfractured	_____
Arithmetic Average	Fractured	_____ % Fracture B

Project # Forestry Pit 97-29  
 Bag # 37939  
 Technician: J. J.

Testhole # 97-29  
 Date: Nov. 25/97

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates		
Method A (Count)			
Passing 37.5mm	Unfractured	_____	
Retained 25.0 mm	Fractured	_____	_____ % (25mm)
Passing 25.0mm	Unfractured	<u>5</u>	
Retained 19.0 mm	Fractured	<u>17</u>	<u>77.3</u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>24</u>	
Retained 12.5 mm	Fractured	<u>61</u>	<u>71.8</u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>49</u>	
Retained 9.5 mm	Fractured	<u>118</u>	<u>70.7</u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>192</u>	
Retained 4.75mm	Fractured	<u>560</u>	<u>74.5</u> % (4.75mm)
	Unfractured	<u>270</u>	
TOTAL	Fractured	<u>756</u>	<u>73.7</u> % Fracture A
METHOD (MASS)			
Passing 19.0mm	Unfractured	_____	
Retained 12.5 mm	Fractured	_____	_____ % (12.5mm)
Passing 12.5mm	Unfractured	_____	
Retained 9.5 mm	Fractured	_____	_____ % (9.5mm)
Passing 9.5mm	Unfractured	_____	
Retained 4.75mm	Fractured	_____	_____ % (4.75mm)
	Unfractured	_____	
Arithmetic Average	Fractured	_____	_____ % Fracture B

Project # FORESTRY  
 Bag # 37930  
 Technician : B.W.

97-12

Testhole # 97-44  
 Date : 97-12-1

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates		
Method A (Count)			
Passing 37.5mm	Unfractured	<u>          </u>	
Retained 25.0 mm	Fractured	<u>          </u>	<u>          </u> % (25mm)
Passing 25.0mm	Unfractured	<u>      2      </u>	
Retained 19.0 mm	Fractured	<u>      22      </u>	<u>      92      </u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>      21      </u>	
Retained 12.5 mm	Fractured	<u>      96      </u>	<u>      82      </u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>      34      </u>	
Retained 9.5 mm	Fractured	<u>      113      </u>	<u>      77      </u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>      128      </u>	
Retained 4.75mm	Fractured	<u>      535      </u>	<u>      80      </u> % (4.75mm)
	Unfractured	<u>      185      </u>	
TOTAL	Fractured	<u>      766      </u>	<u>      80      </u> % Fracture A
METHOD (MASS)			
Passing 19.0mm	Unfractured	<u>          </u>	
Retained 12.5 mm	Fractured	<u>          </u>	<u>          </u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>          </u>	
Retained 9.5 mm	Fractured	<u>          </u>	<u>          </u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>          </u>	
Retained 4.75mm	Fractured	<u>          </u>	<u>          </u> % (4.75mm)
	Unfractured	<u>          </u>	
Arithmetic Average	Fractured	<u>          </u>	<u>          </u> % Fracture B

Project # FORESTRY  
 Bag # 37933  
 Technician : B.W.

97-44

Testhole # 97-40  
 Date : 97-12-1

METHOD "A" METHOD "B"	For Crushed granular Surfacing and Base Aggregates For Crushed Paving Aggregates		
Method A (Count)			
Passing 37.5mm	Unfractured	<u>          </u>	
Retained 25.0 mm	Fractured	<u>          </u>	<u>          </u> % (25mm)
Passing 25.0mm	Unfractured	<u>          1</u>	
Retained 19.0 mm	Fractured	<u>          11</u>	<u>          92</u> % (19.0mm)
Passing 19.0mm	Unfractured	<u>          21</u>	
Retained 12.5 mm	Fractured	<u>          82</u>	<u>          80</u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>          28</u>	
Retained 9.5 mm	Fractured	<u>          90</u>	<u>          76</u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>          127</u>	
Retained 4.75mm	Fractured	<u>          826</u>	<u>          87</u> % (4.75mm)
	Unfractured	<u>          177</u>	
TOTAL	Fractured	<u>          1009</u>	<u>          85</u> % Fracture A
METHOD (MASS)			
Passing 19.0mm	Unfractured	<u>          </u>	
Retained 12.5 mm	Fractured	<u>          </u>	<u>          </u> % (12.5mm)
Passing 12.5mm	Unfractured	<u>          </u>	
Retained 9.5 mm	Fractured	<u>          </u>	<u>          </u> % (9.5mm)
Passing 9.5mm	Unfractured	<u>          </u>	
Retained 4.75mm	Fractured	<u>          </u>	<u>          </u> % (4.75mm)
	Unfractured	<u>          </u>	
Arithmetic Average	Fractured	<u>          </u>	<u>          </u> % Fracture B

GRADATION SUMMARY

GROUP 1

PIT: Forestry Pit  
NOT CORRECTED FOR OVERSIZE

TH	SA	CLASS	FACT	+225	+150	+75	GRAV	SAND	FINE	75.0	63.0	50.0	37.5	25.0	19.0	12.5	9.50	4.75	2.36	1.18	.600	.300	.150	.075
97-06	1	GP	1.000	0	0	0	56	40	4	100	88	83	73	63	58	54	51	45	35	23	11	6	5	4.2
97-07	1	GP	1.000	0	0	0	83	13	4	100	100	91	76	57	48	38	30	17	12	10	9	7	5	4.0
97-08	1	GW	1.000	0	0	0	62	34	4	100	100	100	97	88	78	67	58	38	25	16	11	7	6	4.3
97-09	1	GP	1.000	0	0	0	77	19	4	100	97	89	84	67	56	43	35	23	21	19	18	13	7	4.1
97-10	1	GW	1.000	0	0	0	76	21	3	100	100	99	94	82	71	55	45	24	13	9	7	5	4	2.7
97-12	1	SP	1.000	0	0	0	39	57	4	100	100	98	96	94	90	84	77	61	47	35	25	12	5	3.6
97-15	1	SP	1.000	0	0	0	47	50	3	100	100	97	95	86	79	72	65	53	44	35	26	14	5	3.0
97-16	1	GW	1.000	0	0	0	52	46	2	100	93	91	88	81	76	69	64	48	32	21	11	6	3	1.9
97-17	1	GP	1.000	0	0	0	53	45	2	100	100	100	95	85	77	66	59	47	38	29	17	7	3	2.0
97-21	1	GW	1.000	0	0	0	64	33	3	100	100	94	88	75	67	57	51	36	25	17	11	6	4	3.3
97-23	1	GW	1.000	0	0	0	56	39	5	100	100	100	95	82	75	65	59	44	31	21	14	9	6	4.7
97-29	1	GP GM	1.000	0	0	0	64	31	5	100	100	90	83	72	64	55	49	36	24	17	12	8	6	5.2
97-32	1	GP	1.000	0	0	0	58	38	4	100	100	88	83	73	67	59	53	42	30	20	12	7	5	4.2
97-34	1	GW	1.000	0	0	0	49	47	4	100	100	100	98	86	81	73	67	50	33	22	13	6	4	3.7
97-37	1	GP GM	1.000	0	0	0	61	31	8	100	100	95	93	83	74	64	56	39	26	20	16	13	10	8.1
97-38	1	GP GM	1.000	0	0	0	71	23	6	100	97	95	92	79	67	54	46	29	20	15	12	10	7	5.7
97-39	1	GW	1.000	0	0	0	72	24	4	100	100	96	94	80	72	58	49	28	16	10	8	6	6	4.4
97-40	1	GW	1.000	0	0	0	68	29	3	100	100	96	95	87	77	65	54	32	16	9	6	5	4	3.0
97-42	1	GW	1.000	0	0	0	71	26	3	100	100	91	82	76	70	59	51	29	17	10	6	4	4	2.8
97-43	1	GP	1.000	0	0	0	57	41	2	100	100	92	85	79	72	64	57	43	33	24	15	6	3	2.1
97-44	1	GW	1.000	0	0	0	73	25	2	100	97	94	85	74	64	52	44	27	17	9	6	4	3	2.4
AVERAGE		GW		0	0	0	62	34	4	100	99	94	89	78	71	61	53	38	26	19	13	8	5	3.8

GRADATION SUMMARY

GROUP 2

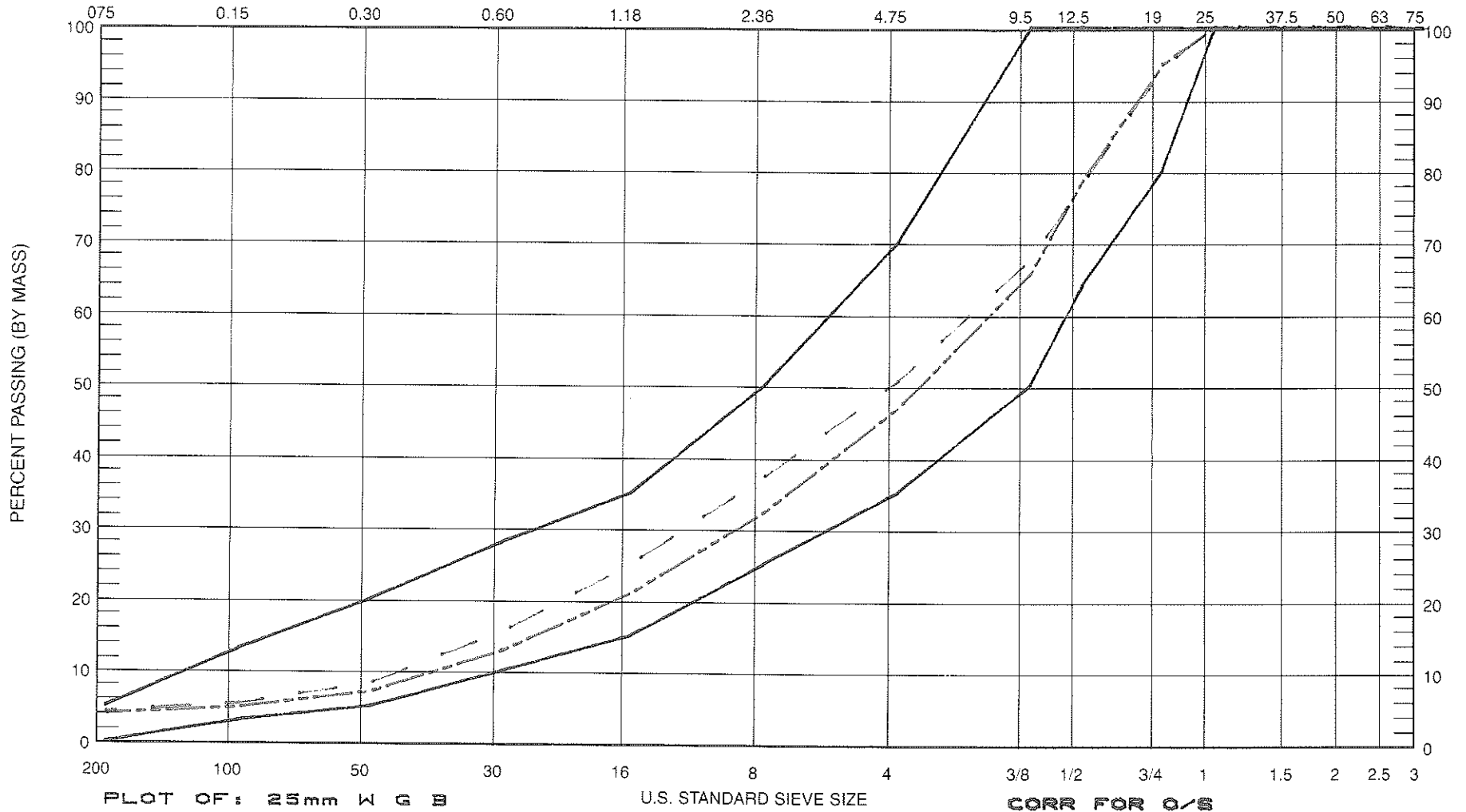
PIT: Forestry Pit  
NOT CORRECTED FOR OVERSIZE

TH	SA	CLASS	FACT	+225	+150	+75	GRAV	SAND	FINE	75.0	63.0	50.0	37.5	25.0	19.0	12.5	9.50	4.75	2.36	1.18	.600	.300	.150	.075
97-06	2	GP	1.000	0	0	0	50	46	4	100	100	100	100	100	92	73	63	51	40	27	14	8	6	4.4
97-08	2	GW	1.000	0	0	0	58	38	4	100	100	100	100	100	94	78	65	42	27	17	11	7	6	4.4
97-09	2	GP	1.000	0	0	0	67	28	5	100	100	100	100	100	93	65	51	32	25	21	19	13	8	4.7
97-10	2	GW	1.000	0	0	0	73	24	3	100	100	100	100	100	92	67	51	27	14	10	8	6	4	2.8
97-12	2	SP	1.000	0	0	0	37	59	4	100	100	100	100	100	98	89	81	63	49	37	26	12	6	3.7
97-16	2	SW	1.000	0	0	0	49	49	2	100	100	100	100	99	94	79	70	51	34	22	12	6	3	2.1
97-17	2	GP	1.000	0	0	0	50	48	2	100	100	100	100	100	94	77	66	51	42	33	20	9	4	2.3
97-21	2	GW	1.000	0	0	0	58	38	4	100	100	100	100	100	94	73	61	42	30	20	12	7	5	3.6
97-29	2	GP GM	1.000	0	0	0	57	37	6	100	100	100	100	100	94	73	61	43	30	21	14	9	7	5.6
97-34	2	SW	1.000	0	0	0	47	49	4	100	100	100	100	100	96	80	71	53	35	22	13	7	5	3.9
97-37	2	GP GM	1.000	0	0	0	58	34	8	100	100	100	100	100	94	76	64	43	28	21	17	13	11	8.3
97-38	2	GP GM	1.000	0	0	0	65	29	6	100	100	100	100	100	92	70	57	35	22	16	12	10	8	6.1
97-39	2	GW	1.000	0	0	0	65	30	5	100	100	100	100	99	93	73	59	35	18	11	9	7	6	4.8
97-40	2	GW	1.000	0	0	0	62	35	3	100	100	100	100	100	96	77	64	38	22	12	8	6	5	3.4
97-42	2	GW	1.000	0	0	0	66	31	3	100	100	100	100	99	92	72	59	34	19	11	8	5	4	3.1
97-43	2	GP	1.000	0	0	0	53	45	2	100	100	100	100	99	96	77	66	48	35	26	17	7	4	2.4
97-44	2	GW	1.000	0	0	0	65	32	3	100	100	100	100	99	93	71	57	35	19	11	7	5	4	2.8
AVERAGE		GW		0	0	0	58	38	4	100	100	100	100	100	94	75	63	43	29	20	13	8	5	4.0

# AGGREGATE GRADATION CHART

PROJECT: FORESTRY PIT  
DISTRICT: FRASER VALLEY

SIEVE OPENING (mm) FILE NUMBER: 1640F



PLOT OF: 25mm W G B

U.S. STANDARD SIEVE SIZE

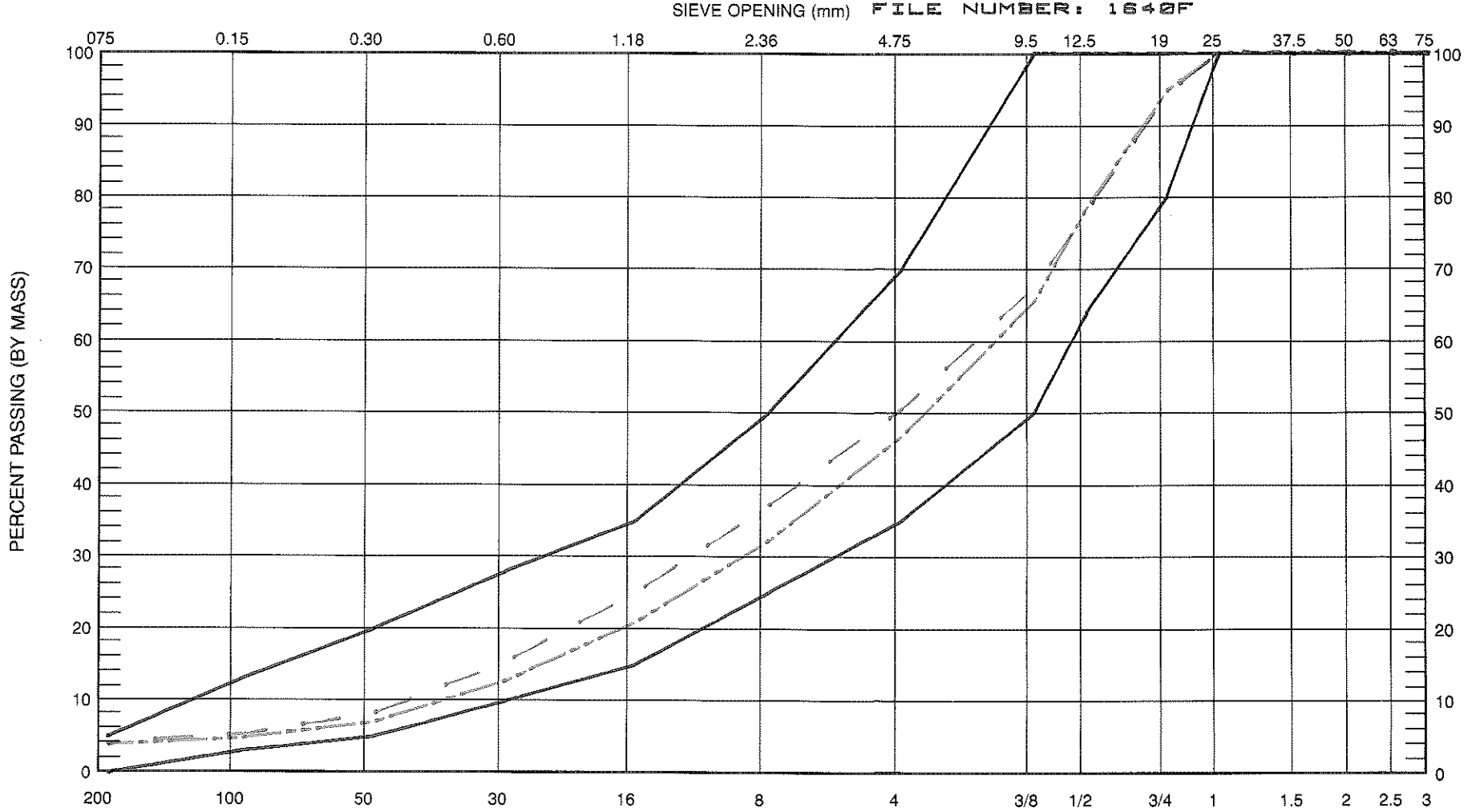
CORR FOR 0/5

BAG #	SAMPLE #	TESTHOLE/PIT	DEPTH	SAMPLE OF	SAMPLED BY	METHOD	DATE	TESTED BY	DATE
B4817	1	1	0.0 to 0.0	1	DH, RS, SB	PAVING	MAR 28 91	J W	MAR 28 91
CLASS: GW			CU: 17.8 CZ: 1.0	+200: 0 +100: 0		+75: 0 +4.75: 0		SAND: 40	FINES: 4
B4818	2	1	0.0 to 0.0	1	DH, RS, SB	PAVING	MAR 28 91	J W	MAR 28 91
CLASS: GP			CU: 19.4 CZ: 1.0	+200: 0 +100: 0		+75: 0 +4.75: 0		SAND: 40	FINES: 4

WELL GRADED BASE 25mm

# AGGREGATE GRADATION CHART

REGION: SOUTH COAST  
 PROJECT: FORESTRY PIT  
 DISTRICT: FRASER VALLEY  
 FILE NUMBER: 1640F



PLOT OF: 25mm W G B

U.S. STANDARD SIEVE SIZE

CORR FOR O/S

BAG #	SAMPLE #	TESTHOLE/PIT	DEPTH	SAMPLE OF	SAMPLED BY	METHOD	DATE	TESTED BY	DATE
24417	1	1	0.0 to 0.0	1	DH, RR, SB	PAVING	MAR 28 91	J W	MAR 28 91
CLASS: GW	CU: 17.9	CZ: 1.0		+200: 0	+150: 0	+75: 0	+4.75: 00	SAND: 40	FINES: 4
24418	2	1	0.0 to 0.0	1	DH, RR, SB	PAVING	MAR 28 91	J W	MAR 28 91
CLASS: GP	CU: 19.4	CZ: 1.0		+200: 0	+150: 0	+75: 0	+4.75: 00	SAND: 40	FINES: 4

WELL GRADED BASE 25mm

PROVINCE OF BRITISH COLUMBIA  
 MINISTRY OF TRANSPORTATION & HIGHWAYS  
 GEOTECHNICAL & MATERIALS BRANCH

Project FORESTRY PIT  
 Sta or T.H. \_\_\_\_\_ Sample # \_\_\_\_\_  
 Depth \_\_\_\_\_  
 Cost Code \_\_\_\_\_ Date APRIL 4 '91  
 Technician g/w

**DEGRADATION TEST**

BAG# TRIAL #	24577 1	24578 2	3	4
Sediment Height (H) mm	<u>207</u>	<u>196</u>	_____	_____
Degradation Factor (D)	<u>23.41</u>	<u>25.55</u>	_____	_____

CALCULATIONS

$$D = \frac{381 - H}{381 + 1.75 H} \times 100$$

1985

<u>C</u>	<u>F</u>
15.2	27.3

1991

<u>C</u>	<u>F</u>
13.4	19.3

Ministry of Transportation and Highways  
 GEOTECHNICAL AND MATERIALS BRANCH

PROJECT FORESTRY PIT

Station or T.H. \_\_\_\_\_ Sample No. \_\_\_\_\_

Depth \_\_\_\_\_ Cost Code \_\_\_\_\_

Date APRIL 3, 1991

Technician J. D.

SOUNDNESS TEST (A.S.T.M. C88)

Sieve Size		Grading of Original Sample (%)	Mass of Test Fractions Before Test (g)	After 5 Cycles		Weighted Percentage Mass Loss (%)	
Passing	Retained			Mass Remaining (g)	Loss (%)		
<b>SOUNDNESS TEST OF COARSE AGGREGATE</b>							
63 mm	50 mm	}	}	500.4	445.4	1.2	
50 mm	37.5 mm						
37.5 mm	25.0 mm	10.9	500.4	500.4	10.99	1.2	
25.0 mm	19.0 mm	}	}	1005.4	914.7	4.9	
19.0 mm	12.5 mm						
12.5 mm	9.5 mm	54.3	334.9	301.4	20.94	7.3	
9.5 mm	4.75 mm	34.8	301.4	238.3	20.94	7.3	
<b>TOTALS</b>		<b>100.0</b>					
						Max. Allowable = 20%	13.4%

<b>SOUNDNESS TEST OF FINE AGGREGATE</b>							
★9.5 mm	4.75 mm						
4.75 mm	2.36 mm	28.8	99.6	75.6	24.10	6.9	
2.36 mm	1.18 mm	24.0	99.6	71.6	28.11	6.7	
1.18 mm	.600 mm	18.3	99.5	79.5	20.10	3.7	
.600 mm	.300 mm	13.4	99.5	84.9	14.67	2.0	
.300 mm	.150 mm	5.4					
.150 mm	PAN	10.1					
<b>TOTALS</b>		<b>100.0</b>					
						Max. Allowable = 25%	19.3%

★ This Fraction is not used When Sample Contains Both Coarse and Fine Portions

% Of Initial Sample Passing 4.75 mm Sieve = \_\_\_\_\_%

REMARKS:- \_\_\_\_\_

Ministry of Transportation and Highways  
 GEOTECHNICAL AND MATERIALS BRANCH

PROJECT FORESTRY PIT

Station or T.H. 85-5 Sample No. 6339

Depth 0.0' - 4.5' Cost Code \_\_\_\_\_

Date 86-01-22

Technician B.T.R. J.W.

SOUNDNESS TEST (A.S.T.M. C88)

Sieve Size		Grading of Original Sample (%)	Mass of Test Fractions Before Test (g)	After 5 Cycles		Weighted Percentage Mass Loss (%)
Passing	Retained			Mass Remaining (g)	Loss (%)	
<b>SOUNDNESS TEST OF COARSE AGGREGATE</b>						
63 mm	50 mm	18.93	}		5.71	1.08
50 mm	37.5 mm					
37.5 mm	25.0 mm	35.44	}	1508.6	1422.5	5.71
25.0 mm	19.0 mm					
19.0 mm	12.5 mm	26.60	}	1007.6	767.9	23.79
12.5 mm	9.5 mm					
9.5 mm	4.75 mm	19.03		304.9	193.0	36.70
TOTALS		100.0				16.41

<b>SOUNDNESS TEST OF FINE AGGREGATE</b>						
★9.5 mm	4.75 mm					
4.75 mm	2.36 mm	16.55		100.8	48.6	51.78
2.36 mm	1.18 mm	13.31		101.0	42.9	57.52
1.18 mm	.600 mm	8.47		101.0	37.6	62.77
.600 mm	.300 mm	8.51		101.0	53.2	47.32
.300 mm	.150 mm	8.77				
.150 mm	PAN	44.39				
TOTALS		100.0				25.58

★ This Fraction is not used When Sample Contains Both Coarse and Fine Portions

% Of Initial Sample Passing 4.75 mm Sieve = \_\_\_\_\_%

REMARKS:- (35 PIECES + 19mm) CRACKING & CRUMBLING

Ministry of Transportation and Highways  
 GEOTECHNICAL AND MATERIALS BRANCH

PROJECT FORESTRY PIT  
 Station or T.H. 85-2B Sample No. #6218  
 Depth 6'-15' Cost Code \_\_\_\_\_  
 Date 86-01-22  
 Technician BTR 3 SW

SOUNDNESS TEST (A.S.T.M. C88)

Sieve Size		Grading of Original Sample (%)	Mass of Test Fractions Before Test (g)	After 5 Cycles		Weighted Percentage Mass Loss (%)
Passing	Retained			Mass Remaining (g)	Loss (%)	
<b>SOUNDNESS TEST OF COARSE AGGREGATE</b>						
63 mm	50 mm	15.40	}		4.26	.66
50 mm	37.5 mm					
37.5 mm	25.0 mm	23.13	} 510.1	1520.2	1455.4	4.26
25.0 mm	19.0 mm					
19.0 mm	12.5 mm	28.16	} 331.2	1004.7	831.4	17.24
12.5 mm	9.5 mm					
9.5 mm	4.75 mm	28.16	303.2	222.3	26.68	7.51
<b>TOTALS</b>		100.0				14.01

<b>SOUNDNESS TEST OF FINE AGGREGATE</b>						
★9.5 mm	4.75 mm					
4.75 mm	2.36 mm	32.71	100.8	63.4	37.01	12.10
2.36 mm	1.18 mm	20.06	101.0	54.4	46.14	9.26
1.18 mm	.600 mm	8.94	100.9	49.6	50.84	4.55
.600 mm	.300 mm	7.07	100.9	56.8	43.71	3.09
.300 mm	.150 mm	6.32				
.150 mm	PAN	24.90				
<b>TOTALS</b>		100.0				29.0

★ This Fraction is not used When Sample Contains Both Coarse and Fine Portions

% Of Initial Sample Passing 4.75 mm Sieve = \_\_\_\_\_%

REMARKS:- 5.15% RETAINED ON 63mm SIEVE (39 PIECES + 19mm)  
CRACKING & CRUMBLING

Ministry of Transportation and Highways

# ATTERBERG LIMITS

PROJECT *Sanctuary Rd*

T.H. *26-1*

DEPTH

Sample # *5*

TEST BY *Kane*

*Sept...09...19.86...*

## LIQUID LIMIT

Trial No.					
No. of Blows	S	<i>31</i>	<i>21</i>		
Container No.		<i>A37</i>	<i>262</i>		
Mass of Wet Sample + Tare		<i>47.48</i>	<i>42.87</i>		
Mass of Dry Sample + Tare		<i>43.44</i>	<i>39.05</i>		
Tare of Container		<i>37.41</i>	<i>33.54</i>		
Mass of Water		<i>4.04</i>	<i>3.82</i>		
Mass of Dry Soil		<i>6.03</i>	<i>5.51</i>		
MOISTURE CONTENT		<i>62.00</i>	<i>69.33</i>		
LIQUID LIMIT		<i>68.93</i>	<i>67.77</i>		

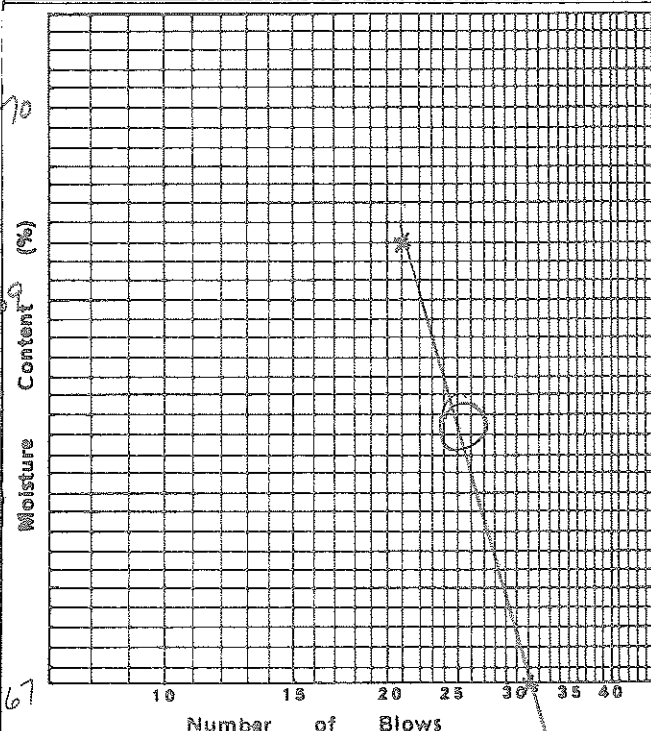
## PLASTIC LIMIT

Trial No.					
Container No.		<i>A-7</i>	<i>260</i>		
Mass Wet Sample + Tare		<i>38.10</i>	<i>39.47</i>		
Mass Dry Sample + Tare		<i>37.07</i>	<i>38.48</i>		
Tare of Container		<i>33.87</i>	<i>35.35</i>		
Mass of Water		<i>1.03</i>	<i>0.99</i>		
Mass of Dry Soil		<i>3.20</i>	<i>3.13</i>		
MOISTURE CONTENT		<i>32.19</i>	<i>31.63</i>		

NATURAL MOISTURE CONTENT ----- %

AV LIQUID LIMIT *68.35* ----- PLASTICITY INDEX *36.44* -----

AV PLASTIC LIMIT *31.91* ----- LIQUIDITY INDEX -----



LIQUID LIMIT FROM ONE POINT

$$L.L. = \frac{M.C. \text{ at } S}{1,419 - 0.3 \log_{10} S}$$

PLASTICITY INDEX

$$P.I. = L.L. - P.L.$$

*CH*

LIQUIDITY INDEX

$$L.I. = \frac{M.C. - P.L.}{P.I.}$$

CONSTANTS FOR ONE POINT FORMULA

BLOWS	DENOM:	BLOWS	DENOM:
20	1.029	26	.995
21	1.023	27	.990
22	1.017	28	.985
23	1.011	29	.980
24	1.005	30	.976
25	1.000	31	.972