

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136 & C 117



August 8, 2007

Ministry of Transportation
7818 6TH ST
Burnaby, B.C.
V3N 4N8

PROJECT NUMBER: 07-1416-0030/9000
SAMPLE NUMBER: 5

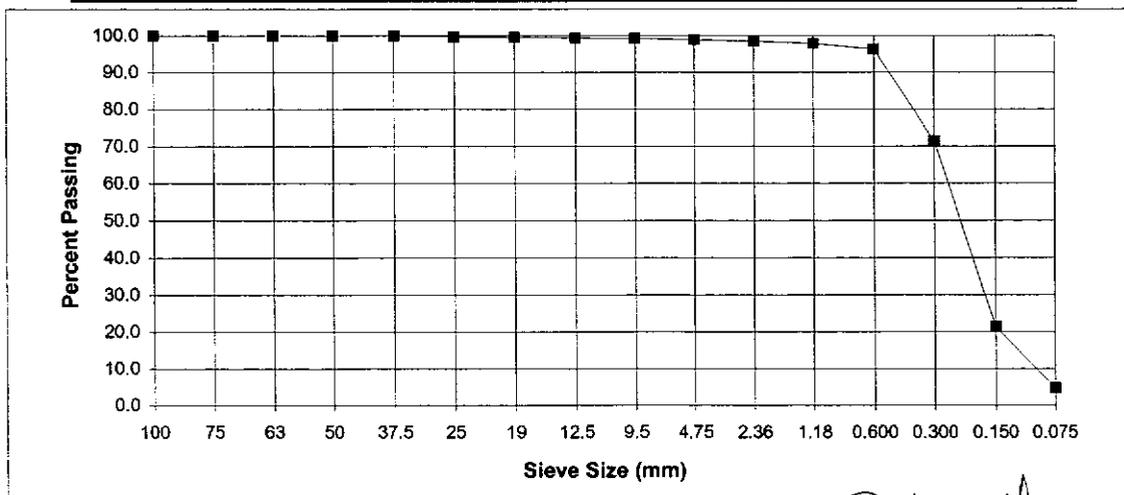
ATTN: Ken Lukawesky

PROJECT: Haney Pit Aggregate Testing

Sample:	TP 07-6, Bag #68
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DATE SAMPLED: July 18, 2007 SAMPLED BY: SL
DATE TESTED: August 7, 2007 TESTED BY: KF/TD

SIEVE ANALYSIS				
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)	
			+ 4.75	- 4.75
100	0.0	100.0	0.0	
75	0.0	100.0	0.0	
63	0.0	100.0	0.0	
50	0.0	100.0	0.0	
37.5	0.0	100.0	0.0	
25	0.3	99.7	30.0	
19	0.1	99.5	11.4	
12.5	0.1	99.4	12.1	
9.5	0.2	99.2	15.7	
4.75	0.3	98.9	30.7	
2.36	0.4	98.4		0.4
1.18	0.6	97.8		0.6
0.600	1.6	96.3		1.6
0.300	24.9	71.4		25.1
0.150	50.1	21.4		50.6
0.075	16.6	4.8		16.8
PAN	4.8			4.8
Total	100.0			



Remarks:

Reported by: T.Deboch

Reviewed by: _____

N. Mwitla
N. Mwitla

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SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136 & C 117



August 7, 2007

Ministry of Transportation
7818 6TH ST
Burnaby, B.C.
V3N 4N8

PROJECT NUMBER: 07-1416-0030/9000
SAMPLE NUMBER: 6

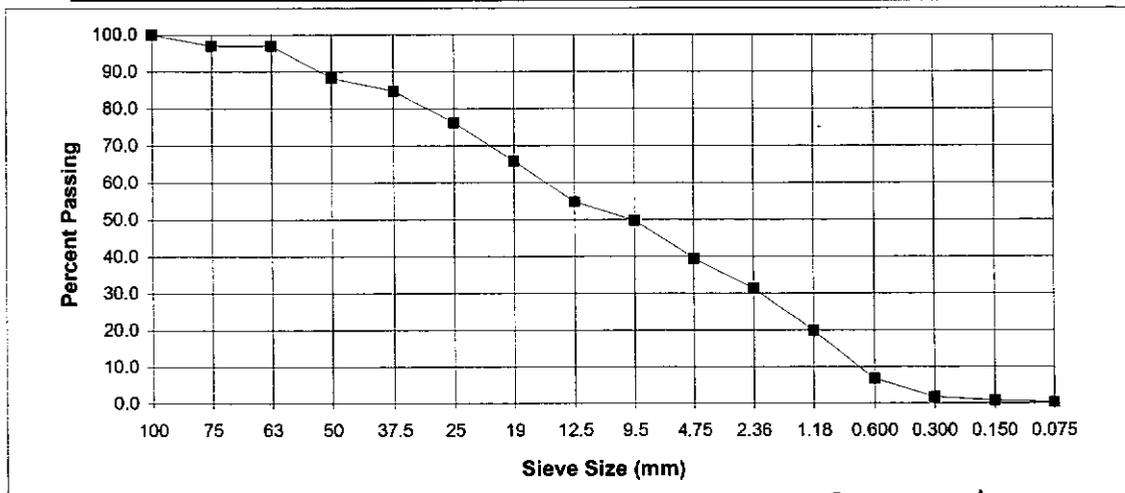
ATTN: Ken Lukawesky

PROJECT: Haney Pit Aggregate Testing

Sample:	TP 07-7, Bag #69
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DATE SAMPLED: July 18, 2007 SAMPLED BY: SL
DATE TESTED: August 3, 2007 TESTED BY: SS/KB

SIEVE ANALYSIS				
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)	
			+ 4.75	- 4.75
100	0.0	100.0	0.0	
75	3.0	97.0	4.9	
63	0.0	97.0	0.0	
50	8.7	88.3	14.3	
37.5	3.6	84.7	5.9	
25	8.5	76.2	14.1	
19	10.3	65.9	17.0	
12.5	11.0	54.9	18.2	
9.5	5.1	49.7	8.5	
4.75	10.4	39.4	17.1	
2.36	8.1	31.3		20.5
1.18	11.5	19.8		29.1
0.600	13.1	6.7		33.3
0.300	5.0	1.7		12.6
0.150	1.0	0.8		2.4
0.075	0.4	0.4		1.0
PAN	0.4			1.1
Total	100.0			



Remarks:

Reported by: K. Bertrend

Reviewed by:

N. Mwitwa

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SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136 & C 117



August 7, 2007

Ministry of Transportation
7818 6TH ST
Burnaby, B.C.
V3N 4N8

PROJECT NUMBER: 07-1416-0030/9000
SAMPLE NUMBER: 7

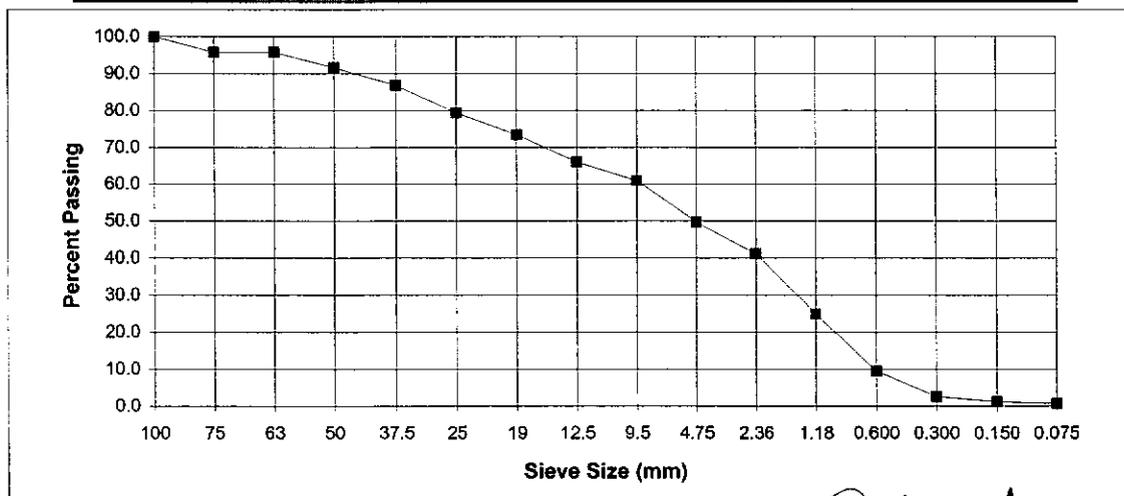
ATTN: Ken Lukawesky

PROJECT: Haney Pit Aggregate Testing

Sample:	TP 07-8, Bag #67
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DATE SAMPLED:	July 18, 2007	SAMPLED BY:	SL
DATE TESTED:	August 3, 2007	TESTED BY:	SS/KB

SIEVE ANALYSIS				
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)	
			+ 4.75	- 4.75
100	0.0	100.0	0.0	
75	4.2	95.8	8.4	
63	0.0	95.8	0.0	
50	4.1	91.7	8.2	
37.5	4.8	86.8	9.6	
25	7.4	79.4	14.8	
19	5.9	73.5	11.8	
12.5	7.4	66.0	14.8	
9.5	5.1	60.9	10.1	
4.75	11.3	49.6	22.4	
2.36	8.5	41.1		17.1
1.18	16.3	24.9		32.7
0.600	15.4	9.5		31.0
0.300	6.9	2.6		13.9
0.150	1.4	1.2		2.7
0.075	0.6	0.7		1.1
PAN	0.7			1.3
Total	100.0			



Reported by: K. Bertrend

Reviewed by:

N. Mwita

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**RESISTANCE OF COARSE AGGREGATE
TO DEGRADATION BY ABRASION IN
THE MICRO-DEVAL APPARATUS
ASTM D6928**



August 16, 2007

Project Number: 07-1416-0030/9000
Sample Number: 6

MINISTRY OF TRANSPORTATION
7818 6th ST
BURNABY, B.C.
V3N 4N8

ATTENTION: Mr. Ken Lukawesky

PROJECT: Haney Pit Aggregate Testing

Sample:	TP 07-07, +4.75mm portion
Source:	Haney Pit

Date sampled: July 18, 2007
Date Tested: August 13, 2007

Sampled by: SL
Tested by: DC

Grading	8.2 -19, 16, 12.5, 9.5mm
Mass of spheres (g)	4999.6
Mass of test sample (g)	1501.5
Loss at conclusion of test (%)	4.4

Loss (%) for Control aggregate (Brechin Stone), test completed August 13, 2007	19.8
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Reported by: L. Hu

Reviewed by:
N. Mwitta



Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

GOLDER ASSOCIATES LTD., Unit B, 12330 - 88th Avenue, Surrey, B.C. Canada V3W 3J6 Tel: 604-591-6616 Fax: 604-591-6608

**RESISTANCE OF FINE AGGREGATE
TO DEGRADATION BY ABRASION IN
THE MICRO-DEVAL APPARATUS
CSA A23.2-23A**



August 12, 2007

Project Number: 07-1416-0030/9000
Sample Number: 6

MINISTRY OF TRANSPORTATION
7818 6th ST
BURNABY, B.C.
V3N 4N8

ATTENTION: Mr. Ken Lukawesky

PROJECT: Haney Pit Aggregate Testing

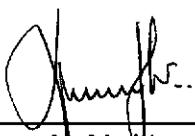
Sample:	TP 07- 07, - 4.75mm portion
Source:	Haney Pit

Date sampled: July 18, 2007
Date Tested: August 9, 2007

Sampled by: SL
Tested by: DC

Grading	As is
Mass of spheres (g)	1251.0
Mass of test sample (g)	500.5
Loss at conclusion of test (%)	8.9
Loss (%) for Control Fine aggregate (James Dick Sand), test completed August 9, 2007	21.8

Reported by: L. Hu

Reviewed by: 
N. Mwita



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GOLDER ASSOCIATES LTD., Unit B - 12330 - 88th Avenue, Surrey, B.C. Canada V3W 3J6 Tel: 604-591-6616 Fax: 604-591-6608

SAND EQUIVALENT TEST
ASTM D2419



August 19, 2007

Project Number: 07-1416-0030/9000
 Sample Number: 6

MINISTRY OF TRANSPORTATION
 7818 6th ST
 BURNABY, B.C.
 V3N 4N8

ATTENTION: Mr. Ken Lukawesky

PROJECT: Haney Pit Aggregate Testing

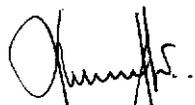
Sample:	TP 07- 07, - 4.75mm portion
Source:	Haney Pit

Date Sampled: July 18, 2007
 Date Tested: August 8, 2007

Sampled by: SL
 Tested by: SJ/LH

TRIAL #	SEDIMENT PERIOD (min)	CLAY HEIGHT (inches)	SAND HEIGHT (inches)	SAND EQUIVALENT
1	20	4.3	3.5	81
2	20	4.4	3.5	80
AVERAGE				80

Reported by: L. Hu

Reviewed by: 
 N. Mwitta



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GOLDER ASSOCIATES LTD, Unit B, 12330 - 88th Avenue, Surrey, B.C. Canada V3W 3J6 Tel: 604-591-6616 Fax 604-591-6608



Province of British Columbia
Ministry of Transportation

PETROGRAPHIC EXAMINATION REPORT – COARSE AGGREGATE FRACTION

Region: N/A	Sample name: TH 07-6, Sa-1, bag-129
Project: 07-1416-0030.9000	Pit Name/I.D. Haney Pit
Date: February 4, 2008	Sample grading: Greater than 50 mm, crushed in the laboratory to 20 x 5 mm
Petrographer: A. Briggs, GIT	Petrographer's Registration: APEGBC

ROCK TYPES & DESCRIPTION		Percent (by mass)			
		Good	Fair	Poor	Delet.
IGNEOUS		Good	Fair	Poor	Delet.
Granodiorite	Medium grained, grey, fresh, strong - quartz, plagioclase, biotite	73.6			
Granodiorite	Medium grained, grey and rusty brown, slightly to moderately weathered	15.9	3.0		
Basalt	Fine grained, dark greyish green, porphyritic, fresh, strong	0.5			
Tonalite	Fine grained, light grey	1.9			
Subtotal		91.9	3.0		
METAMORPHIC		Good	Fair	Poor	Delet.
Schist	Fine to medium grained, greyish green, contains some magnetite	5.1			
Subtotal		5.1			

PETROGRAPHIC NUMBER CALCULATION			
Physical Quality Classification	Percent of Total	PN Multiplier	PN Contribution
GOOD	97.0	1	97.0
FAIR	3.0	3	9.0
POOR	0	6	0
DELETERIOUS	0	10	0
TOTAL	100.0		106.0
PETROGRAPHIC NUMBER			106

OTHER ATTRIBUTES				
SHAPE (indicate estimate or percent by mass or by count)	Angular	Subangular	Subrounded	Rounded
	100			
COATINGS 1. Indicate estimate or percent by mass or by count 2. Indicate type of coating, if identified	None	Minimal	Moderate/Partial	Heavy/Complete
	100			

ALKALI-AGGREGATE REACTION (AAR): Aggregate should be checked for potential for AAR in concrete, due to presence of siliceous aggregate (granodiorite) and schist. Testing should be carried out in conformance with CSA A23.1/2-04.

POTENTIAL FOR ACID GENERATION (PAG): In the thin section examined, the metallic mineral was identified as magnetite, with minute inclusions of chalcopyrite.

Under the stereozoom microscope, magnetite was observed in 50-75% of the granodiorite particles and 25-30% of the granodiorite particles were found to contain minor to moderate amounts of chalcopyrite. Chalcopyrite occurred as individual crystals and, more frequently, intergrown with biotite. The chalcopyrite in some of the more weathered particles had oxidation rims, which contributed to the observed rusty brown colour. Biotite also frequently showed such oxidation rims in the weathered particles.

Chalcopyrite (CuFeS₂) can contribute to the generation of acid and leaching of metals. Furthermore, no carbonate minerals were observed in the rock material. Carbonate minerals, such as calcite have a buffering and neutralizing effect on the acids that could potentially be produced from the oxidation of pyrite. Therefore, further testing is recommended of this sample, in order to evaluate the potential for acid production. This would include acid base accounting.

OVERALL SUITABILITY RATING: The aggregate is considered suitable for most applications, including road base, structural fill, drain rock, asphalt aggregate and concrete aggregate, subject to satisfactory completion of applicable qualification tests.

The comments given above are the result of a preliminary visual examination of the sample using the stereozoom binocular microscope with the aid of one thin section. The rock names and the preliminary PAG evaluation are based on the analysis of this individual thin section.

**SOUNDNESS OF AGGREGATE BY
USE OF MAGNESIUM SULFATE
ASTM C 88**



August 25, 2007

Project number: 07-1416-0030/9000
Sample Number: 7

MINISTRY OF TRANSPORTATION
7818 6th ST
BURNABY, B.C.
V3N 4N8

ATTENTION: Mr. Ken Lukawesky

PROJECT: Haney Pit Aggregate Testing

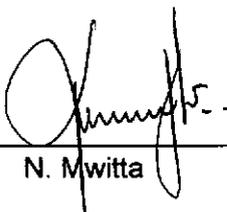
Sample:	TP 07- 8, +4.75mm portion
Source:	Haney Pit

Date sampled: July 18, 2007

Sampled by: SL

Sieve Fraction (mm)	Original Grading (%)	Mass per fraction before test (g)	Loss (%)	Weighted Loss (%)
	--	--	--	--
63 x 37.5	0.0	--	--	--
37.5 x 19	18.8	1488.5	8.7	1.64
19 x 9.5	50.7	1002.9	2.4	1.22
9.5 x 4.75	30.5	300.1	1.7	0.52
	100.0		TOTAL	3.38

Reported by: KB

Reviewed by: 
N. Mwitwa



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**SOUNDNESS OF AGGREGATE BY
USE OF MAGNESIUM SULFATE
ASTM C 88**



August 25, 2007

Project number: 07-1416-0030/9000
Sample Number: 7

MINISTRY OF TRANSPORTATION
7818 6th ST
BURNABY, B.C.
V3N 4N8

ATTENTION: Mr. Ken Lukawesky

PROJECT: Haney Pit Aggregate Testing

Sample:	TP 07- 8, -4.75mm portion
Source:	Haney Pit

Date sampled: July 18, 2007

Sampled by: SL

Sieve Fraction (mm)	Original Grading	Mass per fraction before test (g)	Loss (%)	Weighted Loss (%)
> 4.75	--	--	--	--
4.75 × 2.36	17.1	100.0	3.2	0.55
2.36 × 1.18	32.7	100.0	4.2	1.37
1.18 × 0.600	31.0	100.0	6.2	1.92
0.600 × 0.300	13.9	100.0	7.6	1.06
< 0.300	5.3	--	--	--
	100.0		TOTAL	4.9

Reported by: _____

L. Hu

Reviewed by: _____

N. Mwitwa



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**Sand Equivalent Test
ASTM D2419**



Client: MOTI
Project No.: KA21172.2300
Project Name: Haney Pit
Test Pit Number: 22 - 05
Bag Number: TRAN - 667 Sa. 1
Depth: 0.0 - 2.8 m

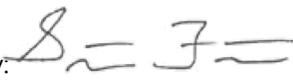
Date Sampled: 2022-02-18
Sampled By: Harihar Bhandari
Tested By: DL
Date Tested: 2022-03-25

Trial #	1	2	3	Average
Sediment Period:	30 mins	27 mins	28 mins	
Clay Height (mm):	6.3	6.8	6.2	
Sand Height (mm):	3.7	3.8	3.7	
Sand Equivalent (SE):	58.7	55.9	59.7	59.0

Calculation: Sand Equivalent (SE) = (Sand Height / Clay Height) x 100

Comments:

Reported by: David Love
Surrey, BC

Reviewed by: 
Scott Forsyth
Surrey, BC



Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request

**Sand Equivalent Test
ASTM D2419**



Client: MOTI
Project No.: KA21172.2300
Project Name: Haney Pit
Test Pit Number: 22 - 05
Bag Number: TRAN - 667 Sa. 1
Depth: 0.0 - 2.8 m

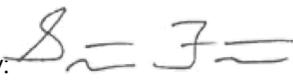
Date Sampled: 2022-02-18
Sampled By: Harihar Bhandari
Tested By: DL
Date Tested: 2022-03-25

Trial #	1	2	3	Average
Sediment Period:	30 mins	27 mins	28 mins	
Clay Height (mm):	6.3	6.8	6.2	
Sand Height (mm):	3.7	3.8	3.7	
Sand Equivalent (SE):	58.7	55.9	59.7	59.0

Calculation: Sand Equivalent (SE) = (Sand Height / Clay Height) x 100

Comments:

Reported by: David Love
Surrey, BC

Reviewed by: 
Scott Forsyth
Surrey, BC



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**Coarse Aggregate Micro-Deval Abrasion
ASTM D6928**



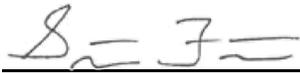
Client: MOTI
 Project No.: KA21172.2300
 Project Name: Haney Pit
 Test Pit Number: 22-07
 Bag Number: TRAN - 660 Sa. 1
 Depth: 2.2 - 4.1 m

Date Sampled: 18-Feb-22
 Sampled By: Harihar Bhandari
 Tested By: PG
 Date Tested: 20-Mar-22

Grading	Sample ID	Initial Mass of Sample (g) A	Final Mass of Sample (g) B	Mass Lost (g) A - B	DM (CA) % Loss (A-B)*100/A
16 mm - 9.5 mm	22 - 07	1504.2	1432.6	71.6	4.8

Comments: Refer to BCMoT 2020 Standard Specifications for Highway Construction;
 - Section 202, Table 202-B for acceptable values of coarse aggregate for :
 - HFSA, 25mm and 50mm base course, IGSB and OGSB is 25 or less
 - SGSB and BEF is 30 or less
 - 75mm base course is 17 or less
 - Section 502, Table 502-B for acceptable value of coarse aggregate for :
 -Superpave and Class 1 aggregates is 18 or less
 -Class 2 aggregates is 20 or less.
 - A petrographic analysis may be required if material fails to meet these specifications.

Reported by: David Love
 Surrey, BC

Reviewed by: 
 Scott Forsyth
 Surrey, BC



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**Sand Equivalent Test
ASTM D2419**



Client: MOTI
Project No.: KA21172.2300
Project Name: Haney Pit
Test Pit Number: 22-07
Bag Number: TRAN - 660 Sa. 1
Depth: 2.2 - 4.1 m

Date Sampled: 2022-02-18
Sampled By: Harihar Bhandari
Tested By: DL
Date Tested: 2022-03-25

Trial #	1	2	3	Average
Sediment Period:	20 mins	20 mins	20 mins	
Clay Height (mm):	5.1	4.8	5	
Sand Height (mm):	3.9	3.9	4.1	
Sand Equivalent (SE):	76.5	81.3	82.0	80.0

Calculation: Sand Equivalent (SE) = (Sand Height / Clay Height) x 100

Comments:

Reported by: David Love
Surrey, BC

Reviewed by: 
Scott Forsyth
Surrey, BC



Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request

**Coarse Aggregate Micro-Deval Abrasion
ASTM D6928**



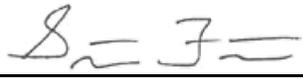
Client: MOTI
 Project No.: KA21172.2300
 Project Name: Haney Pit
 Test Pit Number: 22-09
 Bag Number: TRAN - 672 Sa. 2
 Depth: 3.5 - 5.3 m

Date Sampled: 18-Feb-22
 Sampled By: Harihar Bhandari
 Tested By: PG
 Date Tested: 18-Mar-22

Grading	Sample ID	Initial Mass of Sample (g) A	Final Mass of Sample (g) B	Mass Lost (g) A - B	DM (CA) % Loss (A-B)*100/A
16 mm - 9.5 mm	22 - 09	1503.5	1442.3	61.2	4.1

Comments: Refer to BCMoT 2020 Standard Specifications for Highway Construction;
 - Section 202, Table 202-B for acceptable values of coarse aggregate for :
 - HFSA, 25mm and 50mm base course, IGSB and OGSB is 25 or less
 - SGSB and BEF is 30 or less
 - 75mm base course is 17 or less
 - Section 502, Table 502-B for acceptable value of coarse aggregate for :
 -Superpave and Class 1 aggregates is 18 or less
 -Class 2 aggregates is 20 or less.
 - A petrographic analysis may be required if material fails to meet these specifications.

Reported by: David Love
 Surrey, BC

Reviewed by: 
 Scott Forsyth
 Surrey, BC



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**Sand Equivalent Test
ASTM D2419**



Client: MOTI
Project No.: KA21172.2300
Project Name: Haney Pit
Test Pit Number: 22-09
Bag Number: TRAN - 672 Sa. 2
Depth: 3.5 - 5.3 m

Date Sampled: 2022-02-18
Sampled By: Harihar Bhandari
Tested By: DL
Date Tested: 2022-03-25

Trial #	1	2	3	Average
Sediment Period:	27 mins	26 mins	32 mins	
Clay Height (mm):	5.8	6.5	5.7	
Sand Height (mm):	3.8	3.8	3.9	
Sand Equivalent (SE):	65.5	58.5	68.4	65.0

Calculation: Sand Equivalent (SE) = (Sand Height / Clay Height) x 100

Comments:

Reported by: David Love
Surrey, BC

Reviewed by: 
Scott Forsyth
Surrey, BC



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Sieve Analysis



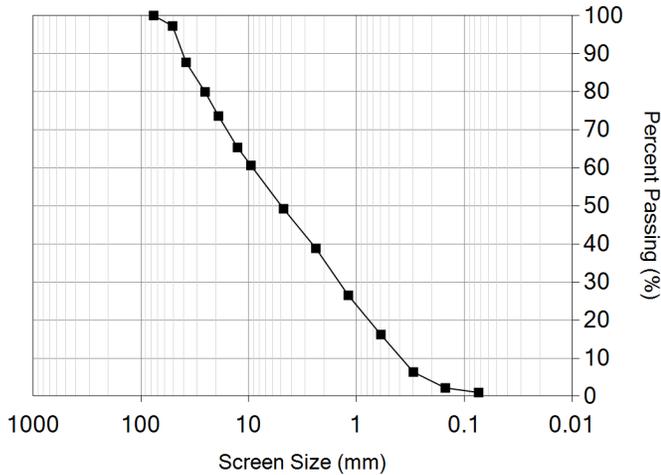
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-09
 Depth: 3.5 - 5.3 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 672

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	97%		
	37.5mm	88%		
	25mm	80%		
	19.0mm	74%		
	12.5mm	65%		
	9.5mm	61%		
	4.75mm	49%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	39%		
	1.18mm	27%		
	600µm	16%		
	300µm	6%		
	150µm	2%		
	75µm	1.0%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	26.0%	25.0%	14.0%	25.0%	9.0%	1.0%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



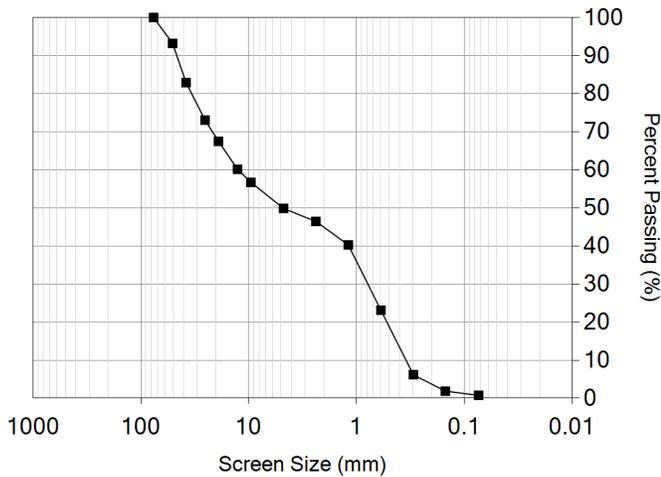
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-15
 Depth: 0 - 1.6 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 665

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	93%		
	37.5mm	83%		
	25mm	73%		
	19.0mm	67%		
	12.5mm	60%		
	9.5mm	57%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	46%		
	1.18mm	40%		
	600µm	23%		
	300µm	6%		
	150µm	2%		
	75µm	0.7%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	33.0%	17.0%	6.0%	31.0%	12.3%	0.7%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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RELATIVE DENSITY AND ABSORPTION OF AGGREGATE REPORT

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

Project Number: KA2172.2300
Date: 2022-04-06
Client Contract No.: (604) 250-7448
Client Project No.: N/A

ATTN: Harihar Bhandari

PROJECT: Haney Pit

Sample Source & ID: TP22-16, Bag #651 SA #2
Sampled by: Sampled and Submitted by MoTI

Lab No.: L6744
Sample Date: Feb 15-18, 2022

Sample Number & Type	Relative Density (Oven Dry)	Apparent Relative Density	Relative Density (SSD)	Absorption %
Coarse	2.73	2.79	2.75	0.9
Fine	2.64	2.71	2.67	1.0

Comments: - Relative Density and Absorption of coarse and fine aggregate were conducted in accordance with ASTM C127 and C128

Prepared By: David Love

Reviewed By: 

Scott Forsyth, P.Eng.

Sieve Analysis



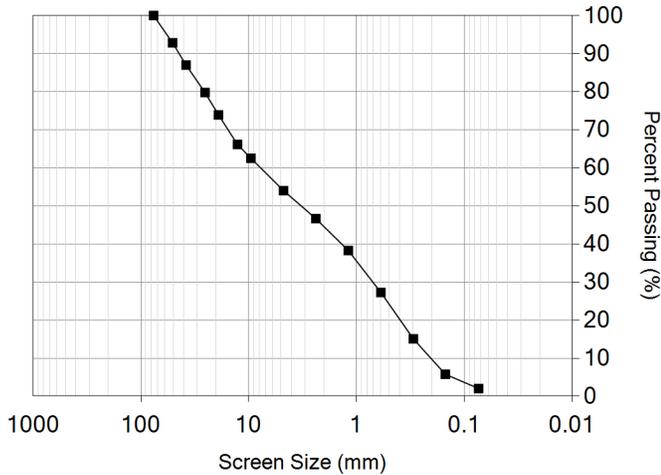
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-16
 Depth: 2.2 - 4.5 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 651

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	93%		
	37.5mm	87%		
	25mm	80%		
	19.0mm	74%		
	12.5mm	66%		
	9.5mm	63%		
	4.75mm	54%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	47%		
	1.18mm	38%		
	600µm	27%		
	300µm	15%		
	150µm	6%		
	75µm	2.0%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	26.0%	20.0%	10.0%	24.0%	18.0%	2.0%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



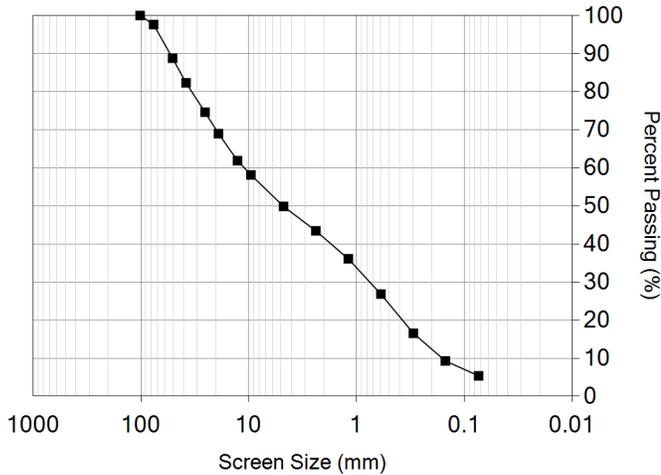
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-16
 Depth: 4.5 - 6.0 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 652

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

Coarse Portion:	Sieve Size	Passing	Min	Max
	100mm	100%		
	75mm	98%		
	50mm	89%		
	37.5mm	82%		
	25mm	75%		
	19.0mm	69%		
	12.5mm	62%		
	9.5mm	58%		
	4.75mm	50%		
Fine Portion:	Sieve Size	Passing	Min	Max
	2.36mm	43%		
	1.18mm	36%		
	600µm	27%		
	300µm	17%		
	150µm	9%		
	75µm	5.4%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
2.0%	29.0%	19.0%	9.0%	20.0%	15.6%	5.4%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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**Coarse Aggregate Micro-Deval Abrasion
ASTM D6928**



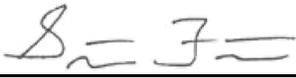
Client: MOTI
 Project No.: KA21172.2300
 Project Name: Haney Pit
 Test Pit Number: 22-17
 Bag Number: TRAN - 655 Sa. 2
 Depth: 2.0 - 2.9 m

Date Sampled: 18-Feb-22
 Sampled By: Harihar Bhandari
 Tested By: PG
 Date Tested: 18-Mar-22

Grading	Sample ID	Initial Mass of Sample (g) A	Final Mass of Sample (g) B	Mass Lost (g) A - B	DM (CA) % Loss (A-B)*100/A
16 mm - 9.5 mm	22 - 17	1501.4	1439.9	61.5	4.1

Comments: Refer to BCMoT 2020 Standard Specifications for Highway Construction;
 - Section 202, Table 202-B for acceptable values of coarse aggregate for :
 - HFSA, 25mm and 50mm base course, IGSB and OGSB is 25 or less
 - SGSB and BEF is 30 or less
 - 75mm base course is 17 or less
 - Section 502, Table 502-B for acceptable value of coarse aggregate for :
 -Superpave and Class 1 aggregates is 18 or less
 -Class 2 aggregates is 20 or less.
 - A petrographic analysis may be required if material fails to meet these specifications.

Reported by: David Love
 Surrey, BC

Reviewed by: 
 Scott Forsyth
 Surrey, BC



Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request.

**Sand Equivalent Test
ASTM D2419**



Client: MOTI
Project No.: KA21172.2300
Project Name: Haney Pit
Test Pit Number: 22-17
Bag Number: TRAN - 655 Sa. 2
Depth: 2.0 - 2.9 m

Date Sampled: 2022-02-18
Sampled By: Harihar Bhandari
Tested By: DL
Date Tested: 2022-03-25

Trial #	1	2	3	Average
Sediment Period:	20 mins	20 mins	20 mins	
Clay Height (mm):	5.5	5.2	5.2	
Sand Height (mm):	4.1	3.9	3.9	
Sand Equivalent (SE):	74.5	75.0	75.0	75.0

Calculation: Sand Equivalent (SE) = (Sand Height / Clay Height) x 100

Comments:

Reported by: David Love
Surrey, BC

Reviewed by: 
Scott Forsyth
Surrey, BC



Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request

Sieve Analysis



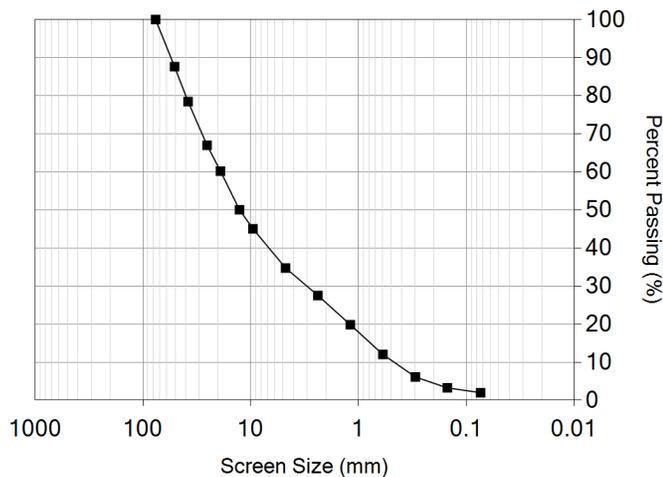
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-17
 Depth: 2.0 - 2.9 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 655

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	88%		
	37.5mm	78%		
	25mm	67%		
	19.0mm	60%		
	12.5mm	50%		
	9.5mm	45%		
	4.75mm	35%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	28%		
	1.18mm	20%		
	600µm	12%		
	300µm	6%		
	150µm	3%		
	75µm	2.0%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	40.0%	25.0%	10.0%	16.0%	7.0%	2.0%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



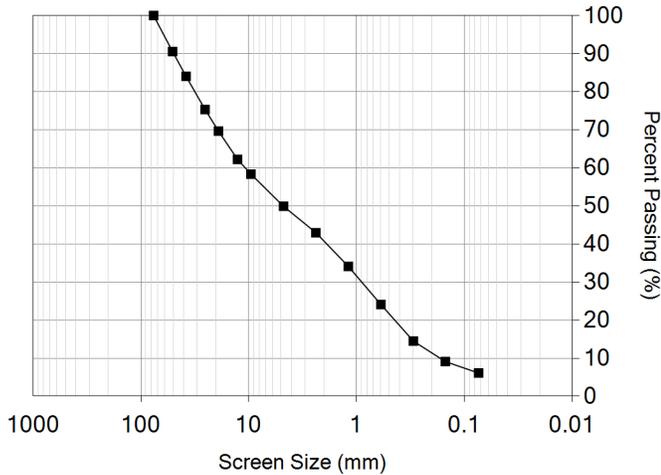
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-17
 Depth: 0 - 2.0 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 666

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	91%		
	37.5mm	84%		
	25mm	75%		
	19.0mm	70%		
	12.5mm	62%		
	9.5mm	58%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	43%		
	1.18mm	34%		
	600µm	24%		
	300µm	14%		
	150µm	9%		
	75µm	6.1%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	30.0%	20.0%	10.0%	22.0%	11.9%	6.1%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



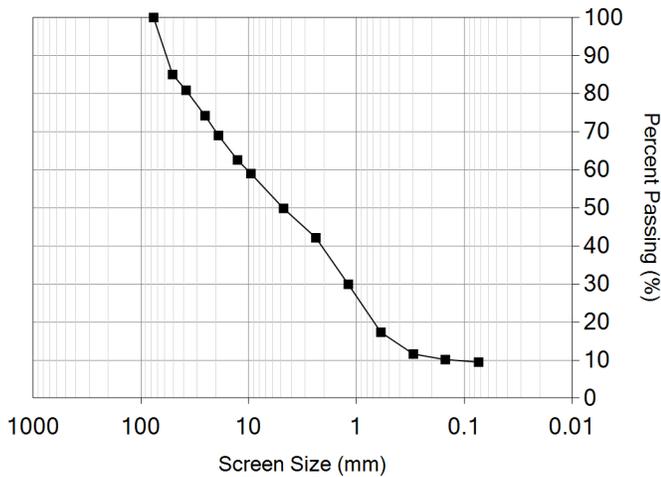
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-18
 Depth: 3.0 - 4.4 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 657

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	85%		
	37.5mm	81%		
	25mm	74%		
	19.0mm	69%		
	12.5mm	63%		
	9.5mm	59%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	42%		
	1.18mm	30%		
	600µm	17%		
	300µm	12%		
	150µm	10%		
	75µm	9.5%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	31.0%	19.0%	12.0%	24.0%	4.5%	9.5%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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 phone: (604) 295-8657 fax: (604) 295-8658



RELATIVE DENSITY AND ABSORPTION OF AGGREGATE REPORT

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

Project Number: KA2172.2300
Date: 2022-04-06
Client Contract No.: (604) 250-7448
Client Project No.: N/A

ATTN: Harihar Bhandari

PROJECT: Haney Pit

Sample Source & ID: TP22-18, Bag #659 SA #1
Sampled by: Sampled and Submitted by MoTI

Lab No.: L6744
Sample Date: Feb 15-18, 2022

Sample Number & Type	Relative Density (Oven Dry)	Apparent Relative Density	Relative Density (SSD)	Absorption %
Coarse	2.57	2.64	2.60	0.8
Fine	2.62	2.75	2.67	1.7

Comments: - Relative Density and Absorption of coarse and fine aggregate were conducted in accordance with ASTM C127 and C128

Prepared By: David Love

Reviewed By: 

Scott Forsyth, P.Eng.

Sieve Analysis



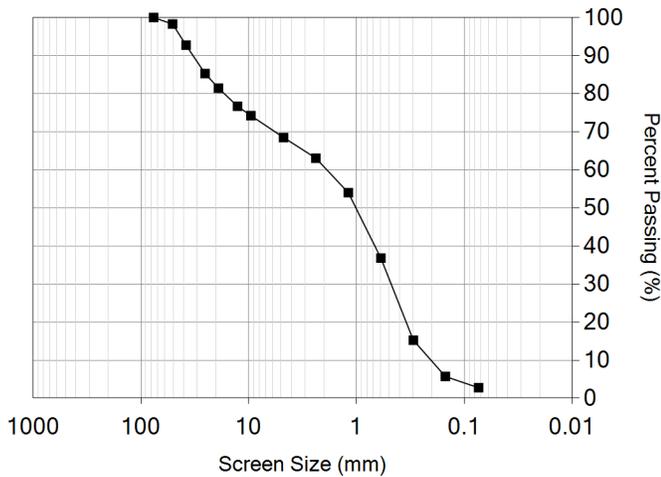
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-18
 Depth: 0.1 - 3.0 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 659

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	98%		
	37.5mm	93%		
	25mm	85%		
	19.0mm	81%		
	12.5mm	77%		
	9.5mm	74%		
	4.75mm	68%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	63%		
	1.18mm	54%		
	600µm	37%		
	300µm	15%		
	150µm	6%		
	75µm	2.8%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	19.0%	13.0%	8.0%	36.0%	21.2%	2.8%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



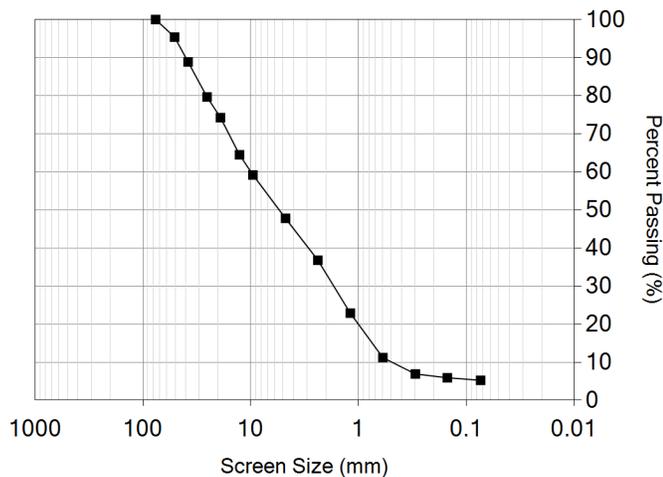
Report Date: April 13, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-19
 Depth: 1.5 - 3.1 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 656

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	95%		
	37.5mm	89%		
	25mm	80%		
	19.0mm	74%		
	12.5mm	64%		
	9.5mm	59%		
	4.75mm	48%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	37%		
	1.18mm	23%		
	600µm	11%		
	300µm	7%		
	150µm	6%		
	75µm	5.2%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	26.0%	26.0%	16.0%	23.0%	3.8%	5.2%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



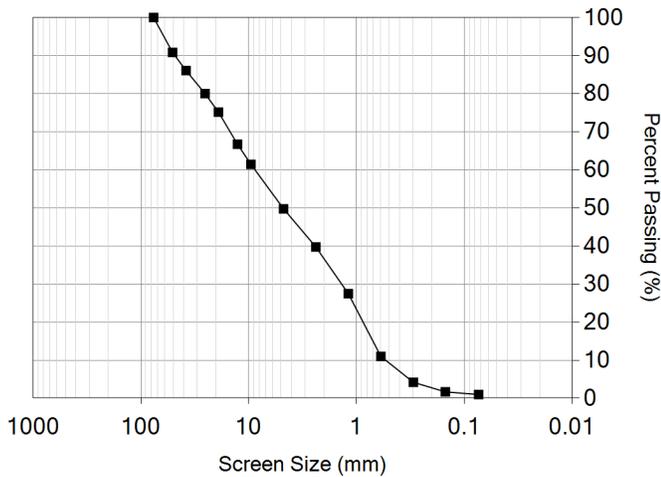
Report Date: April 13, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-19
 Depth: 3.1 - 4.5 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 708

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	91%		
	37.5mm	86%		
	25mm	80%		
	19.0mm	75%		
	12.5mm	67%		
	9.5mm	61%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	40%		
	1.18mm	27%		
	600µm	11%		
	300µm	4%		
	150µm	2%		
	75µm	1.0%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	25.0%	25.0%	14.0%	29.0%	6.0%	1.0%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

Reporting of these test results constitutes a testing service only. Engineering evaluation of the test results is provided only on written request.
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 phone: (604) 295-8657 fax: (604) 295-8658



Sieve Analysis



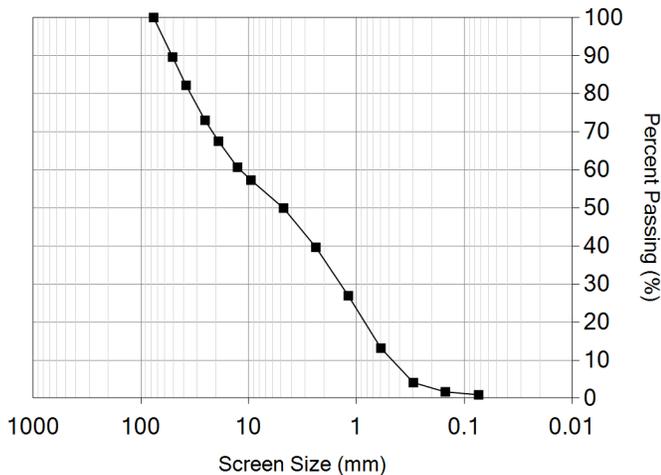
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-19
 Depth: 3.1 - 4.5 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 768

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	90%		
	37.5mm	82%		
	25mm	73%		
	19.0mm	68%		
	12.5mm	61%		
	9.5mm	57%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	40%		
	1.18mm	27%		
	600µm	13%		
	300µm	4%		
	150µm	2%		
	75µm	0.9%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	32.0%	18.0%	14.0%	28.0%	7.1%	0.9%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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 phone: (604) 295-8657 fax: (604) 295-8658



**Coarse Aggregate Micro-Deval Abrasion
ASTM D6928**



Client: MOTI
 Project No.: KA21172.2300
 Project Name: Haney Pit
 Test Pit Number: 22-20
 Bag Number: TRAN - 768 Sa. 2
 Depth: 1.5 - 4.5 m

Date Sampled: 18-Feb-22
 Sampled By: Harihar Bhandari
 Tested By: PG
 Date Tested: 18-Mar-22

Grading	Sample ID	Initial Mass of Sample (g) A	Final Mass of Sample (g) B	Mass Lost (g) A - B	DM (CA) % Loss (A-B)*100/A
16 mm - 9.5 mm	22 - 20	1503.4	1456.1	47.3	3.1

Comments: Refer to BCMoT 2020 Standard Specifications for Highway Construction;
 - Section 202, Table 202-B for acceptable values of coarse aggregate for :
 - HFSA, 25mm and 50mm base course, IGSB and OGSB is 25 or less
 - SGSB and BEF is 30 or less
 - 75mm base course is 17 or less
 - Section 502, Table 502-B for acceptable value of coarse aggregate for :
 -Superpave and Class 1 aggregates is 18 or less
 -Class 2 aggregates is 20 or less.
 - A petrographic analysis may be required if material fails to meet these specifications.

Reported by: David Love
 Surrey, BC

Reviewed by: 
 Scott Forsyth
 Surrey, BC



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**Sand Equivalent Test
ASTM D2419**



Client: MOTI
Project No.: KA21172.2300
Project Name: Haney Pit
Test Pit Number: 22-20
Bag Number: TRAN - 768 Sa. 2
Depth: 1.5 - 4.5 m

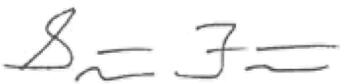
Date Sampled: 2022-02-18
Sampled By: Harihar Bhandari
Tested By: PG
Date Tested: 2022-04-03

Trial #	1	2	3	Average
Sediment Period:	20 mins	20 mins	20 mins	
Clay Height (mm):	4.9	4.7	4.7	
Sand Height (mm):	4.5	4.4	4.4	
Sand Equivalent (SE):	91.8	93.6	93.6	94.0

Calculation: Sand Equivalent (SE) = (Sand Height / Clay Height) x 100

Comments:

Reported by: David Love
Surrey, BC

Reviewed by: 
Scott Forsyth
Surrey, BC



Sieve Analysis



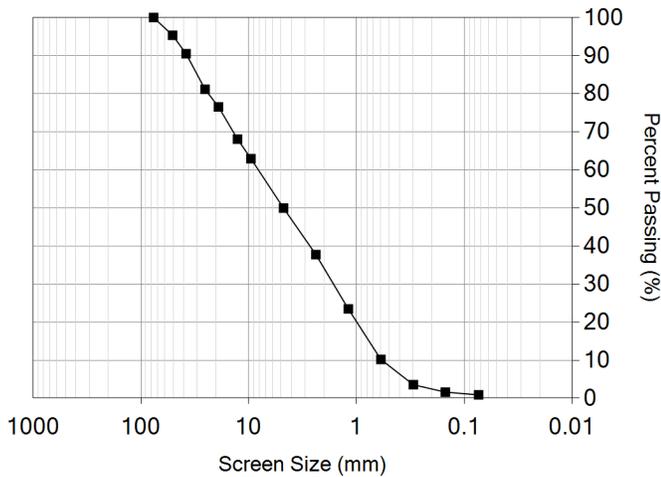
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-21
 Depth: 3.6 - 5.9 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 766

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	95%		
	37.5mm	91%		
	25mm	81%		
	19.0mm	77%		
	12.5mm	68%		
	9.5mm	63%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	38%		
	1.18mm	23%		
	600µm	10%		
	300µm	4%		
	150µm	2%		
	75µm	0.9%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	23.0%	27.0%	17.0%	27.0%	5.1%	0.9%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



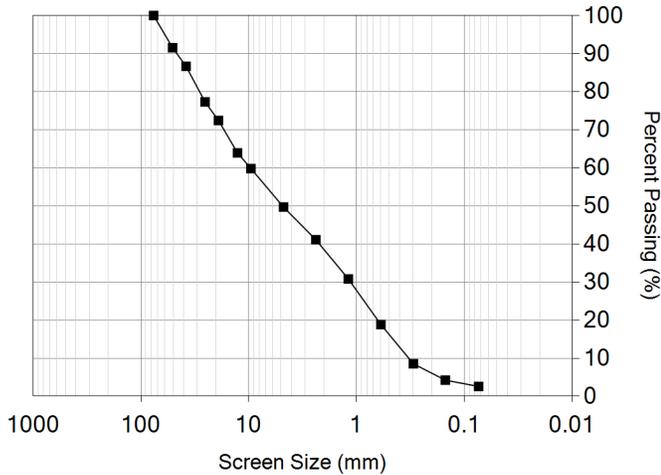
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-21
 Depth: 1.1 - 3.6 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 767

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	92%		
	37.5mm	87%		
	25mm	77%		
	19.0mm	72%		
	12.5mm	64%		
	9.5mm	60%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	41%		
	1.18mm	31%		
	600µm	19%		
	300µm	9%		
	150µm	4%		
	75µm	2.6%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	28.0%	22.0%	12.0%	25.0%	10.4%	2.6%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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 phone: (604) 295-8657 fax: (604) 295-8658



**Coarse Aggregate Micro-Deval Abrasion
ASTM D6928**



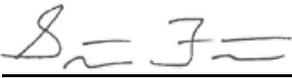
Client: MOTI
 Project No.: KA21172.2300
 Project Name: Haney Pit
 Test Pit Number: 22-22
 Bag Number: TRAN - 711 Sa. 1
 Depth: 0.5 - 5.5 m

Date Sampled: 18-Feb-22
 Sampled By: Harihar Bhandari
 Tested By: PG
 Date Tested: 18-Mar-22

Grading	Sample ID	Initial Mass of Sample (g) A	Final Mass of Sample (g) B	Mass Lost (g) A - B	DM (CA) % Loss (A-B)*100/A
16 mm - 9.5 mm	22 - 22	1502.8	1447.2	55.6	3.7

Comments: Refer to BCMoT 2020 Standard Specifications for Highway Construction;
 - Section 202, Table 202-B for acceptable values of coarse aggregate for :
 - HFSA, 25mm and 50mm base course, IGSB and OGSB is 25 or less
 - SGSB and BEF is 30 or less
 - 75mm base course is 17 or less
 - Section 502, Table 502-B for acceptable value of coarse aggregate for :
 -Superpave and Class 1 aggregates is 18 or less
 -Class 2 aggregates is 20 or less.
 - A petrographic analysis may be required if material fails to meet these specifications.

Reported by: David Love
 Surrey, BC

Reviewed by: 
 Scott Forsyth
 Surrey, BC



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Sand Equivalent Test
ASTM D2419



Client: MOTI
Project No.: KA21172.2300
Project Name: Haney Pit
Test Pit Number: 22-22
Bag Number: TRAN - 711 Sa. 1
Depth: 0.5 - 5.5 m

Date Sampled: 2022-02-18
Sampled By: Harihar Bhandari
Tested By: DL
Date Tested: 2022-03-25

Trial #	1	2	3	Average
Sediment Period:	25 mins	25 mins	28 mins	
Clay Height (mm):	5.9	6.0	6.0	
Sand Height (mm):	4.1	4.0	4.1	
Sand Equivalent (SE):	69.5	66.7	68.3	69.0

Calculation: Sand Equivalent (SE) = (Sand Height / Clay Height) x 100

Comments:

Reported by: David Love
Surrey, BC

Reviewed by: 
Scott Forsyth
Surrey, BC



Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request

Sieve Analysis



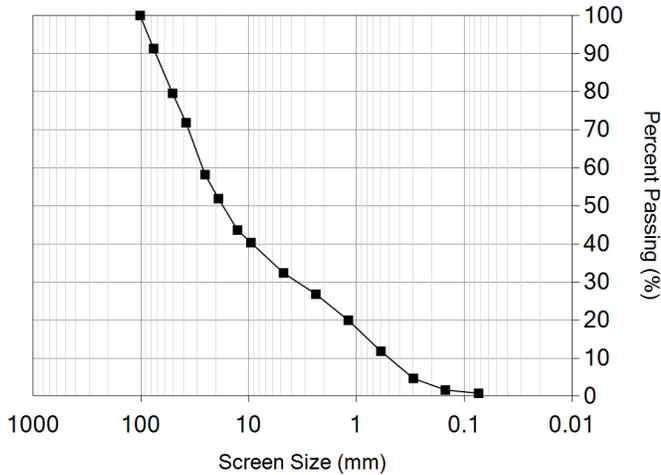
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-22
 Depth: 0.5 - 5.5 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 711

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	100mm	100%		
	75mm	91%		
	50mm	80%		
	37.5mm	72%		
	25mm	58%		
	19.0mm	52%		
	12.5mm	44%		
	9.5mm	40%		
	4.75mm	32%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	27%		
	1.18mm	20%		
	600µm	12%		
	300µm	5%		
	150µm	2%		
	75µm	0.8%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
9.0%	39.0%	20.0%	7.0%	17.0%	7.2%	0.8%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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 phone: (604) 295-8657 fax: (604) 295-8658



RELATIVE DENSITY AND ABSORPTION OF AGGREGATE REPORT

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

Project Number: KA2172.2300
Date: 2022-04-06
Client Contract No.: (604) 250-7448
Client Project No.: N/A

ATTN: Harihar Bhandari

PROJECT: Haney Pit

Sample Source & ID: TP22-23, Bag #714 SA #3
Sampled by: Sampled and Submitted by MoTI

Lab No.: L6744
Sample Date: Feb 15-18, 2022

Sample Number & Type	Relative Density (Oven Dry)	Apparent Relative Density	Relative Density (SSD)	Absorption %
Coarse	2.74	2.79	2.76	0.7
Fine	2.65	2.72	2.68	0.9

Comments: - Relative Density and Absorption of coarse and fine aggregate were conducted in accordance with ASTM C127 and C128

Prepared By: David Love

Reviewed By: 

Scott Forsyth, P.Eng.

Sieve Analysis



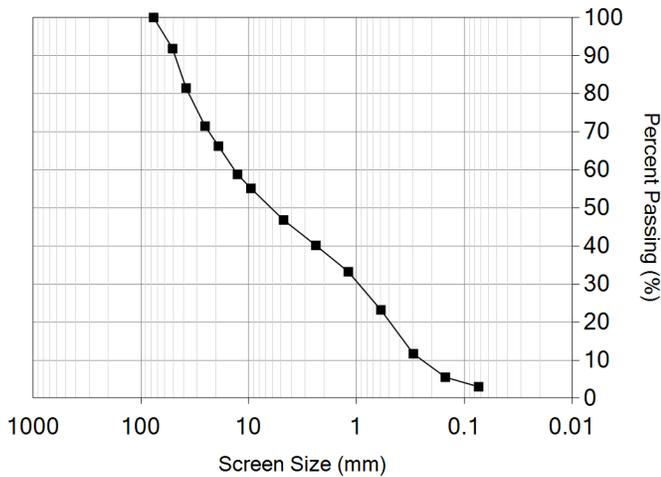
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-23
 Depth: 3.5 - 5.8 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 714

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	92%		
	37.5mm	81%		
	25mm	71%		
	19.0mm	66%		
	12.5mm	59%		
	9.5mm	55%		
	4.75mm	47%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	40%		
	1.18mm	33%		
	600µm	23%		
	300µm	12%		
	150µm	6%		
	75µm	3.0%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	34.0%	19.0%	9.0%	22.0%	13.0%	3.0%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



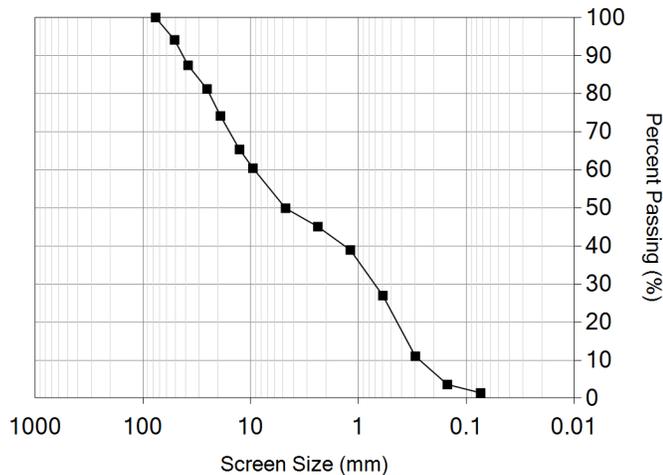
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-23
 Depth: 2.5 - 3.5 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 718

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	94%		
	37.5mm	87%		
	25mm	81%		
	19.0mm	74%		
	12.5mm	65%		
	9.5mm	60%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	45%		
	1.18mm	39%		
	600µm	27%		
	300µm	11%		
	150µm	4%		
	75µm	1.4%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	26.0%	24.0%	7.0%	25.0%	16.6%	1.4%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



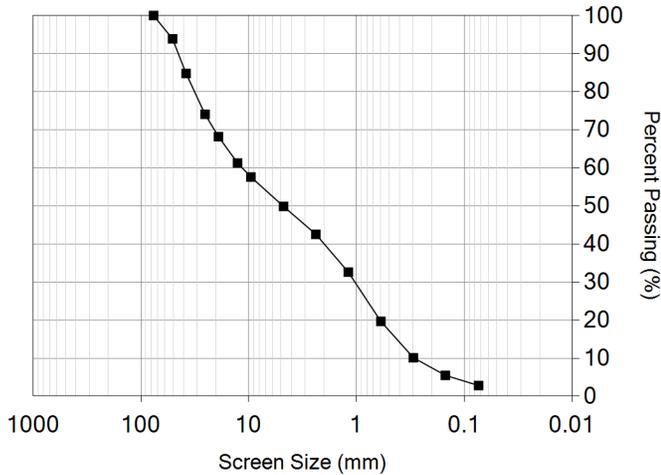
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-23
 Depth: 0 - 2.5 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 719

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	94%		
	37.5mm	85%		
	25mm	74%		
	19.0mm	68%		
	12.5mm	61%		
	9.5mm	58%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	43%		
	1.18mm	33%		
	600µm	20%		
	300µm	10%		
	150µm	5%		
	75µm	2.8%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	32.0%	18.0%	11.0%	25.0%	11.2%	2.8%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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Sieve Analysis



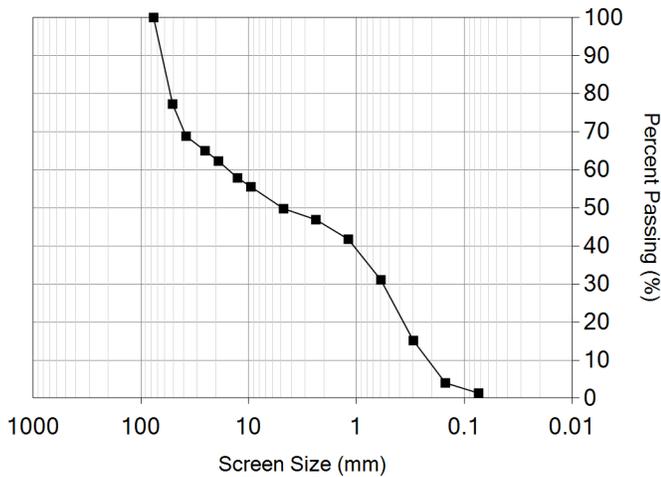
Report Date: April 05, 2022

Client
Name: BC Ministry Of Transportation and Infrastructure
Address: 310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8
Attention: Salem Bahamdun
PO Number:
Sample Date: 2/18/2022 by Client
Source: Test Pit: 22-24
 Depth: 1.5 - 2.5 m

Project
Name: (KA21172.2300) Materials Services South Coast Haney Pit
Address:
Phase: **Task:**
Manager: David Love
Lab/Ref. #: Tran 653

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



Sieve Analysis: (ASTM C117-17/C136-19)

200 Wash Procedure: A

Specification

<u>Coarse Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	75mm	100%		
	50mm	77%		
	37.5mm	69%		
	25mm	65%		
	19.0mm	62%		
	12.5mm	58%		
	9.5mm	56%		
	4.75mm	50%		
<u>Fine Portion:</u>	<u>Sieve Size</u>	<u>Passing</u>	<u>Min</u>	<u>Max</u>
	2.36mm	47%		
	1.18mm	42%		
	600µm	31%		
	300µm	15%		
	150µm	4%		
	75µm	1.3%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	38.0%	12.0%	5.0%	23.0%	20.7%	1.3%	

Remarks:

Distribution: Wood, Surrey Materials

Reviewed By: Scott Forsyth, P.Eng.

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 phone: (604) 295-8657 fax: (604) 295-8658



CERTIFICATE OF ANALYSIS

REPORTED TO Wood Plc. (Burnaby)
Suite 600 - 4445 Lougheed Highway
Burnaby, BC V5C 0E4

ATTENTION David Love

PO NUMBER
PROJECT KA21172.2300
PROJECT INFO

WORK ORDER 22D0197

RECEIVED / TEMP 2022-04-01 16:15 / NA
REPORTED 2022-04-12 14:51
COC NUMBER B112606

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks



You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry



It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve



Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

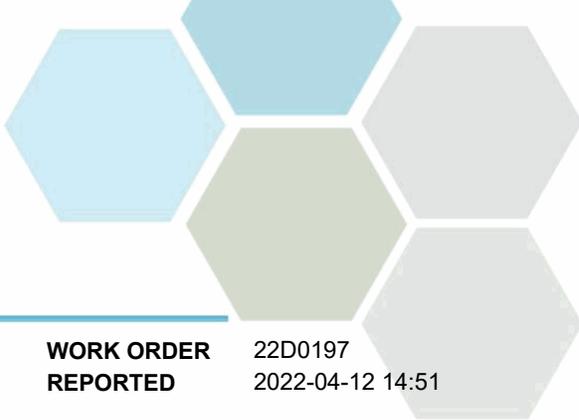
If you have any questions or concerns, please contact me at teamcaro@caro.ca

Authorized By:

Team CARO
Client Service Representative

1-888-311-8846 | www.caro.ca

#110 4011 Viking Way Richmond, BC V6V 2K9 | #102 3677 Highway 97N Kelowna, BC V1X 5C3 | 17225 109 Avenue Edmonton, AB T5S 1H7 | #108 4475 Wayburne Drive Burnaby, BC V5G 4X4

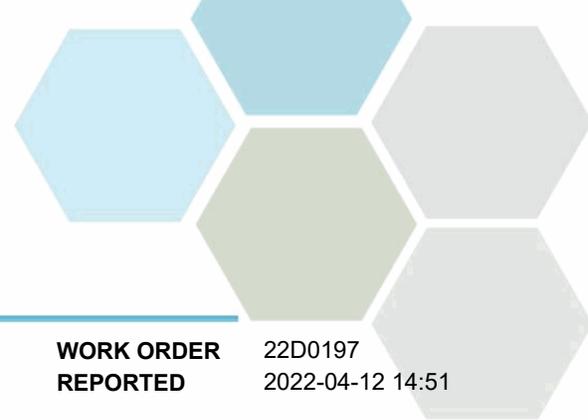


TEST RESULTS

REPORTED TO PROJECT Wood Plc. (Burnaby)
KA21172.2300

WORK ORDER REPORTED 22D0197
2022-04-12 14:51

Analyte	Result	RL	Units	Analyzed	Qualifier
Tran 664 - Sulfate (22D0197-01) Matrix: Solid Sampled: 2022-04-01					
<i>General Parameters</i>					
Sulfate, Water-Soluble	< 0.050	0.050	%	2022-04-08	
Tran 711 - Chloride (22D0197-02) Matrix: Solid Sampled: 2022-04-01					
<i>General Parameters</i>					
Chloride, Water-Soluble	< 0.010	0.010	% dry	2022-04-11	
Tran 714 - Chloride (22D0197-03) Matrix: Solid Sampled: 2022-04-01					
<i>General Parameters</i>					
Chloride, Water-Soluble	< 0.010	0.010	% dry	2022-04-11	
Tran 664 - Chloride (22D0197-04) Matrix: Solid Sampled: 2022-04-01					
<i>General Parameters</i>					
Chloride, Water-Soluble	< 0.010	0.010	% dry	2022-04-11	
Tran 714 - Sulfate (22D0197-05) Matrix: Solid Sampled: 2022-04-01					
<i>General Parameters</i>					
Sulfate, Water-Soluble	< 0.050	0.050	%	2022-04-08	
Tran 711 - Sulfate (22D0197-06) Matrix: Solid Sampled: 2022-04-01					
<i>General Parameters</i>					
Sulfate, Water-Soluble	< 0.050	0.050	%	2022-04-08	



APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO PROJECT Wood Plc. (Burnaby)
KA21172.2300

WORK ORDER REPORTED 22D0197
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Analysis Description	Method Ref.	Technique	Accredited	Location
Chloride, Water-Soluble in Solid	CSAA23.2-4B	Hot Water Extraction / Potentiometric Titration		Richmond
Sulfate, Water-Soluble in Solid	CSAA23.2-3B / CSA A23.2-2B	Extraction (HCl) / Gravimetry (Barium Sulfate Precipitation)		Richmond

Glossary of Terms:

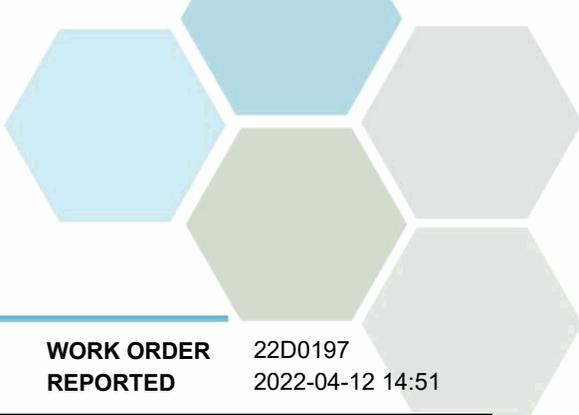
RL	Reporting Limit (default)
%	Percent
% dry	Percent (dry weight basis)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
CSA	Canadian Standards Association Chemical Test Methods

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued or once samples expire, whichever comes first. Longer hold is possible if agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager: teamcaro@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline(s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.



APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO Wood Plc. (Burnaby)
PROJECT KA21172.2300

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REPORTED 2022-04-12 14:51

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk):** A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup):** An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS):** A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS):** A second aliquot of sample is fortified with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM):** A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B2D0331									
Blank (B2D0331-BLK1)			Prepared: 2022-04-05, Analyzed: 2022-04-08						
Sulfate, Water-Soluble	< 0.050	0.050 %							
Blank (B2D0331-BLK2)			Prepared: 2022-04-05, Analyzed: 2022-04-08						
Sulfate, Water-Soluble	< 0.050	0.050 %							
Blank (B2D0331-BLK3)			Prepared: 2022-04-05, Analyzed: 2022-04-08						
Sulfate, Water-Soluble	< 0.050	0.050 %							
Matrix Spike (B2D0331-MS3)			Source: 22D0197-06		Prepared: 2022-04-05, Analyzed: 2022-04-08				
Sulfate, Water-Soluble	0.521	0.050 %	0.667	< 0.050	78	63-117			
General Parameters, Batch B2D0925									
Blank (B2D0925-BLK1)			Prepared: 2022-04-08, Analyzed: 2022-04-11						
Chloride, Water-Soluble	< 0.010	0.010 % dry							