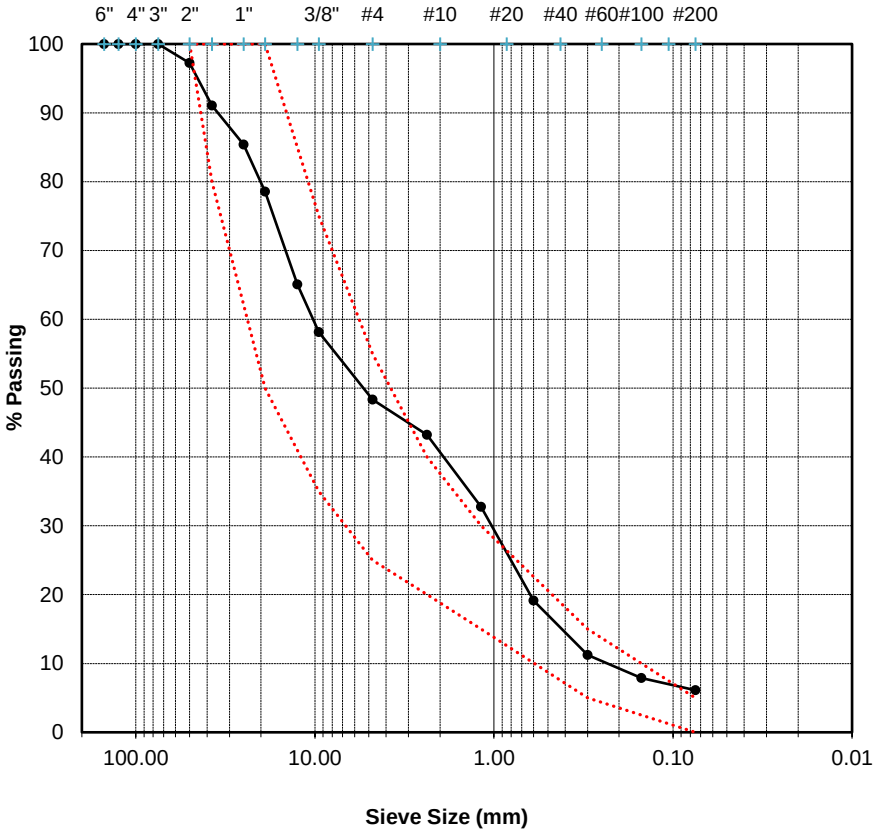
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-01, SA 1, 0.5 - 3.5m	**Report No.:**	1
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 12, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	97.2	100	100
37.5	91.1	80	100
25.0	85.4		
19.0	78.5	50	100
12.5	65.1		
9.5	58.2	35	75
4.75	48.3	25	55
2.36	43.2	20	40
1.18	32.8	15	30
0.600	19.1		
0.300	11.2	5	15
0.150	7.9		
0.075	6.1	0	5



% Gravel:	51.7
% Sand:	42.2
% Silt/Clay:	6.1

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

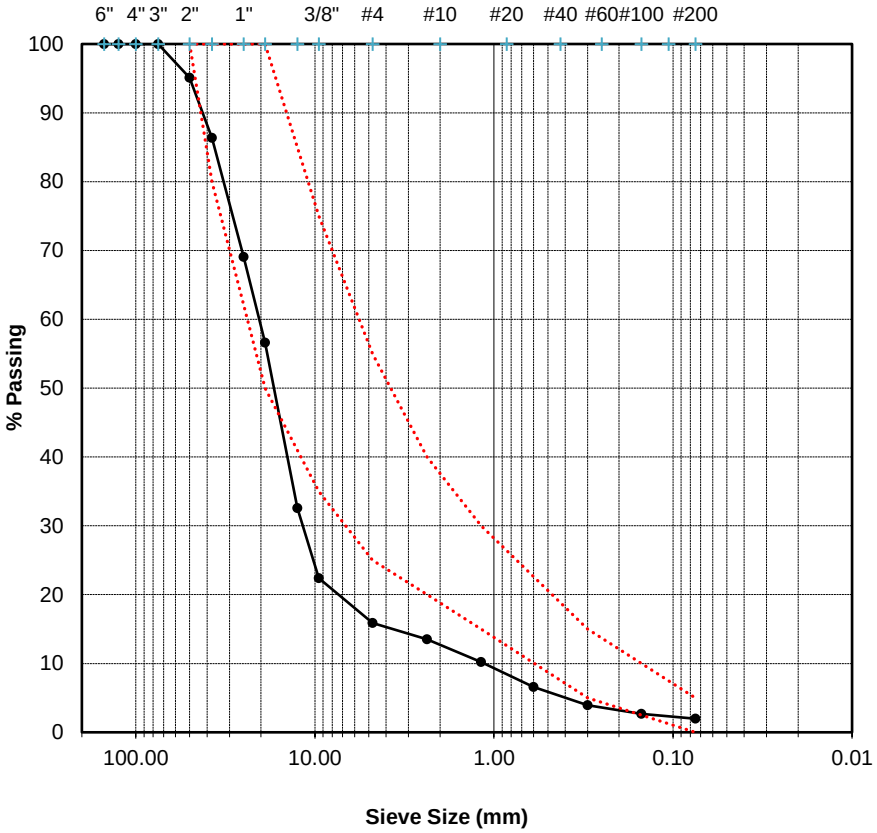
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry Of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-02, SA 1, 0.0 - 3.0m	**Report No.:**	2
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 12, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	95.1	100	100
37.5	86.4	80	100
25.0	69.1		
19.0	56.6	50	100
12.5	32.6		
9.5	22.4	35	75
4.75	15.9	25	55
2.36	13.5	20	40
1.18	10.2	15	30
0.600	6.6		
0.300	3.9	5	15
0.150	2.7		
0.075	2.0	0	5



% Gravel:	84.1
% Sand:	13.9
% Silt/Clay:	2.0

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

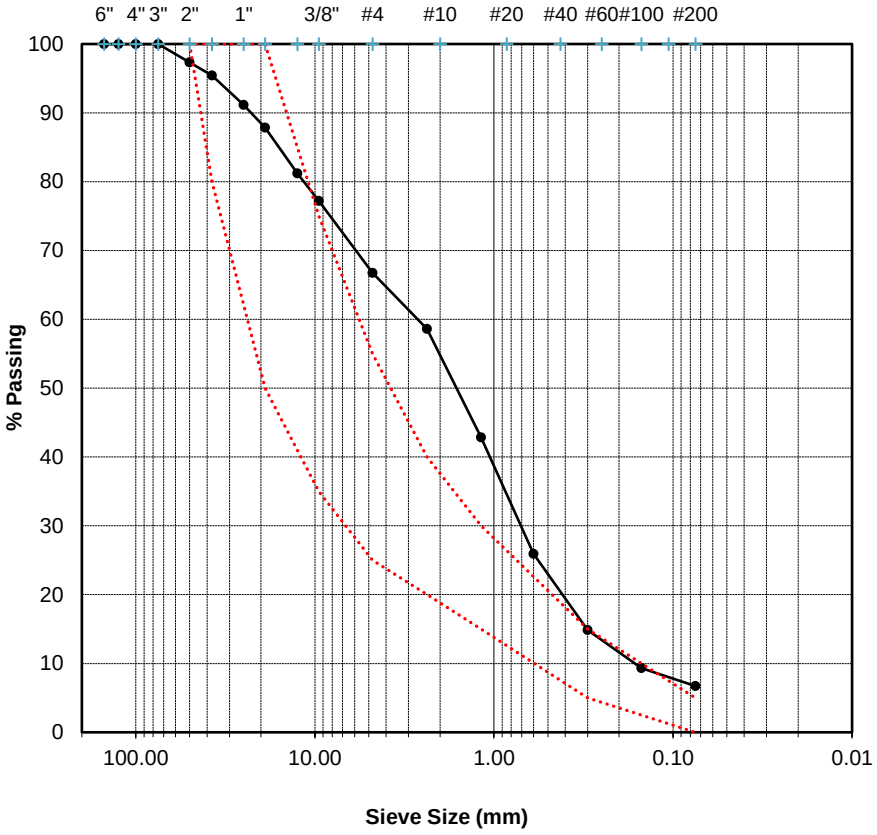
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-03, SA 1, 0.0 - 3.5m	**Report No.:**	3
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 17, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	97.3	100	100
37.5	95.5	80	100
25.0	91.1		
19.0	87.9	50	100
12.5	81.2		
9.5	77.2	35	75
4.75	66.8	25	55
2.36	58.6	20	40
1.18	42.8	15	30
0.600	25.9		
0.300	14.9	5	15
0.150	9.3		
0.075	6.7	0	5



% Gravel:	33.2
% Sand:	60.0
% Silt/Clay:	6.7

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

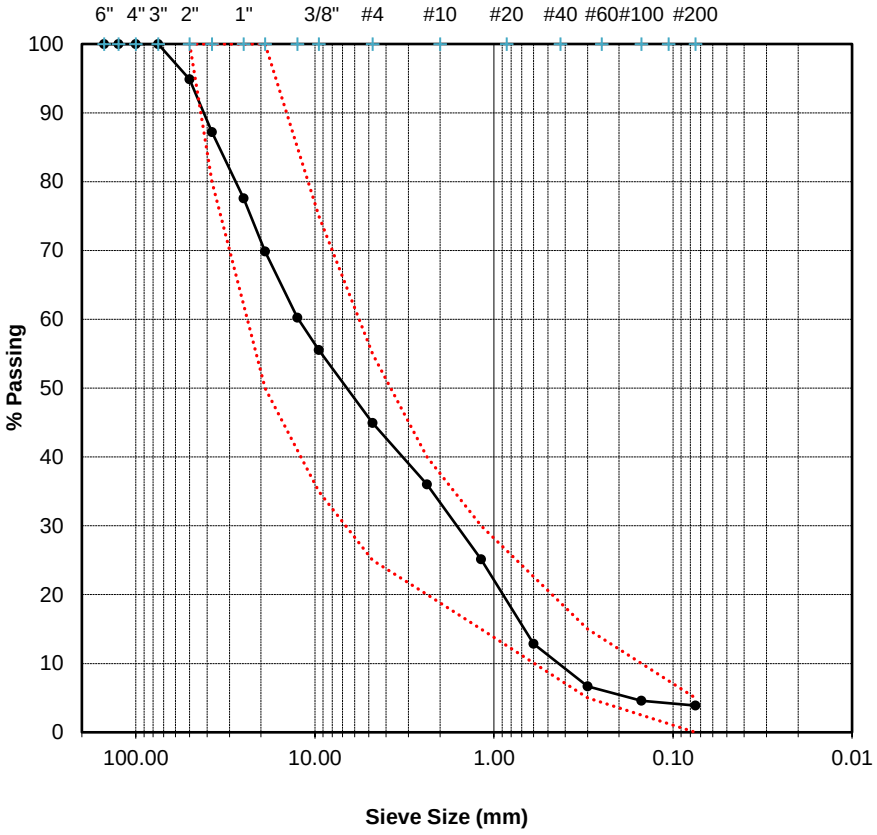
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-04, SA 2, 1.0 - 3.5m	**Report No.:**	4
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 12, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	94.9	100	100
37.5	87.2	80	100
25.0	77.6		
19.0	69.9	50	100
12.5	60.3		
9.5	55.6	35	75
4.75	45.0	25	55
2.36	36.0	20	40
1.18	25.1	15	30
0.600	12.8		
0.300	6.7	5	15
0.150	4.6		
0.075	3.9	0	5



% Gravel:	55.0
% Sand:	41.1
% Silt/Clay:	3.9

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

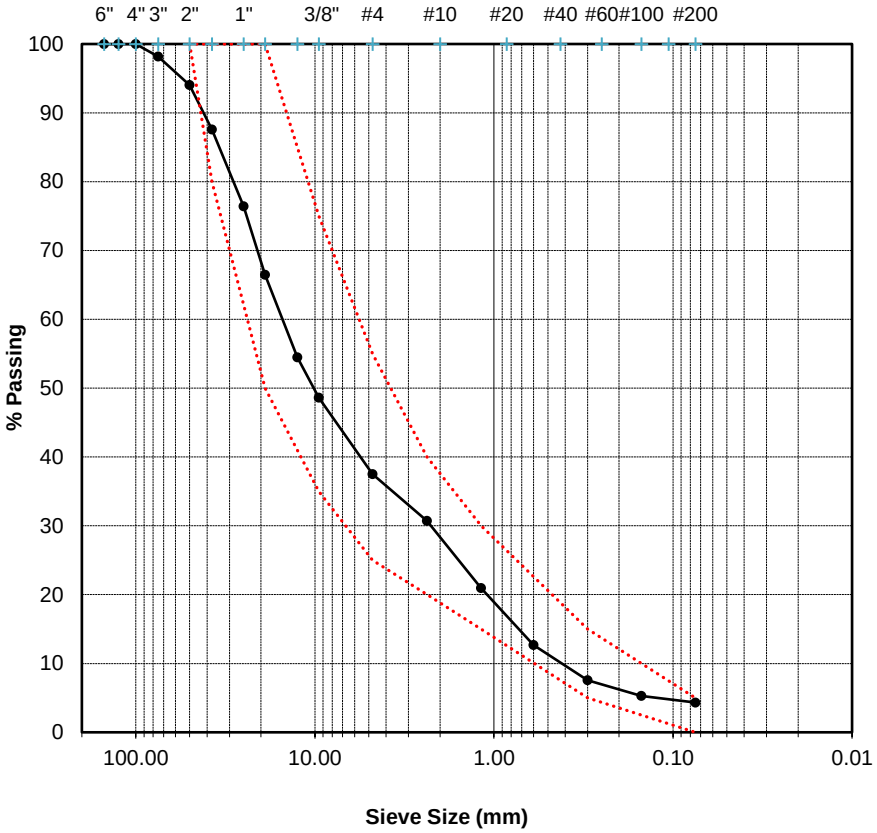
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-04, SA 3, 3.5-5.0m	**Report No.:**	5
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 17, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	98.2		
50	94.0	100	100
37.5	87.6	80	100
25.0	76.4		
19.0	66.5	50	100
12.5	54.4		
9.5	48.6	35	75
4.75	37.5	25	55
2.36	30.7	20	40
1.18	20.9	15	30
0.600	12.7		
0.300	7.6	5	15
0.150	5.3		
0.075	4.3	0	5



% Gravel:	62.5
% Sand:	33.2
% Silt/Clay:	4.3

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

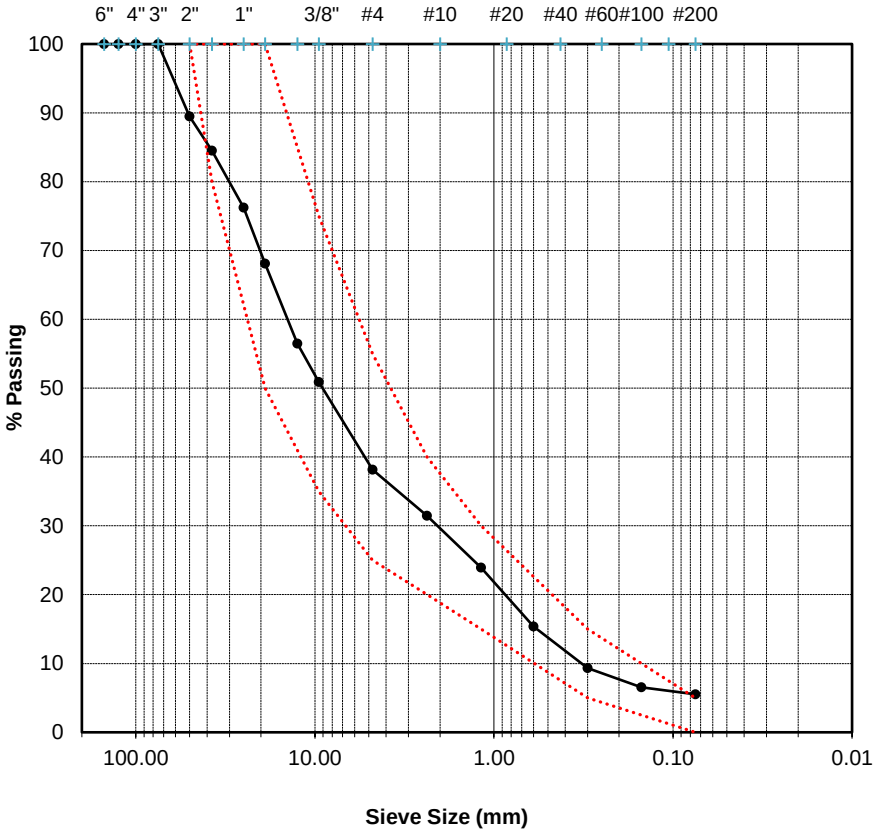
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-05, SA 1, 0-2.7m	**Report No.:**	6
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 18, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	89.5	100	100
37.5	84.5	80	100
25.0	76.2		
19.0	68.1	50	100
12.5	56.5		
9.5	50.9	35	75
4.75	38.2	25	55
2.36	31.4	20	40
1.18	23.9	15	30
0.600	15.4		
0.300	9.3	5	15
0.150	6.6		
0.075	5.5	0	5



% Gravel:	61.8
% Sand:	32.6
% Silt/Clay:	5.5

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

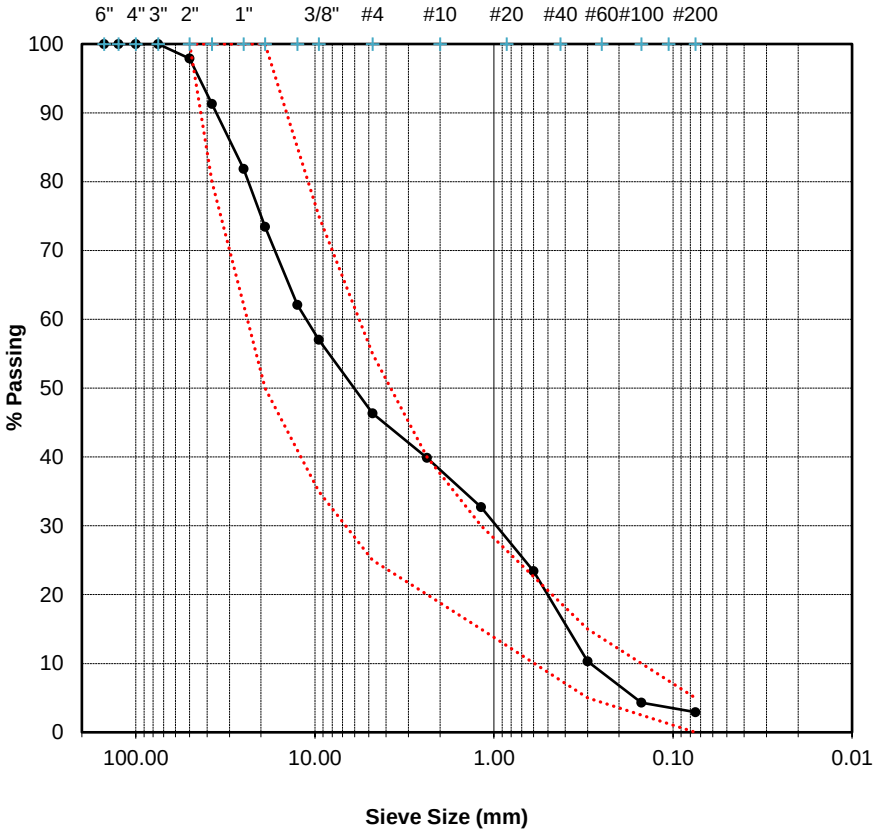
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-07, SA 1, 0.0-2.4m	**Report No.:**	7
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 15, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	97.9	100	100
37.5	91.3	80	100
25.0	81.9		
19.0	73.4	50	100
12.5	62.1		
9.5	57.0	35	75
4.75	46.3	25	55
2.36	39.9	20	40
1.18	32.7	15	30
0.600	23.4		
0.300	10.3	5	15
0.150	4.3		
0.075	2.9	0	5



% Gravel:	53.7
% Sand:	43.4
% Silt/Clay:	2.9

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

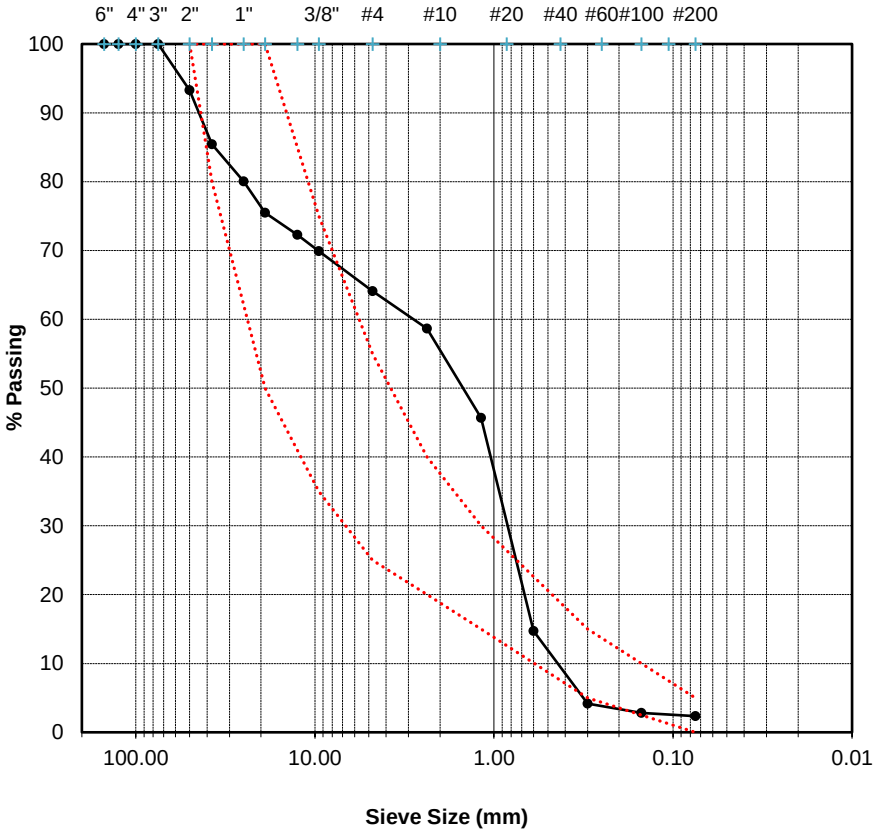
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry Of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-08, SA 1, 0.4-2.7m	**Report No.:**	8
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 15, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	93.3	100	100
37.5	85.4	80	100
25.0	80.0		
19.0	75.5	50	100
12.5	72.3		
9.5	69.9	35	75
4.75	64.1	25	55
2.36	58.7	20	40
1.18	45.7	15	30
0.600	14.7		
0.300	4.1	5	15
0.150	2.8		
0.075	2.3	0	5



% Gravel:	35.9
% Sand:	61.8
% Silt/Clay:	2.3

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

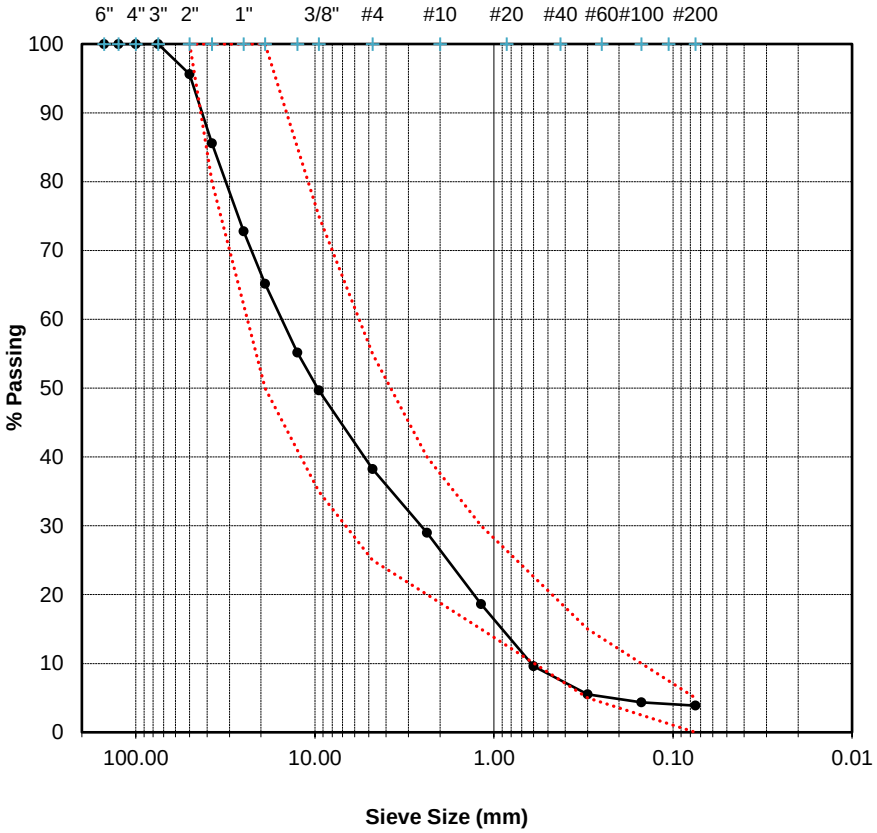
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-08, SA 2, 2.7-5.0m	**Report No.:**	9
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 15, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	95.6	100	100
37.5	85.6	80	100
25.0	72.8		
19.0	65.2	50	100
12.5	55.2		
9.5	49.7	35	75
4.75	38.2	25	55
2.36	29.0	20	40
1.18	18.6	15	30
0.600	9.6		
0.300	5.5	5	15
0.150	4.4		
0.075	3.9	0	5



% Gravel:	61.8
% Sand:	34.4
% Silt/Clay:	3.9

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

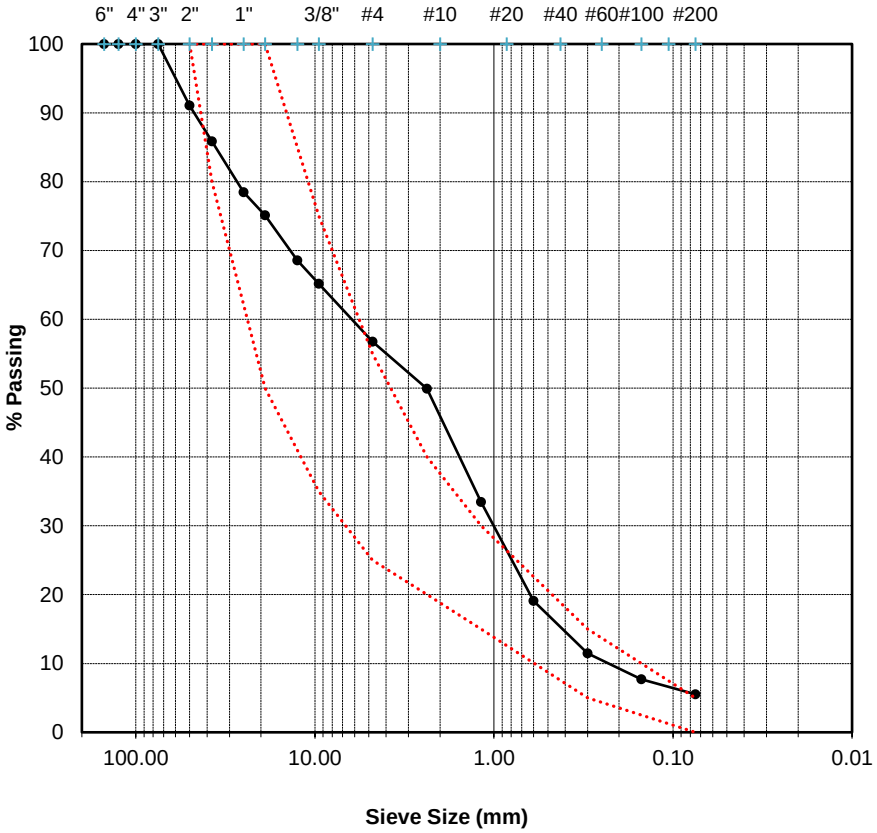
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-09, SA 1, 0.1-0.4m	**Report No.:**	10
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 19, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	91.1	100	100
37.5	85.9	80	100
25.0	78.5		
19.0	75.1	50	100
12.5	68.6		
9.5	65.2	35	75
4.75	56.8	25	55
2.36	49.9	20	40
1.18	33.5	15	30
0.600	19.1		
0.300	11.5	5	15
0.150	7.7		
0.075	5.5	0	5



% Gravel:	43.2
% Sand:	51.2
% Silt/Clay:	5.5

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

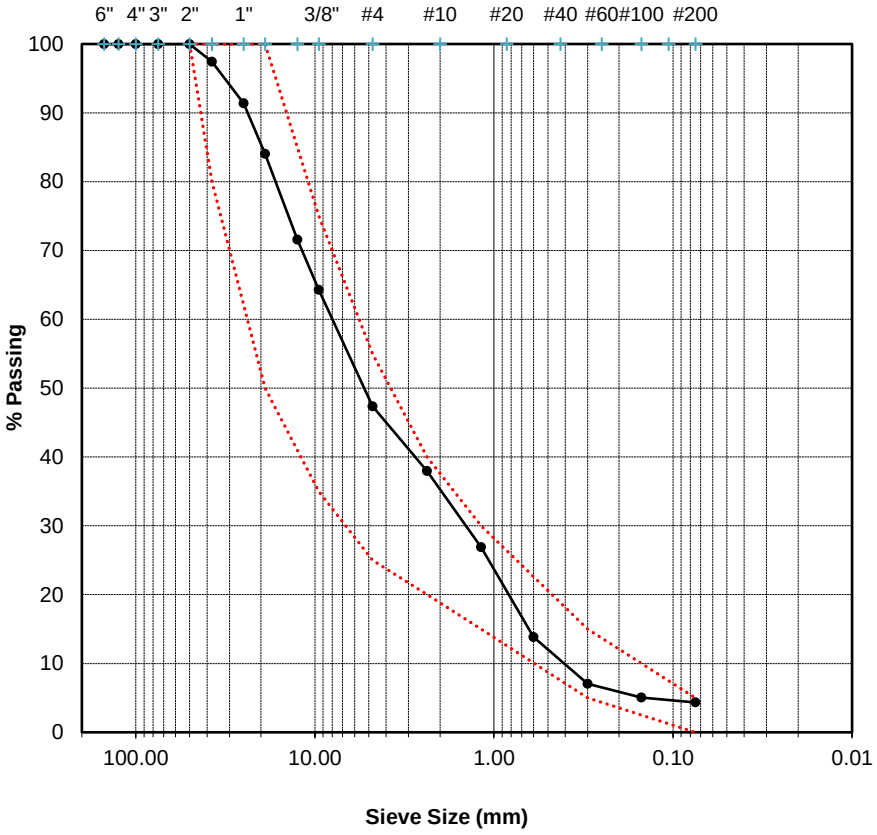
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-10, SA 2, 3.0-5.4m	**Report No.:**	11
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 19, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	100.0	100	100
37.5	97.4	80	100
25.0	91.4		
19.0	84.1	50	100
12.5	71.6		
9.5	64.3	35	75
4.75	47.4	25	55
2.36	38.0	20	40
1.18	26.9	15	30
0.600	13.8		
0.300	7.0	5	15
0.150	5.1		
0.075	4.3	0	5



% Gravel:	52.6
% Sand:	43.0
% Silt/Clay:	4.3

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

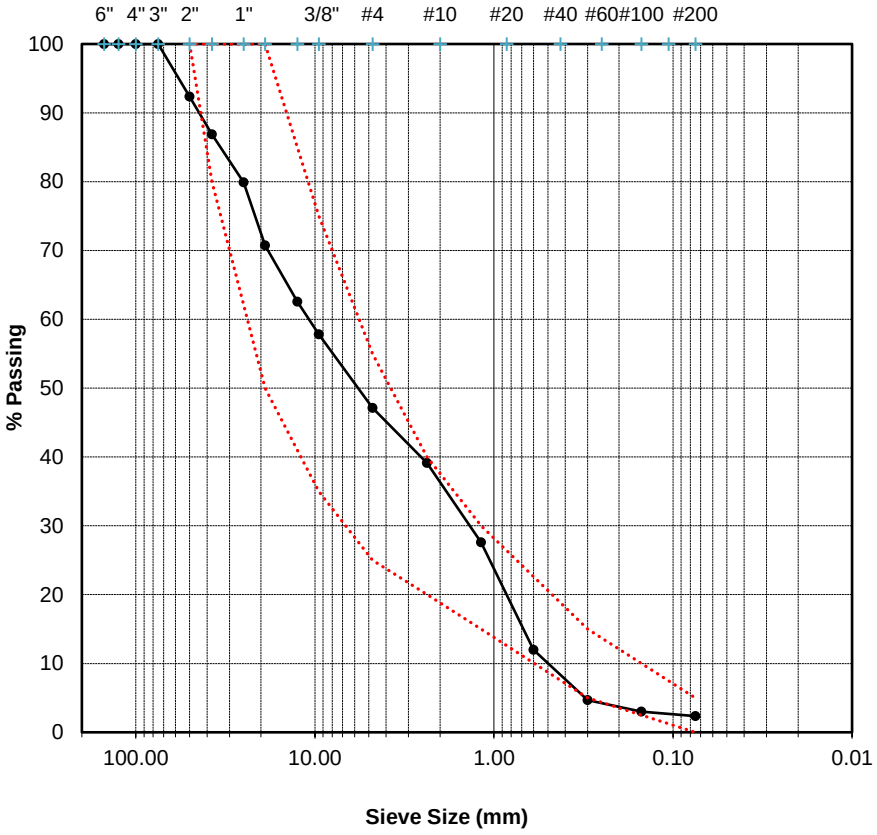
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-11, SA 1, 0.0-3.8m	**Report No.:**	12
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 16, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	92.3	100	100
37.5	86.9	80	100
25.0	79.9		
19.0	70.7	50	100
12.5	62.5		
9.5	57.8	35	75
4.75	47.1	25	55
2.36	39.1	20	40
1.18	27.6	15	30
0.600	12.0		
0.300	4.7	5	15
0.150	3.0		
0.075	2.4	0	5



% Gravel:	52.9
% Sand:	44.8
% Silt/Clay:	2.4

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

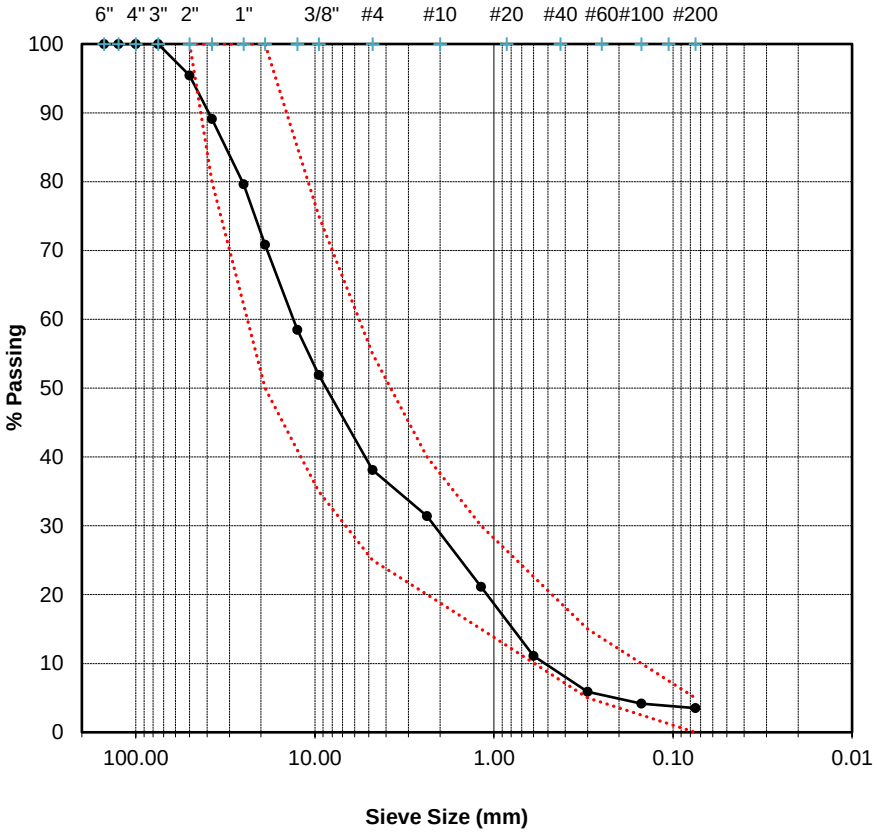
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-11, SA 2, 3.8-5.2m	**Report No.:**	13
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 16, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	95.4	100	100
37.5	89.1	80	100
25.0	79.6		
19.0	70.8	50	100
12.5	58.5		
9.5	51.9	35	75
4.75	38.1	25	55
2.36	31.4	20	40
1.18	21.1	15	30
0.600	11.1		
0.300	5.9	5	15
0.150	4.1		
0.075	3.5	0	5



% Gravel:	61.9
% Sand:	34.6
% Silt/Clay:	3.5

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

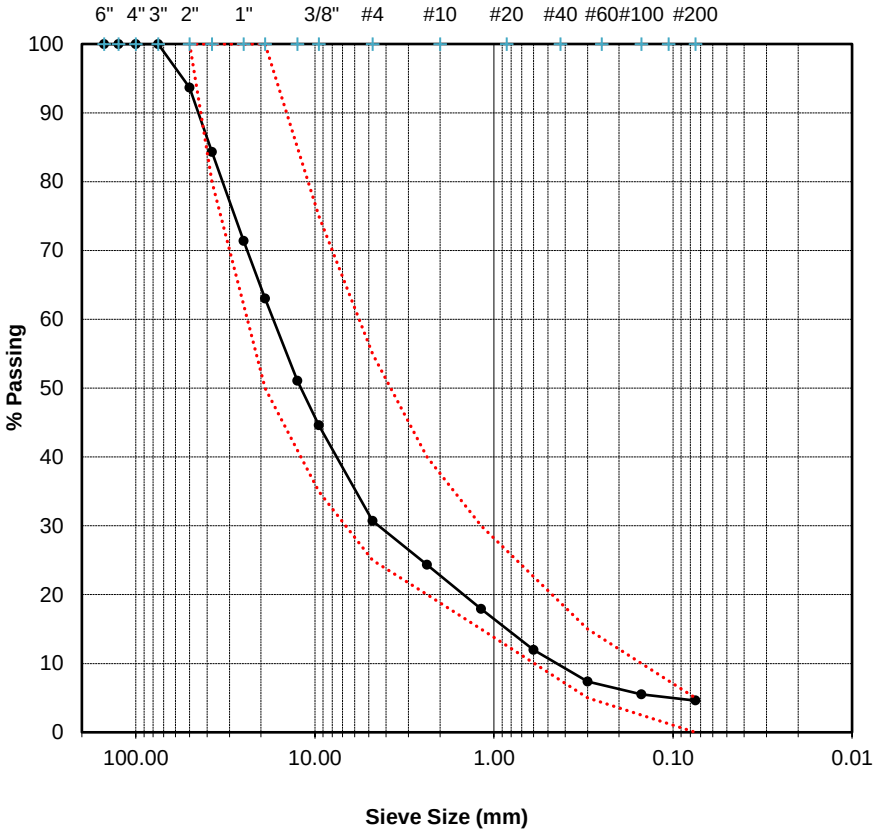
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-12, SA 2, 2.7-4.7m	**Report No.:**	14
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 16, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	93.7	100	100
37.5	84.3	80	100
25.0	71.4		
19.0	63.0	50	100
12.5	51.1		
9.5	44.6	35	75
4.75	30.7	25	55
2.36	24.3	20	40
1.18	17.9	15	30
0.600	12.0		
0.300	7.4	5	15
0.150	5.5		
0.075	4.6	0	5



% Gravel:	69.3
% Sand:	26.1
% Silt/Clay:	4.6

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

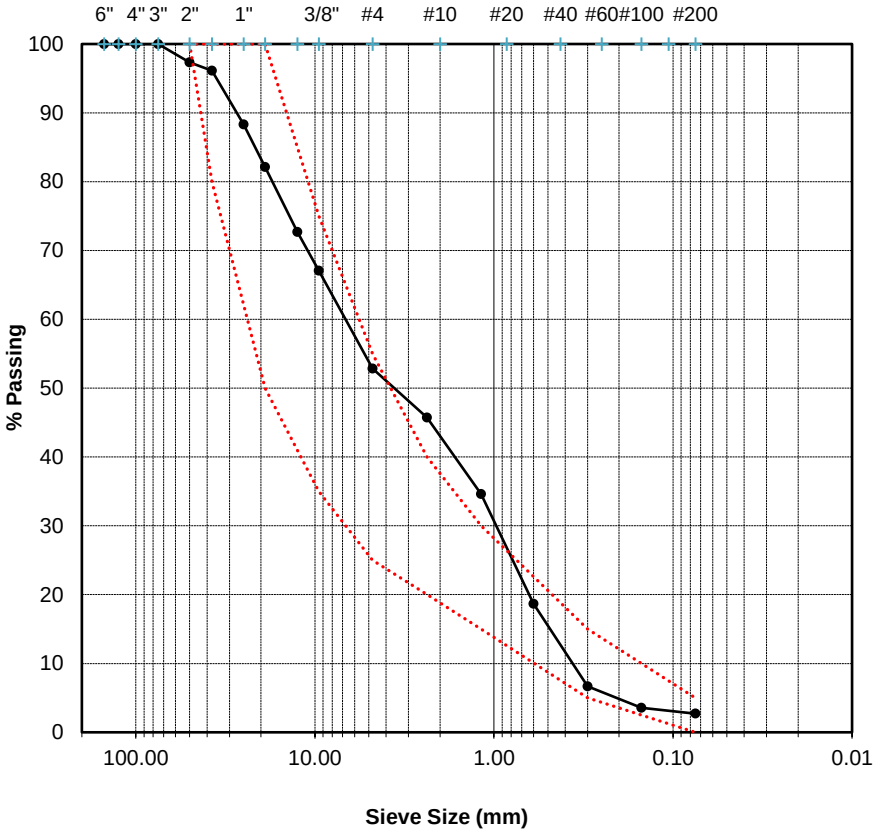
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-13, SA 1,0.5-3.0m	**Report No.:**	15
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 17, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	97.4	100	100
37.5	96.1	80	100
25.0	88.3		
19.0	82.1	50	100
12.5	72.7		
9.5	67.1	35	75
4.75	52.9	25	55
2.36	45.7	20	40
1.18	34.6	15	30
0.600	18.7		
0.300	6.7	5	15
0.150	3.5		
0.075	2.7	0	5



% Gravel:	47.1
% Sand:	50.2
% Silt/Clay:	2.7

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

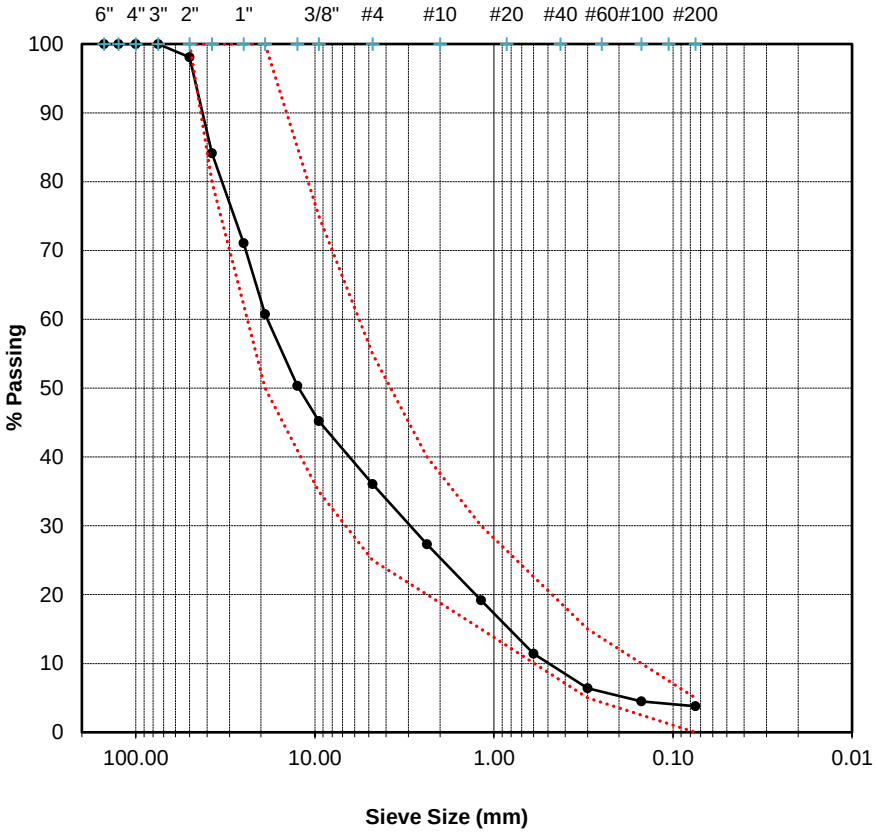
Sieve Analysis of Fine and Coarse Aggregates

ASTM C136 and C117

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase No.:**	800

Sample No.:	TP24-13, SA 2, 3.0-4.5m	**Report No.:**	16
Sample Source:	Florence Pit	**Date Sampled:**	January 8, 2024
Sample Location:	Florence Pit	**Sampled By:**	MoTI
Material Description:	Sand and Gravel	**Date Tested:**	January 17, 2024
Material Specification:	BCMOTI, WGB, 50 MM	**Tested By:**	K. Gonzales

Sieve Size (mm)	Passing %	Material Specification	
		Lower	Upper
150	100.0		
125	100.0		
100	100.0		
75	100.0		
50	98.1	100	100
37.5	84.1	80	100
25.0	71.1		
19.0	60.8	50	100
12.5	50.3		
9.5	45.2	35	75
4.75	36.0	25	55
2.36	27.3	20	40
1.18	19.2	15	30
0.600	11.4		
0.300	6.4	5	15
0.150	4.5		
0.075	3.8	0	5



% Gravel:	64.0
% Sand:	32.3
% Silt/Clay:	3.8

Reviewed by: _____

Lily X. Hu, P. Eng.

Notice: The test data given herein pertain to the sample provided. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Sand Equivalent Value of Soils and Fine Aggregate

ASTM D2420

Client:	Ministry of Transportation and Infrastructure	Project No.:	CA0007505.5261
Project:	Florence Pit	Phase:	800

Sample ID:	TP24-01, SA 1, 0.5 - 3.5m	Sampled Date:	January 8, 2024
Sample Type:	Sand and Gravel	Sampled By:	MoTI
Sample Location:	Florence Pit	Tested Date:	February 21, 2024
Source:	Florence Pit	Tested By:	K. Gonzales

Trial #		1	2	3	Average
Sedimentation Period	(minutes)	20	20	20	
Clay Height	(inch)	8.3	8.5	8.4	
Sand Height	(inch)	3.5	3.7	3.6	
Sand Equivalent Value		**42**	**44**	**43**	**43**

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Reviewed by: _____

L. X. Hu, MSc.E., P. Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other source or production. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Sand Equivalent Value of Soils and Fine Aggregate

ASTM D2420

Client:	Ministry of Transportation and Infrastructure	Project No.:	CA0007505.5261
Project:	Florence Pit	Phase:	800

Sample ID:	TP24-04, SA 2, 1.0 - 3.5m	Sampled Date:	January 8, 2024
Sample Type:	Sand and Gravel	Sampled By:	MoTI
Sample Location:	Florence Pit	Tested Date:	January 25, 2024
Source:	Florence Pit	Tested By:	K. Gonzales

Trial #		1	2	3	Average
Sedimentation Period	(minutes)	20	20	20	
Clay Height	(inch)	8.6	8.4	8.4	
Sand Height	(inch)	3.7	3.7	3.7	
Sand Equivalent Value		**43**	**44**	**44**	**44**

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Reviewed by: _____

L. X. Hu, MSc.E., P. Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other source or production. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Sand Equivalent Value of Soils and Fine Aggregate

ASTM D2420

Client:	Ministry of Transportation and Infrastructure	Project No.:	CA0007505.5261
Project:	Florence Pit	Phase:	800

Sample ID:	TP24-08, SA 2, 2.7 - 5.0m	Sampled Date:	January 8, 2024
Sample Type:	Sand and Gravel	Sampled By:	MoTI
Sample Location:	Florence Pit	Tested Date:	January 25, 2024
Source:	Florence Pit	Tested By:	K. Gonzales

Trial #		1	2	3	Average
Sedimentation Period	(minutes)	20	20	20	
Clay Height	(inch)	9.2	9.1	9.1	
Sand Height	(inch)	3.7	3.7	3.7	
Sand Equivalent Value		**40**	**41**	**41**	**41**

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Reviewed by: _____

L. X. Hu, MSc.E., P. Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other source or production. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Sand Equivalent Value of Soils and Fine Aggregate

ASTM D2420

Client:	Ministry of Transportation and Infrastructure	Project No.:	CA0007505.5261
Project:	Florence Pit	Phase:	800

Sample ID:	TP24-10, SA 2, 3.0 - 5.4m	Sampled Date:	January 8, 2024
Sample Type:	Sand and Gravel	Sampled By:	MoTI
Sample Location:	Florence Pit	Tested Date:	January 25, 2024
Source:	Florence Pit	Tested By:	K. Gonzales

Trial #		1	2	3	Average
Sedimentation Period	(minutes)	20	20	20	
Clay Height	(inch)	8.9	8.8	8.8	
Sand Height	(inch)	3.7	3.8	3.8	
Sand Equivalent Value		**42**	**43**	**43**	**43**

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Reviewed by: _____

L. X. Hu, MSc.E., P. Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other source or production. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

ASTM D6928

Client:	Ministry of Transportation and Infrastructure	Project No.:	CA0007505.5261
Project:	Florence Pit	Phase:	800

Test Aggregate ID:	TP24-01, SA1, 0.5 - 3.5m	Date Tested:	January 18, 2024
Aggregate Type:	Sand and Gravel	Tested By:	D. Singh
Aggregate Source:	Florence Pit	Sampled By:	MoTI

Aggregate Test Results

Grading Used	**Clause 8.2**
Mass of Sphere, grams	5003.0
Mass of Sample before Abrasion, grams	1501.6
Percent of Loss After Abrasion, %	**8.4**

Reference Aggregate Validation Results

Date Tested:	*January 4, 2024*
Abrasion Loss, %	*12.6*
Acceptable abrasion range , %	*11.4 - 14.8*

CCIL The Voice Of Independent Canadian Laboratories / La voix des laboratoires indépendants canadiens

Reviewed by: _____

L. X. Hu, MSc.E., P. Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other source or production. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

ASTM D6928

Client:	Ministry of Transportation and Infrastructure	Project No.:	CA0007505.5261
Project:	Florence Pit	Phase:	800

Test Aggregate ID:	TP24-04, SA2,1.0 - 3.5m	Date Tested:	January 18, 2024
Aggregate Type:	Sand and Gravel	Tested By:	D. Singh
Aggregate Source:	Florence Pit	Sampled By:	MoTI

Aggregate Test Results

Grading Used	**Clause 8.2**
Mass of Sphere, grams	5001.8
Mass of Sample before Abrasion, grams	1500.3
Percent of Loss After Abrasion, %	**7.6**

Reference Aggregate Validation Results

Date Tested:	*January 4, 2024*
Abrasion Loss, %	*12.6*
Acceptable abrasion range , %	*11.4 - 14.8*

CCIL The Voice Of Independent Canadian Laboratories / La voix des laboratoires indépendants canadiens

Reviewed by: _____

L. X. Hu, MSc.E., P. Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other source or production. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

ASTM D6928

Client:	Ministry of Transportation and Infrastructure	Project No.:	CA0007505.5261
Project:	Florence Pit	Phase:	800

Test Aggregate ID:	TP24-08, SA2, 2.7- 5.0m	Date Tested:	January 17, 2024
Aggregate Type:	Sand and Gravel	Tested By:	D. Singh
Aggregate Source:	Florence Pit	Sampled By:	MoTI

Aggregate Test Results

Grading Used	**Clause 8.2**
Mass of Sphere, grams	5000.8
Mass of Sample before Abrasion, grams	1502.1
Percent of Loss After Abrasion, %	**7.5**

Reference Aggregate Validation Results

Date Tested:	*January 4, 2024*
Abrasion Loss, %	*12.6*
Acceptable abrasion range , %	*11.4 - 14.8*

CCIL The Voice Of Independent Canadian Laboratories / La voix des laboratoires indépendants canadiens

Reviewed by: _____

L. X. Hu, MSc.E., P. Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other source or production. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

ASTM D6928

Client:	Ministry of Transportation and Infrastructure	Project No.:	CA0007505.5261
Project:	Florence Pit	Phase:	800

Test Aggregate ID:	TP24-10, SA 2, 3.0 - 5.4m	Date Tested:	January 17, 2024
Aggregate Type:	Sand and Gravel	Tested By:	D. Singh
Aggregate Source:	Florence Pit	Sampled By:	MoTI

Aggregate Test Results

Grading Used	**Clause 8.2**
Mass of Sphere, grams	5003.0
Mass of Sample before Abrasion, grams	1504.7
Percent of Loss After Abrasion, %	**6.2**

Reference Aggregate Validation Results

Date Tested:	*January 4, 2024*
Abrasion Loss, %	*12.6*
Acceptable abrasion range , %	*11.4 - 14.8*

CCIL The Voice Of Independent Canadian Laboratories / La voix des laboratoires indépendants canadiens

Reviewed by: _____

L. X. Hu, MSc.E., P. Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other source or production. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Relative Density (Specific Gravity) and Absorption of Coarse and Fine Aggregate

ASTM C127/C128

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase:**	800

Sample ID:	TP-24-02, SA1, 0.0 - 3.0m	**Sampled Date:**	January 8, 2024
Sample Type:	Sand and Gravel	**Sampled By:**	MoTI
Sample Location:	Florence Pit	**Tested Date:**	January 16, 2024
Source:	Florence Pit	**Tested By:**	J.Amante/D.Singh

Coarse Aggregate (+4.75mm), ASTM C127

Trail	Relative Density (Specific Gravity)			Absorption, %
	Dry Basis (OD)	SSD Basis (SSD)	Apparent	
1	2.699	2.721	2.760	0.81
2	2.696	2.718	2.757	0.81
Average	**2.698**	**2.720**	**2.759**	**0.81**

Fine Aggregate (- 4.75mm), ASTM C128

Trail	Relative Density (Specific Gravity)			Absorption, %
	Dry Basis (OD)	SSD Basis (SSD)	Apparent	
1	2.647	2.679	2.734	1.20
2	2.647	2.677	2.731	1.16
Average	**2.647**	**2.678**	**2.732**	**1.18**

Note: The fine aggregate was laboratory washed prior to the SG test.

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Reviewed by: 

Lily X. Hu, MSc.E., P. Eng.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other source or production. Reporting of these data constitutes a testing service. Engineering review and interpretation may be provided upon written request.

Relative Density (Specific Gravity) and Absorption of Coarse and Fine Aggregate

ASTM C127/C128

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase:**	800

Sample ID:	TP-24-07, SA, 0.0 - 2.4m	**Sampled Date:**	January 8, 2024
Sample Type:	Sand and Gravel	**Sampled By:**	MoTI
Sample Location:	Florence Pit	**Tested Date:**	January 16, 2024
Source:	Florence Pit	**Tested By:**	J.Amante/D.Singh

Coarse Aggregate (+4.75mm), ASTM C127

Trail	Relative Density (Specific Gravity)			Absorption, %
	Dry Basis (OD)	SSD Basis (SSD)	Apparent	
1	2.727	2.746	2.782	0.73
2	2.726	2.746	2.781	0.73
Average	**2.726**	**2.746**	**2.782**	**0.73**

Fine Aggregate (- 4.75mm), ASTM C128

Trail	Relative Density (Specific Gravity)			Absorption, %
	Dry Basis (OD)	SSD Basis (SSD)	Apparent	
1	2.639	2.676	2.739	1.37
2	2.638	2.674	2.737	1.37
Average	**2.639**	**2.675**	**2.738**	**1.37**

Note: The fine aggregate was laboratory washed prior to the SG test.

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Reviewed by: _____

Lily X. Hu, MSc.E., P. Eng.

Relative Density (Specific Gravity) and Absorption of Coarse and Fine Aggregate

ASTM C127/C128

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase:**	800

Sample ID:	TP-24-11, SA1, 0.0 - 3.8m	**Sampled Date:**	January 8, 2024
Sample Type:	Sand and Gravel	**Sampled By:**	MoTI
Sample Location:	Florence Pit	**Tested Date:**	January 16, 2024
Source:	Florence Pit	**Tested By:**	J.Amante/D.Singh

Coarse Aggregate (+4.75mm), ASTM C127

Trail	Relative Density (Specific Gravity)			Absorption, %
	Dry Basis (OD)	SSD Basis (SSD)	Apparent	
1	2.708	2.726	2.759	0.69
2	2.719	2.738	2.770	0.67
Average	**2.714**	**2.732**	**2.765**	**0.68**

Fine Aggregate (- 4.75mm), ASTM C128

Trail	Relative Density (Specific Gravity)			Absorption, %
	Dry Basis (OD)	SSD Basis (SSD)	Apparent	
1	2.604	2.644	2.713	1.54
2	2.588	2.628	2.696	1.55
Average	**2.596**	**2.636**	**2.705**	**1.55**

Note: The fine aggregate was laboratory washed prior to the SG test.

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Reviewed by: 

Lily X. Hu, MSc.E., P. Eng.

Relative Density (Specific Gravity) and Absorption of Coarse and Fine Aggregate

ASTM C127/C128

Client:	Ministry of Transportation and Infrastructure	**Project No.:**	CA0007505.5261
Project:	Florence Pit	**Phase:**	800

Sample ID:	TP-24-13, SA1, 0.5 - 3.0m	**Sampled Date:**	January 8, 2024
Sample Type:	Sand and Gravel	**Sampled By:**	MoTI
Sample Location:	Florence Pit	**Tested Date:**	January 16, 2024
Source:	Florence Pit	**Tested By:**	J.Amante/D.Singh

Coarse Aggregate (+4.75mm), ASTM C127

Trail	Relative Density (Specific Gravity)			Absorption, %
	Dry Basis (OD)	SSD Basis (SSD)	Apparent	
1	2.712	2.733	2.769	0.76
2	2.724	2.742	2.774	0.66
Average	**2.718**	**2.737**	**2.772**	**0.71**

Fine Aggregate (- 4.75mm), ASTM C128

Trail	Relative Density (Specific Gravity)			Absorption, %
	Dry Basis (OD)	SSD Basis (SSD)	Apparent	
1	2.597	2.634	2.697	1.44
2	2.592	2.627	2.688	1.38
Average	**2.594**	**2.631**	**2.692**	**1.41**

Note: The fine aggregate was laboratory washed prior to the SG test.

CCIL
The Voice Of Independent Canadian Laboratories
La voix des laboratoires indépendants canadiens

Reviewed by: _____

Lily X. Hu, MSc.E., P. Eng.

CERTIFICATE OF ANALYSIS

Work Order	: **VA24A1385**	Page	: 1 of 3
Client	: **WSP E&I Canada Limited**	Laboratory	: ALS Environmental - Vancouver
Contact	: David Love	Account Manager	: Selam Worku
Address	: 110 - 18568 96 Avenue Surrey BC Canada V4N 3P9	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: KA21201.600	Date Samples Received	: 24-Jan-2024 09:42
PO	: ----	Date Analysis Commenced	: 31-Jan-2024
C-O-C number	:	Issue Date	: 05-Feb-2024 13:56
Sampler	: ----		
Site	: ----		
Quote number	: BC Standard Pricing		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Drake	Lab Analyst	Inorganics, Edmonton, Alberta
Katarzyna Glinka	Analyst	Inorganics, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

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

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*	*Client sample ID*	**Florence Pit, TP24-02, SA#1, 0.0-3.0m**	**Florence Pit, TP24-11, SA#1, 0.0-3.8m**	**----**	**----**	**----**
					Client sampling date / time	23-Jan-2024 00:00	23-Jan-2024 00:00	----	----	----
						VA24A1385-001	**VA24A1385-002**	**--------**	**--------**	**--------**
						Result	Result	----	----	----
Inorganics										
Chloride, soluble ion content	16887-00-6	E246.CL/EO	0.0025	%		<0.0025	<0.0025	----	----	----
Sulfate, total, ion content	14808-79-8	E246.SO4/CG	0.050	%		<0.050	<0.050	----	----	----
Sulfate, soluble ion content	14808-79-8	E246A.SO4/CG	0.05	%		NR	NR	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
right partner.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA24A1385**	Page	: 1 of 5
Client	: **WSP E&I Canada Limited**	Laboratory	: ALS Environmental - Vancouver
Contact	: David Love	Account Manager	: Selam Worku
Address	: 110 - 18568 96 Avenue Surrey BC Canada V4N 3P9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: KA21201.600	Date Samples Received	: 24-Jan-2024 09:42
PO	: ----	Issue Date	: 05-Feb-2024 13:55
C-O-C number	:		
Sampler	: ----		
Site	: ----		
Quote number	: BC Standard Pricing		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Inorganics : Chloride in soil by boiling water extraction, IC										
LDPE bag Florence Pit, TP24-02, SA#1, 0.0-3.0m	E246.CL	23-Jan-2024	02-Feb-2024	180 days	10 days	✓	02-Feb-2024	28 days	0 days	✓
Inorganics : Chloride in soil by boiling water extraction, IC										
LDPE bag Florence Pit, TP24-11, SA#1, 0.0-3.8m	E246.CL	23-Jan-2024	02-Feb-2024	180 days	10 days	✓	02-Feb-2024	28 days	0 days	✓
Inorganics : Soluble Sulfate ion in soil by boiling water extraction, IC.										
LDPE bag Florence Pit, TP24-02, SA#1, 0.0-3.0m	E246A.SO4	23-Jan-2024	01-Feb-2024	180 days	9 days	✓	01-Feb-2024	28 days	0 days	✓
Inorganics : Soluble Sulfate ion in soil by boiling water extraction, IC.										
LDPE bag Florence Pit, TP24-11, SA#1, 0.0-3.8m	E246A.SO4	23-Jan-2024	01-Feb-2024	180 days	9 days	✓	01-Feb-2024	28 days	0 days	✓
Inorganics : Total Sulfate ion in soil by acidic boiling water extraction, IC										
LDPE bag Florence Pit, TP24-02, SA#1, 0.0-3.0m	E246.SO4	23-Jan-2024	31-Jan-2024	180 days	8 days	✓	31-Jan-2024	28 days	0 days	✓
Inorganics : Total Sulfate ion in soil by acidic boiling water extraction, IC										
LDPE bag Florence Pit, TP24-11, SA#1, 0.0-3.8m	E246.SO4	23-Jan-2024	31-Jan-2024	180 days	8 days	✓	31-Jan-2024	28 days	0 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Chloride in soil by boiling water extraction, IC	E246.CL	1320974	1	10	10.0	5.0	✓
Soluble Sulfate ion in soil by boiling water extraction, IC.	E246A.SO4	1319764	0	8	0.0	5.0	×
Total Sulfate ion in soil by acidic boiling water extraction, IC	E246.SO4	1318377	1	10	10.0	5.0	✓
Laboratory Control Samples (LCS)							
Chloride in soil by boiling water extraction, IC	E246.CL	1320974	1	10	10.0	5.0	✓
Soluble Sulfate ion in soil by boiling water extraction, IC.	E246A.SO4	1319764	2	8	25.0	10.0	✓
Total Sulfate ion in soil by acidic boiling water extraction, IC	E246.SO4	1318377	2	10	20.0	10.0	✓
Method Blanks (MB)							
Chloride in soil by boiling water extraction, IC	E246.CL	1320974	1	10	10.0	5.0	✓
Soluble Sulfate ion in soil by boiling water extraction, IC.	E246A.SO4	1319764	1	8	12.5	5.0	✓
Total Sulfate ion in soil by acidic boiling water extraction, IC	E246.SO4	1318377	1	10	10.0	5.0	✓
Matrix Spikes (MS)							
Chloride in soil by boiling water extraction, IC	E246.CL	1320974	1	10	10.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by “mod”).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chloride in soil by boiling water extraction, IC	E246.CL ALS Environmental - Edmonton	Soil/Solid	CSA-A23.2-4B mod	Hot water soluble chloride is determined in soil by combining a fixed ratio of soil and water, boiling the mixture for a period of time, cooling, filtration, and analysis by ion chromatography.
Total Sulfate ion in soil by acidic boiling water extraction, IC	E246.SO4 ALS Environmental - Calgary	Soil/Solid	CSA-A23.2-3B	The dried solid is mixed with water and acid then heated. After filtration the liquid is ready for analysis by IC with conductivity detector.
Soluble Sulfate ion in soil by boiling water extraction, IC.	E246A.SO4 ALS Environmental - Calgary	Soil/Solid	CSA-A23.2-3B	The dried solid is mixed with water at a specified ratio then heated. After filtration the liquid is ready for analysis by IC with conductivity detector. A result of "NR" indicates that the total sulfate analysis was <0.2% and based on CSA-A23.2-3B no analysis for soluble sulfate is required.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Chloride in soil by boiling water extraction, IC	EP246.CL ALS Environmental - Edmonton	Soil/Solid	CSA-A23.2-3B mod	Hot water soluble chloride is determined in soil by combining a fixed ratio of soil and water, boiling the mixture for a period of time, cooling, then filtration prior to analysis
Soluble ion Sulfate in soil or concrete preparation.	EP246.S ALS Environmental - Calgary	Soil/Solid	CSA-A23.2B	The dried solid is mixed with water then heated. After filtration the liquid is ready for analysis.
Total ion Sulfate in soil or concrete preparation	EP246.T ALS Environmental - Calgary	Soil/Solid	CSA-A23.2B	The dried solid is mixed with water and acid then heated. After filtration the liquid is ready for analysis.

QUALITY CONTROL REPORT

Work Order	: **VA24A1385**	Page	: 1 of 4
Client	: WSP E&I Canada Limited	Laboratory	: ALS Environmental - Vancouver
Contact	: David Love	Account Manager	: Selam Worku
Address	: 110 - 18568 96 Avenue Surrey BC Canada V4N 3P9	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: KA21201.600	Date Samples Received	: 24-Jan-2024 09:42
PO	: ----	Date Analysis Commenced	: 31-Jan-2024
C-O-C number	:	Issue Date	: 05-Feb-2024 13:55
Sampler	: ---- ----		
Site	: ----		
Quote number	: BC Standard Pricing		
No. of samples received	: 2		
No. of samples analysed	: 2		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Alex Drake	Lab Analyst	Edmonton Inorganics, Edmonton, Alberta
Katarzyna Glinka	Analyst	Calgary Inorganics, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Inorganics (QC Lot: 1318377)											
CG2401009-001	Anonymous	Sulfate, total, ion content	14808-79-8	E246.SO4	500	mg/kg	<0.050 %	<500	0	Diff <2x LOR	----
Inorganics (QC Lot: 1320974)											
CG2401137-002	Anonymous	Chloride, soluble ion content	16887-00-6	E246.CL	25	mg/kg	0.0042 %	50	8	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Inorganics (QCLot: 1318377)						
Sulfate, total, ion content	14808-79-8	E246.SO4	500	mg/kg	<500	----
Inorganics (QCLot: 1319764)						
Sulfate, soluble ion content	14808-79-8	E246A.SO4	500	mg/kg	NR	----
Inorganics (QCLot: 1320974)						
Chloride, soluble ion content	16887-00-6	E246.CL	25	mg/kg	<25	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Inorganics (QCLot: 1318377)									
Sulfate, total, ion content	14808-79-8	E246.SO4	500	mg/kg	10000 mg/kg	102	90.0	110	----
Inorganics (QCLot: 1320974)									
Chloride, soluble ion content	16887-00-6	E246.CL	25	mg/kg	5000 mg/kg	101	70.0	130	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Inorganics (QCLot: 1320974)										
CG2401137-002	Anonymous	Chloride, soluble ion content	16887-00-6	E246.CL	5140 mg/kg	5000 mg/kg	105	60.0	140	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

Reference Material (RM) Report									
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					
Inorganics (QCLot: 1318377)									
	RM	Sulfate, total, ion content	14808-79-8	E246.SO4	33400 mg/kg	97.3	80.0	120	----

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 15 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	WSP Environment & Infrastructure Canada Limited
Contact:	David Love
Phone:	(250) 808-0483
	Company address below will appear on the final report
Street:	#100 - 20339 96 Ave
City/Province:	Langley, British Columbia
Postal Code:	V1M 0E4
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	WSP Environment & Infrastructure Canada Limited
Contact:	(250) 808-0483

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	David.A.Love@WSP.com
Email 2	lily.hu@wsp.com
Email 3	diljot.singh@wsp.com
Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	David.A.Love@WSP.com
Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	KA21201.600	Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler:

Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
4 day [P4]	☐	1 Business day [E1]	☐
3 day [P3]	☐	Same Day, Weekend or Statutory holiday [E0]	☐
2 day [P2]	☐		

Date and Time Required for all E&P TATs: dd-mm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Sulphate Content A23.3B	Chloride Content A23.2-4B	Number of Containers
	Florence Pit, TP24-02, SA#1, 0.0-3.0m	23-Jan-24		Soil	R	R	1
	Florence Pit TP24-11, SA#1, 0.0-3.8m	23-Jan-24		Soil	R	R	1

Environmental Division Vancouver

Work Order Reference

VA24A1385

Telephone : +1 604 253 4188

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ ☐ NO

Are samples for human drinking water use? ☐ ☐ NO

eport by clicking on the drop-down list below
OC only)

No

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			21		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Lily Hu	Date: 2024-01-23	Time:	Received by:	Date:	Time:	Received by: JE	Date: 24-1-24	Time: 942am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Coarse Aggregate Micro-Deval Abrasion
ASTM D6928

Client:	MOTI	Date Sampled:	20-Sep-22
Project No.:	KA21172.2600	Sampled By:	Harihar Bhandari
Project Name:	Florence Pit	Tested By:	WK
Test Pit Number:	Face Sample	Date Tested:	20-Oct-22
Bag Number:	2		
Depth:	0.15-0.3 m		

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	B	1501.6	1354.0	147.6	**9.8**

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: Wenjing Ke
Surrey, BC

Reviewed by:
Scott Forsyth, P.Eng.
Surrey, BC

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

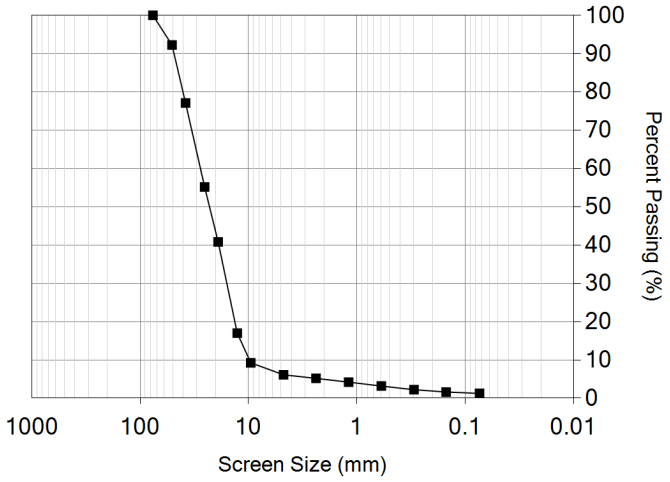
Sieve Analysis

Report Date: November 09, 2022

Client		Project	
Name:	BC Ministry Of Transportation and Infrastructure	**Name:**	(KA21172-2600) Florence Pit
Address:	310 - 1500 Woolridge Street Coquitlam, BC V3K 0B8	**Address:**	Surrey,
Attention:	Salem Bahamdun	**Phase:**	2600 **Task:**
PO Number:		**Manager:**	Scott Forsyth, P.Eng.
Sample Date:	9/20/2022 by Client	**Lab/Ref. #:**	L6826-2
Source:	Florence Pit Bag# 2, Sample B; Depth: 0.15 -0.3m	**Description:**	Poorly graded gravel

Type of Specification: No project specification was provided.

Cumulative Particle Distribution



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

200 Wash Procedure: A

	Sieve Size	Passing	Specification Min	Specification Max
Coarse Portion:	75mm	100%		
	50mm	92%		
	37.5mm	77%		
	25mm	55%		
	19.0mm	41%		
	12.5mm	17%		
	9.5mm	9%		
	4.75mm	6%		
Fine Portion:	**Sieve Size**	**Passing**	**Min**	**Max**
	2.36mm	5%		
	1.18mm	4%		
	600µm	3%		
	300µm	2%		
	150µm	2%		
	75µm	1.2%		

Particle Size (bold indicates value was interpolated)							
Over 3" / 76mm	Gravel		Sand			Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	59.0%	35.0%	**1.0%**	**2.0%**	**1.8%**	1.2%	

Remarks:

Distribution: Surrey, Materials

Reviewed By: Scott Forsyth, P.Eng.

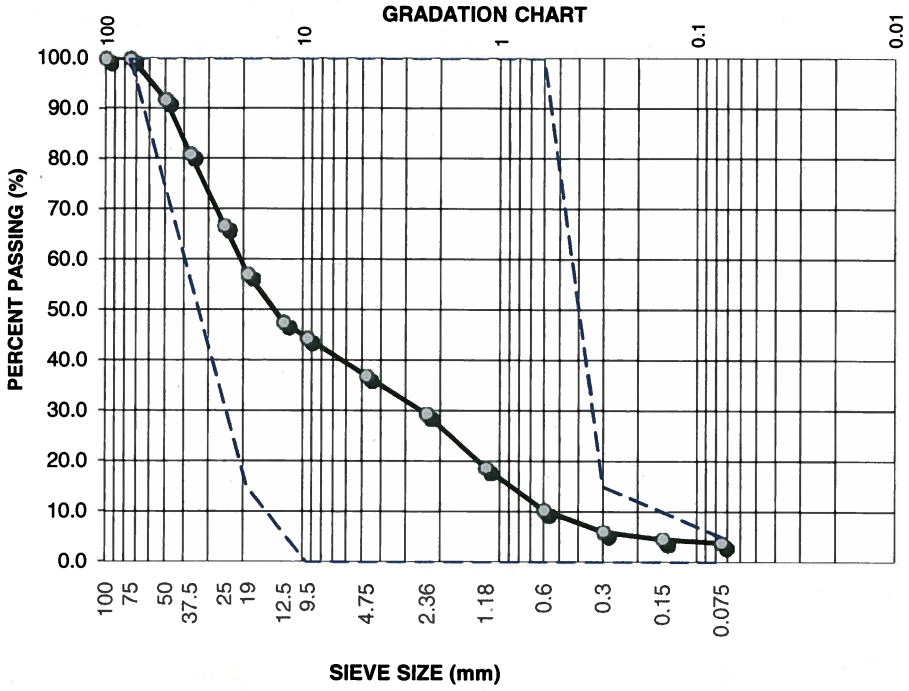
WSP E&I Canada Limited. - #110 - 18568 - 96th Avenue - Surrey, BC - V4N 3P9 Canada. Phone: (604) 219-1674

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tell: 604-295-8657
Fax: 604-295-8658

SIEVE ANALYSIS REPORT

CLIENT: Ministry of Transportation & Infrastructure
310 - 1500 Woolridge St.
Coquitlam, BC V3K 0B8
ATTN: Terence Lai
PROJECT: **Florence Pit - Lower Mainland District**

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No: 156CS0824
Client Project No: 39100-20-Florence Pit



Lab Number: L5259

Date Sampled: Sampled by MOTI
Date Received: 9-Mar-15
Date Tested: 10-Mar-15
Sampled By: MOTI
Tested By: Rodrigo Lauricio

TP/TH No.: TP15-1
Bag No.: 553
Material Type: Pit Run
Sample No.: 1

Gravel Sizes (mm)	Percent Passing	Gradation Limits Lower	Upper
100	100	-	
75	100	100 -	100
50	92	-	
37.5	81	-	
25	67	-	
19	57	15 -	100
12.5	48	-	
9.5	44	0 -	100

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits Lower	Upper
4.75	37	-	
2.36	29	-	
1.18	19	-	
0.6	10	0 -	100
0.3	6.0	0 -	15
0.15	4.5	-	
0.075	3.8	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

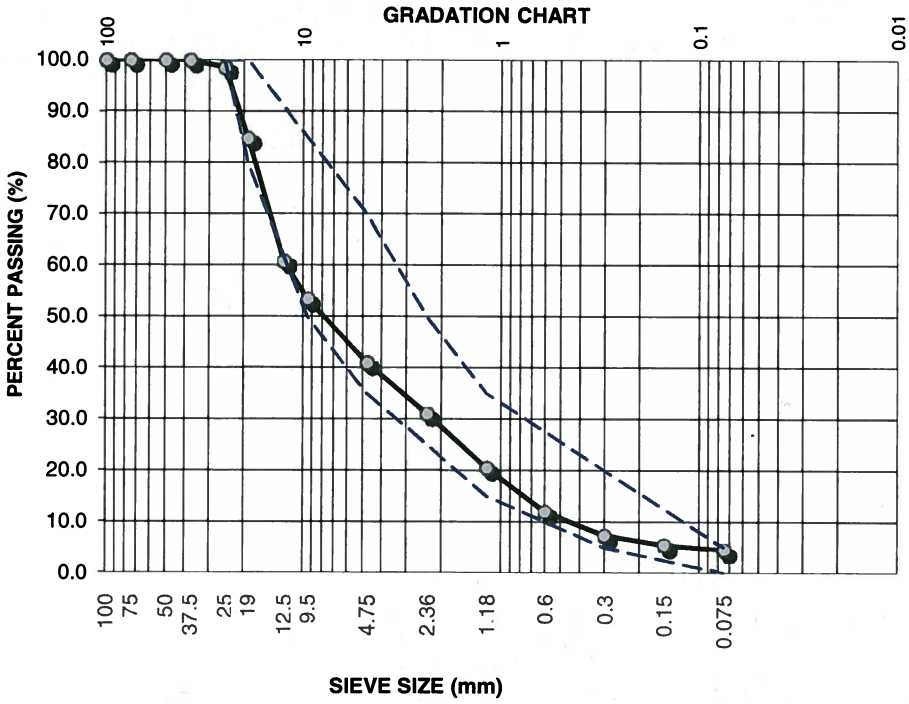
Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tell: 604-295-8657
Fax: 604-295-8658

SIEVE ANALYSIS REPORT

CLIENT: Ministry of Transportation & Infrastructure
310 - 1500 Woolridge St.
Coquitlam, BC V3K 0B8
ATTN: Terence Lai
PROJECT: **Florence Pit - Lower Mainland District**

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0824
Client Project No.: 39100-20-Florence Pit



Lab Number: L5259

Date Sampled: Sampled by MOTI
Date Received: 9-Mar-15
Date Tested: 10-Mar-15
Sampled By: MOTI
Tested By: Rodrigo Lauricio

TP/TH No.: TP15-1
Bag No.: 553
Material Type: Crushed
Sample No.: 1

Gravel Sizes (mm)	Percent Passing	Gradation Limits Lower	Upper
100	100	-	
75	100	-	
50	100	-	
37.5	100	-	
25	99	100 -	100
19	85	80 -	100
12.5	61	-	
9.5	53	50 -	85

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits Lower	Upper
4.75	41	35 -	70
2.36	31	25 -	50
1.18	20	15 -	35
0.6	12	-	
0.3	7.3	5 -	20
0.15	5.4	-	
0.075	4.5	0 -	5

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

Prepared By: Giti Ghorbanian
Senior Materials Technologist

Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tel: 604-295-8657
Fax: 604-295-8658

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: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0824
Client Project No.: 39100-20-Florence Pit

PROJECT: Florence Pit - Lower Mainland District

Sample Source & ID: TP15-1- Bag # 553- SA #1 - Crushed

Lab No.: L5259

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	60	31	29	52	
19.0 to 12.5	169	128	41	76	
12.5 to 9.5	107	75	32	70	
9.5 to 4.75	481	236	245	49	
Totals	817	470	347		**58**

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: Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tel: 604-295-8657
Fax: 604-295-8658

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: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0824
Client Project No.: 39100-20-Florence Pit

PROJECT: Florence Pit - Lower Mainland District

Sample Source & ID: TP15-1- Bag # 553- SA #1 - Crushed

Lab No.: L5259

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	1011.4	378.8	632.6	37
19.0 to 13.2	784.3	524.9	259.4	67
13.2 to 9.5	349.0	235.8	113.2	68
-	-	-	-	-
Totals	2144.7	1139.5	1005.2	**53**

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: Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tel: 604-295-8657
Fax: 604-295-8658

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: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0824
Client Project No.: 39100-20-Florence Pit

PROJECT: Florence Pit- Lower Mainland District
Sample Source & ID: TP15-1 Bag# 553 SA #1 - Crushed
Lab No.: L5259

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	1499.5	1334.1	165.4	11.0
Fine	500.2	427.7	72.5	14.5

Comments: -Maximum size of aggregate is 25.0 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

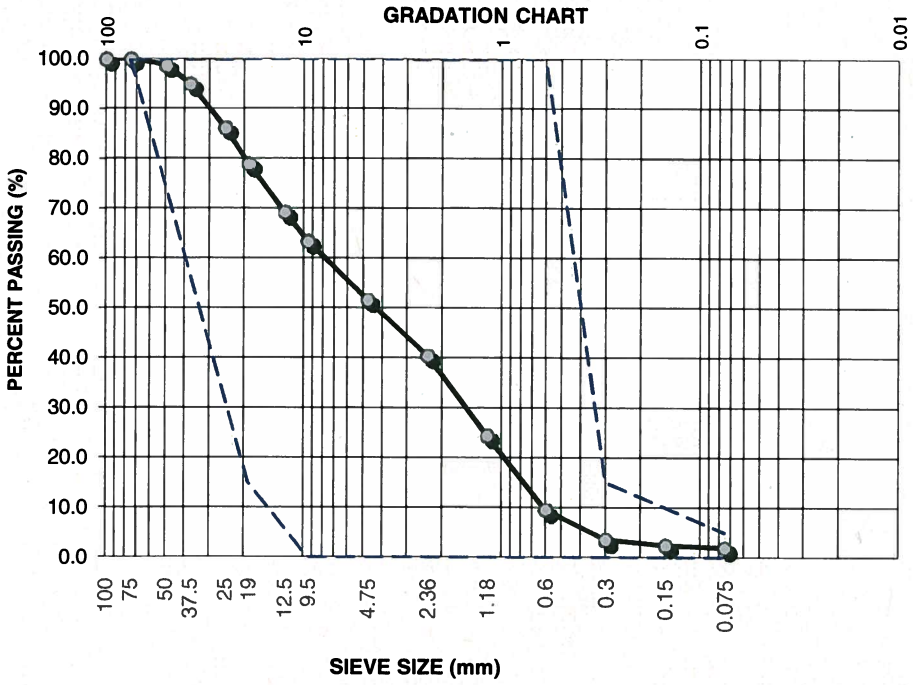
Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tell: 604-295-8657
Fax: 604-295-8658

SIEVE ANALYSIS REPORT

CLIENT: Ministry of Transportation & Infrastructure
310 - 1500 Woolridge St.
Coquitlam, BC V3K 0B8
ATTN: Terence Lai
PROJECT: **Florence Pit - Lower Mainland District**

Project Number: KA21098-1200
Date: March 17, 2015
Client Contract No: 156CS0824
Client Project No: 39100-20-Florence Pit



Lab Number: L5260

Date Sampled: Sampled by MOTI
Date Received: 9-Mar-15
Date Tested: 9-Mar-15
Sampled By: MOTI
Tested By: Rodrigo Lauricio

TP/TH No.: TP15-1
Bag No.: 554
Material Type: Pit Run
Sample No.: 2

Gravel Sizes (mm)	Percent Passing	Gradation Limits Lower	Upper
100	100	-	
75	100	100 -	100
50	99	-	
37.5	95	-	
25	86	-	
19	79	15 -	100
12.5	69	-	
9.5	63	0 -	100

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits Lower	Upper
4.75	52	-	
2.36	40	-	
1.18	24	-	
0.6	9.5	0 -	100
0.3	3.5	0 -	15
0.15	2.4	-	
0.075	1.9	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

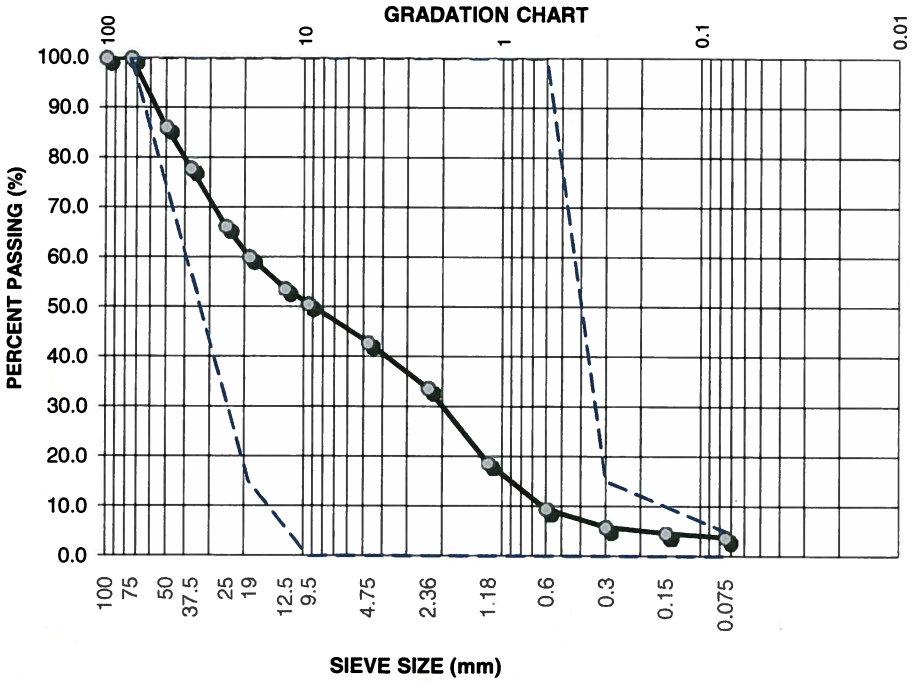
Reviewed By: Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tell: 604-295-8657
Fax: 604-295-8658

SIEVE ANALYSIS REPORT

CLIENT: Ministry of Transportation & Infrastructure
310 - 1500 Woolridge St.
Coquitlam, BC V3K 0B8
ATTN: Terence Lai
PROJECT: **Florence Pit - Lower Mainland District**

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No: 156CS0824
Client Project No: 39100-20-Florence Pit



Lab Number: L5261

Date Sampled: Sampled by MOTI
Date Received: 9-Mar-15
Date Tested: 15-Mar-15
Sampled By: MOTI
Tested By: Rodrigo Lauricio

TP/TH No.: TP15-2
Bag No.: 555
Material Type: Pit Run
Sample No.: 1

Gravel Sizes (mm)	Percent Passing	Gradation Limits Lower	Upper
100	100	-	
75	100	100 -	100
50	86	-	
37.5	78	-	
25	66	-	
19	60	15 -	100
12.5	54	-	
9.5	51	0 -	100

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits Lower	Upper
4.75	43	-	
2.36	34	-	
1.18	19	-	
0.6	9.4	0 -	100
0.3	5.8	0 -	15
0.15	4.6	-	
0.075	3.8	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

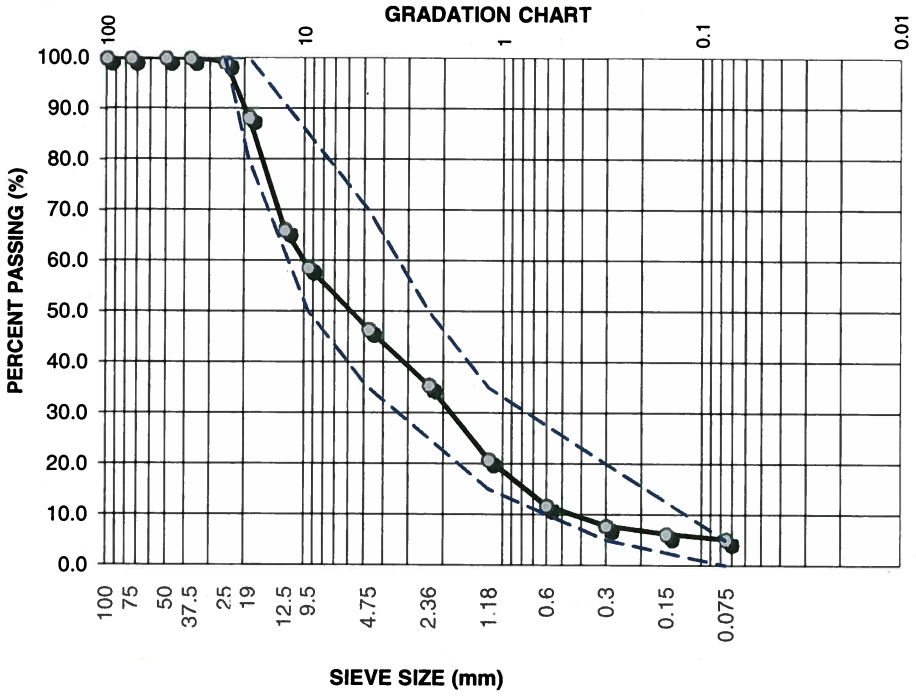
Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tell: 604-295-8657
Fax: 604-295-8658

SIEVE ANALYSIS REPORT

CLIENT: Ministry of Transportation & Infrastructure
310 - 1500 Woolridge St.
Coquitlam, BC V3K 0B8
ATTN: Terence Lai
PROJECT: **Florence Pit - Lower Mainland District**

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0824
Client Project No.: 39100-20-Florence Pit



Lab Number: L5261

Date Sampled: Sampled by MOTI
Date Received: 9-Mar-15
Date Tested: 15-Mar-15
Sampled By: MOTI
Tested By: Rodrigo Lauricio

TP/TH No.: TP15-2
Bag No.: 555
Material Type: Crushed
Sample No.: 1

Gravel Sizes (mm)	Percent Passing	Gradation Limits Lower		Upper
100	100		-	
75	100		-	
50	100		-	
37.5	100		-	
25	99	100	-	100
19	88	80	-	100
12.5	66		-	
9.5	59	50	-	85

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits Lower		Upper
4.75	46	35	-	70
2.36	35	25	-	50
1.18	21	15	-	35
0.6	12		-	
0.3	7.8	5	-	20
0.15	6.2		-	
0.075	5.1	0	-	5

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

Prepared By: Giti Ghorbanian
Senior Materials Technologist

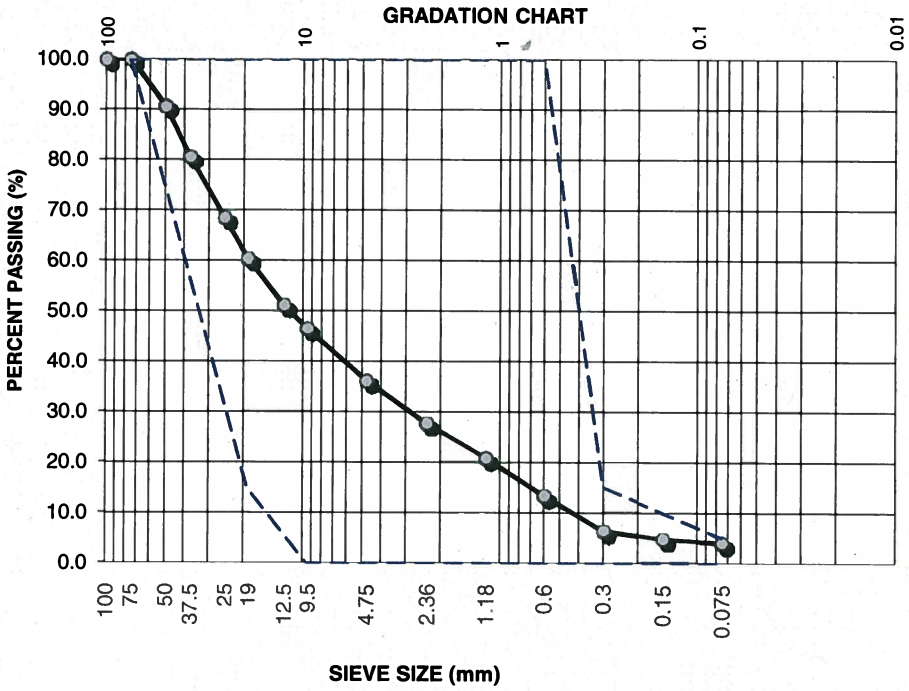
Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tell: 604-295-8657
Fax: 604-295-8658

SIEVE ANALYSIS REPORT

CLIENT: Ministry of Transportation & Infrastructure
310 - 1500 Woolridge St.
Coquitlam, BC V3K 0B8
ATTN: Terence Lai
PROJECT: **Florence Pit - Lower Mainland District**

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No: 156CS0824
Client Project No: 39100-20-Florence Pit



Lab Number: L5271

Date Sampled: Sampled by MOTI
Date Received: 9-Mar-15
Date Tested: 15-Mar-15
Sampled By: MOTI
Tested By: Rodrigo Lauricio

TP/TH No.: TP15-13
Bag No.: 569
Material Type: Pit Run
Sample No.: 1

Gravel Sizes (mm)	Percent Passing	Gradation Limits Lower	Upper
100	100	-	
75	100	100 -	100
50	91	-	
37.5	81	-	
25	69	-	
19	60	15 -	100
12.5	51	-	
9.5	47	0 -	100

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits Lower	Upper
4.75	36	-	
2.36	28	-	
1.18	21	-	
0.6	13	0 -	100
0.3	6.4	0 -	15
0.15	4.7	-	
0.075	4.0	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

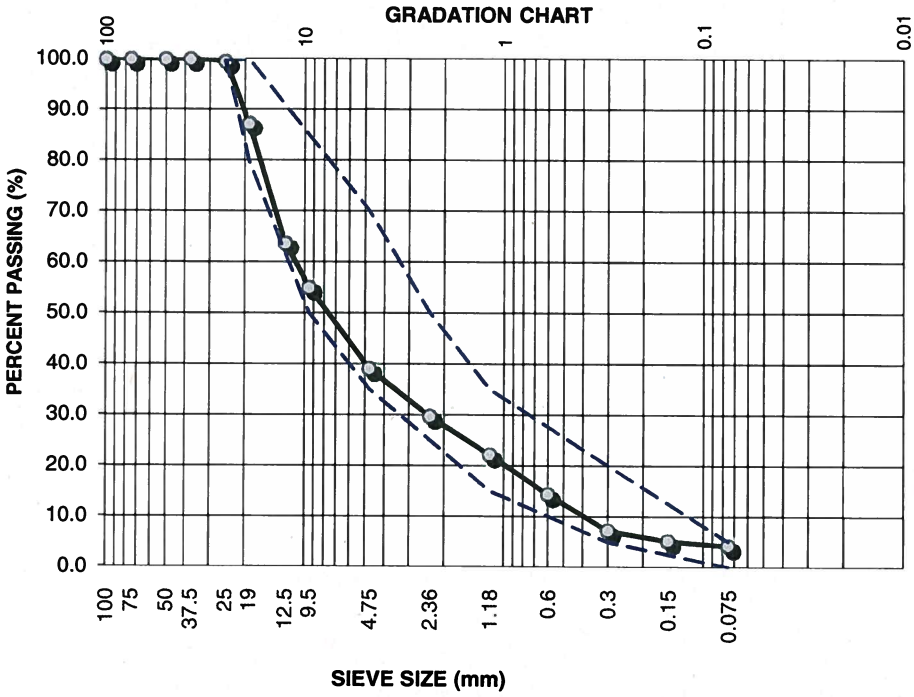
Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tell: 604-295-8657
Fax: 604-295-8658

SIEVE ANALYSIS REPORT

CLIENT: Ministry of Transportation & Infrastructure
310 - 1500 Woolridge St.
Coquitlam, BC V3K 0B8
ATTN: Terence Lai
PROJECT: **Florence Pit - Lower Mainland District**

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0824
Client Project No.: 39100-20-Florence Pit



Lab Number: L5271

Date Sampled: Sampled by MOTI
Date Received: 9-Mar-15
Date Tested: 16-Mar-15
Sampled By: MOTI
Tested By: Rodrigo Lauricio

TP/TH No.: TP15-13
Bag No.: 569
Material Type: Crushed
Sample No.: 1

Gravel Sizes (mm)	Percent Passing	Gradation Limits Lower	Upper
100	100	-	
75	100	-	
50	100	-	
37.5	100	-	
25	100	100 -	100
19	87	80 -	100
12.5	64	-	
9.5	55	50 -	85

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits Lower	Upper
4.75	39	35 -	70
2.36	30	25 -	50
1.18	22	15 -	35
0.6	14	-	
0.3	7.1	5 -	20
0.15	5.1	-	
0.075	4.1	0 -	5

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

Prepared By: Giti Ghorbanian
Senior Materials Technologist

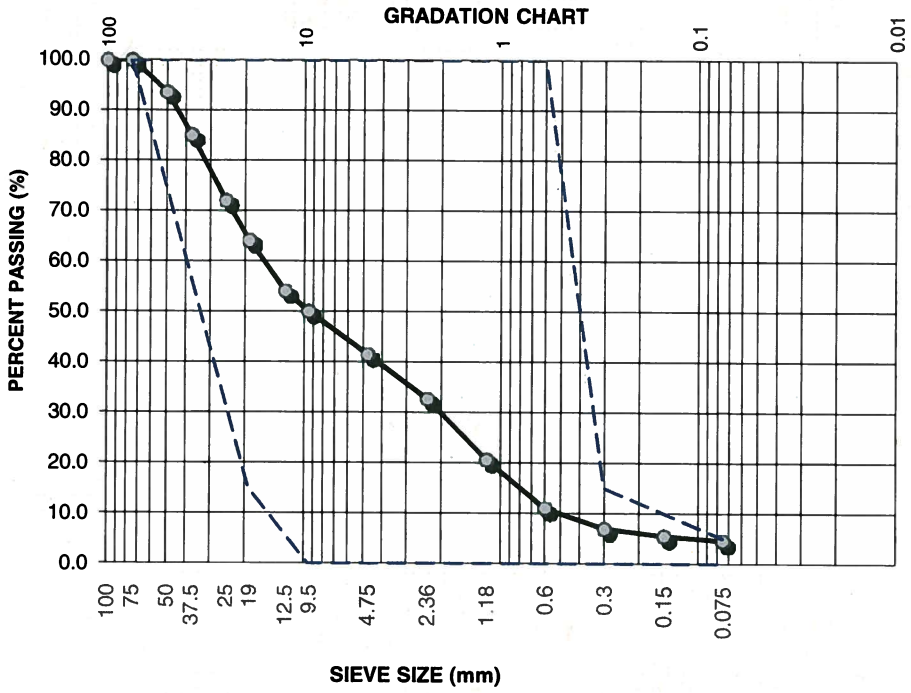
Reviewed By: Daniel St-Pierre
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tell: 604-295-8657
Fax: 604-295-8658

SIEVE ANALYSIS REPORT

CLIENT: Ministry of Transportation & Infrastructure
310 - 1500 Woolridge St.
Coquitlam, BC V3K 0B8
ATTN: Terence Lai
PROJECT: **Florence Pit - Lower Mainland District**

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No: 156CS0824
Client Project No: 39100-20-Florence Pit



Lab Number: L5272

Date Sampled: Sampled by MOTI
Date Received: 9-Mar-15
Date Tested: 11-Mar-15
Sampled By: MOTI
Tested By: Rodrigo Lauricio

TP/TH No.: TP15-14
Bag No.: 570
Material Type: Pit Run
Sample No.: 1

Gravel Sizes (mm)	Percent Passing	Gradation Limits Lower	Upper
100	100	-	
75	100	100 -	100
50	94	-	
37.5	85	-	
25	72	-	
19	64	15 -	100
12.5	54	-	
9.5	50	0 -	100

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits Lower	Upper
4.75	41	-	
2.36	33	-	
1.18	21	-	
0.6	11	0 -	100
0.3	6.9	0 -	15
0.15	5.5	-	
0.075	4.6	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

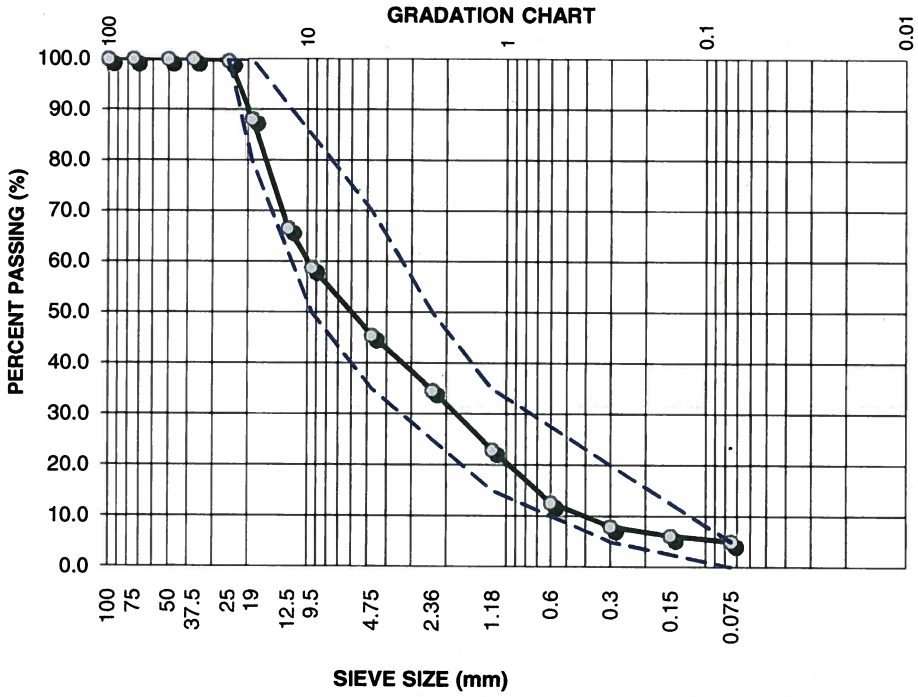
Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tell: 604-295-8657
Fax: 604-295-8658

SIEVE ANALYSIS REPORT

CLIENT: Ministry of Transportation & Infrastructure
310 - 1500 Woolridge St.
Coquitlam, BC V3K 0B8
ATTN: Terence Lai
PROJECT: **Florence Pit - Lower Mainland District**

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0824
Client Project No.: 39100-20-Florence Pit



Lab Number: L5272

Date Sampled: Sampled by MOTI
Date Received: 9-Mar-15
Date Tested: 16-Mar-15
Sampled By: MOTI
Tested By: Rodrigo Lauricio

TP/TH No.: TP15-14
Bag No.: 570
Material Type: Crushed
Sample No.: 1

Gravel Sizes (mm)	Percent Passing	Gradation Limits Lower	Upper
100	100	-	
75	100	-	
50	100	-	
37.5	100	-	
25	100	100 -	100
19	88	80 -	100
12.5	67	-	
9.5	59	50 -	85

Sand Sizes And Fines (mm)	Percent Passing	Gradation Limits Lower	Upper
4.75	45	35 -	70
2.36	35	25 -	50
1.18	23	15 -	35
0.6	13	-	
0.3	7.9	5 -	20
0.15	6.1	-	
0.075	5.0	0 -	5

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

Prepared By: Giti Ghorbanian
Senior Materials Technologist

Reviewed By: Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tel: 604-295-8657
Fax: 604-295-8658

SOUNDNESS OF AGGREGATE

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

ATTN: Terence Lai

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0824
Client Project No.: 39100-20-Florence Pit

PROJECT: Florence Pit - Lower Mainland District

Lab No.: L5272
Sample No.: TP15-14 Bag #570 - Crushed - Coarse

Sieve Size (mm)	Original Weight (g)	Grading of Original Sample (%)	Wt. Of Test Fraction Before test (g)	Wt. Of Test Fraction After test (g)	Percentage passing designated Sieve after Test	Weighted Percentage Loss
37.5-19	-	-	-	-	-	-
25 to 19	3110.0	21.2	504.2	445.0	11.7	2.5
19 to 12.5	5854.0	39.8	670.9	638.2	4.9	1.9
12.5 to 9.5	2115.0	14.4	326.9	293.5	10.2	1.5
9.5 to 4.75	3616.0	24.6	302.6	260.4	13.9	3.4
Totals						**9.3**

Sample No.: TP15-14 Bag #570 - Crushed - Fine

Sieve Size (mm)	Original Weight (g)	Grading of Original Sample (%)	Wt. Of Test Fraction Before test (g)	Wt. Of Test Fraction After test (g)	Percentage passing designated Sieve after Test	Weighted Percentage Loss
4.75	-	-	-	-	-	-
4.75 to 2.36	347.1	28.8	100.0	84.7	15.3	4.4
2.36 to1.18	376.8	31.3	100.0	82.5	17.5	5.5
1.18 to 0.6	332.9	27.6	100.0	82.6	17.4	4.8
0.6 to 0.3	148.1	12.3	100.0	77.6	22.4	2.8
Totals						**17.4**

Comments: Soundness of aggregate by use of Magnesium Sulfate tests were conducted in accordance with ASTM C88

Prepared By: Giti Ghorbanian
Senior Materials Technologist

Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tel: 604-295-8657
Fax: 604-295-8658

RELATIVE DENSITY AND ABSORBTION OF AGGREGATE REPORT

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

ATTN: Terence Lai

Project Number: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0824
Client Project No.: 39100-20-Florence Pit

PROJECT: **Florence Pit - Lower Mainland District**
Lab No : **L5272**

Sample Number &Type		Relative density (Oven Dry)	Apparent Relative Density	Relative Density (SSD)	Absorption %
TP 15-14, SA # 1, Bag #570, Crushed	Coarse	2.72	2.80	2.75	1.0
	Fine	2.56	2.78	2.64	3.0

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

Prepared By: Giti Ghorbanian
Senior Materials Technologist

Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer

Amec Foster Wheeler Environment & Infrastructure
#110 - 18568 - 96th Avenue
Surrey British Columbia
Canada, V4N 3P9
Tel: 604-295-8657
Fax: 604-295-8658

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: KA21098-1200
Date: March 24, 2015
Client Contract No.: 156CS0670
Client Project No.: 39100-20-Florence Pit

PROJECT: Florence Pit- Lower Mainland District

Lab No.: L5272

Sample type and No.: TP15-14, Bag #570, SA#1

Sample Source: Sampled and Submitted by MOTI

Trial #	1	2	3
Sand Height, mm	97	99	97
Clay Height, mm	185	188	185
Sand Equivalent Value= 100*Sand Height/Clay Height	52	53	52
Average Sand Equivalent	**52**		

Comments: Sand Equivalent test was conducted in accordance with ASTM D2419

Prepared By: Giti Ghorbanian
Senior Materials Technologist

Reviewed By:
Daniel St-Pierre, M.Sc., PE, P.Eng.
Senior Civil Materials Engineer