Ministry of Transportation and Infrastructure

Geotechnical and Materials Engineering

Southern Interior Region
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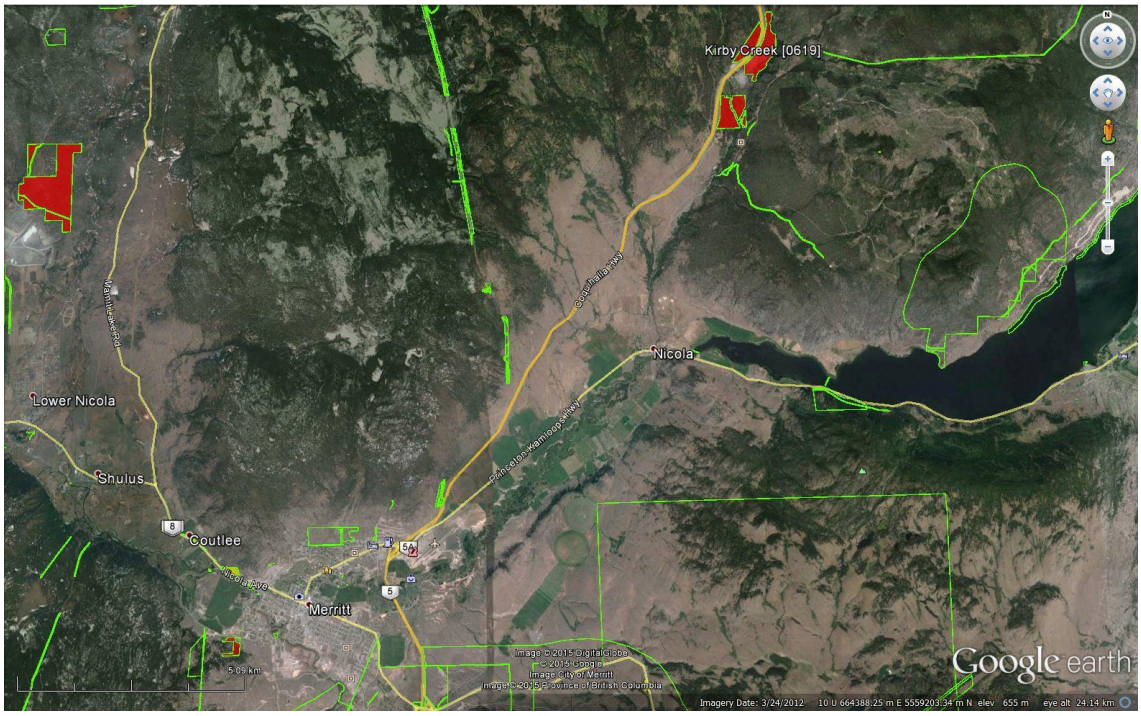
Kirby Pit No. 0619

2015 Technical Information Report

Location: The pit is located approximately 15 km northeast of Merritt via Highway 5.



Legal Description: Ministry of Transportation and Infrastructure Section 16 Map Reserve legally described as all that Unsurveyed Crown Land situated between District Lot's 3366 and 4210 IR No. 14, Kamloops Division of Yale District, containing 63 hectares, more or less. UTM co-ordinates are Zone 10, 668700 Easting and 5566300 Northing.

Gradation: The average and range of laboratory samples as well as oversize rock field estimates for material from the 2013 testing program (Area A; TP's 13-01 to 13-14) contained within the developed area of the pit are as follows:

Laboratory Samples

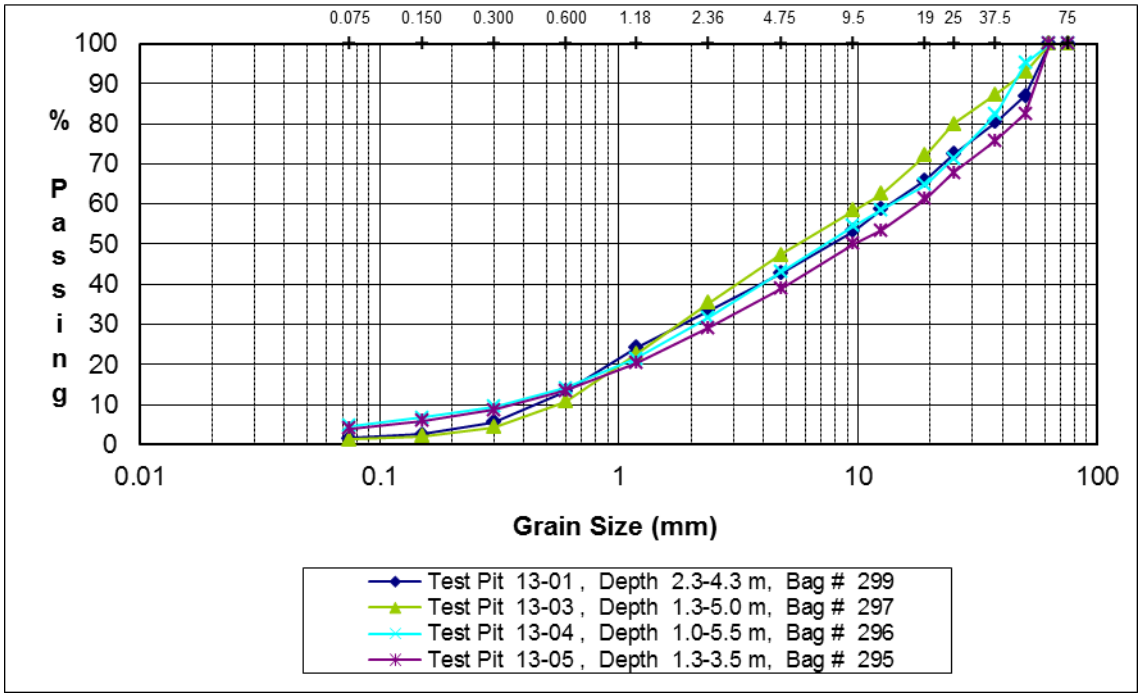
Classification:	Average (%)	Range (%)
Gravel (4.75-75mm)	56.7	33.1 – 65.3
Sand (0.075-4.75mm)	39.7	29.3 – 63.5
Fines (<0.075mm)	3.6	1.2 – 6.2

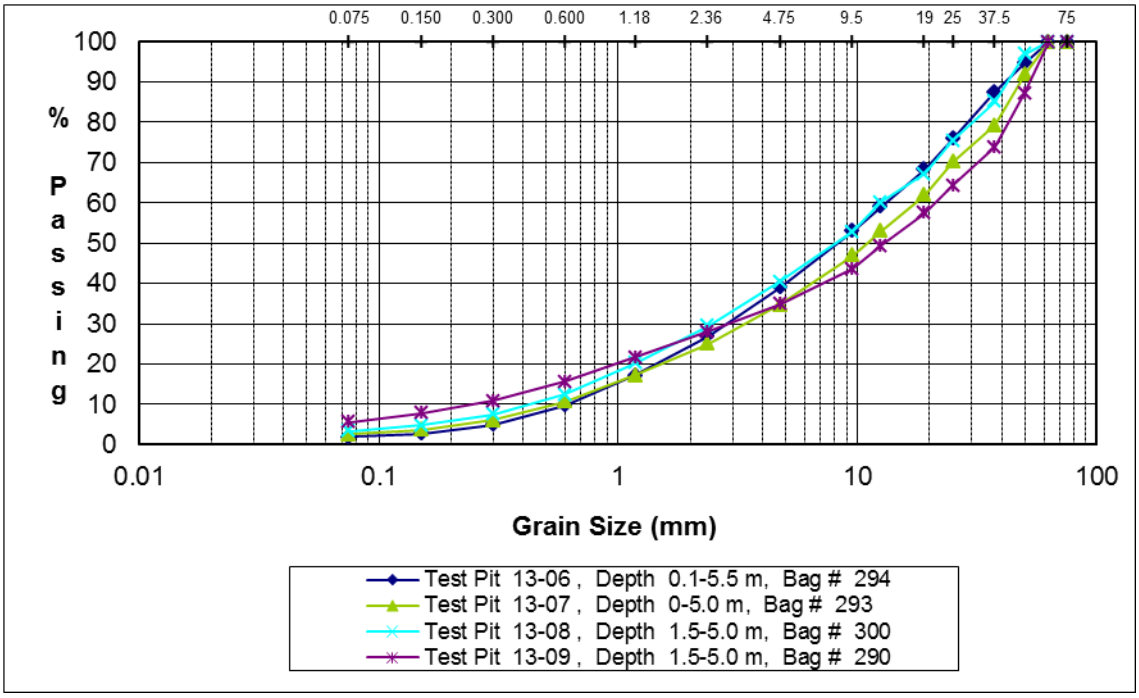
Oversize Field Estimates

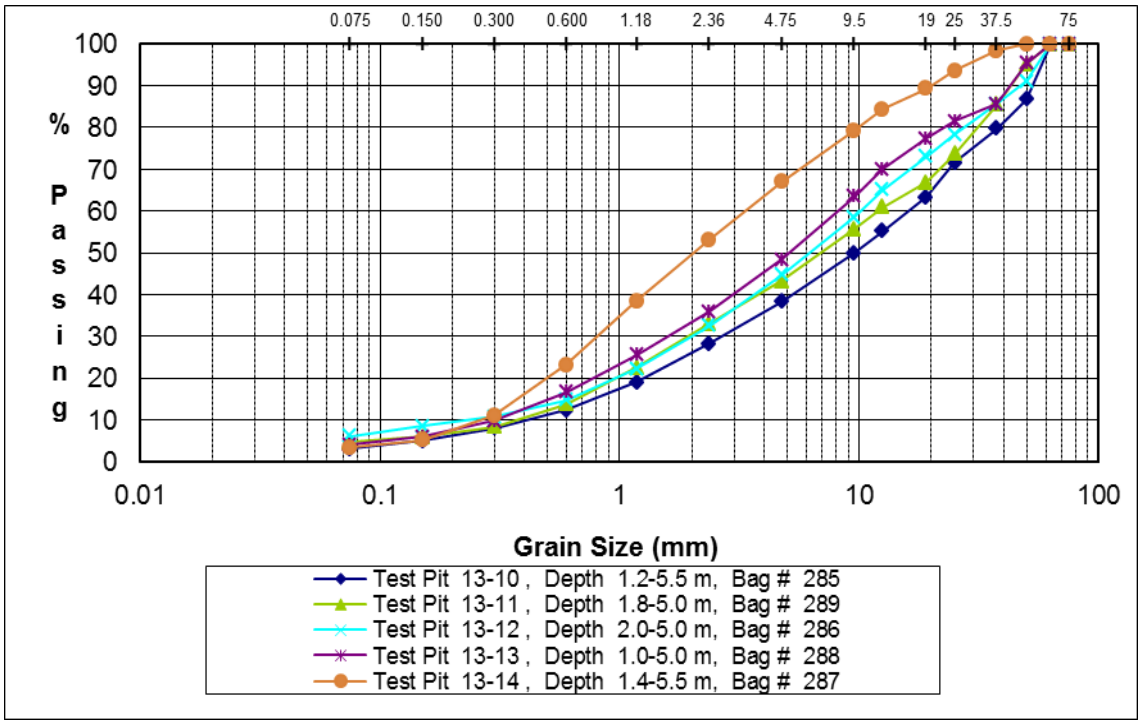
Classification:	Average (%)	Range (%)
Boulders (>375mm)	6.6	0 – 20
Cobbles (150-375mm)	7.7	1 – 15
Cobbles (75-150mm)	9	1 – 15

The maximum size rock observed was 1000 mm.

Aggregate Gradation Chart:




0.075
0.150
0.300
0.600
1.18
2.36
4.75
9.5
19
25
37.5
75
100
90
80
70
60
50
40
30
20
10
0
% Passing
0.01
0.1
1
10
100
Grain Size (mm)
Test Pit 13-06 , Depth 0.1-5.5 m, Bag # 294
Test Pit 13-07 , Depth 0-5.0 m, Bag # 293
Test Pit 13-08 , Depth 1.5-5.0 m, Bag # 300
Test Pit 13-09 , Depth 1.5-5.0 m, Bag # 290


0.075
0.150
0.300
0.600
1.18
2.36
4.75
9.5
19
25
37.5
75
100
90
80
70
60
50
40
30
20
10
0
% Passing
0.01
0.1
1
10
100
Grain Size (mm)
Test Pit 13-10 , Depth 1.2-5.5 m, Bag # 285
Test Pit 13-11 , Depth 1.8-5.0 m, Bag # 289
Test Pit 13-12 , Depth 2.0-5.0 m, Bag # 286
Test Pit 13-13 , Depth 1.0-5.0 m, Bag # 288
Test Pit 13-14 , Depth 1.4-5.5 m, Bag # 287

Summary of Test Pit Logs (including Laboratory Results – bolded in red) are located below:

AGGREGATE LOG

PROJECT:	Kirby Creek Pit	**SAMPLED BY:**	Bryan James
PIT #:	0619	**METHOD:**	Excavator
DISTRICT:	Thompson Nicola	**DATE:**	July 8-12, 2013

TP	DEPTH		SAMPLE	SOILS CLASS	ESTIMATED GRADUATION			ESTIMATED ROCK 75mm				SAND TYPE			REMARKS
	FROM	TO	BAG No.		G	S	F	MAX SIZE	75mm - 150mm	150mm - 375mm	>375mm	F	M	C	
13-01	0	2		GP	55	44	1	200	10	5				C	
	2	2.3	299	SP	10	89	1	25						C	
	2.3	4.3		GP	55	44	1	400	10	5	5			C	
	4.3	4.8		Till											
				GP	**57.2**	**41.1**	**1.7**								**Lab Sieve**
13-02	0	2.4		OB											Dirty Gravel/Wood Debris
	2.4	4.6		GP	55	40	5	430	10	10	5			C	
	4.6	5		Till											Wet
13-03	0	1.3		GP	55	40	5	400	10	5	5			C	
	1.3	5	297	GP	50	49	1	200	5	5	0			C	Sluffing
				GP	**52.7**	**46**	**1.3**								**Lab Sieve**
13-04	0	1		Stockpile				50							
	1	3		GP	55	41	4	400	10	5	1				
	3	5.5	296	GP	55	41	4	150	5	0	0			C	Vertical Hole
				GP	**57**	**38.3**	**4.7**								**Lab Sieve**
13-05	0	1.3		OB											Dirty Gravel/Wood Debris
	1.3	3.5	295	GP	55	41	4	400	10	15	15			MC	
				GP	**61.1**	**34.8**	**4.1**								**Lab Sieve**
13-06	0	0.1		Stockpile				9.5							
	0.1	5.5	294	GP	55	44	1	400	10	10	15			C	Sluffing
				GP	**61**	**37.1**	**1.9**								**Lab Sieve**
13-07	0	4	293	GP	57	42	1	1000	15	15	15			C	
				GP	**65.3**	**32.2**	**2.5**								**Lab Sieve**
13-08	0	0.6		Stockpile				4.75							Manufactured Fines
	0.6	1.2		OB											Dirty Gravel
	1.2	1.5		ML			100								Damp
	1.5	5	300	GP	55	43	2	250	5	5	0			C	
	1.5	5		**GP**	**59.6**	**37.1**	**3.3**								**Lab Sieve**
13-09	0	1.5		OB											Dirty Gravel/Wood Waste
	1.5	5		GPGM	57	46	7	300	10	10	0			MC	
				GPGM	**65.1**	**29.3**	**5.6**								**Lab Sieve**
13-10	0	0.6		Stockpile				16							
	0.6	1.2		OB											Dirty Gravel
	1.2	5.5		GP	55	43	2	450	10	10	5			MC	
				GP	**61.7**	**35.3**	**3**								**Lab Sieve**

AGGREGATE LOG

PROJECT:	Kirby Creek Pit	**SAMPLED BY:**	Bryan James
PIT #:	0619	**METHOD:**	Excavator
DISTRICT:	Thompson Nicola	**DATE:**	July 8-12, 2013

TP	DEPTH		SAMPLE	SOILS CLASS	ESTIMATED GRADUATION			ESTIMATED ROCK 75mm				SAND TYPE			REMARKS
	FROM	TO	BAG No.		G	S	F	MAX SIZE	75mm - 150mm	150mm - 375mm	>375mm	F	M	C	
13-11	0	0.6		Stockpile				19							
	0.6	1.8		OB											Dirty gravel/wood debris
	1.8	5	289	GP	55	40	5	1000	10	10	15		MC		
				GP	56.8	38.5	4.7								Lab Sieve
13-12	0	0.1		Stockpile				19							
	0.1	1		GP	50	47	3	75					MC		
	1	2		OB											Dirty gravel/wood debris
	2	5	286	GPGM	55	49	6	400	10	10	5		MC		
				GPGM	55.4	38.4	6.2								Lab Sieve
13-13	0	1		Stockpile				19							Mixed with a few boulders
	1	5	288	GP	50	47	3	200	5	2			MC		
				GP	51.7	44.3	4								Lab Sieve
13-14	0	0.6		Stockpile											
	0.6	1.4		GP	50	48	2	75					M		
	1.4	5.5	287	SP	35	63	2	200	1	1			MC		
				SP	33.1	63.5	3.4								Lab Sieve

Aggregate Quality: A summary of recent and historic (samples from within developed area) aggregate quality tests performed on pit run samples from the pit are as follows:

TP	Micro-Deval C/F (%)	SE (%)	Bulk Relative Density C/F	Absorption (%) C/F	Degradation	Soundness
Historical Average		71.2	2.757/2.70	0.91/1.30	72.7	2.97/7.30
13-06			2.733 / 2.677	1.31/1.35		
13-10	12.8/10.2					
Range	N/A	61.0 – 82.9	**C**: 2.733 – 2.770 **F**: 2.677 – 2.715	**C**: 0.79 – 1.31 **F**: 1.22 – 1.44	66.7 – 82.9	N/A

Petrographic Analysis: Rocks observed within the deposit consist mainly of andesite, basalt, greenstone and vesicular basalt with minor amounts of granitic, granodiorite and gabbro rock.

Granular Volume:

Estimated Volume

135,000 m^3

The estimated volume has been calculated by mining the developed Suggested Mining Area to an average depth of 3.3 metres.

Pit Development and Recommendations:

- The mining area has been previously developed by the Ministry of Transportation and Infrastructure (MoTI). Any additional development will be the responsibility of the contractor and shall be completed as per the pit development plan or as directed by the Ministry Representative.

- **Mining is restricted to the previously disturbed areas of the pit. No development is to take place outside of the currently disturbed areas.**

- A stockpile containing approximately 18,000 m^3 of product crushed in 1986 for the construction of the Coquihalla Highway is available for use on this contract.

- The crusher is to be located on the pit floor near TP 13-14, with mining proceeding in a northerly direction.

- Processed aggregate may be stockpiled to southwest of the production site where room is available, however, it should be noted there are some existing stockpiles.

- A primary crusher capable of reducing 350mm x 475mm rock should be utilized in order to maximize material usage.

- At the time of investigation, several remnant processed aggregate stockpiles are located within the area. They can either be relocated or incorporated into the pit run during aggregate production.

- In order to avoid an excessive pit face it is recommended a bulldozer be used to push material to the crusher.

- At the completion of mining, active pit faces shall be sloped to a minimum of 1 ½:1 with granular material. **Reject material from aggregate production is not to be used to slope or infill pit faces without the prior approval of the Ministry Gravel Resource Manager.**

Photographs:

TP 13-13 spoil

Al Mitchell
Regional Gravel Resource Manager