

**NORTHERN REGION**

**FINAL REPORT**

**ECHO LAKE 2 PIT EVALUATION**

**BULKLEY/STIKINE DISTRICT**

**For**

**Satish Prasad  
Aggregate/Terrain Geoscientist**

**By**

**2saint Enterprises Ltd  
4832 Graham Avenue  
Terrace, B.C. V8G 1B2  
Phone: (250)635-7779, Fax: (250)638-7939**

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4832 GRAHAM AVENUE  
TERRACE BC V8G 1B2**

*tel: 250.635.7779 cell: 250.615.3725 fax: 250.638.7939*

December 2, 2004

Ministry of Transportation  
#213-1011-4<sup>th</sup> Avenue  
Prince George, B.C.  
V2L 3H9

Attention: Mr. Satish Prasad  
Aggregate/Terrain Geoscientist

**RE: Echo Lake 2 Pit Aggregate Investigation  
Bulkley/Stikine District**

## **1.0 INTRODUCTION**

In October 2004 2saint Enterprises Ltd. was contracted by the Ministry of Transportation to conduct a test pit assessment of Echo Lake 2 Pit. The intent of the investigation was to re-evaluate the existing pit area and undeveloped locations within the pit boundary to determine the quality and quantity of gravel within the area.

2saint Enterprise's scope of services was to conduct a test pit assessment by using an excavator hired by the Ministry, surveying test pits, determining average gradation by visual identification, providing sample analysis by laboratory testing as determined by the Ministry and to estimate a volume and suitability of granular soils in the pit area.

### **1.1 Location**

The pit area is located on Unsurveyed Crown Land just south and east of Echo Lake on Highway #37 as shown on the attached plan (Figure 1).

## **2.0 FIELD WORK**

2saint Enterprises Ltd. supervised the excavation of 11 test pits in Echo Lake 2 Pit on October 21, 2004. The test pits were excavated to depths between 2.2m and 4.0m with a tracked John Deere 490D excavator. The test pits were logged

and sampled by Darcy Netzel of Skeena Project Services Ltd... An Aggregate Test Hole Summary Sheet is attached in Appendix "A". Samples of the granular material were taken and tested in the laboratory of Skeena Project Services Ltd. in Terrace. The overall gradation of the material shown on the Aggregate Test Hole Summary Sheets were estimated visually in the field and recorded on the field logs. Laboratory tests are also shown on the Aggregate Test Hole Summary Sheets. Soils were described according to the Modified Unified Classification System for Soils.

Test pits were located using a handheld GPS ( Appendix D ) with back up using a compass and hip chain. The test pits are plotted on the Site Plan shown in Figure 1. All other information on the plan is from the GPS survey provided by the Ministry.

### 3.0 FIELD OBSERVATIONS

Test pits were excavated in the existing pit area adjacent to Highway #37. Granular material was only encountered in TP#04-9. In all other test pits clayey gravel, silty and clayed sands were encountered to the full depths of the test pits. Based on the field and laboratory tests the following is a summation of the proposed pit area.

#### Laboratory Testing Results: ( Appendix B )

The Ministry of Transportation requested 2saint Enterprises Ltd. perform laboratory tests on 1 sample from the area. All testing was carried out on the material by Skeena Project Services Ltd. according to the Manual of Test Procedures: Soils and Mineral Aggregates. Specifications indicated are from the Standard Specifications for Highway Construction, (2004).

#### Average Overall Gradation: (corrected for oversize)

The average field visual gradation including oversize of the granular material encountered in TP#04-9 is **75-150mm (10%), 150-225mm (5%), >225mm (2%), gravel <75mm (46%), sand (32%) and fines (5%).**

Based on the laboratory tests the overall gradation of the aggregate within TP#04-9 as shown on the attached plan is as follows:

Oversize Material	- greater than 225mm	- 2%
	- 150mm - 225mm	- 5.0%
	- 75mm - 150mm	- 10.0%
Gravel	- 4.75mm – 75mm	- 47.0%
Sand	- 75um – 4.75mm	- 30.0%
Fines	- less than 75um	- 6.0%

**Plastic Fines: (Sand Equivalent Test)**

Average: 37  
Range: 37

The minimum allowable values are:

- i) 40 for 25 and 50mm Base Course and fine asphalt aggregates,
- ii) 30 for 75mm Base Course Aggregates; and,
- iii) 20 for Sub-Base and Surfacing Aggregates.

**Durability: (Degradation Test)**

Average: 11  
Range: 11

The minimum allowable values are:

- i) 40 for surface treatment aggregates
- ii) 35 for Base Course and Paving Aggregates

**Laboratory Crush Analysis (Appendix C )**

Laboratory crush testing was performed on TP#04-9 and the results indicate the material falls within the High Fines Surfacing Aggregate Specifications.

**Suitability of Material:**

Based on laboratory testing the material in the vicinity of TP#04-9 may be suitable for:

- High Fines Surfacing Aggregate
- Borrow

It should be noted that material from this pit has previously been crushed for surfacing aggregate due to the fact it is the only granular source within the area. As for it's suitability for paving aggregate further testing of the material will have to be carried out to determine if the aggregate would meet the requirements of the specifications.

**Quantity of Material:**

In order to estimate the potential of granular material in the area further test pit excavations will have to be conducted around all the stockpile sites in the old pit floor. There may be a potential for material provided the stockpiles are removed and the material encountered in the test pits is similar to the material encountered in TP#04-9.

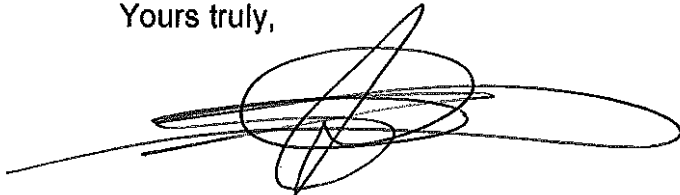
### **Pit Characteristics and Recommended Development:**

1. There was no suitable material encountered in the pit area except in TP#9 to a depth of 4.0 metres.
2. There was no overburden encountered in TP#04-9 as shown on the Aggregate Testhole Summary Sheets.
3. There was no water table encountered in any of the test pits.
4. The pit floor has been previously developed and all stockpiles would have to be removed if granular material was found in the pit floor.
5. Further testing will be required in the pit floor to determine if there is any potential for granular material in the pit as all the other test pits show the pit area to be depleted.

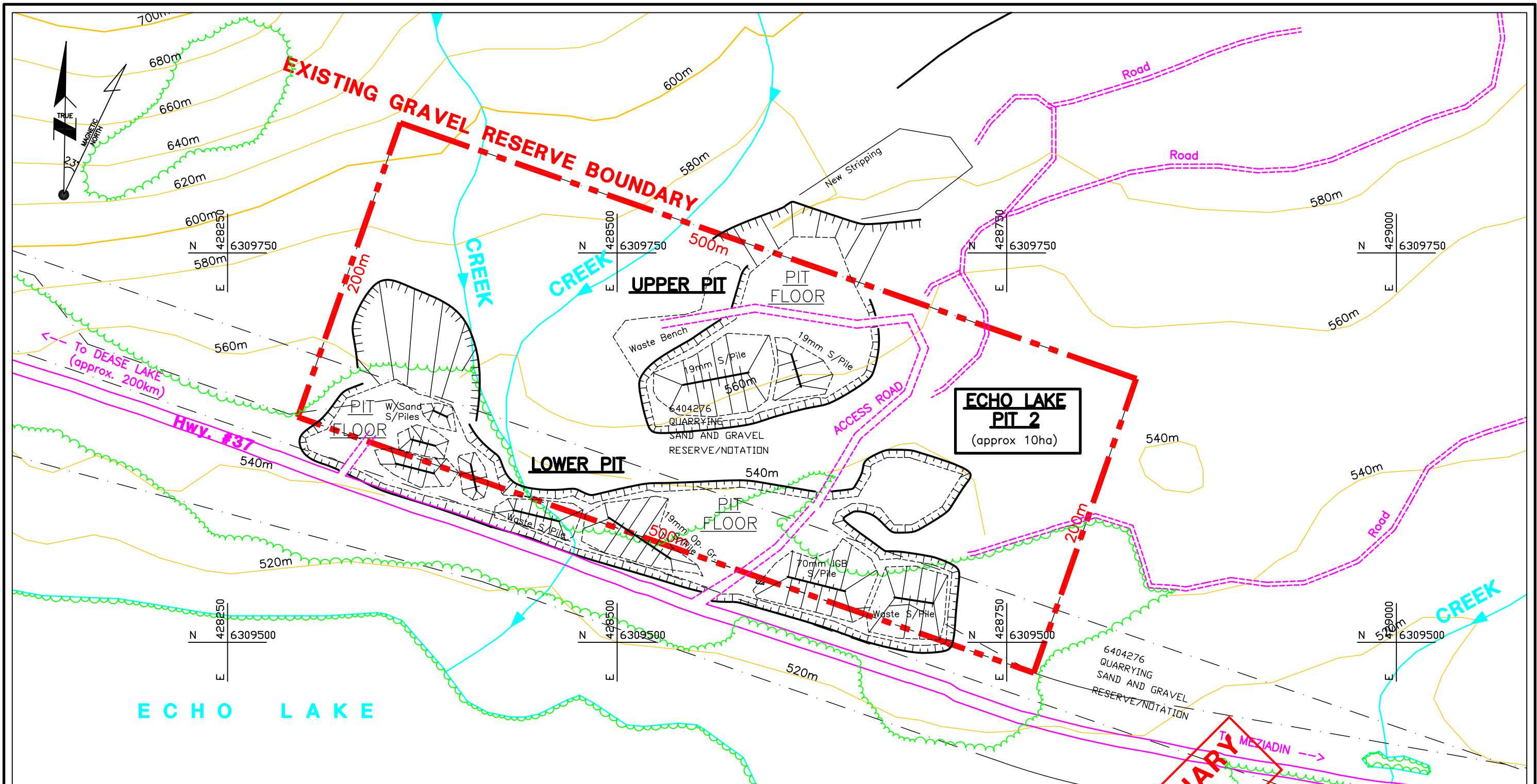
This report is based on test pits and the results of limited laboratory testing. It should be noted that different, and possibly poorer, soil conditions may be encountered between test pit locations and volume estimates may vary significantly.

If you have any further questions or concerns regarding the above, please contact me at (250) 635-7779 or by cell at (250) 615-3725.

Yours truly,

A handwritten signature in black ink, consisting of several overlapping loops and a long horizontal stroke extending to the left.

Dave St. Thomas  
Owner



PRELIMINARY ONLY

**PIT LEGEND**

	NATURAL EMBANKMENT		TREELINE
	PIT FACE		SWAMP
	TEST PIT		CREEK
	TEST HOLE		BUILDING (symbolic)
	PAVED ROAD		FENCE
	GRAVEL ROAD		SIGN POST
	TRAIL		UTILITY POLE
	DISTRICT LOT LINE		GRAVEL RESERVE BOUNDARY
	MONUMENT		800m Contour Line (100m interval)
	IRON PIN		20m Contour Line (20m interval)

**T.R.I.M. NOTE :**

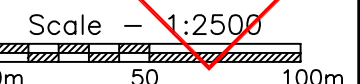
- 1) Contour Interval @ 20 metres
- 2) Base Map derived from T.R.I.M. Digital Map Data: Map No.: 104B.100 Flown: July 1982

**LEGAL NOTE :**

- 1) District Lot lines are derived from digital Crown Cadastral reference mapping supplied by CROWN LAND REGISTRY, Victoria

**DRAWING NOTES:**

- 1) Pit topography update derived from MoT DGPS Oct. 2004.



Geotechnical & Materials Engineering

Figure 2

**PIT PLAN (2004)  
ECHO LAKE PIT 2**

STIKINE HIGHWAY DISTRICT

drb/SP	Oct /04	As Shown
39100-20/2666-28		GEOTECH/ECHO CEC-PL04

**APPENDIX A**

**Aggregate Test Hole Summary Sheets**



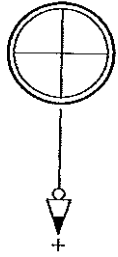




**APPENDIX B**

**Laboratory Sieve Analysis**

## SIEVE ANALYSIS REPORT



**SKEENA  
PROJECT  
SERVICES  
LTD.**

4445 Greig Avenue  
Terrace, B.C. V8G 1M4  
(250) 638-0808 (Bus)  
(250) 635-4667 (Fax)

(ASTM C-117; C-136)

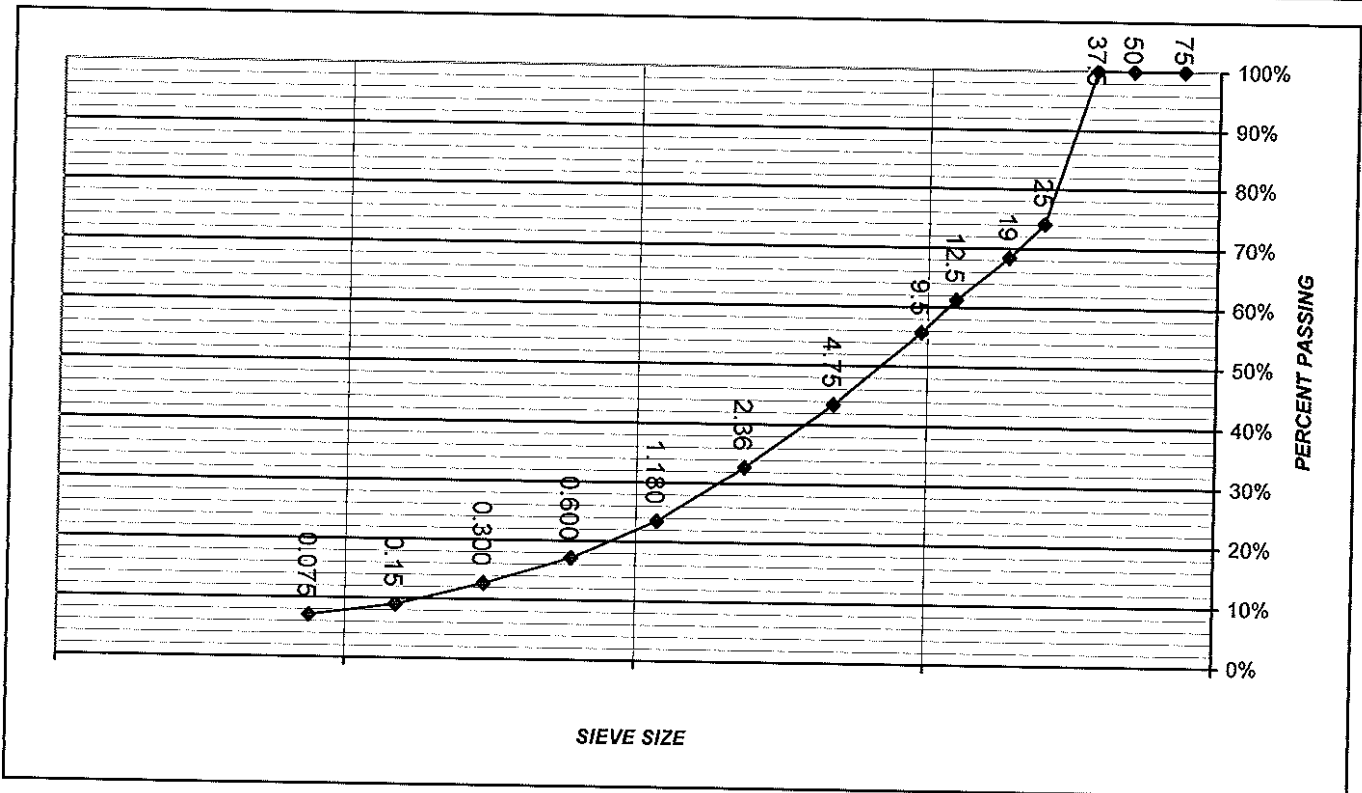
Test Date: **24-Nov-04**  
Client: **2Saint Ent.**  
Project: **Northern Plits**  
Job File # **04-090**  
Report date

Location or Pit: **Echo Pit**  
Time Sampled: **19-Oct-04**  
Time Sieved: **24-Nov-04**  
Test #: **04-09**  
Inspector: **DJN/KB**

Copy To: **Dave St. Thomas**  
CC To:  
CC To:

Fax #  
Fax #  
Fax #

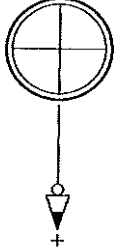
MATERIAL TYPE		TEST DETAILS				
Pit Run		SIEVE SIZE	MASS RETAINED	PERCENT RETAINED	PERCENT PASSING	SPEC % Passing
BEFORE WASH	6203	75	0	0.0%	100.0%	
AFTER WASH	5784	50	0	0.0%	100.0%	
MASS PASSING 0.075 SCREEN	419	37.5	0	0.0%	100.0%	
		25	1602	25.8%	74.2%	
		19	356	5.7%	68.4%	
		12.5	443	7.1%	61.3%	
		9.5	344	5.5%	55.7%	
		4.75	761	12.3%	43.5%	
		2.36	665	10.7%	32.8%	
		1.18	576	9.3%	23.5%	
		0.600	390	6.3%	17.2%	
		0.300	276	4.4%	12.7%	
		0.150	229	3.7%	9.0%	
		0.075	120	1.9%	7.1%	
		PAN	22	0.4%		
		+WASH	419	6.8%	0.0%	
FRACTURE COUNT						
TF/TC						
GRADATIONS						
GRAVEL	56.5%					
SAND	36.4%					
SILT/CLAY	7.1%					

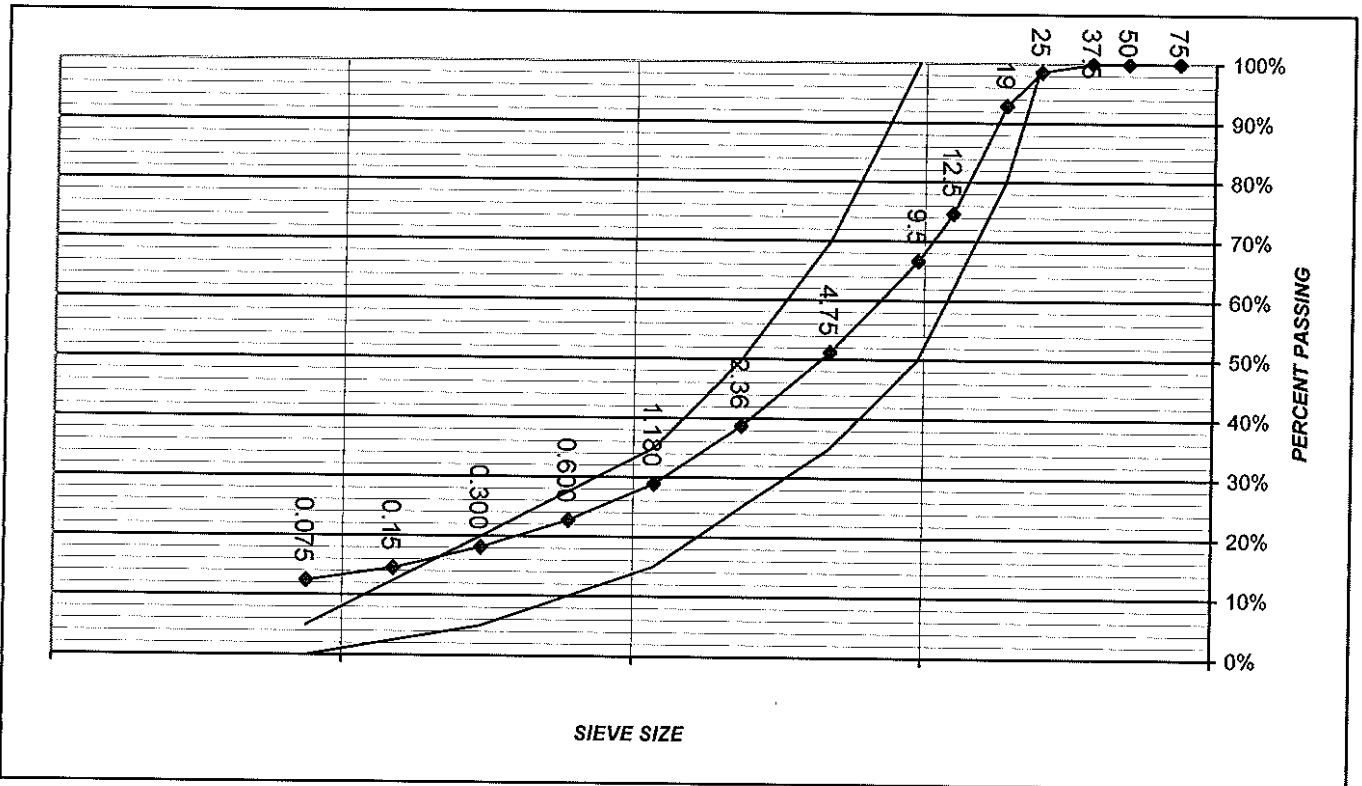


**APPENDIX C**

Laboratory Crush Sieve Analysis  
&  
Miscellaneous Test Results  
Degradation, Sand Equivalent, Specific Gravity & Absorption

## SIEVE ANALYSIS REPORT

 <p><b>SKEENA PROJECT SERVICES LTD.</b> 4445 Greig Avenue Terrace, B.C. V8G 1M4 (250) 638-0808 (Bus) (250) 635-4667 (Fax)</p>	(ASTM C-117; C-136)				
	Test Date: <b>24-Nov-04</b>	Location or Pit: <b>Echo Pit</b>			
	Client: <b>2Saint Ent.</b>	Time Sampled: <b>19-Oct-04</b>			
	Project: <b>Northern Pits</b>	Time Sieved: <b>24-Nov-04</b>			
Job File #: <b>04-090</b>	Test #: <b>04-09 LC</b>				
Report date	Inspector: <b>DJN/KB</b>				
Copy To: <b>Dave St. Thomas</b>	Fax #				
CC To:	Fax #				
CC To:	Fax #				
<b>MATERIAL TYPE</b>	<b>TEST DETAILS</b>				
Lab Crush	<b>SIEVE SIZE</b>	<b>MASS RETAINED</b>	<b>PERCENT RETAINED</b>	<b>PERCENT PASSING</b>	<b>SPEC % Passing</b>
BEFORE WASH      5219	75	0	0.0%	100.0%	
AFTER WASH      4590	50	0	0.0%	100.0%	
MASS PASSING	37.5	0	0.0%	100.0%	
0.075 SCREEN      629	25	74	1.4%	98.6%	100%
	19	296	5.7%	92.9%	80-100%
	12.5	952	18.2%	74.7%	
	9.5	420	8.0%	66.6%	50-100%
<b>FRACTURE COUNT</b>	4.75	804	15.4%	51.2%	35-70%
	2.36	651	12.5%	38.7%	25-50%
	1.18	513	9.8%	28.9%	15-35%
TF/TC	0.600	321	6.2%	22.8%	
<b>GRADATIONS</b>	0.300	240	4.6%	18.2%	5-20%
GRAVEL      48.8%	0.150	188	3.6%	14.6%	
SAND      38.7%	0.075	109	2.1%	12.5%	0-5%
SILT/CLAY      12.5%	PAN	22	0.4%		
	+WASH	629	12.1%	0.0%	





**APPENDIX D**

GPS Coordinates

Echo Lake Pit

Point No.	Northing	Easting	Elevation	Description
4001	6309851.828	428781.130	599.416	TP04-01
4002	6309889.074	428679.697	594.395	TP04-02
4003	6309840.070	428600.951	589.984	TP04-03
4004	6309781.030	428556.743	585.450	TP04-04
4005	6309762.682	428578.650	583.455	TP04-05
4006	6309802.357	428698.550	586.610	TP04-06
4007	6309846.326	428676.737	587.796	TP04-07
4008	6309800.668	428616.756	586.410	TP04-08
4009	6309720.705	428617.809	574.145	TP04-09
4010	6309740.030	428386.266	581.803	TP04-10
4011	6309746.495	428354.162	585.615	TP04-11