

Technical Summary

July 2024

Pit Name: Colpitt Lake Pit

Provincial Pit Number: 1946

Location: The pit is located approximately 15 km south of Williams lake on the Dog creek Road then approximately 8 km southwest on Colpitt Lake Forest Service Road. (Figure 1).

Legal Land Description: The pit is legally unsurveyed Crown Land in the eastern ½ of Section 7 and the western ½ of Section 8 all of Township 45, Cariboo Lands District. UTM Co ordinates, Zone 10, 5762335 Northing and 562293 Easting. The layout of the Map Reserve boundary is shown in the legal plan (Figure 2).

Subsurface Investigation: Subsurface investigations at Colpitt Lake Pit were carried out in June of 2024 by Ministry of Transportation & Infrastructure.

In 2024 seventeen (17) test pits were excavated to depths ranging from 2.8 to 5.0m. During the test pitting, subsurface soil and groundwater conditions were logged and representative samples of the granular materials were collected for laboratory testing and future reference. Laboratory testing was carried out on fourteen (14) of these samples at WSP laboratories to assess the gradation and durability characteristics. The tests completed were wet sieve analysis, micro deval, sand equivalent, relative density, and absorption.

Based on the results of the 2024 investigation, one (1) granular area was defined. The detailed results of the subsurface testing are provided in the Test Pit Summaries and test pit locations are shown on the Pit Development Plan (Figure 3).

Material Gradation: Table 1 shows the gradation as a percentage by weight of the fines (silts and clays), sand and gravel components as well as the Unified Soil Classification (USC [included after test pit summary]) for the samples tested.

Table 1: Pit Run Gradation

Test Pit	Depth (m)	Fines (%)* <0.075mm	Sand (%)* 0.075- 4.75mm	Gravel (%)* 4.75-75mm	USC
TP24-01	0 – 4.8	5.9	37.6	56.5	GP-GM
TP24-02	0 – 2.5	9.3	39.7	51	GM
TP24-03	1.6 – 4.8	2.6	39.2	58.2	GP
TP24-04	0.5 – 4.0	20.8	45.9	33.3	SM2
TP24-06	1.2 – 4.2	17.5	46.5	36.0	SM1
TP24-07	0.7 – 2.8	30.2	54.1	15.7	SM3
TP24-08	0 – 2.8	35.1	48.8	16.1	SM3
TP24-09	0 – 5.0	2.8	46.4	50.8	GP
TP24-11	1.6 – 5.0	4.2	42.5	53.3	GP
TP24-12	0 – 2.4	5.3	57.6	37.1	SP
TP24-13	0.4 – 2.4	0.4	52.9	46.7	SP
TP24-14	0.5 – 2.4	30	60.1	9.9	SM3
TP24-16	0 – 4.8	1.8	81.9	16.3	SP
TP24-17	1.3 – 4.9	3.0	46.9	50.1	GP
2024 Averages		12.1	50.0	37.9	-

Table 2 shows the estimated percent of oversize rock as noted in the field during exploration.

Table 2: Oversize Field Estimates

2024

Classification	Average (%)	Range (%)
Boulders (>375mm)	0.5	0 - 2
Cobbles (150-375mm)	0.4	0 – 1
Cobbles (75-150mm)	0.3	0 – 1

Maximum rock size observed was 1500 mm.

Material Durability: Table 3 shows the results of the durability tests as well as the specifications as required in the Standard Specifications for Highway Construction.

Table 3: Durability Test Results

Test Pit	Sand Equivalent (%)	Micro Deval (%)		Absorption		Relative Density	
		Coarse	Fine	Coarse	Fine	Coarse	Fine
2024							
TP21-01	40	8.2	10.8	0.992	2.6	2.801	2.701
BC MoTI Specifications							
Sand Equivalent	≥40 for base coarse and fine asphalt mix aggregate ≥20 for surfacing, sub-base and bridge end fill aggregates						
Micro Deval	≤30% for sub-base and bridge end fill aggregates ≤25% for surfacing & base course aggregates ≤18% for Class 1 Pavement asphalt mix aggregates ≤20% for Class 2 Pavement asphalt mix aggregates						
Absorption	<2.0% for coarse paving aggregates ≤1.0% for coarse and ≤1.5% for fine graded aggregate seals						
Relative Density	~2.65 for all aggregate products						

Material Suitability: Based on the 2024 investigation results, the material is judged to be suitable for the following purposes:

Table 4: Suitability

	Pit Run	Crush
Colpitt Lake Pit Suitability Area	SGSB	HFSA Winter Abrasive

The samples tested meet the gradation, sand equivalent, and micro-deval specifications for subbase course, winter abrasive and HFSA aggregate. Sand rejection is expected to be necessary to meet spec for HFSA. Material suitable for paving aggregates in Colpitt Lake Pit are not included in the provided suitability area in this report.

Sulphate and Chloride Testing

Table 5 shows the sulphate and chloride test results for select samples from the suitability area. These results are provided for information and have not been considered for material suitability.

Table 5: Sulphate and Chloride Test Results

Test Pit	Total Sulphate Ion Content %	Water-Soluble Chloride %
TP21-06	0.058	0.006

Volume Estimates: Table 6 shows the volume estimates that can be expected for gravel from the proposed suitability area. This is based on the measured depths encountered during the subsurface investigation. The potential volumes of granular material were calculated by averaging the total thickness of granular material encountered in test pits and multiplying by the estimated surface area.

Table 6: Volume Estimates

Suitability Area ~2.0ha.	Topsoil	Overburden	Granular Material
Average Layer Thickness (m)	0.0	0.0	2.5
Volume (m³)	0.0	0.0	50,000

Pit Development Notes

- All development must be carried out in accordance with the Health, Safety, and reclamation Code for Mines in British Columbia, BC Ministry of Energy, Mines and Low Carbon Innovation (2022, or later edition), the Standard Specifications for Highway Construction, BC Ministry of Transportation and Infrastructure (2020, or later edition) and the Aggregate Operators Best Management Practices Handbook for BC.
- Colpitt Lake Pit has been previously developed by the Ministry of Transportation & Infrastructure. Clearing of regrowth in the suitability area will be required, and additional clearing, grubbing, and stripping may be required during mining.
- Overburden that is currently stockpiled adjacent to the treeline is not available for use and will have to be moved if additional development is required.
- The variability of the 2024 test pits suggest that mixing and blending will be required during crushing to meet specifications. Some clearing, grubbing, and stripping may be required to access dirtier material for HFSA production. It is anticipated that sand rejection will be required.
- All trees, vegetation, and overburden are to be removed within 2m of the top of the pit faces. Topsoil, overburden, and aggregate cannot be removed within five meters of the reserve boundary.
- An area of Old Growth is identified on the Pit Development Plan. These trees may not be removed without prior approval from the Ministry.
- The processing area is recommended to be located on the pit floor as identified on the Pit Development Plan, with mining proceeding in a primarily southern direction.

- Processed aggregate may be stockpiled on the pit floor where space permits, away from pit faces or other stockpiles that need to be accessed.
- No dumping of debris or petroleum products will be permitted, and the site must be left in a clean and safe condition.
- At the completion of the pit development operations, but prior to the depletion of the pit, the sides of the pit faces, waste piles, and overburden stockpiles must be trimmed to a 1.5H:1V slope. Active pit faces must be reshaped with native granular materials.
- Upon depletion of the pit, all disturbed areas are to be reclaimed. The minimum reclamation procedure should include re-sloping of the pit faces and waste piles to a 2H:1V slope, contouring the area for appropriate drainage, spreading of overburden followed by topsoil, and seeding.
- Should any of the above conditions conflict with the Health, Safety, and Reclamation Code for Mines in British Columbia, then the Code will prevail.

Closure

The findings of this report and the soil conditions noted above are inferred from the extrapolation of limited surface and subsurface data collected during the site investigation. It should be noted that different and possibly poorer soil conditions may exist between the test pit locations and volume estimates may vary from those reported in this report.

Prepared by:
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Reviewed by:
Laura Courtenay
Sr Aggregate Resource Specialist

Enclosures

Figures:

- Figure 1 - Location Plan
- Figure 2 - Legal Plan
- Figure 3 - Pit Development Plan

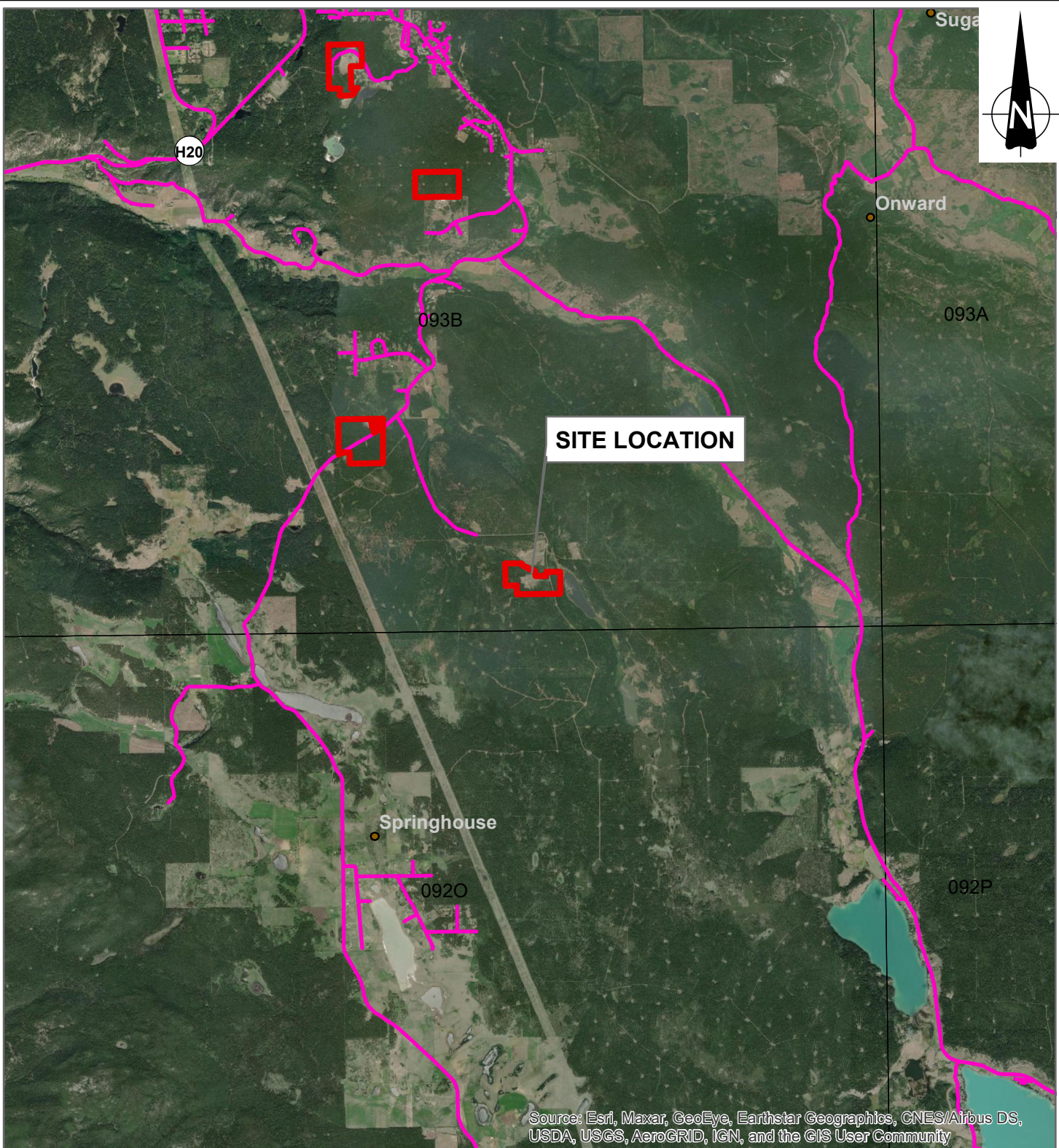
Test Pit Summaries

- Test Pit Logs (2024)
- Wet Sieve Analysis Charts (2024)
- Aggregate Gradation Charts (2024)

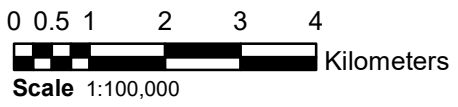
USC Legend

Photos

Figures

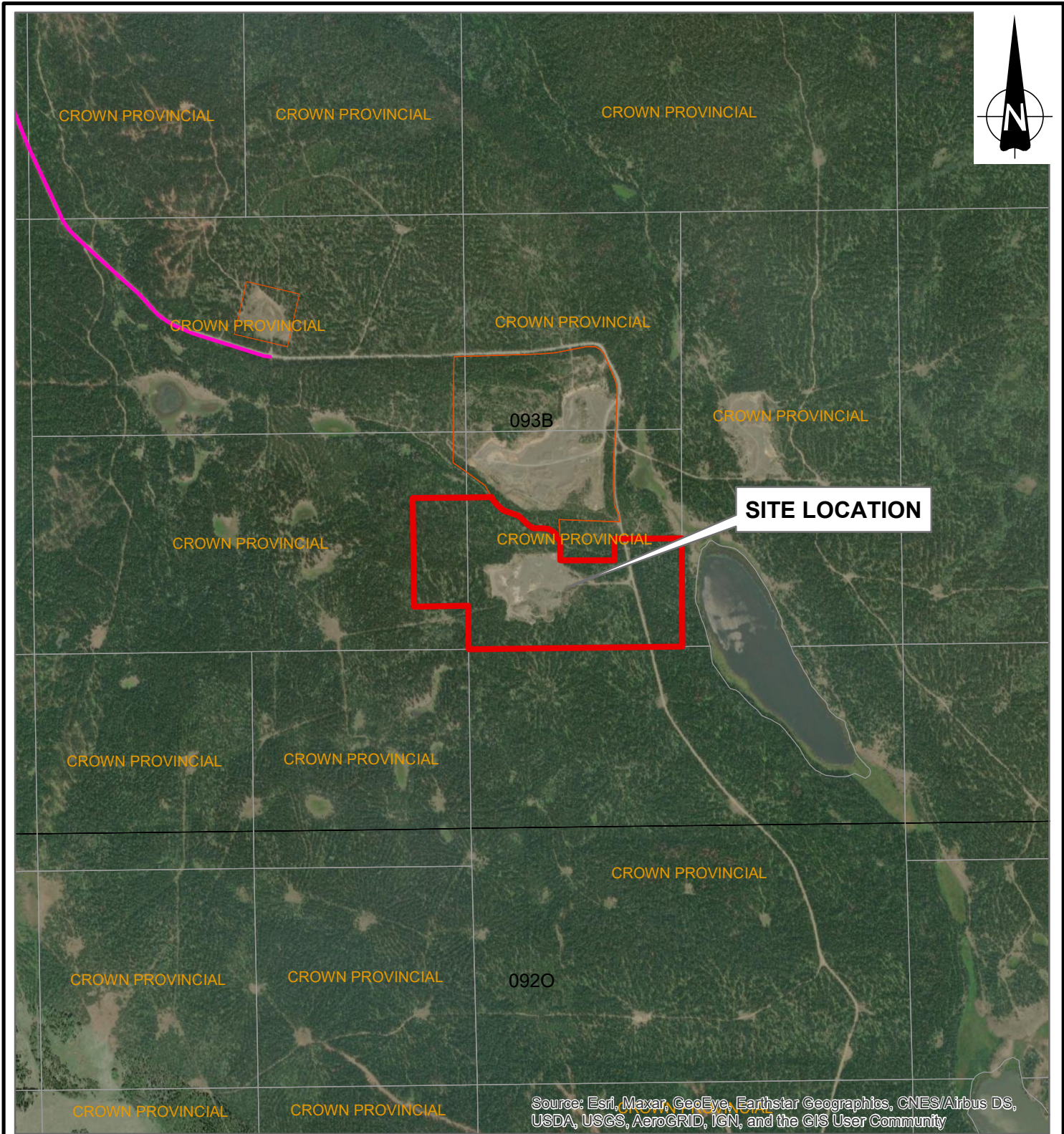


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

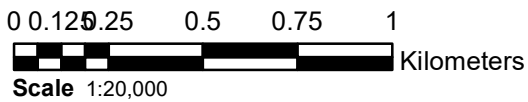




 Ministry of Transportation and Infrastructure Geotechnical and Materials Branch					
LOCATION PLAN (2022) Colpitt Lake Pit No. 1946 SA 17 - CARIBOO DISTRICT					
DRAWN BY: skinnibu		PROJECTION: NAD 1983 UTM Zone 10N		SCALE: As Shown	
CHECKED BY: A.Mitchell		DATUM: NAD 1983 UTM Zone 10N		DATE: 2022-04-27	
FileName: GISTemplate_Gravel_R2_2021-04-16_GISV8		Geotech Project No: GISV8		Reg: 2 Drawing No: FIGURE 1	

This drawing was originally produced in colour.



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community




















 Ministry of Transportation and Infrastructure
 Geotechnical and Materials Branch
 

LEGAL PLAN (2022)
Colpitt Lake Pit No. 1946
SA 17 - CARIBOO DISTRICT

DRAWN BY:	skinnibu	PROJECTION:	NAD 1983 UTM Zone 10N	SCALE:	As Shown
CHECKED BY:	A.Mitchell	DATUM:	NAD 1983 UTM Zone 10N	DATE:	2022-04-27
FileName:	GISTemplate_Gravel_R2_2021-04-16_GISV8	Geotech Project No:	Reg: 2	Drawing No:	FIGURE 2

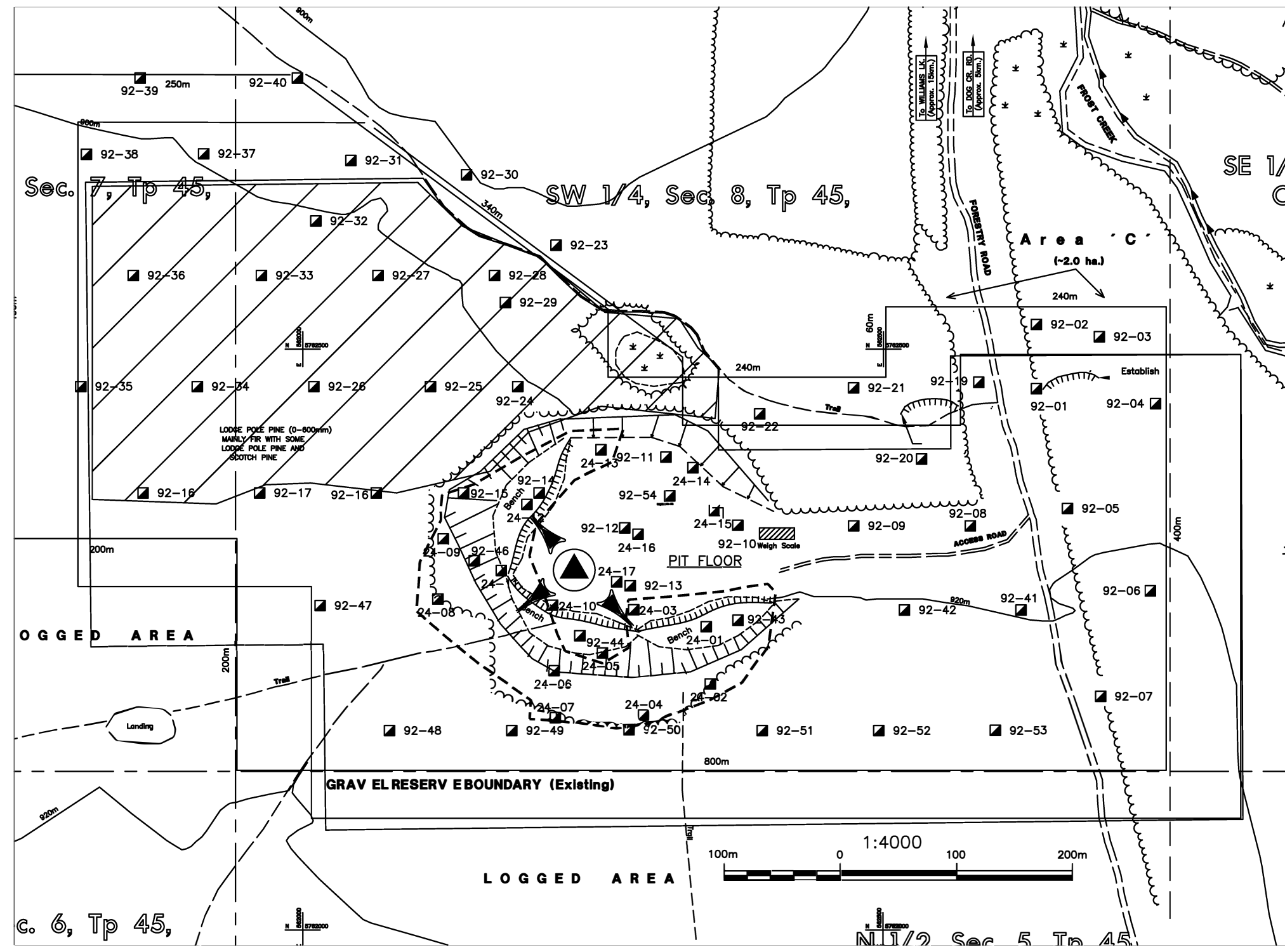
This drawing was originally produced in colour.

LEGEND

-  CRUSHER LOCATION
-  DEVELOPMENT DIRECTION
-  SUITABILITY BOUNDARY
-  EXTENSION POTENTIAL
-  TEST PIT
-  GRAVEL RESERVE BOUNDARY
-  ACCESS ROAD
-  IRON PIN
-  LEGAL SURVEY MONUMENT
-  EXISTING PIT FACE
-  PROCESSED AGGREGATE STOCKPILE AREA
-  OVERBURDEN STOCKPILE SITE
-  TOPSOIL STOCKPILE SITE
-  FENCE
-  TREELINE
-  OLD GROWTH MANAGEMENT AREA

MINING NOTES

- All vegetation, topsoil and overburden is to be stripped a minimum of 2 metres back from active pit faces.
- Topsoil and overburden is to be stockpiled and seeded with grass. Removal of this material is not permitted.
- At the completion of mining activities, all pit faces are to be sloped to a minimum of 1 1/2 to 1 with native granular material.
- For projects mining in excess of 1,000 cubic metres, the Ministry of Energy Mines (Mines Division) must be notified (approximately 14 days prior to the commencement of mining).
- All reject material, resulting from aggregate production, is to be placed in neat, easily accessible stockpiles free of deleterious material (i.e. wood waste).
- No dumping of Demolition, Land Clearing and Construction debris is permitted without prior written approval of the Ministry of Transportation.
- Tree clearing in the old growth management area is not permitted without prior Ministry approval.



"INFORMATION PROVIDED HEREIN IS INTENDED TO BE USED BY THE MINISTRY OF TRANSPORTATION IN CONJUNCTION WITH ALL OTHER DATA RELEVANT TO THE SITE. THE SOIL AND GROUND WATER CONDITIONS SHOWN ARE REPRESENTATIVE AT THE TESTHOLE LOCATIONS ON THE DATES INDICATED. CONDITIONS ARE SUBJECT TO CHANGE WITH TIME. THE MINISTRY OF TRANSPORTATION SHALL NOT BE HELD LIABLE FOR ANY CLAIMS OR ACTIONS ARISING FROM THE USE OR INTERPRETATION OF THE DATA HEREIN PROVIDED."

NOTE:
- District Lot lines are approximate location only



REVISIONS		Initial
Date	Description	
July 2024	Updated for HFSA crushing 2024	

REVIEWED BY:	
A.T.A.	
APPROVED BY:	
G.R.M.	

SCALE: 1:4000
DRAWN: LLH
DATE: MAY 99
AutoCAD: F31946

COLPITT LAKE PIT #1946
PIT DEVELOPMENT PLAN
FILE NO. 50-17-1946

FIGURE
3

Test Pit Summaries

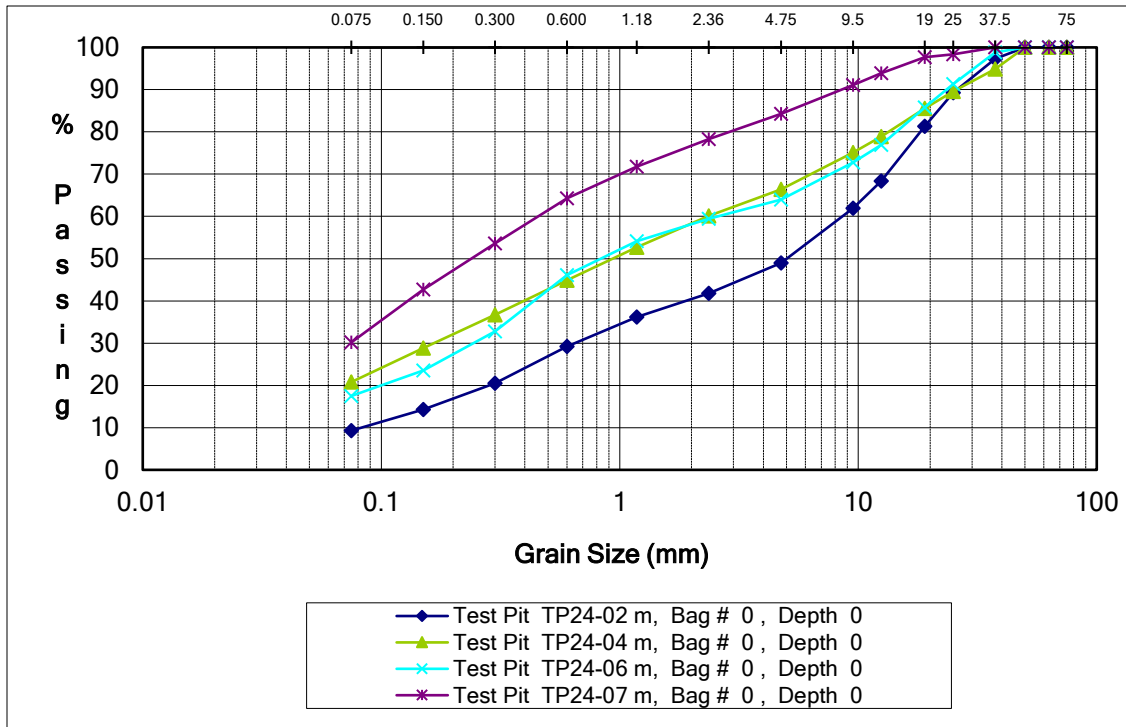
AGGREGATE LOG													
PROJECT: Colpitt Lake testing				SAMPLED BY: Steven Lee									
PIT #: 981				METHOD: Excavator									
DISTRICT: SA17 Central Cariboo				DATE: 12-Jun-24									
TEST PIT NO.	DEPTH		SAMPLE BAG NO.	SOILS CLASS	ESTIMATED GRADATION			ESTIMATED ROCK 75mm				SAND TYPE F M C	REMARKS
	FROM	TO			G	S	F	MAX SIZE	75mm - 150mm	150mm - 375mm	>375mm		
TP24-01	0	4.8	TP24-01	GP	50	45	5		0	0	0	M-C	Lab Sieve
													56.5/37.6/5.9
TP24-02	0	2.5	TP24-02	SP	30	62	8	420	1	1	1	F	Test pit located just beyond treeline and existing overburden stockpile.
	2.5	3.8		GP	50	46	4					F-M	
TP24-03	0	1.6		SP	40	55	5					M-C	Top 1.6 m dirtier and less coarse
	1.6	4.8	TP24-03	GP	55	43	2		0	0	0	C	
TP24-04	0	0.5		OB									Undeveloped area beyond old strippings pile. Finer sand and silts. Boulder refusal at 4.0 m
	0.5	4	TP24-04	SM2	35	58	8		1	1	1	F	
TP24-05	0	3		OB									~3 meters of old overburden. Woody debris and topsoil. Fine silty sand with ~25% gravels @ 3m+ depth. No sample taken.
TP24-06	0	1.2	TP24-06	SM1	40	53	7					F	36.0/46.5/17.5
	1.2	4.2		GP	50	47	5	250	1	1	0	F	
TP24-07	0	0.7		OB									Boulder refusal at 2.8m
	0.7	2.8	TP24-07	SM3	35	57	8	1500	2	1	1	F	
TP24-08	0	2.8	TP24-08	SM3	25	55	20	1000	1	1	1	F	Boulders at 2.8m. Near SW top of face.
													16.1/48.8/35.1

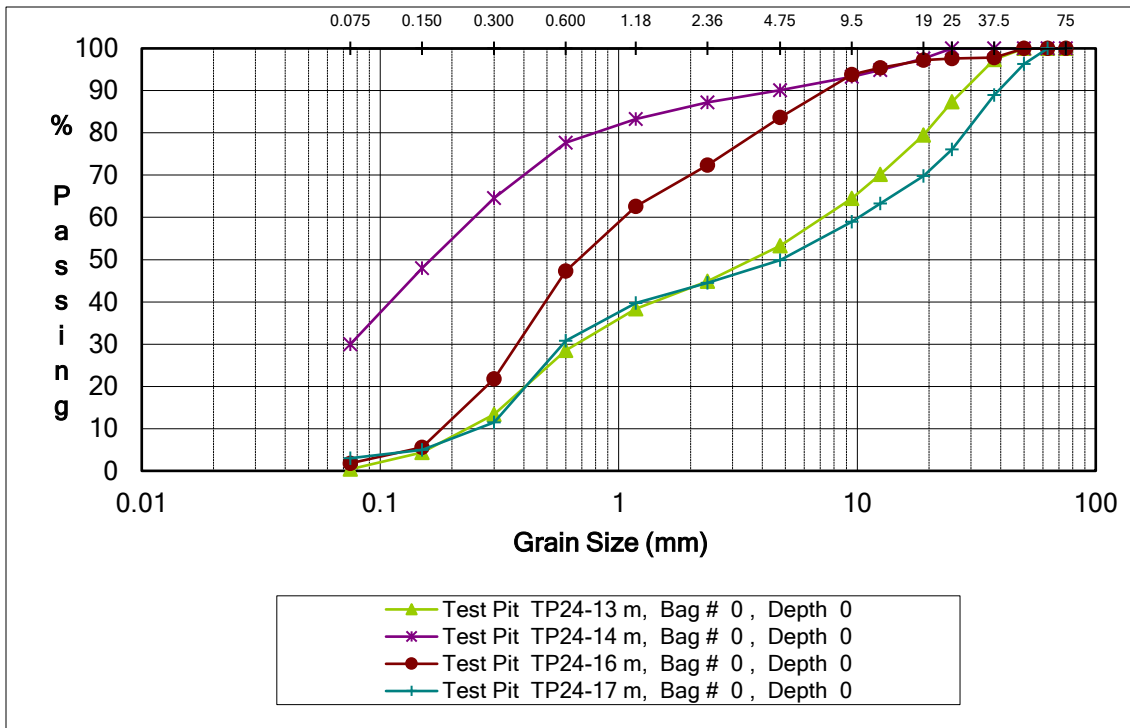
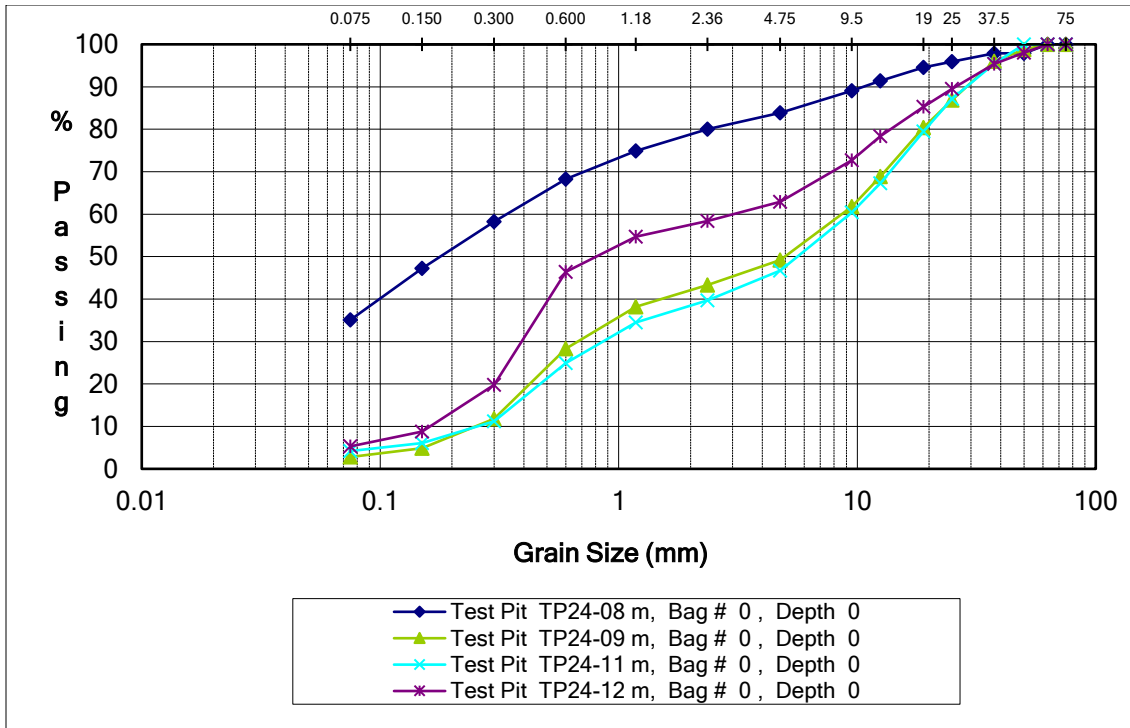
AGGREGATE LOG													
PROJECT: Colpitt Lake testing				SAMPLED BY: Steven Lee									
PIT #: 981				METHOD: Excavator									
DISTRICT: SA17 Central Cariboo				DATE: 12-Jun-24									
TEST PIT NO.	DEPTH		SAMPLE BAG NO.	SOILS CLASS	ESTIMATED GRADATION			ESTIMATED ROCK 75mm				SAND TYPE F M C	REMARKS
	FROM	TO			G	S	F	MAX SIZE	75mm - 150mm	150mm - 375mm	>375mm		
TP24-09	0	5	TP24-09	GP	50	46	4	100	1	0	0	M	Middle of SW face
TP24-10	0	1.3		SP	47	50	3		0	0	0		
	1.3	1.9			37	60	3						
	1.9	4.6			27	70	3						
													No lab sample. Test pit in floor.
TP24-11	0	1.6	TP24-11	GP	55	43	2		0	0	0	M	Test pit dug in pit floor
	1.6	5			20	75	3						M
													53.3/42.5/4.2
TP24-12	0	2.4	TP24-12	GP	45	50	5		0	0	0	M	Test pit dug in pit floor
	2.4	5.1			25	75	5						M
													37.1/57.6/5.3
TP24-13	0	0.4	Floor/old crush/GP										Test pit dug in pit floor
	0.4	2.4	TP24-13	GP	55	43	2		0	0	0	M	
	2.4	5			10	87	3						
													46.7/52.9/0.4
TP24-14	0	0.5	Floor/old crush/GP										Test pit dug in pit floor. Area has been
	0.5	2.4		SM	20	60	20	350	1	1	0	F-M	worked before. Some organics and
	2.4	4.9			10	80	10						F
													9.9/60.1/30
TP24-15	0	0.5	Floor/old crush/GP										Test pit dug in pit floor
	0.5	2.3		SP	35	62	3	600	0	0	<1	M-C	
	2.3	5			10	85	5						
													No sample taken
TP24-16	0	4.8	TP24-16	SP	10	87	3		0	0	0	M	Test pit dug in pit floor
													16.3/81.9/1.8
TP24-17	0	1.3	TP24-17	GP	60	38	2					M	Test pit dug in pit floor
	1.3	4.9			10	87	3	400	1	1	1		M
													50.1/46.9/3.0

**PROJECT REPORT OF
SIEVE ANALYSIS SUMMARIES** **PERCENT RETAINED**

Project: Colpitt Lake Pit	Project No.:
Sample Sour: Colpitt Lake Pit	Client:
Material: PIT RUN	Date: Jun-24

Test Pit	Bag #	Percent Retained															PAN	check
		Pit Run Sieve Sizes (mm)																
		75	63	50	37.5	25	19	12.5	9.5	4.75	2.36	1.18	0.6	0.3	0.15	0.075		
TP24-02	0	0	0.0	0.0	2.7	8.0	8.0	12.9	6.5	12.9	7.2	5.6	7.0	8.7	6.2	5.0	9.3	100
TP24-04	0	0	0.0	0.0	5.1	5.3	4.0	6.7	3.8	8.7	6.3	7.4	7.8	8.2	7.9	8.0	20.8	100
TP24-06	0	0	0.0	0.0	1.2	7.5	5.5	8.9	4.1	8.8	4.6	5.3	8.0	13.3	9.3	6.0	17.5	100
TP24-07	0	0	0.0	0.0	0.0	1.6	0.7	3.8	2.8	6.8	6.0	6.5	7.5	10.7	10.9	12.5	30.2	100
TP24-08	0	0	0.0	2.1	0.0	2.0	1.3	3.2	2.3	5.2	3.9	5.1	6.6	10.1	11.0	12.1	35.1	100
TP24-09	0	0	0.0	1.2	2.8	9.1	6.5	11.5	7.1	12.6	5.9	5.1	9.9	16.5	6.9	2.1	2.8	100
TP24-11	0	0	0.0	0.0	4.5	8.3	7.7	12.2	6.9	13.7	7.0	5.2	9.6	13.7	5.1	1.9	4.2	100
TP24-12	0	0	0.0	2.0	2.6	5.9	4.2	6.9	5.7	9.8	4.5	3.7	8.3	26.6	11.0	3.5	5.3	100
TP24-13	0	0	0.0	0.0	2.6	10.0	7.9	9.3	5.7	11.2	8.4	6.5	9.9	15.1	9.0	4.0	0.4	100
TP24-14	0	0	0.0	0.0	0.0	0.0	2.4	2.7	1.6	3.2	2.9	3.9	5.6	13.1	16.6	18.0	30.0	100
TP24-16	0	0	0.0	0.0	2.2	0.2	0.4	1.8	1.6	10.1	11.3	9.8	15.3	25.5	16.2	3.8	1.8	100
TP24-17	0	0	0.0	3.7	7.3	12.9	6.3	6.5	4.3	9.1	5.4	4.8	8.9	19.3	6.5	2.0	3.0	100





USC Legend

MATERIALS CLASSIFICATION LEGEND

MAJOR DIVISIONS	SYMBOL	SOIL TYPE					
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	WELL GRADED GRAVELS OR GRAVEL-SAND MIXTURES, < 5% FINES				
		GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, < 5% FINES				
		GM*	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES				
		GC*	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES				
	SAND AND SANDY SOILS	SW	WELL-GRADED SANDS OR GRAVELLY SANDS, < 5% FINES				
		SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, < 5% FINES				
		SM*	SILTY SANDS SAND-SILT MIXTURES				
		SC*	CLAYEY SANDS SAND-CLAY MIXTURES				
FINE GRAINED SOILS	SILTS AND CLAYS $w_L < 50$	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY				
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS				
		OL	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY				
	SILTS AND CLAYS $w_L > 50$	MH	INORGANIC SILTS, MICACEOUS OR DIATOMEACEOUS FINE SANDY OR SILTY SOILS, PLASTIC SILTS				
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS				
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS				
ORGANIC SOILS	Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS					
TOPSOIL	TS	TOPSOIL WITH ROOTS, ETC.					
COBBLES	SB	ROCK FRAGMENTS AND COBBLES, PARTICLE SIZE 75mm TO 300mm					
LARGE BOULDERS	LB	BOULDERS, PARTICLE SIZE OVER 300mm					
BEDROCK	BR	BEDROCK					
FOR SOILS HAVING 5 - 12% PASSING .075 SIEVE, USE DUAL SYMBOL							
<table style="border: none;"> <tr> <td style="border: none;">*GM1; GC1; SM1; SC1; 12 - 20%</td> <td rowspan="4" style="border: none; vertical-align: middle;">} PASSING .075mm SIEVE</td> </tr> <tr> <td style="border: none;">GM2; GC2; SM2; SC2; 20 - 30%</td> </tr> <tr> <td style="border: none;">GM3; GC3; SM3; SC3; 30 - 40%</td> </tr> <tr> <td style="border: none;">GM4; GC4; SM4; SC4; 40 - 50%</td> </tr> </table>		*GM1; GC1; SM1; SC1; 12 - 20%	} PASSING .075mm SIEVE	GM2; GC2; SM2; SC2; 20 - 30%	GM3; GC3; SM3; SC3; 30 - 40%	GM4; GC4; SM4; SC4; 40 - 50%	
*GM1; GC1; SM1; SC1; 12 - 20%	} PASSING .075mm SIEVE						
GM2; GC2; SM2; SC2; 20 - 30%							
GM3; GC3; SM3; SC3; 30 - 40%							
GM4; GC4; SM4; SC4; 40 - 50%							

REV. 90-04-26

 PROVINCE of BRITISH COLUMBIA MINISTRY OF TRANSPORTATION & HIGHWAYS Geotechnical & Materials Engineering
UNIFIED SOIL CLASSIFICATION LEGEND
Drawn: LU Date: JULY'97 Scale: _____ File No.: _____ ACAD File: ACAD0709 (200709-000-000)

Photos



Suggested crusher setup and stockpile area. Two existing stockpiles in the center of the pit floor may require relocation (2024).



Recommended mining area, south of crusher setup (2024).



View of recommended mining area, facing southeast (2024).



View of recommended mining area, facing south-southwest (2024).



Closer view of mining area (2024).



Closer view of mining area (2024)



View of secondary mining area, facing south from the western part of pit. Existing stockpiles may have to be relocated. Note the treed area above the pickup truck (TP24-05) contains large quantities of overburden/strippings (2024).



Western pit face, standing near TP24-08, facing north. The trees to the north are in an Old Growth Management Area and may not be cleared without prior Ministry approval (2024).



TP24-01



TP24-02 spoil



TP24-03



TP24-03 spoil



TP24-03



TP24-05



TP24-05 spoil



TP24-06



TP24-06 spoil



TP24-07 hole and spoil



TP24-08 spoil



TP24-09



TP24-17



TP24-17 spoil (1.3 metres and below)



TP24-17 spoil (top 1.3 metres)