

Technical Summary

November 2024

Pit Name: Happy's Gulch

Provincial Pit Number: 0573

Location: The pit is located adjacent to Highway 1 on the east side, approximately 20km south of Spences Bridge (Figure 1).

Legal Land Description: The pit is legally described as that part of Section 28, Tp 15, R 25, W6M, K.D.Y.D. The pit covered by a Section 16 Map Reserve in the name of the Ministry of Transportation and Infrastructure. The Map Reserve is 29.718 hectares in size. The geographical coordinates are Universal Transverse Mercator Grid Zone 10, 614679.38 Easting, 5572663.77 Northing. The layout of the Map Reserve boundary is shown in the legal plan (Figure 2).

Subsurface Investigation: Subsurface investigations have not been carried out at Happy's Gulch Pit. In January 1991 three (3) test pits were excavated in the stockpile of imported material from Thompson Siding Pit 1km to the south. Other quality testing dates back to 1969.

Based on the results of the 1991 investigation, a suitable granular area for mining has been defined (Figure 3). The detailed results of the subsurface stockpile testing are provided in the Material Gradation section and test pit locations are shown on the Pit Development Plan (Figure 3).

Material was imported into Happy's Gulch Pit and placed on the mining area in 2024. Results from these sieves are included in the 2024 Sieves section at the end of this report.

The March 1987 pit evaluation indicated that the pit contains a large volume of granular material. The predominant rock type is a granitic with occasional vesicular basalt and weathered volcanic tuff. Results from the degradation and sand equivalent tests indicate the aggregate has good durability and the fines are non-plastic.

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 for the imported stockpile samples tested in 1991.

Table 1: Pit Run Gradation

Test Pit	Depth (m)	Fines (%)* <0.075mm	Sand (%)* 0.075- 4.75mm	Gravel (%)* 4.75-75mm	USC
TP91-01	0 - 3.0	2.2	35.8	62.0	GW
TP91-02	0 - 3.5	2.5	36.5	61.0	GW
TP91-03	0 - 5.0	3.6	41.4	55.0	GP
Average	-	2.8	37.9	59.3	-

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

Table 2: Oversize Field Estimates

1991

Classification:	Average (%)	Range (%)
Boulders (>375mm)	0	0
Cobbles (150-375mm)	1	1
Cobbles (75-150mm)	4.3	3 - 5

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	Degradation (%)	Absorption		Specific Gravity		MgSO4 C/F	Micro Deval C/F
			Coarse	Fine	Coarse	Fine		
1969			0.91	1.13	2.715	2.640		
1971			0.71	1.03	2.701	2.632	5.48 / 10.58	
1974					2.686	2.594		
1977			0.79	1.21	2.696	2.632		
1983	53.6	72.8	1.49	1.87	2.683	2.621	5.10 / 13.10	
1987	89.2 / 93.9	85.9 / 84.4						
1995			0.96	1.36	2.730	2.653		
1999	68.3 / 66.7	85.1 / 66.7						4.7 / 8.9
2020			1.11	1.38	2.675	2.633		6.3 / 11.7

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
Magnesium Sulphate	<20% for coarse aggregate <25% for fine aggregate
Degradation	Minimum 35% for base and subbase Minimum 40% for graded aggregate seal

Material Suitability: Based on the historical quality results, the material in the proposed suitability area is judged to be suitable for the following purposes:

Table 4: Suitability

	Pit Run	Crush
Stockpile Suitability Area	Bridge End Fill SGSB	Base Course Products Graded Aggregate Seal Asphalt Mix Aggregates

Additional quality testing is recommended to determine suitability for other products.

Sulphate and Chloride Testing

No sulphate or chloride tests have been performed on the material at the pit.

Volume Estimates: Table 6 shows the volume estimates that can be expected 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

Imported Stockpile	Granular Material
Volume (m ³)	100,000

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 and Mines (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.
- When developing the high ridge in the northern portion of the reserve, a benching method should be used to maintain a manageable pit face height.
- The crusher is recommended to be located at the base of the slope near the access gate with development to the east. It should be noted that the processed aggregate stockpile space is limited within the working area of the pit.
- 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.
- Processed aggregate may be stockpiled where space permits as indicated on the Pit Development Plan.
- 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.

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Enclosures

Figures:

Figure 1 - Location Plan

Figure 2 - Legal Plan

Figure 3 - Development Plan

2024 Sieves

Photos

Figures

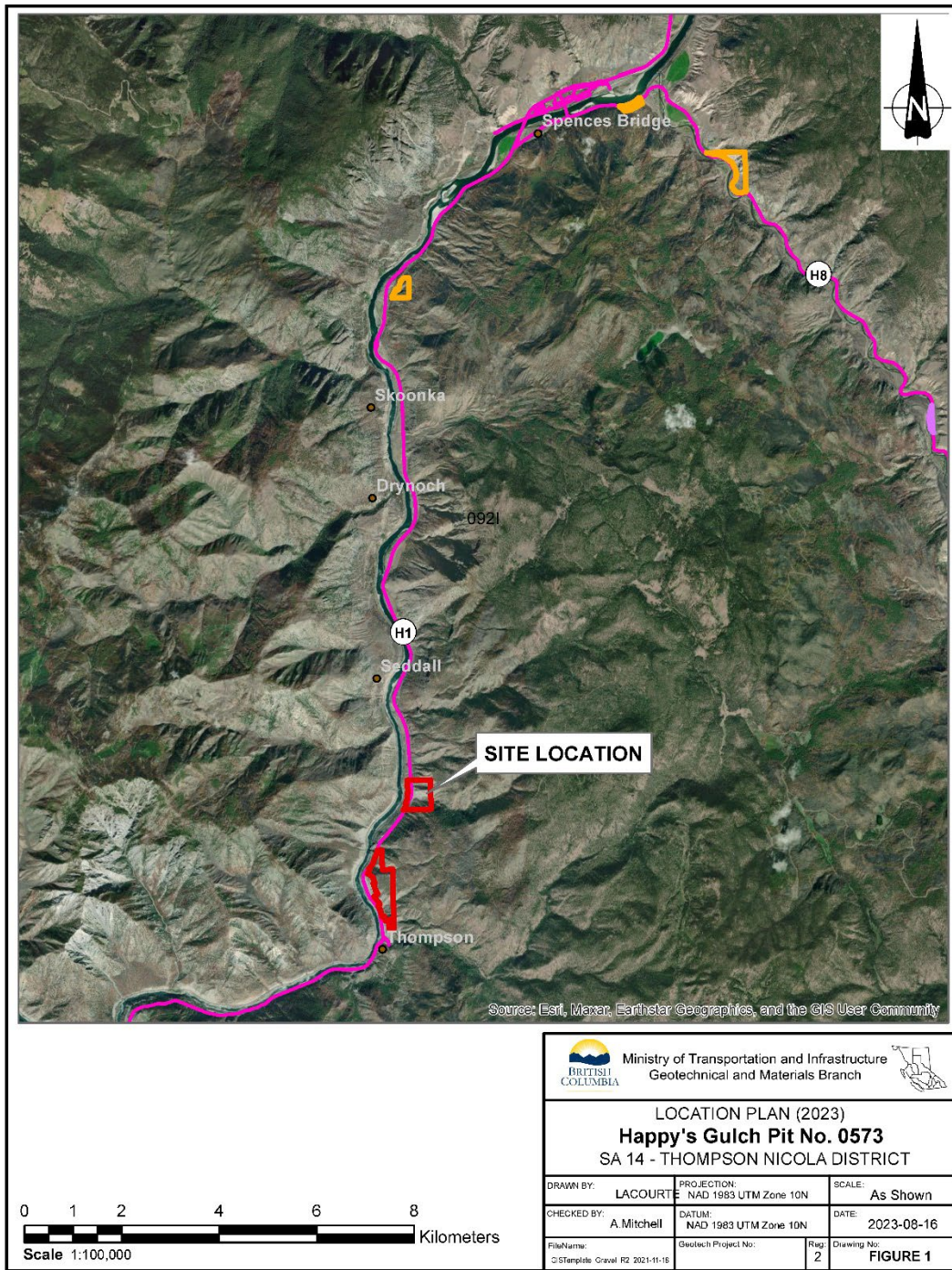


Figure 1 – Location Plan

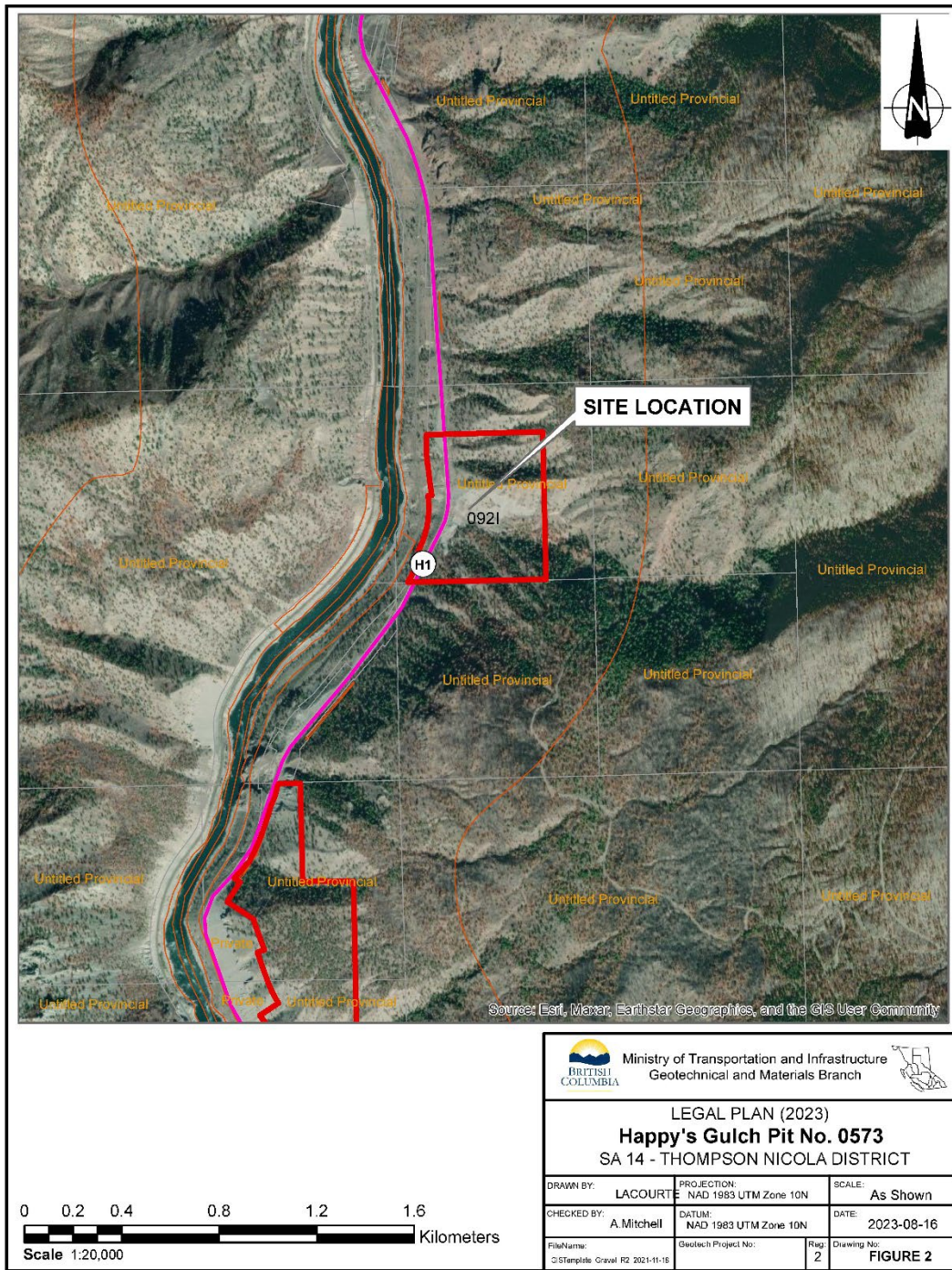
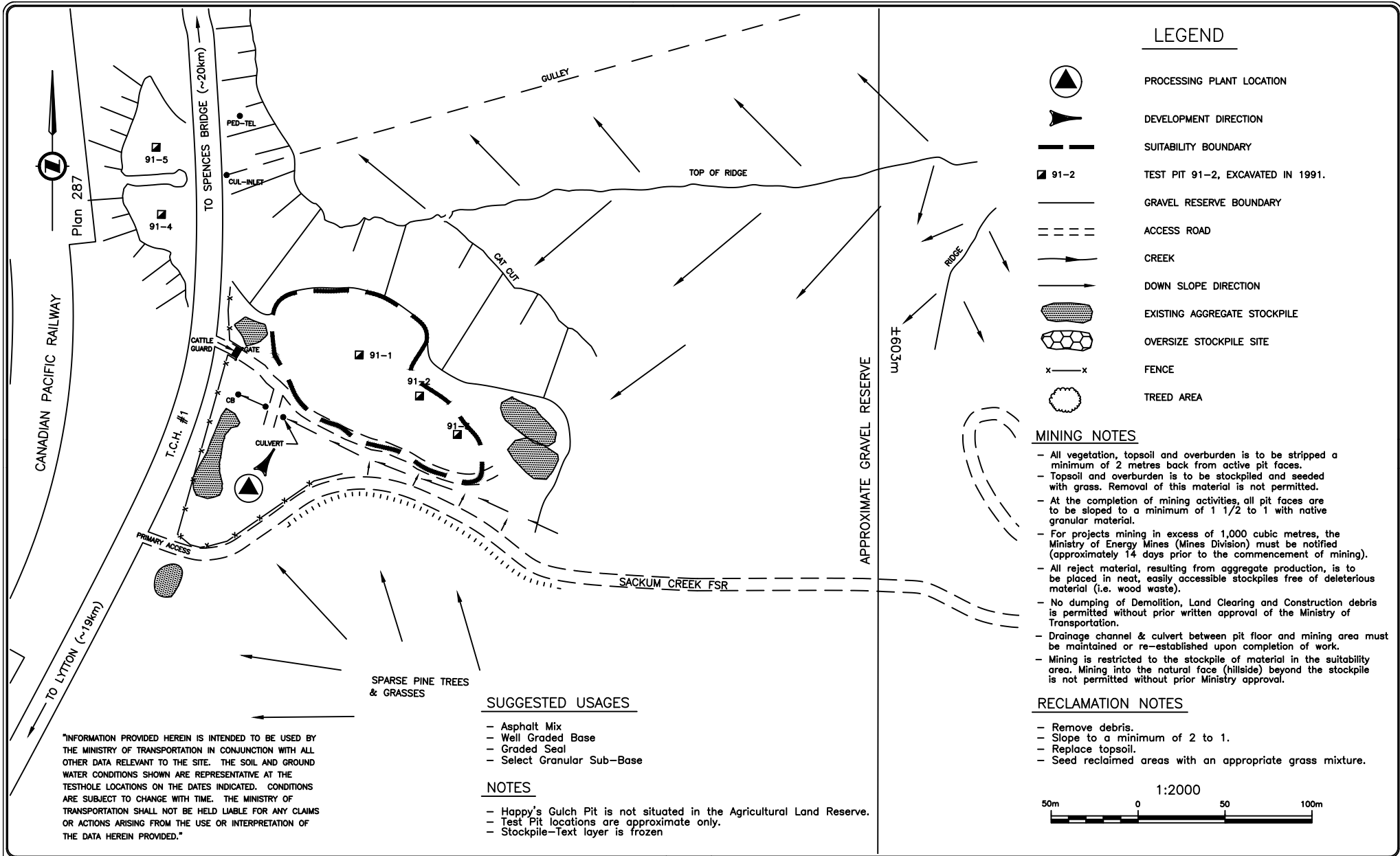


Figure 2 – Legal Plan



LEGEND

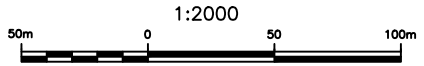
- PROCESSING PLANT LOCATION
- DEVELOPMENT DIRECTION
- SUITABILITY BOUNDARY
- TEST PIT 91-2, EXCAVATED IN 1991.
- GRAVEL RESERVE BOUNDARY
- ACCESS ROAD
- CREEK
- DOWN SLOPE DIRECTION
- EXISTING AGGREGATE STOCKPILE
- OVERSIZE STOCKPILE SITE
- FENCE
- TREED AREA

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.
- Drainage channel & culvert between pit floor and mining area must be maintained or re-established upon completion of work.
- Mining is restricted to the stockpile of material in the suitability area. Mining into the natural face (hillside) beyond the stockpile is not permitted without prior Ministry approval.

RECLAMATION NOTES

- Remove debris.
- Slope to a minimum of 2 to 1.
- Replace topsoil.
- Seed reclaimed areas with an appropriate grass mixture.



"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."

SUGGESTED USAGES

- Asphalt Mix
- Well Graded Base
- Graded Seal
- Select Granular Sub-Base

NOTES

- Happy's Gulch Pit is not situated in the Agricultural Land Reserve.
- Test Pit locations are approximate only.
- Stockpile-Text layer is frozen



REVISIONS			Initial
Date	Description		
Nov/95	Update Title Block, Layers, Mining Notes, etc.		
Oct/95	Update S/P Locations, Layers, Notes, etc.		
Nov/95	Update S/P Locations and banks		
Nov/01	Put into 25 MS - Minutes, Layers, GPS added		
Nov 2024	Updated S/P locations from drone survey		

REVIEWED BY:	DATE:
.....
APPROVED BY:	DATE:
.....

SCALE: 1:2000
DRAWN: BBC/RL
DATE: NOV/96
AutoCAD: F30573

HAPPY'S GULCH PIT #0573
PIT DEVELOPMENT PLAN
FILE NO. 50-14-0573

2024 Sieves

GRAIN SIZE DISTRIBUTION ASTM C136

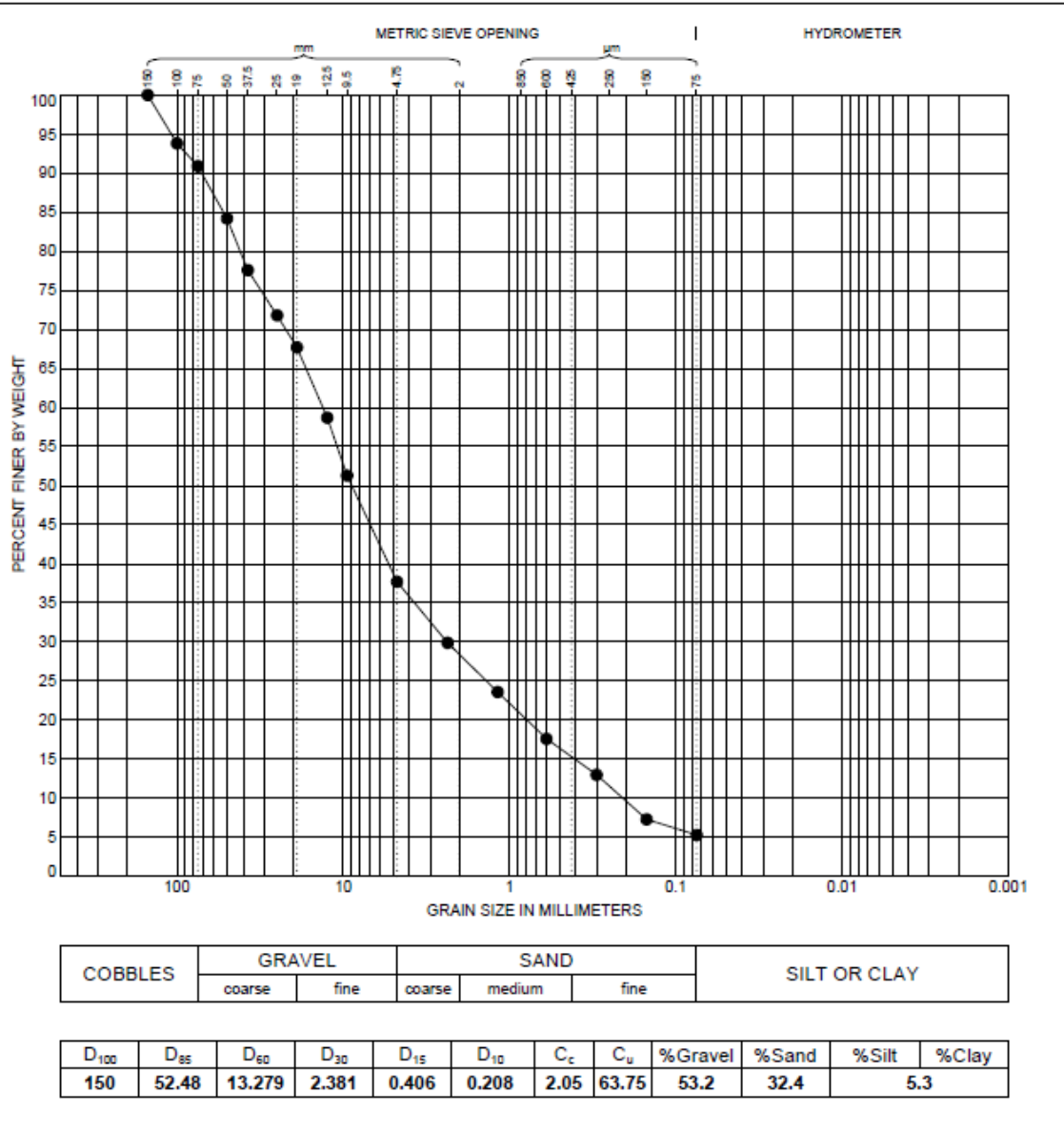
Project: Nicomen Bridge

Project No: 230715

Location: Hwy 1, 19 km south of Spences Bridge, BC

Client: Quattro Constructors

Sample Location/Source: Existing embankment material - in-situ north of bridge



Description: 150 mm(-) Sandy GRAVEL, trace cobbles, trace fines

Natural Moisture Content: 4.2 %

Material Specification: N/A

Intended Use: Embankment Fill, Site Common material

Comments: Cobbles = 9.1%.

Sample Number: K24-042

Date Tested: 2024-10-07

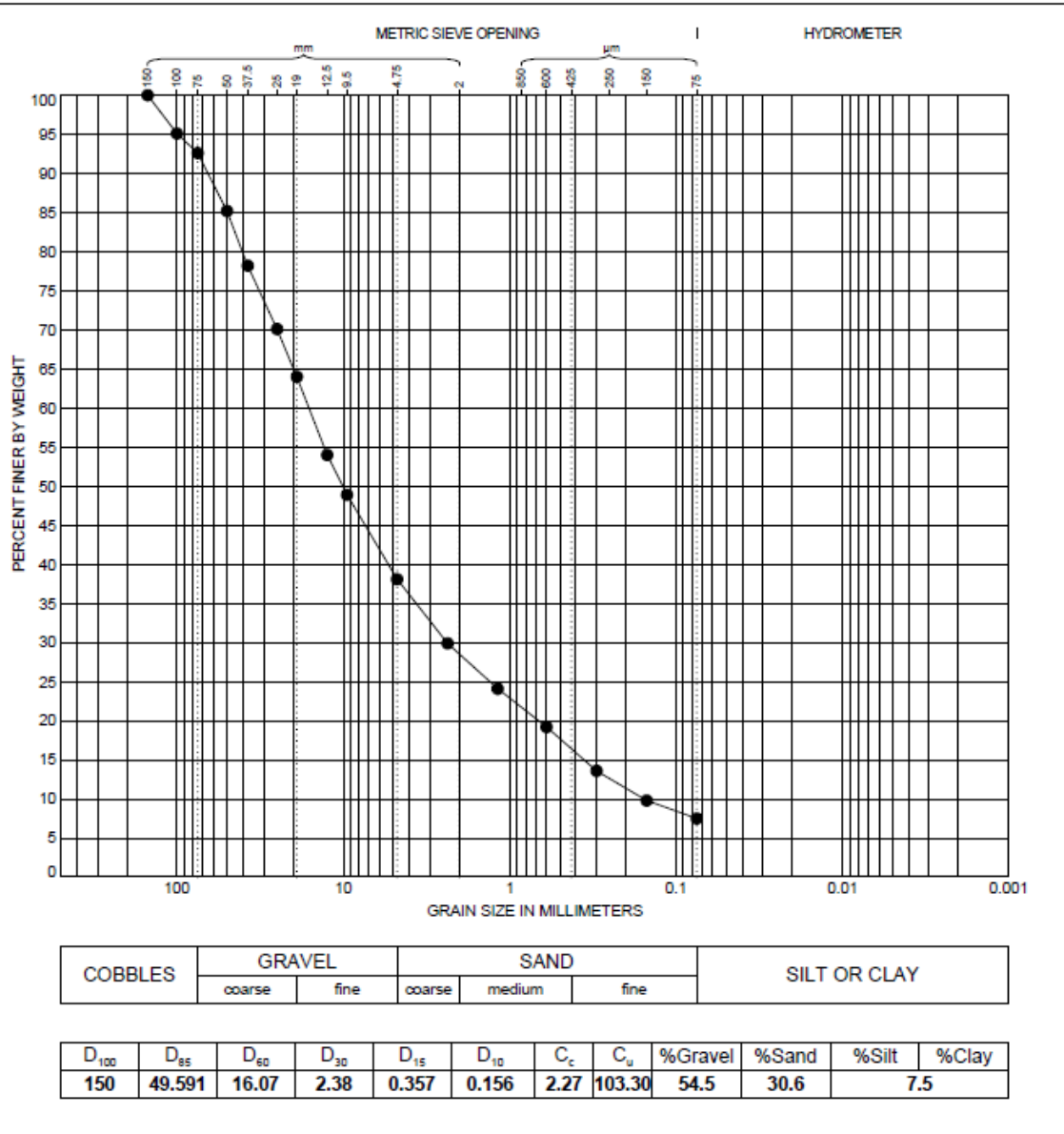
Tested By: GW

Checked By: NF

GRAIN SIZE DISTRIBUTION ASTM C136

Project: Nicomen Bridge
 Location: Hwy 1, Lytton, BC
 Source: Existing material from North MSE wall

Project No: 230715
 Client: Quattro Constructors



Description: 150mm(-) Sandy, GRAVEL, trace Fines
 Natural Moisture Content: 5.4 %
 Material Specification: N/A
 Intended Use: Structural backfill
 Comments: Actual +19mm rock content = 38%

Sample Number: 24-130
 Date Tested: 2024-03-19
 Tested By: SQ

Checked By:

GRAIN SIZE DISTRIBUTION ASTM C136

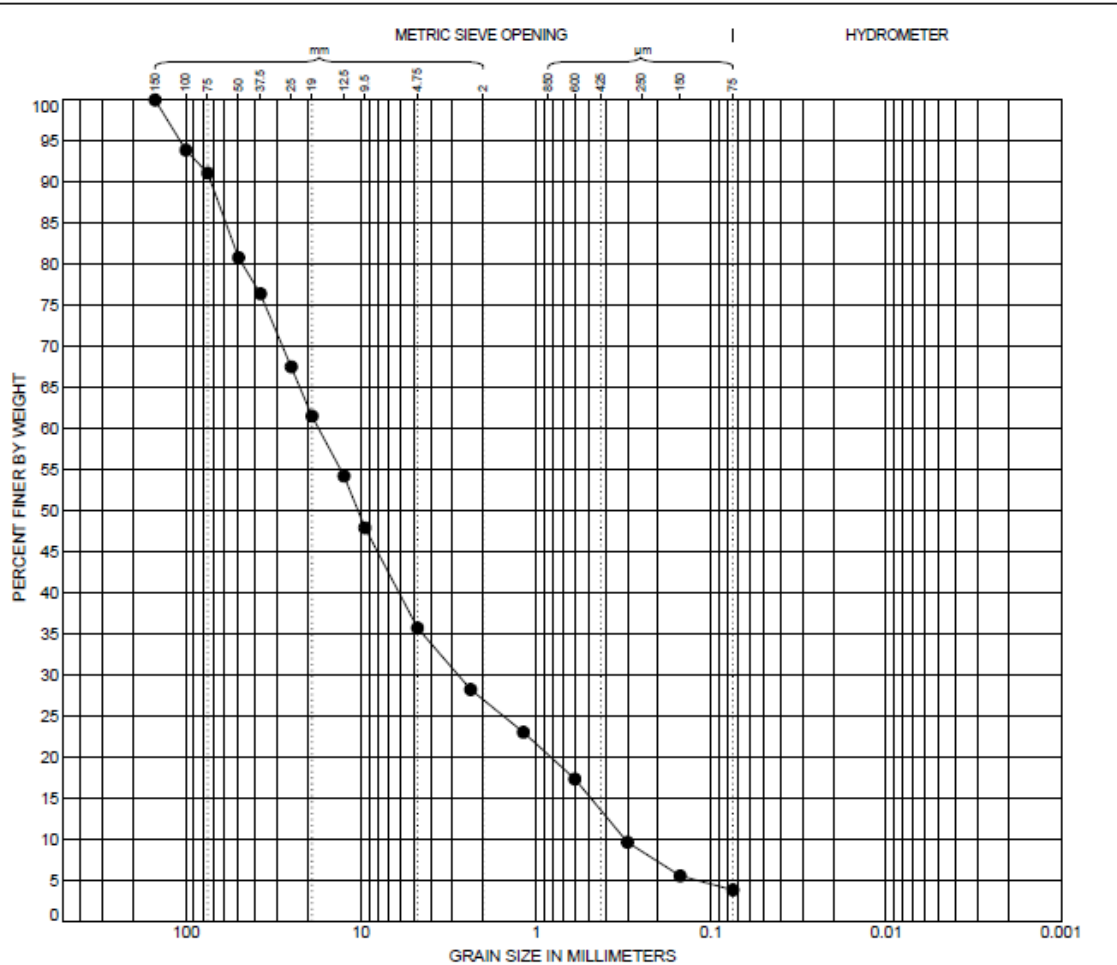
Project: Nicomen Bridge

Project No: 230715

Location: Hwy 1, BC

Client: Quattro Constructors

Sample Location/Source: Site Stockpile / Existing Material Excavated from North MSE Wall Location.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

D ₁₀₀	D ₈₅	D ₆₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u	%Gravel	%Sand	%Silt	%Clay
150	58.989	17.434	2.791	0.488	0.311	1.44	56.06	64.3	31.9		3.8

Description: 150 mm (-) GRAVEL, sandy, trace fines
 Natural Moisture Content: 2.8 %
 Material Specification: N/A
 Intended Use: Structural Fill
 Comments: N/A

Sample Number: 23-459
 Date Tested: 2023-09-22
 Tested By: SQ

Checked By:

GRAIN SIZE DISTRIBUTION ASTM C136

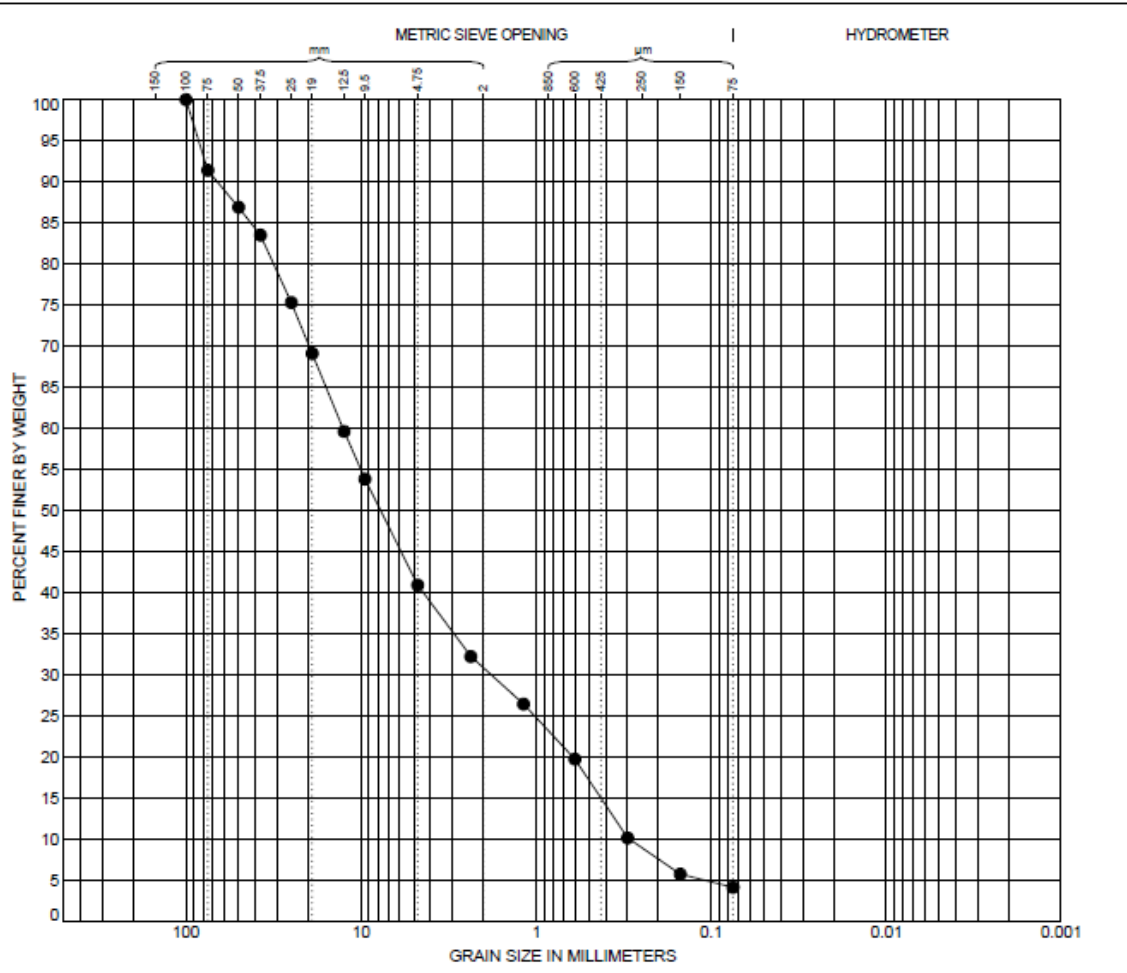
Project: Nicomen Bridge

Project No: 230715

Location: Hwy 1, BC

Client: Quattro Constructors

Sample Location/Source: Site Stockpile / Existing Material Excavated from South MSE Wall Location



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

D ₁₀₀	D ₈₅	D ₆₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u	%Gravel	%Sand	%Silt	%Clay
100	42.575	12.722	1.814	0.427	0.295	0.88	43.08	59.1	36.8		4.1

Description: 100 mm (-) GRAVEL and SAND, trace fines
 Natural Moisture Content: 1.8 %
 Material Specification: N/A
 Intended Use: Structural Fill
 Comments: N/A

Sample Number: 23-458
 Date Tested: 2023-09-22
 Tested By: SQ

Checked By:

Photos



View of mining area (November 2024).



View of mining area and lower bench/crusher setup area to the right (November 2024).



View east: steep ridge, bench on stockpiled material, and pit floor (June 2022).



View of lower bench/crusher setup area, and access (November 2024).