Technical Summary

January 2024

Pit Name: Lindstein Pit

Provincial Pit Number: 0847

Location: Lindstein Pit is located aproximately 4.0 km south of Silverton, B.C. on the west side of Highway No. 6, en route to Bannock Point.
Geographic location: 49°55'7.1" N, 117°23'0.1" E

UTM 11N: 472478m E, 5529651m N (Figure 1).

Legal Land Description: The site is currently a Section 16 Map Reserve (LF# 4400547) held by the British Columbia Ministry of Transportation and Infrastructure (BC MoTI). The area of interest (i.e. extension) is approximately 6.0 hectares of unsurveyed Crown land within that part of District Lot 8424 of the Kootenay District. The surrounding lands of DL 8424 and 8423 are vacant Crown. The existing pit falls under map reserve no. 934002 (Crown Lands File No. 4402157, approx. 11.6 ha), and the area of extension to the south of the existing pit falls under map reserve no. 864109.The legal description of the Map Reserve is "That part of District Lot 8424, Kootenay District, containing 11.6 hectares, more or less." (Figure 2).

Subsurface Investigation: Subsurface investigations at Lindstein Pit were carried out in 2011 by Sitkum Consulting Ltd.

In 2011 twenty-one (21) test pits were excavated to depths ranging from 4.5 to 6.6m. 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 twenty (20) of these samples 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 2011 investigations, one (1) granular area - Area A has been 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 5 samples tested from Area A. The remaining test pit data is available in the Test Pit Summaries section of this report.

Table 1: Pit Run Gradation

Test Pit	Depth (m)	Fines (%)* <0.075mm	Sand (%)* 0.075-4.75mm	Gravel (%)* 4.75-75mm	USC
Area A					
TP11-12	0.3-6.0	3	5	92	GW
TP11-14	0.4-6.6	3	15	82	GW
TP11-15	0.4-6.3	8	37	55	GM1
TP11-16	0.3-6.4	4	16	80	GW
TP11-17	0.4-5.9	5	25	70	GP-GM
Average – Area A		5	25	70	-

* Values are rounded to the nearest whole number so may not add exactly to 100%

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

Table 2: Oversize Field Estimates

Oversize (field estimates):

Classification:	Average (%)	Range (%)
Boulders (>375 mm)	0.4	0-1
Cobbles (150-375 mm)	4	0-7
Cobbles (75-150 mm)	17	10-25

The maximum size rock was 500 mm (in TP 11-16).

Aggregate Quality – Suitability Area: 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 (% loss)	Absorption		Relative Density	
			Coarse	Fine	Coarse	Fine
Area A						
TP11-14	77	22				
TP11-16	81	19				
(Area A)			1.7	2.07	2.584	2.584
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 2011 investigation results, the material in Areas A is judged to be suitable for the following purposes:

Table 4: Suitability

	Pit Run	Crush
Areas A	Winter Abrasives SGSB	25mm WGB Asphalt Mix Aggregates

The Micro-Deval average 20.5% loss from the combined test results just barely meets standard specifications for durability (20% loss is the maximum for Class 2 medium asphalt mix). The coarse and fine fraction had absorption percentages also just meet standard specifications for Coarse Aggregates (<1.0% and <1.5% respectively).

Sulphate and Chloride Testing

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

Table 5: Sulphate and Chloride Test Results

Test Pit	Water-Soluble Sulphate	Water-Soluble Chloride

Pit run	<0.050	<0.010

Volume Estimates: Table 6 shows the volume estimates that can be expected for gravel from Area A. Topsoil and overburden has previously been stripped. 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 Estimate

VOLUMES: Suitability Area A	
Minimum Evaluated Aggregate	24,750 m^3

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 (2012, 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.

- The water table was found in two test outside of Area A during the time of the investigations. Test pits 11-05 and 11-20 encountered the water table at 3.5 m and 4.0 m, respectively.

- Test pits in the existing pit floor to the north of Area A are estimated to have been mined out. The water table was not encountered in this area and these test pits bottomed out in gravel, suggesting the floor may be lowered during mining if required.

- Processed aggregate may be stockpiled to the north of the suitability area, or in the northeast portion of the pit, where space permits. Existing processed aggregate stockpiles may have to be moved from the pit floor if they are impeding development.

- Areas A has been logged, grubbed, and stripped of overburden. All development and stockpiling must avoid the established drainage ditches and settling ponds along the eastern portion of the map reserve.

- All trees, vegetation, and overburden are to be removed within 2m of the top of the pit faces. Overburden in the vicinity of TP11-18 may be relocated to other existing overburden stockpiles to access subsurface material. Topsoil, overburden, and aggregate cannot be removed within five meters of the reserve boundary.

- Development in Areas A should start from the existing pit faces and continue in the directions shown in the Development Plan (Figure 3).

- 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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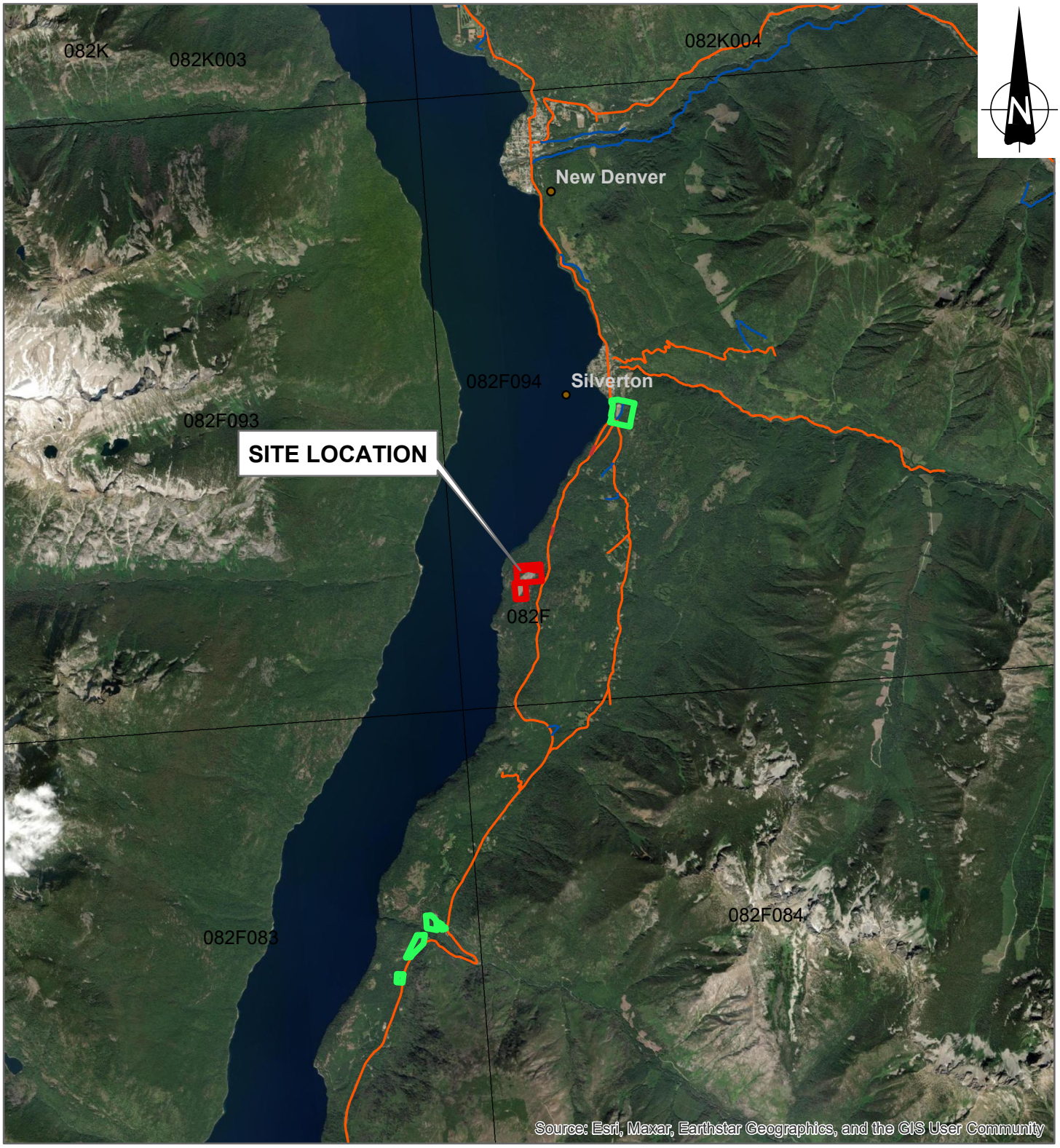
Enclosures

Figures:

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

Test Pit Summary, Wet Sieve Analysis Summary, Gradation Charts, Test Pit Logs
USC Legend
Photos

Figures



0 0.5 1 2 3 4 Kilometers

Scale 1:100,000

Ministry of Transportation and Infrastructure
Geotechnical and Materials Branch

LOCATION PLAN (2023)

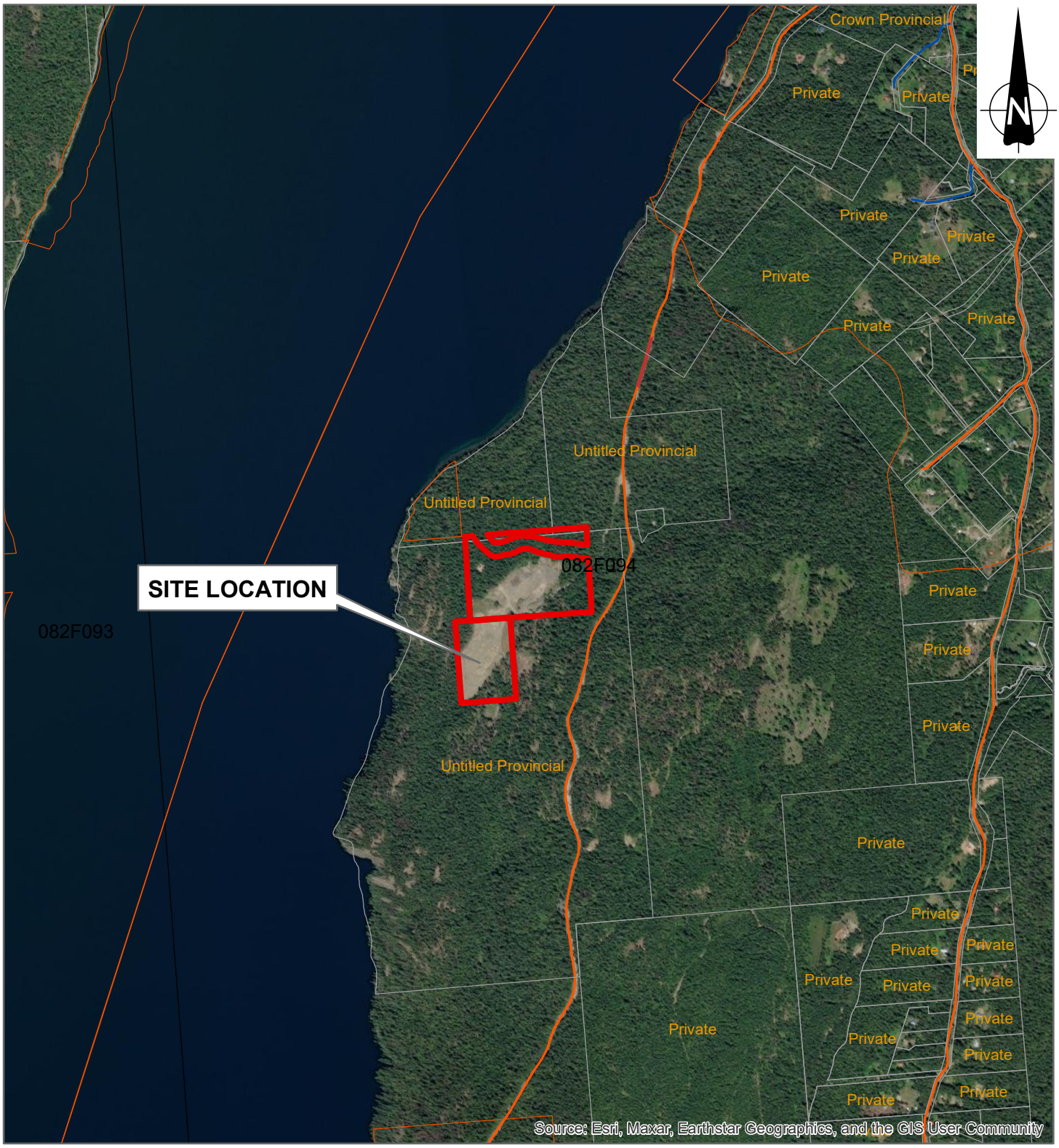
LINDSTEIN PIT NO. 0847

SA 10 - CENTRAL KOOTENAY DISTRICT

DRAWN BY: STELEE	PROJECTION: NAD 1983 UTM Zone 10N		SCALE: As Shown
CHECKED BY: A.Mitchell	DATUM: NAD 1983 UTM Zone 10N		DATE: 2024-01-17
FileName: GISTemplate_Gravel_Provincial_2023-03-16	Geotech Project No:	Reg: 1	Drawing No: **FIGURE 1**

Document Path: Q:\GEOTECHNICAL\S.RUIZ_DESIGN\Reference\Gravel\GISTemplate_Gravel_Provincial_2023-03-16.mxd

This drawing was originally produced in colour.



0 0.125 0.25 0.5 0.75 1

Kilometers

Scale 1:20,000

Ministry of Transportation and Infrastructure
Geotechnical and Materials Branch

LEGAL PLAN (2023)

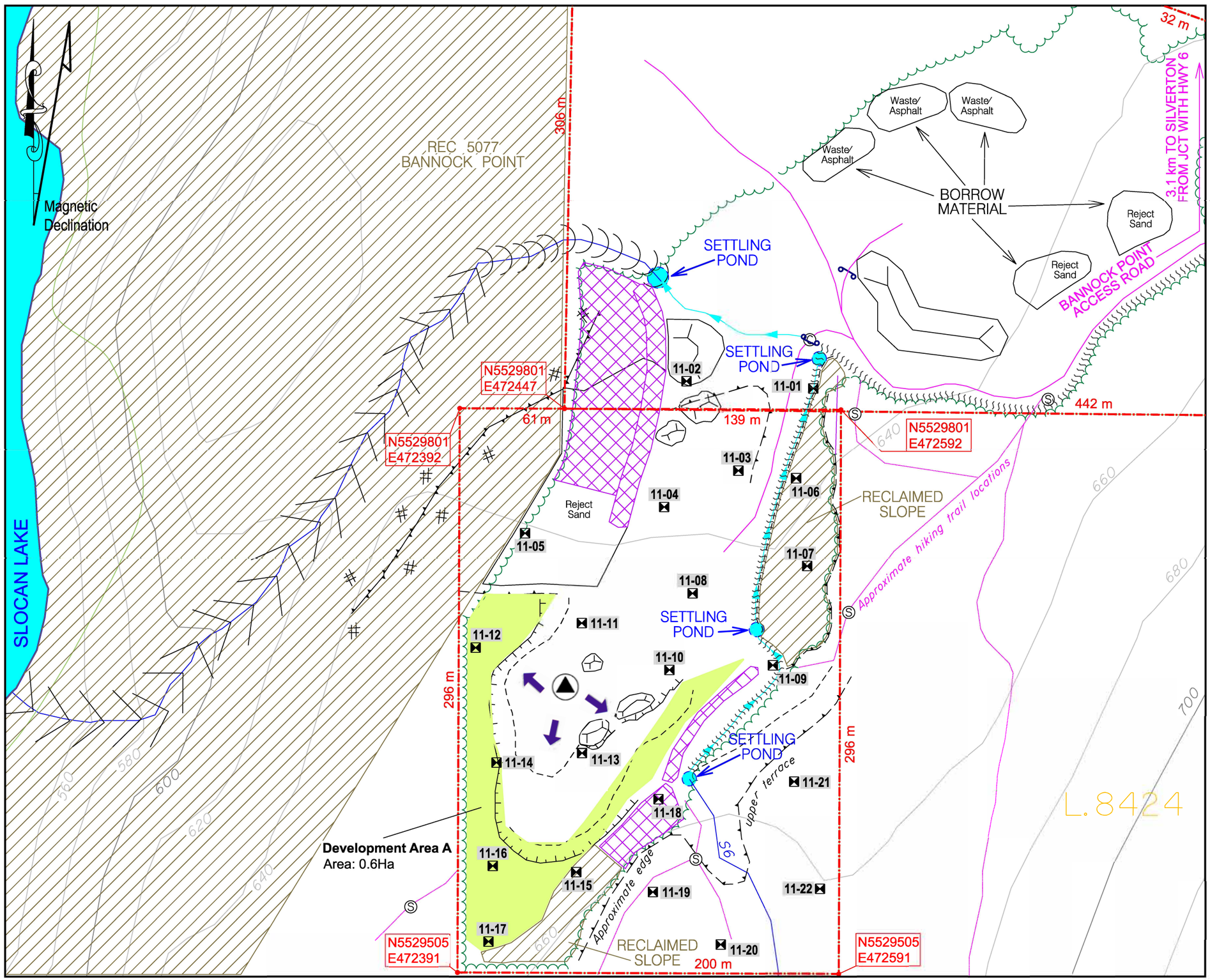
LINDSTEIN PIT NO. 0847

SA 10 - CENTRAL KOOTENAY DISTRICT

DRAWN BY: STELEE	PROJECTION: NAD 1983 UTM Zone 10N		SCALE: As Shown
CHECKED BY: A.Mitchell	DATUM: NAD 1983 UTM Zone 10N		DATE: 2024-01-17
FileName: GISTemplate_Gravel_Provincial_2023-03-16	Geotech Project No:	Reg: 2	Drawing No: **FIGURE 2**

Document Path: Q:\GEOTECHNICAL\S.RUIZ_DESIGN\Reference\Gravel\GISTemplate_Gravel_Provincial_2023-03-16.mxd

This drawing was originally produced in colour.



PIT DEVELOPMENT LEGEND

- NATURAL EMBANKMENT
- PIT FACE
- TEST PIT
- TEST HOLE
- TEST PIT (DEPLETED)
- ROAD
- CREEK
- NON-CLASSIFIED DRAINAGE
- TRAIL
- CADASTRE
- TANTALIS
- GRAVEL RESERVE BOUNDARY
- PROPOSED GRAVEL RESERVE BOUNDARY
- GRAVEL RESERVE TO BE DELETED
- OCCUPATIONAL LICENSE TO CUT AREA
- DEVELOPMENT AREA A
- PROPOSED CRUSHER SETUP
- TREELINE
- CONTOURS
- BUILDING (symbolic)
- IRON PIN
- SWAMP
- STOCKPILE
- NO DISTURBANCE
- DEVELOPMENT DIRECTION
- POTENTIAL DEVELOPMENT
- OVERBURDEN STOCKPILE
- CRUSHER LOCATION
- GATE
- SIGN
- FENCE
- CULVERT
- SETTLING POND
- TRANSMISSION LINE
- PIPE LINE
- RAILWAY LINE

DRAWING NOTES:

1. Base data provided from TRIM, (20m Contours).
2. Cadastre and Tantalis Lines were provided from online sources.
3. Some testpits and/or testholes may not be representative of current conditions due to development and excavation done after testing.
4. Some extraction may have occurred since the last GPS survey of the pit was undertaken, therefore pit faces and stockpiles may not be representative of current conditions.

PIT DEVELOPMENT NOTES:

1. Pit development must be carried out in accordance with the Health, Safety, and Reclamation Code for Mines in BC, the current Standard Specifications for Highway Construction, and the Aggregate Operations Best Management Practices Handbook for BC.
2. Development Area A has been logged, cleared, grubbed and stripped.
3. Development of Area A should commence from the existing pit face and directed towards the east, south, and west.
4. The contractor must ensure that all materials passing through 375mm x 450mm slotted openings shall be used in the production of the crushed aggregates.
5. Pit excavations must not take place to within a minimum distance of 2m from the edge of clearing & stripped areas.
6. When the contractor discontinues operations in the pit, all working pit faces and stockpiles must be trimmed to 1.5H to 1V slope. Working pit faces must be reshaped with native granular materials. All other permanent slopes must be re-sloped to no steeper than 2H:1V.
7. No dumping of debris or petroleum products is permitted. The pit must be left in a clean and safe condition.
8. Processed aggregate may be stockpiled to the north of the proposed crusher setup area where space permits.
9. Concrete roadside barrier is placed in the pit, separating the north and south portions of the pit. The plant and crusher must stay behind the barrier and safe passage for the public must be maintained.

0m 20 40 60 80

1:2000

Ministry of Transportation and Infrastructure
Southern Interior Region
Geotechnical and Materials Branch

BRITISH COLUMBIA

PIT DEVELOPMENT PLAN
LINDSTEIN EXTENSION PIT #0847
SA 10 - CENTRAL KOOTENAY

DRAWN BY: K.Anderson	PROJECTION: UTM Zone 11	SCALE: AS SHOWN
CHECKED BY: J.Sabean	DATUM: NAD83	DATE: 12 December 2023
FILE NAME: Lindstein_0847_PDP_2023-12-13.dgn	REG. 1	DRAWING NUMBER: FIGURE 3

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This drawing was originally produced in colour.

Test Pit Summaries, Wet Sieve Analysis Summary, Gradation Charts

AGGREGATE LOG

PROJECT:	Lindstein Pit	**SAMPLED BY:**	Rory MacLeod
PIT #:	0849	**METHOD:**	Excavator
DISTRICT:	**West Kootenay**	**DATE:**	July 26 to 29, 2011

TH / TP	DEPTH		SAMPLE	SOILS CLASS	ESTIMATED GRADATION			ESTIMATED ROCK 75mm				SAND TYPE			REMARKS
	FROM	TO	BAG No.		G	S	F	MAX SIZE	75mm 150mm	150mm 375mm	375mm	F	M	C	
Lin 11-01	0.0	0.3	-	TS	-	-	-	-	-	-	-	-			Photos: 3711, 3712
	0.3	6.5	Lin 11-01A	GP	55	40	50	200	7	1	-			C	On old trail in timber;
															Some fine roots at 2.5m
Lin 11-02	0.0	0.3	-	TS	-	-	-	-	-	-	-	-			Photos: 3713,3714
	0.3	6.5	Lin 11-02A	GP	60	35	5	150	5	1	-			C	0.3m sand seam at 1.5m
															Poorly sorted sands and gravels
Lin 11-03	0.0	0.3	-	TS	-	-	-	-	-	-	-	-			Photos: 3715, 3716
	0.3	1.0	No Sample	SW	-	95	5	-	-	-	-		M		Sand layer on top
	1.0	2.5	Lin 11-03A	GP	50	45	5	75	2	-	-			C	Alternating thin beds of S&G
	2.5	3.5	No Sample	SW	-	95	5	-	-	-	-		M		Thick well graded sand beds
	3.5	4.3	No Sample	GP	50	45	5	50	-	-	-			C	Fine sandy gravels
	4.3	5.3	No Sample	SW	-	95	5	-	-	-	-		M		sand bed
	5.3	6.0	No Sample	GP	55	40	5	50	-	-	-			C	Fine sandy gravels
Lin 11-04	0.0	0.3	-	TS	-	-	-	-	-	-	-	-			Photos: 3717,3718
	0.3	2.5	Lin 11-04A	GP	60	35	5	150	7	-	-			C	Thick poorly graded gravels
	2.5	3.3	No Sample	SW	95	5	-	-	-	-	-	F			Thin sand seam
	3.3	6.0	Lin 11-04B	GP	55	40	5	75	-	-	-			C	Finer gravels; poorly graded
Lin 11-05	0.0	0.3	-	TS	-	-	-	-	-	-	-	-			Photos: 3721, 3722
	0.3	5.0	Lin 11-05A	SW	-	95	5	-	-	-	-		M		Blending sand
															Water table at 3.5m
Lin 11-06	0.0	0.3	-	TS	-	-	-	-	-	-	-	-			Photos: 3723, 3724
	0.3	5.0	Lin 11-06A	GP	70	25	5	200	20	3	-			C	Poorly graded gravels
															sloughing
Lin 11-07	0.0	0.3	-	TS	-	-	-	-	-	-	-	-			Photos: 3725, 3726
	0.3	5.0	Lin 11-07A	GP	88	7	5	400	15	7	1			C	Coarse, poorly graded, clean gravels
															no bedding; too much sloughing
Lin 11-08	0.0	0.3	-	TS	-	-	-	-	-	-	-	-			Photos: 3727, 3728
	0.3	5.0	Lin 11-08A	GP	75	20	5	425	17	2	2			C	on terrace; poorly sorted S&G
															no bedding; some fine roots at 1.5m
															root layer at 2.0m
															too much sloughing
Lin 11-09	0.0	0.3	-	TS	-	-	-	-	-	-	-	-			Photos: 3729, 3730
	0.3	5.0	Lin 11-09A	GP	81	15	4	325	15	1	-			C	on terrace; poorly graded G&S
															no bedding
															some fine roots at 2.5m
															0.25m sand seam at 3.0m
															too much sloughing

AGGREGATE LOG

PROJECT:	Lindstein Pit	**SAMPLED BY:**	Rory MacLeod
PIT #:	0849	**METHOD:**	Excavator
DISTRICT:	**West Kootenay**	**DATE:**	July 26 to 29, 2011

TH / TP	DEPTH		SAMPLE	SOILS CLASS	ESTIMATED GRADATION			ESTIMATED ROCK 75mm				SAND TYPE			REMARKS
	FROM	TO	BAG No.		G	S	F	MAX SIZE	75mm 150mm	150mm 375mm	375mm	F	M	C	
Lin 11-10	0.0	0.3	-	TS	-	-	-	-	-	-	-		-		Photos: 3731,3732
	0.3	5.0	Lin 11-10A	GP	87	10	3	425	15	7	1			C	middle of terrace
															very clean G&S; no bedding
															too much sloughing
Lin 11-11	0.0	0.3	-	TS	-	-	-	-	-	-	-		-		Photos: 3734,3735
	0.3	5.0	Lin 11-11A	GP	87	8	5	350	20	3	-			C	on terrace; no bedding
															poorly sorted G&S; some blocks
															too much sloughing
Lin 11-12	0.0	0.3	-	TS	-	-	-	-	-	-	-		-		Photos: 3736, 3737
	0.3	5.0	Lin 11-12A	GP	92	5	3	350	25	3	-			C	on terrace; very clean G&S
															sloughing
Lin 11-13	0.0	0.4	-	TS	-	-	-	-	-	-	-		-		Photos: 3738, 3739
	0.4	5.5	Lin 11-13A	GP	55	40	5	325	7	1	-			C	on old trail
															poorly sorted S&G; no bedding
Lin 11-14	0.0	0.4	-	TS	-	-	-	-	-	-	-		-		Photos: 3740, 3741
	0.4	5.0	Lin 11-14A	GP	82	15	3	375	25	7	1			C	very clean G&S; no bedding
															too much sloughing
Lin 11-15	0.0	0.4	-	TS	-	-	-	-	-	-	-		-		Photos: 3742, 3743
	0.4	6.0	Lin 11-15A	GP/GM1	55	37	8	200	10	-	-		M		Base of upper terrace
															no bedding
Lin 11-16	0.0	0.3	-	TS	-	-	-	-	-	-	-		-		Photos: 3744, 3745
	0.3	5.5	Lin 11-16A	GP	80	16	4	500	15	5	1			C	on terrace; clean G&S
															Poorly sorted; no bedding
Lin 11-17	0.0	0.4	-	TS	-	-	-	-	-	-	-		-		Photos: 3746, 3747
	0.4	5.5	Lin 11-17a	GP	70	25	5	250	10	2	-			C	no bedding; poorly sorted G&S
															sloughing
Lin 11-18	0.0	0.4	-	TS	-	-	-	-	-	-	-		-		Photos: 3748, 3749
	0.4	6.0	Lin 11-18A	GP	35	29	6	450	8	3	1			C	GPS 801; base of upper terrace
															no bedding; poorly sorted G&S
															some fine roots at 1.5m
Lin 11-19	0.0	0.3	-	TS	-	-	-	-	-	-	-		-		Photos: 3750, 3751
	0.3	5.5	Lin 11-19A	GM1	50	38	12	450	7	3	1		M		GPS 802; on edge of upper terrace
															poorly sorted silty G&S
															bo bedding;
															compacted material very difficult digging

AGGREGATE LOG

PROJECT:	Lindstein Pit		**SAMPLED BY:**	Rory MacLeod	
PIT #:	0849		**METHOD:**	Excavator	
DISTRICT:	**West Kootenay**		**DATE:**	July 26 to 29, 2011	

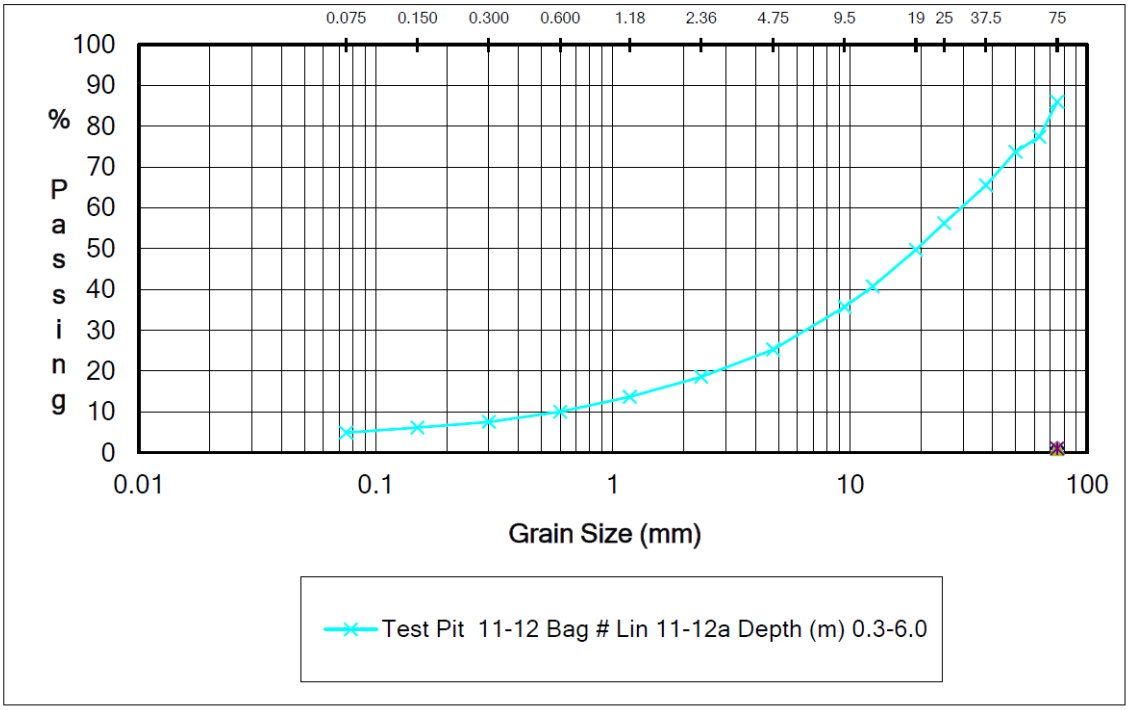
TH / TP	DEPTH		SAMPLE	SOILS CLASS	ESTIMATED GRADATION			ESTIMATED ROCK 75mm				SAND TYPE	REMARKS
	FROM	TO	BAG No.		G	S	F	MAX SIZE	75mm 150mm	150mm 375mm	375mm	F M C	
Lin 11-20	0.0	0.3	-	TS	-	-	-	-	-	-	-	-	Photos: 3752, 3753
	0.3	4.5	Lin 11-20A	GM1	45	40	15	200	5	1	_	F-M	close to S6 stream on trail on upper terrace
													GPS 803
													dirty, silty S&G
													compacted material - very difficult digging
													seepage at 2.5m and water at 4.0m
Lin 11-21	0.0	0.4	-	TS	-	-	-	-	-	-	-	-	Photos: 3754, 3755
	0.4	4.5	Lin 11-21A	GM1	40	45	15	200	3	1	-	F-M	seepage at 1.5m; on upper terrace
													silty S&G; no bedding
													compacted material - difficult digging
Lin 11-22	0.0	0.4	-	TS	-	-	-	-	-	-	-	-	Photos: 3756, 3757
	0.4	3.5	Lin 11-22A	GM1	40	47	13	400	2	1	1	F-M	compacted material
	3.5	4.5	No Sample	ML	-	-	-	-	-	-	-	F	silty S&G; seepage at 1.0m
													standing water in timeber adjacent to TP
													clay at 3.5m
													on upper terrace

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

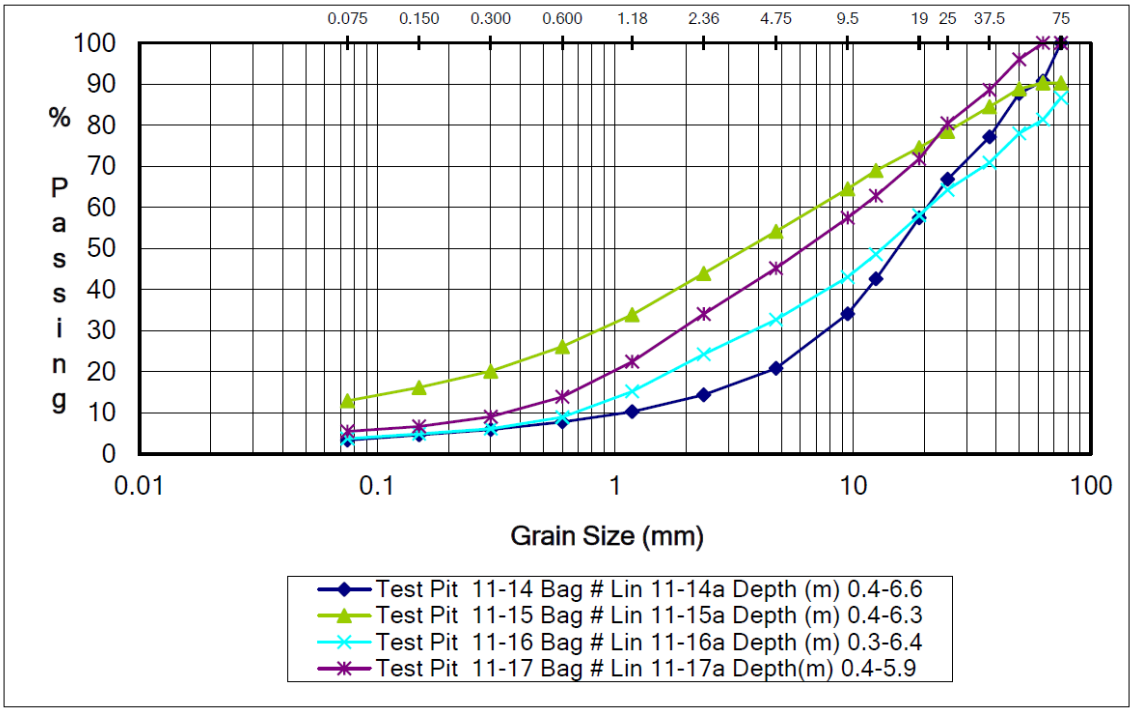
Project:	L:indstein Pit Investigation	Project No.:	SCL 11 - 821
Sample Source:	Lindstein Pit	Client:	
Material:	PIT RUN	Date:	WM

Sample Information			Percent Retained Pit Run Sieve Sizes (mm)															
Test Pit	Depth (m)	Bag #	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	PAN
11-01	Lin 11-01a	0.3-6.5	0.0	0.0	8.0	3.7	4.4	6.2	8.1	5.3	9.4	6.4	7.9	11.0	11.9	7.5	3.8	6.5
11-02	Lin 11-02a	0.3-6.5	0.0	0.0	2.8	5.9	8.4	5.5	7.6	4.9	9.3	6.9	7.5	11.0	15.0	6.8	3.2	5.2
11-03	Lin 11-03a	1.0-6.0	0.0	11.0	1.8	3.4	7.1	3.0	4.5	2.6	4.6	3.1	4.8	7.8	20.4	13.5	5.4	7.1
11-04	lin 11-04a	0.3-2.5	0.0	4.0	3.8	10.9	9.8	8.3	8.3	4.4	9.1	6.4	7.9	7.9	7.1	5.0	2.5	4.5
11-04	Lin 11-04b	3.3-6.0	0.0	0.0	4.0	4.0	8.6	5.2	5.5	4.0	8.6	6.5	7.9	12.1	15.6	8.6	4.1	5.3
11-05	Lin 11-05a	0.3-5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	1.3	8.0	42.4	32.4	15.3
11-06	Lin 11-06a	0.3-5.0	7.4	6.7	5.3	8.5	5.1	6.6	7.9	5.3	9.2	7.2	6.5	6.9	5.8	6.5	1.8	3.5
11-07	Lin 11-07a	0.3-5.0	5.3	2.7	10.1	6.3	7.5	5.7	8.4	6.8	16.5	12.3	7.6	3.3	2.1	1.2	1.0	3.4
11-08	Lin 11-08a	0.3-5.0	4.2	13.9	3.2	6.9	7.3	3.9	4.2	3.3	7.6	5.8	8.5	15.0	8.3	2.0	1.3	4.5
11-09	Lin 11-09a	0.3-5.0	0.0	6.8	2.8	13.0	8.2	5.0	7.7	3.7	7.6	6.8	9.2	10.9	10.1	3.6	1.3	3.2
11-10	Lin 11-10a	0.3-5.0	4.0	6.7	1.1	9.4	9.4	10.4	13.6	7.1	10.8	6.5	5.6	3.6	2.7	1.8	1.5	5.9
11-11	Lin 11-11a	0.3-6.5	0.0	2.5	7.3	8.5	12.9	11.3	12.2	7.2	12.4	7.7	4.7	2.9	2.2	1.5	1.5	5.3
11-12	lin 11-12a	0.3-6.0	14.0	8.6	3.7	8.2	9.3	6.5	9.0	5.0	10.5	6.7	4.9	3.7	2.5	1.4	1.3	4.9
11-13	Lin 11-13a	0.4-5.9	0.0	0.0	1.7	6.3	8.2	4.7	8.2	4.5	11.2	12.5	15.7	9.4	4.7	2.8	2.5	7.3
11-14	Lin 11-14a	0.4-6.6	0.0	9.3	3.0	10.6	10.3	9.4	14.8	8.5	13.2	6.4	4.1	2.5	1.9	1.3	1.3	3.4
11-15	Lin 11-15a	0.4-6.3	9.7	0.0	1.4	4.4	6.0	3.9	5.6	4.5	10.4	10.2	10.0	7.8	6.0	4.0	3.2	12.9
11-16	Lin 11-16a	0.3-6.4	13.3	5.3	3.4	7.1	6.6	6.2	9.5	5.6	10.4	8.4	9.0	6.3	2.8	1.3	1.2	3.8
11-17	lin 11-17a	0.4-5.9	0.0	0.0	4.0	7.4	8.1	8.6	9.0	5.4	12.3	11.1	11.6	8.5	4.8	2.4	1.2	5.5
11-18	Lin 11-18a	0.4-6.0	6.7	4.1	5.7	3.0	10.5	7.5	8.5	5.1	9.6	6.6	7.4	6.7	5.8	3.3	2.3	7.1
11-19	Lin 11-19a	0.3-5.5	6.5	0.0	1.5	1.7	7.0	5.2	6.1	3.3	6.0	5.4	5.7	5.6	7.0	6.9	6.5	25.7
11-21	Lin 11-21a	0.4-4.5	0.0	0.0	1.9	4.4	4.9	5.3	5.5	2.6	5.8	5.5	5.9	6.0	7.4	7.7	7.3	29.8

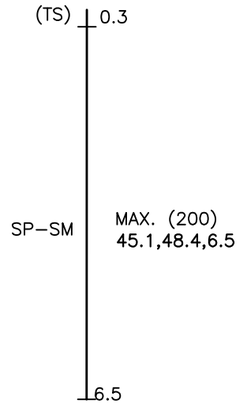
Test Pit 11-12



Test Pits 11-14, -15, -16, -17



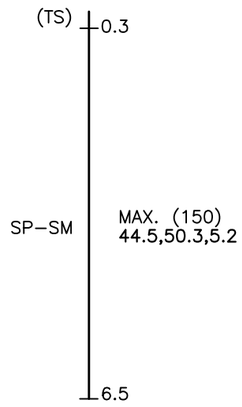
11–01



BAG NS
DEPTH 0.0–0.3

BAG Lin 11–01a
DEPTH 0.3–6.5

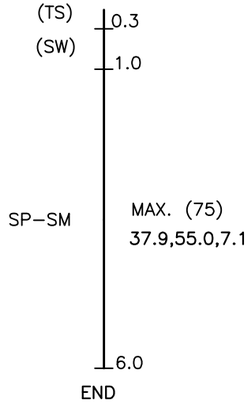
11–02



BAG NS
DEPTH 0.0–0.3

BAG Lin 11–02a
DEPTH 0.3–6.5

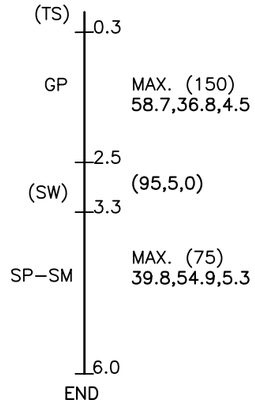
11–03



BAG NS
DEPTH 0.0–1.0

BAG Lin 11–03a
DEPTH 1.0–6.0

11–04

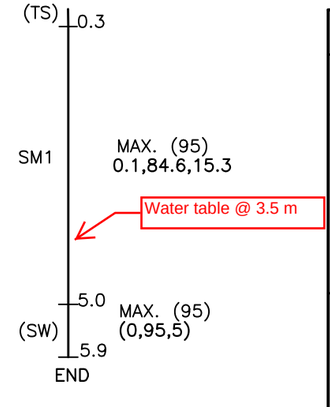


BAG NS
DEPTH 0.0–0.3/2.5–3.3

BAG Lin 11–04a
DEPTH 0.3–2.5

BAG Lin 11–04b
DEPTH 3.3–6.0

11–05



BAG NS
DEPTH 0.0–0.3/5.0–5.9

BAG Lin 11–05a
DEPTH 0.3–5.0

SOIL 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 WI <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 WI >50	MH	INORGANIC SILTS, MICACEOUS OR DIATOM–ACEOUS 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
BOULDERS		LB	BOULDERS, PARTICLE SIZE OVER 300mm

FOR SOILS HAVING 5 – 12% PASSING .075 SIEVE, USE DUAL SYMBOL

*GM1; GC1; SM1; SC1;	12 – 20%
GM2; GC2; SM2; SC2;	20 – 30%
GM3; GC3; SM3; SC3;	30 – 40%
GM4; GC4; SM4; SC4;	40 – 50%

} PASSING .075mm SIEVE

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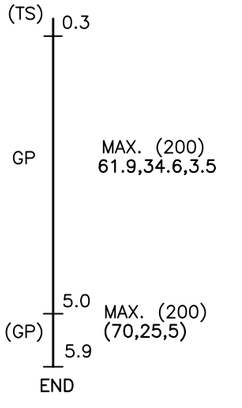
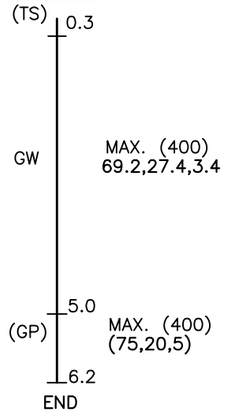
11–06



BAG NS
DEPTH 0.0–0.3/5.0–5.9

BAG Lin 11–06a
DEPTH 0.3–5.0

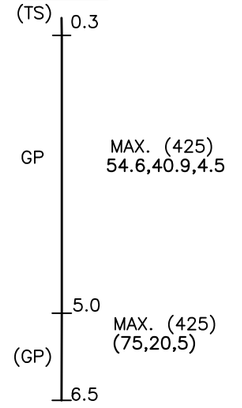
11–07



BAG NS
DEPTH 0.0–0.3/5.0–6.2

BAG Lin 11–07a
DEPTH 0.3–5.0

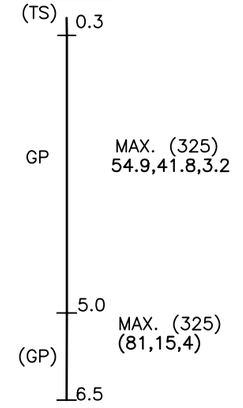
11–08



BAG NS
DEPTH 0.0–0.3/5.0–6.5

BAG Lin 11–08a
DEPTH 0.3–5.0

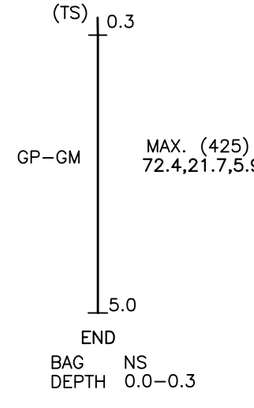
11–09



BAG NS
DEPTH 0.0–0.3/5.0–6.5

BAG Lin 11–09a
DEPTH 0.3–5.0

11–10



BAG NS
DEPTH 0.0–0.3

BAG Lin 11–10a
DEPTH 0.3–5.0

REVISED: OCT.16, 2012, JW

KEY

LABORATORY SIEVE ANALYSIS :

40,58,2
G S F

FIELD GRADATION ESTIMATE :

(40,58,2)
G S F

MAX. .200 = MAX. ROCK SIZE IN mm.
DEPTH IS IN METERS

GOVERNMENT OF BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION & HIGHWAYS
GEOTECHNICAL & MATERIALS ENGINEERING

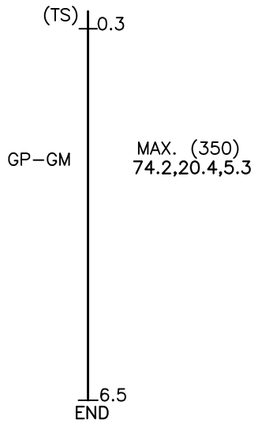
TEST PIT LOGS

LINDSTEIN PIT

WEST KOOTENAY SHEET 1

DRAWN JW	DATE JULY 2011	SCALE 1:100	
FILE NO. 11–821		ACAD NO. 11–821–Testpits	

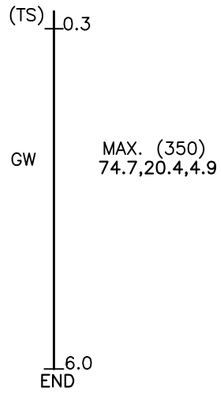
11–11



BAG NS
DEPTH 0.0–0.3

BAG Lin 11–11a
DEPTH 0.3–6.5

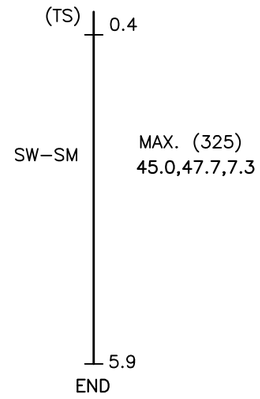
11–12



BAG NS
DEPTH 0.0–0.3

BAG Lin 11–12a
DEPTH 0.3–6.0

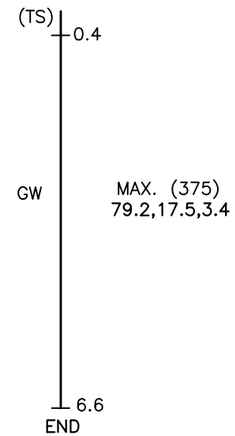
11–13



BAG NS
DEPTH 0.0–0.4

BAG 11–13a
DEPTH 0.4–5.9

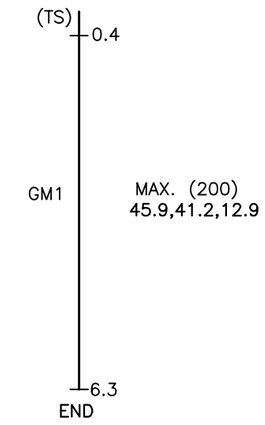
11–14



BAG NS
DEPTH 0.0–0.4

BAG 11–14a
DEPTH 0.4–6.6

11–15



BAG NS
DEPTH 0.0–0.4

BAG 11–15a
DEPTH 0.4–6.3

SOIL 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 WI <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 WI >50	MH	INORGANIC SILTS, MICACEOUS OR DIATOM–ACEOUS 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
BOULDERS		LB	BOULDERS, PARTICLE SIZE OVER 300mm

FOR SOILS HAVING 5 – 12% PASSING .075 SIEVE, USE DUAL SYMBOL
*GM1; GC1; SM1; SC1; 12 – 20%
GM2; GC2; SM2; SC2; 20 – 30%
GM3; GC3; SM3; SC3; 30 – 40%
GM4; GC4; SM4; SC4; 40 – 50%
} PASSING .075mm SIEVE

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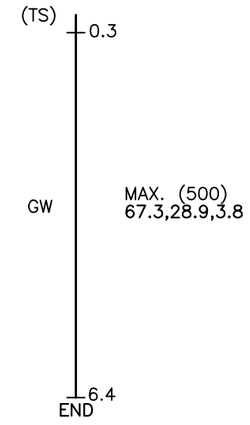
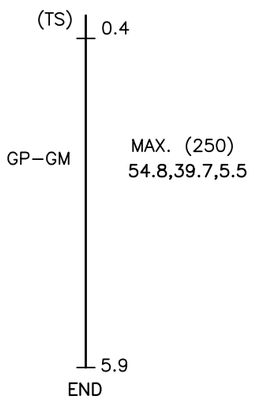
11–16



BAG NS
DEPTH 0.0–0.3

BAG 11–16a
DEPTH 0.3–6.4

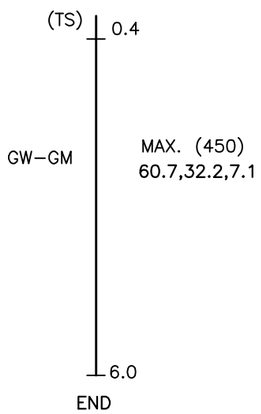
11–17



BAG NS
DEPTH 0.0–0.4

BAG 11–17a
DEPTH 0.4–5.9

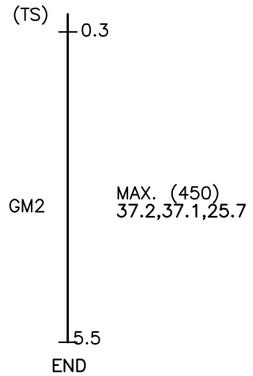
11–18



BAG NS
DEPTH 0.0–0.4

BAG 11–18a
DEPTH 0.4–6.0

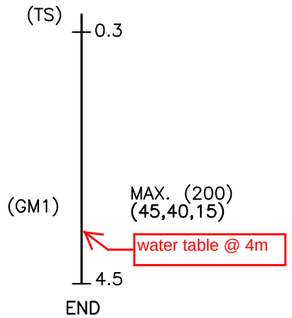
11–19



BAG NS
DEPTH 0.0–0.3

BAG 11–19a
DEPTH 0.3–5.5

11–20



BAG NS
DEPTH 0.0–0.3

BAG 11–20a
DEPTH 0.3–4.5

KEY

LABORATORY SIEVE ANALYSIS :

40,58,2
G S F

FIELD GRADATION ESTIMATE :

(40,58,2)
G S F

MAX. .200 = MAX. ROCK SIZE IN mm.
DEPTH IS IN METERS

REVISED: OCT.16, 2012, JW

GOVERNMENT OF BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION & HIGHWAYS
GEOTECHNICAL & MATERIALS ENGINEERING

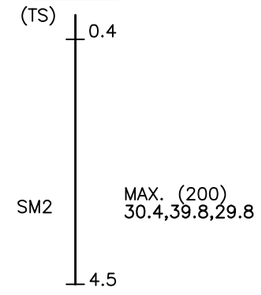
TEST PIT LOGS

LINDSTEIN PIT

WEST KOOTENAY SHEET 2

DRAWN JW	DATE JULY, 2011	SCALE 1:100
FILE NO. 11–821		ACAD NO. 11–821–Testpits

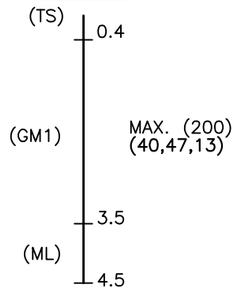
11–21



BAG NS
DEPTH 0.0–0.4

BAG 11–21a
DEPTH 0.4–4.5

11–22



BAG NS
DEPTH 0.0–0.4/3.5–4.5

BAG 11–22a
DEPTH 0.4–3.5

SOIL 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 WI <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 WI >50	MH	INORGANIC SILTS, MICACEOUS OR DIATOM–ACEOUS 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
BOULDERS		LB	BOULDERS, PARTICLE SIZE OVER 300mm

FOR SOILS HAVING 5 – 12% PASSING .075 SIEVE, USE DUAL SYMBOL

*GM1; GC1; SM1; SC1; 12 – 20%
GM2; GC2; SM2; SC2; 20 – 30%
GM3; GC3; SM3; SC3; 30 – 40%
GM4; GC4; SM4; SC4; 40 – 50%
} PASSING .075mm SIEVE

REV. 89–07–17

KEY

LABORATORY SIEVE ANALYSIS :

40,58,2
G S F

FIELD GRADATION ESTIMATE :

(40,58,2)
G S F

MAX. .200 = MAX. ROCK SIZE IN mm.
DEPTH IS IN METERS

REVISED: OCT.16, 2012, JW

GOVERNMENT OF BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION & HIGHWAYS
GEOTECHNICAL & MATERIALS ENGINEERING

TEST PIT LOGS

LINDSTEIN PIT

WEST KOOTENAY SHEET 3

DRAWN JW	DATE JULY, 2011	SCALE 1:100
FILE NO. 11–821		ACAD NO. 11–821–Testpits

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 DIATOM–ACEOUS 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

*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%	

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PROVINCE of BRITISH COLUMBIA
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Geotechnical & Materials Engineering

UNIFIED SOIL CLASSIFICATION LEGEND

Drawn: LU	Date: JULY'97	Scale:
File No.:		ACAD File: ACADSTDS

Photos

Southern development Area A (2023).

Photo taken from same location as previous photo, facing further west toward main face (2023).

Top of pit face in Area A (2023).

TP 11-12

TP 11-12 spoil

TP11-14

TP11-14 spoil

TP11-15

TP11-15 spoil

TP11-16

TP11-16

TP11-17

TP11-17 spoil