

Chenault Pit Technical Summary

February 2025

Pit Name: Chenault Pit

Provincial Pit Number: 0651

Location: Chenault Pit is located on Highway 99, approximately 5km north of Lillooet, BC (Figure 1).

Legal Land Description: The site is currently owned by the British Columbia Ministry of Transportation and Transit (BC MoTT). The legal description of the Map Reserve is “that part of District Lot 1294 lying north of District Lot 703 and east of the Pacific Great Eastern Railway Right of Way on Plan A22 Lillooet District, except Plans 33683, H17273 and KAP46682. UTM coordinates for the pit are Grid Zone 10, 576990 Easting, 5617737 Northing.” The layout of the Map Reserve boundary is shown in the pit plan (Figure 2).

2017 Investigation: In September 2017, BC MoTT conducted a test pitting program at the Chenault Pit. Twenty-two (22) test pits were excavated to depths ranging from 2.6 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 seventeen (17) samples at AMEC Foster Wheeler 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 2017 investigation, one (1) suitability area – Area A, has been defined (Figure 3). The detailed results of the subsurface testing are provided in the Test Pit Summaries and test pit locations are shown on the Pit Plan (Figure 2).

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 from Area A.

Table 1: Pit Run Gradation

Test Pit, Sample #	Depth (m)	Fines (%)* <0.075mm	Sand (%)* 0.075- 4.75mm	Gravel (%)* 4.75-75mm	USC
Area A					
17-06, 206	0.1-2.0	5	28	68	GP

17-06, 207	2.0-5.0	1	88	11	SP
17-07	0.1-5.0	5	47	48	GP
17-09	0.7-5.0	5	50	45	SP
17-10	2.0-5.0	4	63	33	SP
17-12	0.9-5.0	2	41	57	GP
17-13	0.5-5.0	9	56	35	SP
17-16	0.2-4.3	2	48	50	GP
17-17	0.6-2.6	7	39	53	GP
17-19	0.9-4.8	7	44	49	GP
17-21	0.2-5.0	5	38	56	GP
17-22	0.1-4.0	5	32	63	GP
Average – Area A		4.8	47.8	47.3	-

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

Table 2 shows the estimated percent by weight of small and large boulders as well as the percentages of fines, sand and gravel corrected to approximately 100%. The gravel is also divided into fine and coarse portions.

Table 2: Oversize Field Estimates

Classification	Average (%)	Range (%)
Boulders (>375mm)	0.3	0-2
Large Cobbles (150-375mm)	4.5	0-15
Small Cobbles (75-150mm)	8.7	0-20

The maximum size of rock observed was 450 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 (% loss)		Absorption		Relative Density	
		Coarse	Fine	Coarse	Fine	Coarse	Fine
Area A							
17-02	34			1.11	1.55	2.653	2.624
17-06		6.6	11.6		1.56		
17-12	67			1.01		2.638	2.619
17-21	46	7.9	11.2				
17-19		4.4	10.4				

BC MoTT Specifications	
Sand Equivalent	≥ 40 for base coarse and fine asphalt mix aggregate ≥ 20 for surfacing, sub-base and bridge end fill aggregates
Micro Deval	$\leq 30\%$ for sub-base and bridge end fill aggregates $\leq 25\%$ for surfacing & base course aggregates $\leq 18\%$ for Class 1 Pavement asphalt mix aggregates $\leq 20\%$ for Class 2 Pavement asphalt mix aggregates
Absorption	$< 2.0\%$ for coarse paving aggregates $\leq 1.0\%$ for coarse and $\leq 1.5\%$ for fine graded aggregate seals
Relative Density	~ 2.65 for all aggregate products

Material Suitability: Based on the 2017 investigation results, the material in Area A is judged to be suitable for the following purposes:

Table 4: Suitability

	Pit Run	Crush
Area A	SGSB	AMA GAS ¹ HFSA Winter Abrasive

¹ It may be necessary to screen out excess sand when producing GAS.

The samples tested meet the gradation, sand equivalent, and micro-deval specifications for select granular sub-base (SGSB), winter abrasive, graded aggregate seal (GAS) and asphalt mix aggregate (AMA). The sand equivalent testing did not meet specification for one of the three samples tested.

Sulphate and Chloride Testing

Table 5 shows the sulphate and chloride test results from 2018 for select samples outside 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
TP18-01	$< 0.050\%$	$< 0.010\%$ dry
TP18-02	$< 0.050\%$	$< 0.010\%$ dry

Volume Estimates: Table 6 shows the volume estimates that can be expected for topsoil, overburden and gravel from Area A. 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

Area A ~1.0 ha.	Topsoil	Overburden	Granular Material
Average Layer Thickness (m)	0.0	0.0	3.0
Volume (m³)	0.0	0.0	30 000

Pit Development Notes

- The mining area was previously developed by the Ministry of Transportation and Transit (MoTT). 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.
- Some test pits from the 2015 and 2017 testing program may have been mined out. The area around TP17-10 and TP17-12 was recently lowered (the lower floor on PDP). These areas bottomed out in gravelly sand or sandy gravel.
- The crusher is to be located on the lower pit floor, as indicated on the Pit Development Plan or as space permits. Mining is to proceed in a northerly or southerly direction.
- Material north of the suitability area is sandier and more suitable for use as embankment fill or borrow. Coarser aggregate within the suitability is not to be used as a borrow source.
- Clay seam should be avoided or removed during mining. Larger sand deposits are present in TP 17-09 and TP17-10 so mining in that direction may require more bleeding off of sand to obtain certain specified aggregate products.
- Evidence of past activity in the pit was discovered; some asphalt layers were identified within the suitability area (see photos). Other undesirable material or objects may be present beneath the surface and may have to be stockpiled separately or disposed of.



- Processed aggregate may be stockpiled as indicated in the pit development plan or where space permits as directed by the Ministry Representative.
- It is recommended to maintain or reconstruct the east pit access road that runs from the entrance and south to north of the pit upon completion of mining, to enable access for others, should it be mined into during this contract. It must be kept to the Health, Safety and Reclamation Code standards as per the Mine Haul Road Design Section 6.9.1.
- **All reject materials resulting from aggregate production are to be placed in separate stockpiles free from deleterious material and in an easily accessible location. No stockpiling against the pit face is permitted without the permission from the Aggregate Resource Manager.**
- 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 (2017, 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.
- 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.
- 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 - Pit Plan

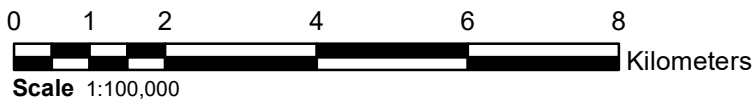
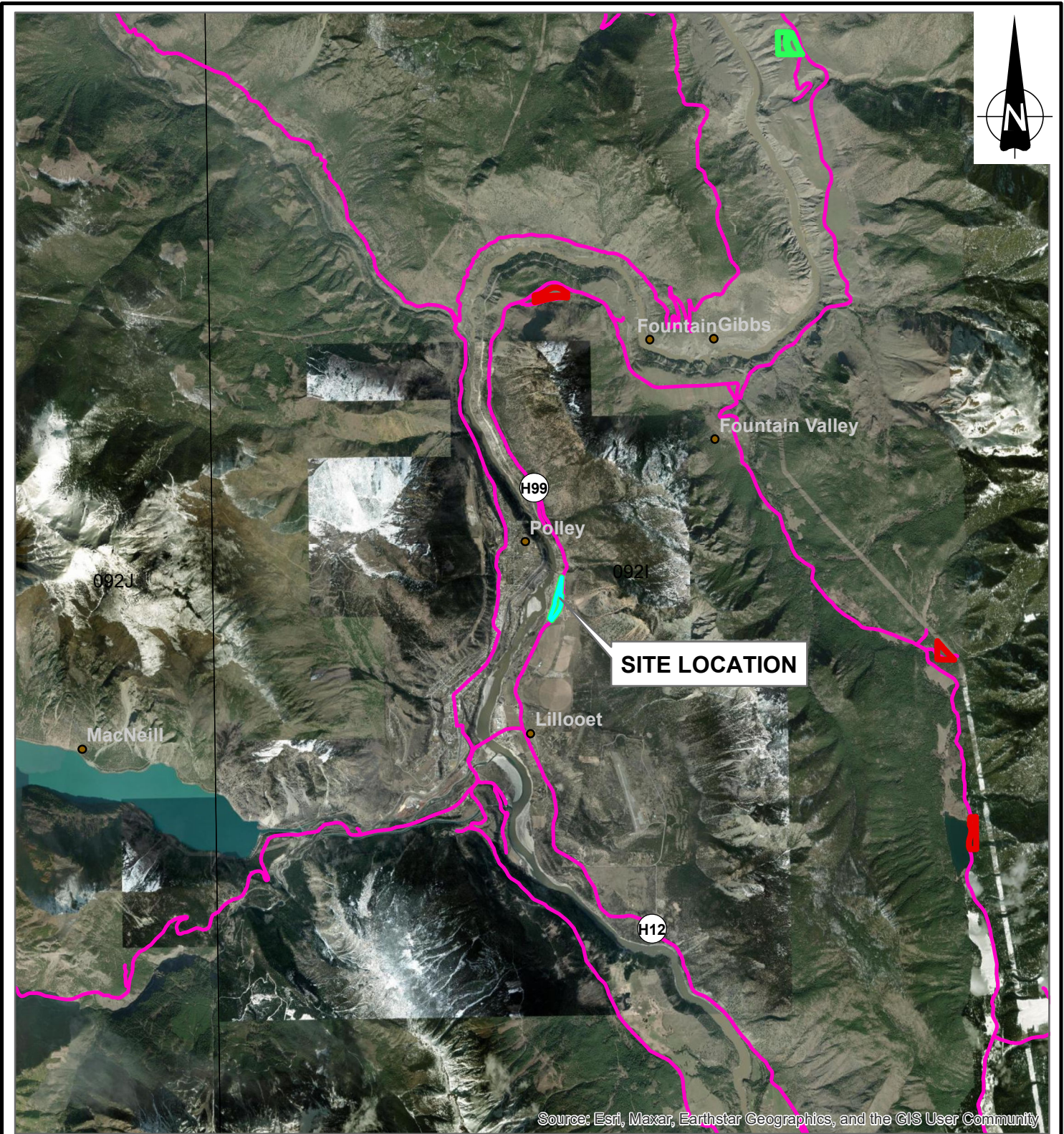
Figure 3 - Development Plan



Test Pit Summary

Photos



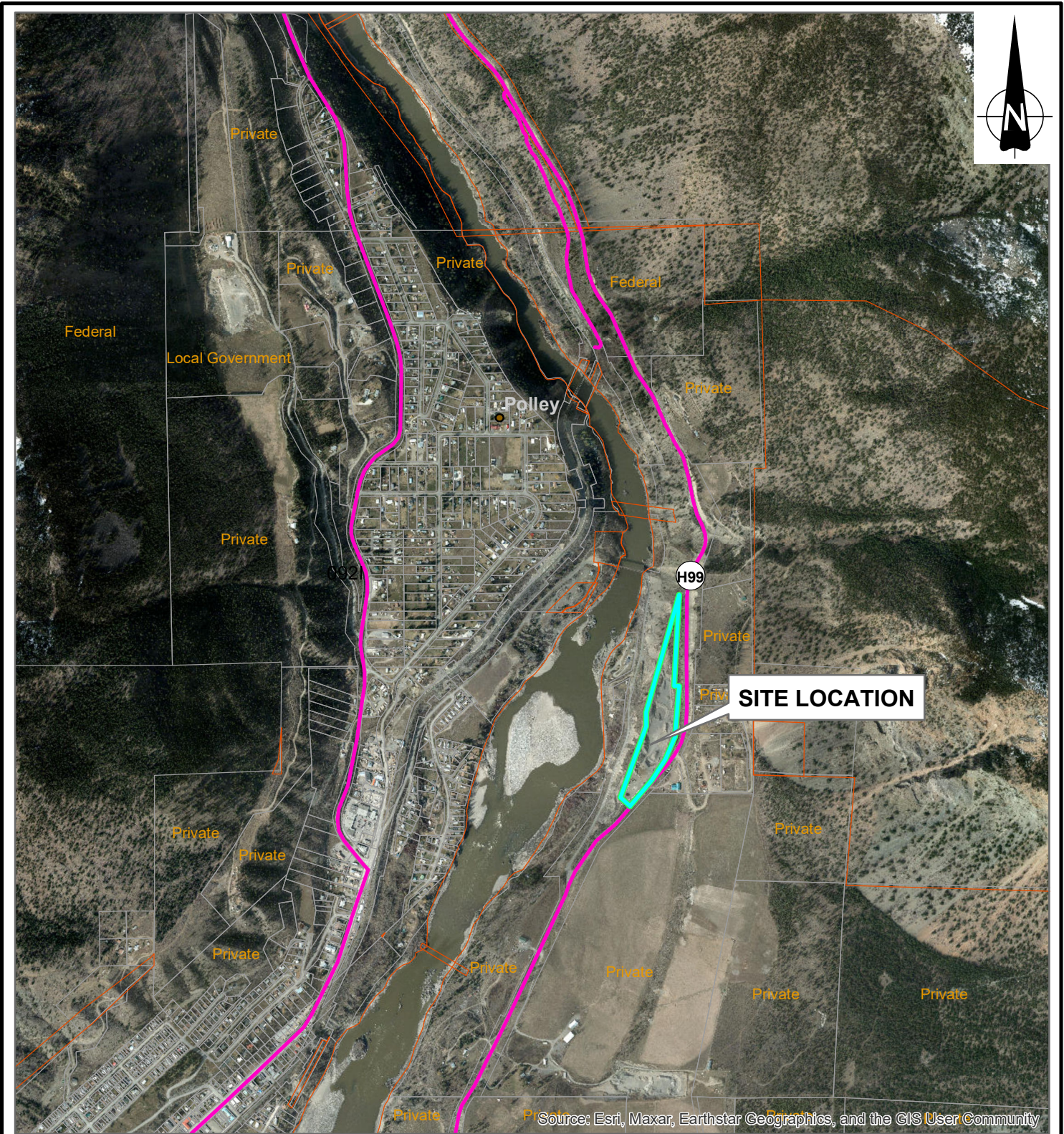
Figures



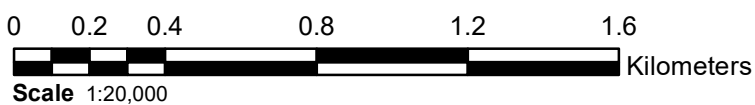
 Ministry of Transportation and Infrastructure Geotechnical and Materials Branch			
LOCATION PLAN (2024) Chenault Pit No. 0651 SA 16 - CARIBOO DISTRICT			
DRAWN BY: LACOURTE	PROJECTION: NAD 1983 UTM Zone 10N	SCALE: As Shown	
CHECKED BY: A. Mitchell	DATUM: NAD 1983 UTM Zone 10N	DATE: 2024-09-04	
File Name: GISTemplate_Gravel_R2_2021-11-18	Geotech Project No:	Reg: 2	Drawing No: FIGURE 1

This drawing was originally produced in colour.



Document Path: C:\Users\LACOURTE\Desktop\GISTemplate_Gravel_R2_2021-11-18.mxd

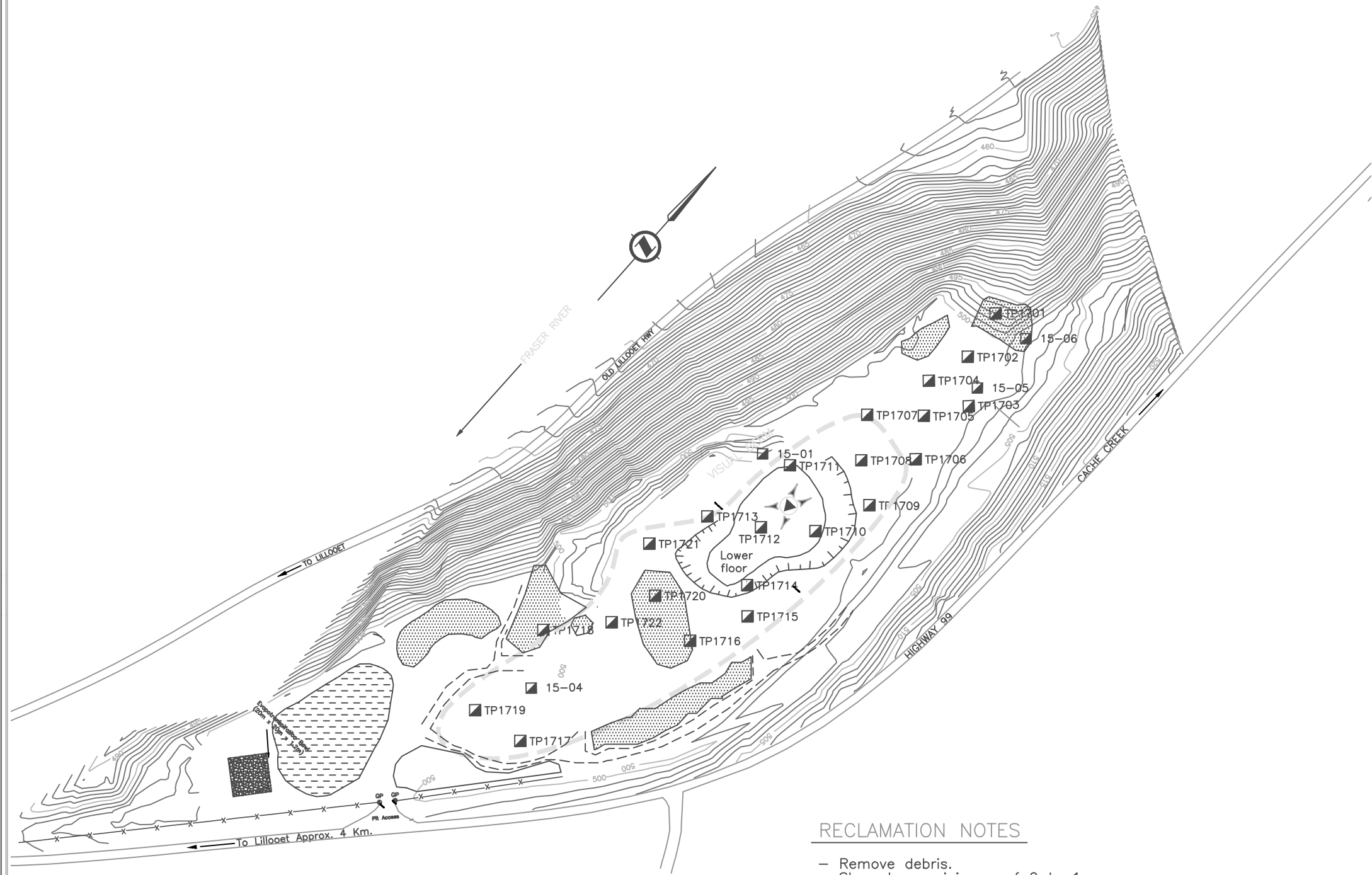


Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community





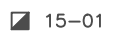







This drawing was originally produced in colour.

 Ministry of Transportation and Infrastructure Geotechnical and Materials Branch		
LEGAL PLAN (2024) Chenault Pit No. 0651 SA 16 - CARIBOO DISTRICT		
DRAWN BY: LACOURTE	PROJECTION: NAD 1983 UTM Zone 10N	SCALE: As Shown
CHECKED BY: A. Mitchell	DATUM: NAD 1983 UTM Zone 10N	DATE: 2024-09-04
File Name: GISTemplate_Gravel_R2_2021-11-18	Geotech Project No: 	Reg: 2
		Drawing No: FIGURE 2



LEGEND

-  CRUSHER LOCATION
-  DEVELOPMENT DIRECTION
-  SUITABILITY BOUNDARY
-  17-01 TEST PIT 17-01, EXCAVATED IN 2017.
-  15-01 TEST PIT 15-01, EXCAVATED IN 2015.
-  ROAD CONNECTING UPPER AND LOWER PIT
-  EXISTING PIT FACE
-  FENCE
-  EXISTING AGGREGATE STOCKPILES
-  PROPOSED AGGREGATE STOCKPILE AREA

MINING NOTES

- Stockpiles can not be placed in front of mining faces without approval from the Ministry of Transportation and Transit.
- 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.

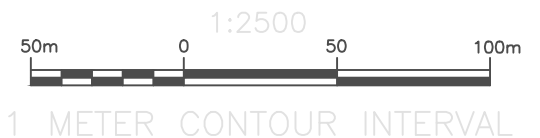
RECLAMATION NOTES

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

NOTES

- Chenault Pit is not situated in the Agricultural Land Reserve.
- Test Hole and Test Pit locations are approximate only.
- Stockpile and Pit Face locations are approximate only.
- Visual berm along northern edge of pit face area must be maintained
- Aggregate north of the suitability area is sandier and may be used as be used as embankment fill. Coarser aggregate within the suitability area is not to be used as a borrow source.

"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."



Date	REVISIONS Description	Initial
NOV 99	UPDATED	
NOV 02	UPDATED	
JAN 18	UPDATED	
APR 21	UPDATED	

REVIEWED BY:	
A.T.A.	Date
APPROVED BY:	
A.R.H.	Date

SCALE: 1:2500
DRAWN: SJK
DATE: JAN 2018
AutoCAD: F3P0651

CHENAULT PIT #0651
PIT DEVELOPMENT PLAN
FILE NO. 50-16-0651

FIGURE
3



Test Pit Summaries

AGGREGATE LOG

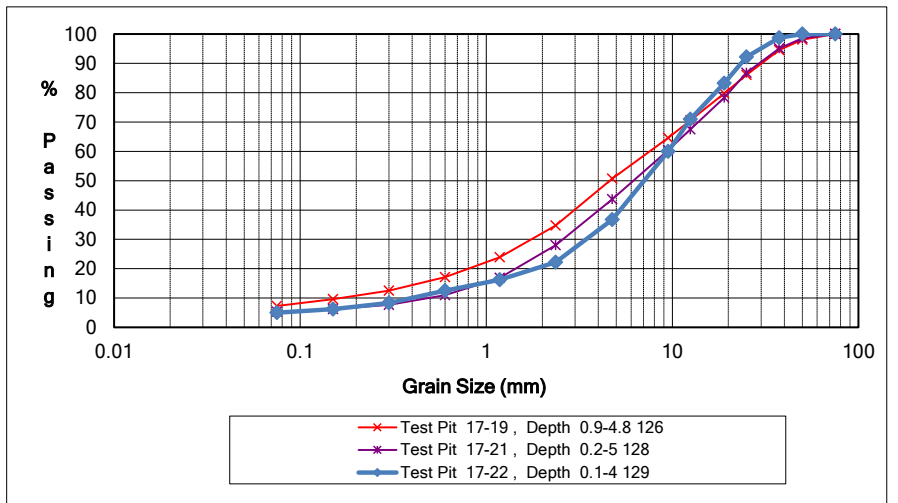
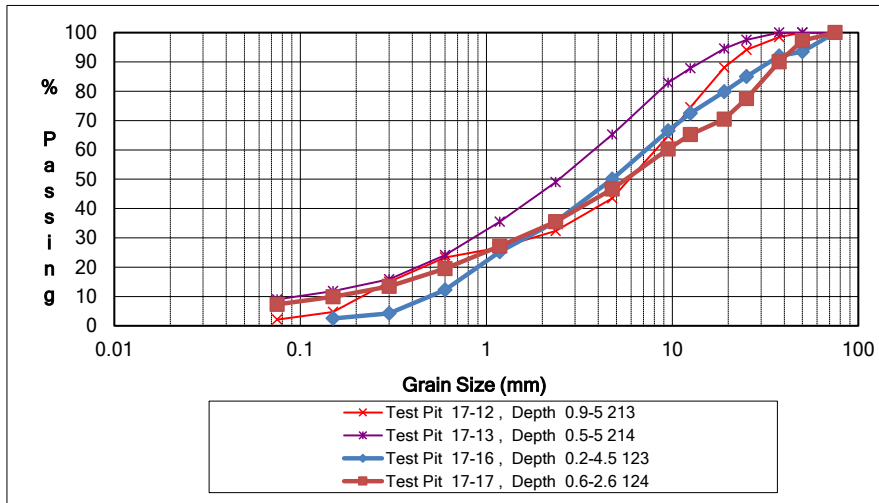
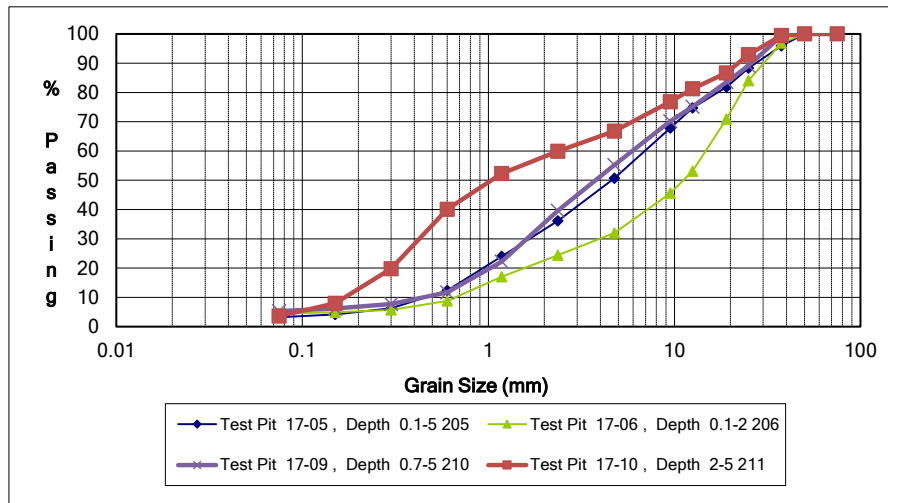
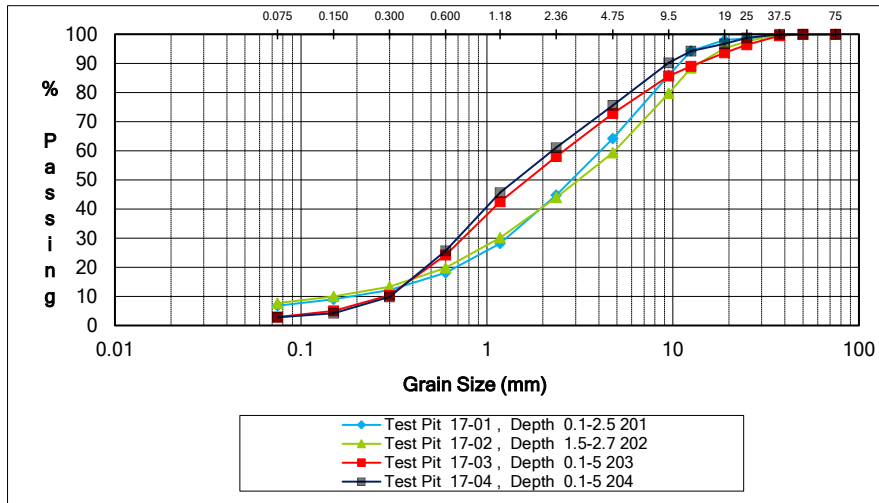
PROJECT: Chenault Pit
PIT #: 0651
DISTRICT: Cariboo

SAMPLED BY: Samantha Kinniburgh & Steven Lee
METHOD: Excavator
DATE: September 27-28

TP	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		
17-01	0	0.1		Floor									
	0.1	2.5	201	SP	29	70	1	100	1	0	0	C-M	Consistent, sloughing after 1m Conglomerate, cementing fines
				SP	35.8	57.4	6.8						
17-02	0	0.2		Floor									
	0.2	1.5		SP	39	60	1						Lots of oversize present
	1.5	2.7	202	SP	33	65	2	300	5	3	0	C-M	Sloughing after 1m
				SP	40.7	51.6	7.7						
17-03	0	0.1		Floor									
	0.1	5	203	SP	44	55	1	70	0	0	0	C-M	sand seam off W side of TP
				West	19	80	1						visible, seems to change 1/2 through vertically
				SP	27.2	69.9	2.9						
17-04	0	0.1		Floor									
	0.1	5	204	SP	24	75	1	120	1	0	0	M	consistent, sloughing at 2.5m
				SP	24.4	72.9	2.8						
17-05	0	0.1		Floor									
	0.1	5	205	SP	38	60	2	270	5	2	0	C-M	sand seam at N end cementing fines, oversize
				GP	49.3	47.4	3.2						
17-06	0	0.1		Floor									
	0.1	2	206	GP	60	39	1						clay chunks towards E side
				GP	68	27.5	4.5						
	2	5	207	GP	80	19	1	100	2	0	0	M	2 samples taken
				SP	11.4	87.6	1						

17-07	0	0.1		Floor										Lots of OS present
	0.1	5	208	GP	50	47	3	150	5	1	0	C-M		Clay-like feel in sand
				GP	48.4	46.8	4.7							
17-08	0	0.1		Floor										
	0.1	5	209	GP	52	46	2	400	8	2	1	C-M		Consistent throughout, same as 17-07
17-09	0	0.1		Floor										
	0.1	0.7		SP										
	0.7	5	210	GP	57	40	3	130	6	1	0	C-M		Consistent after sandy 0.6m
				SP	44.8	50	5.3							
17-10	0	0.2												Gravel to 2m, variable sand and gravel
	0.2	2		GP										N to S sand seam at 2m sloping down
	2	5	211	SP	34	65	1	100	3	0	0	C-M		
				SP	33.2	63.2	3.6							
17-11	0	0.1		Floor										
	0.1	5	212	GP	50	48	2	110	2	0	0	C-M		Consistent throughout
17-12	0	0.1		Floor										
	0.1	0.9		SP										
	0.9	2.2	213	GP										Noticeable changes in stratum
	2.2	5		SP	40	58	2	160	5	1	0	C-M		Composite sample taken from 0.9-5m
				GP	56.5	41.1	2.1							
17-13	0	0.1		Floor										
	0.1	0.5		SP										Lots of oversize
	0.5	5	214	GP	60	39	1	300	20	10	0	C-M		
				SP	34.8	56.3	9							
17-14	0	0.1		Floor										
	0.1	4.5	215	GP	60	39	1	290	15	8	0	C-M		Consistent with 17-13
17-15	0	0.5		SP										Sticky clay, lots of cementing.
	0.5	4.8	216	GP	55	42	3	120	10	0	0	C-M		OS present

17-16	0	0.2		Floor									
	0.2	4.5	123	GP	53	45	2	210	10	5	0	C	Consistent with 17-15
				GP	50	48.2	1.8						
17-17	0	0.6		SP									Dirty, lots of boulders
	0.6	2.6	124	SP	20	76	4	400	12	10	1	M-F	Will need primary crusher
				GP	53.4	39.3	7.3						
17-18	0	0.6		Floor									Lots of boulders
	0.6	1.3		GP									Dirty, layer of fines
	1.3	1.5		SP									May be STP area
	1.5	4.2	125	SP	45	52	3	480	15	10	2	C-M	
17-19	0	0.6		Floor									Lots of boulders
	0.6	0.9		SP									Consistent with 17-18
	0.9	4.8	126	SP	40	57	3	400	15	10	2	C-M	
				GP	49.3	43.5	7.3						
17-20	0	0.25		Floor									Boulders, dirty sand
	0.25	5.1	127	GP	49	48	3	390	20	15	1	C-M	Similar to 17-16 and 17
17-21	0	0.2		Floor									
	0.2	5	128	GP	55	42	3	270	15	10	0	C-M	Boulders, dirty and gritty
				GP	56.3	38.4	5.3						
17-22	0	0.1		Floor									Sloughing & sandy on W side
	0.1	4	129	SP	47	51	2	320	15	10	0	C-M	Top 2m very sandy
				GP	63.3	31.7	5						



1 OF 1
AGGREGATE LOG

PROJECT: Texas Crk - Misc road 40
PIT #: Chenault Pit
DISTRICT: Cariboo

SAMPLED BY: BJ - BC
METHOD: Excavator
DATE: 1984-02-15-16

TH / TP	DEPTH		SAMPLE BAG No.	SOILS CLASS	ESTI MAT			ESTI MAT			SAND TYPE F M C	REMARKS
	FROM	TO			G	S	F	MAX SIZE	75mm - 150mm	150mm - 375mm		
TP 84-06	0.0	0.7		OB								
	0.7	2.7		GP/GM	56	36	8					Lab tested
TP 84-10	0.0	0.6		OB								
	0.6	4.3		GP	61	35	4					Lab tested
TP 84-14	0.0	0.6		TS								
	0.6	3.7		GP/GM	53	42	5					Lab tested
TP 84-15	0.0	1.0		OB								
	1.0	4.0		GP	56	40	4					Lab tested
TP 84-17	0.0	0.5		OB								
	0.5	0.8		GP-LB	62	35	3					Field Verified - Large Boulders
	0.8	3.2		GP	67	29	4					Lab tested



Photos



Proposed crusher set up location, looking south. (April 2021)



Facing north. (April 2021)



Standing near TP17-19, facing north. (April 2021)



Eastern side of lower pit face. Note layers of asphalt product near surface. (April 2021)



TP17-16, September 2017.



TP17-17, September 2017.



TP17-19 Spoil, September 2017.



TP17-20, September 2017.



TP17-21, September 2017.