BRITISH COLUMBIA | Ministry of Transportation and Transit

Hole Name		
TH	Testhole	Label with Year and Hole Number **TH26-01** **TP26-01**
TP	Testpit	

Sample Type	
A	AUGER
C	SONIC CORE
G	GRAB
R	ROCK CORE
O	ODEX
S	SPLIT SPOON
T	SHELBY TUBE
W	WASH (MUD RETURN)

Soil Type / Description Order

1	**SYMBOL**	CAPITAL LETTERS eg; GP, SP-SM, SC4, ML
2	**SOIL TYPE**	Grading plus SOIL TYPE eg Well-graded GRAVEL, SILTY CLAY
3	**Cobbles / Boulders**	Add "with cobbles or boulders" to soil group
4	**(GEOLOGICAL INTERPRETATION)**	Interpreted geological origin of material in capitals (FILL, TILL)
5	**Description of Primary Constituents**	**Coarse Grained Soils:** Max particle size, grading shape and hardness **Fine Grained Soils:** Plasticity, strength, dilatancy, toughness
6	**Description of Secondary Constituents**	**Coarse Grained Soils:** Max particle size, grading shape and hardness **Fine Grained Soils:** Plasticity, strength, dilatancy, toughness
7	**Minor Constituents**	any other minor components
8	**Additional Observations**	Additional observation, mineralogy (calcareous, micaceous), max particle size of cobbles/boulders, shape, hardness, percentage by volume optional for test pits
9	**Structure**	eg. Layering, fissuring, cementation
10	**Contamination**	if applicable; staining and odour
11	**Colour**	Note primary colour in its moist condition, Note if soil is dry
12	**Moisture**	Field moisture condition: dry, moist, wet
13	**Compactness or Consistency**	Non-cohesive Soils: Compactness Cohesive soils: Consistency

Double lines indicate separation with ";"

Reference: Adapted from MoTI Soil Field Log Rev 2 and Section 4.2.4 of the 2023 CFEM

1. Classification

MAJOR DIVISIONS		SYMBOL	SOIL TYPE
Coarse Grained Soils	Gravels	GW	Well-graded GRAVEL, or GRAVEL with Sand, <5% fines
		GP	Poorly-graded GRAVEL, or GRAVEL with Sand, <5% fines
		GM[1]	SILTY GRAVEL, or SILTY GRAVEL with Sand, >12% fines
		GC[1]	CLAYEY GRAVEL, or CLAYEY GRAVEL with Sand, >12% fines
		GW-GM, GP-GC[2]	Well-graded or Poorly-graded GRAVEL with Silt, or with Clay, or with Silt and Sand, or with Clay and Sand, 5-12% fines
	Sands	SW	Well-graded SAND, or SAND with Gravel, <5% fines
		SP	Poorly-graded SAND, or SAND with Gravel, <5% fines
		SM[1]	SILTY SAND, or SILTY SAND with Gravel, >12% fines
		SP-SM, SW-SC[2]	Well-graded or Poorly-graded SAND with Silt, or with Clay, or with Silt and Gravel, or with Clay and Gravel, 5-12% fines
Fine Grained Soils	Silts and Clays LL<50	ML	SILT, or SILT with Sand, or with Gravel, or Sandy, or Gravelly
		CL	Lean CLAY, or Lean CLAY with Sand, or with Gravel, or Sandy, or Gravelly
		CL-ML	SILTY CLAY, or SILTY CLAY with Sand, or with Gravel, or Sandy, or Gravelly
		OL	Organic SILT, or Organic CLAY, with Sand, or with Gravel, or Sandy, or Gravelly
	Silts and Clays LL>50	MH	Elastic SILT, or Elastic SILT with Sand, or with Gravel, or Sandy, or Gravelly
		CH	Fat CLAY, or Fat CLAY with Sand, or with Gravel, or Sandy, or Gravelly
		OH	Organic Fat CLAY or Organic Elastic SILT, or with Sand, or with Gravel, or Sandy , or Gravelly
Organic Soils		PT	Amorphous and fibrous peat and other highly organic soils
Asphalt		AP	Asphalt concrete pavement surfacing
Topsoil		TS	Topsoil with roots, forest litter, etc.
Cobbles		SB	Rock fragments and cobbles, particle size 75mm to 300mm diameter
Boulders		LB	Boulders, particle size over 300mm in diameter

[1] GM1; GC1; SM1; SC1; 12-20% Passing #200 (0.075mm) Sieve
[1] GM2; GC2; SM2; SC2; 20-30% Passing #200 (0.075mm) Sieve
[1] GM3; GC3; SM3; SC3; 30-40% Passing #200 (0.075mm) Sieve
[1] GM4; GC4; SM4; SC4; 40-50% Passing #200 (0.075mm) Sieve
[2] GP-GM ; GP-GC; SP-SM; SP-SC; 5-12% Passing #200 (0.075mm) Sieve

Reference: Adapted from Table 4.4 of the 2023 CFEM with soil subscripts and AP added from MoTI

2.1 Soil Type - Predominant Coarse Grained

Coarse Grained Soils: >50% mass retained on the 0.075mm sieve

SOIL TYPE	SW	SP	SW-SM to SP-SC	SC	SM	GW	GP	GW-GM to GP-GC	GC	GM
SOIL NAME	SAND			CLAYEY SAND	SILTY SAND	GRAVEL			CLAYEY GRAVEL	SILTY GRAVEL
Size of Coarse Fraction	SANDS (majority of coarse fraction is smaller than 4.75mm)					GRAVELS (majority of coarse fraction is larger than 4.75mm)				
Fines Content	<5% fines		5-12% Fines	>12% Fines		<5% Fines		5-12% Fines	>12% Fines	
Gradation or Plasticity	Well Graded	Poorly Graded	Plastic Fines = SC Non-plastic Fines =SM	Plastic Fines	Non-plastic Fines	Well Graded	Poorly Graded	Plastic Fines = GC Non-plastic Fines =GM	Plastic Fines	Non-plastic Fines

If soil contains **>15%** sand / gravel as a secondary component add **"with Sand" or "with Gravel"**, whichever is predominant to Soil Type
If soil contains 5-12% fines add **"with Silt"** or **"with Clay"**
Reference: Adapted from Table 4.4 of CFEM 2023
Minstry allows **"and"** when constituents appear to be roughly equal (eg **GRAVEL and SAND**)

2.2 Soil Type - Predominant Fine Grained

Coarse Grained Soils: >50% mass passing the 0.075mm sieve

SOIL TYPE	CH	OL or OH	MH		OL or OH	CL	ML	CL-ML
SOIL NAME	FAT CLAY	Organic CLAY	ELASTIC SILT		Organic SILT	LEAN CLAY	SILT	SILTY CLAY
Dry Strength (Pressure required to crumble 12 mm diameter dried ball)	High to Very High	Medium to Very High	Low to Medium	LL =50	None to Medium	Medium to High	None to Low	None to Low
Dilatancy (Visible water when shaken)	None	None to Slow	None to Slow		Slow to Rapid	None to Slow	Slow to Rapid	Slow
Toughness (of 3mm thread)	High	Low to Medium	Low to Medium		Low	Medium	Low	Low
Plasticity	High	Low to High	Low to Medium		Nonplastic to Medium	Medium	Nonplastic to Low	Low to Medium

Fines should be classified by behaviour, not grain size
If soil contains **>15%** sand / gravel as a secondary component add **"with Sand" or "with Gravel"**, whichever is predominant to Soil Type
If soil contains **>30%** sand / gravel as a secondary constituent, add **"Sandy" or "Gravelly"**, whichever is predominant to Soil Type.
Reference: Adapted from Table 4.12 of CFEM 2023

Example Soil Descriptions

SOIL TYPE	GRADATION	EXAMPLE SOIL DESCRIPTIONS	SOIL TYPE	GRADATION	EXAMPLE SOIL DESCRIPTIONS
Coarse-Grained Soil	80% Gravel 17% Sand 3% Fines	GW - Well-Graded GRAVEL with Sand, with Cobbles (FILL); mostly fine to coarse, subangular gravel up to 25 mm, little fine to coarse, subangular sand, trace fines; cobbles up to 150 mm, subrounded, granitic, homogeneous, reddish staining; grey, moist, dense.	Fine Grained Soil	65% Clay 19% Sand 16% Gravel	CL -Lean CLAY with Sand (ALLUVIUM); about 65% low plasticity, no dilatency, high toughness clay, about 20% fine to medium sand, about 15% rounded fine gravel; laminated (3 mm); grey, moist, firm.
	49% Silt 35% Sand 16% Gravel	SM4 - SILTY SAND with Gravel; about 50% non plastic silt, about 35% fine to medium sand, about 15% fine, subrounded gravel; brown, moist, compact.		51% Clay 44% Sand 5% Gravel	CH - Sandy Fat CLAY, with Boulders (TILL); mostly high plasticity, high toughness clay, some fine to coarse, angular sand, trace subangular gravel; granitic boulder >350 mm (~10% by volume); dark grey, moist, hard.

Soil Description Example

SYMBOL - Grading/Lean/Fat SOIL TYPE with Minor Soil Type,with cobbles, (GEOLOGY); Coarse Grained: primary/secondary, shape, hardness, Fine Grained: plasticity dilatancy, dry strength, minor; observations, boulder description, structure, contamination; colour, moisture, compactness/consistency

Notes for Completion of Soil Field Logs - Page 2

Ministry of Transportation and Transit

2.3 - SOIL TYPE - Fine Grained Criteria - Field Identification Methods

	DESCRIPTION	CRITERIA
Criteria for Dilatancy	NONE	No visible change in the specimen when shaken
	SLOW	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing
	RAPID	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing

Reference: Table 4.9 of CFEM 2023

	DESCRIPTION	CRITERIA
Criteria for Toughness	LOW	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft
	MEDIUM	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness
	HIGH	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness

Reference: Table 4.10 of CFEM 2023

	DESCRIPTION	CRITERIA
Criteria for Plasticity	NONPLASTIC	A 3 mm thread cannot be rolled at any water content
	LOW	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit
	MEDIUM	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit
	HIGH	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit

Reference: Table 4.11 of CFEM 2023

	DESCRIPTION	CRITERIA
Criteria for Dry Strength	NONE	Dry specimen crumbles into powder with mere pressure of handling
	LOW	Dry specimen crumbles into powder with some finger pressure
	MEDIUM	Dry specimen crumbles into pieces or crumbles with considerable finger pressure
	VERY HIGH	Dry specimen cannot be broken with finger pressure alone, can be broken into pieces between thumb and a hard surface
	HIGH	Dry specimen cannot be broken between the thumb and a hard surface

Reference: Table 4.8 of CFEM 2023

2.4 Soil Type - Predominant Organics

	NAME	DISTINGUISHING CHARACTERISTICS FOR VISUAL IDENTIFICATION
ORGANIC SOILS >5 % organic matter by dry weight	FIBROUS PEAT	Composed of vegetation tissue in various stages of decomposition with organic odour, dark-brown to black colour, spongy consistency. >75% organic matter by dry weight
	AMORPHOUS PEAT	Vegetation tissue and plant structure visibly altered to unidentifiable
	Organic SILTY SAND	Coarse-grained to fine-grained more-or-less plastic soil with sufficient organic content to influence the soil properties. Shells and visible fragments of partly decayed vegetation matter may also be present. The soil ranges in colour from light to very dark gray. The permeability of organic soil is low to very low and its compressibility is very high
	Organic SANDY SILT	
	Organic SILT	
	Organic CLAY	Clay that owes some of its significant physical properties to the presence of finely divided organic matter. When wet, organic clay is likely to be very compressible, but when dry its strength is very high. It is usually dark gray or black and it may have a conspicuous odour

Reference: Adapted from Section 4.3 of CFEM 2023

3. Cobbles and Boulders

4. Geological Interpretation

5. Description of Primary Constituents

Soil Constituent	Particle Size	Millimeters (Sieve Size)
BOULDERS	Not applicable	>300
COBBLES	Not applicable	75 to 300
GRAVEL	Coarse Grained	19 to 75
	Fine Grained	4.75 to 19
SAND	Coarse Grained	2.00 to 4.75
	Medium Grained	0.425 to 2.00
	Fine Grained	0.075 to 0.425
SILT/CLAY	Not applicable	<0.075

Reference: Table 4.4 and 4.5 of CFEM 2023

Particle Shape & Angularity		DESCRIPTION
Angularity	Rounded	Particles have smoothly curved sides and no edges
	Subrounded	Particles have nearly plane sides but have well-rounded corners and edges
	Subangular	Particles are similar to angular description but have rounded edges
	Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces
Shape (Gravel)	Flat	Width to thickness ratio >3
	Elongated	Length to width ratio >3
	Flat and Elongated	Meet criteria for both

Reference: Section 4.2.2, and Tables 4.6 and 4.7 of CFEM 2023

Particle Size Distribution		DESCRIPTION
Well Graded		Even distribution of particle sizes
Poorly Graded	Gap Graded	Intermediate particle sizes absent
	Uniformly Graded	Primarily one particle size

Reference: Section 15.3.2 of ASTM D2488-09a

6. Description of Secondary Constituents

7. Description of Minor Constituents

If visually logging, estimate to the nearest 5% or use terms listed	% (by mass)	Terms
	<5	Trace
	5 to 12	Few
	12 to 30	Little
	30 to 50	Some
	>50	Mostly

Cobbles/boulders should not be quantified by mass or using terms.
Percentages must total 100%.
Reference: Adapted from section 4.2.3 CFEM 2023

8. Additional Observations

9. Structure

ZONING & FISSURES	DESCRIPTION
Homogeneous	Soil mass is of uniform composition or structure
Stratified	Alternating layers of varying material or color with layers at least 6 mm thick; note thickness
Laminated	Alternating layers of varying material or colour with the layers less than 6 mm thick; note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	A laminated soil consisting of two distinct soils (usually clay and silt) occurring in a regularly repeating pattern resulting from seasonal variations in sediment load in a lacustrine environment
Cementation	Weak: Crumbles or breaks with handling or little finger pressure
	Moderate: Crumbles or breaks with considerable finger pressure
	Strong: Will not crumble or break with finger pressure

Additional Geological terms may be used as appropriate,
Response to hydrogen chloride (HCl) may be noted.
Reference: Table 7 of ASTM D2488-09a

10. Contamination

11. Colour

Describe the colour of the soil in its moist condition. Note if soil represents dry condition eg. grey (dry). Use primary colour modified, if appropriate, with single adjective. Border cases can be hyphenated eg. grey-brown. Describe streaks or splotches of other colors as "mottled"

Reference: MoTI Soil Field Log Rev 2

12. Moisture (Non-Cohesive)

TERM	FIELD MOISTURE IDENTIFICATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

Reference: Table 3 ASTM D2488-09a

13.1 Compactness (Non-Cohesive)

Non-Cohesive Soils: When unconfined, exhibit little or no strength when air-dried and little or no cohesion when wet. Inferred may be added when not directly measured.

TERM	SPT "N" (Blows/ 0.3m)	FIELD IDENTIFICATION OF SOIL EXPOSURES
Very Loose	0 to 4	Easily penetrated with shovel handle
Loose	4 to 10	Easily excavated with hand shovel.
Compact	10 to 30	Difficult to excavate with hand shovel
Dense	30 to 50	Must be loosened with pick to excavate
Very Dense	>50	Very difficult to excavate even with pick

Reference: Adapted from Table 4.3 CFEM 2023

13.2 Consistency (Cohesive)

Cohesive Soils: When unconfined, exhibit considerable strength when air-dried and significant cohesion when wet. Inferred may be added when not directly measured.

TERM	FIELD IDENTIFICATION	Undrained Shear Strength (kPa)	Unconfined Compressive Strength (kPa)	SPT "N" (blows /0.3m)
Very Soft	Extrudes between fingers when squeezed	<12	<25	0 to 2
Soft	Moulded by light finger pressure	12 to 25	25 to 50	2 to 4
Firm	Moulded by strong finger pressure	25 to 50	50 to 100	4 to 8
Stiff	Indented by thumb	50 to 100	100 to 200	8 to 15
Very Stiff	Indented by thumbnail	100 to 200	200 to 400	15 to 30
Hard	Difficult to indent with thumbnail	>200	>400	30

Reference: Adapted from Table 4.1 CFEM 2023