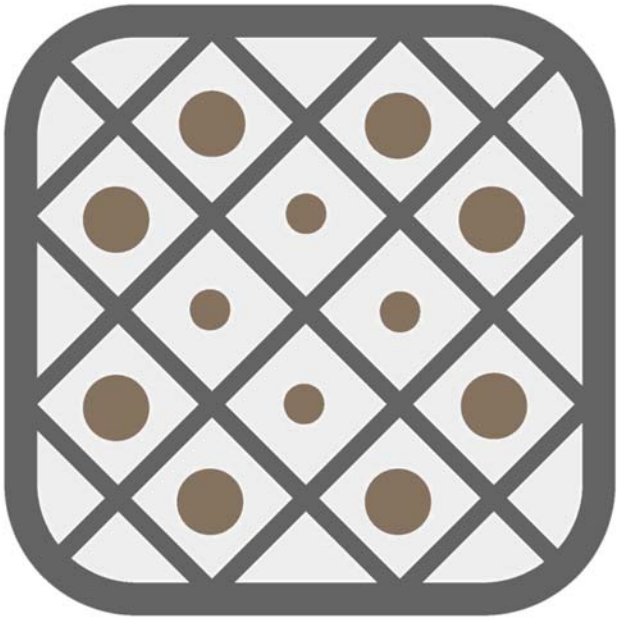
Oil Office



SO-Sieve

Current samples are in "Metric" units.

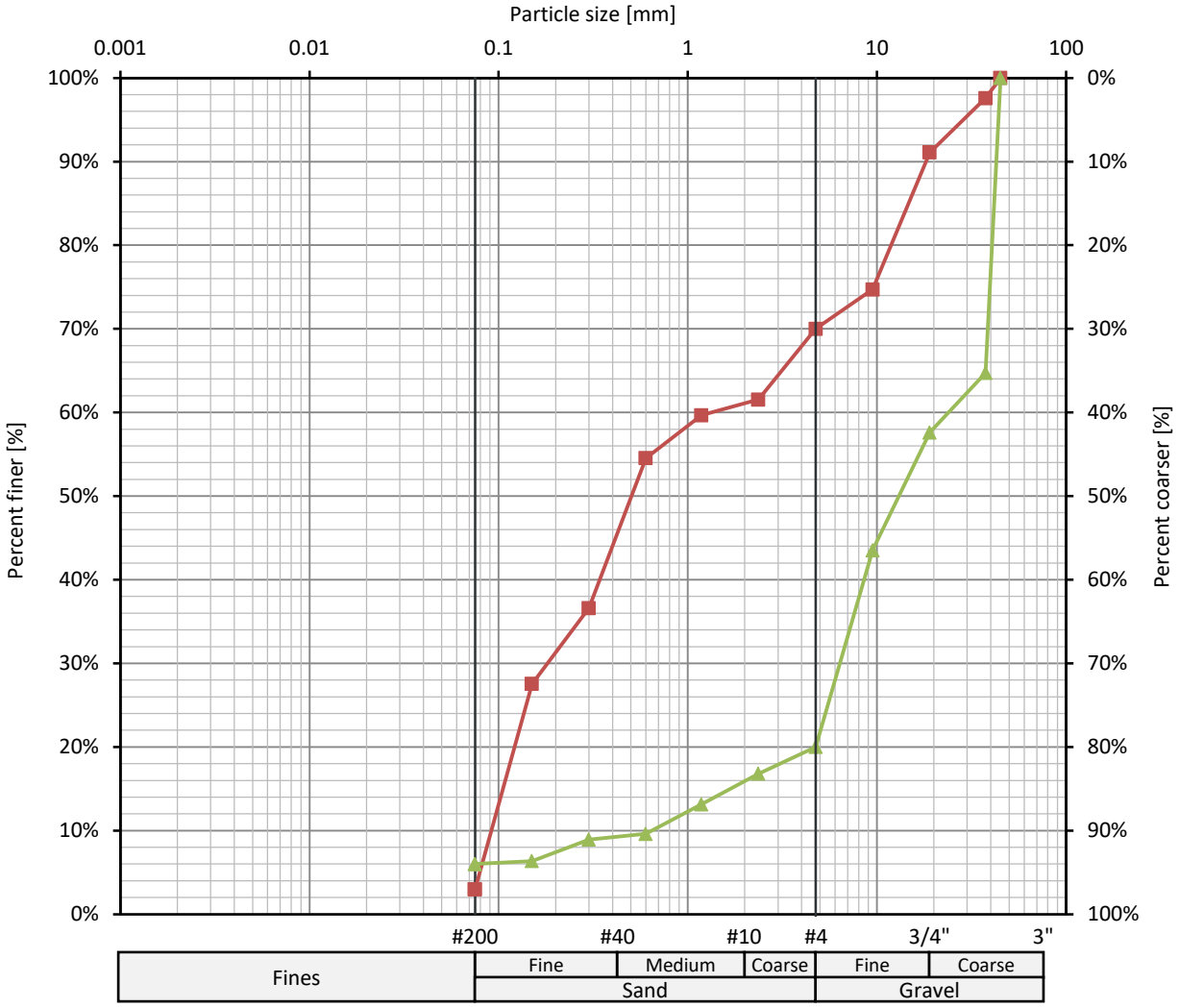
SO-Sieve also supports “English” mode where depths are in “feet”.

Particle-Size Distribution

Portrait

Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



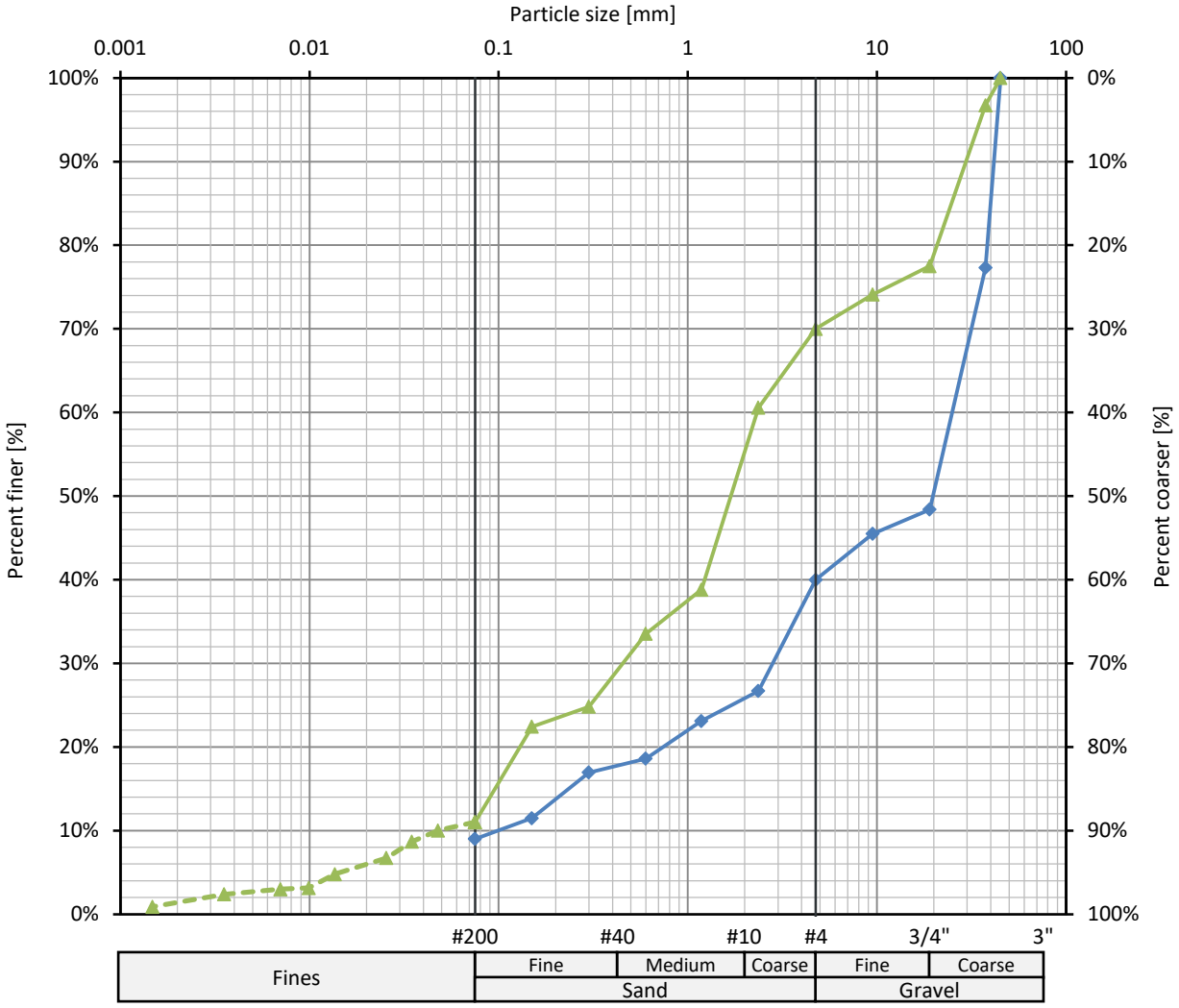
Symbol	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆								
■	30	67	3		0.0914	0.181	0.5035	1.3367
▲	80	14	6		0.6466	6.378	13.0697	23.8938

Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	1			-	-	GW	Well-Graded GRAVEL with Sand
■	TP-01	2	14.63	0.27	-	-	SP	Poorly-Graded SAND with Gravel and Cobbles
▲	TP-01	3	36.96	2.63			GW-GC	Well-Graded GRAVEL with Clay and Boulders

Tip: Hatched cells are visually examined.

Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	60	31	9		0.0991	2.808	19.7283	24.9569
■								
▲	30	59	9.6	1.4	0.0476	0.4532	1.6853	2.3182

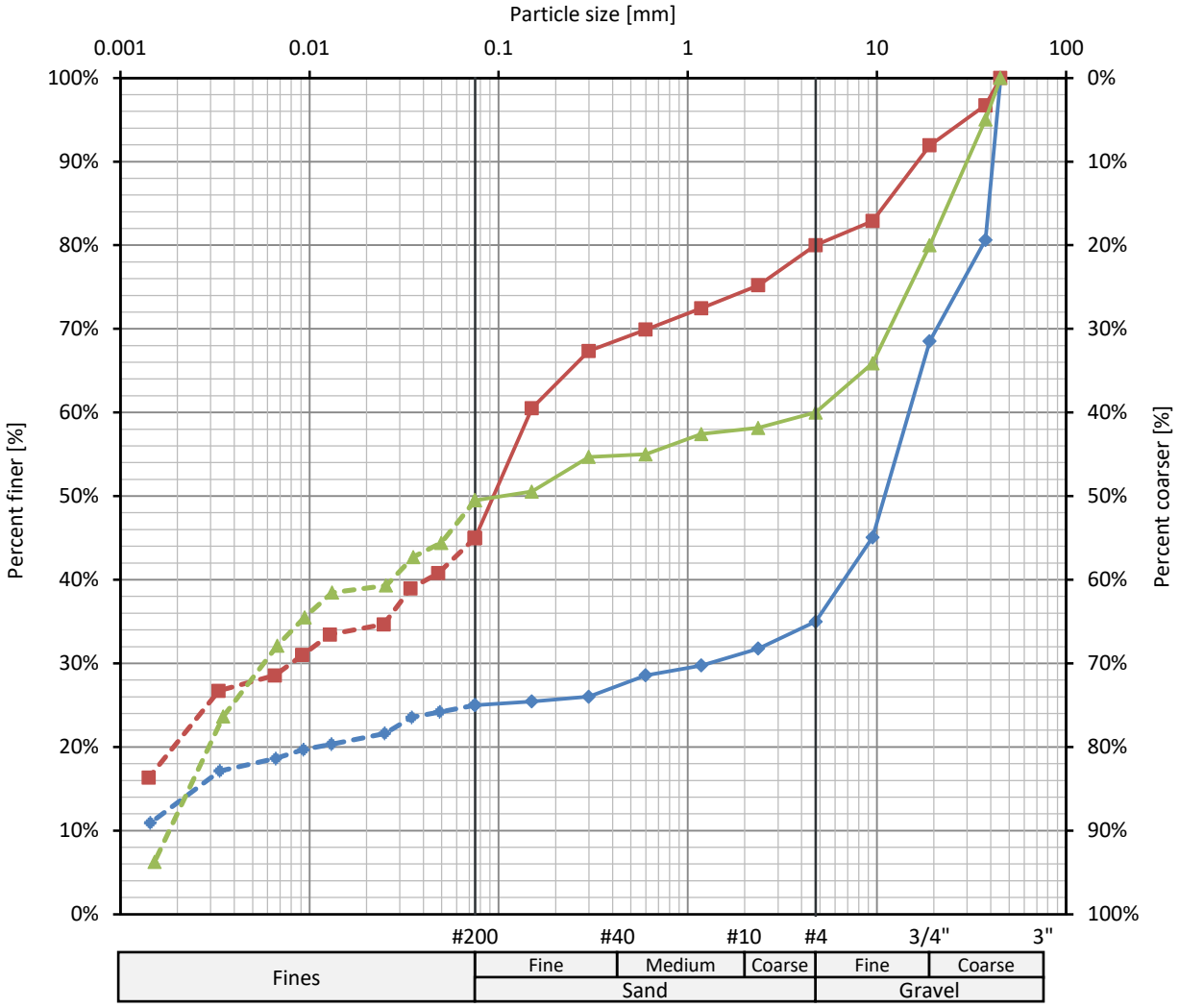
Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	4	251.9	3.19	NP	NP	GP-GM	Poorly-Graded GRAVEL with Silt, Sand, Cobbles and Boulders
■	TP-01	5			28	7	SW-SC	Well-Graded SAND with Silty Clay
▲	TP-01	6	48.68	1.86			SW-SM	Well-Graded SAND with Silt, Gravel and Cobbles

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Tip: Hatched cells are visually examined.

Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



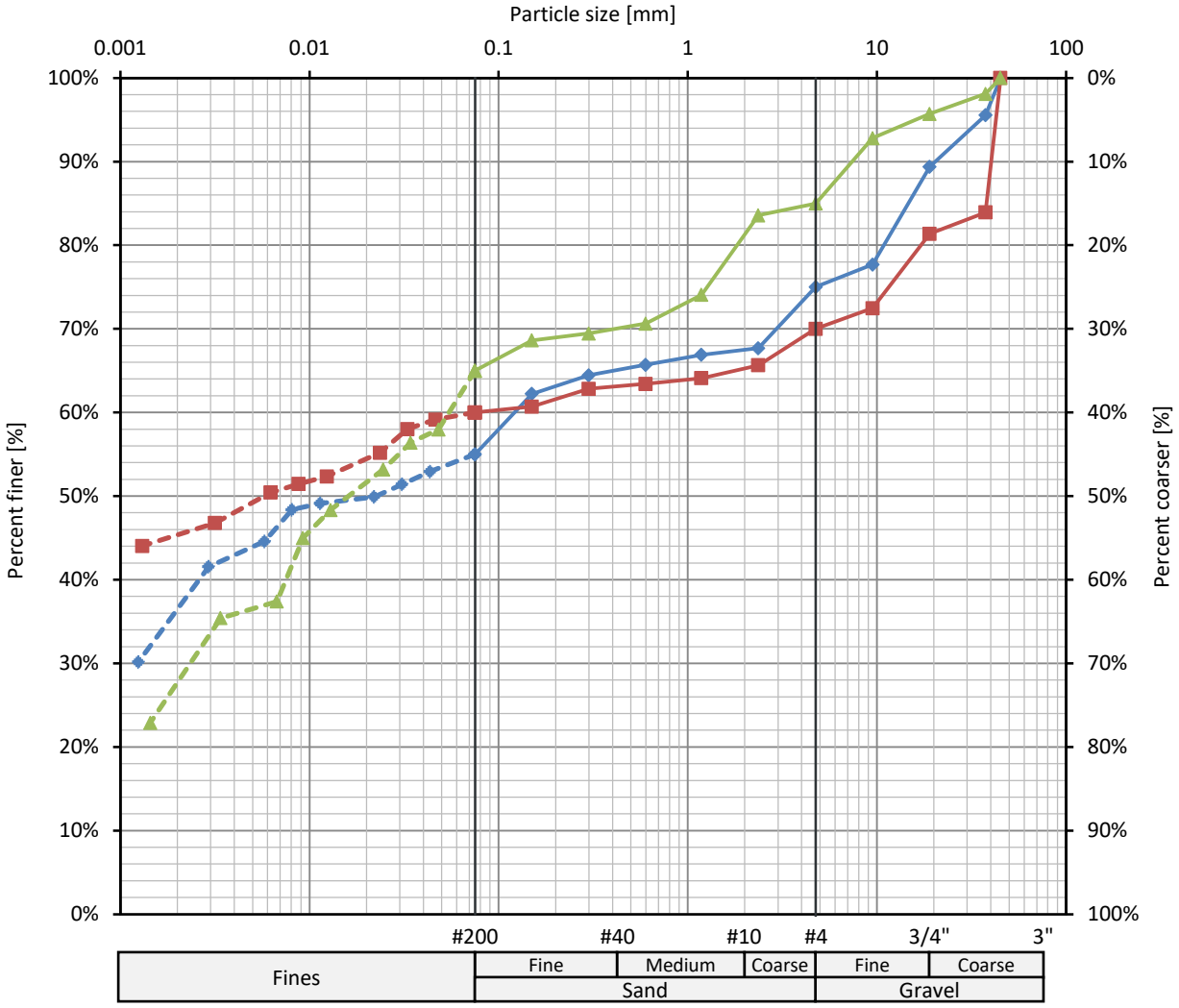
Symbol	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	65	10	11.7	13.3	-	1.2876	10.991	14.7677
■	20	35	24.4	20.6	-	0.008	0.0938	0.1466
▲	40	10.5	37.5	12	0.0018	0.0057	0.1043	4.75

Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	7	-	-	61	37	GC	Clayey GRAVEL with Boulders
■	TP-01	8	-	-	23	5	SC-SM	Silty, Clayey SAND with Gravel, Cobbles and Boulders
▲	TP-01	9	2612.81	0	43	14	GM	Silty GRAVEL

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	25	20	18.5	36.5	-	-	0.0225	0.1211
■	30	10	14.6	45.4	-	-	0.0058	0.075
▲	15	20	37.3	27.7	-	0.0023	0.0161	0.0547

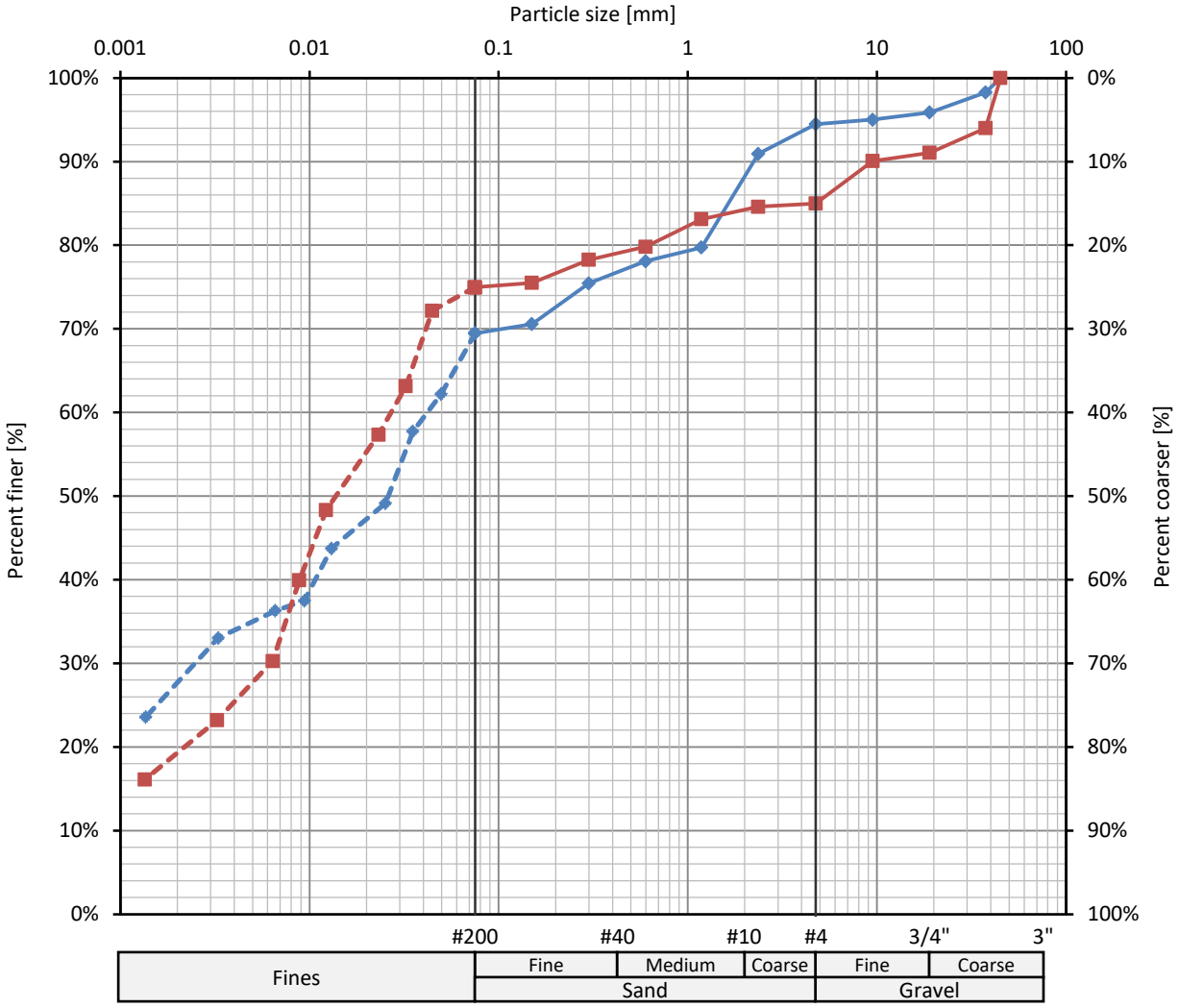
Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	10	-	-			CL	Gravelly LEAN CLAY with Sand and Cobbles
■	TP-01	11	-	-	64	38	CH	Gravelly FAT CLAY with Boulders
▲	TP-01	12	-	-			CL-ML	Sandy SILTY CLAY with Gravel, Cobbles and Boulders

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Tip: Hatched cells are visually examined.

Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	5.5	25	41.8	27.7	-	0.0025	0.0261	0.0419
■	15	10	55.7	19.3	-	0.0062	0.0138	0.027
▲								

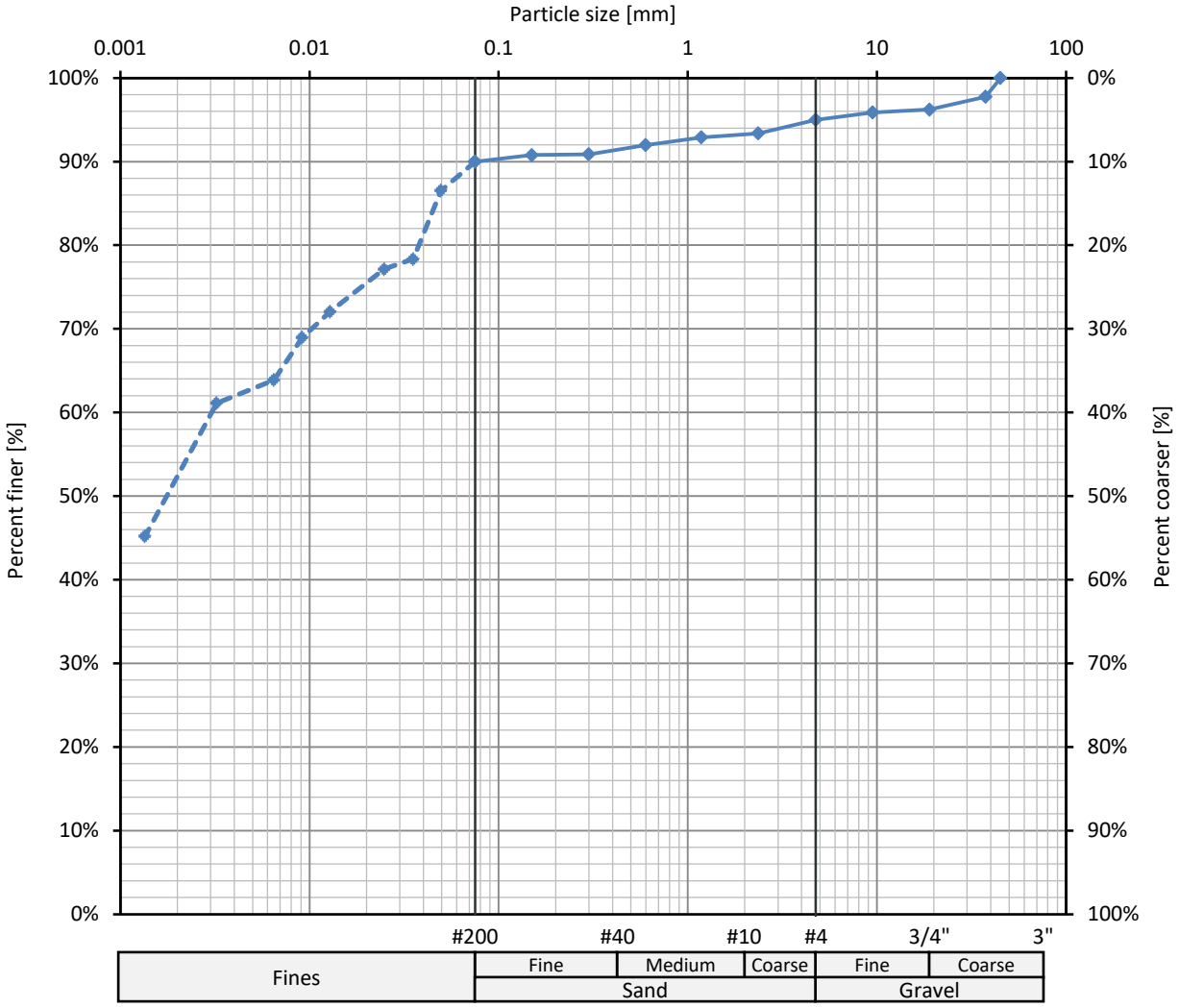
Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	13	-	-	NP	NP	ML	Sandy SILT
■	TP-01	14	-	-	74	20	MH	ELASTIC SILT with Gravel and Cobbles
▲	TP-01	15			43	18	OL	ORGANIC CLAY with Sand and Boulders

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Tip: Hatched cells are visually examined.

Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	5	5	37.6	52.4	-	-	0.0018	0.003

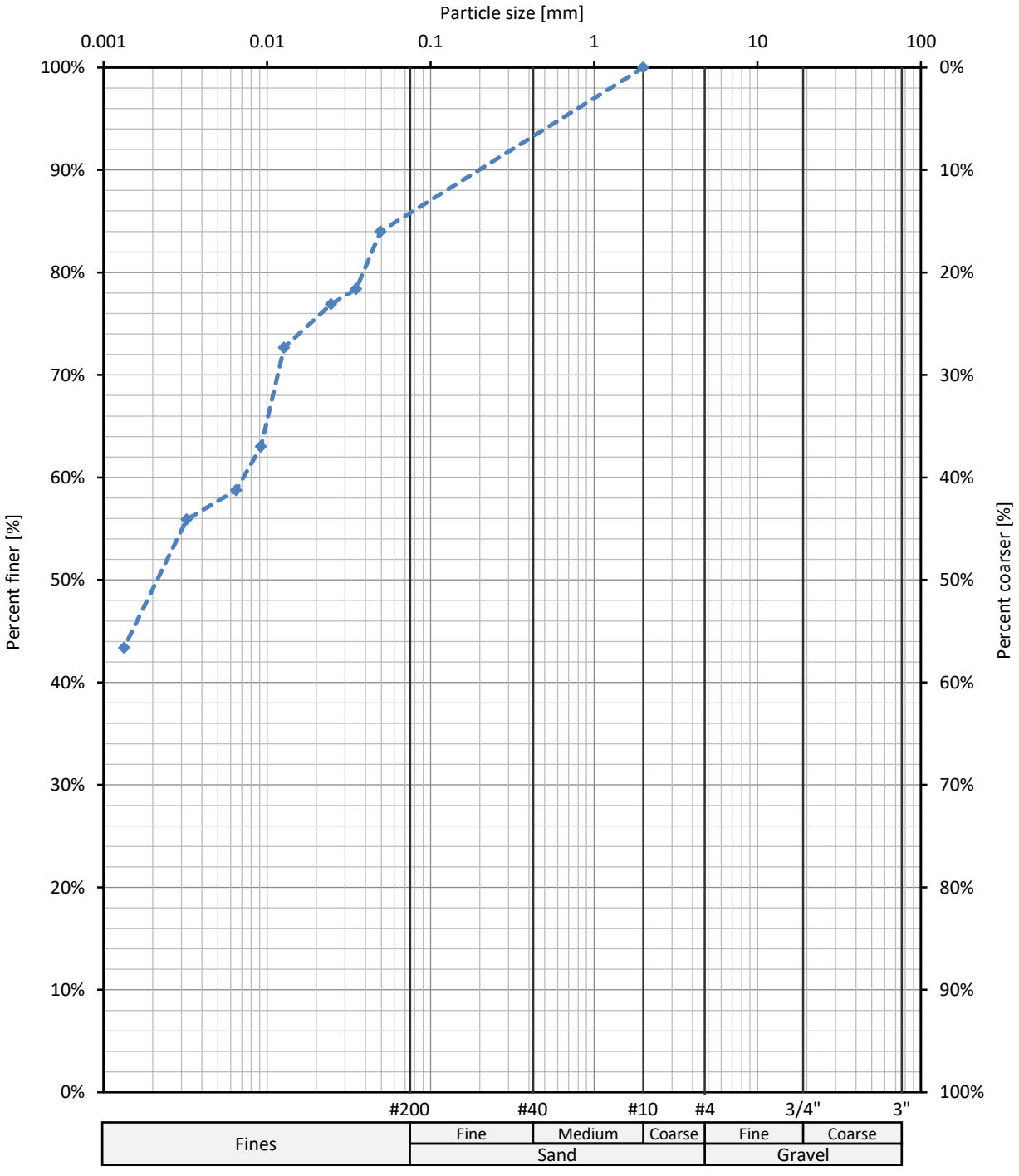
Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	16	-	-			OH	ORGANIC CLAY with Cobbles and Boulders

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Tip: Hatched cells are visually examined.

Hydrometer Test

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	BH/TP	Depth [m]	Sand [%]	Silt [%]	Clay [%]
◆	TP-01	15	14.2	36.7	49.1

Att.: Particles finer than 0.002 [mm] are considered as Clay.

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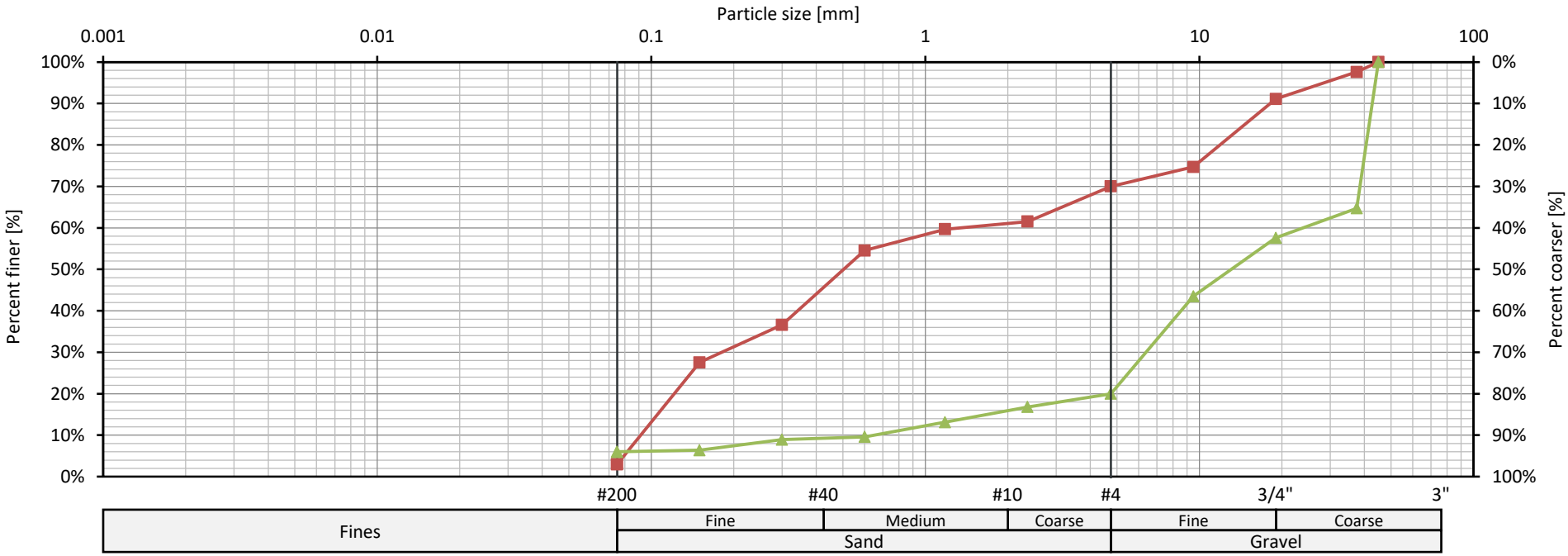
Particle-Size Distribution

Landscape

Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Organic	Cobble	Boulder	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	-	-	-								
■	-	✓	-	30	67		3	0.0914	0.181	0.5035	1.3367
▲	-	-	✓	80	14		6	0.6466	6.378	13.0697	23.8938

Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	1			-	-	GW	Well-Graded GRAVEL with Sand
■	TP-01	2	14.63	0.27	-	-	SP	Poorly-Graded SAND with Gravel and Cobbles
▲	TP-01	3	36.96	2.63			GW-GC	Well-Graded GRAVEL with Clay and Boulders

Tip: Hatched cells are visually examined.

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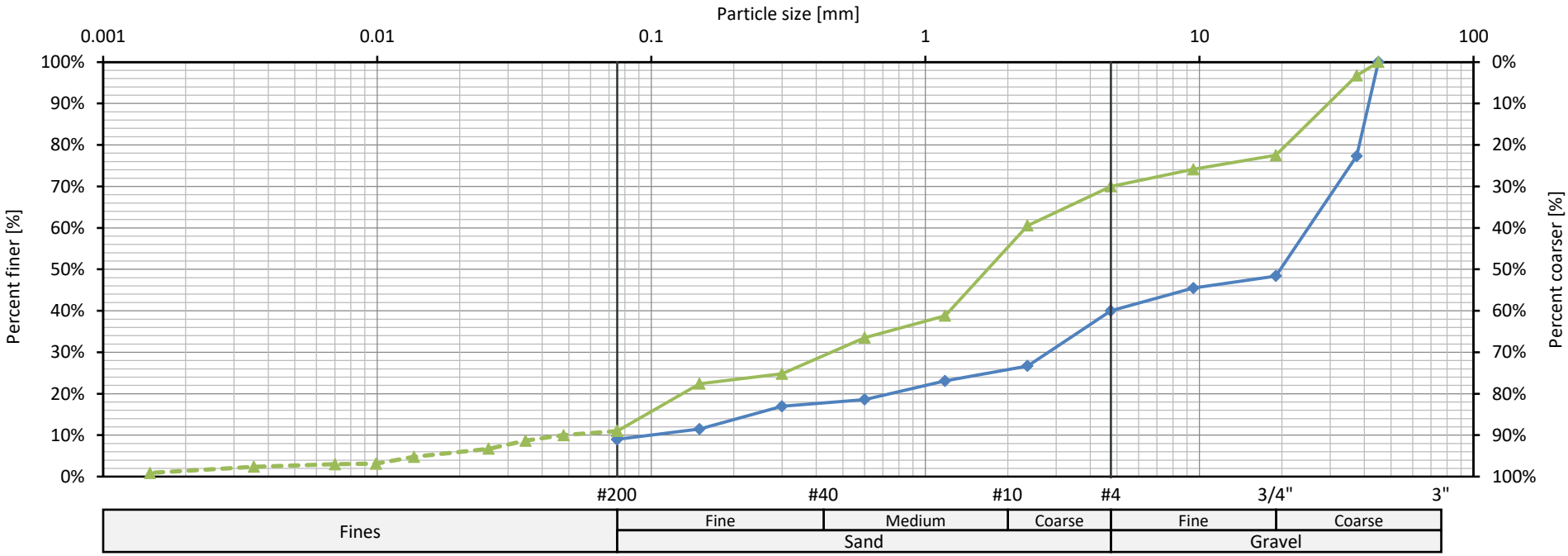
Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Organic	Cobble	Boulder	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	-	✓	✓	60	31	9		0.0991	2.808	19.7283	24.9569
■	-	-	-								
▲	-	✓	-	30	59	9.6	1.4	0.0476	0.4532	1.6853	2.3182

Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	4	251.9	3.19	NP	NP	GP-GM	Poorly-Graded GRAVEL with Silt, Sand, Cobbles and Boulders
■	TP-01	5			28	7	SW-SC	Well-Graded SAND with Silty Clay
▲	TP-01	6	48.68	1.86			SW-SM	Well-Graded SAND with Silt, Gravel and Cobbles

Att.: Particles finer than 0.002 [mm] are considered as Clay. Tip: Hatched cells are visually examined.

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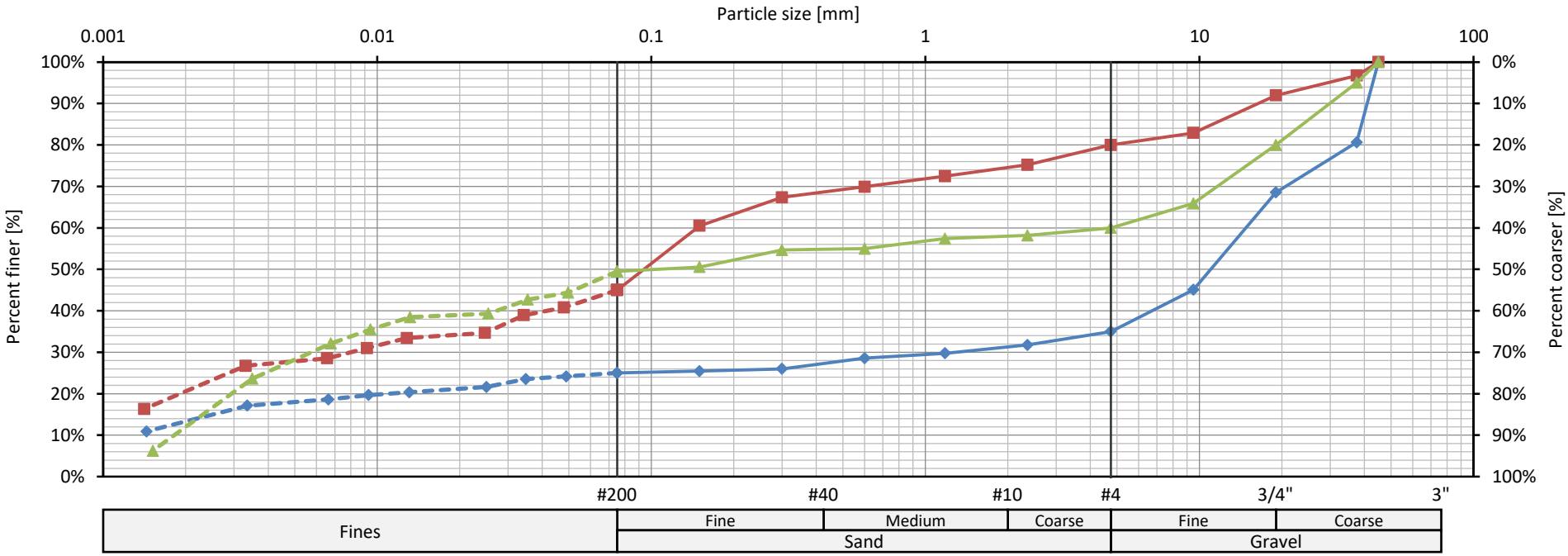
Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Organic	Cobble	Boulder	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	-	-	✓	65	10	11.7	13.3	-	1.2876	10.991	14.7677
■	-	✓	✓	20	35	24.4	20.6	-	0.008	0.0938	0.1466
▲	-	-	-	40	10.5	37.5	12	0.0018	0.0057	0.1043	4.75

Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	7	-	-	61	37	GC	Clayey GRAVEL with Boulders
■	TP-01	8	-	-	23	5	SC-SM	Silty, Clayey SAND with Gravel, Cobbles and Boulders
▲	TP-01	9	2612.81	0	43	14	GM	Silty GRAVEL

Att.: Particles finer than 0.002 [mm] are considered as Clay.

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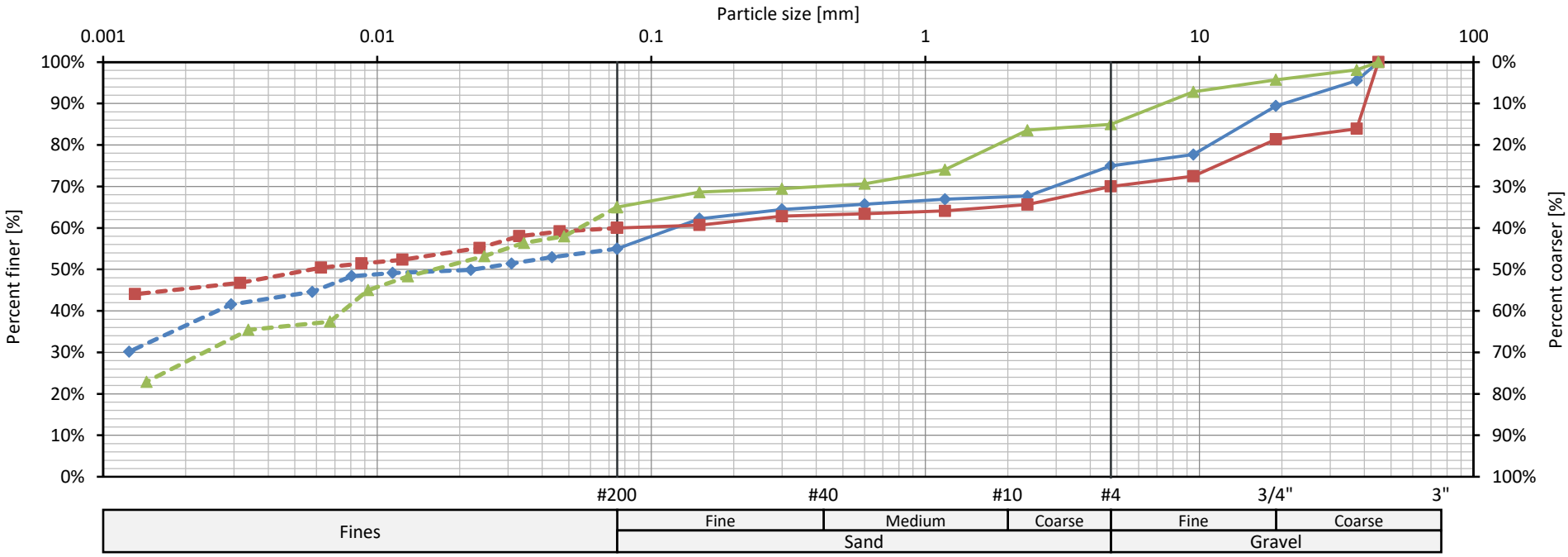
Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Organic	Cobble	Boulder	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	-	✓	-	25	20	18.5	36.5	-	-	0.0225	0.1211
■	-	-	✓	30	10	14.6	45.4	-	-	0.0058	0.075
▲	-	✓	✓	15	20	37.3	27.7	-	0.0023	0.0161	0.0547

Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	10	-	-			CL	Gravelly LEAN CLAY with Sand and Cobbles
■	TP-01	11	-	-	64	38	CH	Gravelly FAT CLAY with Boulders
▲	TP-01	12	-	-			CL-ML	Sandy SILTY CLAY with Gravel, Cobbles and Boulders

Att.: Particles finer than 0.002 [mm] are considered as Clay. Tip: Hatched cells are visually examined.

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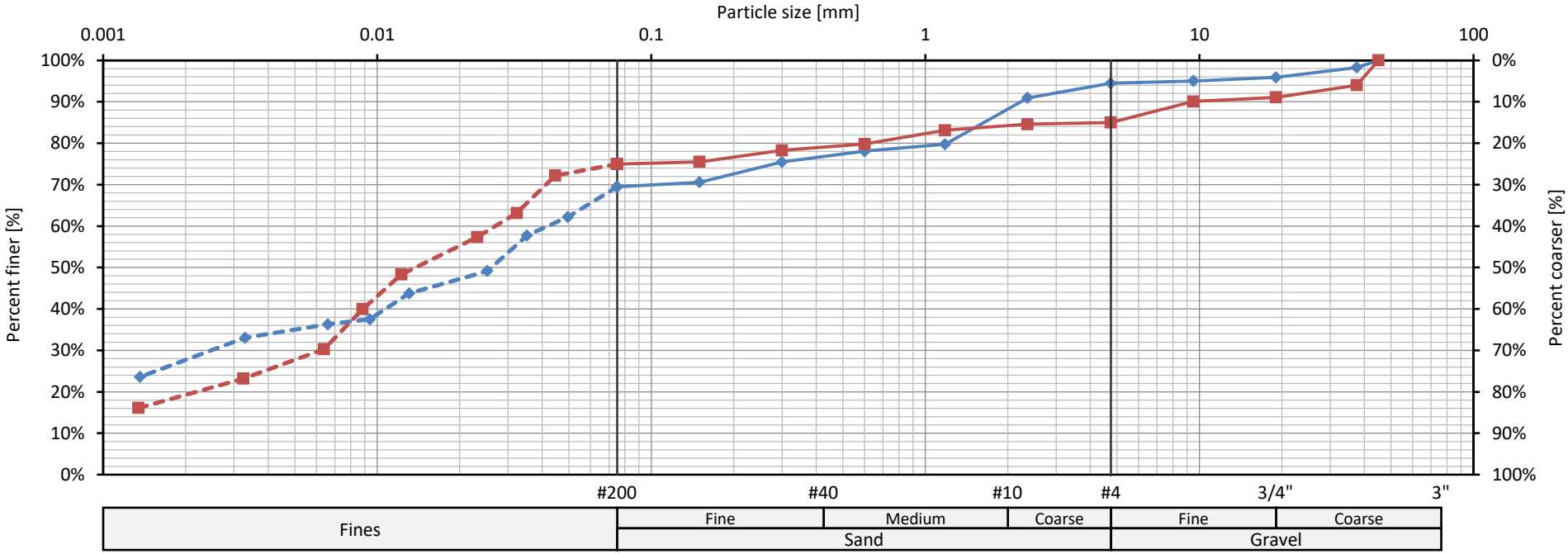
Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Organic	Cobble	Boulder	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	-	-	-	5.5	25	41.8	27.7	-	0.0025	0.0261	0.0419
■	-	✓	-	15	10	55.7	19.3	-	0.0062	0.0138	0.027
▲	✓	-	✓								

Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	13	-	-	NP	NP	ML	Sandy SILT
■	TP-01	14	-	-	74	20	MH	ELASTIC SILT with Gravel and Cobbles
▲	TP-01	15			43	18	OL	ORGANIC CLAY with Sand and Boulders

Att.: Particles finer than 0.002 [mm] are considered as Clay. Tip: Hatched cells are visually examined.

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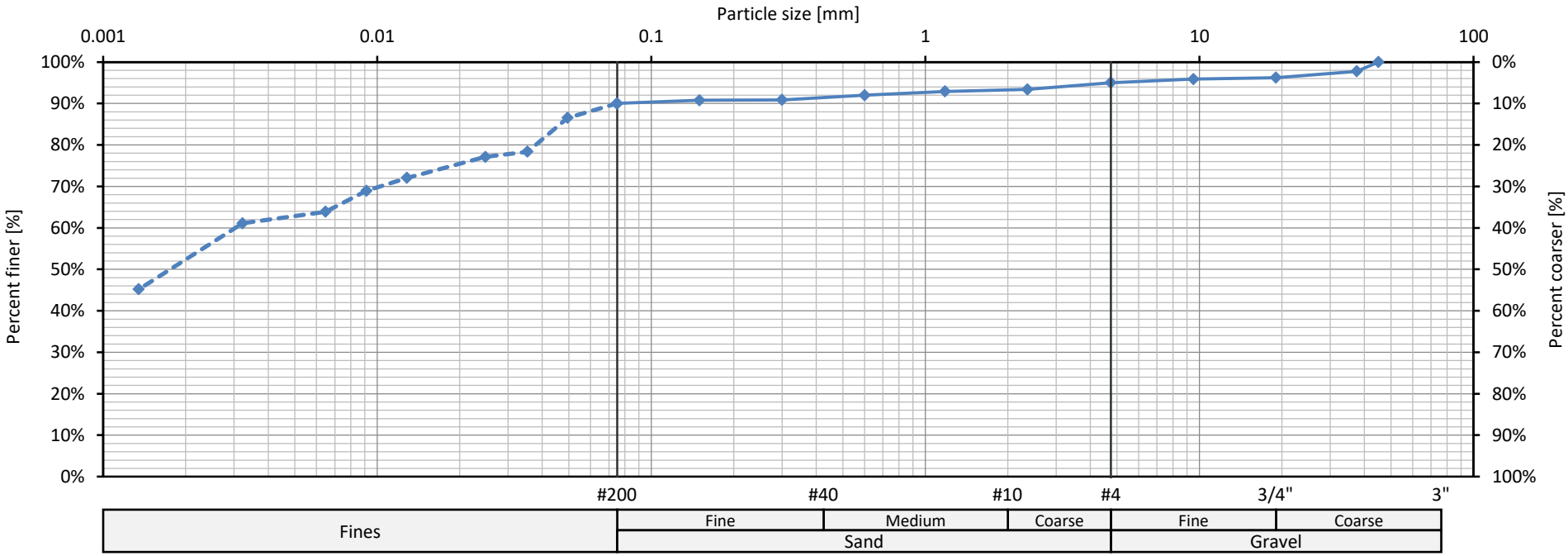
Particle-Size Distribution

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	Organic	Cobble	Boulder	Gravel [%]	Sand [%]	Silt [%]	Clay [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
◆	✓	✓	✓	5	5	37.6	52.4	-	-	0.0018	0.003

Symbol	BH/TP	Depth [m]	C_u	C_c	LL	PI	USCS	Description
◆	TP-01	16	-	-			OH	ORGANIC CLAY with Cobbles and Boulders

Att.: Particles finer than 0.002 [mm] are considered as Clay. Tip: Hatched cells are visually examined.

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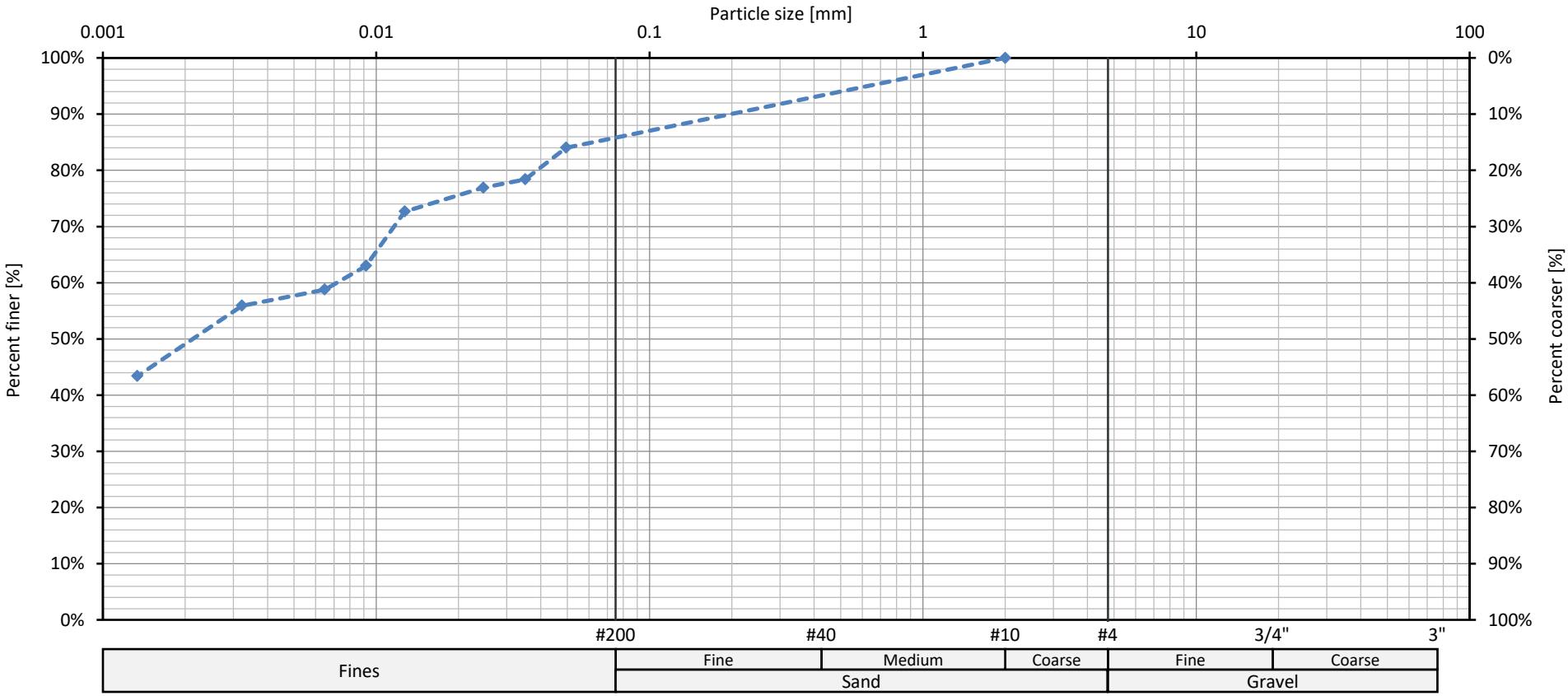
Hydrometer Test

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



Symbol	BH/TP	Depth [m]	Sand [%]	Silt [%]	Clay [%]
◆	TP-01	15	14.2	36.7	49.1

Att.: Particles finer than 0.002 [mm] are considered as Clay.

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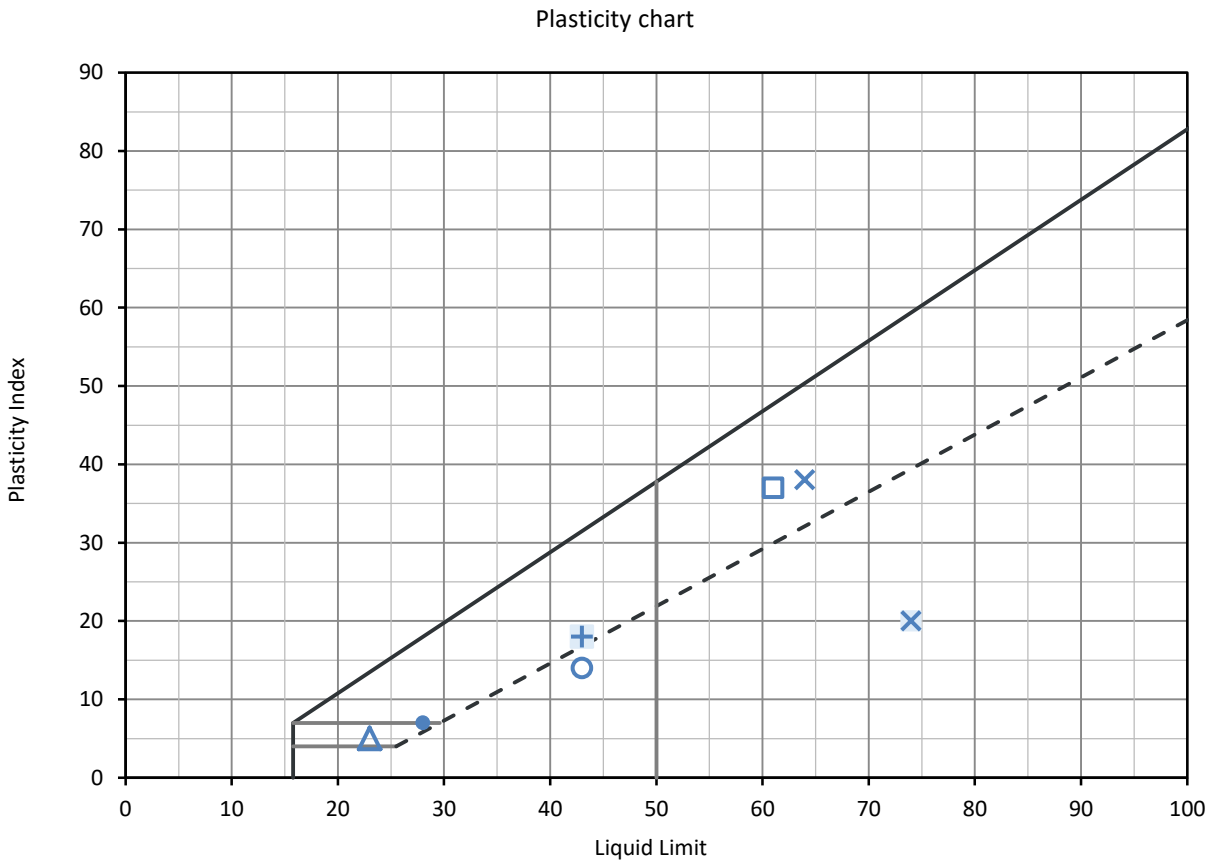
Atterberg Limits

Atterberg Limits Tests

Project:	Sample
Client:	Client
Location:	Location
Code:	Project code



No.	Symbol	BH/TP	Depth [m]	USCS	LL	PL	PI	Fines as
1	■	TP-01	3	GW-GC				CL
2	▲	TP-01	4	GP-GM	NP	NP	NP	ML
3	●	TP-01	5	SW-SC	28	21	7	CL-ML
4	◆	TP-01	6	SW-SM				ML
5	□	TP-01	7	GC	61	24	37	CH
6	△	TP-01	8	SC-SM	23	18	5	CL-ML
7	○	TP-01	9	GM	43	29	14	ML
8	◇	TP-01	10	CL				CL
9	×	TP-01	11	CH	64	26	38	CH
10	+	TP-01	12	CL-ML				CL-ML
11	✳	TP-01	13	ML	NP	NP	NP	ML
12	×	TP-01	14	MH	74	54	20	MH
13	+	TP-01	15	OL	43	25	18	CL
14	✳	TP-01	16	OH				CH

Tip: Hatched cells are visually examined.

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Sieve Analysis

Test data

Sieve Analysis - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	2 [m]
Location:	Location	USCS:	SP
Code:	Project code	Sample:	Disturbed

☐ Organic ☑ Cobble ☐ Boulder

Dry mass: 5000.0 [g]

No.	Sieve	Opening [mm]	Mass retained [g]	Mass retained [%]	Cumulative percent [%] Coarser	Finer
1	3"	75	500	-	-	-
2	1 (1/2)"	37.5	108.6	2.41	2.41	97.59
3	(3/4)"	19	292.1	6.49	8.9	91.1
4	(3/8)"	9.5	737.4	16.39	25.29	74.71
5	No. 4	4.75	212	4.71	30	70
6	No. 8	2.36	380.6	8.46	38.46	61.54
7	No. 16	1.18	84.5	1.88	40.34	59.66
8	No. 30	0.6	230.6	5.12	45.46	54.54
9	No. 50	0.3	807.1	17.94	63.4	36.6
10	No. 100	0.15	407.5	9.06	72.45	27.55
11	No. 200	0.075	1104.7	24.55	97	3
		Pan [g]	134.9			

Date: 2023-09-28 Time: 08:30 Tested by: -

Notes:

Gravel [%]	Sand [%]	Fines [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
30	67	3	0.0914	0.181	0.5035	1.3367

C_u	C_c	LL	PI	USCS	Description
14.63	0.27	-	-	SP	Poorly-Graded SAND with Gravel and Cobbles

Sieve Analysis - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	7 [m]
Location:	Location	USCS:	GC
Code:	Project code	Sample:	Undisturbed

☐ Organic ☐ Cobble ☑ Boulder

Dry mass: 5000.0 [g]

No.	Sieve	Opening [mm]	Mass retained [g]	Mass retained [%]	Cumulative percent [%] Coarser	Finer
1	1 (1/2)"	37.5	968.7	19.37	19.37	80.63
2	(3/4)"	19	604.7	12.09	31.47	68.53
3	(3/8)"	9.5	1173.4	23.47	54.94	45.06
4	No. 4	4.75	503.3	10.07	65	35
5	No. 8	2.36	161.7	3.23	68.24	31.76
6	No. 16	1.18	100.9	2.02	70.25	29.75
7	No. 30	0.6	58.9	1.18	71.43	28.57
8	No. 50	0.3	128	2.56	73.99	26.01
9	No. 100	0.15	28.5	0.57	74.56	25.44
10	No. 200	0.075	22	0.44	75	25
		Pan [g]	1249.9			

Date: 2023-09-28 Time: 08:30 Tested by: -

Notes:

Gravel [%]	Sand [%]	Fines [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
65	10	25	-	1.2876	10.991	14.7677

C_u	C_c	LL	PI	USCS	Description
-	-	61	37	GC	Clayey GRAVEL with Boulders

Sieve Analysis - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	13 [m]
Location:	Location	USCS:	ML
Code:	Project code	Sample:	Undisturbed

☐ Organic ☐ Cobble ☐ Boulder

Dry mass: 1000.0 [g]

No.	Sieve	Opening [mm]	Mass retained [g]	Mass retained [%]	Cumulative percent [%] Coarser	Finer
1	1 (1/2)"	37.5	17.3	1.73	1.73	98.27
2	(3/4)"	19	24	2.4	4.13	95.87
3	(3/8)"	9.5	8.6	0.86	4.99	95.01
4	No. 4	4.75	5.3	0.53	5.52	94.48
5	No. 8	2.36	35.5	3.55	9.07	90.93
6	No. 16	1.18	112	11.2	20.27	79.73
7	No. 30	0.6	16.4	1.64	21.91	78.09
8	No. 50	0.3	26.4	2.64	24.55	75.45
9	No. 100	0.15	48.8	4.88	29.43	70.57
10	No. 200	0.075	11	1.1	30.53	69.47
		Pan [g]	694.7			

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Gravel [%]	Sand [%]	Fines [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
5.5	25	69.5	-	0.0025	0.0261	0.0419

C_u	C_c	LL	PI	USCS	Description
-	-	NP	NP	ML	Sandy SILT

Sieve Analysis - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	16 [m]
Location:	Location	USCS:	OH
Code:	Project code	Sample:	Undisturbed

☑ Organic ☑ Cobble ☑ Boulder

Dry mass: 1000.0 [g]

No.	Sieve	Opening [mm]	Mass retained [g]	Mass retained [%]	Cumulative percent [%] Coarser	Finer
1	1 (1/2)"	37.5	22.4	2.24	2.24	97.76
2	(3/4)"	19	15.4	1.54	3.78	96.22
3	(3/8)"	9.5	3.4	0.34	4.12	95.88
4	No. 4	4.75	8.8	0.88	5	95
5	No. 8	2.36	16.2	1.62	6.62	93.38
6	No. 16	1.18	4.8	0.48	7.1	92.9
7	No. 30	0.6	9.2	0.92	8.02	91.98
8	No. 50	0.3	11	1.1	9.12	90.88
9	No. 100	0.15	1	0.1	9.22	90.78
10	No. 200	0.075	7.8	0.78	10	90
		Pan [g]	900			

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Gravel [%]	Sand [%]	Fines [%]	D_{10} [mm]	D_{30} [mm]	D_{50} [mm]	D_{60} [mm]
5	5	90	-	-	0.0018	0.003

C_u	C_c	LL	PI	USCS	Description
-	-			OH	ORGANIC CLAY with Cobbles and Boulders

Tip: Hatched cells are visually examined.

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Hydrometer

Test data

Hydrometer (ASTM D7928) - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	6 [m]
Location:	Location	USCS:	SW-SM
Code:	Project code	Sample:	Disturbed

General Type: 151H Dispersant: NaPO3 Separation sieve: No. 200

Passing: 11.00 [%]

Properties G_s: 2.45 Suspension vol., V_{sp}: 996.3 [cm3] Dry soil mass, M_d: 30.6 [g]

Correction Meniscus - C_m: 0.00050

Control cylinder

Note: The "Offset" column is filled with companion measurements taken in a control cylinder filled with the reference solution during the test.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
No.	Elapsed time	Temp.	Reading	Offset	Corrected readings		Fall distance	Diameter	Percent finer [%]	
	t [min]	T [°c]	R	R_{dt}	R - R_{dt}	R_{cL}	H [cm]	D [mm]	Partial	Total
1	1	28.7	1.01975	1.003	0.01675	1.02025	10.83	0.04784	91.06	10.02
2	2	28.7	1.0175	1.003	0.0145	1.018	11.43	0.03476	78.83	8.67
3	4	28.7	1.01425	1.003	0.01125	1.01475	12.31	0.0255	61.16	6.73
4	15	28.7	1.011	1.003	0.008	1.0115	13.19	0.01363	43.49	4.79
5	30	28.7	1.00825	1.003	0.00525	1.00875	13.93	0.00991	28.54	3.14
6	60	28.7	1.008	1.003	0.005	1.0085	14	0.00702	27.18	2.99
7	240	28.7	1.007	1.003	0.004	1.0075	14.27	0.00354	21.75	2.39
8	1440	28.7	1.0045	1.003	0.0015	1.005	14.94	0.00148	8.15	0.9

Date: 2023-09-28 Time: 08:30 Tested by: -

Notes:

Sand [%]	Silt [%]	Clay [%]
N/A	87.2	12.8

Equations

(7): $R_{cL} = R + C_m$

(9): $D = 10 \times \{ [18\mu / (\rho_w \times g) / (G_s - 1)] \times (H / t) \}^{0.5}$

(10): $[G_s / (G_s - 1)] \times (V_{sp} / M_d) \times \rho_w \times (R - R_{dt}) \times 100$

(11): (10) x Passing

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Parameters

μ: Viscosity of water at 20 [°C], $\mu = 0.01$ [g/(cm.s)]

ρ_w: Mass density of water at 20 [°C], $\rho_w = 0.99821$ [g/cm^3]

Hydrometer (ASTM D7928) - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	7 [m]
Location:	Location	USCS:	GC
Code:	Project code	Sample:	Undisturbed

General Type: 152H Dispersant: NaPO3 Separation sieve: No. 200

Passing: 25.00 [%]

Properties G_s: 2.45 Suspension vol., V_{sp}: 996.3 [cm3] Dry soil mass, M_d: 30.6 [g]

Correction Meniscus - C_m: 0.50 [g/L]

Control cylinder

Note: The "Offset" column is filled with companion measurements taken in a control cylinder filled with the reference solution during the test.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
No.	Elapsed time	Temp.	Reading	Offset [g/L]	Corrected readings [g/L]		Fall distance	Diameter	Percent finer [%]	
	t [min]	T [°c]	R [g/L]	R_{dt}	R - R_{dt}	R_{cL}	H [cm]	D [mm]	Partial	Total
1	1	28.7	29.75	1.5	28.25	30.25	11.35	0.04897	96.76	24.19
2	2	28.7	29	1.5	27.5	29.5	11.48	0.03483	94.19	23.55
3	4	28.7	26.75	1.5	25.25	27.25	11.88	0.02506	86.48	21.62
4	15	28.7	25.25	1.5	23.75	25.75	12.15	0.01308	81.35	20.34
5	30	28.7	24.5	1.5	23	25	12.29	0.0093	78.78	19.69
6	60	28.7	23.25	1.5	21.75	23.75	12.51	0.00664	74.5	18.62
7	240	28.7	21.5	1.5	20	22	12.82	0.00336	68.5	17.12
8	1440	28.7	14.25	1.5	12.75	14.75	14.11	0.00144	43.67	10.92

Date: 2023-09-28 Time: 08:30 Tested by: -

Notes:

Sand [%]	Silt [%]	Clay [%]
N/A	46.7	53.3

Equations

(7): $R_{cL} = R + C_m$

(9): $D = 10 \times \{ [18\mu / (\rho_w \times g) / (G_s - 1)] \times (H / t) \}^{0.5}$

(10): $0.6226 \times [G_s / (G_s - 1)] \times (V_{sp} / M_d) \times (R - R_{dt}) \times (100/1000)$

(11): (10) x Passing

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Parameters

μ: Viscosity of water at 20 [°C], $\mu = 0.01$ [g/(cm.s)]

ρ_w: Mass density of water at 20 [°C], $\rho_w = 0.99821$ [g/cm^3]

Hydrometer (ASTM D7928) - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	11 [m]
Location:	Location	USCS:	CH
Code:	Project code	Sample:	Undisturbed

General Type: 151H Dispersant: NaPO3 Separation sieve: No. 10

Passing: 65.27 [%]

Properties G_s: 2.45 Suspension vol., V_{sp}: 996.3 [cm3] Dry soil mass, M_d: 30.6 [g]

Correction Meniscus - C_m: 0.00050

Calibration relationship

No.	1	2	3	4	5
T_t [°c]	15	18.5	22	25.5	29
$R_{151,t}$	1.006	1.00525	1.0045	1.00375	1.00275
A_t*	1.00723	1.00709	1.00707	1.00717	1.00715

* $A_t = R_{151,t} + (7.784 \times 10^{-6} \times T_t) + (4.959 \times 10^{-6} \times T_t^2)$

A	1.00714	✓
Std. Dev.	6E-05	✓

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
No.	Elapsed time	Temp.	Reading	Offset	Corrected readings		Fall distance	Diameter	Percent finer [%]	
	t [min]	T [°c]	R	R_{dt}	R - R_{dt}	R_{cL}	H [cm]	D [mm]	Partial	Total
1	1	17	1.02225	1.00558	0.01667	1.02275	10.15	0.04632	90.63	59.15
2	2	18	1.02175	1.0054	0.01635	1.02225	10.29	0.03297	88.89	58.02
3	4	19	1.02075	1.0052	0.01555	1.02125	10.56	0.02362	84.54	55.18
4	15	20	1.01975	1.005	0.01475	1.02025	10.83	0.01235	80.19	52.34
5	30	20	1.0195	1.005	0.0145	1.02	10.89	0.00876	78.83	51.45
6	60	21	1.019	1.00479	0.01421	1.0195	11.03	0.00623	77.25	50.42
7	240	22	1.01775	1.00457	0.01318	1.01825	11.37	0.00316	71.65	46.77
8	1440	23	1.01675	1.00434	0.01241	1.01725	11.64	0.00131	67.47	44.04

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Sand [%]	Silt [%]	Clay [%]
N/A	24.4	75.6

Equations

(5): $R_{dt} = A - 7.784 \times 10^{-6} \times T - 4.959 \times 10^{-6} \times T^2$

(7): $R_{cL} = R + C_m$

(9): $D = 10 \times \{ [18\mu / (\rho_w \times g) / (G_s - 1)] \times (H / t) \}^{0.5}$

(10): $[G_s / (G_s - 1)] \times (V_{sp} / M_d) \times \rho_w \times (R - R_{dt}) \times 100$

(11): (10) x Passing

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Parameters

μ: Viscosity of water at 20 [°C], $\mu = 0.01$ [g/(cm.s)]

ρ_w: Mass density of water at 20 [°C], $\rho_w = 0.99821$ [g/cm^3]

Hydrometer (ASTM D7928) - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	12 [m]
Location:	Location	USCS:	CL-ML
Code:	Project code	Sample:	Undisturbed

General Type: 152H Dispersant: NaPO3 Separation sieve: No. 200

Passing: 65.00 [%]

Properties G_s: 2.45 Suspension vol., V_{sp}: 996.3 [cm3] Dry soil mass, M_d: 30.6 [g]

Correction Meniscus - C_m: 0.50 [g/L]

Calibration relationship

No.	1	2	3	4	5
T_t [°c]	15	18.5	22	25.5	29
$R_{152,t}$ [g/L]	6.5	5.5	4.25	3	1.5
B_t* [g/L]	8.48	8.45	8.37	8.49	8.55

B [g/L]	8.47	✓
Std. Dev.	0.06	✓

* $B_t = R_{152,t} + (1.248 \times 10^{-2} \times T_t) + (7.950 \times 10^{-3} \times T_t^2)$

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
No.	Elapsed time	Temp.	Reading	Offset [g/L]	Corrected readings [g/L]		Fall distance	Diameter	Percent finer [%]	
	t [min]	T [°c]	R [g/L]	R_{dt}	R - R_{dt}	R_{cL}	H [cm]	D [mm]	Partial	Total
1	1	17	32	5.96	26.04	32.5	10.95	0.0481	89.19	57.97
2	2	18	31	5.67	25.33	31.5	11.13	0.03429	86.76	56.39
3	4	19	29.25	5.36	23.89	29.75	11.44	0.02458	81.83	53.19
4	15	20	26.75	5.04	21.71	27.25	11.88	0.01294	74.36	48.33
5	30	20	25.25	5.04	20.21	25.75	12.15	0.00925	69.22	44.99
6	60	21	21.5	4.7	16.8	22	12.82	0.00672	57.54	37.4
7	240	22	20.25	4.34	15.91	20.75	13.04	0.00339	54.49	35.42
8	1440	23	14.25	3.97	10.28	14.75	14.11	0.00144	35.21	22.89

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Sand [%]	Silt [%]	Clay [%]
N/A	57.4	42.6

Equations

(5): $R_{dt} = B - 1.248 \times 10^{-2} \times T - 7.950 \times 10^{-3} \times T^2$

(7): $R_{cL} = R + C_m$

(9): $D = 10 \times \{ [18\mu / (\rho_w \times g) / (G_s - 1)] \times (H / t) \}^{0.5}$

(10): $0.6226 \times [G_s / (G_s - 1)] \times (V_{sp} / M_d) \times (R - R_{dt}) \times (100/1000)$

(11): (10) x Passing

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Parameters

μ: Viscosity of water at 20 [°C], $\mu = 0.01$ [g/(cm.s)]

ρ_w: Mass density of water at 20 [°C], $\rho_w = 0.99821$ [g/cm^3]

Hydrometer (ASTM D422) - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	13 [m]
Location:	Location	USCS:	ML
Code:	Project code	Sample:	Undisturbed

General Type: 151H Dispersant: NaPO3 Separation sieve: No. 50

Passing: 75.45 [%]

Properties G_s: 2.45 Dry soil mass, M_d: 30.6 [g]

Correction

Normal

Meniscus - C_m: 0.00050

Temperature - C_t: ASTM*

Dispersant - C_d: 0.00500

* Refer to scientific manual.

Composite

Meniscus - C_m:

Test No.	1	2
T_t [°c]		
$C_{c,t}$		

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No.	Elapsed time t [min]	Temp. T [°c]	Reading R	Corrected readings R_{cp}	R_{cL}	Fall distance H [cm]	Diameter D [mm]	Percent finer [%] Partial	Total
1	1	17	1.0205	1.01493	1.021	10.74	0.04962	82.42	62.18
2	2	18	1.01925	1.01386	1.01975	11.07	0.03518	76.52	57.73
3	4	19	1.017	1.0118	1.0175	11.67	0.02522	65.15	49.16
4	15	20	1.0155	1.0105	1.016	12.06	0.01308	57.98	43.74
5	30	20	1.014	1.009	1.0145	12.46	0.0094	49.7	37.5
6	60	21	1.0135	1.00871	1.014	12.59	0.0066	48.1	36.29
7	240	22	1.0125	1.00793	1.013	12.86	0.0033	43.8	33.05
8	1440	23	1.01	1.00566	1.0105	13.52	0.00136	31.27	23.59

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Sand [%]	Silt [%]	Clay [%]
N/A	60.1	39.9

Equations

(5): $R_{cp} = R - C_d + C_t$; $R_{cp} = R - C_c$

(6): $R_{cL} = R + C_m$

(8): $D = K \times (H / t)^{0.5}$; $K = [30n / 980 / (G_s - G_1)]^{0.5}$

(9): $\{ (100{,}000 / M_d) \times [G_s / (G_s - G_1)] \} \times (R_{cp} - G_1)$

(10): (9) x Passing

Parameters

G_1: Specific gravity of the suspending medium (G_1 = 1.000 for all practical purposes).

n: Viscosity of the suspending medium (in this case water) [g/(cm.s)].

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Hydrometer (ASTM D422) - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	14 [m]
Location:	Location	USCS:	MH
Code:	Project code	Sample:	Undisturbed

General Type: 152H Dispersant: NaPO3 Separation sieve: No. 200

Passing: 74.97 [%]

Properties G_s: 2.45 Dry soil mass, M_d: 30.6 [g]

Correction

Normal

Meniscus - C_m: 0.50 [g/L]

Temperature - C_t: 3.50 [g/L]

Dispersant - C_d: 5.00 [g/L]

Composite

Meniscus - C_m:

Test No.	1	2
T_t [°c]		
$C_{c,t}$ [g/L]		

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No.	Elapsed time t [min]	Temp. T [°c]	Reading R [g/L]	Corrected readings [g/L] R_{cp}	R_{cL}	Fall distance H [cm]	Diameter D [mm]	Percent finer [%] Partial	Total
1	1	28.7	29.5	28	30	11.37	0.04456	96.27	72.17
2	2	28.7	26	24.5	26.5	11.95	0.03229	84.23	63.15
3	4	28.7	23.75	22.25	24.25	12.32	0.02318	76.5	57.35
4	15	28.7	20.25	18.75	20.75	12.89	0.01225	64.46	48.33
5	30	28.7	17	15.5	17.5	13.42	0.00884	53.29	39.95
6	60	28.7	13.25	11.75	13.75	14.04	0.00639	40.4	30.29
7	240	28.7	10.5	9	11	14.49	0.00325	30.94	23.2
8	1440	28.7	7.75	6.25	8.25	14.94	0.00135	21.49	16.11

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Sand [%]	Silt [%]	Clay [%]
N/A	74.3	25.7

Equations

(5): $R_{cp} = R - C_d + C_t$; $R_{cp} = R - C_c$

(6): $R_{cL} = R + C_m$

(8): $D = K \times (H / t)^{0.5}$; $K = [30n / 980 / (G_s - G_1)]^{0.5}$

(9): $[(R_{cp} \times a) / M_d] \times 100$

(10): (9) x Passing

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Parameters

a: Correction factor

G_1: Specific gravity of the suspending medium (G_1 = 1.000 for all practical purposes).

n: Viscosity of the suspending medium (in this case water) [g/(cm.s)].

Hydrometer (ASTM D422) - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	15 [m]
Location:	Location	USCS:	OL
Code:	Project code	Sample:	Undisturbed

General Type: 151H Dispersant: NaPO3 Separation sieve: No. 10 Passing: -

Properties G_s: 2.45 Dry soil mass, M_d: 30.6 [g]

Correction

Normal: Meniscus - C_m: Temperature - C_t: Dispersant - C_d:

Composite: Meniscus - C_m: 0.00050

Test No.	1	2
T_t [°c]	15	29
$C_{c,t}$	0.006	0.00275

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No.	Elapsed time t [min]	Temp. T [°c]	Reading R	Corrected readings R_{cp}	Corrected readings R_{cL}	Fall distance H [cm]	Diameter D [mm]	Percent finer [%] Partial	Percent finer [%] Total
1	1	17	1.02075	1.01521	1.02125	10.67	0.04947	84.01	-
2	2	18	1.0195	1.0142	1.02	11	0.03507	78.39	-
3	4	19	1.019	1.01393	1.0195	11.14	0.02464	76.91	-
4	15	20	1.018	1.01316	1.0185	11.4	0.01272	72.67	-
5	30	20	1.01625	1.01141	1.01675	11.86	0.00917	63.01	-
6	60	21	1.01525	1.01064	1.01575	12.13	0.00648	58.77	-
7	240	22	1.0145	1.01013	1.015	12.33	0.00323	55.91	-
8	1440	23	1.012	1.00786	1.0125	12.99	0.00134	43.39	-

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Sand [%]	Silt [%]	Clay [%]
14.2	36.7	49.1

Equations

(5): $R_{cp} = R - C_d + C_t$; $R_{cp} = R - C_c$

(6): $R_{cL} = R + C_m$

(8): $D = K \times (H / t)^{0.5}$; $K = [30n / 980 / (G_s - G_1)]^{0.5}$

(9): $\{ (100{,}000 / M_d) \times [G_s / (G_s - G_1)] \} \times (R_{cp} - G_1)$

(10): (9) x Passing

Parameters

G_1: Specific gravity of the suspending medium (G_1 = 1.000 for all practical purposes).

n: Viscosity of the suspending medium (in this case water) [g/(cm.s)].

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Hydrometer (ASTM D422) - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	16 [m]
Location:	Location	USCS:	OH
Code:	Project code	Sample:	Undisturbed

General Type: 152H Dispersant: NaPO3 Separation sieve: No. 200

Passing: 90.00 [%]

Properties G_s: 2.45 Dry soil mass, M_d: 30.6 [g]

Correction

Normal

Meniscus - C_m:

Temperature - C_t:

Dispersant - C_d:

Composite

Meniscus - C_m: 0.50 [g/L]

Test No.	1	2
T_t [°c]	15	29
$C_{c,t}$ [g/L]	6.5	1.5

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
No.	Elapsed time t [min]	Temp. T [°c]	Reading R [g/L]	Corrected readings [g/L] R_{cp}	R_{cL}	Fall distance H [cm]	Diameter D [mm]	Percent finer [%] Partial	Total
1	1	17	33.75	27.96	34.25	10.68	0.04948	96.14	86.53
2	2	18	30.75	25.32	31.25	11.17	0.03533	87.06	78.35
3	4	19	30	24.93	30.5	11.29	0.02481	85.71	77.14
4	15	20	28	23.29	28.5	11.62	0.01284	80.06	72.05
5	30	20	27	22.29	27.5	11.78	0.00914	76.62	68.96
6	60	21	25	20.64	25.5	12.11	0.00648	70.97	63.87
7	240	22	23.75	19.75	24.25	12.32	0.00323	67.9	61.11
8	1440	23	18.25	14.61	18.75	13.22	0.00135	50.22	45.2

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Sand [%]	Silt [%]	Clay [%]
N/A	41.8	58.2

Equations

(5): $R_{cp} = R - C_d + C_t$; $R_{cp} = R - C_c$

(6): $R_{cL} = R + C_m$

(8): $D = K \times (H / t)^{0.5}$; $K = [30n / 980 / (G_s - G_1)]^{0.5}$

(9): $[(R_{cp} \times a) / M_d] \times 100$

(10): (9) x Passing

Parameters

a: Correction factor

G_1: Specific gravity of the suspending medium (G_1 = 1.000 for all practical purposes).

n: Viscosity of the suspending medium (in this case water) [g/(cm.s)].

Att.: Particles finer than 0.002 [mm] are considered as Clay.

Atterberg Limits

Test data

Atterberg Limits - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	7 [m]
Location:	Location	USCS:	GC
Code:	Project code	Sample:	Undisturbed

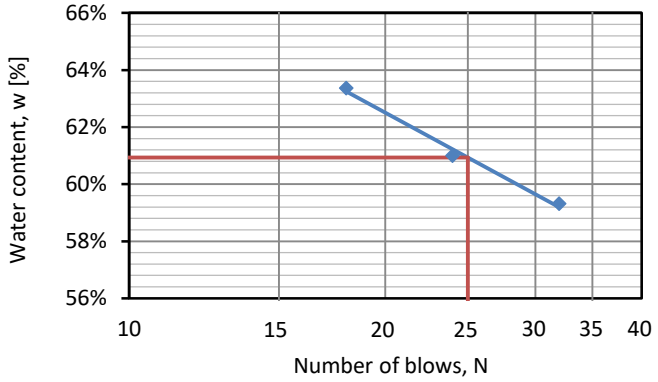
Liquid limit test (LL)

Multipoint method | One-point method

☐ Liquid limit test could not be performed.

	No.01	No.02	No.03	No.04	No.05
Number of blows, N	32	24	18		
Container No.	No. 01	No. 02	No. 03		
Mass of container + moist soil, M_{cms} [g]	35.24	37.79	35.88		
Mass of container + dry soil, M_{cds} [g]	28.52	30.5	28.46		
Mass of container, M_c [g]	17.19	18.55	16.75		
Mass of water, Mw [g]	6.72	7.29	7.42		
Mass of dry soil, Mds [g]	11.33	11.95	11.71		
Water content, w [%]	59.31	61	63.36		

No.01	No.02



$LL_n=W_n.(N/25)^{0.121}$

$LL=(LL_1+LL_2)/2$

LL = 60.9

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Plastic limit test (PL)

☐ Plastic limit test could not be performed.

	No.01	No.02
Container No.	No. 04	No. 05
Mass of container + moist soil, M_{cms} [g]	24.44	23.75
Mass of container + dry soil, M_{cds} [g]	22.96	22.13
Mass of container, M_c [g]	16.76	15.32
Mass of water, M_w [g]	1.48	1.62
Mass of dry soil, M_{ds} [g]	6.2	6.81
Water content, w [%]	23.87	23.79

Date: 2023-09-28 Time: 16:30

Tested by: -

Notes:

$PL=PL_1+PL_2$

PL = 23.8

Results

LL	PL	PI	Fines as
61	24	37	CH

Atterberg Limits - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	9 [m]
Location:	Location	USCS:	GM
Code:	Project code	Sample:	Undisturbed

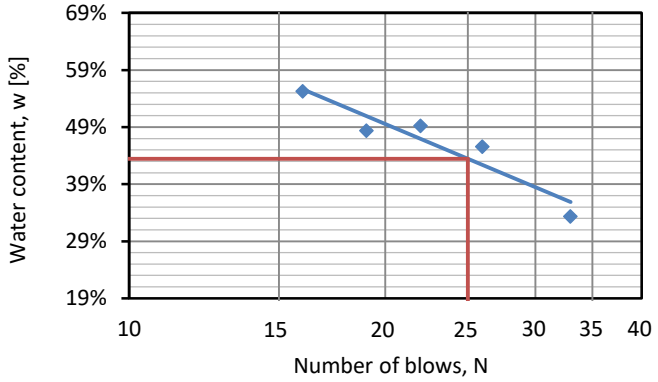
Liquid limit test (LL)

Multipoint method | One-point method

☐ Liquid limit test could not be performed.

	No.01	No.02	No.03	No.04	No.05
Number of blows, N	33	26	22	19	16
Container No.	No. 06	No. 07	No. 08	No. 09	No. 10
Mass of container + moist soil, M_{cms} [g]	33.2	32.6	38	36.9	36.8
Mass of container + dry soil, M_{cds} [g]	28.8	28.5	31.7	31.1	30.5
Mass of container, M_c [g]	15.6	19.5	18.9	19.1	19.1
Mass of water, Mw [g]	4.4	4.1	6.3	5.8	6.3
Mass of dry soil, Mds [g]	13.2	9	12.8	12	11.4
Water content, w [%]	33.33	45.56	49.22	48.33	55.26

No.01	No.02



$LL_n=W_n.(N/25)^{0.121}$

$LL=(LL_1+LL_2)/2$

LL = 43.4

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Plastic limit test (PL)

☐ Plastic limit test could not be performed.

	No.01	No.02
Container No.	No. 11	No. 12
Mass of container + moist soil, M_{cms} [g]	24.7	28.1
Mass of container + dry soil, M_{cds} [g]	22.4	25.8
Mass of container, M_c [g]	14.9	17.2
Mass of water, M_w [g]	2.3	2.3
Mass of dry soil, M_{ds} [g]	7.5	8.6
Water content, w [%]	30.67	26.74

Date: 2023-09-28 Time: 16:30

Tested by: -

Notes:

$PL=PL_1+PL_2$

PL = 28.7

Results

LL	PL	PI	Fines as
43	29	14	ML

Atterberg Limits - Test Data

Project:	Sample	BH/TP:	TP-01
Client:	Client	Depth:	14 [m]
Location:	Location	USCS:	MH
Code:	Project code	Sample:	Undisturbed

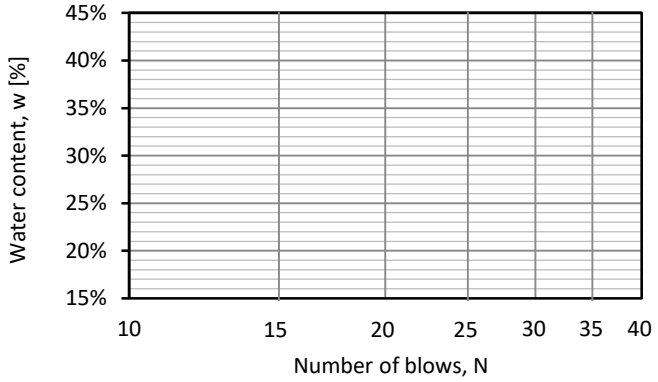
Liquid limit test (LL)

Multipoint method | One-point method

☐ Liquid limit test could not be performed.

	No.01	No.02	No.03	No.04	No.05
Number of blows, N					
Container No.					
Mass of container + moist soil, M_{cms} [g]					
Mass of container + dry soil, M_{cds} [g]					
Mass of container, M_c [g]					
Mass of water, Mw [g]					
Mass of dry soil, Mds [g]					
Water content, w [%]					

No.01	No.02
26	24
No. 13	No. 14
36	40.2
28.3	29.5
17.8	15.1
7.7	10.7
10.5	14.4
73.33	74.31



$LL_n=W_n.(N/25)^{0.121}$

$LL=(LL_1+LL_2)/2$

LL = 73.8

Date: 2023-09-28 Time: 16:30 Tested by: -

Notes:

Plastic limit test (PL)

☐ Plastic limit test could not be performed.

	No.01	No.02
Container No.	No. 15	No. 16
Mass of container + moist soil, M_{cms} [g]	30.4	27.9
Mass of container + dry soil, M_{cds} [g]	25.6	24.8
Mass of container, M_c [g]	16.9	18.9
Mass of water, M_w [g]	4.8	3.1
Mass of dry soil, M_{ds} [g]	8.7	5.9
Water content, w [%]	55.17	52.54

Date: 2023-09-28 Time: 16:30

Tested by: -

Notes:

$PL=PL_1+PL_2$

PL = 53.9

Results

LL	PL	PI	Fines as
74	54	20	MH